Use of Load Impact Protocol Outputs Under 24-hour Slice Framework

R.21-10-002 Reform Track Workshop

September 16, 2022

California Public Utilities Commission

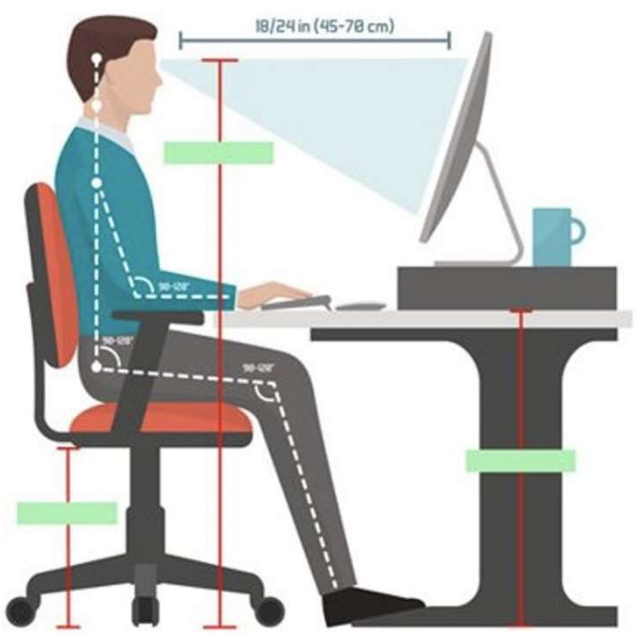
Logistics and Safety

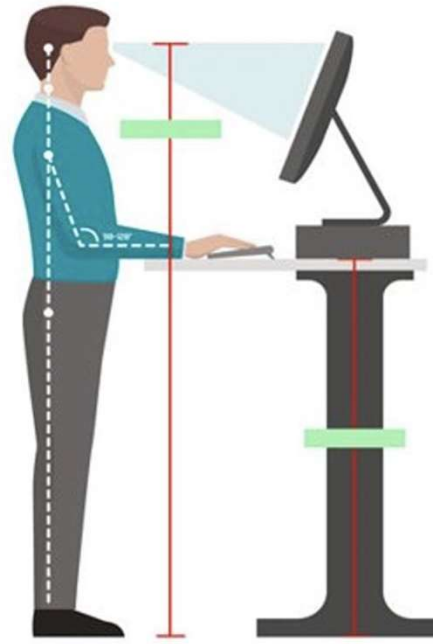
- Workshop is being recorded

- Today's presentation & recording will be uploaded onto RA history website
  - Resource Adequacy History (ca.gov)

- Facilitators (Energy Division Staff)
  - Simone Brant

- Safety
  - Note surroundings and emergency exits
  - Ergonomic check





Background

- D.22-08-039 directed parties to develop proposals for how to utilize the Load Impact Protocol outputs under the 24-hour slice framework for the 2024 test year in Workstream 2 of this proceeding
- Proposals should address:
  - The hours in which demand response resources can be shown and whether those hours must be consecutive
  - Whether the transmission and planning reserve margin adders should be applied
  - Whether or not the value of demand response resources can vary by hour
  - Whether, and if so, how, snap back effects should be accounted for

Demand Response Resource Counting for Slice-of-Day Test Year

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Background on DR Counting Methodology

- **D.22-06-050, OP 11:** "The California Energy Commission (CEC) Working Group is requested to continue to develop long-term recommendations for a new demand response (DR) qualifying capacity (QC) methodology … for consideration for the 2025 RA year."
- **D.22-06-050, OP 24:** "All use-limited resources shall be subject to a minimum four-hour daily output availability."

