

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

In the Matter of the Application of)	Application No. 06-08-010
San Diego Gas & Electric Company)	(Filed August 4, 2006)
(U-902) for a Certificate of Public)	
Convenience and Necessity for the)	
<u>Sunrise Powerlink Transmission Project.</u>)	

**INITIAL TESTIMONY OF THE
CALIFORNIA INDEPENDENT SYSTEM OPERATOR CORPORATION
PART IV**

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Dated: May 14, 2007

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1 **I. INTRODUCTION**

2 **Q. Please state your names, titles and employer.**

3 **A.** Our names are Armando J. Perez, Vice President of Planning and Infrastructure
4 Development for the California Independent System Operator (CAISO), Robert
5 Sparks, Lead Regional Transmission Engineer at the CAISO, and Ren Orans,
6 Managing Partner of Energy and Environmental Economics, Inc. (E3). Our
7 qualifications have been previously provided at Attachment A to our initial
8 testimony, Part I, submitted on January 26, 2007.

9
10 **Q. On whose behalf are you submitting this Part IV of your testimony?**

11 **A.** We are submitting this testimony on behalf of the CAISO.

12
13 **Q. What is the purpose of this testimony?**

14 **A.** The purpose of this Part IV of the CAISO initial testimony is to present the results
15 of the additional alternative scenarios requested by UCAN and Ranchos
16 Penasquitos Concerned Citizens (RPCC) to be completed after the submission of
17 Part III of this testimony on April 20, 2007 pursuant to the Assigned
18 Commissioner and Administrative Law Judge's April 24 and May 4, 2007
19 Rulings. Three types of scenario results are presented herein:

- 20 1. Economic results for three UCAN-requested scenarios based on 2015
21 analyses.
- 22 2. Economic results for four UCAN-requested scenarios based on 2010 and 2015
23 analyses.

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1 3. CAISO reliability findings for three RPCC-requested transmission scenarios.

2

3 **Q. How did the CAISO develop the economic results?**

4 **A.** The CAISO developed these results in the same manner as described in Part III of
5 its initial testimony submitted on April 20, 2007.

6

7 **Q.** **What do the economic study results convey?**

8 **A.** These results convey the costs and benefits estimated by the CAISO for the
9 additional intervener-requested cases. These costs and benefits are described in
10 Part III of the CAISO's initial testimony submitted on April 20, 2007. Like
11 previously completed intervener-requested cases, the CAISO is calculating
12 benefits for each alternative relative to a base case. No incremental transmission
13 costs are included in any intervener-requested runs.

14

15 **Q.** **How are these economic results presented?**

16 **A.** The CAISO presents these results in the same format as the one used in its Part III
17 of its initial testimony submitted on April 20, 2007.

18

19 **Q.** **How are the reliability findings for the RPCC-requested transmission
20 scenarios presented?**

21 **A.** Using the format in its April 20, 2007 testimony, the CAISO discusses the RPCC
22 scenarios after its presentation of the UCAN-requested scenarios.

23

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1 **Q. Does this testimony in any way reflect the CAISO's opinion as to the viability**
2 **or feasibility of any of the intervener-proposed alternatives to Sunrise, which**
3 **is referred to as Sun Path by UCAN?**

4 **A.** No. As we have discussed above, the purpose of this testimony is simply to
5 describe each additional follow-up alternative scenario submitted to the CAISO
6 for study (including base case assumptions and comparisons with the CAISO base
7 case); describe the process used by the CAISO to conduct its evaluation; and set
8 forth the results of each study in a format consistent with the presentation used by
9 the CAISO in Part II of its initial testimony submitted on March 1, 2007.

10

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1 **II. UCAN –REQUESTED ADDITIONAL FOLLOW-UP RUNS – 2015 CASES**

2 **A. UCANC0: Case 0 + Green Path**

3

4 **Q. Please describe Scenario UCANC0.**

5 **A.** Scenario UCANC0 modifies UCAN’s base case by including the Green Path
6 project plan.

7

8 **Q. Please summarize the results for Scenario UCANC0 based on the CAISO
9 Workpaper: UCANC0.xls.**

10 **A.** This scenario has the following benefits:

- 11 • Energy benefit. The levelized energy benefit is -\$14M, the same as the one in
12 the UCAN3 alternative¹ set forth in the CAISO’s presentation of UCAN
13 results in the CAISO April 20, 2007 testimony.
- 14 • Reliability benefit. This alternative does not have any reliability benefit
15 because it does not alter the base case’s need for RMR capacity from existing
16 generation, nor the timing and need for new CT capacity. Note that this
17 economic analysis ignores previously identified transient frequency criteria
18 violations and any costs of mitigating these violations.
- 19 • RPS benefit. This alternative does not have any RPS benefit because it does
20 not alter the base case’s renewable energy development and RPS compliance.

21

¹ UCAN3 is defined as: UCAN Case 0 + Mexico Light 165 MW (2010-2014 only) and Path 44 upgrade of 350 MW in 2015, thereby increasing Path 44 emergency rating to 2850 MW but leaving the normal rating of 2200 MW unaffected + LADWP’s Green Path North (2011)

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1

		A	B	C
		Costs		Net Benefits
		(\$ millions per year,		(Base case cost -
		UCAN		
		base case	UCANCO	
Summary of 2015 Cost and Benefits				
Energy and Reliability Costs				
1	Customer Payments from Gridview	14,178	14,172	6
2	Less CAISO congestion cost (reduces TAC)	(77)	(61)	(16)
3	Less URG Margin (reduces URG bal acct)	(4,396)	(4,395)	(1)
4	Less IOU excess loss payments	(670)	(668)	(2)
5	Subtotal Energy Cost and Benefit	9,035	9,048	(12)
6	RMR Capacity Payments	80	80	-
7	RMR Operating Payments	60	60	-
8	CT Capacity Costs	25	25	-
9	Transmission cost for new CTs	9	9	-
10	Remediation cost to provide reactive support	-	-	-
11	RA Costs to replace CTs and RMR contracts	-	-	-
12	Subtotal Reliability Cost and Benefit	173	173	-
13	Total Energy and Reliability Benefits			(12)
RPS Procurement Cost				
14	Adjusted RPS Cost	4,153	4,153	-
15	Total Benefits			(12)

2

3

4

		A	B	C
		Costs		Net Benefits
		(\$ millions per year,		(Base case cost -
		nominal)		Alt. case cost)
		UCAN		
		base case	UCANCO	
Summary of Levelized Costs and Benefits				
Energy and Reliability Costs				
1	Customer Payments from Gridview	16,073	16,066	7
2	Less CAISO congestion cost (reduces TAC)	(87)	(69)	(18)
3	Less URG Margin (reduces URG bal acct)	(4,983)	(4,982)	(1)
4	Less IOU excess loss payments	(760)	(757)	(2)
5	Subtotal Energy Cost and Benefit	10,243	10,257	(14)
6	RMR Capacity Payments - Levelized	90	90	-
7	RMR Operating Payments - Levelized	60	60	-
8	CT Capacity Costs - Levelized	71	71	-
9	Transmission cost for new CTs-Levelized	25	25	-
10	Remediation cost to provide reactive support	-	-	-
11	RA Costs to replace CTs and RMR contracts	-	-	-
12	Subtotal Reliability Cost and Benefit	246	246	-
13	Total Energy and Reliability Benefits			(14)
RPS Procurement Cost				
14	Adjusted RPS Cost	5,263	5,263	-
15	Total Benefits			(14)

5

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1 **B. UCAND1: Case 0 + 620 MW South Bay Repower + Sun Path Project**

2 **(2010)**

3 **Q. Please describe Scenario UCAND1.**

4 **A.** Scenario UCAND1 modifies UCAN's base case by including the South Bay
5 repowering and Sun Path projects. Compared to the base case, the Sun Path
6 project reduces the local capacity requirement by 704MW, from 1434MW to
7 730MW in 2010. The repowering of South Bay adds 620MW of RMR capability
8 in 2010.

