DOCKETED

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DR QUALIFYING CAPACITY PROPOSALS LOLP-WEIGHTED LOAD IMPACTS AND NET LOAD ELCC PROXY

(DSA, PG&E, SCE, SDG&E, AND CLECA)

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APRIL 28, 2022

MAIN OBJECTIVES

1 Incorporate DR characteristics and use limitations into QC in a simple, transparent, and open source manner

2 Produce estimates of DR capability that align with system peak days and slice of day resource adequacy framework

3 Account for interactive effects of supply mix (and other DR resources)

5 Accurate measurement of reduction delivered and resource capability

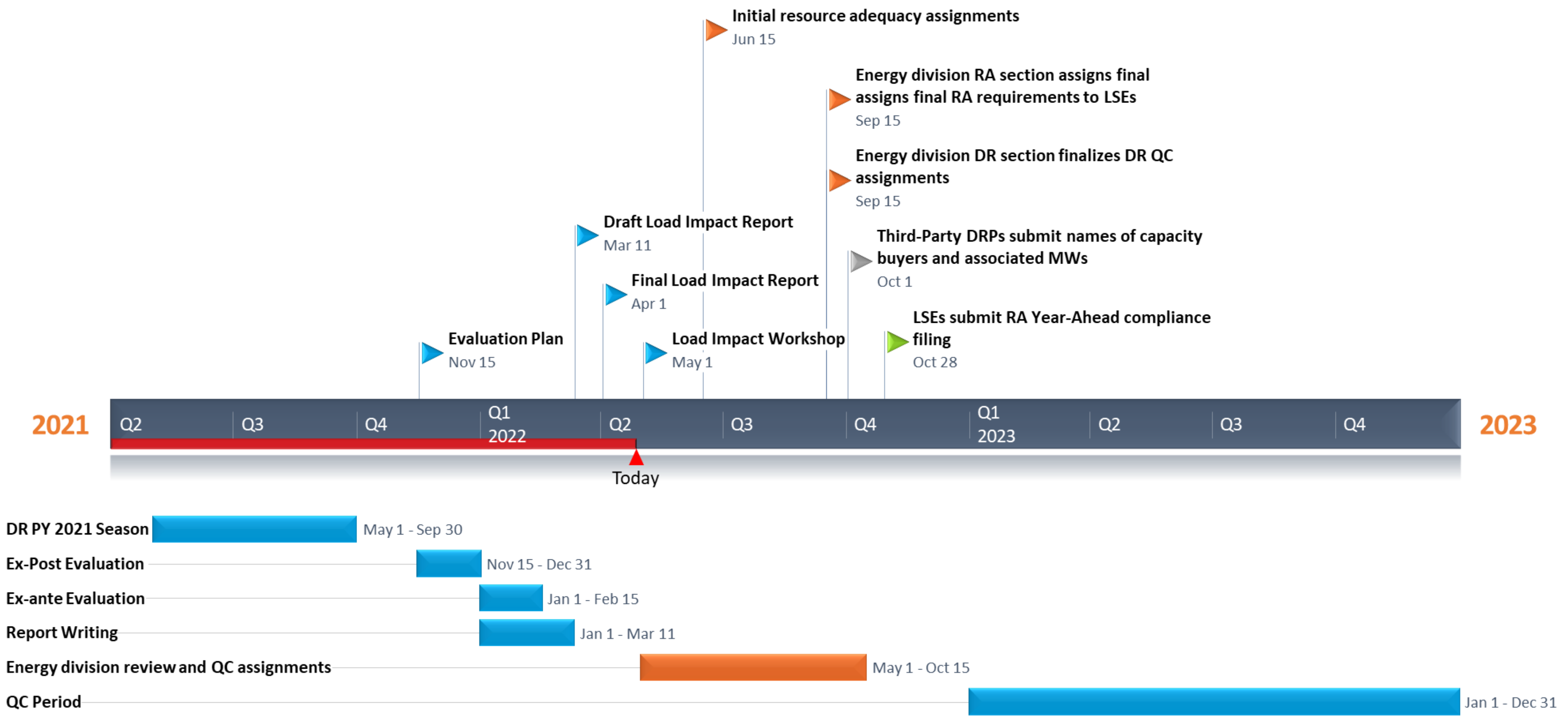
6 Enable both year-ahead RA planning and long-term planning

7 Develop a framework that accounts for the unique characteristics of each resource

CAVEATS

- The team met multiple times over the past weeks to formulate workable solutions, based on some common principles.
- The group is still discussing and working out the details to find common ground.
- The proposal is preliminary and not final.
- Each organization will determine whether to support the proposal after additional discussions.
- Due to complexity of the topic, we requested a revised deadline to submit draft proposals, but have yet to receive a response with a decision.
- While we are open to improving the annual RA process for QC determination, we did not have enough time to address this topic in full. Changing the RAQC timeline and process affects resources other than DR, and should be done with caution.
- We are open to improving and simplifying the Load Impact Protocols – the document that outlines evaluation requirements. Due to its technical nature, we recommend avoiding major changes to them as part of this effort and limiting any changes to modifying outputs so they can be used for RAQC.

CURRENT DR QC TIMELINE



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CHALLENGES WITH CURRENT PROCESS

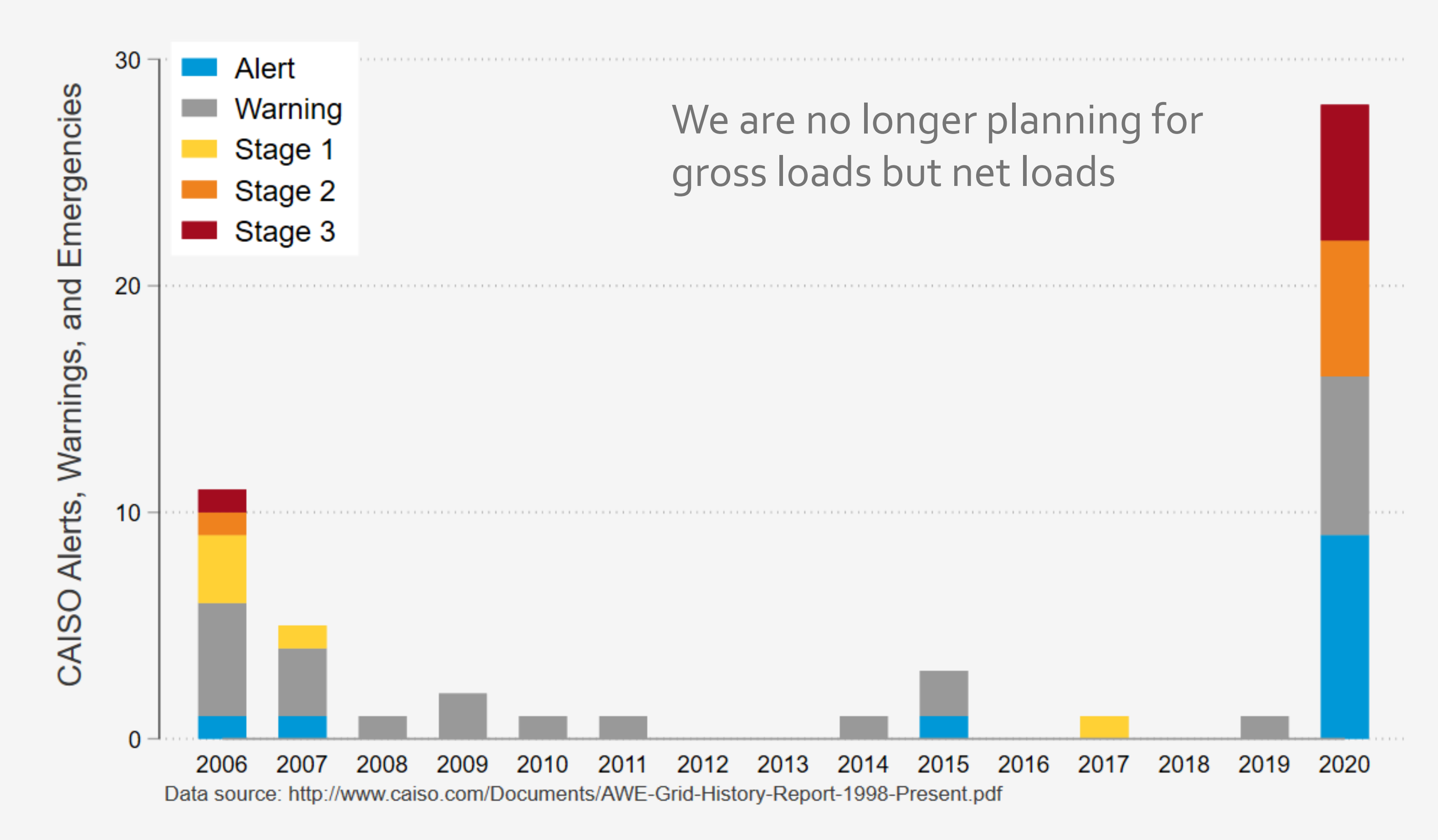
Issue	Explanation
The QC values do not account for hourly patterns of DR	The current approach produces a single value per month, which is the simple average hourly load impacts from 4-9 PM. It does not reflect the hourly load reduction capability. It also does not reflect the flexibility of some resources (e.g., the ability to dispatch them between 12 PM and 11 PM) or the ability to deliver reductions for longer than five hours.
The QC values do not fully account for the characteristics and use limitations of DR	The approach does not account well for weather-sensitive programs that can deliver larger reductions when it is hotter and resources are needed most. It also does not fully account for the use limitations of DR such as limits on max event duration, consecutive event days, and annual number of event hours. The limitations are accounted for indirectly via minimum requirements.
Timeline lag	The DR QC values for 2023 rely on the load impact evaluation for 2021, a nearly two-year lag. Moreover, the capability is based on enrollment forecasts that are not updated, as better information (i.e., weather) becomes available

