

**BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF CALIFORNIA**

Order Instituting Rulemaking to Continue Electric
Integrated Resource Planning and Related
Procurement Processes.

Rulemaking 20-05-003
(Filed May 7, 2020)

CALPINE ENERGY SOLUTIONS, LLC 2020 INTEGRATED RESOURCE PLAN

PUBLIC VERSION

August 31st, 2020

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Pursuant to Decision 18-02-018, Calpine Energy Solutions, LLC (“Calpine Solutions”) submits its 2020 Integrated Resource Plan (“IRP”). The public version of Calpine Solutions’ 2020 IRP has removed in its entirety confidential Appendix A Confidential Worksheets and Appendix B Milestone #1 Contracts and Senior Executive Attestation. In accordance with instructions from the Commission Docket Office, the confidential version of Calpine Solutions’ 2020 IRP was tendered under seal in digital format.

Dated: August 31, 2020

Respectfully submitted,

/s/

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Standard LSE Plan

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CALPINE ENERGY SOLUTIONS, LLC
2020 INTEGRATED RESOURCE PLAN
August 31, 2020

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1 I. Executive Summary

2 Calpine Energy Solutions, LLC (Calpine Solutions) is an Electricity Service Provider (ESP) registered
3 with the California Public Utilities Commission (Commission) with ESP #1364. Calpine Solutions has
4 been actively serving commercial, industrial and institutional customers since California restructured its
5 wholesale and retail electricity markets in 1998, albeit under different names as corporate ownership of
6 Calpine Solutions has changed over time.

7 Calpine Solutions is a wholly owned subsidiary of Calpine Corporation (“Calpine”). Calpine is America's
8 largest generator of electricity from natural gas and geothermal resources. Calpine's clean, efficient,
9 modern and flexible generation fleet uses advanced technologies to generate electricity in a low-carbon
10 and environmentally responsible manner. In California, Calpine is the largest renewable power provider.
11 Calpine’s California generation capacity of nearly 6,300 Megawatts is equivalent to approximately 11
12 percent of the California Independent System Operator’s peak power demand.

13 Calpine Solutions analyzed two energy portfolios¹ as part of its integrated resource plan (IRP): both
14 portfolios are conforming portfolios of generation resources assuming forecasted 2021 and 2030 demand
15 levels as assigned by the Commission’s Energy Division using a conforming load shape as provided by
16 the Commission’s model with a year 2030 46 million metric tons (“MMT”) emissions target and a second
17 energy portfolio with the same forecast and load shape assumptions with a year 2030 38 MMT emissions
18 target These portfolios are similar in many ways. Each portfolio has the same:

- 19 • Amount of annual wholesale demand
- 20 • Commission provided commercial/industrial load shape
- 21 • Renewable energy targets based on the current renewable portfolio standard (RPS) requirements
- 22 • Total supply-side renewable energy in the portfolio, except in year 2030 when additional
23 greenhouse gas (GHG) free energy—assumed to be procured from RPS portfolio content
24 category one (PCC 1) renewable resources and large hydroelectric resources—is added to meet
25 GHG emissions targets
- 26 • RPS PCC 1 renewable resource mix of existing wind and solar based on 2020 procurement
- 27 • Addition of biomass as a new renewable resource technology

28 Calpine Solutions was surprised to discover that key assumptions of the Commission’s IRP models have
29 been changed from the assumptions provided in the 2018 IRP cycle. The three assumption changes that
30 have had a material impact on the size and technology types of the 2030 energy portfolios are the removal
31 of GHG-free resources from the system generation mix, the inclusion of behind-the-meter CHP emissions
32 and the treatment of the renewable generation curtailment and export hours in the IRP models. These
33 changes have had a profound effect on the size of the 2030 renewable resource mix, effectively requiring
34 additional GHG-free resources to be added to the 2030 energy portfolios above-and-beyond Calpine
35 Solutions’ 2030 resource mix identified in the 2018 IRP. In order to achieve the 2030 GHG emissions

¹ Calpine Solutions provides a summary of its current RA portfolio, but does not speculate as to what resources will meet future RA requirements.

1 benchmark for Calpine Solutions, significant amounts of large hydroelectric procurement will need to
2 occur, along with an emphasis on biomass procurement.

3 Calpine Solutions also commits to the following:

- 4 • Meeting all Commission promulgated Resource Adequacy (RA) requirements including local RA
5 and any future multi-year RA requirements
- 6 • Procuring adequate renewable energy and renewable energy credits (RECs) from contracts of ten
7 years or greater duration (long-term) in order to meet Senate Bill 350 (De Leon) requirements and
8 Commission promulgated RPS rules
- 9 • Reporting on RPS long-term contracting results in its next IRP
- 10 • Considering the impact to disadvantaged communities in its decision process prior to procuring
11 energy directly from non-renewable energy resources responsible for local air pollution should
12 any such unforeseen need arise

13 **II. Study Design**

14 **a. Objectives**

15 Calpine Solutions procures energy and RA on behalf of direct access customers throughout
16 California. The objectives for its IRP are to:

- 17 • Analyze two conforming portfolios of generation resources assuming forecasted load levels
18 provided by the Commission’s Energy Division and the default commercial & industrial load
19 shape as provided by the Commission;
- 20 • Estimate GHG emissions for the two conforming portfolios using the Commission approved,
21 clean net short method; and
- 22 • Show the conforming portfolios meets all requirements of Public Utility Code Section
23 454.52(a)(1).
- 24 • Incorporate the results of the IRP and the resource make-up of the conforming portfolios as a
25 guidepost for future renewables procurement.

26 **b. Methodology**

27 **i. Modeling Tool(s)**

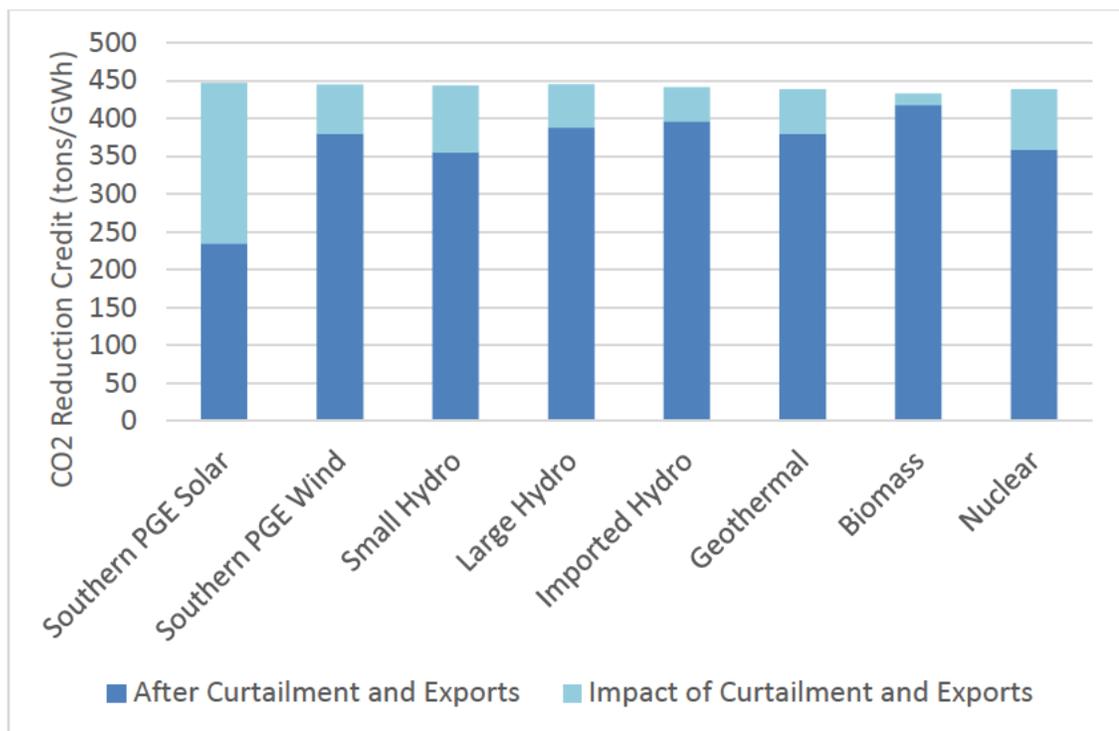
28 Calpine Solutions relied exclusively on Microsoft Excel software for all calculations in support
29 of its IRP. It created a spreadsheet model to create the resource portfolios. It then relied on the
30 Commission’s Clean System Power (CSP) calculator spreadsheet tool to estimate GHG
31 emissions and local criteria pollutants. It did not conduct any production cost modeling or
32 portfolio optimization studies. The GHG calculator and resource portfolio attached.