9
10 **Q. Please summarize the results for Scenario UCAND1 based on the CAISO
11 Workpaper: UCAND1.xls.**

12 **A.** This scenario has the following benefits:

- 13 • Energy benefit. The levelized energy benefit is \$18M, compared to UCAN's
14 base case.
- 15 • Reliability benefit. This alternative has a levelized benefit of \$121M per year
16 due to the ability of these combined new facilities to defer the need for new
17 capacity from 2011 to 2035 and decrease the local capacity requirement by
18 704 MW, from 1434MW for the base case to 730MW in 2010. This lowers
19 the reliability-related cost of the alternative by (1) reducing the MW of RMR
20 under contract in the early years, (2) reducing the RMR capacity cost (on a per
21 MW basis) and RMR operating cost in the early years, and (3) reducing the
22 amount of new CT capacity required in the later years.

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- 1 • RPS benefit. This alternative does not have any RPS benefit because it does
2 not alter the base case's renewable energy development and RPS compliance.

		A B		C
		Costs		Net Benefits
Summary of 2015 Cost and Benefits		(\$ millions per year,		(Base case cost -
		UCAN		
		base case	UCAND1	
Energy and Reliability Costs				
1	Customer Payments from Gridview	14,178	14,098	80
2	Less CAISO congestion cost (reduces TAC)	(77)	(56)	(21)
3	Less URG Margin (reduces URG bal acct)	(4,396)	(4,363)	(32)
4	Less IOU excess loss payments	(670)	(660)	(10)
5	Subtotal Energy Cost and Benefit	9,035	9,019	16
6	RMR Capacity Payments	80	31	49
7	RMR Operating Payments	60	42	18
8	CT Capacity Costs	25	-	25
9	Transmission cost for new CTs	9	-	9
10	Remediation cost to provide reactive support	-	-	-
11	RA Costs to replace CTs and RMR contracts	-	-	-
12	Subtotal Reliability Cost and Benefit	173	72	101
13	Total Energy and Reliability Benefits			117
RPS Procurement Cost				
14	Adjusted RPS Cost	4,153	4,153	-
15	Total Benefits			117

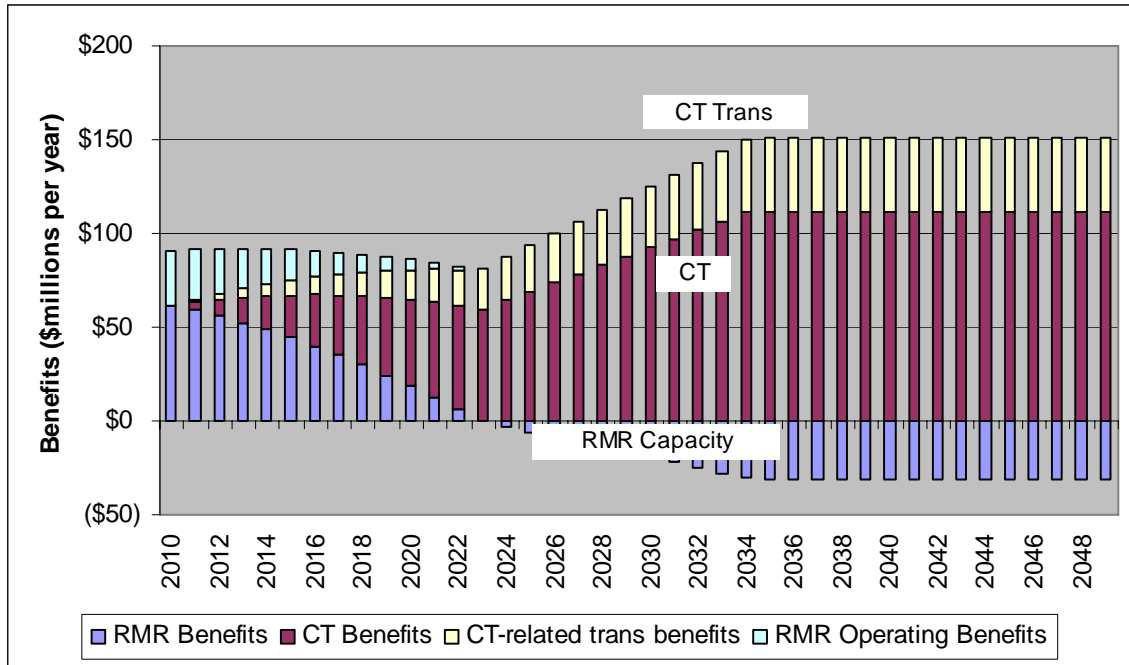
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		A B		C
		Costs		Net Benefits
Summary of Levelized Costs and Benefits		(\$ millions per year,		(Base case cost -
		nominal)		Alt. case cost)
		UCAN		
		base case	UCAND1	
Energy and Reliability Costs				
1	Customer Payments from Gridview	16,073	15,983	91
2	Less CAISO congestion cost (reduces TAC)	(87)	(63)	(24)
3	Less URG Margin (reduces URG bal acct)	(4,983)	(4,947)	(37)
4	Less IOU excess loss payments	(760)	(748)	(12)
5	Subtotal Energy Cost and Benefit	10,243	10,225	18
6	RMR Capacity Payments - Levelized	90	70	20
7	RMR Operating Payments - Levelized	60	48	12
8	CT Capacity Costs - Levelized	71	6	65
9	Transmission cost for new CTs-Levelized	25	2	23
10	Remediation cost to provide reactive support	-	-	-
11	RA Costs to replace CTs and RMR contracts	-	-	-
12	Subtotal Reliability Cost and Benefit	246	125	121
13	Total Energy and Reliability Benefits			139
RPS Procurement Cost				
14	Adjusted RPS Cost	5,263	5,263	-
15	Total Benefits			139