Background on DR Counting Methodology (cont'd)

- **D.22-08-039, OP 2**
  - "Parties shall develop proposals for how to utilize the Load Impact Protocol outputs under the 24-hour slice framework for the 2024 test year in Workstream 2 of this proceeding. Parties shall submit proposals according to the schedule* adopted in Decision 22-06-050. The proposals shall address:
    a) The hours in which demand response resources can be shown and whether those hours must be consecutive.
    b) Whether the transmission and planning reserve margin adders should be applied.
    c) Whether or not the value of demand response resources can vary by hour.
    d) Whether, and if so, how, snap back effects should be accounted for."

*D.22-06-050 OP 28: Final proposals from Workstreams 1 – 3 must be filed and served by **November 15, 2022**.

Current Counting Methodology

- **2020 Qualifying Capacity Methodology Manual:** "The monthly QC of a DR resource is the average expected (ex ante) load impact measured over certain measurement hours. The measurement hours are the same as the RA hours in Table 1."

All Months	HE17 - HE21[11] (4:00 p.m. - 9:00 p.m.)

Table 1: RA Measurement Hours

- **D.22-06-050, OP 5:** "The Resource Adequacy (RA) measurement hours are modified to 5:00-10:00 PM for March and April, and 4:00–9:00 PM for all other months. The modified RA hours shall be effective beginning in the 2023 RA compliance year."

Potential SOD Counting Methodologies for 2024

1. Variable across all hours (identical to LIP)
2. Variable but cap at average across 4 worst consecutive hours in AAH
3. Variable, any 4 hours from LIP
4. Constant, minimum of any 4 consecutive hours within AAH
   a. Derate if less than 4 hours of positive load impact
   b. 0 if less than 4 hours of positive load impact

   For Options 2-4, can use more hours if longer duration required by contract/tariff (e.g. 6 hours for BIP)

1. Variable across all hours (identical to LIP)

HE	Actual LIP results	Variable across all hours
	HE 1-12 not shown	
13	10	10
14	40	40
15	20	20
16	0	0
17	40	40
18	70	70
19	50	50
20	40	40
21	30	30
22	-20	-20
23	-15	-15
24	-10	-10

Color Key

AAH

2. Variable but cap at average across 4 worst consecutive hours in AAH

HE	Actual LIP results	Variable across all hours (shown for comparison)	Variable but cap at avg. 4 worst *consecutive* hours in AAH
	HE 1-12 not shown		
13	10	10	10
14	40	40	40
15	20	20	20
16	0	0	0
17	40	40	40
18	70	70	48
19	50	50	48
20	40	40	40
21	30	30	30
22	-20	-20	-20
23	-15	-15	-15
24	-10	-10	-10

3. Variable, any 4 hours from LIP

HE	Actual LIP results	Variable across all hours (shown for comparison)	Variable, any 4 hours from LIP
	HE 1-12 not shown		
13	10	10	
14	40	40	40
15	20	20	
16	0	0	
17	40	40	40
18	70	70	70
19	50	50	50
20	40	40	
21	30	30	
22	-20	-20	
23	-15	-15	
24	-10	-10	

4. Constant, minimum of any 4 consecutive hours within AAH

HE	Actual LIP results	Variable across all hours (shown for comparison)	Constant, min. of any 4 *consecutive* hours within AAH
	HE 1-12 not shown		
13	10	10	
14	40	40	
15	20	20	
16	0	0	
17	40	40	40
18	70	70	40
19	50	50	40
20	40	40	40
21	30	30	
22	-20	-20	
23	-15	-15	
24	-10	-10	

4(a) vs. 4(b): Constant, minimum of any 4 consecutive hours within AAH

NOTE: This resource cannot sustain **positive** load impacts for 4 or more hours.