1 **ii. Modeling Approach**

2 **General Approach**

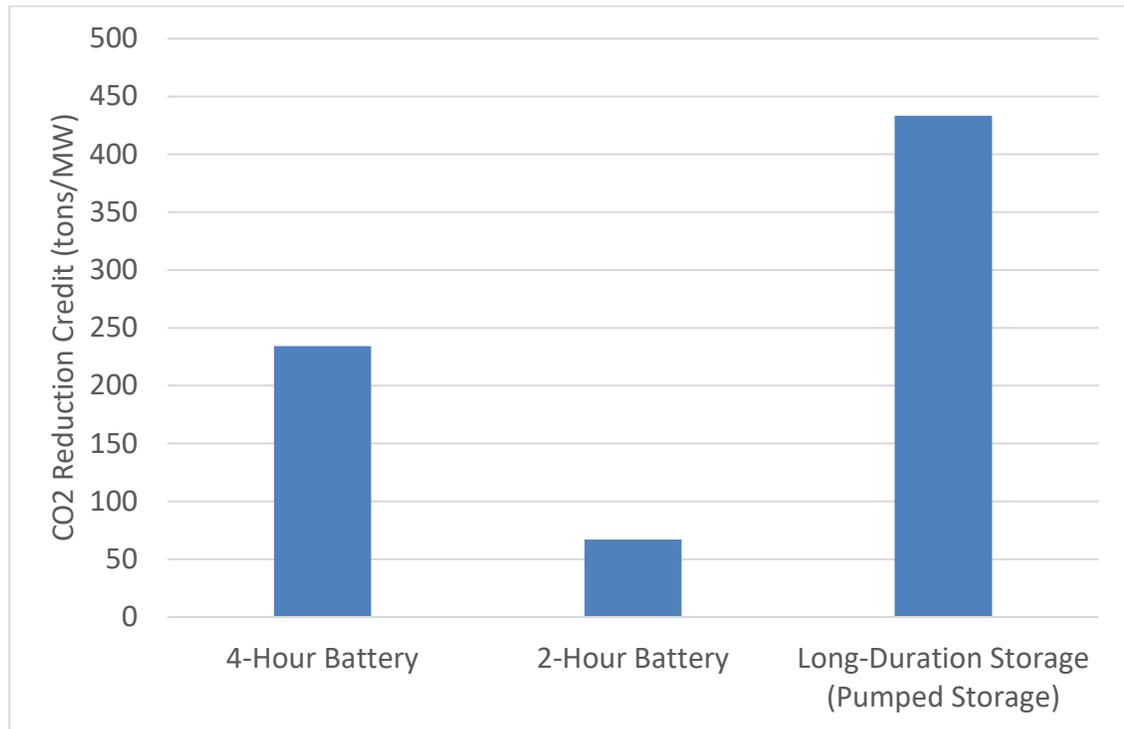
3 To determine a mix of resources in 2030 that will meet Calpine Solutions’ GHG emissions
4 target, Calpine Solutions analyzed the emissions reduction potential of different renewable
5 technology types listed in the CSP calculator. Calpine Solutions determined that the impact of
6 the renewable curtailment/export hours on the emissions reductions is significant. During these
7 curtailment hours, the CSP calculator assigns a fixed amount of GHG emissions to each LSE
8 depending on the LSE’s load. Therefore, during these hours, generation from renewable or
9 GHG free energy sources has no impact on the emissions assigned to an LSE. Because solar
10 generation is predicated to have the most curtailment of any resource technology type during
11 such hours, it has a lower GHG emissions reduction potential than other generation resources
12 on a per GWh basis. This impact is summarized in the chart below.

13 Figure 1. GHG emissions reduction potential by resource type in CSP calculator. GHG emissions
14 reduction potential of wind and solar for the Southern PGE region are similar to wind and solar in other
15 regions.



16
17 Similarly, when storage charges during these hours, the CSP calculator adds no emissions to an
18 LSE. Thus, the addition of storage resources reduces an LSE’s GHG emissions without adding
19 any renewable or GHG-free energy, as shown below.

1 Figure 2. GHG emissions reduction potential of storage resources in CSP calculator.



2

3 Calpine Solutions used the numbers in the previous two charts as guidelines for what renewable
4 and GHG free generation technologies to include in its 2030 portfolio. Specifically, Calpine
5 Solutions added more technology types than just new solar energy given its reduced GHG
6 emissions reduction potential. The final 2030 generation resource mix selected is discussed
7 further below.

8 **Renewable Resources**

9 Each conforming portfolio includes the current contracts for RPS PCC 1² renewable resources
10 Calpine Solutions has procured to serve its retail customers. In comparison to the 2018 IRP,
11 Calpine Solutions has significantly increased reliance on long-term (10-years or longer in
12 duration) RPS contracts. This change in contracting term was driven exclusively by the RPS
13 compliance requirements as established by SB 350 and implemented by Commission
14 Decisions.³ Thus, all the years modeled (2020, 2022, 2026, and 2030) reflect actual RPS
15 contracts. Long-term RPS contracts that expire prior to Year 2030 are assumed to be renewed.
16 Year 2030 incorporates a mix of renewable resource technology types as actually procured for
17 2021. However, in order to meet the intervening years' RPS compliance percentages, Calpine

² Commission D.11-12-052.

³ Commission D.17-06-026. Et al.

1 Solutions modeled additional wind, solar and biomass RPS procurement⁴. The level of RPS
2 PCC 1 energy and RECs in each portfolio is the minimum needed to satisfy RPS portfolio
3 content and portfolio quantity requirements for the intervening years and for year 2030, the
4 additional GHG emissions targets (see Additional Resources below). Additional RPS PCC 2
5 and RPS PCC 3 RECs⁵ are added as required to meet the applicable annual RPS portfolio
6 content and portfolio quantity compliance percentage targets.

7 **Additional Resources**

8 Currently, Calpine Solutions procures unspecified system power to meet customer energy
9 demand above that met with RPS PCC 1 renewable resources as required to comply with
10 California RPS Program This is forecasted to continue through year 2029 for both portfolios. In
11 order to meet the 2030 GHG emissions target assigned to Calpine Solutions and once the RPS
12 compliance is forecast to be met, each portfolio requires additional GHG-free energy in order to
13 meet the GHG emissions targets the Commission has set for Calpine Solutions. That
14 procurement, currently forecasted to come from in-state large hydroelectric generation is then
15 added as additional resources. If, as Calpine Solutions approaches year 2030, in-state large
16 hydroelectric generation is not available in procurement quantities sufficient to meet the year
17 2030 GHG emissions target, Calpine Solutions is prepared to add other additional GHG free
18 generation resources (e.g. battery storage). However, this alternative procurement plan is
19 highly speculative and therefore not forecasted in this year's IRP.

20 As with all ESPs, Calpine Solutions is mandated by the Commission to contract for energy
21 storage capacity equivalent to one percent (1%) of its Year 2020 peak demand per the
22 Commission's directive following passage of AB 2514.⁶ However, ESPs also receive a storage
23 procurement credit for a portion of energy storage procured by investor owned utilities (IOUs)
24 done for reliability purposes. As of the date of the 2020 IRP, Calpine Solutions estimates it
25 does not need to directly contract for any additional storage capacity under AB 2514's
26 obligations due to these credits⁷. However, Calpine Solutions is entering into long-term
27 contracts with renewable generation facilities that plan to add battery storage as part of the
28 project's development, therefore even though it is not assumed in this year's IRP that Calpine
29 Solutions' will add significant battery storage to its portfolio by 2030 it is still reasonable to
30 consider these resources as a backup plan, though the actual timing of the contracts and
31 resource installation unknown at the time of this year's IRP.

32
⁴ Please note that a certain solar facility have been modeled as wind energy. Calpine Solutions expects this contract to deliver wind RECs and may or may not deliver solar PV RECs.

⁵ Commission D.11-12-052.

⁶ Commission D.13-10-040, pg. 2.

⁷ See Calpine Solutions Advice Letter 53-E, filed December 18, 2019.

1 **GHG Emissions**

2 Calpine Solutions relied upon the Commission-approved GHG calculator spreadsheet tool to
3 estimate GHG emissions from each conforming portfolio using the CSP method. Of all
4 renewable energy resource contracts, only RPS PCC 1 resources are considered GHG free by
5 the Commission.⁸ The amount of capacity for each RPS PCC 1 resource type entered into the
6 “Capacity Inputs” section of the spreadsheet produces the energy generation included in a given
7 energy portfolio. It may differ from actual capacity of contracted resources if the assumed
8 capacity factor in the spreadsheet is different from the actual capacity factor of the resource.