LIMITATIONS OF USING LOLP MODELS FOR RA QC

Issue	Explanation
Complexity	The models requires extensive expertise and training to operate and include a lot of assumptions about how resources operate and the future supply mix.
Lack of transparency and cost	The software used is not always public and it is costly. The public software typically costs over a $100k to access. Moreover, the input assumptions are not all public. DR providers cannot be expected to replicate the analysis to understand if and why a resource received the QC value assigned to it.
Inconsistency	LOLP models are designed to estimate the portfolio ELCC, which includes the entire supply mix. They are not designed to produce ELCC values for individual resources. In fact, they produce inconsistent results when applied to individual resources. The sum of the individual resources does not add up to the Portfolio ELCC.
Impracticality with QC Timeline	The time, effort, expertise, and complexity of running LOLP models to estimate ELCC make it impractical to introduce this step into a QC timeline that is already overly complex and overly long

1) BACKGROUND AND CONTEXT

WHILE RESOURCE SHORTAGES ARE UNCOMMON, CALIFORNIA EXPERIENCED A LARGE NUMBER OF EMERGENCY EVENTS IN 2020



Stage 1 Emergency — Contingency Reserve shortfalls exist or forecast to occur.

Strong need for conservation.

Stage 2 Emergency — The ISO has taken all mitigating actions and is no longer able to provide its expected energy requirements.

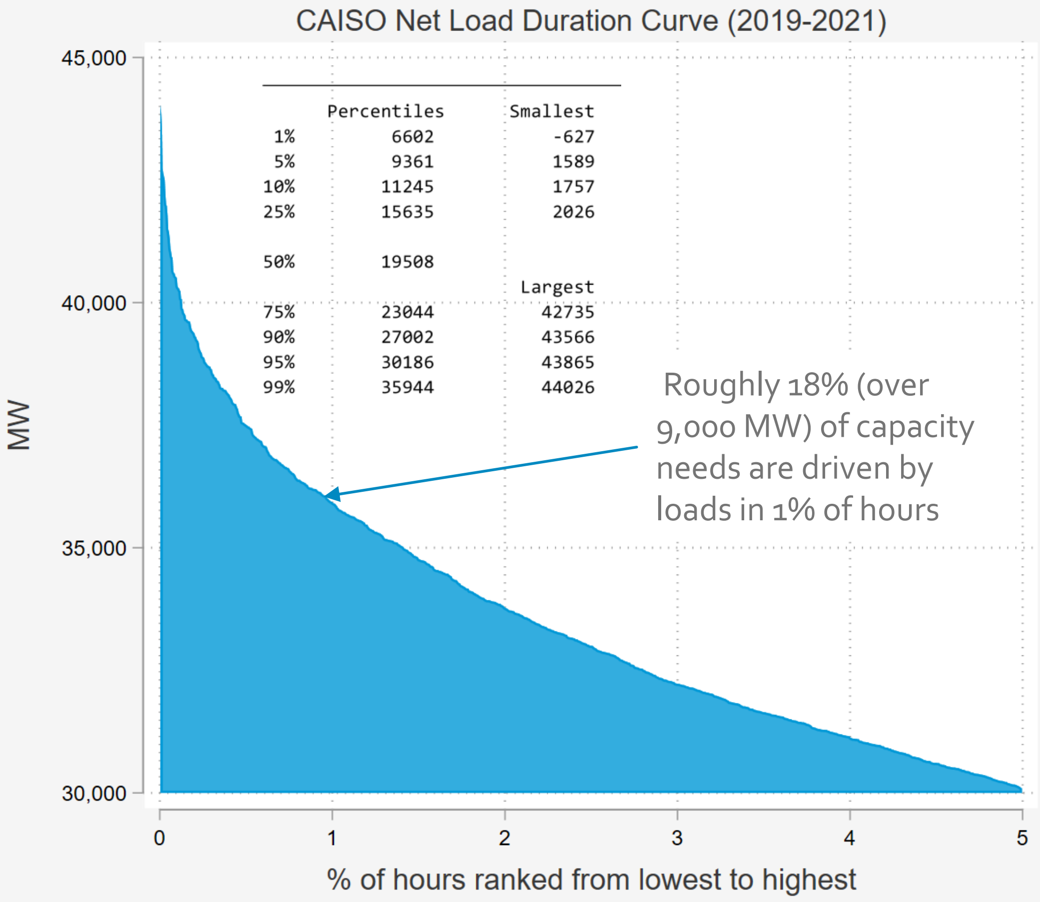
Requires ISO intervention in the market, such as ordering power plants online.

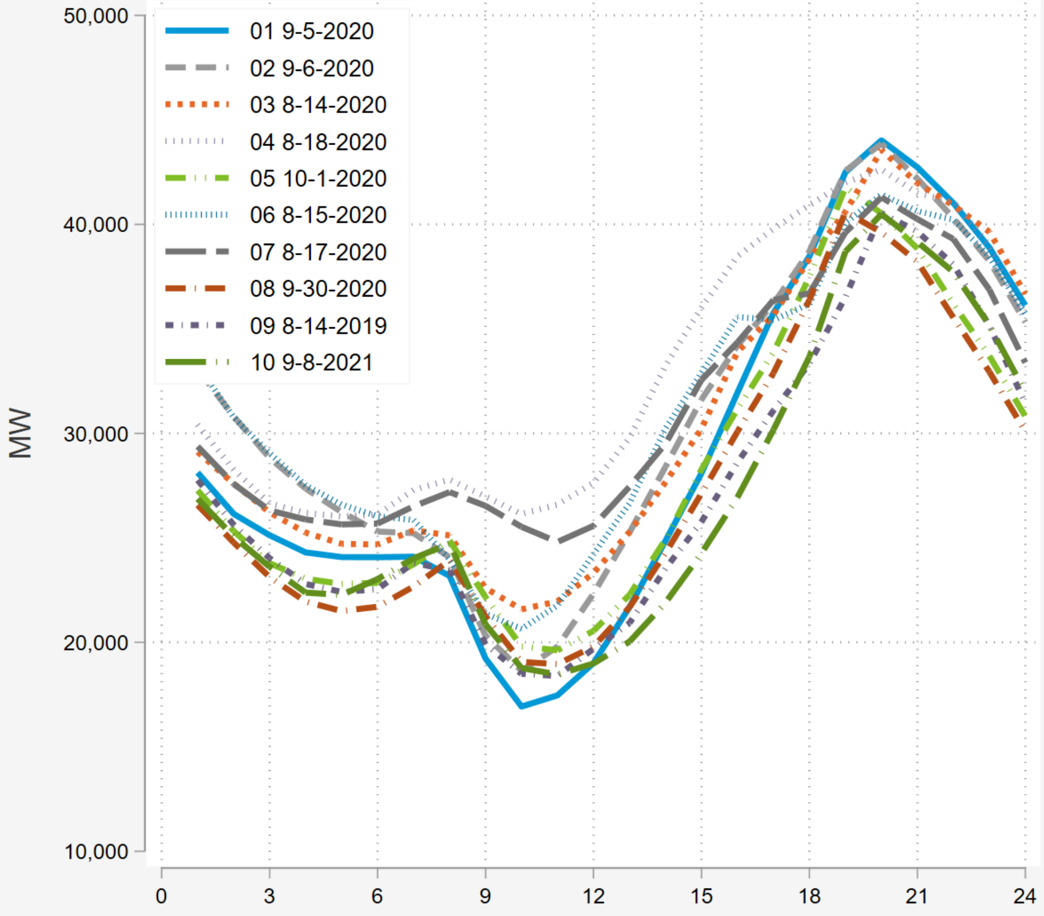
Stage 3 Emergency — The ISO is unable to meet minimum contigency reserve requirements, and load interruption is imminent or in progress.

Notice issued to utilities of potential electricity interruptions.

