

24-25 TPP Busbar Mapping – Gas Capacity not Retained Criteria Application and Selection

February 15, 2024

Energy Division Staff



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Overview

- The IRP portfolios only contain system level MW information on how much gas is not retained. CPUC staff need to identify specific units to be modeled as not retained in the busbar mapping process for the CAISO to utilize the portfolios in their TPP studies.
- These slide provide:
 - An overview of the selection criteria used to identify existing gas resources to model as not retained in the 24-25 TPP portfolios transmitted to the CAISO.
 - Summary breakdown of the CAISO gas fleet by the criteria factors.
 - Summary of the selection results for the base case and high gas retirement sensitivity portfolios.
- Full workbook of criteria analysis and lists of the specific units selected to be modeled as not retained in both the 24-25 TPP base case and high gas retirement sensitivity is posted to the CPUC webpage:
 - [Assumptions for the 2024-2025 TPP](#)

Context

- In developing this sensitivity study and asking CAISO to study in its TPP, CPUC is attempting to collect planning information about the impacts and requirements of potential plant retirements.
 - The CPUC is not directing retirement of specific gas generators via this study.
 - The CPUC is not attempting to assert authority to retire specific units via this study.
- The criteria and list of plants covered herein are meant to be used in a study and they describe possible retirement scenarios, which when studied, will provide useful information regarding transmission system impacts triggered by potential plant retirements.
- The energy planning agencies have limited detail regarding potential transmission needs for retiring gas units and these portfolios are an early step in expanding the set of information that can be used in planning and potential procurement in the future.

Gas capacity not retained in the 24-25 TPP portfolios

- Both the Base Case and High Gas Retirement Sensitivity Portfolios have input assumptions for gas capacity not retained that included:
 - Remaining 3.7 MW OTC units retire as currently planned
 - Linear expected phase out of all 1.9 GWs of CHPs between 2031-2040
 - Additional gas retirement of CCGT & Peakers
 - The Base Case has 2.7 GW of gas capacity not retained for economic reasons, as selected by RESOLVE, in both 2034 and 2039 model years.
 - The High Gas Retirement Sensitivity has over 10 GW of gas capacity not retained (by 2039) forced in.
- **Purpose of the selection criteria** is to identify what plants should represent the amount of gas capacity not retained.

Gas Capacity Not Retained for the 2024-25 TPP Base Case and Sensitivity Portfolios				
Portfolio and Model Year	OTC	CHPs	CCGT & Peakers	Total
Base Case (2034)	3.7 GW	0.76 GW	2.7 GW	7.1 GW
Base Case (2039)	3.7 GW	1.7 GW	2.7 GW	8.1 GW
Gas Retirement Sens. (2034)	3.7 GW	0.76 GW	4.7 GW	9.1 GW
Gas Retirement Sens. (2039)	3.7 GW	1.7 GW	10.5 GW	15.9 GW

Gas Plant Factors used in Selection Criteria

Environmental/Community Factors

1. Disadvantaged communities – Plants in or near DACs receive highest score/priority
2. NOx Emissions Rate – Plants with highest NOx emissions weighted by Capacity Factor (by plant type) receive highest score/priority
3. Air Quality Non-attainment Zones – Plants in worse PM2.5 and Ozone non-attainment areas receive highest score/priority

Performance Related Factors

4. Heat Rate – Plants with highest heat rate (by plant type) receive highest score/priority
5. Age – Oldest plants (by plant type) receive highest score/priority

Local Reliability Factors

6. Local Effectiveness Factor (LEF) – Highest CAISO local area effectiveness factor plants have lowest priority. Plants with no effectiveness factor receive highest priority/score.

- Based on stakeholder feedback, CPUC staff have dropped Capacity Factor (CF) as an individual factor in the selection criteria

Selection Criteria Scoring

- CPUC staff implemented a scoring criteria based on the six factors to develop a prioritized ranking of plants to model as not retained.
- Selection Criteria Score calculated by weighing the six factors by their categories by following percentage:
 - 50 % for Env/Community factors
 - The scores of the three factors: DAC, NOx, and Non-Attainment Zone, are summed and provide 50% of the total score
 - 25 % for Performance factors
 - The score of the two factors: Heat Rate & Age, are summed and provide 25% of the total score
 - 25 % for Local Reliability
 - The local area effectiveness factor (LEF) score provide 25% of the total score
- Include two additional screens to exclude generators from being selected:
 - Exclude generator if it is in youngest Age Factor quartile
 - Exclude generator if it is in the highest Local Effectiveness Factor (LEF) quartile.

Selection Criteria Scoring (cont'd)

- Units are selected highest scores first until the selected plants have a combined MW capacity roughly equal to the amount retired in the selected model year.
 - When selecting between plants with the same score, staff generally narrowed comparison to Age, LEF, and DAC scores.
- The CHPs are separated out from CCGT & Peakers and selected separately due to the modeling input assumptions having a fixed retirement date for CHPs.
 - The same selection criteria and scoring process is applied to CHPs
 - For 2039 model year, selected CHP units include some units in flagged by the two additional screens as portfolios are not retaining 1.7 GW of 1.9 GW of CHPs identified.

