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ORA Project Mgr. : Christopher Myers
: Barry Flynn
: Robert Jenkins
: Pushkar Wagle



OFFICE OF RATEPAYER ADVOCATES
CALIFORNIA PUBLIC UTILITIES COMMISSION

AMENDED
PREPARED REBUTTAL TESTIMONY
ON THE APPLICATION OF SOUTHERN CALIFORNIA
EDISON COMPANY (SCE) FOR A CERTIFICATE OF PUBLIC
CONVENIENCE AND NECESSITY FOR THE WEST OF
DEVERS UPGRADE PROJECT AND FOR AN INTERIM
DECISION APPROVING THE PROPOSED TRANSACTION
BETWEEN SOUTHERN CALIFORNIA EDISON AND
MORONGO TRANSMISSION LLC

San Francisco, California
November 13, 2015

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1 **I. SUMMARY OF RECOMMENDATIONS**

2 In this rebuttal testimony, Office of Ratepayer Advocates (“ORA”) rebuts the
3 Supplemental testimony of Southern California Edison (“SCE”) and the testimony of the
4 California Independent System Operator (“CAISO”). In this rebuttal testimony, ORA
5 reiterates the following:

6 Full Capacity Deliverability Status (FCDS) is not necessary to achieve the 33
7 percent Renewable Portfolio Standard (RPS) goal;

- 8 • The RPS Calculator version 6.1 does not supports the West of Devers
9 Upgrade Project (WODUP);
- 10 • WODUP does not supports Public Policy;
- 11 • Interconnection Agreements or Interconnection Requests are not
12 appropriate metrics to determine transmission need; and
- 13 • The CAISO Deliverability Methodology is not an appropriate tool to assess
14 transmission needs for renewable generation.

15 As stated in our Prepared Testimony, ORA asserts that the existing transmission
16 capacity including the West of Devers Interim Upgrades, is sufficient to support the
17 state’s renewable energy goals.

18 **II. ORA’s ANALYSIS AND RECOMMENDATIONS**

19 **A. FCDS Is Not A Necessary Requirement For RPS**
20 **Generation**

21 Mr. Millar asserts in his testimony that meeting the 33 percent RPS portfolios
22 necessarily requires Full Capacity Deliverability Status (“FCDS”):

23 “Full Capacity Deliverability Status is a necessary and reasonable
24 requirement for the renewable generation portfolios provided to
25 achieve the 33 percent renewable portfolio standard. Energy-only
26 service is not sufficient for these resources, as explained in more
27 detail below.” (Mr. Millar on page 13)

28 Mr. Millar attempts to justify this position by explaining:

29 “Power purchase agreements approved by the Commission for
30 purposes of meeting RPS goals overwhelmingly require renewable
31 generators to provide resource adequacy capacity, which, in turn,
32 requires Full Capacity Deliverability Status as a prerequisite.” (Mr.
33 Millar on page 13)
34

1 However, as described in ORA’s Prepared Testimony, the three large Load
2 Serving Entities have sought both FCDS and Energy Only (“EO”) renewable resources to
3 meet their RPS requirements.¹ Such procurement is guided by the Commission’s least
4 cost-best fit (“LCBF”) methodology, which is not an endorsement for procurement of
5 resources that also count towards Resource Adequacy (“RA”), as Mr. Millar’s testimony
6 would suggest.

7 In the current CAISO transmission planning cycle, the CAISO has initiated a
8 special study of the transmission impacts of a 50% RPS target. In a stakeholder meeting
9 held on February 23, 2015, Mr. Millar made a presentation describing the scope of this
10 special study.² In that presentation, Mr. Millar stated:

11 “In going beyond 33%, the special study will explore a new
12 approach and assume the incremental renewable generation to be
13 energy-only.”

14 By stating that the CAISO will study the 17 percentage point increase in
15 renewable generation as EO, the CAISO clearly acknowledges that FCDS is not a
16 necessary requirement for renewable generation to connect to the CAISO grid.

17 As for existing generation with Power Purchase Agreements (“PPA”), ORA’s
18 Prepared Testimony, Tables 2 and 3, demonstrates that the existing system with the
19 Interim Upgrades has more than sufficient capacity to provide FCDS to all generators in
20 the area currently with PPAs.

21 It should be reiterated that the past 33% RPS and the current 50% RPS are energy-
22 based goals, not RA capacity goals. Full Capacity Delivery Status is not a necessary
23 requirement for renewable generation portfolios provided to achieve the 33 percent
24 renewable portfolio standard.

¹ ORA Prepared Testimony, Section III.C.1.

² Attachment 1.

1 **B. RPS Calculator v6.1 Supports That The WODUP Is Not**
2 **Justified**

3 In this section, we address the statements made by the CAISO and the SCE
4 witnesses that attempt to justify the need for the WODUP based upon the CPUC-
5 developed renewable resource portfolios (“RPS portfolios” hereafter) used in the past
6 CAISO Transmission Planning Process (“TPP”) cycles and the 50% RPS portfolios
7 modeled in the RPS Calculator version 6.1 (“v.6.1”). We rebut these justifications for
8 WODUP by explaining:

- 9 1. How the recent TPP RPS portfolios were primarily influenced by the
10 projects with power purchase agreements (“PPA”),
11 2. How the more recent information on the PPA projects as included in
12 the RPS Calculator v.6.1 does not identify any need for the WODUP
13 to meet either
14 a. The 33% RPS by 2024 assuming all resources to be FCDS, or
15 b. The 50% RPS by 2030 assuming a combination of FCDS and EO
16 resources.
17 3. How a very large capacity of RPS resources can be built in the
18 *Riverside East* and *Palm Springs* Competitive Renewable Energy
19 Zone (“CREZs”) on the existing West of Devers (“WOD”) capacity
20 (without the WODUP) if their delivery status is EO.
21 4. How the RPS Calculator v.6.1 understates the capability of the
22 existing WOD capacity as it ignores the transmission capacity added
23 by the Interim Upgrades.

24 **1. CAISO Witness Statements On CPUC-Developed**
25 **RPS Portfolios**

26 The CAISO witness, N. Millar on page 11 of his testimony states the following:

27 “The CAISO recognizes that time has passed since SCE submitted
28 the initial application for the Proposed Project and, as a result, this
29 testimony and the CAISO’s accompanying testimony of Dr. Zhu rely
30 on the most up-to-date renewable portfolio information available.
31 The updated information is based on the Commission-developed
32 renewable portfolios provided to the CAISO for use in the 2015-
33 2016 transmission planning cycle.”

1 Mr. Millar states that the CAISO TPP, including the WODUP, is simply driven by
2 the CPUC’s RPS portfolios. In response to this statement, below we describe how the
3 RPS portfolios have evolved over the years from being unable to distinguish between
4 Full Capacity Deliverability Status (“FCDS”) and Energy Only (“EO”) generation
5 projects to now being able to separately consider each option in the current RPS
6 Portfolios. This change dramatically reduces the amount of transmission needed to meet
7 the State’s current 50% RPS goal.