HE	Actual LIP results	Variable across all hours (shown for comparison)	Derate* if <4 positive hours	0 if <4 positive hours
	HE 1-14 not shown			
15	-8	-8		
16	-5	-5		
17	45	45	23	0
18	50	50	23	0
19	30	30	23	0
20	-1	-1		
21	-4	-4		
22	-15	-15		
23	-5	-5		
24	-3	-3		

*Derate proportional to number of missing hours, e.g. 25% if 1 out of 4 hours is missing

Pros and Cons

#	Option	Pros	Cons
1	**Variable across all hours (identical to LIP)**	• Most flexibility for LSEs/DRPs • Accounts for snap back	• Complicated to implement/validate • No enforcement of 4-hour availability, reliability concerns • Likely significantly overstates available capacity over 24-hr period
2	**Variable but cap at avg. 4 worst consecutive hours in AAH**	• Some enforcement of 4-hour availability • Accounts for snap back	• Complicated to implement/validate • Reliability concerns • Likely significantly overstates available capacity over 24-hr period
3	**Variable, any 4 hours from LIP**	• Enforces 4-hour availability (non-consecutive) • More flexibility	• Complicated to implement/validate • Reliability concerns • Does not account for snap back • Many resources cannot dispatch multiple times per day, may not align with master file program design and/or contract capabilities
4	**Constant, min. 4 consecutive hours within AAH**	• Enforces 4-hour availability (consecutive) • Simplest to implement/validate • Fewest reliability concerns, esp. if QC = 0 for <4 hours	• Does not account for snap back

Background on DR Adders

- **D.21-06-029** (note: these changes were effective for 2022 RA compliance year)
  - **OP 9:** "The 6% component of the PRM adder associated with ancillary services/operating reserves for DR resources should be removed."
  - **OP 10:** "The 9% component of the PRM adder associated with forced outages and load forecast error should be retained."
    - Page 41: "While we deem it reasonable to remove the component associated with load forecast error, because the 9% portion cannot be feasibly separated, the Commission opts to retain the 9% portion of the PRM adder at this time."
  - **OP 11:** "The TLF and DLF components of the PRM adder for DR resources should be retained."
- **D.22-06-050, OP 8:** "A minimum 17 percent planning reserve margin (PRM) is adopted for the 2024 Resource Adequacy year."

Adders for 2024

- Distribution loss factor, transmission loss factor, and planning reserve margin (PRM) adders would be applied for 2024 test year
  - Even though PRM is increasing, increasing *PRM adder* is questionable given that the Commission supported removing the forecast error component
  - CEC Working Group will recommend "whether, and if so how, any changes to DR adders should be reflected in DR QC methodology" for 2025 RA year and beyond

Adder	Action	Value (PG&E)	Value (SCE)	Value (SDG&E)
PRM - Operating Reserves	Removed by D.21-06-029	N/A		
PRM - Forecast Error & Forced Outages	**Retain**	**9%** (same for all IOUs)		
Distribution Loss Factor	**Retain**	**1.067%**	**1.051%**	**1.071%**
Transmission Loss Factor	**Retain**	**0.030%**	**0.025%**	**0.025%**

Methodology for SOD-Adjusted Procurement Limits

Slight Update: For DR to serve 24 peak load hours, need to include marginal load between 25th highest load (DR not dispatched) and 24th highest load (DR dispatched)

1. Calculate hourly load profiles for last 3 years (gross or net)
2. For each year…
   a. Rank the hours from highest to lowest load for every HE in each month
   b. Calculate the "average summer month", with hours ranked by HE
3. Calculate the "average summer month" for last 3 years, with hours ranked by HE
4. Find the peak load (L_1) within the AAH for the average summer month
5. Find the 25th highest load (L_{25}) within the AAH for the average summer month
6. RA procurement limit for DR = $\frac{L_1 - L_{25}}{L_1}$

Procurement Limit Example: Option 1

Using top 24 gross load hours for 2019-2021 average summer month…

- $L_1 = 40{,}905\ MW$
- $L_{25} = 36{,}870\ MW$
- Procurement limit for DR = $\frac{40{,}905\ MW - 36{,}870\ MW}{40{,}905\ MW} = 9.9\%$

Color Key

- Top 24 load hours in AAH
- Peak load hour in AAH
- 25th highest load hour in AAH