SOURCE: http://www.caiso.com/Documents/SystemAlertsWarningsandEmergenciesFactSheet.pdf

PEAK LOADS ARE HIGHLY CONCENTRATED AND RISK OF DUE TO CAPACITY SHORTAGES IS LIMITED TO HIGH NET LOAD HOURS





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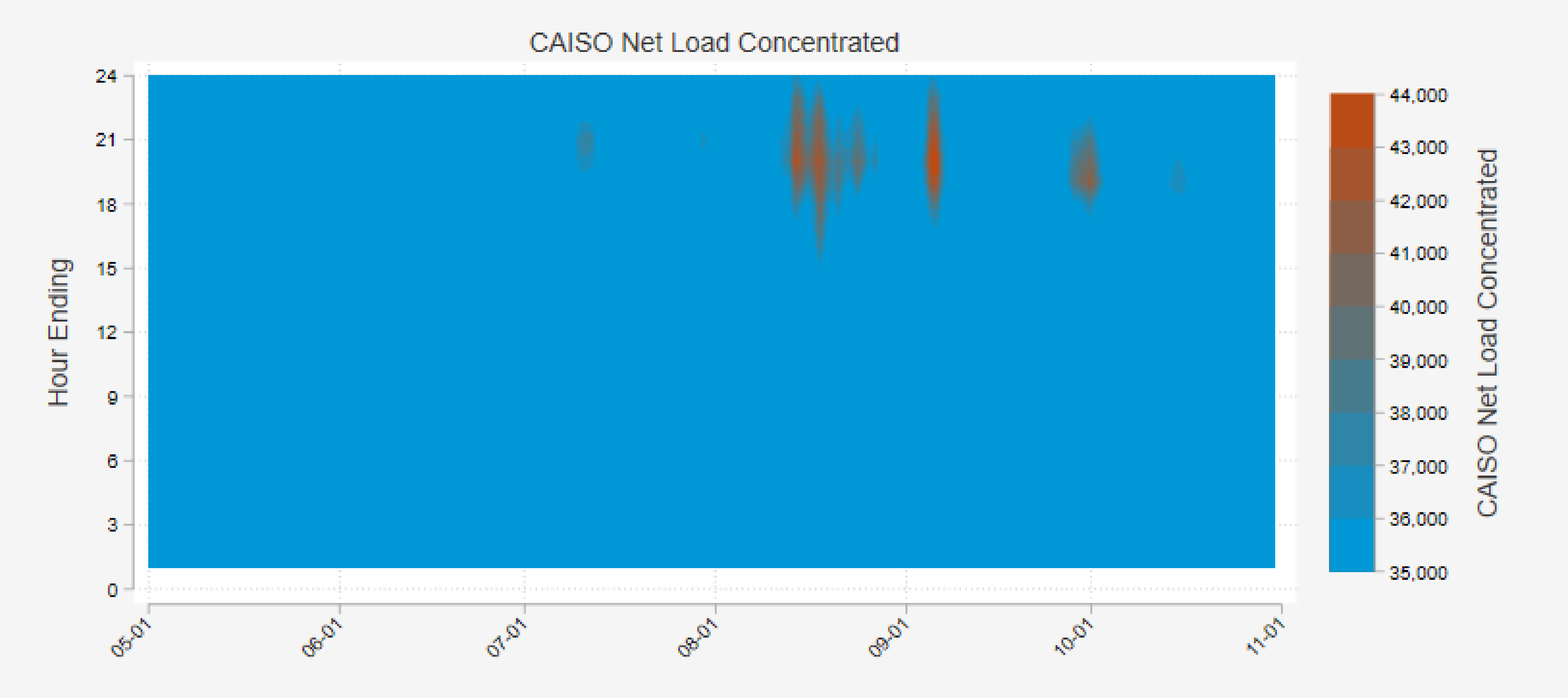
THE HIGH LOAD HOURS ARE HIGHLY CONCENTRATED IN SPECIFIC HOURS AND DRIVEN BY HEAT WAVES



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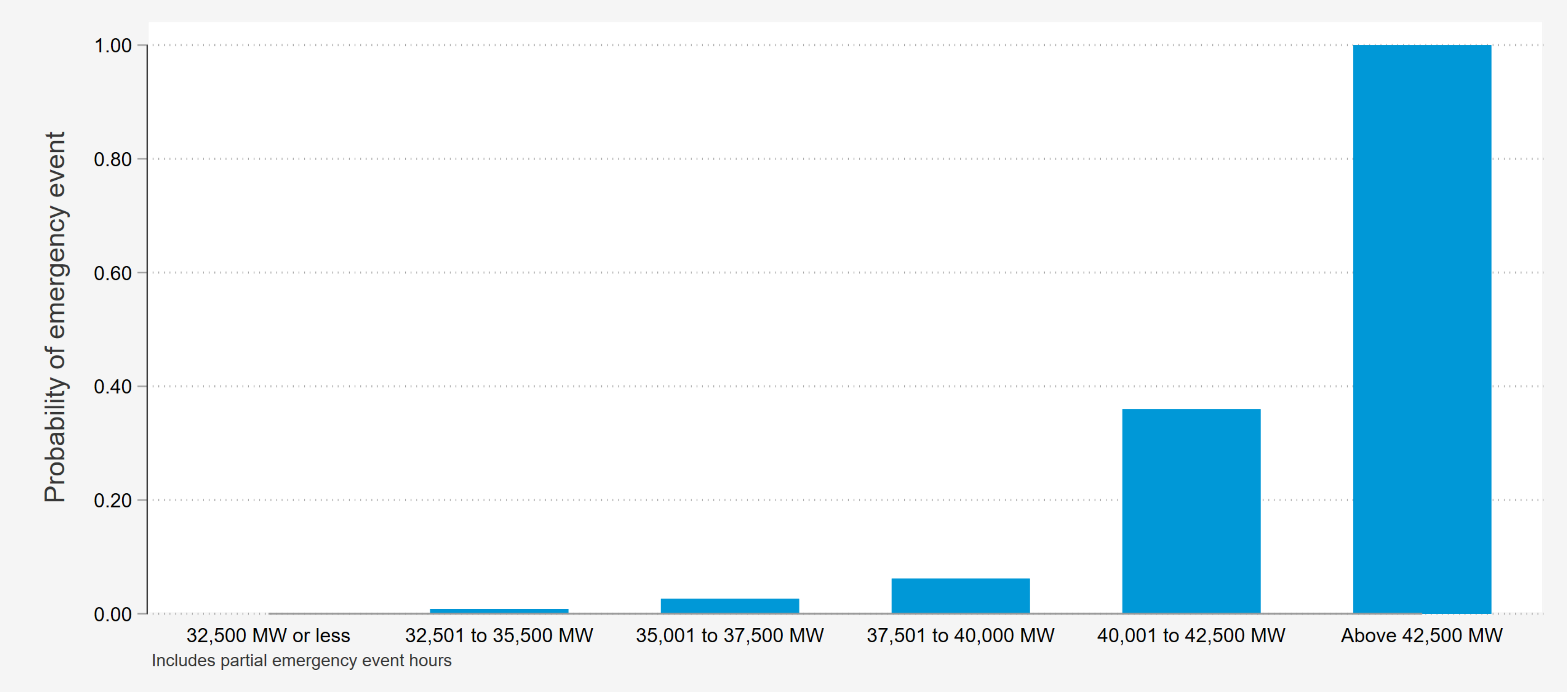
THE EMPIRICAL DATA SHOWS THAT NET LOADS ARE CLOSELY RELATED TO CAISO EMERGENCIES (INDICATING SHORTAGES)



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HOW MUCH A RESOURCE CONTRIBUTES TO RELIABILITY DEPENDS ON ITS CHARACTERISTICS AND HOW WELL IT COINCIDES WITH THE NEED FOR RESOURCES

KEY QUESTION	CONSTRAINT	DEFINITION
Is the DER tied to a specific load shape?	Load profile	Structural shape of load reductions deliverable by a resource. For example, energy efficiency will deliver loads aligned with underlying consumption patterns (e.g., lighting or HVAC); solar PV will deliver loads varying by time of day, peaking in early afternoon; batteries of fuel based generation have no such limits.
	Seasonal availability	Availability year round versus summer only.
Is the resource flexible?	Availability window (start and end hours)	Hours of the day during which the resource is available. May be longer than the duration category. If duration category is shorter than the availability window, optimal window is used (e.g., the window with the most peak load).
	Ramp speed	Length of time it takes for resource to achieve maximum load reduction.
	Dispatch delay	Advance notice which must be given for resource to be dispatched.
Are there specific operating constraints?	Dispatch duration	Maximum number of consecutive hours during which a resource is able to deliver load reduction. May be limited by technology constraints (battery discharge time) or program limits (demand response event window).
	Max dispatch hours per year	Limit to total number of dispatchable hours in a year.
	Max events per year	Limit to total number of dispatch events (days) in a year.
	Max consecutive	Limit to total number of consecutive dispatch events (days) in a year.
	Events per year	(Days) in a year.