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Year	Base Case (Nominal Dollars)						UCAND1					
	RMR Contract (MW)	New CT (MW)	RMR Contract Price (\$/kW-yr)	RMR Contract Cost (\$M)	New CT and Trans Cost (\$M)	RMR Operating Cost (\$M)	RMR Contract (MW)	New CT (MW)	RMR Contract Price (\$/kW-yr)	RMR Contract Cost (\$M)	New CT and Trans Cost (\$M)	RMR Operating Cost (\$M)
2010	1434	0	49.71	\$ 71.3	\$ -	\$ 59.8	730	-	13.31	\$ 9.7	\$ -	\$ 30.4
2011	1440	49	51.02	\$ 73.5	\$ 5.7	\$ 60.0	785	-	16.47	\$ 12.9	\$ -	\$ 32.7
2012	1440	104	52.04	\$ 74.9	\$ 12.3	\$ 60.0	840	-	19.76	\$ 16.6	\$ -	\$ 35.0
2013	1440	159	53.08	\$ 76.4	\$ 19.3	\$ 60.0	895	-	23.17	\$ 20.7	\$ -	\$ 37.3
2014	1440	214	54.14	\$ 78.0	\$ 26.4	\$ 60.0	950	-	26.72	\$ 25.4	\$ -	\$ 39.6
2015	1440	269	55.23	\$ 79.5	\$ 33.9	\$ 60.0	1,005	-	30.39	\$ 30.5	\$ -	\$ 41.9
2016	1440	324	56.33	\$ 81.1	\$ 41.6	\$ 60.0	1,060	-	34.20	\$ 36.3	\$ -	\$ 44.2
2017	1440	379	57.46	\$ 82.7	\$ 49.7	\$ 60.0	1,115	-	38.15	\$ 42.5	\$ -	\$ 46.5
2018	1440	434	58.61	\$ 84.4	\$ 58.0	\$ 60.0	1,170	-	42.25	\$ 49.4	\$ -	\$ 48.8
2019	1440	489	59.78	\$ 86.1	\$ 66.7	\$ 60.0	1,225	-	46.49	\$ 57.0	\$ -	\$ 51.0
2020	1440	544	60.97	\$ 87.8	\$ 75.7	\$ 60.0	1,280	-	50.89	\$ 65.1	\$ -	\$ 53.3
2021	1440	599	62.19	\$ 89.6	\$ 85.0	\$ 60.0	1,335	-	55.44	\$ 74.0	\$ -	\$ 55.6
2022	1440	654	63.44	\$ 91.3	\$ 94.6	\$ 60.0	1,390	-	60.16	\$ 83.6	\$ -	\$ 57.9
2023	1440	709	64.71	\$ 93.2	\$ 104.7	\$ 60.0	1,445	-	64.71	\$ 93.5	\$ -	\$ 60.0
2024	1440	764	66.00	\$ 95.0	\$ 115.0	\$ 60.0	1,500	-	66.00	\$ 99.0	\$ -	\$ 60.0
2025	1440	819	67.32	\$ 96.9	\$ 125.8	\$ 60.0	1,555	-	67.32	\$ 104.7	\$ -	\$ 60.0
2026	1440	874	68.67	\$ 98.9	\$ 136.9	\$ 60.0	1,610	-	68.67	\$ 110.6	\$ -	\$ 60.0
2027	1440	929	70.04	\$ 100.9	\$ 148.4	\$ 60.0	1,665	-	70.04	\$ 116.6	\$ -	\$ 60.0
2028	1440	984	71.44	\$ 102.9	\$ 160.4	\$ 60.0	1,720	-	71.44	\$ 122.9	\$ -	\$ 60.0
2029	1440	1039	72.87	\$ 104.9	\$ 172.7	\$ 60.0	1,775	-	72.87	\$ 129.3	\$ -	\$ 60.0
2030	1440	1094	74.33	\$ 107.0	\$ 185.5	\$ 60.0	1,830	-	74.33	\$ 136.0	\$ -	\$ 60.0
2031	1440	1149	75.81	\$ 109.2	\$ 198.7	\$ 60.0	1,885	-	75.81	\$ 142.9	\$ -	\$ 60.0
2032	1440	1204	77.33	\$ 111.4	\$ 212.4	\$ 60.0	1,940	-	77.33	\$ 150.0	\$ -	\$ 60.0
2033	1440	1259	78.88	\$ 113.6	\$ 226.5	\$ 60.0	1,995	-	78.88	\$ 157.4	\$ -	\$ 60.0
2034	1440	1314	80.45	\$ 115.9	\$ 241.2	\$ 60.0	2,050	-	80.45	\$ 164.9	\$ -	\$ 60.0
2035	1440	1369	82.06	\$ 118.2	\$ 256.3	\$ 60.0	2,060	45	82.06	\$ 169.0	\$ 8.4	\$ 60.0
2036	1440	1424	83.70	\$ 120.5	\$ 271.9	\$ 60.0	2,060	100	83.70	\$ 172.4	\$ 19.1	\$ 60.0
2037	1440	1479	85.38	\$ 122.9	\$ 288.1	\$ 60.0	2,060	155	85.38	\$ 175.9	\$ 30.2	\$ 60.0
2038	1440	1534	87.08	\$ 125.4	\$ 304.8	\$ 60.0	2,060	210	87.08	\$ 179.4	\$ 41.7	\$ 60.0
2039	1440	1589	88.83	\$ 127.9	\$ 322.0	\$ 60.0	2,060	265	88.83	\$ 183.0	\$ 53.7	\$ 60.0
2040	1440	1644	90.60	\$ 130.5	\$ 339.8	\$ 60.0	2,060	320	90.60	\$ 186.6	\$ 66.1	\$ 60.0
2041	1440	1699	92.41	\$ 133.1	\$ 358.2	\$ 60.0	2,060	375	92.41	\$ 190.4	\$ 79.1	\$ 60.0
2042	1440	1754	94.26	\$ 135.7	\$ 377.2	\$ 60.0	2,060	430	94.26	\$ 194.2	\$ 92.5	\$ 60.0
2043	1440	1809	96.15	\$ 138.5	\$ 396.8	\$ 60.0	2,060	485	96.15	\$ 198.1	\$ 106.4	\$ 60.0
2044	1440	1864	98.07	\$ 141.2	\$ 417.0	\$ 60.0	2,060	540	98.07	\$ 202.0	\$ 120.8	\$ 60.0
2045	1440	1919	100.03	\$ 144.0	\$ 437.9	\$ 60.0	2,060	595	100.03	\$ 206.1	\$ 135.8	\$ 60.0
2046	1440	1974	102.03	\$ 146.9	\$ 459.5	\$ 60.0	2,060	650	102.03	\$ 210.2	\$ 151.3	\$ 60.0
2047	1440	2029	104.07	\$ 149.9	\$ 481.7	\$ 60.0	2,060	705	104.07	\$ 214.4	\$ 167.4	\$ 60.0
2048	1440	2084	106.16	\$ 152.9	\$ 504.7	\$ 60.0	2,060	760	106.16	\$ 218.7	\$ 184.1	\$ 60.0
2049	1440	2139	108.28	\$ 155.9	\$ 528.4	\$ 60.0	2,060	815	108.28	\$ 223.1	\$ 201.3	\$ 60.0
1	Levelized			\$ 90.1	\$ 95.8	\$ 60.0				\$ 69.7	\$ 7.9	\$ 47.7

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1 **C. UCAND2: Case 0 + 620 MW South Bay Repower (2010)**

2 **Q. Please describe Scenario UCAND2.**

3 **A. Scenario UCAND1 modifies UCAN's base case by including the South Bay**
4 **repowering in 2010.**

5

6 **Q. Please summarize the results for Scenario UCAND2 based on the CAISO**
7 **Workpaper: UCAND2.xls.**

8 **A. This scenario has the following benefits:**

9 • Energy benefit. The levelized energy benefit is \$29M.

10 • Reliability benefit. This alternative has a levelized benefit of \$31M per year
11 due to a greater amount of RMR capacity from existing generation at a lower
12 cost than capacity from new CTs. The South Bay repowering adds 620MW of
13 RMR capacity to the alternative case, thus deferring the need to add new CTs
14 until 2021.

15 • RPS benefit. This alternative does not have any RPS benefit because it does
16 not alter the base case's renewable energy development and RPS compliance.

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		A	B	C
Summary of 2015 Cost and Benefits		Costs (\$ millions per year,		Net Benefits (Base case cost -
		UCAN		
		base case	UCANCO	
Energy and Reliability Costs				
1	Customer Payments from Gridview	14,178	14,131	47
2	Less CAISO congestion cost (reduces TAC)	(77)	(78)	1
3	Less URG Margin (reduces URG bal acct)	(4,396)	(4,376)	(19)
4	Less IOU excess loss payments	(670)	(667)	(3)
5	Subtotal Energy Cost and Benefit	9,035	9,010	26
6	RMR Capacity Payments	80	96	(16)
7	RMR Operating Payments	60	60	-
8	CT Capacity Costs	25	-	25
9	Transmission cost for new CTs	9	-	9
10	Remediation cost to provide reactive support	-	-	-
11	RA Costs to replace CTs and RMR contracts	-	-	-
12	Subtotal Reliability Cost and Benefit	173	156	18
13	Total Energy and Reliability Benefits			43
RPS Procurement Cost				
14	Adjusted RPS Cost	4,153	4,153	-
15	Total Benefits			43