9 **Resource Adequacy**

10 RA is procured separately from energy. Calpine Solutions’ procurement of 2020 RA is
11 complete and summarized here in Section 3 of the IRP. Because of Commission changes to the
12 RA program since Calpine Solutions filed its 2018 IRP⁹, there has been tangible amounts of
13 RA acquired for future years. These quantities are reported in the resource template.¹⁰ Calpine
14 Solutions has chosen not to speculate as to what resources will provide RA beyond its existing
15 RA contracts especially in light of the Commission’s recent revisions to the RA procurement
16 obligations of load serving entities in regards to local RA¹¹. The Commission also signaled
17 “...that the Commission agrees that there may be potential benefits to expanding multi-year
18 requirements to system and flexible RA, and will continue to monitor and evaluate the multi-
19 year local RA program to consider expansion to flexible and/or system RA in the future.”¹²
20 Calpine Solutions is committed to meeting all RA requirements as promulgated by the
21 Commission, including future multi-year RA requirements for system and flexible RA
22 attributes. In addition, Calpine Solutions, and all ESPs, also receive a RA allocation for a
23 portion of RA procured by the IOUs for reliability purposes when the cost of the procurement is
24 borne by all customers; this allocation of RA is part of the Cost Allocation Method (CAM) and
25 is included in the resource template.

26 **Load Shape**

27 Since Calpine Solutions serves no residential customers Calpine Solutions elected to adopt the
28 Commission provided commercial & industrial load shape as provided in the CSP calculator as
29 the default profile to represent Calpine Solutions’ expected load shape in this IRP. The
30 commercial & industrial load shape is the sum of five separate load profiles: Baseline net
31 energy for load, electric vehicle load, other electrification, energy efficiency, and behind-the-
32 meter photovoltaics. These default load profiles are unaltered by Calpine Solutions.

⁸ Attachment A, OIR, R.16-02-007, May 25, 2018, pg. A-1.

⁹ D.19-02-022, March 4, 2019

¹⁰ Refer to Section 5a of the IRP for further details.

¹¹ D. 20-06-002.

¹² D.19-02-022, Page 33.

1 III. Study Results

2 a. Conforming and Alternative Portfolios

3 Calpine Solutions elected to analyze two conforming portfolios and no alternative portfolios.
4 The two conforming portfolios are targeted to meet the two GHG emissions benchmarks
5 assigned by the Commission to Calpine Solutions: one at 46 MMT and one at 38 MMT. Per
6 direction by Commission Staff, Calpine Solutions used the 2020, 2022, 2026 and 2030
7 forecasted energy demand as provided by Commission Staff. Calpine Solutions appreciates the
8 Commission providing, in the CSP calculator, ESPs the opportunity to rely on a load shape that
9 more accurately reflects the type of customers that ESPs serve. This is an improvement to the
10 IRP modeling and the lack of suitable Commission provided load shapes was of particular note
11 in Calpine Solutions' 2018 IRP. Additionally, the Commission Staff provided Calpine
12 Solutions a detailed energy demand forecast for all years, 2020 through 2030. Calpine
13 Solutions notes that the Commission provided energy demand forecast is optimistic and
14 exceeds Calpine Solutions' internal assessment of additional direct access load growth in the
15 coming decade.

16 The table below summarizes the annual load forecast used in each portfolio and shows the
17 calculated load ratio share used to allocate CAISO system battery capacity to Calpine
18 Solutions.

19 Table 1. Calpine Solutions annual load forecast (GWh) and calculated load ratio share.

	2020	2022	2026	2030	NOTES
Calpine Solutions' Total Managed Net Energy for Load	█	█	█	█	<i>Forecast provided by Commission Staff</i>
CAISO Total Managed Net Energy for Load	205,907	204,065	205,132	206,953	
Load Ratio Share	█	█	█	█	

20
21

21 b. Preferred Conforming Portfolios

22 The following table shows the default assumptions used to construct the load shape for the
23 conforming portfolios based on the inputs in the CSP calculator. The input retail sales numbers
24 are higher than current retail sales because Calpine Solutions was assigned by Commission Staff
25 a load ratio slice of presumed future increases in direct access customer participation. Also
26 impacting the forecasts are the average historical transmission and distribution losses. Calpine
27 Solutions, which serves commercial and industrial customers solely, by-and-large take power
28 deliveries at higher voltages than residential customers and therefore incur less distribution
29 losses. Calpine Solutions' historical distribution loss percentage is approximately 4.5%. This
30 historical loss percentage is substantially lower than system average losses input into the CSP
31 calculator, which is 7.3%.

1 Table 2. Calpine Solutions load assumptions used for conforming portfolios. Numbers are in GWh.

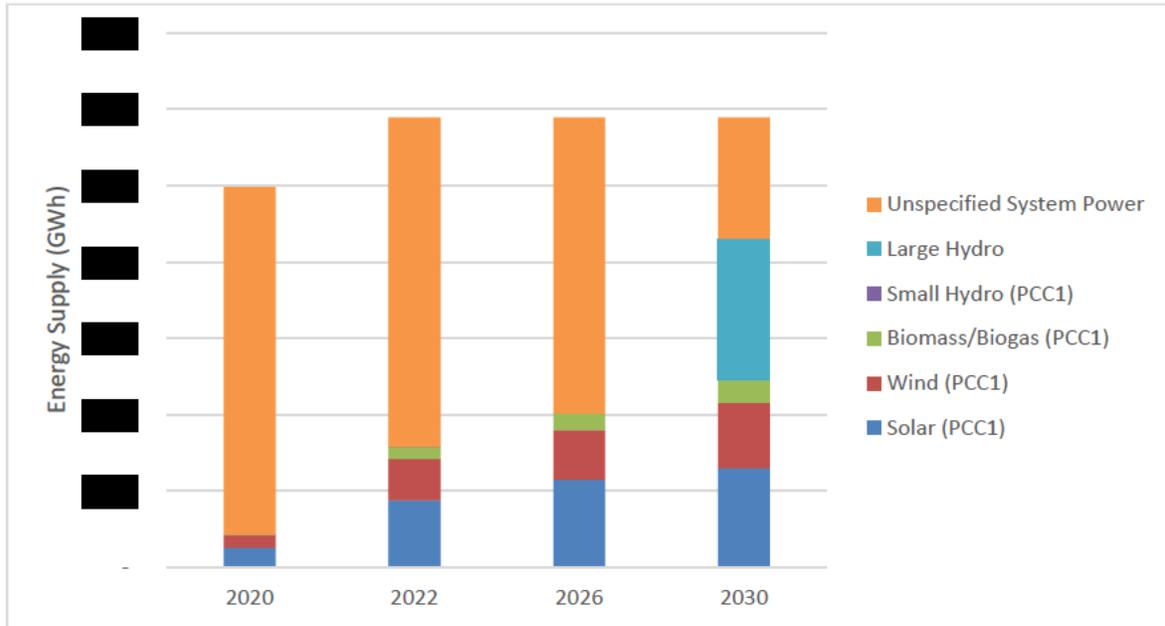
	2020	2022	2026	2030
Assigned Load Forecast for IRP (i.e., Managed Retail Sales Forecast)	████	████	████	████
Calculated Demand (based on sales-weighted share of total from IEPR)				
Baseline net energy for load (no BTM PV, EV, electrification, energy efficiency)	████	████	████	████
Electric Vehicle Load	██	██	██	██
Other Electrification	██	██	██	██
Energy Efficiency	██	██	██	██
BTM PV	██	██	██	██

2 The figure below shows the conforming portfolios by resource type on an energy basis. This
 3 includes RPS PCC 1 wind and solar resources as well as customer behind-the-meter solar
 4 generation based on default assumptions. All demand growth is attributable to the Commission
 5 Staff’s allocation of a load ratio slice of presumed future increases in direct access customers’
 6 participation.