Source: Bode, Lemarchand and Schellenberg (2015). Addressing the Locational Valuation Challenge for Distributed Energy Resources. Available at: https://sepapower.org/resource/beyond-the-meter-addressing-the-locational-valuation-challenge-for-distributed-energy-resources/

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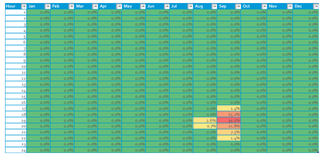
2) LOLE WEIGHTED LOAD IMPACTS + MINIMUMS

KEY STEPS

DEFINE MINIMUMS FOR LIMITED RESOURCES

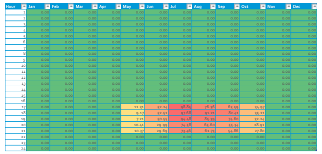
- Threshold for availability (Net Load)
- Consecutive day availability
- Annual max hours

1. Allocate LOLP (without DR resources) to months and hours

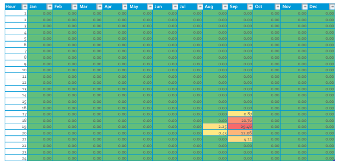


2. Use the LOLP to develop a risk allocation that adds up to 100%

3. Produce DR resource capability hour for monthly peaks



3. Multiply the LOLP by the DR resources capability by month and hour



4. Sum for LOLP weighted DR to produce the LOLP-weighted DR MW

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STEP 1: PRODUCE AN LOLP TABLE BY MONTH AND HOUR

LOLP 2023 (Produced in 2021-22)

Hour	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	-	-	-	-	-	-	-	-	-	-	-	-
2	-	-	-	-	-	-	-	-	-	-	-	-
3	-	-	-	-	-	-	-	-	-	-	-	-
4	-	-	-	-	-	-	-	-	-	-	-	-
5	-	-	-	-	-	-	-	-	-	-	-	-
6	-	-	-	-	-	-	-	-	-	-	-	-
7	-	-	-	-	-	-	-	-	-	-	-	-
8	-	-	-	-	-	-	-	-	-	-	-	-
9	-	-	-	-	-	-	-	-	-	-	-	-
10	-	-	-	-	-	-	-	-	-	-	-	-
11	-	-	-	-	-	-	-	-	-	-	-	-
12	-	-	-	-	-	-	-	-	-	-	-	-
13	-	-	-	-	-	-	-	-	-	-	-	-
14	-	-	-	-	-	-	-	-	-	-	-	-
15	-	-	-	-	-	-	-	-	-	-	-	-
16	-	-	-	-	-	-	-	-	-	-	-	-
17	-	-	-	-	-	-	-	-	0.000098	-	-	-
18	-	-	-	-	-	-	-	-	0.001814	-	-	-
19	-	-	-	-	-	-	-	0.000190	0.002843	-	-	-
20	-	-	-	-	-	-	-	0.000047	0.001569	-	-	-
21	-	-	-	-	-	-	-	-	0.000539	-	-	-
22	-	-	-	-	-	-	-	-	0.000098	-	-	-
23	-	-	-	-	-	-	-	-	-	-	-	-
24	-	-	-	-	-	-	-	-	-	-	-	-

TOTAL LOLP 0.007198

STEP 2: USE THE LOLP TO DEVELOP A RISK ALLOCATION

Relative LOLP - Adds up to 100%

Hour	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
2	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
4	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
5	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
6	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
7	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
8	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
9	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
10	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
11	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
12	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
13	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
14	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
15	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
16	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
17	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.4%	0.0%	0.0%	0.0%
18	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	25.2%	0.0%	0.0%	0.0%
19	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	2.6%	39.5%	0.0%	0.0%	0.0%
20	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.7%	21.8%	0.0%	0.0%	0.0%
21	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	7.5%	0.0%	0.0%	0.0%
22	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.4%	0.0%	0.0%	0.0%
23	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
24	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

TOTAL Relative LOLP 100%

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STEP 3: PRODUCE LOAD REDUCTION CAPABILITY BY MONTH, HOUR

Hourly Load Impacts on Monthly Peak Day (MW)

Hour	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
17	0.00	0.00	0.00	0.00	12.31	34.97	52.24	98.85	76.36	63.59	0.00	0.00
18	0.00	0.00	0.00	0.00	9.17	35.21	52.52	97.68	91.21	82.41	0.00	0.00
19	0.00	0.00	0.00	0.00	7.21	32.24	50.55	94.48	85.39	74.60	0.00	0.00
20	0.00	0.00	0.00	0.00	10.41	28.92	29.99	74.58	65.60	55.34	0.00	0.00
21	0.00	0.00	0.00	0.00	10.37	27.80	29.69	73.46	62.75	54.86	0.00	0.00
22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

STEPS 4 AND 5: MULITPLE THE LOAD IMPACTS BY THE LOLP WEIGHTS AND SUM UP – PRODUCES A LOLP WEIGHTED MW

Interim Step for LOLP weighted load impact (Step 2 table x Step 3 table)

Hour	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.04	0.00	0.00	0.00
18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	22.98	0.00	0.00	0.00
19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.49	33.73	0.00	0.00	0.00
20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.49	14.29	0.00	0.00	0.00
21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.70	0.00	0.00	0.00
22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

LOLP Weighted Load Impact 79.73

LOLP weighted Load Impact = 79.73

SOME IMPORTANT NUANCES

- The LOLP values are produced in advance but model the resource adequacy year(s) in question.
- We recommend the LOLP heatmap be based on modeling that removes DR resources, so they better reflect the hours and months when DR resources are needed most.
- DR providers will need to complete a table specifying the magnitude and availability of their DR resource(s) by month and hour. The table should incorporate any maximum event duration limitations for the resource.
- DR providers with less than 10 MW and less than three years of operations in the California market are exempt from paying for load impact evaluations. The DRMEC will commission a study to independently evaluate new entry resources and estimate realization rates. Total resources exempted cannot exceed 10% of the total California DR portfolio.
- A set of minimum requirements needs to be established for other factors that limit use of DR. Any requirements need to reasonable and to avoid being overly broad. They also will need to be updated as additional solar, wind, and battery storage come online. In specific, we recommend:
  - A threshold for availability, ideally based on net loads.
  - Availability for a minimum number of event days.
  - Availability for a minimum number of annual event hours.
  - The LOLP outputs and minimum requirement would need to be updated every other year.
- The ex-ante load impact protocols should be updated for net load peaking conditions (versus gross demand), and updated to include the reduction capability for weekdays and weekends.

ALIGNMENT WITH PRINCIPLES

	Principle	How the proposal meets the principle
1	Transparent and understandable	The approach does not rely on behind-the-scenes calculations and models that are unavailable to parties. The math required is the basic mathematical functions of multiplication and addition.
2	Based on the best available information regarding resource capabilities, including recent historical performance and participant enrollment and composition projections	The approach incorporates the most recent historical performance. It also provides DR providers the ability to update the values the reflect the most recent enrollments.
3	Allow DR providers to quickly determine or update QC values.	The DR providers can update the QC values quickly under the approach.
4	Consistent and compatible with the resource adequacy program a. Single-value RA program (status quo) b. Twenty-four-slice proposal (SCE) c. Two-slice proposal (Gridwell)	The approach is consistent with all three resource adequacy options. It can produce a single value, the load impact table by month and hour can be directly employed in the 24-hour slice of day proposal. Because the approach relies on the LOLP models to produce the LOLP heat map, it is consistent with the two-slice approach. The only difference is that we request the project LOLP values as an input into the process.

ALIGNMENT WITH PRINCIPLES

	Principle	How the proposal meets the principle
5	Account for any use limitations, availability limitations, and variability in output of DR resources	The approach directly accounts for availability limitations by month hour, availability by net load peaking level, coincidence of DR with need, and limitations of consecutive event days, and annual event hours.
6	Translate a DR resource's load reduction capabilities into its reliability value.	The approach produces the DR reliability value by accounting for the coincidence of the resource with the risk of resource shortages. Resource availability during hours that coincide with the highest risk of shortages are weighted more heavily.
7	Include methods to determine delivered capacity (ex-post) that are compatible with the determination of QC (ex-ante)	The approach makes use of the existing DR load impact evaluation protocols, which require standardized reporting of performance during actual events (ex-post impacts) and require the standardized reporting of hourly demand reduction capability for standardized monthly system peak days conditions (ex-ante impacts). Moreover, the existing evaluation protocols require that, whenever possible, ex ante estimates of DR impacts should be informed by ex post empirical evidence from existing or prior DR resource options.
8	Not a substantial barrier to participation in the RA program.	The approach reduces and removes barriers to participation in the resource adequacy program
9	Account for a resource's capacity when reliability needs are highest	The approach accounts for capacity for monthly system peak days and the high net load periods when reliability needs are highest.