8 The RPS Calculator implements a least-cost, best-fit methodology by identifying
9 resource portfolios that meet the identified objectives (commercial interest, cost,
10 environmental considerations, etc.). In the event of transmission scarcity, the Calculator
11 seeks to identify alternate resource locations and allocate available transmission supply to
12 renewable resources to deliver energy to load. In **Table 1**, we provide a comparison of
13 the Base Case RPS portfolio capacity selected in each CREZ and utilized in the CAISO
14 TPP cycles in the years 2012-13 through 2015-16.

15 Versions 3 through 5 of the RPS Calculator were not capable of distinguishing
16 between the FCDS and the EO resources. Under this framework, the CAISO provided
17 transmission information for each “Transmission Area” or CREZ of a specific quantity of
18 transmission capacity that is incrementally available for interconnecting fully deliverable
19 resources, as well as the cost and characteristics of potential transmission upgrades.
20 Existing transmission capacity is first allocated to IOU contracts or PPAs, and then to the
21 most favorably ranked generic projects. The remaining generic projects needed to fill the
22 renewable goal net short (“RNS”) are bundled together with minor and major upgrades,
23 and the least-cost combination of projects (and transmission upgrades, if necessary) are
24 selected for the portfolio.³

25

³ CPUC ED RPS Calculator User Guide, Version 6.1, August 20 2015, pp. A-17-A-18.

Table 1: A Comparison of RPS Portfolios under Past CAISO TPPs and the RPS Portfolios Developed Using RPS Calculator Version 6.1

Portfolio Name	2012-13*	2013-14**	2014-15***	2015-16*****	FCDS Only+	FCDS & EO (w/ WODUP)+	FCDS & EO (w/o WODUP)+
RPS Calculator Version	v3	v4	v5	v5	v6.1	v6.1	v6.1
CREZ (Transmission Area) /Study Final Year	2023	2023	2024	2024	2024	2030	2030
Alberta	450	450	300	300	-	-	-
Arizona	550	550	400	400	-	-	-
Baja	100	-	100	100	-	-	-
Carrizo	900	900	900	900	-	622	1,140
Distributed Solar - PG&E	1,047	984	984	984	-	-	-
Distributed Solar - SCE	599	565	565	565	-	-	-
Distributed Solar - SDGE	405	143	143	143	-	-	-
Northern California EO	-	-	-	-	-	3,340	3,340
Imperial	2,125	1,700	1,000	1,750	800	2,552	2,633
Kramer	762	762	642	250	250	750	750
Mountain Pass	665	645	658	658	370	841	841
Nevada C	142	316	516	516	-	-	-
NonCREZ	529	443	185	185	273	272	272

Portfolio Name	2012-13*	2013-14**	2014-15***	2015-16****	FCDS Only+	FCDS & EO (w/ WODUP)+	FCDS & EO (w/o WODUP)+
RPS Calculator Version	v3	v4	v5	v5	v6.1	v6.1	v6.1
CREZ (Transmission Area) /Study Final Year	2023	2023	2024	2024	2024	2030	2030
Palm Springs	198	443	185	185	34	1,257	1,105
Riverside East	1,400	964	3,800	3,017	317	3,661	1,811
San Bernardino - Lucerne	101	42	87	87	23	-	-
San Diego South	384	-	-	-	288	-	-
Solano	535	200	-	-	101	1,101	1,101
Tehachapi	3,390	2,176	1,653	1,653	3,657	5,000	5,000
Westlands	1,500	148	484	475	749	749	2,255
Central Valley North	183	25	-	-	-	-	-
Merced	65	62	5	5	-	-	-
Northwest	330	104	-	-	-	-	-
El Dorado	400	407	-	-	-	-	-
Los Banos	370	370	-	-	97	240	240
Total (MW)	17,130	12,397	12,605	12,170	6,959	20,384	20,488
*	5/16/12 Portfolio Submittal Letter (2012-13 TPP)		http://www.cpuc.ca.gov/NR/rdonlyres/82081A9B-8BC3-4203-A83C-6D09319DB664/0/51620CPUC_CECEFinalRenewableScenarioSubmittalletter.pdf				

Portfolio Name		2012-13*	2013-14**	2014-15***	2015-16*****	FCDS Only+	FCDS & EO (w/WODUP)+	FCDS & EO (w/o WODUP)+
**	RPS Portfolio Transmittal Letter (2013-14 TPP)	http://www.cpuc.ca.gov/NR/ronlyres/1A44BC30-8C7A-4400-AEC8-4A33363352AC/0/2013TPPRPSPortfoliostrmittalletter.pdf						
***	RPS Portfolio Transmittal Letter (2014-15 TPP)	http://www.cpuc.ca.gov/NR/ronlyres/88528E98-BB47-41C4-9CED-A4F613444C55/0/2014_15TPP_RPSPortfoliostrmittalletter.pdf						
****	RPS Portfolio Transmittal Letter (2015-16 TPP)	http://www.cpuc.ca.gov/NR/ronlyres/808B1F04-57E3-45D2-88C5-C476971445B4/0/Revised201516TPP_TransmittalLetter.pdf						
+	33% FCDS Scenario in Version 6.1	http://www.cpuc.ca.gov/PUC/energy/Renewables/RPS+Proceeding+Materials+Version+6.htm						

Table 2: RPS Calculator Version 6.1 Input Assumptions

RPS Calculator Inputs	FCDS Only	FCDS & EO (w/WODUP)	FCDS & EO (w/o WODUP)
<i>RPS Policy</i>	33% by 2024	50% by 2030	50% by 2030
<i>Deliverability Type</i>	FCDS Only	FCDS& EO	FCDS& EO
<i>Geography</i>	In-State	In-State	In-State
<i>Land Use Exclusions</i>	Base	Base	Base
<i>Dist Gen Set-Aside</i>	None	None	None
<i>Load Forecast</i>	CEC IEPR 2014 Mid AAEE	CEC IEPR 2014 Mid AAEE	CEC IEPR 2014 Mid AAEE
<i>PATHWAYS Load Modifiers</i>	None	None	None
<i>Analysis Horizon</i>			
<i>First Year</i>	2015	2015	2015
<i>Final Year</i>	2024	2030	2030
<i>NEW EO Capacity Limit in the Riverside East & Palm Springs CREZ (MW)</i>	Not Applicable	4,917	2,917

1 There is increasing recognition among utility industry experts, regulators and
2 policymakers that building transmission to provide resource adequacy credit for
3 intermittent resources is not a cost-effective mechanism to procure renewables. They are
4 recognizing that it does not make economic sense to build expensive transmission
5 projects to obtain deliverability status for renewable projects at a time when there is no
6 immediate or long-term need for such system capacity. The California Energy
7 Commission (“CEC”) acknowledged in their 2013 Integrated Energy Policy Report
8 (“IEPR”)⁴ that

9 “Requiring full deliverability for future PPAs for renewable
10 generators in the state may not be a cost-effective strategy and
11 modification of deliverability requirements should be considered in
12 light of the billions of dollars in transmission investments the
13 requirement triggers.”