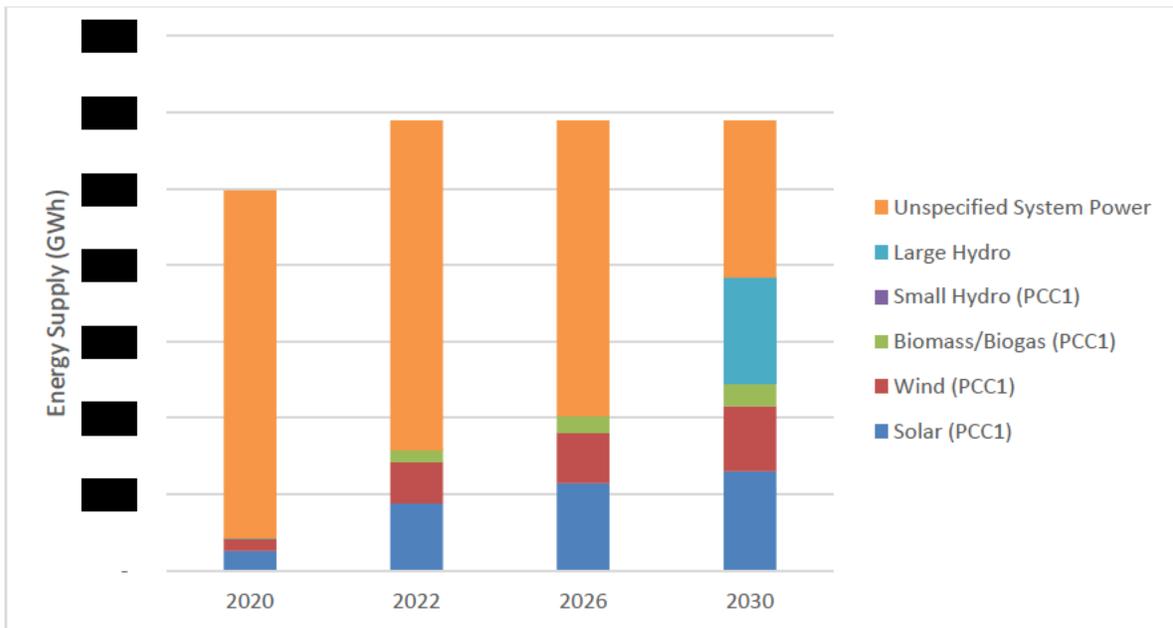
7 The dramatic drop in Calpine Solutions’ reliance on system power in year 2030 is attributable to
 8 the added GHG-free energy resources needed to bring the year 2030 conforming portfolio GHG
 9 emissions under the Commission’s GHG emissions benchmarks of █████ MMT (46 MMT
 10 conforming portfolio) or █████ MMT (38 MMT conforming portfolio) (See Table 3). To achieve
 11 this target level, Calpine Solutions is forecasting the need to either procure additional GHG-free
 12 energy or accept its prorated share of GHG-free energy associated with the investor owned utility
 13 (“IOU”) power charge indifference adjustment (“PCIA”), assumed in this analysis to be in-state
 14 large hydroelectric energy¹³, in an amount that equals █████ of Calpine Solutions’ wholesale
 15 energy demand (approximately █████) in the 46 MMT portfolio and █████ of Calpine
 16 Solutions’ wholesale energy demand (approximately █████) in the 38 MMT portfolio
 17 Without the incremental addition of GHG-free energy in excess of year 2030 RPS procurement
 18 obligation percentages, year 2030 GHG emissions would otherwise have been █████ or
 19 █████ respectively for each conforming portfolio.

¹³ Future IRPs may include nuclear GHG-free energy based on an as yet to be determined future prorated allocation of GHG-free energy from the IOUs based on PCIA.

1 Figure 3. Calpine Solutions 38 MMT portfolio energy by resource type. Calculated at generator busbar.
 2 Small Hydro portion is so small (2 GWh for years 2020 and 2022) it is not visible on the chart.



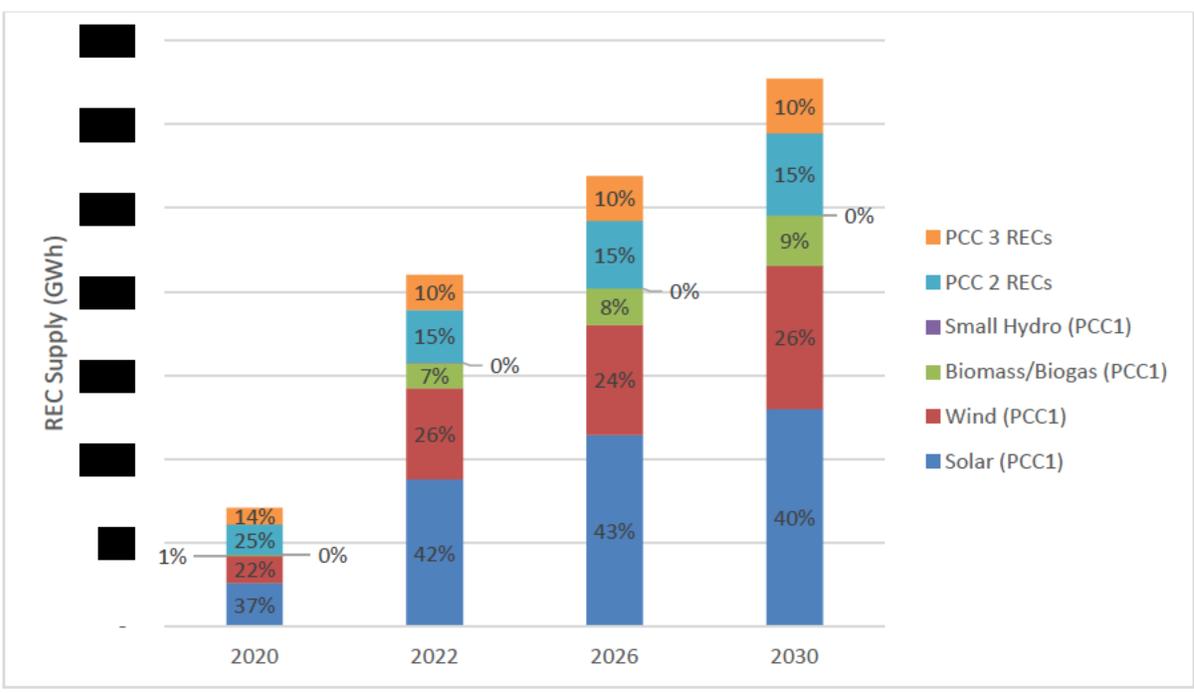
3
 4 Figure 4. Calpine Solutions 46 MMT portfolio energy by resource type. Calculated at generator busbar.
 5 Small Hydro portion is so small (2 GWh for years 2020 and 2022) it is not visible on the chart.



6
 7 Figure 1 above only reports RPS PCC 1 procurement as this procurement, by definition, provides
 8 energy to the CAISO system. In addition to RPS PCC 1 procurement, Calpine Solutions will also
 9 procure additional RPS RECs from RPS categories two and three (PCC 2 and PCC 3) to meet the
 10 Commission's RPS percentage obligations. The figure below shows this graphically. Per current
 11 legislation, RPS PCC 3 resources can only meet at most 10% of Calpine Solutions RPS

1 obligation and RPS PCC 1 must be at least 75% of Calpine Solutions RPS requirements. Calpine
 2 Solutions procures the maximum allowed RPS PCC 3 RECs and minimum amount of RPS PCC 1
 3 resources in order to manage overall RPS compliance costs, purchasing the remaining RPS
 4 compliance percentage obligation with RPS PCC 2 RECs. As the figure shows, Calpine Solutions
 5 assumes its RPS portfolio will have the same percentages by product content category for each
 6 year analyzed.

7 **Figure 5. Calpine Solutions conforming portfolio of RECs needed to meet RPS requirement. Results are**
 8 **the same for both portfolios.**



9
 10 The table below compares the amount of new resources in Calpine Solutions’ conforming
 11 portfolios with its load ratio share of new resources in the RSPs in 2030. The table shows that
 12 Calpine Solutions is expecting to procure enough energy and PCC1 RECs from new renewable
 13 resources to exceed its load ratio share of the RSPs. The mix of new renewable resources in
 14 Calpine Solutions’ conforming portfolios is in the range of the mix in the 46 MMT and 38 MMT
 15 portfolios, except that Calpine Solutions expects to rely on in-state wind as opposed to out-of-
 16 state wind energy that is not dynamically scheduled into the California ISO. More about out-of-
 17 state wind is discussed in the Out-of-State Wind Development section of the IRP.

18 Unlike the RSPs, Calpine Solutions does not include any new battery storage, long-duration
 19 storage, or shed demand response resources in its conforming portfolios¹⁴. The lack of storage
 20 resources stems from Calpine Solutions’ decision to rely on existing hydroelectric generation to

¹⁴ However, Calpine Solutions’ scheduling desk works with certain large customers that have the flexibility in their production processes to react to California ISO day-ahead prices and adjust their processes, and hence electricity demand, in response to these price signals.

1 meet its 2030 emissions benchmark instead of other resource types. Calpine Solutions discusses
 2 its hydroelectric generation reliance in further detail in the Hydro Generation Risk section of the
 3 IRP.

4 Table 3. Comparison of new resources in RSPs and Calpine Solutions portfolios in 2030.¹⁵
 5

	Load Ratio Share of Reference System Portfolios		Calpine Solutions Portfolios
	38 MMT	46 MMT	38 MMT and 46 MMT
Short-Duration Storage (MW/MWh Capacity)	██████████	██████████	-
Long-Duration Storage (MW/MWh Capacity)	██████████	██████████	-
Renewable Energy (GWh)	██████████	██████████	██████████
Renewable Energy Mix ¹⁶	Solar: 57% In-State Wind: 24% Out-of-State Wind: 19%	Solar: 76% In-State Wind: 19% Out-of-State Wind: 5%	Solar: 65% In-State Wind: 35%
Shed Demand Response (MW)	██████████	██████████	-

6
 7 Actual procurement of RPS renewable resources may differ from the mix of resources shown in
 8 the table and charts above, depending on RPS resource economics and RPS resource
 9 commercial availability and impact on 2030 GHG emission targets. Calpine Solutions will
 10 provide updated estimates of its forecasted renewable energy portfolio technology mix in future
 11 IRPs to be filed with the Commission.