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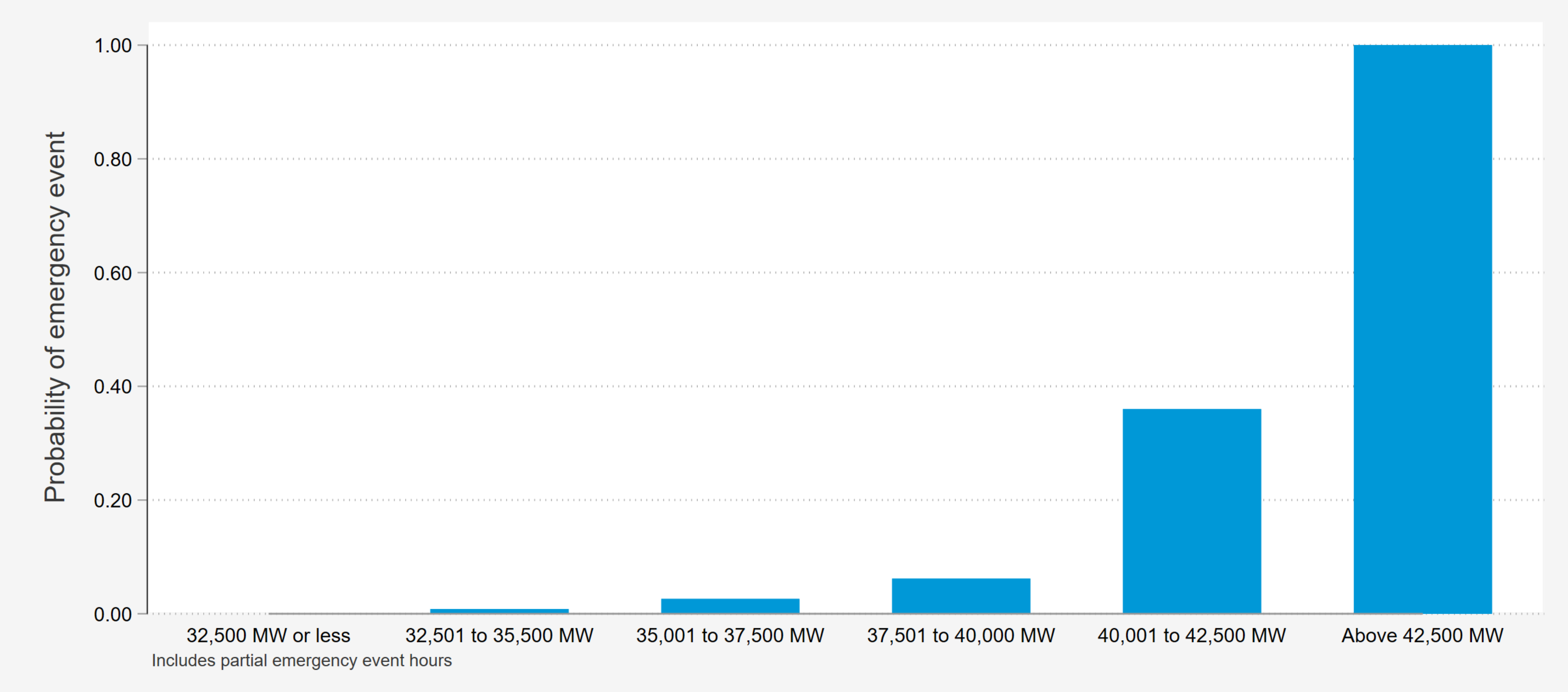
2) NET LOADS ELCC PROXY

- Granular load impacts weighted by risk allocation
- More detailed modeling of DR constraints
- More insight into how factors affect qualifying capacity

THE EMPIRICAL DATA SHOWS THAT NET LOADS ARE CLOSELY RELATED TO CAISO EMERGENCIES (INDICATING SHORTAGES)



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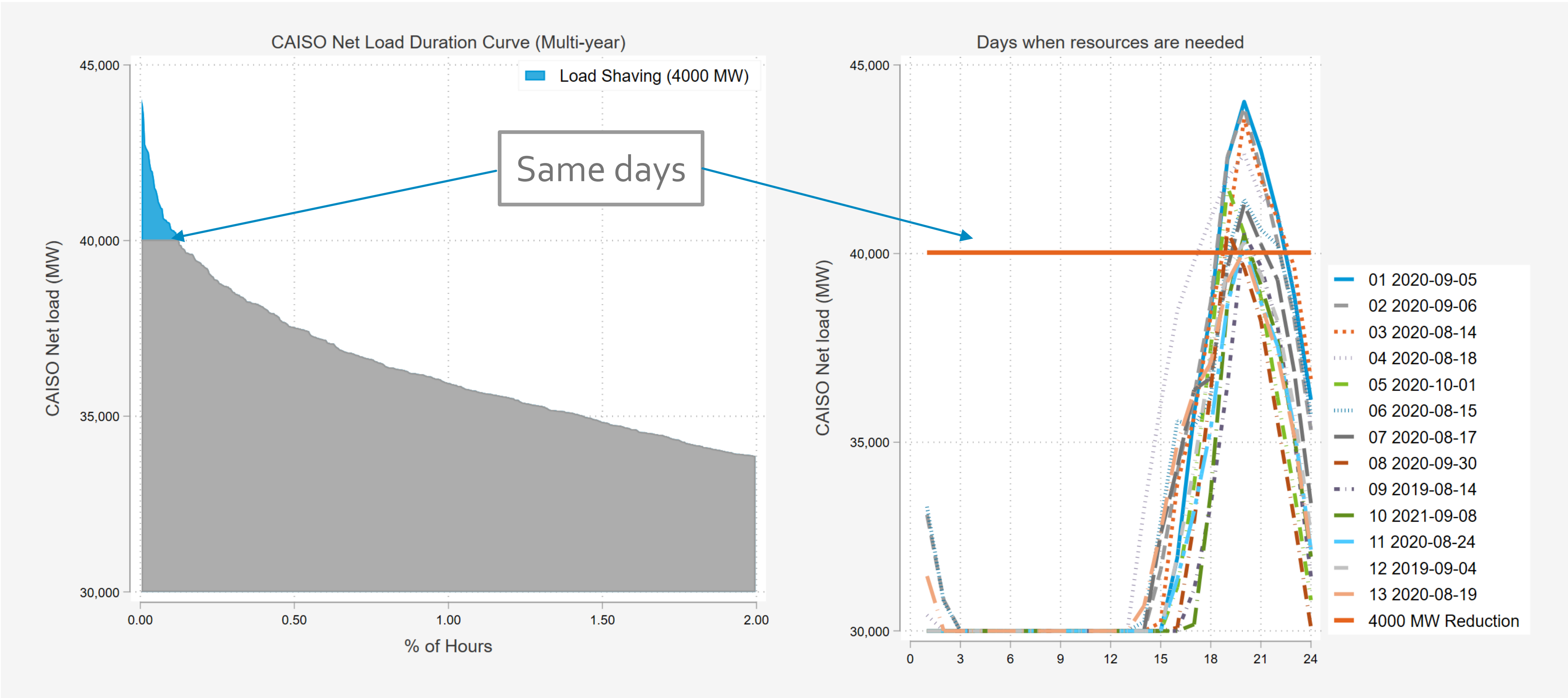
DR AND BATTERY STORAGE ARE USE LIMITED RESOURCES THAT INHERENTLY ARE BETTER SUITED FOR SHAVING PEAK LOADS



- The timing of the net load peak depends of the amount of solar and wind on the system
- More load shaving resources changes the frequency and hours of use
- Load shaving is tied to specific days and hours