14 In recognition of this concept, the CPUC’s RPS Calculator v.6.1 includes
15 additional functionality that allows the model to select resources with EO deliverability
16 status subject to the limitations of the existing transmission network. The CAISO
17 developed “rules of thumb” limitations intended to represent the amount of new
18 renewable generation that could be installed without incurring major congestion.⁵ The
19 specific limitations vary by region throughout the state.

20 The latest information regarding the existing resources and projects with PPAs, a
21 robust, though not definitive, indicator of commercial viability, as incorporated in the
22 RPS Calculator version 6.1 is a superior tool in making any determination of the need for
23 the WODUP. In particular, the version 6.1 reflects that some PPAs that were assumed in
24 the version 5 of the RPS Calculator are now cancelled.⁶

⁴ See pp. 122-23 of the California Energy Commission 2013 Integrated Energy Policy Report (CEC-100-2013-001- CMF), dated January 14, 2014.

⁵ For the CAISO-developed “rules of thumb,” see the Table 6 of the A.13-10-020 ORA’s Prepared Testimony on SCE for WODUP, October 27, 2015 (“ORA Opening Testimony” hereafter).

⁶ The following PPAs with a combined capacity of 490MW are cancelled: Solar Partners XXII (Palen

1 Table 1 shows that the RPS resource capacity selected in the *Riverside East* CREZ
2 has fluctuated over the past TPPs ranging from 964MW in the 2013-14 TPP to 3,800MW
3 in the 2014-15 TPP. RPS Calculator version 6.1 incrementally selects only 317MW⁷ and
4 34MW of FCDS resources in the *Riverside East* and the *Palm Springs* CREZs,
5 respectively (See the ***FCDS Only*** column in Table 1), assuming that all renewable
6 resources to meet 33% RPS in 2024 needs to be FCDS. This selection of RPS resources
7 to meet 33% RPS using only FCDS resources does not trigger any need for the WODUP.

8 As for prior version 5 of the RPS calculator that was used to generate the
9 portfolios for the current CAISO transmission planning cycle, they had a critical flaw,
10 which was that the Interim Upgrades and the associated FCDS capacity (1,050 MW)
11 were not included in the development of any of the version 5 resource portfolios.⁸ Had
12 the RPS Calculator recognized Interim Upgrades as part of the existing transmission
13 capacity, the transmission capacity would have been sufficient in the 2014-15 and 2015-
14 16 TPP cycles to accommodate the incremental PPAs without triggering the WODUP.

15 The CAISO witness, Dr. Zhu, wrote on page 12 of her testimony states the
16 following:

17 “Taking into account the estimated cost of the Proposed Project, the
18 calculator selected the Proposed Project as the most cost effective
19 way to achieve 33 percent renewable portfolio goal.”

20 There is no evidence provided in this proceeding of the CAISO performing any
21 assessment that demonstrates that the WODUP is the most cost-effective way to achieve
22 33 percent renewable portfolio goal. Dr. Zhu’s statement might be based on the selection

SEGS, BrightSource PPA 6)- 170MW, Solar Partners XXIII (Palen SEGS, BrightSource PPA 7) – 170MW, and Rice Solar Energy Amended and Restated – 150MW. The existing and PPA capacity as assumed in the RPS Calculator v.6.1 accommodated in the Riverside East Area are included in Table 4 of the ORA’s Opening Testimony, October 27, 2015.

⁷ This amount excludes the existing capacity of 821MW (First four projects included in the Table 4 of the ORA Opening Testimony) in the Riverside East CREZ.

⁸ Version 6.1 of the RPS Calculator also fails to take into account the FCDS capacity associated with the WOD Interim upgrades.

1 of nearly 3,000MW in the *Riverside East* CREZ in the 2015-16 TPP RPS portfolio using
2 version 5 of the RPS Calculator. The base portfolio used in the 2015-16 TPP was
3 primarily based upon “commercial interest” criterion, rather than the “cost” criterion.⁹ A
4 major consideration in establishing commercial interest was executed PPAs, some of
5 which have been cancelled since the preparation of the portfolios. In the RPS Calculator
6 version 5 that was used to develop the 2015-16 TPP portfolio, the resource ranking and
7 selection was heavily weighed (70%) by the commercial interest criterion, whereas very
8 little weight was assigned to the cost (10%) and environmental (10%) criteria.¹⁰
9 Therefore, Dr. Zhu’s assertion that the “the calculator selected the Proposed Project as
10 the most cost effective way to achieve 33 percent renewable portfolio goal” is
11 misleading. A cost-constrained scenario in the RPS Calculator version 5 that places 70%
12 weight on the overall cost of selecting renewable resources selects only 1,400MW
13 resources in the *Riverside East* CREZ and avoids the WODUP costing \$992 million.¹¹ In
14 other words, had cost been the primary criterion or given sufficient weight (70%) used by
15 the calculator for selecting the renewable resources, the WODUP would not have been
16 needed.¹²

² The Commercial Projects include potential projects currently under some phase of development by California utilities and draws from two sources: the CPUC Energy Division (ED) Database for IOU solicitations and resource plans for POUs in California. Source: Assigned Commissioner And Administrative Law Judge’s Joint Scoping Memo And Ruling, R.10-05-006, February 10, 2011, Attachment 2, Standardized Planning Assumptions (Part 2 – Renewables) for System Resource Plans Section II.5.1, p. 15 / 94

¹⁰ See ***b – Controls*** tab of the RPS Calculator version 5 (RPSCalculator_2007_v5_3-12-14_regular version_to post.xls located at <http://www.cpuc.ca.gov/PUC/energy/Procurement/LTPP/2012+LTPP+Tools+and+Spreadsheets.htm>)

¹¹ SCE’s updated cost estimate is increased to \$992 million per Table 5.2 WOD Upgrade Project Maximum Construction Cost Estimate Comparison in the SCE’s Supplemental Testimony, dated October 27, 2015.

¹² Furthermore, if the cancelled PPA projects (mentioned in the footnote #6) in the *Riverside East* CREZ are removed as the candidate renewable resources, i.e., deleted from the ***i – CommProjData*** tab of the RPS Calculator version 5, not only the cost-constrained scenario, but also the commercial interest scenario does not identify any need for the WODUP.

1 (1) SCE Witness Statements On RPS Calculator
2 Version 6.1

3 SCE witnesses have used the RPS portfolios developed by the RPS Calculator
4 v.6.1 that selects a significant amount of resources in the *Riverside East* and *Palm*
5 *Springs* CREZs to meet the 50% RPS by the 2030 goal to argue that the large amount of
6 RPS resources cannot be accommodated without the WODUP.

7 SCE witness, P. Mackin on page 15-16 of his testimony states:

8 “Yes. I used the CPUC RPS Calculator version 6.1 to calculate the
9 projected renewable generation needed to meet a 50% RPS.... Based
10 on the assumption that 40% of the generation in the Imperial North
11 and the Imperial East CREZs flows into SCE at Devers, the
12 generation capacity for this 50% RPS portfolio that would impact
13 flows on the WOD lines would be 8,143 MW. This amount of
14 generation far exceeds the amount of generation that can be
15 accommodated by the Phased Build Alternative.”