12
 13 Since the California Air Resources Board (“CARB”) GHG emissions benchmark range is
 14 higher than that calculated from the Commission’s GHG targets for direct access demand¹⁷,
 15 Calpine Solutions’ conforming portfolios will be below the minimum GHG emissions range as
 16 set by CARB for Calpine Solutions. The GHG emissions result of ██████████ or ██████████
 17 respectively for each conforming portfolio, predicted when no incremental RPS PCC 1
 18 procurement is added to the year 2030 conforming portfolio, falls within the CARB GHG

¹⁵ These resource categories and those in Table 15 roughly correspond to those listed in ordering paragraph six of D. 20-03-028, with shed demand response as the only resource in the "Other Resources" category. Hybrid resources are omitted because they are not included in the RSPs.

¹⁶ Sanborn Solar is modeled as a solar PV resource in this Table.

¹⁷ CARB’s published GHG emission planning target ranges for Calpine Solutions is between ██████████ and ██████████ of CO₂ equivalent.¹⁷ This is above the targets of ██████████ and ██████████ calculated using the Commission’s methodologies.

emissions benchmark range for Calpine Solutions. This result indicates that no additional incremental procurement of GHG-free energy above the 2030 RPS percentage obligation is required in order to meet the CARB target.

c. GHG Emissions Results

Calpine Solutions adopted the Commission-approved GHG emissions benchmarks for direct access customers in each California IOU service territory. To translate these benchmarks into an appropriate benchmark for Calpine Solutions specifically, we use a load ratio share allocation, as built directly into the CSP calculator tool and as shown in the table below. Load ratio share is calculated separately for each service territory.

Table 4. Calculation of Calpine Solutions’ 2030 GHG emissions benchmark for both portfolios.¹⁸

Scenario	LSEs within Utility Territory	2030 DA GHG Emissions Benchmark (MMT)	2030 DA Load (GWh)	Calpine Solutions’ 2030 Load (GWh)	Calpine Solutions’ Benchmark (MMT)
38 MMT	Pacific Gas and Electric Company (Direct Access)	1.6111	11,400	█	█
	Southern California Edison Company (Direct Access)	1.6062	13,450	█	█
	San Diego Gas and Electric Company (Direct Access)	0.6178	3,940	█	█
	TOTAL		28,790	█	█
46 MMT	Pacific Gas and Electric Company (Direct Access)	2.0168	11,400	█	█
	Southern California Edison Company (Direct Access)	2.0228	13,450	█	█
	San Diego Gas and Electric Company (Direct Access)	0.7708	3,940	█	█
	TOTAL		28,790	█	█

The table below shows Calpine Solutions’ GHG emissions results from the CSP calculator. In 2030, emissions levels fall just below the benchmarks listed in the table above for each scenario.

Figure 6. Calpine Solutions GHG emissions results.

Scenario	Emissions Total	Unit	2020	2022	2026	2030
----------	-----------------	------	------	------	------	------

¹⁸ GHG emissions benchmarks shown in the table are net of BTM CHP emissions, as provided in the CSP calculators.

38 MMT	CO ₂	MMt/yr	1.80	1.60	1.54	0.70
46 MMT	CO ₂	MMt/yr	1.80	1.61	1.57	0.88

1

2

d. Local Air Pollutant Minimization and Disadvantaged Communities

3

i. Local Air Pollutants

4

Calpine Solutions exclusively serves nonresidential commercial, industrial and institutional customers in all three IOU service territories, excluding a small number of incidental residential accounts that are financially associated with a large commercial or institutional customer, such as university dormitories. Calpine Solutions compared the zip codes associated with the disadvantaged communities as defined in Commission D. 18-02-018 to the service accounts that Calpine Solutions currently serves. Calpine Solutions does not track service account by census tract. Comparing by zip code may overstate the number of service accounts in disadvantaged communities because there is not a one-to-one relationship between the census tract boundary and the zip code boundary with the zip code boundary being a larger area. Calpine Solutions serves approximately 6,400 service accounts out of approximately 13,500 total service accounts¹⁹ between the three IOU service territories in disadvantaged communities. This number of service accounts represents 276 zip codes that were identified with a CalEnviroScreen 3.0 score in the 75% percentile or greater. A complete list of the identified zip codes is too burdensome to include in this narrative, however, Calpine Solutions is willing to make that list available to the Commission upon Commission request. Intuitively these results make sense; the industrial sections of California tend to have higher local pollution than exclusively residential neighborhoods and since Calpine Solutions only serves nonresidential commercial, industrial and institutional customers, these business customers are more likely to be located in industrial sections of California.

23

The table below summarizes expected NO_x, PM2.5, and SO₂ emissions from gas-fired generation within each portfolio. Calpine Solutions does not directly contract with any fossil-fired generation to meet its energy needs, and has no plans to in the future. All gas generation in each portfolio is from CAISO system power. The emissions are estimated directly within the CSP calculator.

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As the table shows, emissions increase over time. This is largely due to the increasing addition of biomass resources to the portfolio.

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Table 5. Calpine Solutions estimated NO_x, SO₂, and PM2.5 emissions for both portfolios.

Scenario	Emissions Total	Unit	2020	2022	2026	2030
38 MMT	PM2.5	tonnes/yr				

¹⁹ Calpine Solutions currently serves approximately customers.

	SO ₂	<i>tonnes/yr</i>				
	NO _x	<i>tonnes/yr</i>				
46 MMT	PM2.5	<i>tonnes/yr</i>				
	SO ₂	<i>tonnes/yr</i>				
	NO _x	<i>tonnes/yr</i>				

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ii. Focus on Disadvantaged Communities

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Calpine Solutions has no specific information on how these emissions impact disadvantaged communities. Because the gas generation represents a slice of the entire CAISO system, these emissions should be spread over all gas generation in the system. Although Calpine Solutions has no plans to contract for energy from specific gas generation in the future, if for some reason there is a need to procure energy from these types of non-renewable generation resources, Calpine Solutions will consider the impact to disadvantaged communities in its decision process.

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e. Cost and Rate Analysis

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As an ESP, Calpine Solutions operates in a competitive market with customers free to choose among a host of ESPs and Community Choice Aggregators and these customers demand the products and services that best meet their needs and budgets. Thus, maintaining competitive pricing is critical to maintaining satisfied customers. Calpine Solutions notes that the Commission has a more limited scope of oversight over ESPs. ESPs are not regulated as “public utilities;” the Commission does not regulate retail transactions by ESPs or establish rates for ESP products or services, nor does the Commission directly review and approve of the procurement activities of ESPs undertaken in order to serve an ESP’s retail transactions which includes cost quantification information. However, in order to be responsive to the Commission and the IRP process, costs for energy, RPS and RA procurement to meet Calpine Solutions’ retail sales in California have increased since the 2018 IRP and are approximately [REDACTED] per year. Calpine Solutions also provides detailed renewable cost and rate impact, both historical and forecast in Calpine Solutions’ annual RPS Progress Report, Appendix B, filed in Commission Rulemaking 18-07-003.

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f. System Reliability Analysis

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Calpine Solutions is committed to meeting all CPUC resource adequacy (RA) requirements. With the anticipated upcoming changes to the RA construct, including Commission compliance rule

1 changes and the procurement of local RA by a central procurement entity, it is difficult to forecast
2 RA procurement into the future. Nonetheless, Calpine Solutions has created an RA tracking table
3 per the Commission’s instructions, which is shown below. The tracking table is the same for both
4 of Calpine Solutions’ conforming portfolios. The RA portfolio includes the following resources:

- 5 • All executed contracts for RA with deliveries between 2020 and 2030. Calpine
6 Solutions only procures RA through RA-only contracts. All such contracts are short-
7 term deals with deliveries between 2020 and 2023 except for one contract: a long-term
8 contract for 15 MW of incremental net qualifying capacity (NQC) that will be used to
9 meet the requirements of D.19-11-016.
- 10 • Calpine Solutions’ allocated share of resources subject to the cost allocation
11 mechanism (CAM). Per the CPUC’s IRP filing requirements instructions, Calpine
12 Solutions included a share of all CAM resources in the most recent year-ahead CAM
13 list.²⁰ The share is estimated separately for each IOU territory as the ratio of Calpine
14 Solutions’ 2021 peak demand to the transmission access charge area peak demand
15 listed in the resource data template. The tracking table lists these resources as unknown
16 ELCC type with contract type online.
- 17 • Calpine Solutions’ allocated share of demand response resources from each IOU. For
18 purposes of the RA tracking table, the 2021 initial allocation was held constant through
19 2030 and is reported as an unknown ELCC type with contract type online.
- 20 • Calpine Solutions’ allocated share of resource must-run (RMR) contracts in the North
21 of Path 26 area. For purposes of the RA tracking table, the 2021 initial allocation was
22 held constant through 2030 and is bundled with the other CAM resources.
- 23 • To the extent there is still a gap in RA procurement needs, Calpine Solutions assumes it
24 will procure System RA using short-term, RA-only contracts from existing natural gas
25 generation resources. These are planned existing contracts for thermal resources in the
26 tracking table.