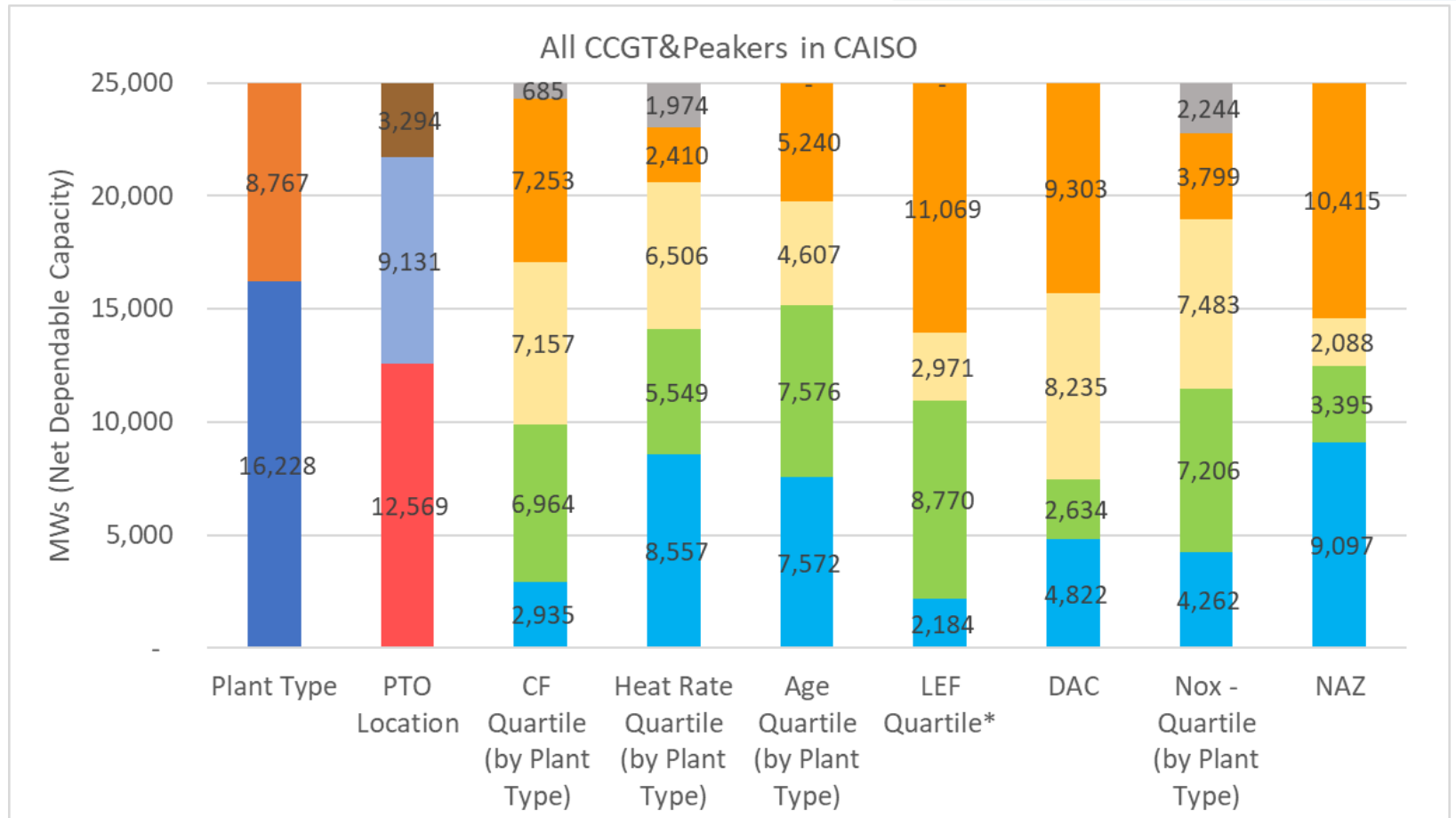
Overview of Gas Plants in CAISO by Criteria Factors



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CCGTs & Peakers in CAISO

- Summary of non-CHP and non-OTC plants in the CAISO system by criteria factors scores:
 - Represents ~25 GWs of CCGT and Peakers in the CAISO,.



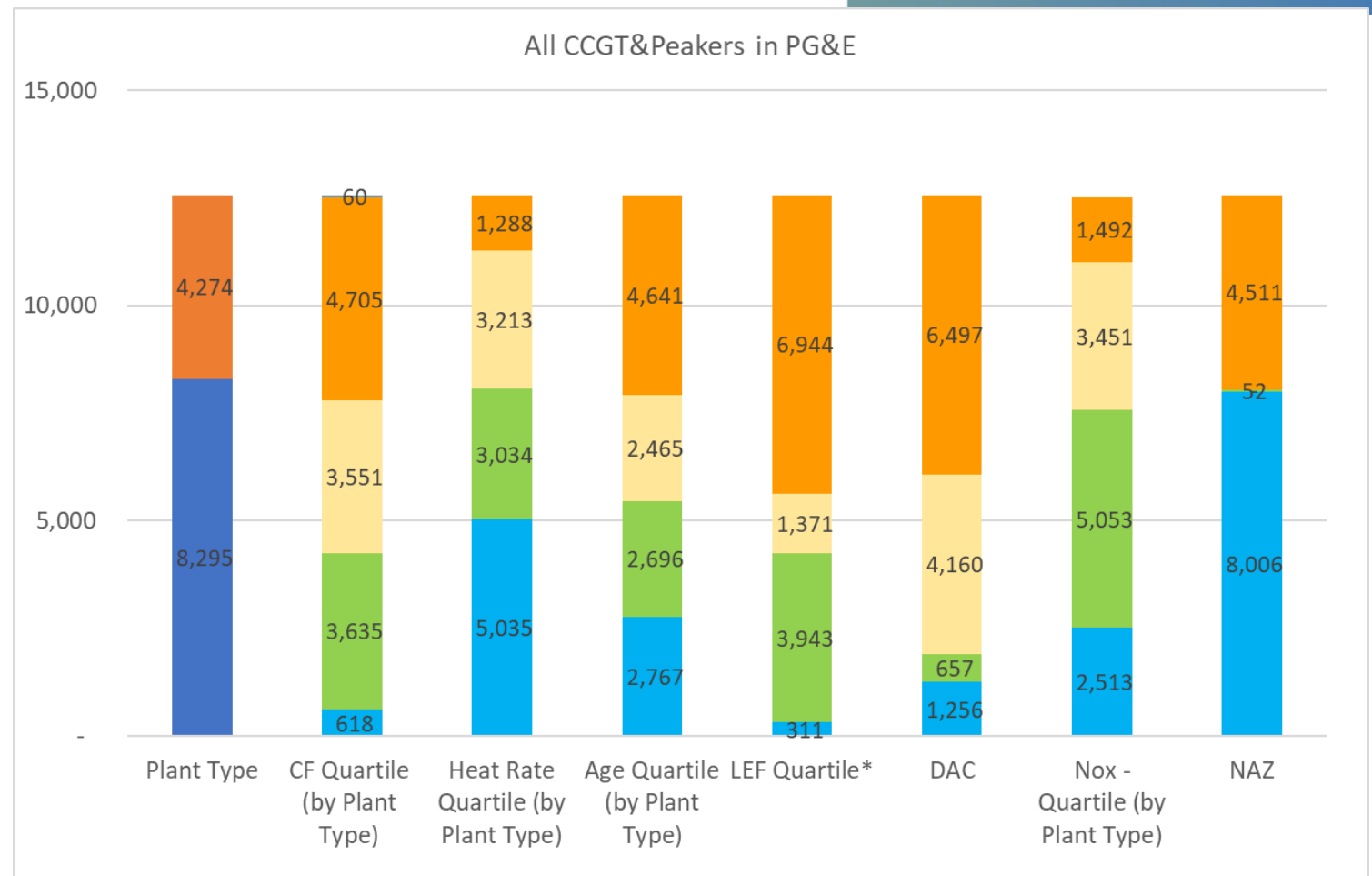
<p>Plant Type</p> <ul style="list-style-type: none"> ■ CCGT ■ Peaker 	<p>Location</p> <ul style="list-style-type: none"> ■ PG&E ■ SCE ■ SDG&E 	<p>CF, Heat Rate, Age, NOx</p> <ul style="list-style-type: none"> ■ 1st Quartile (i.e., lowest CF, youngest) ■ 2nd Quartile ■ 3rd Quartile ■ 4th Quartile (i.e., highest CF, oldest) 	<p>LEF</p> <ul style="list-style-type: none"> ■ 1. 1st Quartile (largest LEF) ■ 2. 2nd & 3rd ■ 3. 4th Quartile ■ 4. No LEF number 	<p>DAC</p> <ul style="list-style-type: none"> ■ 1. >10 mi from DAC ■ 2. < 10 mi ■ 3. < 5 mi ■ 4. In DAC ■ No Data 	<p>Ozone & PM2.5 NAZ</p> <ul style="list-style-type: none"> ■ 1. Not in Either ■ 2. ■ 3. ■ 4. In highest for both
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CCGT & Peakers in CAISO (MWs by Criteria Factors)