16 Also, SCE’s Supplemental testimony, dated October 27, 2015, page 14 states:

17 “Iso, SCE’s Supplemental testimony, dated October 27, 2015, page
18 14 stated renewable generation (narrative would) become a barrier to
19 achieve the 50% RPS goal. According to the CPUC RPS Calculator
20 V6.1 for Scenario 2 (California Energy Only), the installed Capacity
21 Portfolios for Riverside East is 5,179 MW. The use of 795 ACCR
22 conductor would adversely impact the Portfolio by stranding more
23 than 1,000 MW, thus effectively reducing the Portfolio in order to
24 maintain system reliability.”

25 The SCE witness’s conclusions are flawed. ORA Opening Testimony has
26 explained how there are several renewable development areas within the State including
27 the *Riverside East* and *Palms Springs* CREZs that can accommodate both FCDS and EO
28 resources without any need for major network upgrades, including WODUP.¹³ The SCE
29 witness ignores two key elements regarding the RPS resource selection made by the RPS
30 Calculator v.6.1 to meet the 50% RPS by the 2030 goal. First, majority of the RPS

¹³ ORA Opening Testimony, pp. 26-28.

1 resources selected in the *Riverside East* and *Palms Springs* CREZs are Energy Only and
2 were selected by the calculator precisely because they would not drive the need for
3 transmission, and second, the contribution of the WODUP in accommodating selected
4 resources is limited to at most 2,000MW.¹⁴

5 Using exactly the same RPS Calculator version 6.1 assumptions that Mr. Mackin
6 used (pp.15-16), as shown in **Table 2** (see the **FCDS & EO (w/WODUP)** column), we
7 reach a different conclusion as described below. Our results are included in the **FCDS &**
8 **EO (w/ WODUP)** column in Table 1. Per the CAISO’s “rules of thumb” with WODUP,
9 4,917MW of EO resources can be accommodated in the combined *Riverside East* and
10 *Palm Springs* CREZs.¹⁵

11 Mr. Mackin also ignores that energy only resources needed to meet the 50% RPS
12 in 2030 can be accommodated in the combined *Riverside East* and *Palm Springs* CREZs
13 without the WODUP. The WODUP’s contribution assumed by the CAISO in
14 accommodating either FCDS or EO resources is only 2,000MW.¹⁶ **Table 3** provides a
15 breakdown of the CAISO’s estimate of 4,917MW of EO capacity available in the
16 *Riverside East* CREZ as determined by the CAISO.¹⁷ Since the WODUP facilitates
17 2,000MW out of 4,917MW of this capability, we developed a separate scenario using the

¹⁴ When one considers that the Interim Upgrades already provide 1,050 MW of capacity, the maximum contribution of WODUP is actually 950MW as discussed in more detail in Section II.D below.

¹⁵ Mr. Mackin correctly notes there are 821MW and 532MW of existing resources in the *Riverside East* and *Palm Springs*, respectively. However, he incorrectly calculates the incremental EO resources accommodated in the *Riverside East* and *Palm Springs* as 4,358MW and 1,496MW, respectively (with a combined amount of 5,854MW). These amounts should instead be 3,661MW and 1,257MW (with a combined amount of 4,917MW), respectively as shown in Table 1 (**FCDS & EO (w/ WODUP)** column) as the generation potential must be derated to 84% to account for the risk that the project will not be developed, per the CPUC ED RPS Calculator User Guide. The risk adjustment occurs at the portfolio level: it is assumed that 84% of planning projects will succeed, so output from all IOU planned projects is derated by 16% in the calculation of each utility’s compliance position and renewable net short. **Source:** CPUC ED RPS Calculator User Guide, Version 6.1, August 20 2015, p. 4.

¹⁶ Based upon the CAISO Response to ORA Data Request No. 5.3.1, the existing capacity to accommodate new EO resources in the combined *Riverside East* and *Palm Spring* CREZs without the WODUP is 2,917MW.

¹⁷ *Ibid.*

1 RPS Calculator v.6.1, which excludes the WODUP. The resulting RPS portfolio is shown
2 in the last column **FCDS & EO (w/o WODUP)** in Table 1. This portfolio selects 2,917
3 MW in the combined *Riverside East* and *Palm Springs* CREZ, which does not trigger the
4 need for the WODUP. This RPS capacity of 2,917MW is incremental to the existing RPS
5 capacity of 1,353MW (=821+532) in the *Riverside East/Palm Springs* CREZs. So the
6 RPS calculator version 6.1 tells us that adding more renewable resources in the *Riverside*
7 *East/Palm Springs* CREZs meets the Commission’s least-cost, best-fit methodology only
8 to the extent that the additional resources located in these areas do not trigger the
9 WODUP.

10 Also, note that without the WODUP, to compensate for this reduction from
11 4,917MW to 2,917MW in the *Riverside East/Palm Springs* CREZs, more resources are
12 selected in the Carrizo and Westlands CREZs, as shown in the column **FCDS & (w/o**
13 **WODUP)** relative to the resources shown in the column **FCDS & EO (w/ WODUP)** in
14 Table 1. In other words, the RPS calculator version 6.1 redistributes some new renewable
15 resource development to other areas without triggering any additional transmission
16 upgrades elsewhere within the State, while still meeting the RPS target.¹⁸

17

¹⁸ Note that, the last three RPS portfolios modeled in Table 1 using the CPUC RPS Calculator assume no Distributed Generation (“DG”) or Out-of-State (“OOS”) resources that can also be accommodated using the existing transmission and would likely displace the in-State large-scale RPS resources. It is evident from the past TPP cycles that a significant amount of RPS resources are attributed to the DG and OOS resources as shown in Table 1.

Table 3: A Breakdown of CAISO’s “Rule of Thumb” EO Capacity Accommodated in Riverside East/Palm Spring

Existing FCDS	350 MW
WODUP Capacity	2,000 MW
Thermal Plant Curtailment	1,300 MW
Curtailed Imports	<u>1,267 MW</u>
Total EO Capacity	4,917 MW

Figure 1 summarizes the RPS portfolio resources selected in the *Riverside East* CREZ under the past CAISO TPPs as well as the RPS Portfolios developed using the RPS Calculator Version 6.1. In summary, we make the following observations:

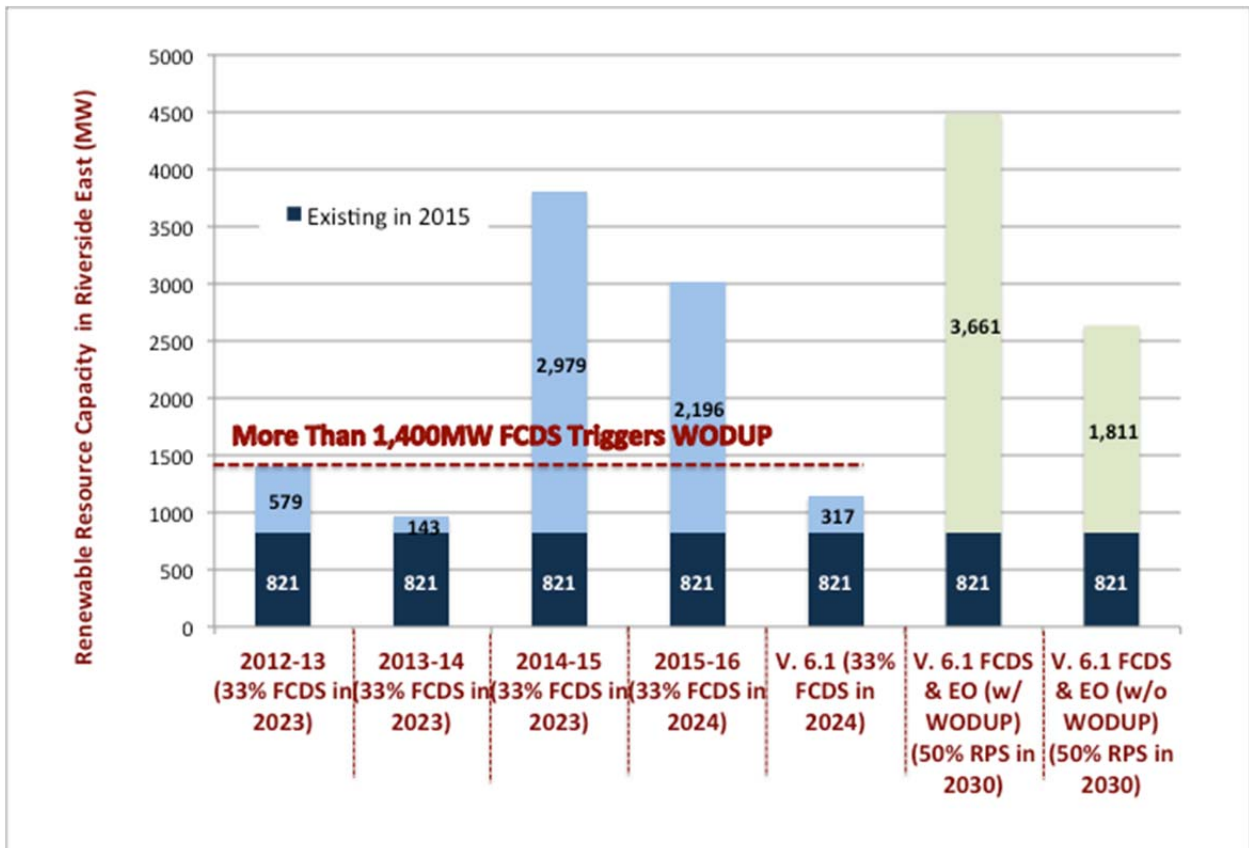
- Recent TPP RPS portfolios are based upon the commercial interest criterion. The latest information on the PPA projects as included in the RPS Calculator v.6.1 should be used to evaluate the need for the WODUP.
- Varying levels of RPS resources were selected in the *Riverside East* CREZ as shown in the first four blue bars in Figure 1. The 2012-13 and 2013-14 TPP portfolios did not trigger any need for the WODUP, whereas the 2014-15 and 2015-16 TPP did identify the need for additional transmission capacity as the PPA projects identified at that time exceeded the existing FCDS transmission capacity. While the RPS calculator version 5 selected the WODUP, had the Interim Upgrades been an available option, the Interim Upgrades would have been sufficient to accommodate the capacity associated with these PPAs.¹⁹
- The RPS Calculator version 6.1, which incorporates the latest information and data on the PPA projects dependent on the

¹⁹ The PPAs capacity exceed the transmission capacity by only 142MWs (=1,542-1,400) in these TPP portfolios, which is well within the 1.050 MW of incremental capacity provided by the Interim Upgrades.

WODUP, *does not identify any need for the WODUP* either to meet 33% RPS by 2024 assuming all resources to be FCDS (see the fifth blue bar from left in Figure 1) *or* to meet 50% RPS by 2030 assuming a combination of FCDS and EO resources (see the rightmost green bar in Figure 1).

- A very large capacity of RPS resources can be built in the *Riverside East* and *Palm Spring* CREZs on the existing WOD capacity (without the WODUP) if their delivery status is EO.
- All versions of the RPS calculator, including v. 6.1, understate the capability of the existing system as they ignore the transmission capacity added by the Interim Upgrades.

Figure 1: A Comparison of Renewable Resources Selected in the Riverside East CREZ under Past CAISO TPPs and the RPS Portfolios Developed Using RPS Calculator Version 6.1



16
17

1 **C. WODUP As A Policy Driven Project**

2 Mr. Millar describes the role of public policy driven transmission upgrades in the
3 CAISO’s transmission planning process. He describes:

4 “ transmission planning process. He describes:driven transmission
5 upgrades in the CAISOSO TPPs and the RPS Portfolios Developed
6 Uid as a part of its generator interconnection process. Subsequently,
7 the CAISO confirmed the need for the Proposed Project in its
8 transmission planning process. The CAISO’s public policy driven
9 studies identify transmission necessary to interconnect expected
10 future renewable generation projects to meet State of California
11 clean energy goals based on Commission-developed renewable
12 energy portfolios.” (Mr. Millar on page 4)

13 Previous versions of the CAISO tariff related to generation interconnection
14 procedures did not apply any economic test to the Large Generator Interconnection
15 Agreement (“LGIA”) related transmission projects, such as the WODUP. Although
16 WODUP was included as one of the elements of the 2010-11 CAISO Transmission Plan
17 supporting Renewable Energy goals²⁰, it was not individually approved by the CAISO
18 Board as part of the annual TPP and was studied purely as part of the generation
19 interconnection process.

20 The excessive reliance of the 2010-11 CAISO Transmission Plan on LGIAs and
21 not assessing them under a policy-driven category was criticized in the letter CPUC
22 President Peevey and Commissioner Florio sent to the CAISO President and CEO
23 Mansour on April 29, 2011.²¹ In particular, this letter stated the following.

24 “After reviewing key portions of the California Independent System
25 Operatoregory was criticized in the letter CPUC “fter reviewing key
26 portions of the California Independent System Operatoregory was
27 criticized in the letter CPUC President Peevey and Commissioner
28 Florio sent to the CAIprocess-driven transmission projects being

²⁰ See Table E1: Elements of the 2010/11 ISO Transmission Plan Supporting Renewable Energy Goals in the CAISO 2010-11 Transmission Plan, May 2011.

²¹ See Attachment 2.

1 pursued by the incumbent Investor Owned Utilities (IOUs), which
2 are not subject to any sort of competitive process or, in fact, to the
3 newly established criteria in the CAISO’fter reviewing key portions
4 of the Calrelated transmission.”

5 The concerns expressed in the above letter appear to have been ignored by the CAISO
6 with respect to the analysis of the need for the WODUP.

7 **D. Neither LGIAs nor Interconnection Requests Equate To**
8 **Commercial Viability**

9 Many of the parties providing testimony cite the large amount of interconnection
10 requests, some of which have interconnection agreements, as justification for increasing
11 the FCDS capacity west of Devers substation.

