



Reproducing the CAISO Deliverability Modelling Methodology, RAS, and Validation for Cluster 14 Ph II, PG&E

Cluster 14 Phase II, PG&E region (NGBA, GBAY, Fresno, Kern, S500)

Dendrite, July 2026

Background

Deliverability determines Cluster entry, Full/Partial Capacity Deliverability Status (F/P-CDS), and therefore Resource Adequacy (RA) contracts. Dendrite has modeled Deliverability across several regions, and this paper presents the methodology and simulation results for the CAISO Cluster 14 (C14) Phase II on-peak assessment in the PG&E region. C14 was chosen because its results are published in full and can be used to grade a blind run, and the PG&E region because it carries multi-region constraint interactions at a digestible size. The simulation used only inputs available before result publication.

Methodology

1. **Case preparation.** CAISO's master deliverability base cases were split by region per the typical CAISO region split. Regional C14 generators were dispatched at 80% of P_{max} , and injection groups constructed for RampGens, SinkGens, and ClusterGens. CAISO's contingency set was added to each case and relevant RAS loaded (see RAS section, below). Preparation followed the On-peak TPD Deliverability Methodologyⁱ.
2. **DFAX Circle.** Responsible generators for each monitored element were aggregated based on units at $|DFAX| \geq 5\%$ ($\geq 10\%$ at 500 kV), with a flow-impact test on generation capacity per the CAISO methodology.
3. **Ranking and ramp.** Generators ranked by $|DFAX| \times$ available headroom. Worst harmers were ramped to their limit under a worst-case injection cap, and Facility Loading Adder (FLA) was applied.
4. **Grouping.** Overloads for mon/con pairs were consolidated into Area Deliverability Constraints (ADCs), one representative mon/con pair was selected per ADC.
5. **AC verification.** A full AC power-flow solve was performed for every DC overload.
6. **Automation.** Process is scripted end to end from the case files to deliverability results. Queue and transmission-upgrade assumptions are modifiable for different market assumptions, regions, and POIs.

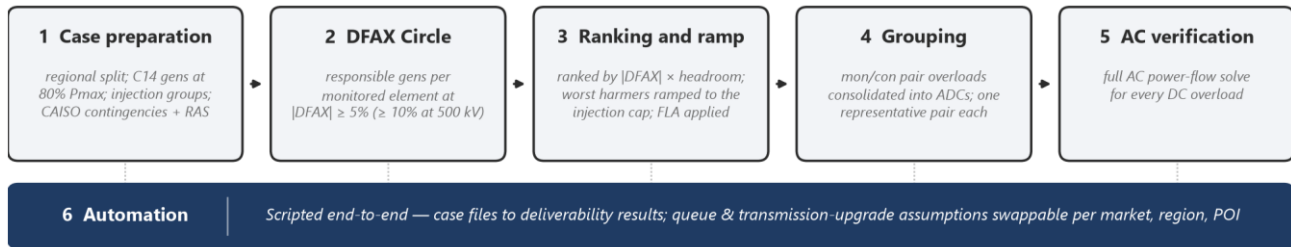


Figure 1. Dendrite deliverability modeling pipeline

Results

1. **100% of constraints identified.** CAISO's C14 PhII Appendix I publishes 24 Area Deliverability Network Upgrades (ADNUs) mitigating 24 area constraints in the PG&E region. **The simulation identifies 100% of the constraints.**
2. **Median absolute deviation of 5 percentage points.** And constraint loadings reproduce all of CAISO's published values within 10 points (Figure 2).
3. **Run blind.** The model was built and run on inputs available before CAISO published the study, and compared against published results.
4. **Further Application.** The same pipeline applies to the Cluster 16 POI deliverability map, the 2027 TPD allocation process, and future Interim Deliverability Allocations where Net Qualifying Capacity (NQC) is determined.

Monitored facility	CAISO published	Dendrite modeled	Δ (pts)
Cache1-Cortina	110%	115.5%	+5.5
Herndon-Chldhosp	142%	138.6%	-3.4
Aderasjct-DairyInd	111%	114.7%	+3.7
WilsonPGAE-LeGrndJ	146%	151.1%	+5.1
Gates 500/230 kV TB #12	128%	128.9%	+0.9
StoreyJct1-WilsonPGAE	126%	124.0%	-2.0
Lakeville-Tuluca	106%	105.9%	-0.1
Lakeville-Ignacio	103%	103.9%	+0.9

Table 1. Excerpt of the PG&E constraint comparison



Deviations in results are attributed to three sources: CAISO's engineering-judgment choice of which mon/con pair represents an area constraint; the dispatch assumptions embedded in the prepared base cases; and differences between the vintage of the case data and the tables as published.

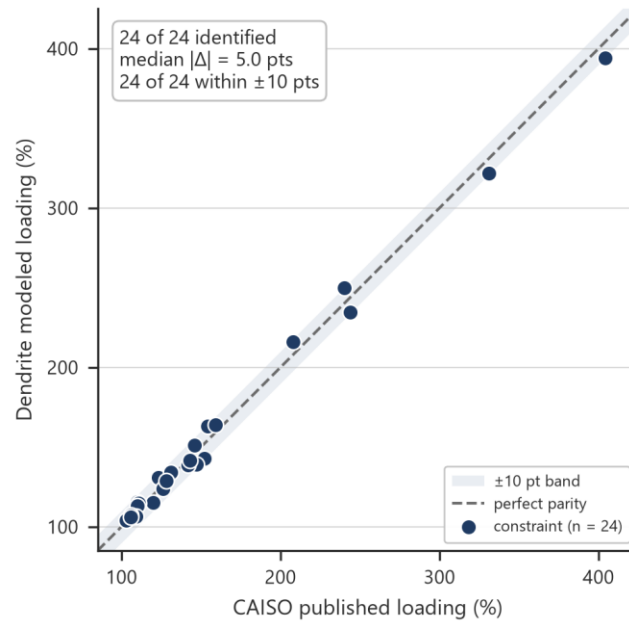


Figure 2. Dendrite modeled loading against CAISO published loading, one point per area constraint (n = 24).

Remedial Action Schemes

CAISO's assessment credits RAS operation, but the armed contingency definitions and RAS files are not part of the publicly available data. Dendrite built its own RAS database, assembled from CAISO and WECC reports, policy documents, legal filings, and power-flow cases, and models the schemes natively. Figure 3 shows the effect on the governing Gates 500/230 kV transformer-bank constraint and the modeled RAS in action.

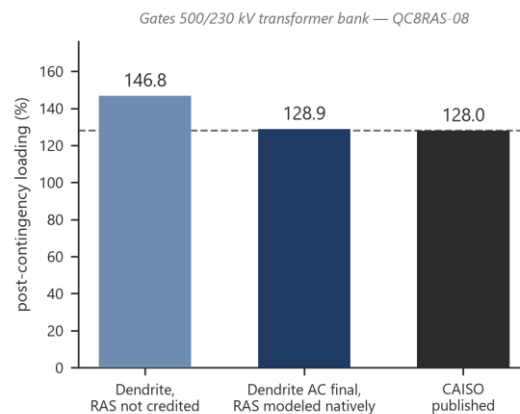


Figure 3. Natively modeled RAS on the Gates transformer-bank constraint.

Discussion

TPD exposure at a point of interconnection can be estimated before CAISO publishes it, and because the screen retains the harmer ranking behind every overload, constraint drivers are traceable to individual projects and quantifiable. CAISO's methodology involves significant engineering judgment, and Dendrite reproduces it by encoding rules discerned from interpretation of published results, direct interaction with CAISO, and policy documents.