	Plant Type		PTO Location	Rating	CF Quartile (by Plant Type)	Heat Rate Quartile (by Plant Type)	Age Quartile (by Plant Type)	LEF Quartile *	DAC	Nox - Quartile (by Plant Type)	NAZ
CCGT	16,228	PG&E	12,569	1	2,935	8,557	7,572	2,184	4,822	4,262	9,097
Peaker	8,767	SCE	9,131	2	6,964	5,549	7,576	8,770	2,634	7,206	3,395
		SDGE	3,294	3	7,157	6,506	4,607	2,971	8,235	7,483	2,088
				4	7,253	2,410	5,240	11,069	9,303	3,799	10,415
			No Data (2.5)		685	1,974	-	-		2,244	

CCGTs & Peakers in PG&E

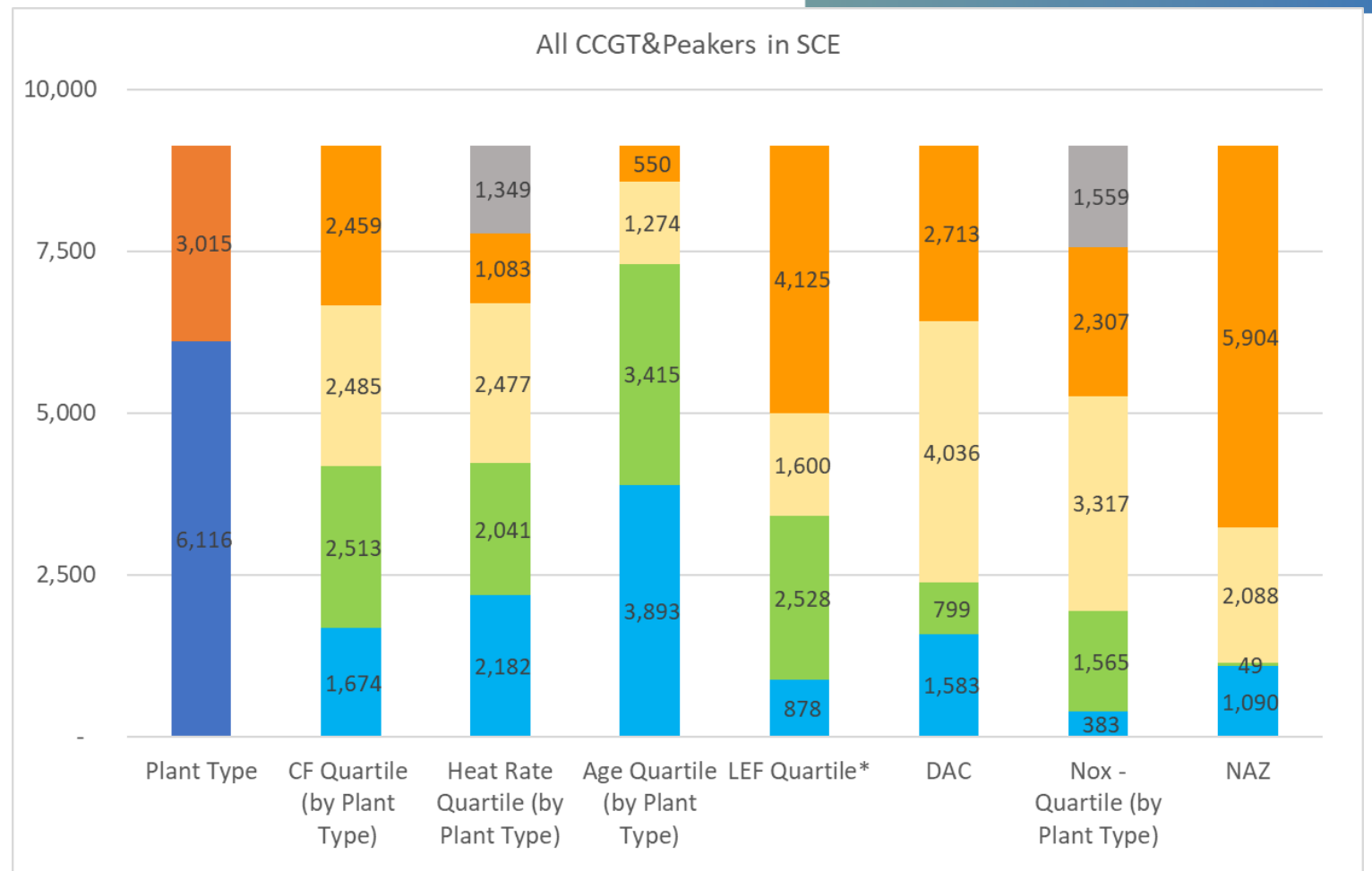
- Summary for the 2.5 GW of CCGT and Peakers in PG&E



Plant Type	CF, Heat Rate, Age, NOx	LEF	DAC	Ozone & PM2.5 NAZ
■ CCGT	■ 1 st Quartile (i.e., lowest CF, youngest)	■ 1. 1 st Quartile (largest LEF)	■ 1. >10 mi from DAC	■ 1. Not in Either
■ Peaker	■ 2 nd Quartile	■ 2. 2 nd & 3 rd	■ 2. < 10 mi	■ 2.
	■ 3 rd Quartile	■ 3. 4 th Quartile	■ 3. < 5 mi	■ 3.
	■ 4 th Quartile (i.e., highest CF, oldest)	■ 4. No LEF number	■ 4. In DAC	■ 4. In highest for both
			■ No Data	