12 “6089.4 MW of generation capacity in the area is currently requesting Full
13 Capacity Deliverability Status. Of those projects, 250 MW of generation is
14 already operational and 735 MW is expected to be operational by the end of
15 November 2016. Five projects totaling 1859 MW have executed
16 interconnection agreements.” (Mr. Millar on page 6)

17
18 “The resulting MW capacity of the generation projects requesting
19 interconnection to Colorado River and Red Bluff substations that depend on
20 SCE’s proposed WOD Upgrade Project to support FCDS increased from
21 2,460 MW to 6,090 MW, 1 of which 1,859 MW have executed LGIAs as
22 shown in Table 1.1 below.” (SCE Supplemental Testimony on page 3)

23
24 “Based on the assumption that 40% of the generation in the Imperial North
25 and the Imperial East CREZs flows into SCE at Devers, the generation
26 capacity for this 50% RPS portfolio that would impact flows on the WOD
27 lines would be 8,143 MW. This amount of generation far exceeds the
28 amount of generation that can be accommodated by the Phased Build
29 Alternative.” (Mr. Mackin on page 16)

30
31 “However, currently there are projects totaling 1534.5 MW of generating
32 capacity from the initial Transition Cluster and an additional 4,554.9 MW
33 of generating capacity from subsequent clusters in the queue requesting
34 Full Capacity Deliverability Status. Table 4 below details the projects in the
35 queue dependent on the Proposed Project for Full Capacity Deliverability
36 Status.” (Dr. Zhu on page 6)

1 First, neither interconnection requests nor interconnection agreements, are strong
2 indicators of commercial viability. In 2012, the CAISO revised its interconnection
3 procedures by developing the Generator Interconnection and Deliverability Allocation
4 Procedures (“GIDAP”). The CAISO developed the GIDAP to “address the significant
5 challenges that it currently faces with respect to efficiently determining transmission
6 upgrades in the context of its generator interconnection procedures in light of California’s
7 ambitious Renewable Portfolio Standards.”²² The CAISO further described these
8 challenges as follows:

9 “Development of new generation to meet California’s
10 ambitious Renewables Portfolio Standard (“RPS”) mandate
11 has resulted in a massive volume of interconnection requests
12 in the ISO’s queue that is approximately four times the
13 amount of new generation needed. It is widely anticipated
14 that only a fraction of these generation projects will actually
15 be built.”²³
16

17 Therefore, it is clear that the CAISO accepts the widely held belief that only a
18 fraction of the generation in the queue, including those in the *Riverside East and Palm*
19 *Springs* CREZ, will ever be developed. An integral part of the GIDAP is the creation of
20 “an objective method for awarding the deliverability created by TPP-approved
21 transmission to generation projects most likely to successfully achieve commercial
22 operation, in areas of the grid where the volume of interconnection requests exceeds the
23 capacity of transmission developed through the planning process.”²⁴

24 This objective method to determine which generator projects are most likely to be
25 commercially successful considers a project’s permitting status, financing status

²² May 25, 2012 letter from the CAISO to FERC filing the GIDAP for FERC approval.
<http://www.caiso.com/Documents/May252012GIDAPAmendmentER12-1855pdf.pdf>

²³ *Ibid.*

²⁴ *Ibid.*

1 (including a power purchase agreement) and land acquisition.²⁵ Starting with Cluster 5,
2 this commercial viability process is applied after the Phase II study, about 23 months
3 after the initial interconnection request. As such, this process has only been applied to
4 clusters 5 and 6 (CAISO queue Numbers 877 through 1003A). Of all the generation
5 projects identified in the SCE Supplemental Testimony Table 1.1, only one project is in
6 Cluster 5 or 6 (Q970 with a capacity of 150 MW). So only one project potentially has
7 even met the most rudimentary test for commercial viability. Of the total 6,090 MW
8 identified by SCE, 400 MW is in cluster 7 and 3,631 MW is in Cluster 8. It is important
9 to note that Cluster 8 interconnection requests have not yet received their first
10 interconnection study and have not had to make any postings of Interconnection
11 Financial Security to retain their position in the queue. Aside from a successful
12 interconnection application, these Cluster 8 projects have yet to encounter any of the
13 hurdles in the CAISO interconnection process that may cause a developer to withdraw an
14 interconnection request. Therefore, these are especially speculative projects.

15 The WODUP would provide FCDS for only a small fraction of these projects
16 being cited by Mr. Millar, Mr. Mackin, Dr. Zhu and in the SCE Supplemental Testimony.
17 The CAISO has identified the FCDS on the existing system as 1,400 MW.²⁶ This
18 existing system capacity excludes the 1,050 MW provided by the Interim Upgrades.²⁷
19 The CAISO has indicated that the WODUP would add 2,000 MW of FCDS to the
20 transmission corridor west of Devers substation.²⁸ As part of the WODUP, SCE will
21 remove the Interim Upgrades and therefore this 2,000 MW increase would include the

²⁵ CAISO Tariff Appendix DD (GIDAP) Section 8.9.2
<http://www.caiso.com/rules/Pages/Regulatory/Default.aspx>

²⁶ Attachment 3 – CAISO response to ORA data request 5.1.1. Note that this differs from the value identified by ORA’s Prepared Testimony Table 2. This is likely due to the 1,400 MW being used as an input to the RPS calculator. As such, it would exclude the FCDS allocated to operational natural gas fired units.

²⁷ Attachment 3 – CAISO response to ORA data request 5.1.3

²⁸ Attachment 3 – CAISO response to ORA data request 5.2.1

1 loss of the FCDS provided by the Interim Upgrades. Therefore, the WODUP will only
2 increase the FCDS by 950 MW over what is on the system today with the Interim
3 Upgrades.

4 **E. Deliverability Methodology Is A Resource Counting**
5 **Mechanism Which Is Flawed and Has Not Been Adapted**
6 **To An Environment Of High Renewable Generation**

7 Both Dr. Zhu and Mr. Mackin described the CAISO’s deliverability study
8 methodology in detail.²⁹ Both fail to describe key flaws in the methodology that lead to
9 it identifying more transmission than is actually needed to meet the State’s RPS goals.
10 As an initial matter, the CAISO’s deliverability methodology has not been endorsed by
11 the CPUC and the CPUC staff has expressed concerns about the lack of transparency of
12 the methodology, including that it provides stakeholders

13 “... no means of fully assessing the CAISO’s determinations of transmission
14 needs and costs to ensure deliverability of generation resources requesting
15 Full or Partial Capacity Deliverability Status, and the resulting “all-in”
16 (including transmission) cost of resource plans.”³⁰

17 The deliverability methodology was developed by the CAISO between 2006 and
18 2008³¹ when the penetration of renewable generation was much less than what it is today
19 and forecast to be in the future.³² As such, parts of the methodology are outdated and
20 when applied in the studies that are used to justify the WODUP, these weaknesses
21 become apparent.

²⁹ Dr. Zhu describes the methodology in Appendix A to her testimony and Mr. Mackin in Attachment A to his testimony.

