

Application No.: 13-10-020

Exhibit No.: _____

Witness: Dr. Songzhe Zhu

In the Matter of the Application of SOUTHERN CALIFORNIA EDISON COMPANY (U338E) 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.

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**REBUTTAL TESTIMONY OF DR. SONGZHE ZHU
ON BEHALF OF THE CALIFORNIA INDEPENDENT SYSTEM OPERATOR
CORPORATION**

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2 **STATE OF CALIFORNIA**

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8 **ON BEHALF OF THE**
9 **CALIFORNIA INDEPENDENT SYSTEM OPERATOR CORPORATION**

10
11
12 **Q. What is your name and by whom are you employed?**

13 **A.**My name is Songzhe Zhu. I am employed by the California Independent System Operator
14 Corporation (CAISO), 250 Outcropping Way, Folsom, California as a Lead Regional
15 Transmission Engineer for Southern California.

16
17 **Q. Have you previously served testimony in this proceeding?**

18 **A.**Yes, I served direct testimony on October 27, 2015. I described my educational and
19 professional background in my direct testimony.

20
21 **Q. What is the purpose of your testimony?**

22 **A.**The purpose of my testimony is to address certain issues raised in the prepared direct
23 testimony of the Office of Ratepayer Advocates (ORA) regarding the West of Devers
24 Upgrade Project (Proposed Project). Specifically, I address the following items:

- 25 (1) ORA’s improper assumption regarding the continued viability of the West of
26 Devers Interim Upgrades (Interim Upgrades); and
27 (2) ORA’s failure to properly calculate deliverability on the current West of Devers
28 transmission path.

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1 **I. ORA Improperly Assumes that the Interim Upgrades Are a Long-Term Solution**

2 **Q. Please describe the Interim Upgrades.**

3 **A.** The Interim Upgrades are primarily series reactors that that could act as a temporary
4 mechanism to increase the delivery capability of the West of Devers path by
5 approximately 1050 MW pending the completion of the Proposed Project.¹
6

7 **Q. Can the Interim Upgrades be relied upon as a permanent solution for deliverability
8 constraints on the West of Devers path?**

9 **A.** The Interim Upgrades were explicitly designed to be temporary and were designed to
10 provide additional deliverability only until the Proposed Project is completed. The
11 Interim Upgrades could provide about 1050 MW additional deliverability in Riverside
12 East and no additional deliverability in Imperial Area. However, that is not sufficient to
13 cover the renewable generation amount selected by the RPS calculator, which includes
14 3,017 MW in Riverside East and 1,750 MW in the Imperial area. Thus, the Interim
15 Upgrades are not suitable to support the long-term renewable generation target in
16 Riverside East and Imperial Area.
17

18 The CAISO has also confirmed, through a contingency analysis based on the 2020
19 reliability base case, a known reliability issue associated with the Interim Upgrades.
20

21 Table 1 below provides details regarding the reliability issue:
22

Table 1

Contingency	Description	Affected Facility
San Bernardino - Etiwanda & San Bernardino - Vista	N-2	Diverged ⁽¹⁾

23 (1) Local generation dispatch at San Bernardino is needed to address the voltage and loading concern until the
24 WOD upgrades are in place

¹ See First Amended ISO Service Agreement No. 2220.
http://www.caiso.com/Documents/Oct8_2013_NextEraDesertCenterLargeGeneratorInterconnectionAgmtER14-56-000.pdf

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1 Through the CAISO's contingency analysis, under this N-2 condition, San Bernardino
2 load would be served radially from Devers through two West of Devers lines with
3 reactors. The two lines could only serve about 480 MW of net load due to voltage
4 instability caused by the high reactance transmission lines, but the summer peak load at
5 San Bernardino is more than 600 MW. This would require at least two gas-fired units at
6 Mountain View to be online to reduce net load at San Bernardino and provide voltage
7 support.

8
9 **Q. Please summarize your findings on the efficacy of the Interim Upgrades as a long-**
10 **term deliverability solution.**

11 **A.** The 1050 MW of deliverability provided by the Interim Upgrades cannot be relied upon
12 as a long-term solution because it (1) is not sufficient to provide the deliverability to the
13 renewable generation in the 33% renewable portfolio and (2) causes concerns about
14 reliably serving load. The CAISO-identified reliability concern is based on a relatively
15 conservative base case scenario. This means that all the voltage instability and thermal
16 overloading issues identified in my direct testimony, as well as this additional reliability
17 concern, would arise under mildly stressed dispatch conditions absent the Proposed
18 Project.

19
20 Because of these two important issues raised by the Interim Upgrades, ORA's analysis
21 improperly relies on the Interim Upgrades as a long-term solution and thereby overstates
22 deliverability on the current West of Devers path by 1050 MW.