CCGTs & Peakers in SCE

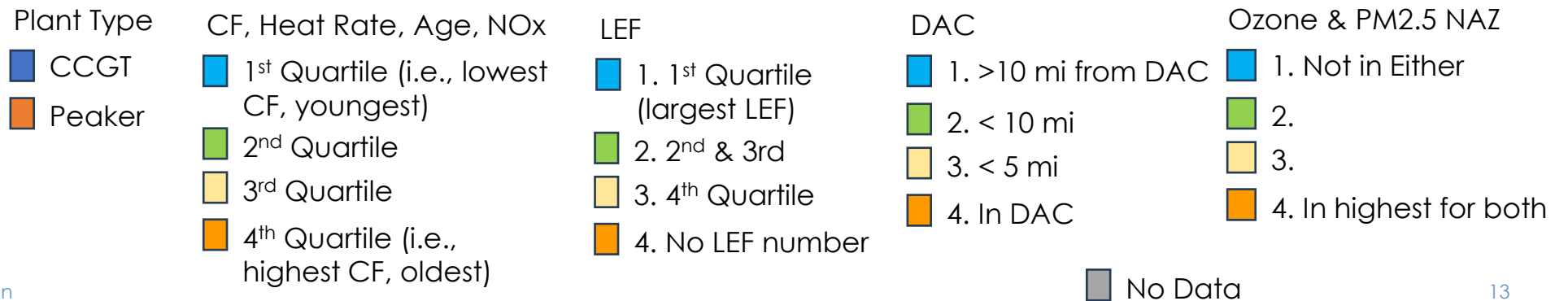
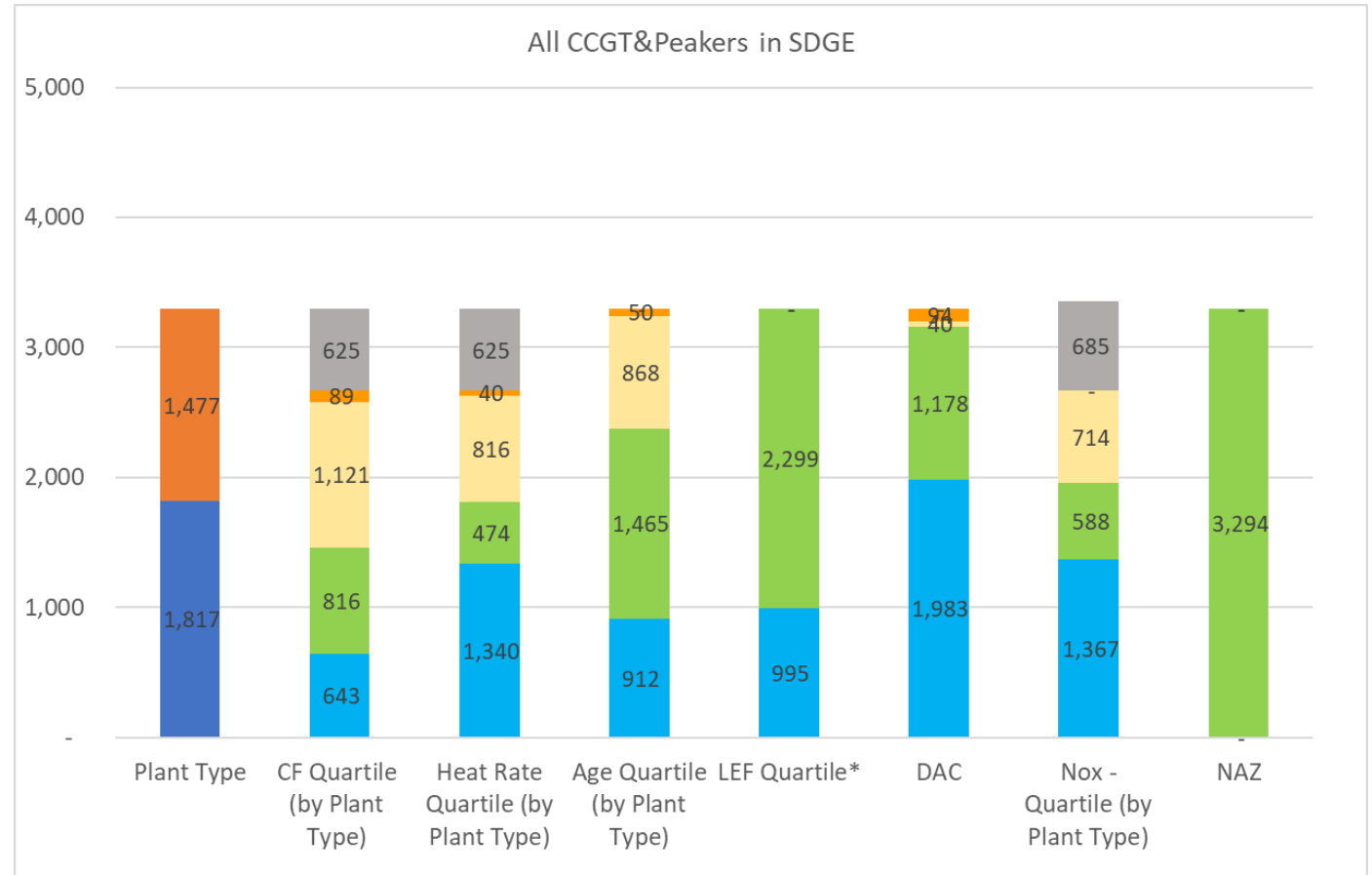
- Summary for 9.1 GW of CCGT and Peakers in SCE



<p>Plant Type</p> <ul style="list-style-type: none"> ■ CCGT ■ Peaker 	<p>CF, Heat Rate, Age, NOx</p> <ul style="list-style-type: none"> ■ 1st Quartile (i.e., lowest CF, youngest) ■ 2nd Quartile ■ 3rd Quartile ■ 4th Quartile (i.e., highest CF, oldest) 	<p>LEF</p> <ul style="list-style-type: none"> ■ 1. 1st Quartile (largest LEF) ■ 2. 2nd & 3rd ■ 3. 4th Quartile ■ 4. No LEF number 	<p>DAC</p> <ul style="list-style-type: none"> ■ 1. >10 mi from DAC ■ 2. < 10 mi ■ 3. < 5 mi ■ 4. In DAC 	<p>Ozone & PM2.5 NAZ</p> <ul style="list-style-type: none"> ■ 1. Not in Either ■ 2. ■ 3. ■ 4. In highest for both
<p>■ No Data</p>				