³⁰ December 19, 2012 memo to Neil Millar and Keith Casey from Edward Randolph, Molly Sterkel, and Robert Strauss of Energy Division, CPUC. See <http://www.aiso.com/Documents/CPUCCommentsDeliverabilityMethodologyTraining.pdf>

³¹ CAISO Generation Interconnection and Deliverability Study Methodology Technical Paper, page 1. <http://www.aiso.com/Documents/TechnicalPaper-GeneratorInterconnection-DeliverabilityStudyMethodology.pdf>

³² In 2008, the total solar product in California was about 0.7 terawatt-hours while by 2014 it had increased to over 12.5 terawatt hours, with further significant increases expected at California moves to a 50% RPS. <http://energyalmanac.ca.gov/renewables/solar/index.php>

1 **1. Load Modeling**

2 As described by Dr. Zhu, the CAISO models a 1-in-5 year heat wave for the
3 summer peak load hours. Such gross peak demand typically occurs in the afternoon
4 between 2:00 and 4:30 pm.³³ The CAISO then models a severely stressed system
5 condition around this daytime summer peak forecast with solar resources generating
6 between 90% and 100% of installed capacity.³⁴

7 **Figure 2** shows a solar generation delivery profile for the CAISO. The solar
8 energy production peaks in the early afternoon and then declines and eventually
9 disappears between 5:00 pm and 6:00 pm. **Figure 3** shows what has come to be known as
10 the “duck curve.” This is a curve developed by the CAISO to highlight the **net load**. Net
11 load is the difference between forecasted load (gross load) and expected electricity
12 production from variable generation resources such as solar generation. Overgeneration
13 is the condition represented by the “belly” of the duck curve. Overgeneration exists
14 when net load falls below the minimum generation level of other resources that must be
15 on-line. Overgeneration can be solved by curtailing renewable generation, retrofitting
16 existing natural gas plants to reduce minimum generation levels, building load through
17 demand response programs when overgeneration conditions are expected, shifting load
18 using system condition dependent Time of Use (“TOU”) rates, by exporting power
19 outside the California ISO balancing authority area, and so forth.³⁵

³³ California ISO Peak Load History 1998 through 2014.
<https://www.aiso.com/Documents/CaliforniaISOPeakLoadHistory.pdf>

³⁴ Dr. Zhu testimony, Table AppA-1.

³⁵ For a recent list of potential solutions see the Joint Agency symposium on the Governor’s Greenhouse Gas Reduction Goals, held July 9, 2015, slide 15. <http://www.arb.ca.gov/cc/pillars/renewables/slides.pdf>

Figure 2: Solar Generation Delivery Profile³⁶

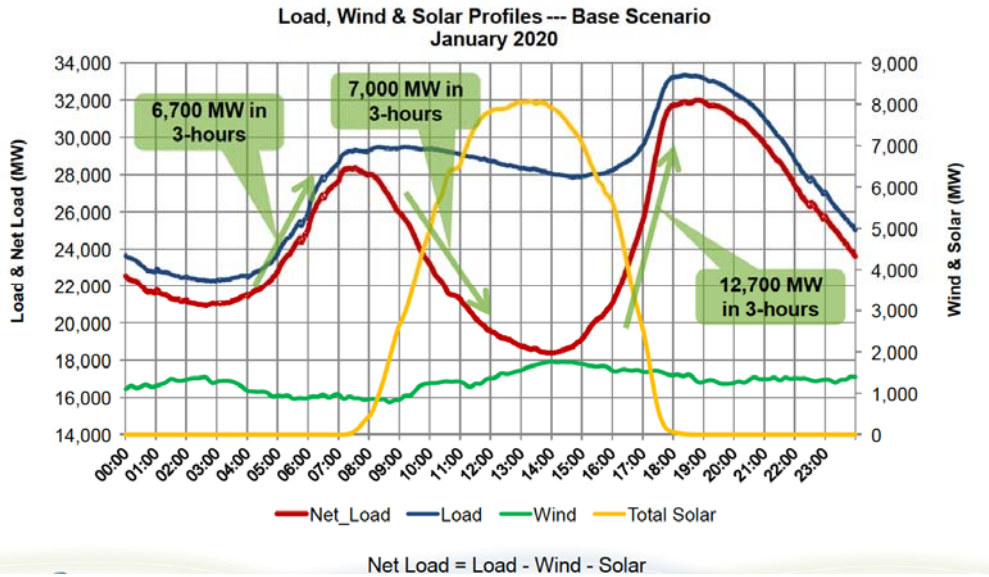
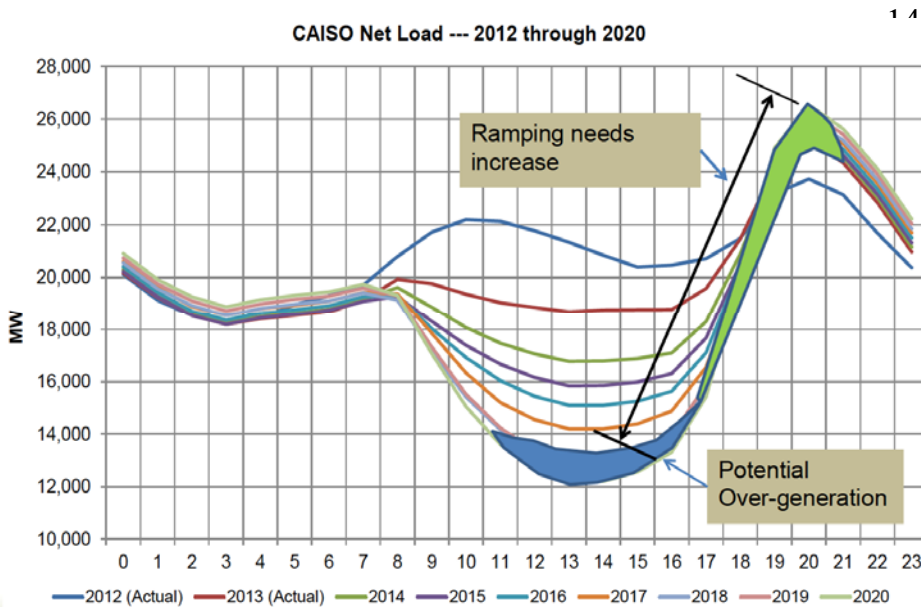


Figure 3: The “Duck Curve”³⁷



³⁶ Presentation by Mark Rothleder, CAISO Vice President, Market Quality and Renewable Integration at the IESO-Stakeholder Summit, February 11, 2014
http://www.ieso.ca/Documents/consult/summit/Part%20II%20MRothleder_IESO%202014%20Summit.pdf

³⁷ *Ibid.*

1 The CAISO deliverability methodology identifies Delivery Network Upgrades
2 (“DNUs”) such as the WODUP by their transmission technical studies “at peak load,
3 under a variety of severely stressed conditions to determine whether, with the generating
4 facility at full output, the aggregate of generation in the local area can be delivered to the
5 aggregate of load on the ISO Controlled Grid...”³⁸ By focusing on the gross system load
6 in the deliverability analysis, the methodology seeks to identify transmission additions to
7 ensure a high level of access to renewable generation during the “belly of the duck
8 curve” at the time of day when the CAISO is forecasting that there may be excessive
9 amounts of renewable generation. So, rather than seeking methods to manage the
10 potential overgeneration situation, the deliverability methodology serves to establish a
11 high degree of access to the very resources that contribute to the duck curve
12 overgeneration problem. This results in overstating the need for projects such as the
13 WODUP that instead reflect a “carrying coal to Newcastle” effort to integrate renewable
14 resources.