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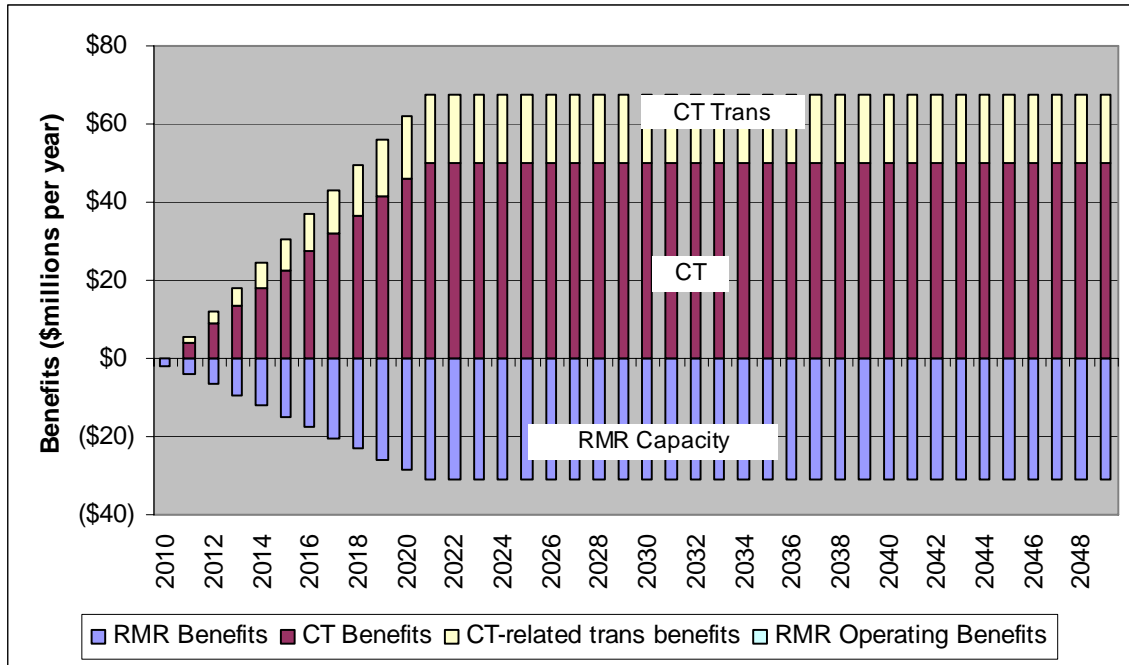
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		A	B	C
Summary of Levelized Costs and Benefits		Costs (\$ millions per year,		Net Benefits (Base case cost -
		nominal)		Alt. case cost)
		UCAN		
		base case	UCANCO	
Energy and Reliability Costs				
1	Customer Payments from Gridview	16,073	16,020	54
2	Less CAISO congestion cost (reduces TAC)	(87)	(88)	1
3	Less URG Margin (reduces URG bal acct)	(4,983)	(4,961)	(22)
4	Less IOU excess loss payments	(760)	(756)	(4)
5	Subtotal Energy Cost and Benefit	10,243	10,214	29
6	RMR Capacity Payments - Levelized	90	117	(27)
7	RMR Operating Payments - Levelized	60	60	-
8	CT Capacity Costs - Levelized	71	28	43
9	Transmission cost for new CTs-Levelized	25	10	15
10	Remediation cost to provide reactive support	-	-	-
11	RA Costs to replace CTs and RMR contracts	-	-	-
12	Subtotal Reliability Cost and Benefit	246	215	31
13	Total Energy and Reliability Benefits			61
RPS Procurement Cost				
14	Adjusted RPS Cost	5,263	5,263	-
15	Total Benefits			61

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Year	Base Case (Nominal Dollars)						UCANCO					
	RMR Contract (MW)	New CT (MW)	RMR Contract Price (\$/kW-yr)	RMR Contract Cost (\$M)	New CT and Trans Cost (\$M)	RMR Operating Cost (\$M)	RMR Contract (MW)	New CT (MW)	RMR Contract Price (\$/kW-yr)	RMR Contract Cost (\$M)	New CT and Trans Cost (\$M)	RMR Operating Cost (\$M)
2010	1434	0	49.71	\$ 71.3	\$ -	\$ 59.8	1,434	-	49.71	\$ 71.3	\$ -	\$ 59.8
2011	1440	49	51.02	\$ 73.5	\$ 5.7	\$ 60.0	1,489	-	51.02	\$ 76.0	\$ -	\$ 60.0
2012	1440	104	52.04	\$ 74.9	\$ 12.3	\$ 60.0	1,544	-	52.04	\$ 80.3	\$ -	\$ 60.0
2013	1440	159	53.08	\$ 76.4	\$ 19.3	\$ 60.0	1,599	-	53.08	\$ 84.9	\$ -	\$ 60.0
2014	1440	214	54.14	\$ 78.0	\$ 26.4	\$ 60.0	1,654	-	54.14	\$ 89.6	\$ -	\$ 60.0
2015	1440	269	55.23	\$ 79.5	\$ 33.9	\$ 60.0	1,736	-	55.23	\$ 95.9	\$ -	\$ 60.0
2016	1440	324	56.33	\$ 81.1	\$ 41.6	\$ 60.0	1,791	-	56.33	\$ 100.9	\$ -	\$ 60.0
2017	1440	379	57.46	\$ 82.7	\$ 49.7	\$ 60.0	1,846	-	57.46	\$ 106.1	\$ -	\$ 60.0
2018	1440	434	58.61	\$ 84.4	\$ 58.0	\$ 60.0	1,901	-	58.61	\$ 111.4	\$ -	\$ 60.0
2019	1440	489	59.78	\$ 86.1	\$ 66.7	\$ 60.0	1,956	-	59.78	\$ 116.9	\$ -	\$ 60.0
2020	1440	544	60.97	\$ 87.8	\$ 75.7	\$ 60.0	2,011	-	60.97	\$ 122.6	\$ -	\$ 60.0
2021	1440	599	62.19	\$ 89.6	\$ 85.0	\$ 60.0	2,060	6	62.19	\$ 128.1	\$ 0.9	\$ 60.0
2022	1440	654	63.44	\$ 91.3	\$ 94.6	\$ 60.0	2,060	61	63.44	\$ 130.7	\$ 8.8	\$ 60.0
2023	1440	709	64.71	\$ 93.2	\$ 104.7	\$ 60.0	2,060	116	64.71	\$ 133.3	\$ 17.1	\$ 60.0
2024	1440	764	66.00	\$ 95.0	\$ 115.0	\$ 60.0	2,060	171	66.00	\$ 136.0	\$ 25.7	\$ 60.0
2025	1440	819	67.32	\$ 96.9	\$ 125.8	\$ 60.0	2,060	226	67.32	\$ 138.7	\$ 34.7	\$ 60.0
2026	1440	874	68.67	\$ 98.9	\$ 136.9	\$ 60.0	2,060	281	68.67	\$ 141.5	\$ 44.0	\$ 60.0
2027	1440	929	70.04	\$ 100.9	\$ 148.4	\$ 60.0	2,060	336	70.04	\$ 144.3	\$ 53.7	\$ 60.0
2028	1440	984	71.44	\$ 102.9	\$ 160.4	\$ 60.0	2,060	391	71.44	\$ 147.2	\$ 63.7	\$ 60.0
2029	1440	1039	72.87	\$ 104.9	\$ 172.7	\$ 60.0	2,060	446	72.87	\$ 150.1	\$ 74.1	\$ 60.0
2030	1440	1094	74.33	\$ 107.0	\$ 185.5	\$ 60.0	2,060	501	74.33	\$ 153.1	\$ 85.0	\$ 60.0
2031	1440	1149	75.81	\$ 109.2	\$ 198.7	\$ 60.0	2,060	556	75.81	\$ 156.2	\$ 96.2	\$ 60.0
2032	1440	1204	77.33	\$ 111.4	\$ 212.4	\$ 60.0	2,060	611	77.33	\$ 159.3	\$ 107.8	\$ 60.0
2033	1440	1259	78.88	\$ 113.6	\$ 226.5	\$ 60.0	2,060	666	78.88	\$ 162.5	\$ 119.8	\$ 60.0
2034	1440	1314	80.45	\$ 115.9	\$ 241.2	\$ 60.0	2,060	721	80.45	\$ 165.7	\$ 132.3	\$ 60.0
2035	1440	1369	82.06	\$ 118.2	\$ 256.3	\$ 60.0	2,060	776	82.06	\$ 169.0	\$ 145.3	\$ 60.0
2036	1440	1424	83.70	\$ 120.5	\$ 271.9	\$ 60.0	2,060	831	83.70	\$ 172.4	\$ 158.7	\$ 60.0
2037	1440	1479	85.38	\$ 122.9	\$ 288.1	\$ 60.0	2,060	886	85.38	\$ 175.9	\$ 172.6	\$ 60.0
2038	1440	1534	87.08	\$ 125.4	\$ 304.8	\$ 60.0	2,060	941	87.08	\$ 179.4	\$ 186.9	\$ 60.0
2039	1440	1589	88.83	\$ 127.9	\$ 322.0	\$ 60.0	2,060	996	88.83	\$ 183.0	\$ 201.8	\$ 60.0
2040	1440	1644	90.60	\$ 130.5	\$ 339.8	\$ 60.0	2,060	1,051	90.60	\$ 186.6	\$ 217.2	\$ 60.0
2041	1440	1699	92.41	\$ 133.1	\$ 358.2	\$ 60.0	2,060	1,106	92.41	\$ 190.4	\$ 233.2	\$ 60.0
2042	1440	1754	94.26	\$ 135.7	\$ 377.2	\$ 60.0	2,060	1,161	94.26	\$ 194.2	\$ 249.7	\$ 60.0
2043	1440	1809	96.15	\$ 138.5	\$ 396.8	\$ 60.0	2,060	1,216	96.15	\$ 198.1	\$ 266.7	\$ 60.0
2044	1440	1864	98.07	\$ 141.2	\$ 417.0	\$ 60.0	2,060	1,271	98.07	\$ 202.0	\$ 284.4	\$ 60.0
2045	1440	1919	100.03	\$ 144.0	\$ 437.9	\$ 60.0	2,060	1,326	100.03	\$ 206.1	\$ 302.6	\$ 60.0
2046	1440	1974	102.03	\$ 146.9	\$ 459.5	\$ 60.0	2,060	1,381	102.03	\$ 210.2	\$ 321.5	\$ 60.0
2047	1440	2029	104.07	\$ 149.9	\$ 481.7	\$ 60.0	2,060	1,436	104.07	\$ 214.4	\$ 340.9	\$ 60.0
2048	1440	2084	106.16	\$ 152.9	\$ 504.7	\$ 60.0	2,060	1,491	106.16	\$ 218.7	\$ 361.1	\$ 60.0
2049	1440	2139	108.28	\$ 155.9	\$ 528.4	\$ 60.0	2,060	1,546	108.28	\$ 223.1	\$ 381.9	\$ 60.0
1	Levelized			\$ 90.1	\$ 95.8	\$ 60.0				\$ 116.7	\$ 37.9	\$ 60.0