	A	P	Q	R	S	T	U	V	W	X	Y
1	**Avg Summer Month (Gross Load 2019-2021)**										
2	HE	15	16	17	18	19	20	21	22	23	24
3	Rank										
4	1	38,182	39,601	40,466	40,905	40,515	39,427	38,223	36,272	33,296	30,378
5	2	36,972	38,577	39,649	40,267	39,978	38,949	37,743	35,824	32,840	29,988
6	3	36,279	37,791	38,777	39,262	38,892	37,943	36,870	34,982	32,096	29,397
7	4	35,181	36,699	37,599	38,268	38,099	37,173	36,063	34,265	31,551	28,912
8	5	34,465	35,946	37,095	37,785	37,610	36,705	35,714	33,916	31,210	28,579
9	6	33,844	35,423	36,598	37,389	37,244	36,326	35,331	33,616	30,873	28,289
10	7	33,470	35,036	36,174	36,925	36,826	35,988	34,937	33,216	30,589	28,081
11	8	33,094	34,555	35,755	36,466	36,446	35,605	34,670	32,940	30,339	27,814
12	9	32,607	34,095	35,246	36,084	36,007	35,239	34,335	32,645	30,101	27,662
13	10	32,179	33,582	34,754	35,660	35,683	34,981	34,062	32,419	29,937	27,479

Procurement Limit Example: Option 2

	HE 17	HE 18	HE 19	HE 20	HE 21
Procurement Limit	9.6%	10.9%	9.1%	6.9%	3.5%

	A	P	Q	R	S	T	U	V	W	X	Y
1	**Avg Summer Month (Gross Load 2019-2021)**										
2	HE	15	16	17	18	19	20	21	22	23	24
3	Rank										
4	1	38,182	39,601	40,466	40,905	40,515	39,427	38,223	36,272	33,296	30,378
5	2	36,972	38,577	39,649	40,267	39,978	38,949	37,743	35,824	32,840	29,988
6	3	36,279	37,791	38,777	39,262	38,892	37,943	36,870	34,982	32,096	29,397
7	4	35,181	36,699	37,599	38,268	38,099	37,173	36,063	34,265	31,551	28,912
8	5	34,465	35,946	37,095	37,785	37,610	36,705	35,714	33,916	31,210	28,579
9	6	33,844	35,423	36,598	37,389	37,244	36,326	35,331	33,616	30,873	28,289
10	7	33,470	35,036	36,174	36,925	36,826	35,988	34,937	33,216	30,589	28,081
11	8	33,094	34,555	35,755	36,466	36,446	35,605	34,670	32,940	30,339	27,814
12	9	32,607	34,095	35,246	36,084	36,007	35,239	34,335	32,645	30,101	27,662
13	10	32,179	33,582	34,754	35,660	35,683	34,981	34,062	32,419	29,937	27,479

Color Key

- Top 24 load hours in AAH
- Peak load hour for each HE
- Next highest load hour after top 24 for each HE

SOD-Adjusted Procurement Limit Options

1. **Single % applied equally across all hours (recommended)**
   - More "fair" if already capping QC at minimum of 4 consecutive hours in AAH
   - Simpler to implement
   - Example: 9.9% across all hours
2. **Variable % for each hour**
   - Could result in lower or *higher* limit for some hours than single %
   - More complicated with unclear reliability benefits
   - Example: Range from 3.5% in HE 21 to 10.9% in HE 18
   - Outstanding Question: For 6-hour programs, what would be used to cap DR outside of AAH? Lowest %?

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Thank you!

Appendix Slides

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Challenge: Optionality in LIP filings

(Most relevant for Option 4)

Potential Solution: Model **two** ex ante 4-hour dispatches (both within AAH) and choose the lowest value

HE	HE 18-21 dispatch	HE 17-20 dispatch	Minimum of any 4 *consecutive* hours within AAH
	HE 1-14 not shown		
15			
16			
17	0	50	33
18	48	46	33
19	44	42	33
20	38	37	33
21	33	-20	33
22	-20	-15	
23	-15	-10	
24	-10	0	