CCGTs & Peakers in SDG&E

- Summary for 3.3 GW of CCGT and Peakers in SDG&E



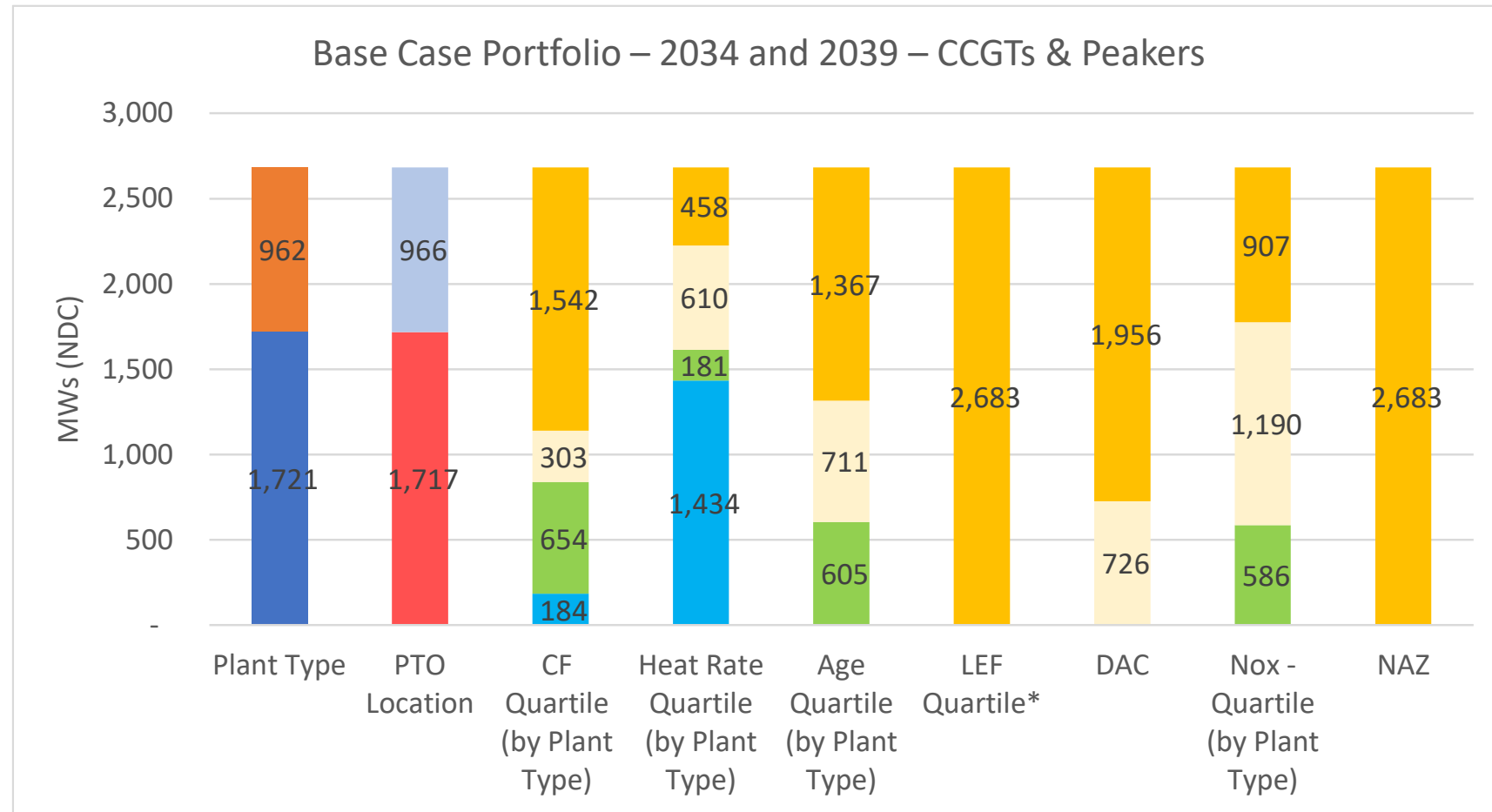
Summary of Units Selected to be Modeled as not Retained for the 24-25 TPP Base Case and Sensitivity Portfolios



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Base Case Portfolio (2034 & 2039)

- Criteria factors overview of the 2.7 GW of CCGTs and Peakers selected for the 2034 & 2039 model years.



Plant Type
■ CCGT
■ Peaker

Location
■ PG&E
■ SCE
■ SDG&E

CF, Heat Rate, Age, NOx
■ 1st Quartile (i.e., lowest CF, youngest)
■ 2nd Quartile
■ 3rd Quartile
■ 4th Quartile (i.e., highest CF, oldest)

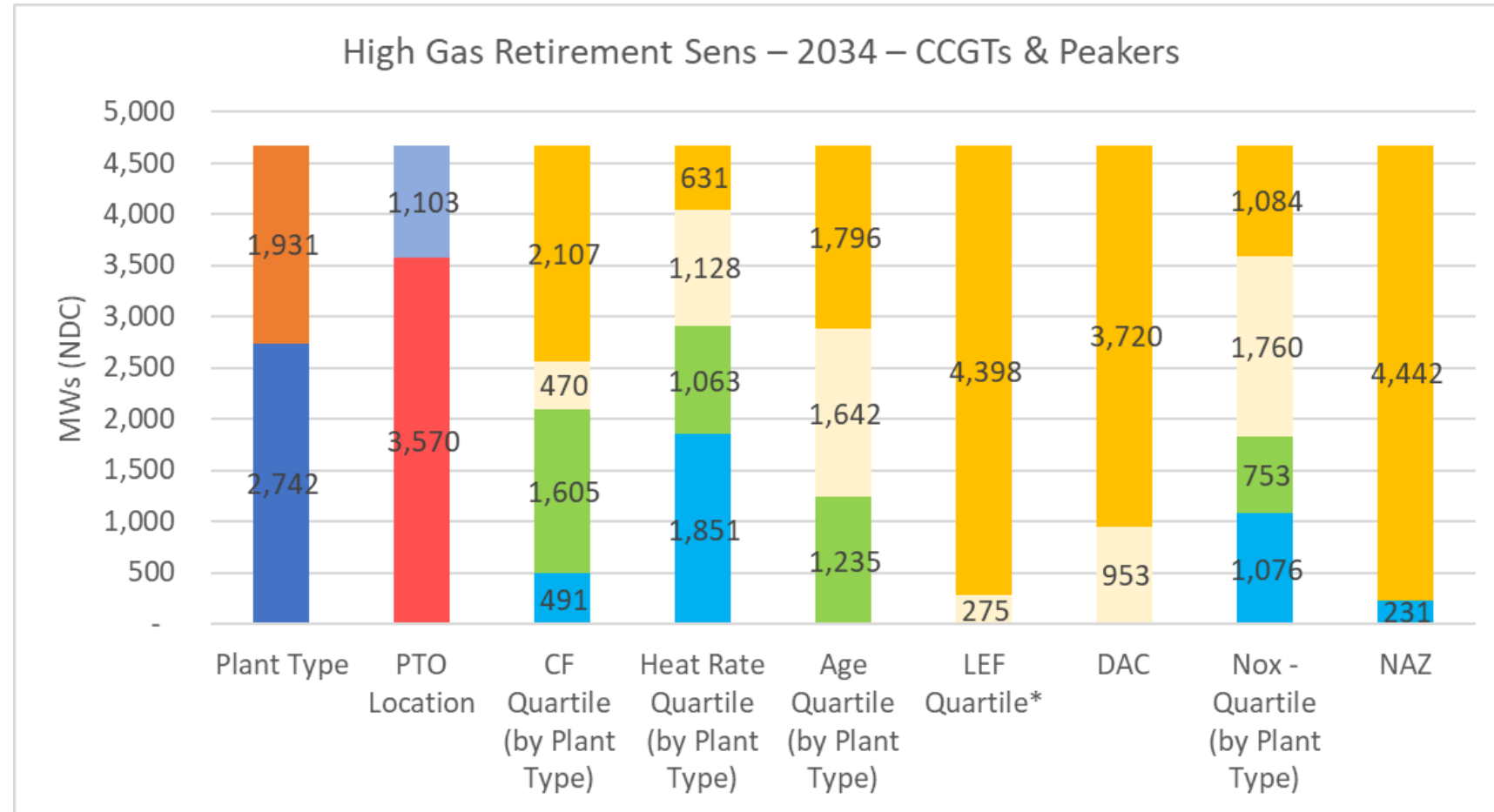
LEF
■ 1. 1st Quartile (largest LEF)
■ 2. 2nd & 3rd
■ 3. 4th Quartile
■ 4. No LEF number