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1 **III. UCAN –REQUESTED ADDITIONAL FOLLOW-UP RUNS – 2010 and**

2 **2015 CASES**

3 **A. UCAN10A1: Case 0 + Sun Path (2010)**

4 **Q. Please describe Scenario UCAN10A1.**

5 **A.** Scenario UCAN10A1 modifies UCAN’s base case by including the Sun Path
6 project plan. The analysis for this case differs from those in Section II because it
7 incorporates GridView results for 2010 and 2015. The 2010 base case energy-
8 related costs are from UCAN10A2, which is Case 0 + Mexico Light. The 2010
9 alternative case energy-related costs are from UCAN10A1. In 2015 and beyond,
10 the energy-related costs are from the UCAN1 scenario presented in the CAISO’s
11 April 20, 2007 testimony, as that scenario assumes Sun Path being operational in
12 2015.

13

14 **Q. Please summarize the results for Scenario UCAN10A1 based on the CAISO**
15 **Workpaper: UCAN10A1.xls.**

16 **A.** This scenario has the following benefits:

- 17 • Energy benefit. The levelized energy benefit is \$7M based on GridView
18 analyses for year 2010 and 2015. For 2010, the GridView run “UCAN10A2”
19 is used as the base case. For 2015, the CAISO used the UCAN base case from
20 its April 20, 2007 testimony. The CAISO assumed linear interpolation of
21 energy-related costs and benefits for the years 2011 through 2014. Consistent
22 with the April 20 testimony, the CAISO assumed that energy benefits for
23 years 2016 through 2049 are the same as 2015 in real terms.

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- 1 • Reliability benefit. This alternative has a levelized benefit of \$147M per year
2 due to a lower local capacity requirement than the base case. The alternative's
3 requirement is 434 MW in 2010, 1000 MW lower than the 1434 MW for the
4 base case. The lower capacity requirement lowers both the RMR capacity
5 amount under contract, and the RMR capacity price and operating cost. In
6 addition, the base case begins adding more costly new CT capacity in 2011,
7 whereas the alternative case does not require new CT capacity until 2029.
- 8 • RPS benefit. This alternative does not have any RPS benefit because it does
9 not alter the base case's renewable energy development and RPS compliance.

		A		B	C
		Costs		Net Benefits	
		(\$ millions per year,		(Base case cost -	
		UCAN10A2	UCAN10A1		
Summary of 2010 Cost and Benefits					
Energy and Reliability Costs					
1	Customer Payments from Gridview	9,844	9,829	14	
2	Less CAISO congestion cost (reduces TAC)	(46)	(46)	0	
3	Less URG Margin (reduces URG bal acct)	(3,110)	(3,103)	(6)	
4	Less IOU excess loss payments	(538)	(535)	(3)	
5	Subtotal Energy Cost and Benefit	6,150	6,145	5	
6	RMR Capacity Payments	71	5	67	
7	RMR Operating Payments	60	18	42	
8	CT Capacity Costs	-	-	-	
9	Transmission cost for new CTs	-	-	-	
10	Remediation cost to provide reactive support	-	-	-	
11	RA Costs to replace CTs and RMR contracts	-	-	-	
12	Subtotal Reliability Cost and Benefit	131	23	108	
13	Total Energy and Reliability Benefits			114	
RPS Procurement Cost					
14	Adjusted RPS Cost	2,215	2,215	-	
15	Total Benefits			114	

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		A	B	C
Summary of 2015 Costs and Benefits		Costs (\$ millions per year, nominal)		Net Benefits (Base case cost - Alt. case cost)
		UCAN base case	UCAN1	
Energy and Reliability Costs				
1	Customer Payments from Gridview	14,178	14,120	58
2	Less CAISO congestion cost (reduces TAC)	(77)	(55)	(22)
3	Less URG Margin (reduces URG bal acct)	(4,396)	(4,374)	(22)
4	Less IOU excess loss payments	(670)	(662)	(8)
5	Subtotal Energy Cost and Benefit	9,035	9,029	6
6	RMR Capacity Payments	80	10	70
7	RMR Operating Payments	60	30	30
8	CT Capacity Costs	25	-	25
9	Transmission cost for new CTs	9	-	9
10	Remediation cost to provide reactive support	-	-	-
11	RA Costs to replace CTs and RMR contracts	-	-	-
12	Subtotal Reliability Cost and Benefit	173	39	134
13	Total Energy and Reliability Benefits			140
RPS Procurement Cost				
14	Adjusted RPS Cost	4,153	4,153	-
15	Total Benefits			140