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KEY STEPS

1. Collect standardized data on DR resources

2. Create risk allocation using historical net loads

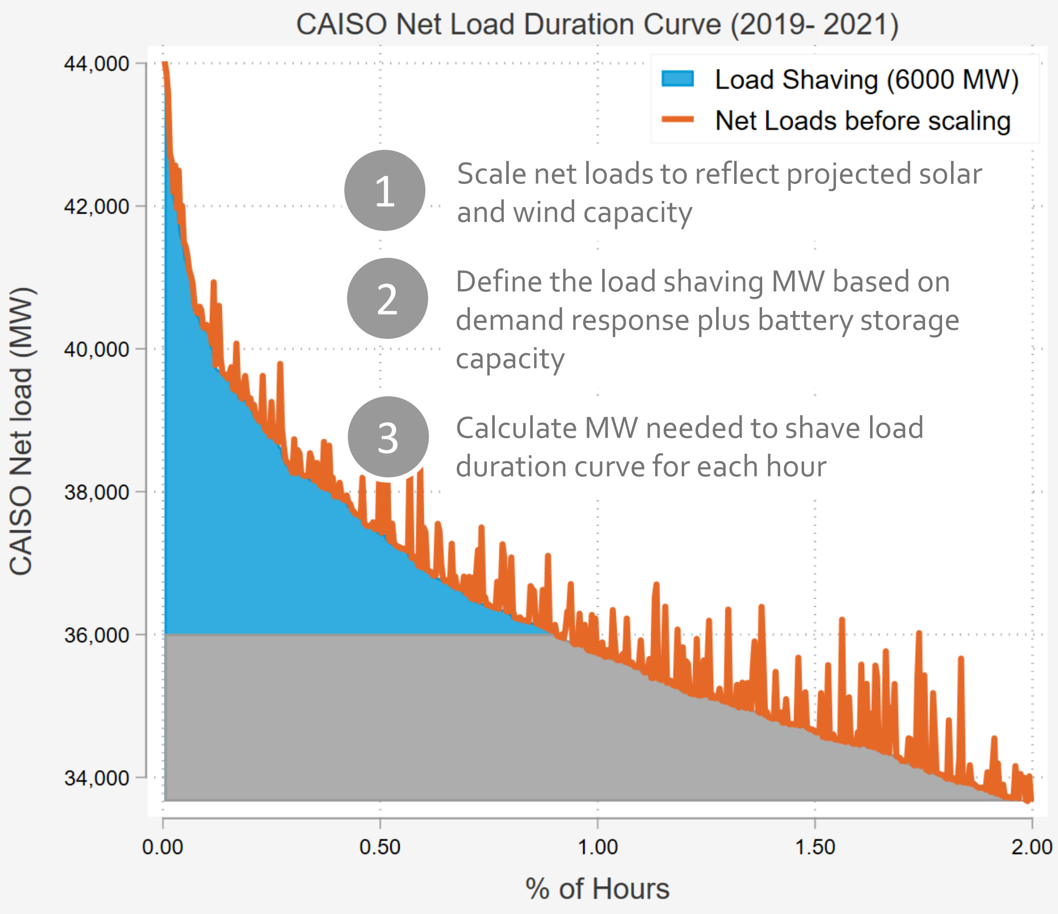
3. Apply DR resource constraints

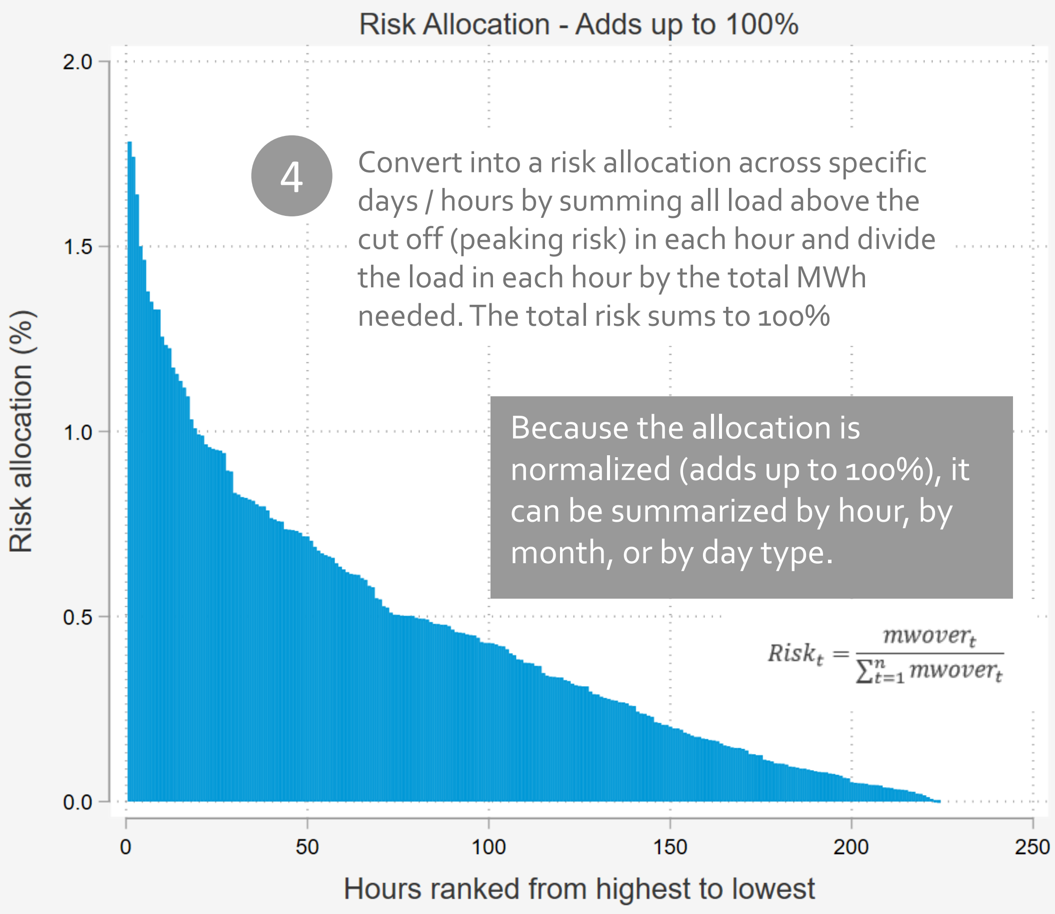
4. Calculate unadjusted ELCC (MW weighted by risk allocation)

STEP 1: COLLECT STANDARDIZED DATA ON DR RESOURCES

Component	Weather Sensitive Resources	Non-Weather Sensitive Resources
Load reduction capability (MW)	Table by hour of day and average daily temperature bins	Table by hour of day and month
Monthly and hourly availability	Table by month and hour indicating availability Net load threshold above which resource is available	Defined by load reduction table Net load threshold above which resource is available
Dispatch constraints	Max event duration Max number of consecutive event days Max annual hours	Max event duration Max number of consecutive event days Max annual hours

STEP 2: CONVERT THE LOAD SHAVING INTO RISK ALLOCATION





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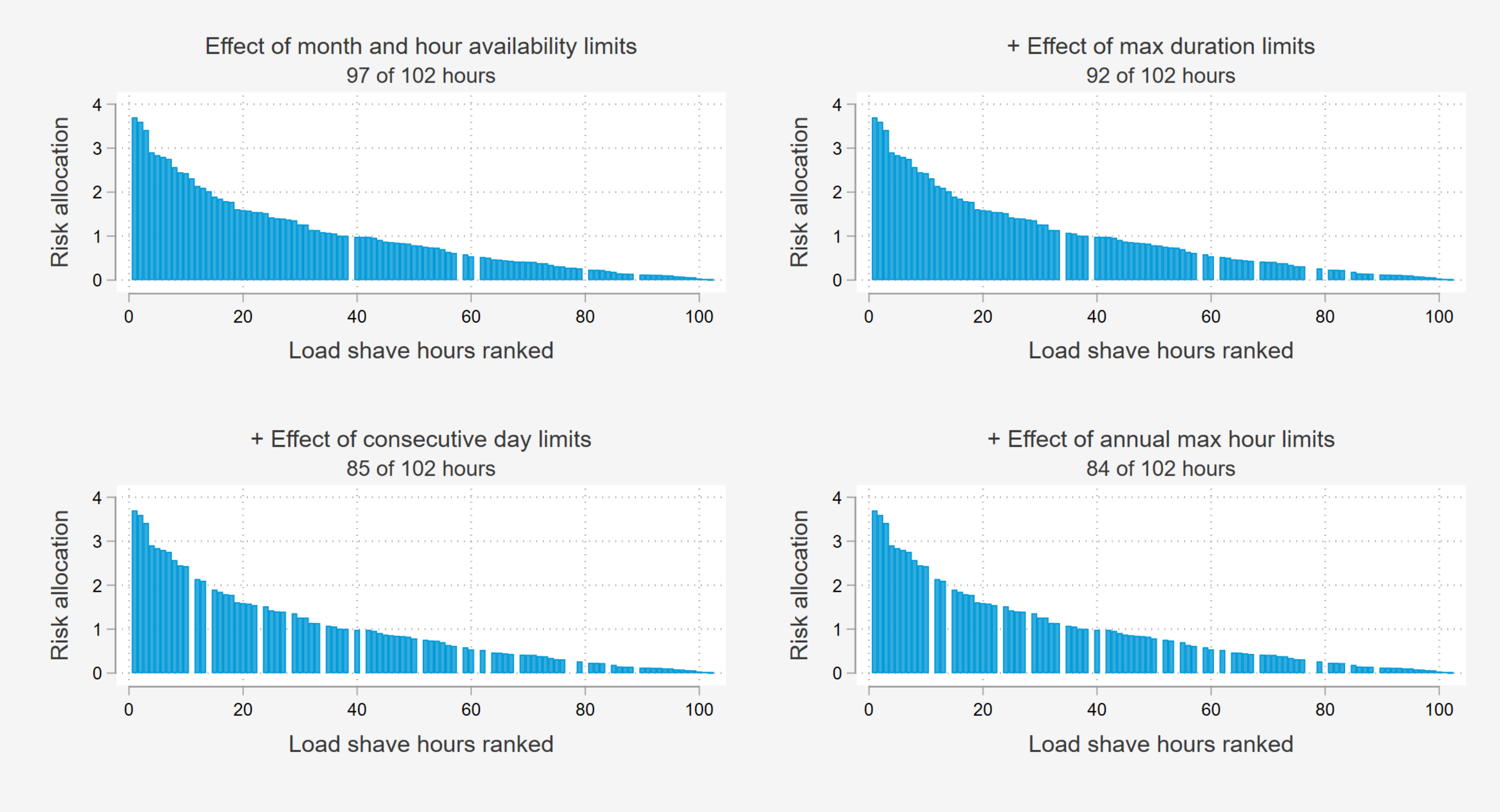
STEP 3: ASSESS THE IMPACT OF CONSTRAINTS



DR Resource characteristics

- Monthly availability: Apr-Oct
- Hourly availability: 12pm-10 pm
- Max event duration: 4 hours
- Max consecutive days: 3
- Max annual hours: 50