DAC
■ 1. >10 mi from DAC
■ 2. < 10 mi
■ 3. < 5 mi
■ 4. In DAC

Ozone & PM2.5 NAZ
■ 1. Not in Either
■ 2.
■ 3.
■ 4. In highest for both

High Gas Retirement Sensitivity (2034)

- Criteria factors overview of the 4.7 GW of CCGTs and Peakers selected for the 2034 model year.



Plant Type
■ CCGT
■ Peaker

Location
■ PG&E
■ SCE
■ SDG&E

CF, Heat Rate, Age, NOx
■ 1st Quartile (i.e., lowest CF, youngest)
■ 2nd Quartile
■ 3rd Quartile
■ 4th Quartile (i.e., highest CF, oldest)

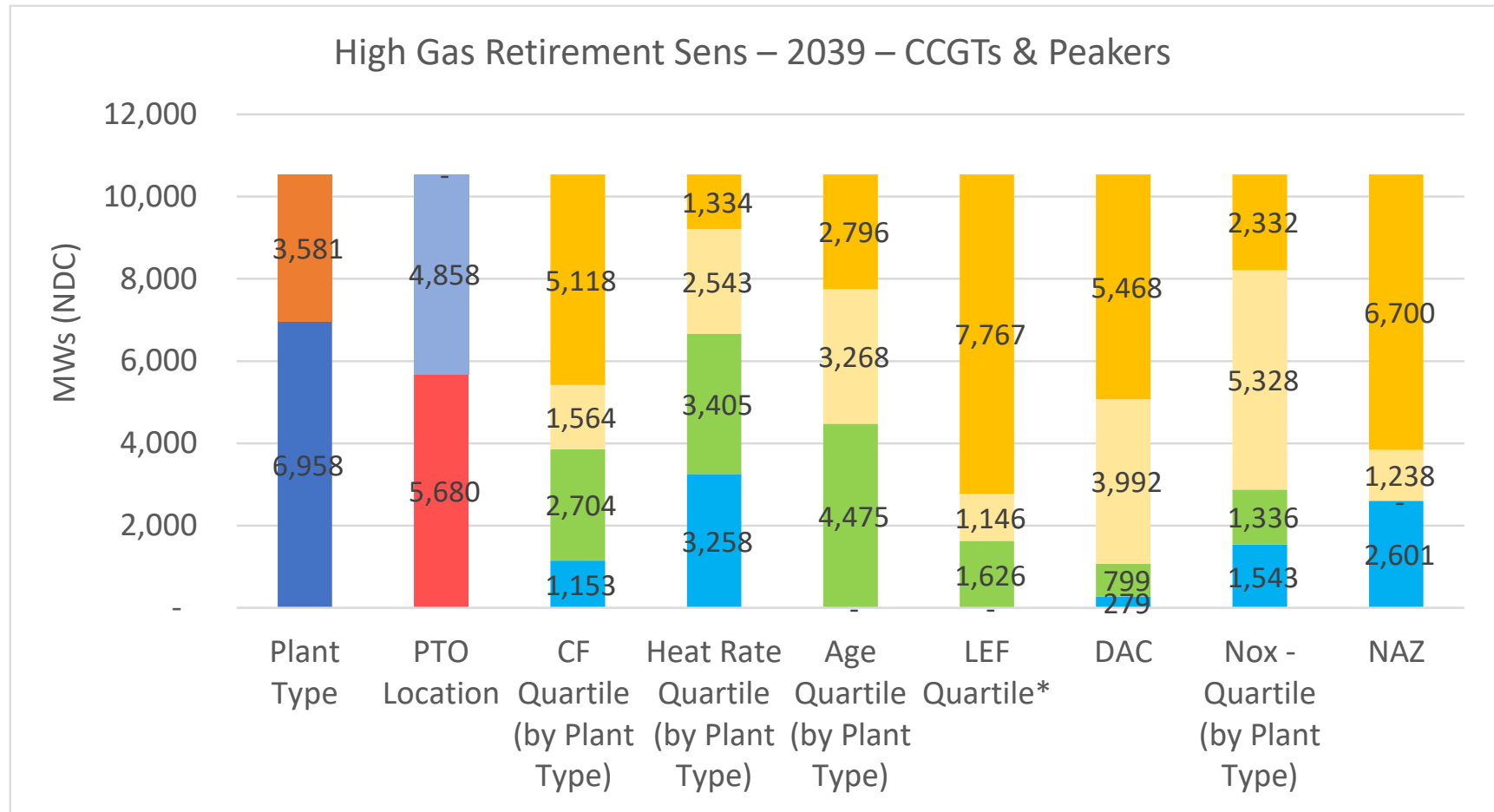
LEF
■ 1. 1st Quartile (largest LEF)
■ 2. 2nd & 3rd
■ 3. 4th Quartile
■ 4. No LEF number

DAC
■ 1. >10 mi from DAC
■ 2. < 10 mi
■ 3. < 5 mi
■ 4. In DAC

Ozone & PM2.5 NAZ
■ 1. Not in Either
■ 2.
■ 3.
■ 4. In highest for both

High Gas Retirement Sensitivity (2039)

- Criteria factors overview of the 10.5 GW of CCGTs and Peakers selected for the 2039 model year.