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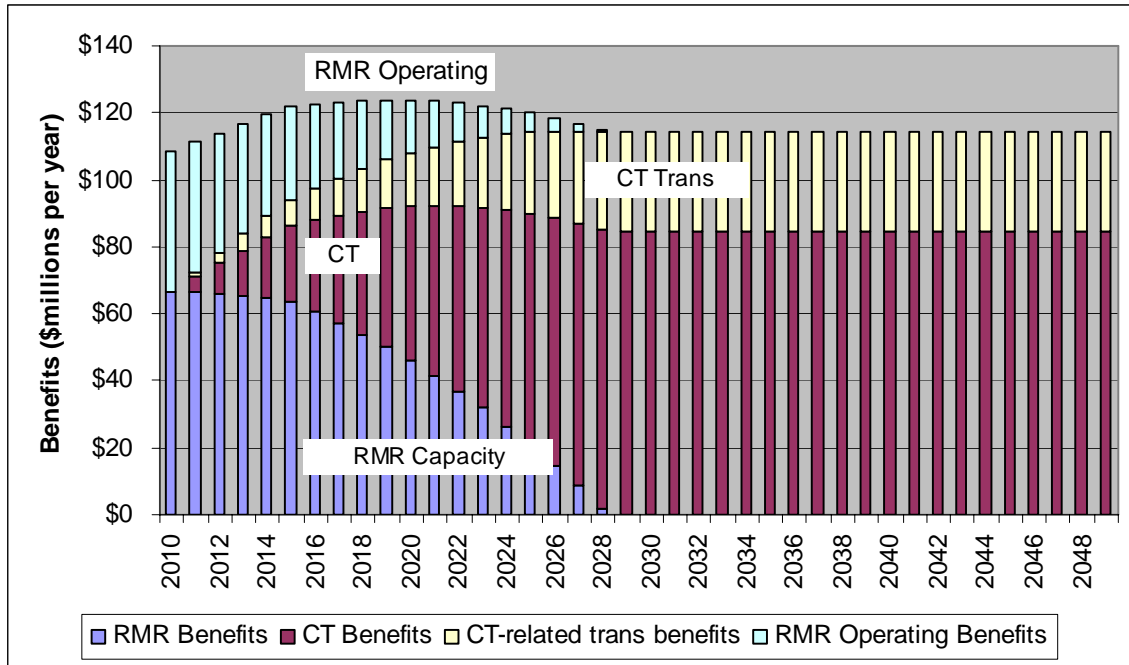
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		A	B	C
Summary of Levelized Costs and Benefits		Costs (\$ millions per year, nominal)		Net Benefits (Base case cost - Alt. case cost)
		Base	Alternative	
Energy and Reliability Costs				
1	Customer Payments from Gridview	15,434	15,376	57
2	Less CAISO congestion cost (reduces TAC)	(82)	(62)	(21)
3	Less URG Margin (reduces URG bal acct)	(4,797)	(4,775)	(22)
4	Less IOU excess loss payments	(745)	(737)	(8)
5	Subtotal Energy Cost and Benefit	9,809	9,803	7
6	RMR Capacity Payments - Levelized	90	43	47
7	RMR Operating Payments - Levelized	60	39	21
8	CT Capacity Costs - Levelized	71	13	58
9	Transmission cost for new CTs-Levelized	25	5	20
10	Remediation cost to provide reactive support	-	-	-
11	RA Costs to replace CTs and RMR contracts	-	-	-
12	Subtotal Reliability Cost and Benefit	246	99	147
13	Total Energy and Reliability Benefits			154
RPS Procurement Cost				
14	Adjusted RPS Cost	5,263	5,263	-
15	Total Benefits			154

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Year	Base Case (Nominal Dollars)			UCAN10A1								
	RMR Contract (MW)	New CT (MW)	RMR Contract Price (\$/kW-yr)	RMR Contract Cost (\$M)	New CT and Trans Cost (\$M)	RMR Operating Cost (\$M)	RMR Contract (MW)	New CT (MW)	RMR Contract Price (\$/kW-yr)	RMR Contract Cost (\$M)	New CT and Trans Cost (\$M)	RMR Operating Cost (\$M)
2010	1434	0	49.71	\$ 71.3	\$ -	\$ 59.8	434	-	10.72	\$ 4.7	\$ -	\$ 18.1
2011	1440	49	51.02	\$ 73.5	\$ 5.7	\$ 60.0	489	-	10.93	\$ 5.3	\$ -	\$ 20.4
2012	1440	104	52.04	\$ 74.9	\$ 12.3	\$ 60.0	544	-	11.15	\$ 6.1	\$ -	\$ 22.7
2013	1440	159	53.08	\$ 76.4	\$ 19.3	\$ 60.0	599	-	11.38	\$ 6.8	\$ -	\$ 25.0
2014	1440	214	54.14	\$ 78.0	\$ 26.4	\$ 60.0	654	-	11.60	\$ 7.6	\$ -	\$ 27.3
2015	1440	269	55.23	\$ 79.5	\$ 33.9	\$ 60.0	709	-	13.49	\$ 9.6	\$ -	\$ 29.5
2016	1440	324	56.33	\$ 81.1	\$ 41.6	\$ 60.0	764	-	16.96	\$ 13.0	\$ -	\$ 31.8
2017	1440	379	57.46	\$ 82.7	\$ 49.7	\$ 60.0	819	-	20.57	\$ 16.8	\$ -	\$ 34.1
2018	1440	434	58.61	\$ 84.4	\$ 58.0	\$ 60.0	874	-	24.31	\$ 21.3	\$ -	\$ 36.4
2019	1440	489	59.78	\$ 86.1	\$ 66.7	\$ 60.0	929	-	28.20	\$ 26.2	\$ -	\$ 38.7
2020	1440	544	60.97	\$ 87.8	\$ 75.7	\$ 60.0	984	-	32.23	\$ 31.7	\$ -	\$ 41.0
2021	1440	599	62.19	\$ 89.6	\$ 85.0	\$ 60.0	1,039	-	36.41	\$ 37.8	\$ -	\$ 43.3
2022	1440	654	63.44	\$ 91.3	\$ 94.6	\$ 60.0	1,094	-	40.75	\$ 44.6	\$ -	\$ 45.6
2023	1440	709	64.71	\$ 93.2	\$ 104.7	\$ 60.0	1,149	-	45.24	\$ 52.0	\$ -	\$ 47.9
2024	1440	764	66.00	\$ 95.0	\$ 115.0	\$ 60.0	1,204	-	49.90	\$ 60.1	\$ -	\$ 50.2
2025	1440	819	67.32	\$ 96.9	\$ 125.8	\$ 60.0	1,259	-	54.72	\$ 68.9	\$ -	\$ 52.5
2026	1440	874	68.67	\$ 98.9	\$ 136.9	\$ 60.0	1,314	-	59.72	\$ 78.5	\$ -	\$ 54.8
2027	1440	929	70.04	\$ 100.9	\$ 148.4	\$ 60.0	1,369	-	64.90	\$ 88.8	\$ -	\$ 57.0
2028	1440	984	71.44	\$ 102.9	\$ 160.4	\$ 60.0	1,424	-	70.26	\$ 100.0	\$ -	\$ 59.3
2029	1440	1039	72.87	\$ 104.9	\$ 172.7	\$ 60.0	1,440	39	72.87	\$ 104.9	\$ 6.5	\$ 60.0
2030	1440	1094	74.33	\$ 107.0	\$ 185.5	\$ 60.0	1,440	94	74.33	\$ 107.0	\$ 15.9	\$ 60.0
2031	1440	1149	75.81	\$ 109.2	\$ 198.7	\$ 60.0	1,440	149	75.81	\$ 109.2	\$ 25.8	\$ 60.0
2032	1440	1204	77.33	\$ 111.4	\$ 212.4	\$ 60.0	1,440	204	77.33	\$ 111.4	\$ 36.0	\$ 60.0
2033	1440	1259	78.88	\$ 113.6	\$ 226.5	\$ 60.0	1,440	259	78.88	\$ 113.6	\$ 46.6	\$ 60.0
2034	1440	1314	80.45	\$ 115.9	\$ 241.2	\$ 60.0	1,440	314	80.45	\$ 115.9	\$ 57.6	\$ 60.0
2035	1440	1369	82.06	\$ 118.2	\$ 256.3	\$ 60.0	1,440	369	82.06	\$ 118.2	\$ 69.1	\$ 60.0
2036	1440	1424	83.70	\$ 120.5	\$ 271.9	\$ 60.0	1,440	424	83.70	\$ 120.5	\$ 81.0	\$ 60.0
2037	1440	1479	85.38	\$ 122.9	\$ 288.1	\$ 60.0	1,440	479	85.38	\$ 122.9	\$ 93.3	\$ 60.0
2038	1440	1534	87.08	\$ 125.4	\$ 304.8	\$ 60.0	1,440	534	87.08	\$ 125.4	\$ 106.1	\$ 60.0
2039	1440	1589	88.83	\$ 127.9	\$ 322.0	\$ 60.0	1,440	589	88.83	\$ 127.9	\$ 119.4	\$ 60.0
2040	1440	1644	90.60	\$ 130.5	\$ 339.8	\$ 60.0	1,440	644	90.60	\$ 130.5	\$ 133.1	\$ 60.0
2041	1440	1699	92.41	\$ 133.1	\$ 358.2	\$ 60.0	1,440	699	92.41	\$ 133.1	\$ 147.4	\$ 60.0
2042	1440	1754	94.26	\$ 135.7	\$ 377.2	\$ 60.0	1,440	754	94.26	\$ 135.7	\$ 162.1	\$ 60.0
2043	1440	1809	96.15	\$ 138.5	\$ 396.8	\$ 60.0	1,440	809	96.15	\$ 138.5	\$ 177.5	\$ 60.0
2044	1440	1864	98.07	\$ 141.2	\$ 417.0	\$ 60.0	1,440	864	98.07	\$ 141.2	\$ 193.3	\$ 60.0
2045	1440	1919	100.03	\$ 144.0	\$ 437.9	\$ 60.0	1,440	919	100.03	\$ 144.0	\$ 209.7	\$ 60.0
2046	1440	1974	102.03	\$ 146.9	\$ 459.5	\$ 60.0	1,440	974	102.03	\$ 146.9	\$ 226.7	\$ 60.0
2047	1440	2029	104.07	\$ 149.9	\$ 481.7	\$ 60.0	1,440	1,029	104.07	\$ 149.9	\$ 244.3	\$ 60.0
2048	1440	2084	106.16	\$ 152.9	\$ 504.7	\$ 60.0	1,440	1,084	106.16	\$ 152.9	\$ 262.5	\$ 60.0
2049	1440	2139	108.28	\$ 155.9	\$ 528.4	\$ 60.0	1,440	1,139	108.28	\$ 155.9	\$ 281.4	\$ 60.0
1	Levelized			\$ 90.1	\$ 95.8	\$ 60.0				\$ 43.0	\$ 17.3	\$ 38.5