15 The “duck curve” also highlights the shift in the net peak load associated with
16 renewable integration. Rather than the traditional daytime peak, the net peak load is
17 shifting to the evening hours, around 8:00 pm in this example. This is a period when
18 solar generation (without integrated storage) is expected to have little or no contribution
19 to system flows.

20 The deliverability methodology has not progressed with the times. The
21 methodology results in proposed transmission additions to allow solar to contribute to
22 Resource Adequacy counting during periods of potential overgeneration.

³⁸ CAISO Generation Interconnection and Deliverability Study Methodology Technical Paper, July 2, 2013, page 3. <https://www.caiso.com/Documents/TechnicalPaper-GeneratorInterconnection-DeliverabilityStudyMethodology.pdf>

APPENDIX A

QUALIFICATIONS OF WITNESSES

**QUALIFICATIONS AND PREPARED TESTIMONY
OF
ROBERT T. JENKINS, P.E.**

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Q.1. Please state your name and business address.

A.1. My name is Robert Jenkins. My business address is 5440 Edgeview Drive, Discovery Bay, California, 94505.

Q.2. By whom are you employed and in what capacity?

A.2. I am employed by Flynn Resource Consultants Inc. (Flynn RCI) as a Managing Consultant.

Q.3. Briefly describe your relevant educational background and work experience.

A.3. I received a Bachelor of Science in Electrical Engineering degree at North Carolina State University and a Masters of Engineering in Electric Power from Rensselaer Polytechnic Institute. I am a registered professional engineer in the State of California.

I have been employed in the industry for over 34 years. For 20 years I served in various engineering and management positions in Pacific Gas and Electric Company's transmission planning department responsible for preparing and overseeing analysis and recommendations for improvement of PG&E's electric transmission system including providing testimony at state and federal proceedings. For twelve years I specialized in generation interconnection issues though management of generation interconnection activities at Mirant, Pacific Gas and Electric and First Solar. I also managed the transmission evaluation for Pacific Gas and Electric's long-term energy procurement activities. I am currently a consultant providing expert support on transmission planning and generation interconnection matters.

Q.4. What is the purpose of your testimony?

1 A.4. I am responsible for the sections addressing FCDS is not a necessary requirement
2 for RPS generation (Section II.A), WODUP as a policy driven project (Section
3 II.C), Neither LGIAs nor interconnection requests equate to commercial viability
4 (Section II.D); and Deliverability methodology is a resource counting mechanism
5 which has not been adapted to an environment of high renewable generation
6 (Section II.E).

7 Q.5. Does that complete your prepared testimony?

8 A.5. Yes, it does.

9

1 **QUALIFICATIONS AND PREPARED TESTIMONY**
2 **OF**
3 **PUSHKAR G. WAGLE, Ph.D.**
4

5 Q.1. Please state your name and business address.

6 A.1. My name is Pushkar Wagle. My business address is 5440 Edgeview Drive,
7 Discovery Bay, California.

8 Q.2. By whom are you employed and in what capacity?

9 A.2. I am employed by Flynn Resource Consultants Inc. (Flynn RCI), as a Senior
10 Consultant.

11 Q.3. Briefly describe your relevant educational background and work experience.

12 A.3. I have a Bachelor of Science in Mathematics and a Masters in Economics from the
13 University of Bombay, India and a Ph.D. in Economics from the Stony Brook
14 University, New York.

15 I have been employed in the industry for over fifteen (15) years. I have worked in
16 the areas of electric transmission planning, economic valuation of electricity
17 transmission projects, production cost simulations modeling, electricity market
18 design, electricity market price forecasting, electricity generating asset valuations,
19 optimization of energy resource portfolio and risk management. I have published
20 in the areas of electricity generation and transmission adequacy, transmission
21 investment alternatives, ancillary service markets and market-based valuation of
22 coal technologies. My prior engagements includes a Senior Economist position
23 with LCG consulting, Los Altos, California, a lecturer of economics at the State
24 University of New York at Stony Brook and an intern at Resources for the Future,
25 Washington, DC. I am currently a consultant providing expert support on
26 transmission planning, economic assessment of generation and transmission and
27 market design matters.

28 Q.4. What is the purpose of your testimony?

- 1 A.4. I am responsible for the sections addressing that the RPS calculator v.6.1 supports
- 2 that the WODUP is not justified (Section II.B).
- 3 Q.5. Does that complete your prepared testimony?
- 4 A.5. Yes, it does.

APPENDIX B
GLOSSARY OF ACRONYMS

CAISO	California Independent System Operator
CEC	California Energy Commission
COD	Commercial Operation Date
CPCN	Certificate of Public Convenience and Necessity
CPUC	California Public Utilities Commission
CREZ	Competitive Renewable Energy Zone
DCR	Delaney-Colorado River 500 kV
DG	Distributed Generation
DNU	Delivery Network Upgrade
DU	Distribution Upgrade
ED	Energy Division
EO	Energy Only
ELCC	Effective Load Carrying Capability
ERR	Eligible Renewable Energy Resource
FCDS	Full Capacity Deliverability Status
FERC	Federal Energy regulatory Commission
GIP	Generation Interconnection Procedures
GIDAP	Generation Interconnection and Deliverability Allocation Procedures
HV	High Voltage
IDS	Interim Deliverability Status
IF	Interconnection Facility
IID	Imperial Irrigation District
kV	kilovolt
LCBF	Least-Cost, Best-Fit
LGIA	Large Generator Interconnection Agreement
LSE	Load Serving Entity
LTPP	Long-Term Procurement Plan
MVA	Mega-volt ampere
MW	Megawatt
MWh	Megawatt-hour
MIC	Maximum Import Capability

MoU	Memorandum of Understanding
NERC	North American Electric Reliability Corporation
NQC	Net Qualifying Capacity
OOS	Out of State
ORA	Office of Ratepayer Advocates
PCDS	Partial Capacity Deliverability Status
PEA	Proponent's Environmental Assessment
PG&E	Pacific Gas and Electric Company
PPA	Power Purchase Agreement
PRM	Planning Reserve Margin
PV	Photovoltaic
QC	Qualifying Capacity
RA	Resource Adequacy
RD	Regional Difference
RFO	Request For Offers
RNS	Renewable Net Short
RNU	Reliability Network Upgrade
RPS	Renewables Portfolio Standard
SAR	Standards Authorization Request
SB	Senate Bill
SCE	Southern California Edison Company
SDG&E	San Diego Gas and Electric Company
SOL	System Operating Limit
TAC	Transmission Access Charge
TOU	Time of Use
TPP	Transmission Planning Process
TRR	Transmission Revenue Requirement
WDAT	Wholesale Distribution Access Tariff
WECC	Western Electricity Coordination Council
WOD	West of Devers
WODUP	West of Devers Upgrade Project