²⁰ CAM resources are included through the contract expiration date listed on the year ahead list.

1 Table 6. RA Tracking Table from resource data template. Tracking table is the same for both conforming
 2 portfolios.

System Reliability Progress Tracking Table (NQC MW) for month of September by contract status, 46 MMT portfolio	ELCC type	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
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1 Given the regulatory uncertainty in RA requirements and compliance discussed above, there is
2 therefore considerable uncertainty of resources in this portfolio. For instance, the Commission may
3 require long-term contracting for system RA in the near future. Calpine Solutions is well-positioned
4 to meet such requirements given its corporate affiliation with the largest generator of electricity from
5 natural gas and geothermal resources in the United States (i.e. Calpine Corporation). Calpine
6 Solutions also relies heavily on natural gas generation in this RA portfolio. Calpine Solutions will
7 likely substitute storage and additional renewable energy resources in the future as the Commission
8 finalizes the Net Qualifying Capacity such resources will contribute over the long-term and once
9 either of these resource types become cost-effective vis-à-vis existing natural gas-fired generation
10 resources or if the Commission mandates that such resources be procured to provide RA. Calpine
11 Solutions is prepared to adjust its IRP RA portfolio of resources to comply with any future
12 Commission requirements, and will report on these changes in future IRP filings.

13 **g. Hydro Generation Risk Management**

14 **Background**

15 Hydroelectric systems can be vulnerable to annual drought when there is both:

- 16 • Significant variation in annual precipitation over the watershed that feeds the hydroelectric
17 generation system, including low water-years that constitute drought conditions.
- 18 • A lack of large water reservoirs that provide multi-year energy storage.²¹

19 California's hydroelectric generation system meets these conditions and is vulnerable to drought.
20 Recent droughts in California illuminate the impact of dry conditions on total hydroelectric
21 generation output. The chart below shows 15 years of recent history of California annual
22 hydroelectric generation alongside the percent of California land area in at least moderate drought
23 according to the US drought monitor. This chart clearly shows an inverse relationship between
24 drought and the amount of hydroelectric generation.
25

²¹ Systems with large reservoirs have the ability to hold water in storage reservoirs from wet years for use in power generation during dry years, and are thus resistant to drought.

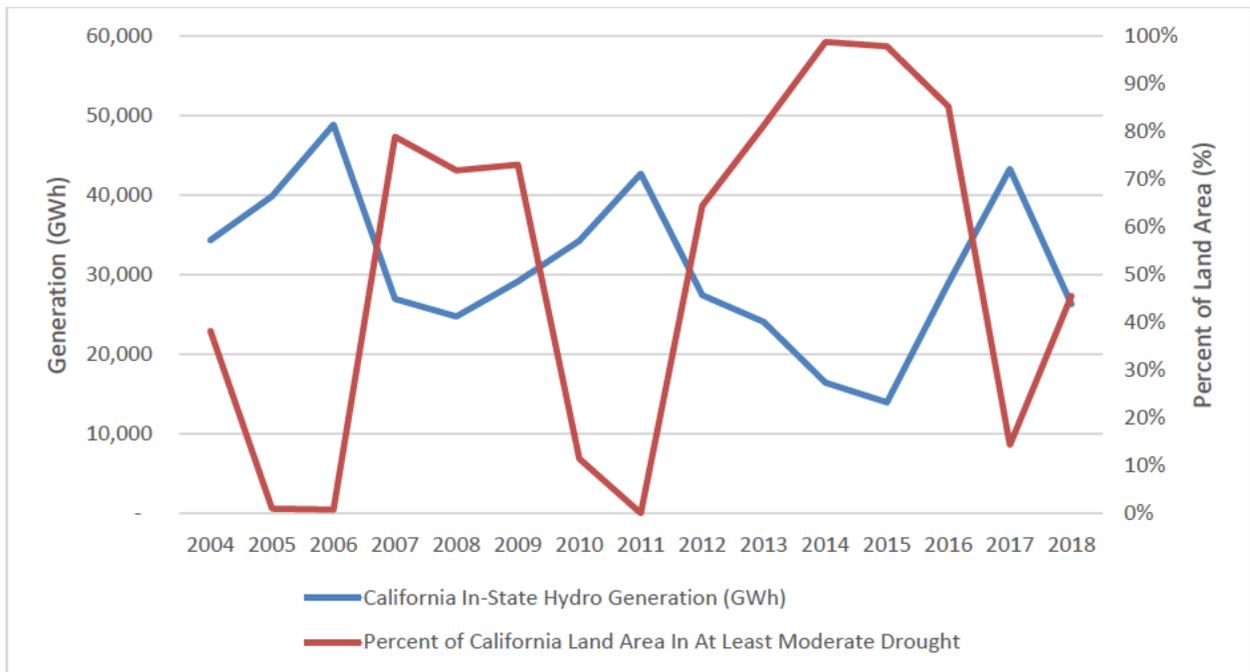


Figure 7. California In-State Hydroelectric Generation compared to percent of California land area in at least moderate drought for 15 years.²²

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Drought risk can impact generation system reliability. A drought in the Pacific Northwest was one of the precipitating events of the California energy crisis of 2000-2001. Drought risk in hydroelectric generation systems also manifests primarily as an energy constraint as opposed to a capacity constraint. This is because hydroelectric generation systems during droughts, provided they have some water storage and dispatch flexibility, can flow enough water through their powerhouses to generate up to their maximum capacity for short periods of time, but are limited in doing so for long periods because of a lack of water due to the drought. Hydroelectric systems with no effective water storage will be energy *and* capacity limited in a drought.

Some hydro-dependent system planners have chosen to incorporate drought-driven energy constraints directly in their reliability planning. The most stringent drought-based reliability standard in North America is Manitoba Hydro’s dependable energy requirement. In Manitoba, dependable energy is defined as the amount of energy a generator can produce during the lowest water-year since records have been kept. Those records stretch back to 1912, thus, at the time of this writing, Manitoba Hydro has a 1-in-109 year drought reliability planning standard.²³ Under this standard, Manitoba Hydro secures access to enough dependable energy to meet its annual energy demand. Under this planning standard there would be no energy shortage should the worst drought in the past 109 years recur.

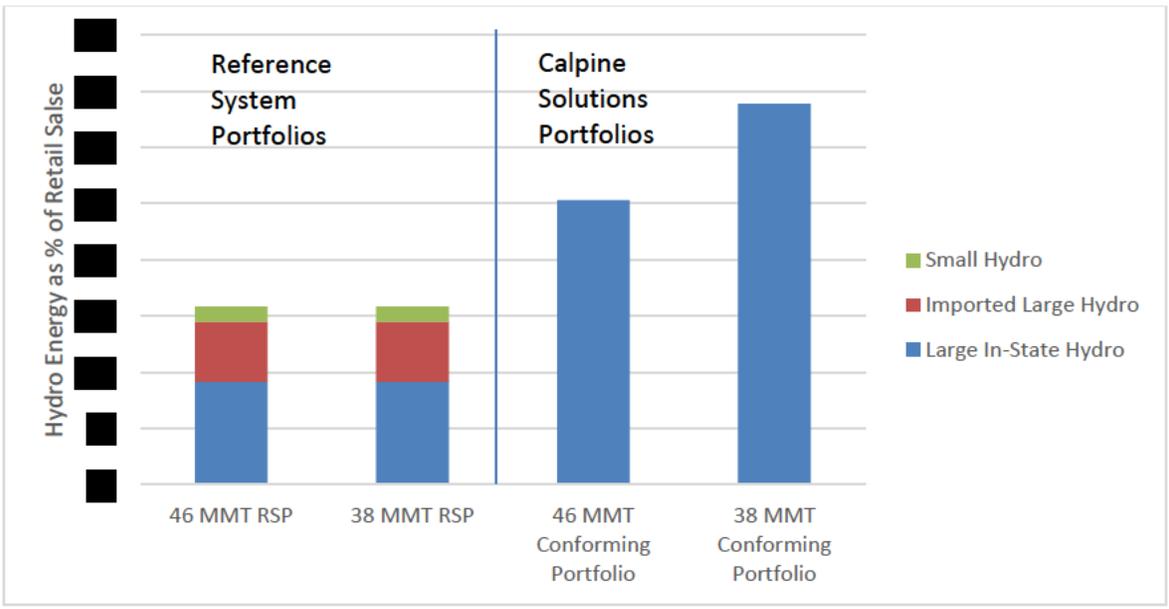
²² Generation data from CEC at: https://ww2.energy.ca.gov/almanac/electricity_data/total_system_power.html; Drought index data from: <https://www.drought.gov/drought/states/california>.