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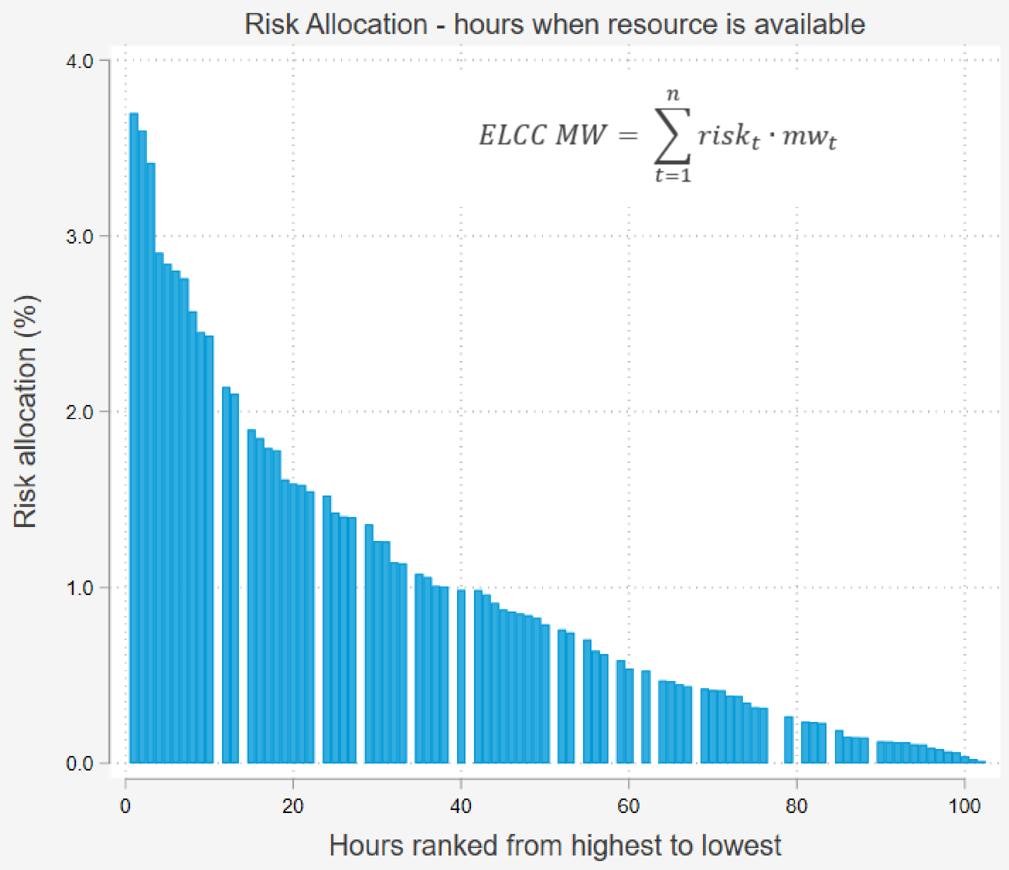
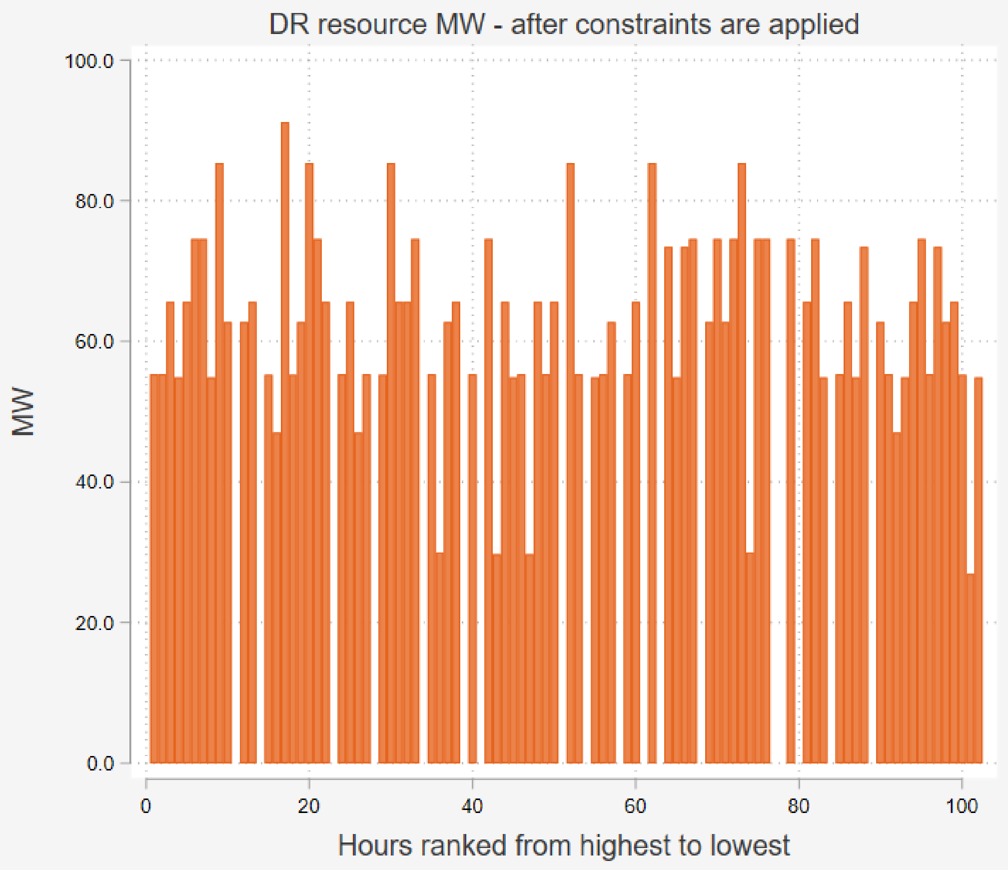
STEP 4: CALCULATE UNADJUSTED ELCC (MW WEIGHTED BY RISK ALLOCATION)





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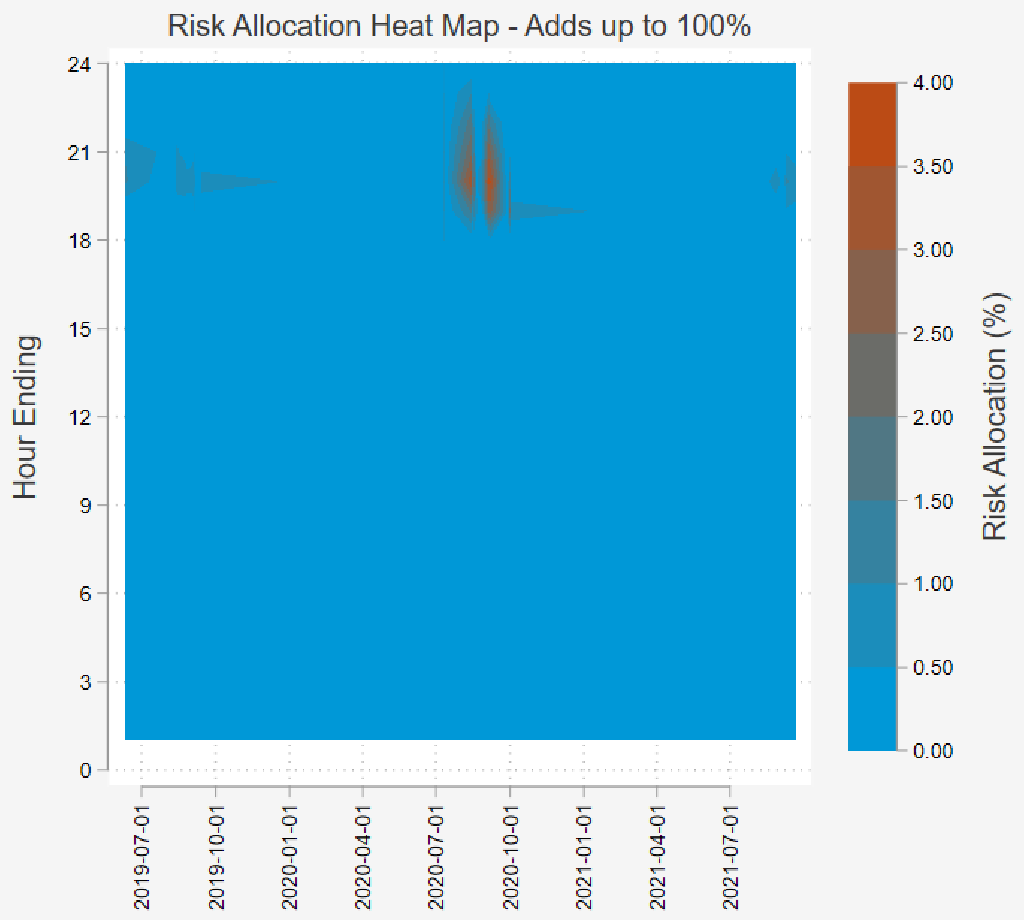
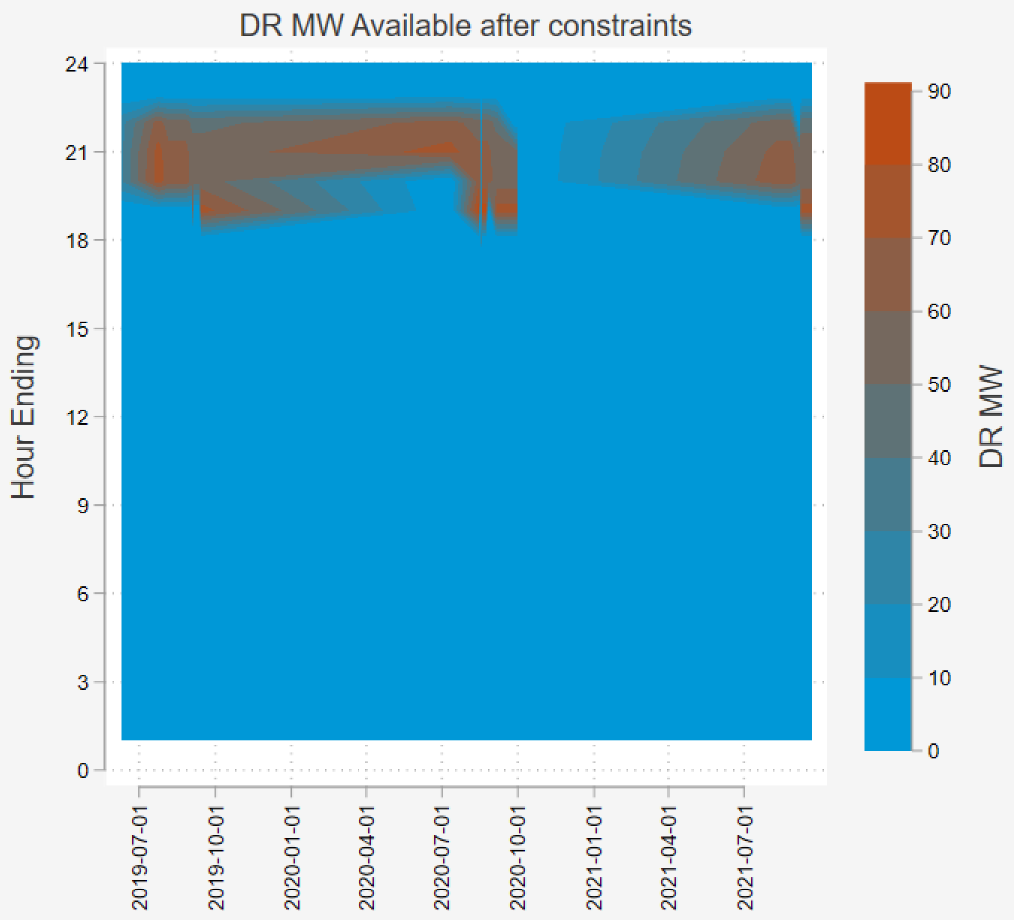
SAME DATA VIEWED AS A HEAT MAP