23
24 **II. ORA Improperly Calculates Deliverability on the West of Devers Transmission**
25 **Path as Currently Configured.**

26 **Q. Please summarize ORA's assessment of deliverability on the West of Devers**
27 **transmission path.**

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1 **A.** In its prepared direct testimony, ORA purports to calculate Full Capacity Deliverability
2 Status (FCDS) “capacity on existing transmission”² and FCDS “capacity in excess of
3 [power purchase agreements].”³ ORAs calculations reflect simple arithmetic addition
4 and subtraction of generation and import, not a comprehensive deliverability assessment
5 such as that conducted by the CAISO. Deliverability of a specific set of generators and
6 imports must be tested through a robust deliverability assessment that considers specific
7 system conditions because deliverability depends on multiple factors including load
8 levels and distribution, generation location and amount across the CAISO balancing area
9 authority (BAA), imports, and transmission upgrades inside and outside the CAISO
10 BAA. Deliverability also depends on the location and technology of the generation in the
11 area. Path 42 maximum import capacity (MIC) and generators at different substations
12 have different impacts on West of Devers flows that cannot be accounted for by the
13 simple addition and subtraction of megawatts as ORA has done. The ORA’s analysis
14 fails to take these factors into account and therefore cannot be relied upon to establish
15 deliverability for any specific generators. Therefore, Tables 2 and 3 in ORA’s testimony
16 represent oversimplified calculations that cannot be relied upon to establish
17 deliverability.

18
19 **Q.** **Do you have other concerns with ORA’s analysis of deliverability on current West
20 of Devers transmission path?**

21 **A.** Yes. The CAISO has also identified several factual errors in ORA’s Table 2:
22 (1) Queue Position Q1 – ORA incorrectly lists this project at 850 MW of capacity.
23 This project has been operational and has a net qualifying capacity (NQC) of 728
24 MW. Deliverability analysis models NQC, not nameplate capacity.
25 (2) Queue Position Q3 – ORA incorrectly lists this project at 520 MW of capacity.
26 This project has been operational with an NQC of 490 MW.

² See ORA Prepared Direct Testimony, p. 14 (Table 2).

³ Id at p. 15 (Table 3).

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1 (3) Queue Position Q138 – This project is a wind generator with lower or countering
2 impacts on West of Devers constraints. It should be discounted at least 50% for
3 comparison to deliverability provided to solar and thermal plants. The CAISO
4 deliverability study models solar and wind generation differently from the thermal
5 plants to account for their intermittency. The CAISO tests up to 47% of this
6 project’s installed capacity in the deliverability study, but 93% of installed solar
7 capacity and 100% of thermal generator qualifying capacities. Therefore, the impact
8 of a wind generator is only about half of the impact of a solar generator of the same
9 size and at the same location.

10 (4) Queue Position WDT263 – This project is energy only and should be removed from
11 Table 2.

12 Correcting these errors reduces the ORA’s deliverability results by 248 MW.

13
14 Furthermore, intermittent generation output exceedance levels have been updated based
15 on 2014 actual historical data. For West of Devers transmission constraints, the
16 deliverability of intermittent generators is tested by modeling their 50% summer peak
17 exceedance outputs as the maximum outputs. The current exceedance levels are 7%
18 higher for wind projects and 8% higher for solar projects than the values in transition
19 cluster or West of Devers Interim Upgrades deliverability assessment. There are about
20 800 MW of existing wind generation in the area affecting West of Devers transmission
21 constraints and 150 MW of wind and 550 MW of solar generation in Table 2. Updating
22 the exceedance value reduces ORA’s deliverability results by an additional 100 MW.

23
24 ORA’s prepared direct testimony asserted that the current West of Devers path combined
25 with the Interim Upgrades could accommodate currently executed power purchase
26 agreements and an additional 862 MW of FCDS capacity. As described above, the West
27 of Devers Interim Upgrades cannot be relied upon as a long-term solution to provide
28 deliverability. As a result, the current West of Devers transmission path would be short
29 of capacity needed to provide deliverability to currently executed power purchase

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1 agreements, even using ORA's oversimplified calculation of deliverability.⁴ Once the
2 errors identified above have been corrected, the FCDS capacity shortage would grow to
3 536 MW for currently executed power purchase agreements, with no additional ability
4 for future renewable growth in the Riverside East and Imperial Valley areas.

5
6 **Q. Please summarize your recommendations.**

7 **A.**ORA has not shown that the current West of Devers transmission path is capable of
8 providing FCDS to currently executed PPAs, much less any future projects that are
9 needed to meet renewable portfolio standard requirements. The Interim Upgrades were
10 designed as a short-term solution to provide temporary FCDS to limited number of
11 generators. The Interim Upgrades are not a reliable long-term deliverability alternative to
12 the Proposed Project.

13
14 **Q. Does this conclude your testimony?**

15 **A.**Yes, it does.

16

⁴ ORA calculated 862 MW of excess FCDS capacity. Subtracting the 1050 MW of deliverability ORA assumes for the Interim Upgrades results in a shortage of 188 MW.