²³ For more on Manitoba Hydro’s generation planning criteria, see http://www.pubmanitoba.ca/v1/nfat/pdf/hydro_application/appendix_04_1_generation_planning_criteria.pdf.

1 California, however, has not incorporated energy requirements directly into its resource adequacy
2 construct.

3
4 **Calpine Solutions Drought Risk Compared to Reference System Portfolio**

5 The Calpine Solutions conforming portfolios are forecast by year 2030 to include contracts with
6 California hydro generation units. A comparison of the amount of hydro in Calpine Solutions’
7 portfolios and the RSPs is shown in the chart below.



8
9 Figure 8. Comparison of reliance on hydro generation in Calpine Solutions portfolios with RSPs. RSP
10 hydro generation is shown as a percent of CAISO retail sales and Calpine Solutions hydro generation is
11 shown as a percent of Calpine Solutions retail sales.

12 Calpine Solutions acknowledges that its 2020 IRP’s 2030 procurement portfolio contains more than
13 its load-ratio share of in-state hydroelectric generation. This technology type selection was
14 intentional. Calpine Solutions recognizes that there are other technology types available for its 2030
15 forecast available in order to achieve its GHG emissions targets (e.g. battery storage, long-duration
16 storage, additional renewables procurement). However, as with its selection of in-state hydroelectric
17 generation, at this point in time the 2030 renewables technology mix is highly speculative, forecasting
18 nearly 10-years into the future. As other renewable technology types become a more cost-effective
19 alternative to in-state hydroelectric generation, Calpine Solutions will not only model that
20 procurement into its future IRPs, but will also undertake procurement of that technology(ies) in order
21 to achieve its GHG emissions target in 2030.

22 **Calpine Solutions Hydroelectric Generation Risk Strategies**

23 Calpine Solutions does acknowledge that certain assumptions regarding hydroelectric production are
24 embedded in the calculations of average emissions rates in the CSP calculator tool. In a drought year,
25 greater amounts of natural gas-fired generation will likely be required, which could result in increased
26 generation from GHG emission creating natural gas-fired generators and therefore increase average

1 GHG emissions rates. However, Calpine Solutions has not attempted to analyze the impact of drought
2 on annual GHG emissions rates, and such an analysis would require access to the SERVM model
3 output that has not been shared with respondents.

4 In the future, the Commission may take a number of actions to reduce hydroelectric generation risk,
5 such as changing the assumptions in its production cost modeling of the Reference System Plan
6 (“RSP”) to ensure the RSP meets GHG emissions goals even in low water years or through research
7 into multi-year energy storage technologies. Calpine Solutions will monitor and participate in any
8 future Commission proceeding(s) on this issue and is prepared to meet any future Commission
9 requirements therefrom.

10 **h. Long-Duration Storage Development**

11
12 At the time of the preparation of this IRP, Calpine Solutions has not undertaken any long-term
13 duration storage procurement activities. Given the complexities and expense associated with
14 development of this particular technology, Calpine Solutions is monitoring the market and, more
15 importantly, legislation on this subject.

16 However, as noted in the Executive Summary, Calpine Solutions is a wholly owned retail
17 subsidiary of Calpine Corporation (“Calpine”). Calpine owns Nova Power, LLC (“Nova”). Nova
18 is a developer of energy storage facilities, which includes long-duration (e.g. 8-hour or greater
19 flow) storage technologies.

20 Based on the economics of this or similar long-duration storage projects, legislative mandates
21 and/or Commission directives, Calpine Solutions and our customers are in a unique corporate
22 position to participate in projects that Calpine and its development subsidiaries undertake. Calpine
23 has brought more energy projects successfully through the California Energy
24 Commission/California Environmental Quality Act permitting processes than any other energy
25 developer and has over three decades of experience participating in California’s energy markets.

26 **i. Out-of-State Wind Development**

27 In this IRP, Calpine Solutions’ wind technology renewable procurement is in-state and delivered to
28 a California balancing authority. However, Calpine Solutions’ renewable procurement team is
29 commercially engaged with wind generation developers for development of locations outside of a
30 California balancing authority.

1 Unfortunately, at the time of this IRP, the commercial opportunities available in this space are
 2 limited. Based on commercial dealings with prominent wind developers, Calpine Solutions
 3 ascertains that there is likely not enough incremental transmission available for the new wind
 4 development to rely upon the existing transmission network in order to deliver the new wind
 5 generation into California from Montana, Wyoming and New Mexico. However, there are some
 6 wind generation developers with sufficiently strong financial standing to overcome the credit and
 7 costs of transmission upgrades. Calpine Solutions works closely, and has an extensive existing
 8 commercial relationship with those wind generation developers in particular, in an effort to make
 9 new out-of-state wind developments a commercial reality.

10 **J. Transmission Development**

11 At the time of this IRP, Calpine Solutions does not have any executed renewable energy
 12 procurement contracts that are contingent upon a significant transmission upgrade or development.
 13 The location information of new resources for which Calpine Solutions has executed contracts is
 14 summarized in the table below.

15 Table 7. Location information for Calpine Solutions executed contracts with new resources.

Resource Name	Resource Type	Resource Capacity (MW)	Location	Interconnection Point	Coordinates	RESOLVE Area
Westland Almonds	Solar	19.88	Kern County, CA	Kent South Substation	36.2 Latitude -119.8 Longitude	Kern Greater Carrizo
Edwards Sanborn Solar I	Solar	40	Kern County, CA	Windhub Substation	35.2 Latitude -118.1 Longitude	Kern Greater Carrizo

16 Calpine Solutions is an ESP focused on suppling natural gas, electricity and associated energy and
 17 risk management services to retail commercial and industrial customers throughout the United
 18 States. Calpine Solutions tailors products and services to capture the benefits of customer choice
 19 and the value proposition available from competitive wholesale energy markets. As such, Calpine
 20 Solutions is not directly involved in transmission development. Under the business model
 21 described above, as Calpine Solutions contracts for new renewable resources, the contractual
 22 liability of timely transmission access and energy delivery to a California balancing authority is
 23 placed on the resource developer with associated financial penalties for failure to deliver on time.

1 In this IRP, Calpine Solutions extended both the duration and procurement quantities of existing
2 renewable energy procurement contracts in order to achieve RPS compliance in 2030. Therefore,
3 the geographical locations of this procurement is predicated on existing renewable generation
4 facilities. Calpine Solutions is not constrained by a preferred geographic location in its current nor
5 in its expected future renewable energy procurement. In addition, Calpine Solutions added
6 significant amounts of biomass renewable generation in this IRP. As with in-state hydroelectric
7 generation (see Section g), this technology type selection was intentional. Calpine Solutions
8 recognizes that there are other renewable energy technology types available for its 2030 forecast in
9 order to achieve the year 2030 sixty-percent RPS compliance. In this IRP, the selection of biomass
10 renewable generation as part of the 2030 renewables technology mix is highly speculative, as the
11 IRP is forecasting nearly 10-years into the future. As other renewable technology types over time
12 become an even more cost-effective alternative to biomass generation and, admittedly, less
13 emission intensive than biomass generation, Calpine Solutions will not only model those
14 technology types in its future IRPs, but will also undertake procurement of that technology(ies) in
15 order to achieve 2030 RPS compliance.

16 **IV. Action Plan**

17 **a. Proposed Activities**

18 Calpine Solutions constantly reviews its market positions to optimize its portfolio of all electricity
19 products. Calpine Solutions is evaluating the most appropriate commercial means of responding to
20 the prescriptive requirement of the IRP which have included significant changes to the required
21 quantities of long-term RPS contracting since the previous IRP.

22 With the passage of Senate Bill 350 (De Leon) in 2015, starting in the year 2021, Calpine Solutions is
23 required to have at least 65% of its RPS procurement obtained from contracts of ten years or greater
24 duration. Calpine Solutions plans to meet this RPS requirement and continues to be in commercial
25 negotiations with a number of renewable generation developers and marketers in order to fulfill this
26 obligation by the close of RPS Compliance Period 4 (2021-2024).