Plant Type
■ CCGT
■ Peaker

Location
■ PG&E
■ SCE
■ SDG&E

CF, Heat Rate, Age, NOx
■ 1st Quartile (i.e., lowest CF, youngest)
■ 2nd Quartile
■ 3rd Quartile
■ 4th Quartile (i.e., highest CF, oldest)

LEF
■ 1. 1st Quartile (largest LEF)
■ 2. 2nd & 3rd
■ 3. 4th Quartile
■ 4. No LEF number

DAC
■ 1. >10 mi from DAC
■ 2. < 10 mi
■ 3. < 5 mi
■ 4. In DAC

Ozone & PM2.5 NAZ
■ 1. Not in Either
■ 2.
■ 3.
■ 4. In highest for both

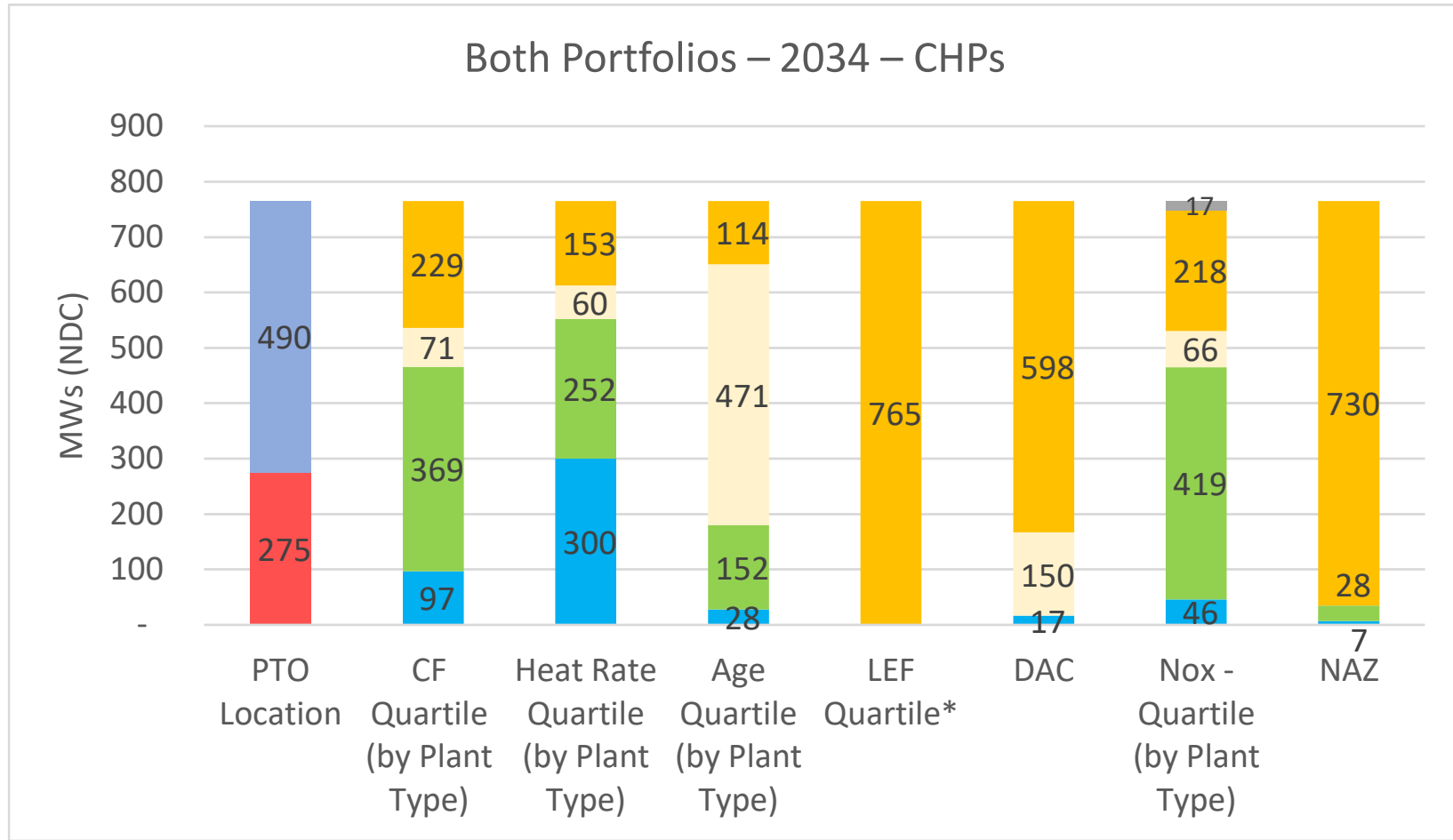
High Gas Retirement Sensitivity (2039)

- MW % of amount in full CAISO Fleet that is selected by criteria factors for the 2039 model year of the high gas retirement sensitivity portfolio.

	Plant Type		PTO Location	Rating	CF Quartile (by Plant Type)	Heat Rate Quartile (by Plant Type)	Age Quartile (by Plant Type)	LEF Quartile	DAC	Nox - Quartile (by Plant Type)	NAZ
CCGT	43%	PG&E	45%	1	39%	38%	0%	0%	6%	36%	29%
Peaker	41%	SCE	53%	2	39%	61%	59%	19%	30%	19%	0%
		SDGE	0%	3	22%	39%	71%	39%	48%	71%	59%
				4	71%	55%	53%	70%	59%	61%	64%

Both Portfolios (2034) - CHP

- Criteria factors overview of the 760 MW of CHPs units to be modeled as not retained for the 2034 model year of both portfolios.