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1 **B. UCAN10A2: Case 0 + Mexico Light 165MW (2010-2014 only) and**
2 **Path 44 Upgrade of 350 MW in 2015.**

3 **Q. Please describe Scenario UCAN10A2.**

4 **A.** Scenario UCAN10A2 modifies UCAN's base case by including the Mexico Light
5 165MW for 2010 through 2014, plus the Path 44 upgrade. The 2010 base case
6 and reference case energy-related costs are from UCAN10A2. In 2015 and
7 beyond, the energy-related costs are from the UCAN2 scenario presented in the
8 CAISO's April 20, 2007 testimony.

9
10 **Q. Please summarize the results for Scenario UCAN10A2 based on the CAISO**
11 **Workpaper: UCAN10A2.xls.**

12 **A.** This scenario has the following benefits:

- 13 • Energy benefit. The levelized energy benefit is zero based on GridView
14 analyses for year 2010 and 2015. This is to be expected because the changes
15 made under the alternative case do not alter the base case GridView analyses.
- 16 • Reliability benefit. This alternative has a levelized benefit of \$4M per year
17 due to higher available RMR capacity in 2010 through 2014. In 2015,
18 however, the available RMR capacity of the alternative returns to the same
19 1440MW level as the base case, because UCAN has specified that the Mexico
20 Light portion of this scenario, which presumably entails operational and
21 contractual agreements, would be terminated in 2014. Therefore in 2015 and
22 beyond, there are no reliability-related benefits because the reliability-related
23 costs of the base case and alternative case are the same.

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- 1 • RPS benefit. This alternative does not have any RPS benefit because it does
2 not alter the base case's renewable energy development and RPS compliance.
3
4

		A	B	C
Summary of 2010 Cost and Benefits		Costs (\$ millions per year,		Net Benefits (Base case cost -
		UCAN10A2	UCAN10A2)
Energy and Reliability Costs				
1	Customer Payments from Gridview	9,844	9,844	-
2	Less CAISO congestion cost (reduces TAC)	(46)	(46)	-
3	Less URG Margin (reduces URG bal acct)	(3,110)	(3,110)	-
4	Less IOU excess loss payments	(538)	(538)	-
5	Subtotal Energy Cost and Benefit	6,150	6,150	-
6	RMR Capacity Payments	71	65	6
7	RMR Operating Payments	60	58	2
8	CT Capacity Costs	-	-	-
9	Transmission cost for new CTs	-	-	-
10	Remediation cost to provide reactive support	-	-	-
11	RA Costs to replace CTs and RMR contracts	-	-	-
12	Subtotal Reliability Cost and Benefit	131	123	8
13	Total Energy and Reliability Benefits			8
RPS Procurement Cost				
14	Adjusted RPS Cost	2,215	2,215	-
15	Total Benefits			8

		A	B	C
Summary of 2015 Costs and Benefits		Costs (\$ millions per year, nominal)		Net Benefits (Base case cost - Alt. case cost)
		UCAN base case	UCAN2)
Energy and Reliability Costs				
1	Customer Payments from Gridview	14,178	14,178	-
2	Less CAISO congestion cost (reduces TAC)	(77)	(77)	-
3	Less URG Margin (reduces URG bal acct)	(4,396)	(4,396)	-
4	Less IOU excess loss payments	(670)	(670)	-
5	Subtotal Energy Cost and Benefit	9,035	9,035	-
6	RMR Capacity Payments	80	80	-
7	RMR Operating Payments	60	60	-
8	CT Capacity Costs	25	25	-
9	Transmission cost for new CTs	9	9	-
10	Remediation cost to provide reactive support	-	-	-
11	RA Costs to replace CTs and RMR contracts	-	-	-
12	Subtotal Reliability Cost and Benefit	173	173	-
13	Total Energy and Reliability Benefits			-
RPS Procurement Cost				
14	Adjusted RPS Cost	4,153	4,153	-
15	Total Benefits			-

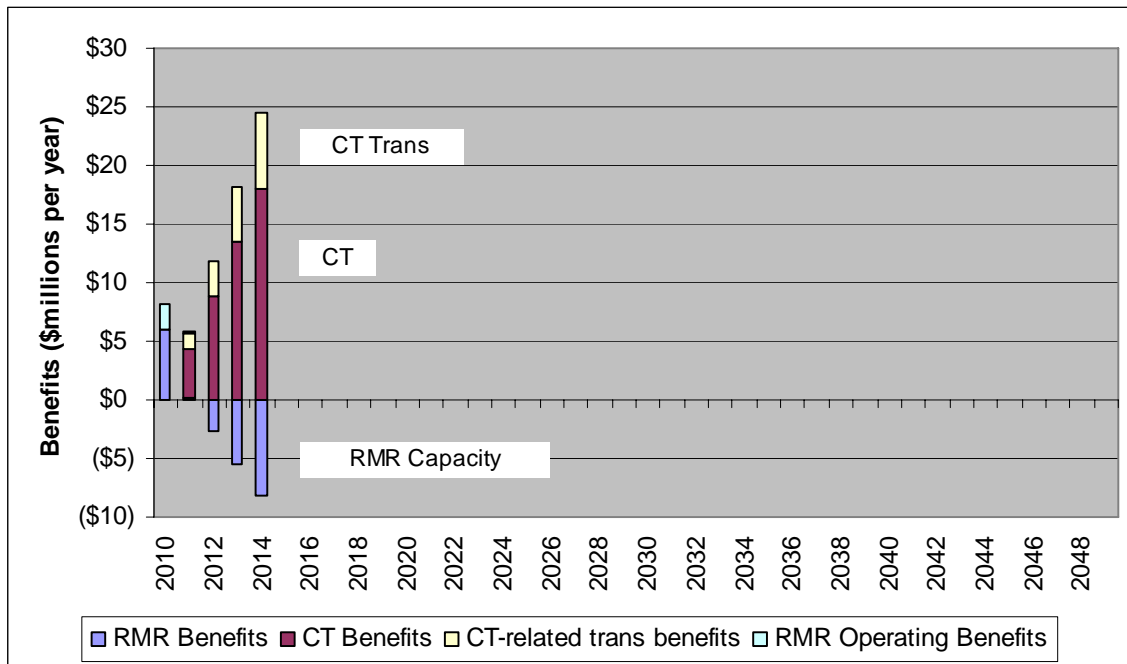
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		A	B	C
Summary of Levelized Costs and Benefits		Costs		Net Benefits
		(\$ millions per year, nominal)		(Base case cost - Alt. case cost)
		Base	Alternative	
Energy and Reliability Costs				
1	Customer Payments from Gridview	15,434	15,434	-
2	Less CAISO congestion cost (reduces TAC)	(82)	(82)	-
3	Less URG Margin (reduces URG bal acct)	(4,797)	(4,797)	-
4	Less IOU excess loss payments	(745)	(745)	-
5	Subtotal Energy Cost and Benefit	9,809	9,809	-
6	RMR Capacity Payments - Levelized	90	91	(1)
7	RMR Operating Payments - Levelized	60	60	0
8	CT Capacity Costs - Levelized	71	68	3
9	Transmission cost for new CTs-Levelized	25	24	1
10	Remediation cost to provide reactive support	-	-	-
11	RA Costs to replace CTs and RMR contracts	-	-	-
12	Subtotal Reliability Cost and Benefit	246	242	4
13	Total Energy and Reliability Benefits			4
RPS Procurement Cost				
14	Adjusted RPS Cost	5,263	5,263	-
15	Total Benefits			4