27 No significant change in the level of RPS and RA procurement activity is expected in the near term
28 under each conforming portfolio scenario; however, Calpine Solutions has become aware, based on
29 the results of this IRP's modeling, how important GHG-free energy procurement will be to achieving
30 its 2030 GHG emissions target and will act upon commercially prudent procurement opportunities of
31 these types of resources as they arise. Calpine Solutions will continue to monitor its expected level of
32 retail sales in light of the passage of SB 237 and analyze its expected customer load profile when
33 considering the technology mix of renewable resources that is most cost effective to serve its
34 customers' power needs and achieves the GHG emissions reduction target.

1 **b. Procurement Activities**

2 To date, Calpine Solutions has made significant progress in adjusting the duration of its RPS
3 procurement contracts portfolio. In Calpine Solutions’ 2018 IRP, the company had 4 RPS
4 procurement contracts that met the long-term contracting requirement of 10 years or greater. In this
5 IRP using year 2021 as an example, out of the 11 RPS procurement contracts that are expected to
6 deliver product in that year, eight of the RPS procurement contracts have an initial term of 10 years or
7 greater. Calpine Solutions has doubled the number of long-term RPS procurement contracts in its
8 portfolio since the previous IRP in 2018. The impact of this change in the portfolio duration, from a
9 REC volume standpoint, results in approximately 75 percent of the RECs expected to be delivered in
10 2021 will be associated with RPS contracts with initial terms of 10 years or greater.

11 Calpine Solutions will continue to add long-term RPS contracts in order to meet the product quantity
12 requirements and long-term RPS contracting percentage minimum of RPS Compliance Period 4.

13 Per an August 13th, 2020 email Commission directive from Kerry Fleisher, Calpine Solutions, as a
14 LSE that has elected to self-provide, offers the following Milestone #1 information:

- 15 New generation construction – Please refer to Appendix B
- 16 Other allowable resources – Please refer to Appendix B
- 17 Senior executive attestation – Please refer to Appendix B

18 **c. Potential Barriers**

19 Calpine Solutions does not anticipate any significant barriers in the near term to procuring resources
20 in line with the conforming portfolios. Given the current competitive cost of new renewable energy
21 development, at this time Calpine Solutions does not foresee the need for price increases of such
22 significance as to render the value proposition for its customers as moot in order to meet the 2030
23 GHG emissions targets, despite the need to procure additional GHG-free energy above the RPS
24 percentage requirements. As noted in the Sections on Out-of-State Wind and Transmission
25 Development, there is a need to address these potential physical and economic constraints to the
26 Western interconnect to renewable development in order to incent additional supply. Calpine
27 Solutions continues to closely monitor the cost of different renewable technologies compared to
28 reliance on system power. Should procuring additional renewable energy of certain technology types
29 beyond the RPS compliance targets become more economic than relying on CAISO system power, it
30 plans to pursue additional renewable energy procurement if those technology types effectively reduce
31 Calpine Solutions’ estimated GHG emissions. To date, system power continues to be the more
32 economic choice for our customers and the GHG emissions target is a little less than a decade in the
33 future. It will also monitor developing technologies through Calpine Solutions’ corporate affiliation
34 with Calpine Corporation, especially battery storage and long-duration storage, designed to further
35 grid integration of intermittent renewable energy and procure such new resources as it becomes cost-
36 effective for RA purposes.

1 One barrier to which Calpine Solutions wishes to draw the Commission’s attention is the changing
2 modeling assumptions in this year’s IRP from the last reporting period’s IRP in 2018, as noted in the
3 Executive Summary. If IRP modeling assumption continue to change with similar dramatic results, at
4 some point in the next handful of years the opportunities for Calpine Solutions to *cost-effectively* meet
5 or exceed the GHG emissions target in year 2030 diminish. If this issue arises, it will be primarily
6 due to the procurement constraining effect associated with the long-term RPS contracting
7 requirement. Over time, this contracting requirement reduces Calpine Solutions’ flexibility to
8 reshape and/or reallocate its mix of renewable technologies in a cost effective and commercially
9 practicable manner while still achieving RPS compliance mandates. If, in the latter half of this
10 decade, key IRP assumptions change from the previously filed IRP, Calpine Solutions may end-up in
11 a situation in which it undertakes additional and unanticipated costly renewable and/or GHG-free
12 energy procurement in order to meet the GHG emissions results derived from the ever changing IRP
13 model. Based on the significance of the changes in certain assumptions between the 2018 IRP model
14 and the 2020 IRP model, Calpine Solutions was surprised to discover that these modeling changes
15 resulted in an unanticipated significant increase in the quantity of GHG-free energy required to meet
16 the GHG emissions targets.

17 **d. Commission Direction or Actions**

18 Calpine Solutions has no additional requests for the Commission at this time other than what was
19 noted in the Potential Barriers Section.

20 **e. Diablo Canyon Power Plant Replacement**

21 As noted in previous Sections of this IRP, Calpine Solutions has undertaken and continues to
22 undertake extensive reshaping of the duration of its renewable energy contracts in order to meet SB
23 350’s (De Leon) long-term RPS contracting requirement, as promulgated by the Commission. At
24 least two of the long-term RPS contracts that Calpine Solutions has executed have resulted in either
25 new renewable generation resources being developed, and on-line, or expected to be developed and
26 on-line prior to year 2026, the year that Diablo Canyon Nuclear Power Plant is scheduled to be retired
27 from service. These two long-term RPS contracts are expected to deliver approximately 175,000
28 GWhs of renewable energy per year as Calpine Solutions continues to layer in additional long-term
29 RPS contracts in order to meet the long-term contracting requirements of RPS Compliance Period 4
30 (2021-2024).

31 **V. Lessons Learned**

32 As noted in the Introduction, Calpine Solutions was surprised to discover that key assumptions of the
33 Commission’s IRP models have changed from the assumptions provided in the 2018 IRP cycle. There
34 were at least three assumption changes that had a material impact on the size of the GHG-free energy
35 procurement in the 2030 energy portfolios; the removal of GHG-free resources from the system

1 generation mix, the inclusion of behind-the-meter CHP emissions and the treatment of the renewable
2 generation curtailment and export hours in the IRP models. These changes have had a profound effect on
3 the size, as a percentage of total energy procurement, of the 2030 renewable resource mix, effectively
4 requiring additional GHG-free resources be added to the 2030 energy portfolios above-and-beyond
5 Calpine Solutions' 2030 preferred resources mix identified in the 2018 IRP. In order to achieve the 2030
6 RPS compliance mandate of 60 percent renewable energy and the GHG emissions target, Calpine
7 Solutions will need to procure significant amounts of large hydroelectric energy (or other cost-effective
8 renewable technology types or cost-effective GHG-free energy resource types), along with an increased
9 emphasis on biomass procurement (or other cost-effective renewable technology types) for RPS
10 compliance purposes. Battery storage, increases in renewable energy procurement above the RPS
11 compliance percentages and acquisition of long-term duration storage may also occur as cost-effective
12 opportunities arise to achieve GHG emissions reductions and as an alternative if hydroelectric energy
13 procurement fails to materialize in sufficient quantities to achieve the GHG emissions target by 2030.

14 Calpine Solutions is also concerned about future system reliability. With increasing reliance on variable
15 resources, especially hydro generation, wind, and solar, that have energy limitations on an annual,
16 seasonal, and hourly basis, the use of a planning reserve margin during peak hours as the only reliability
17 metric is likely insufficient. In this IRP cycle, the CPUC modelers discovered that an early version of the
18 RSP selected by RESOLVE, which was targeted to meet the planning reserve margin could not meet the
19 loss of load expectation standard. This indicates that the CPUC needs to begin the process to enhance and
20 define new reliability standards that will guide future procurement to be successful in meeting demand
21 reliably in a decarbonized world. The discussions underway in Track 3 of the RA proceeding are a good
22 first step toward this goal.

23

24

OFFICER VERIFICATION FORM

I am an officer of the reporting organization herein, and am authorized to make this verification on its behalf. The statements in the foregoing document are true of my own knowledge, except as to matters which are therein stated on information or belief, and as to those matters I believe them to be true.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on August 31st, 2020 at San Diego, California

A handwritten signature in black ink, appearing to read 'Drake Welch', is written above a solid horizontal line.

Drake Welch, Vice President Customer Care

APPENDIX A

Confidential Worksheets

Resource Data Templates:

NES_rdt_46mmt_conforming_na_v1.xlsx

NES_rdt_38mmt_conforming_na_v1.xlsx

Clean System Power Calculator:

NES_csp_46mmt_conforming_na_v1.xlsx

NES_csp_38mmt_conforming_na_v1.xlsx

APPENDIX B

Milestone #1 Contracts Confidential

Senior Executive Attestation Confidential