Plant Type
 ■ CCGT
 ■ Peaker

Location
 ■ PG&E
 ■ SCE
 ■ SDG&E

CF, Heat Rate, Age, NOx
 ■ 1st Quartile (i.e., lowest CF, youngest)
 ■ 2nd Quartile
 ■ 3rd Quartile
 ■ 4th Quartile (i.e., highest CF, oldest)

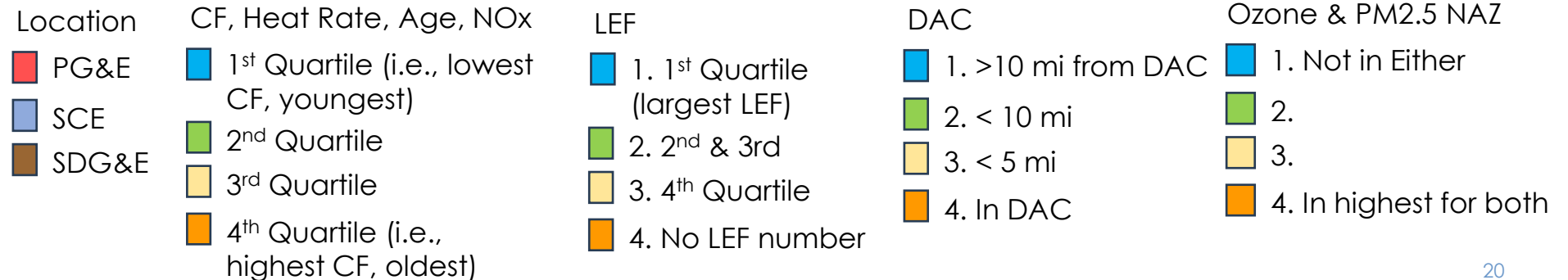
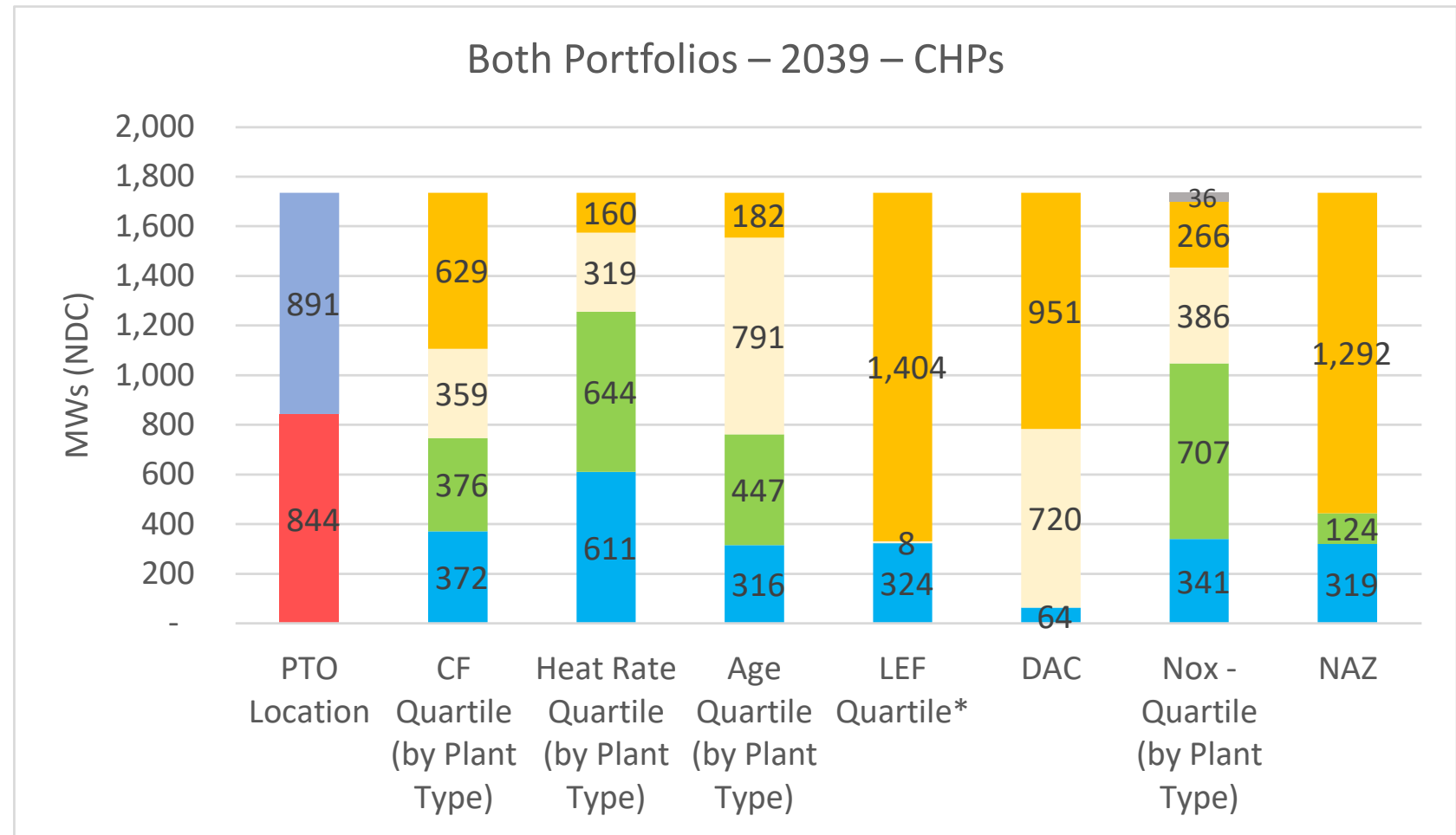
LEF
 ■ 1. 1st Quartile (largest LEF)
 ■ 2. 2nd & 3rd
 ■ 3. 4th Quartile
 ■ 4. No LEF number

DAC
 ■ 1. >10 mi from DAC
 ■ 2. < 10 mi
 ■ 3. < 5 mi
 ■ 4. In DAC

Ozone & PM2.5 NAZ
 ■ 1. Not in Either
 ■ 2.
 ■ 3.
 ■ 4. In highest for both

Both Portfolios (2039) - CHP

- Criteria factors overview of the 1,730 MW of CHPs units to be modeled as not retained for the 2039 model year of both portfolios.



High Gas Retirement Sensitivity (2039) – Comparison to CAISO’s 20-year outlook

- The CAISO’s [20-year Transmission Outlook \(2021-2022\)](#) included just under 15 GW of gas capacity retired.
- This table compares the locations of gas not retained in the high gas retirement sensitivity portfolio to retirements in the 20-year outlook.

Local Area	High Gas Retirement Sensitivity – 2039			First 20-year outlook – 2040 (MWs)
	Selected CCGT & Peakers (MWs)	Selected CHPs (MWs)	Sensitivity Total (MWs)	
Bay Area	1,819	273	2,092	4,427
BC/Ventura	1,153	413	1,567	695
Fresno	526	25	551	669
Humboldt	-	-	-	-
Kern	304	103	407	407
LA Basin	2,361	430	2,791	3,632
SD-IV	-	-	-	131
Sierra	146	8	153	153
Stockton	25	-	25	361
Not_in_LCR	4,205	483	4,688	3,933
Total:	10,539	1,735	12,273	14,408