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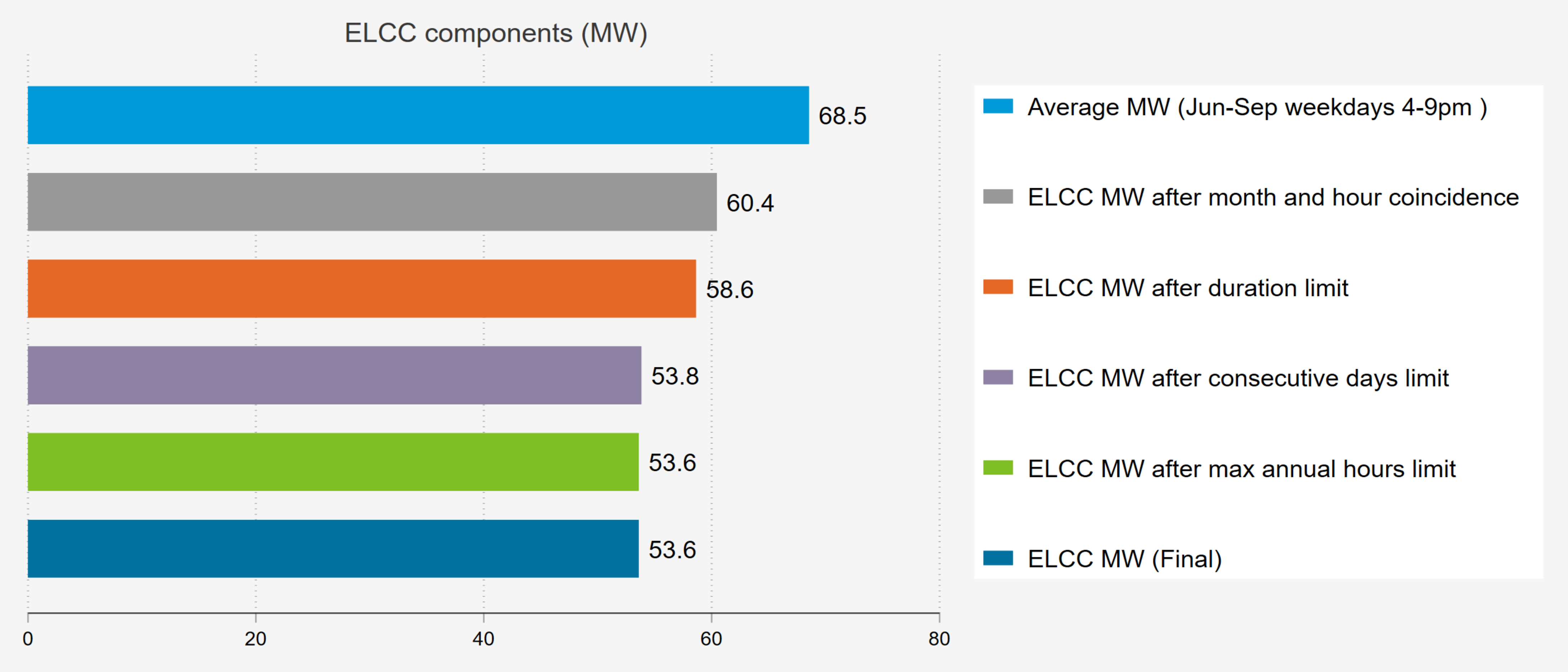
ABILITY TO UNDERSTAND THE IMPACT OF USE LIMITATIONS ON PROXY ELCC



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SENSITIVITY ANALYSIS

Load Shaving MW	Risk allocation days (over 3-year period)	Risk allocation hours (over 3-year period)
3,000	7	15
4,000	13	31
5,000	27	57
6,000	39	102
7,000	58	157
8,000	86	242

As the magnitude of load shaving resources grows, the resources will need be dispatched on more days and more hours in order to reduce or shave the demand

Load Shaving MW	Max event duration	4	4	4	6
	Max consecutive days	3	5	5	5
	Max annual hours	50	50	200	200
3,000		90.50%	90.50%	90.50%	90.50%
4,000		90.50%	90.50%	90.50%	90.50%
5,000		83.53%	87.14%	87.14%	88.14%
6,000		77.30%	79.83%	83.01%	85.34%
7,000		53.67%	48.75%	80.16%	82.75%
8,000		42.57%	44.43%	72.96%	75.01%

The use limitations interact with the amount of load shaving. As different use limitations are removed, the resources contribution to reliability increases

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ALIGNMENT WITH PRINCIPLES

	Principle	How the proposal meets the principle
1	Transparent and understandable	The approach relies on public data, open-source code, and public models. Moreover, it produces the granular outputs which allow a user to verify the calculations and understand which factors most affect the resource's contribution to reliability
2	Based on the best available information regarding resource capabilities, including recent historical performance and participant enrollment and composition projections	The approach incorporates the most recent historical performance and explicitly requires resources to define the limitations in a standardized manner.
3	Allow DR providers to quickly determine or update QC values.	The recommendation is to make the approach available in an online tool, in which case providers can quickly determine the QC values.
4	Consistent and compatible with the resource adequacy program a. Single-value RA program (status quo) b. Twenty-four-slice proposal (SCE) c. Two-slice proposal (Gridwell)	The approach is consistent with all three resource adequacy option. It can produce a single RA value, the evaluation load impact tables by month and hour can be directly employed in the 24-hour slice of day proposal. The approach can also be easily adjust to be consistent with the two-slice approach by modeling ELCC for net loads and gross loads.

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ALIGNMENT WITH PRINCIPLES

	Principle	How the proposal meets the principle
5	Account for any use limitations, availability limitations, and variability in output of DR resources	The approach directly and transparently accounts for availability limitations by month hour, coincidence of DR with need, and limitations of max event duration, consecutive event days, and annual event hours.
6	Translate a DR resource's load reduction capabilities into its reliability value.	As shown in the examples, the approach convert the load reduction capabilities into a contribution to reliability value, accounting for the resources constraint and use limitations.
7	Include methods to determine delivered capacity (ex-post) that are compatible with the determination of QC (ex-ante)	The approach makes use of the existing DR load impact evaluation protocols, which require standardized reporting of performance during actual events (ex-post impacts) and require the standardized reporting of hourly demand reduction capability for standardized monthly system peak days conditions (ex-ante impacts). The existing evaluation protocols require that, whenever possible, ex ante estimates of DR impacts should be informed by ex post empirical evidence from existing or prior DR resource options. Moreover, the approach DR providers to explicitly define availability and use limitations.
8	Not a substantial barrier to participation in the RA program.	The approach reduces and removes barriers to participation in the resource adequacy program. It reduces adding another step – use of LOLP models to estimate ELCC – that prolongs and complicates the QC process.
9	Account for a resource's capacity when reliability needs are highest	The approach accounts for capacity for monthly system peak days and the high net load periods when reliability needs are highest.

QUESTIONS?

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