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Year	Base Case (Nominal Dollars)			UCAN10A2								
	RMR Contract (MW)	New CT (MW)	RMR Contract Price (\$/kW-yr)	RMR Contract Cost (\$M)	New CT and Trans Cost (\$M)	RMR Operating Cost (\$M)	RMR Contract (MW)	New CT (MW)	RMR Contract Price (\$/kW-yr)	RMR Contract Cost (\$M)	New CT and Trans Cost (\$M)	RMR Operating Cost (\$M)
2010	1434	0	49.71	\$ 71.3	\$ -	\$ 59.8	1,384	-	47.12	\$ 65.2	\$ -	\$ 57.7
2011	1440	49	51.02	\$ 73.5	\$ 5.7	\$ 60.0	1,439	-	50.97	\$ 73.3	\$ -	\$ 60.0
2012	1440	104	52.04	\$ 74.9	\$ 12.3	\$ 60.0	1,494	-	52.04	\$ 77.7	\$ -	\$ 60.0
2013	1440	159	53.08	\$ 76.4	\$ 19.3	\$ 60.0	1,549	-	53.08	\$ 82.2	\$ -	\$ 60.0
2014	1440	214	54.14	\$ 78.0	\$ 26.4	\$ 60.0	1,604	-	54.14	\$ 86.8	\$ -	\$ 60.0
2015	1440	269	55.23	\$ 79.5	\$ 33.9	\$ 60.0	1,440	269	55.23	\$ 79.5	\$ 33.9	\$ 60.0
2016	1440	324	56.33	\$ 81.1	\$ 41.6	\$ 60.0	1,440	324	56.33	\$ 81.1	\$ 41.6	\$ 60.0
2017	1440	379	57.46	\$ 82.7	\$ 49.7	\$ 60.0	1,440	379	57.46	\$ 82.7	\$ 49.7	\$ 60.0
2018	1440	434	58.61	\$ 84.4	\$ 58.0	\$ 60.0	1,440	434	58.61	\$ 84.4	\$ 58.0	\$ 60.0
2019	1440	489	59.78	\$ 86.1	\$ 66.7	\$ 60.0	1,440	489	59.78	\$ 86.1	\$ 66.7	\$ 60.0
2020	1440	544	60.97	\$ 87.8	\$ 75.7	\$ 60.0	1,440	544	60.97	\$ 87.8	\$ 75.7	\$ 60.0
2021	1440	599	62.19	\$ 89.6	\$ 85.0	\$ 60.0	1,440	599	62.19	\$ 89.6	\$ 85.0	\$ 60.0
2022	1440	654	63.44	\$ 91.3	\$ 94.6	\$ 60.0	1,440	654	63.44	\$ 91.3	\$ 94.6	\$ 60.0
2023	1440	709	64.71	\$ 93.2	\$ 104.7	\$ 60.0	1,440	709	64.71	\$ 93.2	\$ 104.7	\$ 60.0
2024	1440	764	66.00	\$ 95.0	\$ 115.0	\$ 60.0	1,440	764	66.00	\$ 95.0	\$ 115.0	\$ 60.0
2025	1440	819	67.32	\$ 96.9	\$ 125.8	\$ 60.0	1,440	819	67.32	\$ 96.9	\$ 125.8	\$ 60.0
2026	1440	874	68.67	\$ 98.9	\$ 136.9	\$ 60.0	1,440	874	68.67	\$ 98.9	\$ 136.9	\$ 60.0
2027	1440	929	70.04	\$ 100.9	\$ 148.4	\$ 60.0	1,440	929	70.04	\$ 100.9	\$ 148.4	\$ 60.0
2028	1440	984	71.44	\$ 102.9	\$ 160.4	\$ 60.0	1,440	984	71.44	\$ 102.9	\$ 160.4	\$ 60.0
2029	1440	1039	72.87	\$ 104.9	\$ 172.7	\$ 60.0	1,440	1,039	72.87	\$ 104.9	\$ 172.7	\$ 60.0
2030	1440	1094	74.33	\$ 107.0	\$ 185.5	\$ 60.0	1,440	1,094	74.33	\$ 107.0	\$ 185.5	\$ 60.0
2031	1440	1149	75.81	\$ 109.2	\$ 198.7	\$ 60.0	1,440	1,149	75.81	\$ 109.2	\$ 198.7	\$ 60.0
2032	1440	1204	77.33	\$ 111.4	\$ 212.4	\$ 60.0	1,440	1,204	77.33	\$ 111.4	\$ 212.4	\$ 60.0
2033	1440	1259	78.88	\$ 113.6	\$ 226.5	\$ 60.0	1,440	1,259	78.88	\$ 113.6	\$ 226.5	\$ 60.0
2034	1440	1314	80.45	\$ 115.9	\$ 241.2	\$ 60.0	1,440	1,314	80.45	\$ 115.9	\$ 241.2	\$ 60.0
2035	1440	1369	82.06	\$ 118.2	\$ 256.3	\$ 60.0	1,440	1,369	82.06	\$ 118.2	\$ 256.3	\$ 60.0
2036	1440	1424	83.70	\$ 120.5	\$ 271.9	\$ 60.0	1,440	1,424	83.70	\$ 120.5	\$ 271.9	\$ 60.0
2037	1440	1479	85.38	\$ 122.9	\$ 288.1	\$ 60.0	1,440	1,479	85.38	\$ 122.9	\$ 288.1	\$ 60.0
2038	1440	1534	87.08	\$ 125.4	\$ 304.8	\$ 60.0	1,440	1,534	87.08	\$ 125.4	\$ 304.8	\$ 60.0
2039	1440	1589	88.83	\$ 127.9	\$ 322.0	\$ 60.0	1,440	1,589	88.83	\$ 127.9	\$ 322.0	\$ 60.0
2040	1440	1644	90.60	\$ 130.5	\$ 339.8	\$ 60.0	1,440	1,644	90.60	\$ 130.5	\$ 339.8	\$ 60.0
2041	1440	1699	92.41	\$ 133.1	\$ 358.2	\$ 60.0	1,440	1,699	92.41	\$ 133.1	\$ 358.2	\$ 60.0
2042	1440	1754	94.26	\$ 135.7	\$ 377.2	\$ 60.0	1,440	1,754	94.26	\$ 135.7	\$ 377.2	\$ 60.0
2043	1440	1809	96.15	\$ 138.5	\$ 396.8	\$ 60.0	1,440	1,809	96.15	\$ 138.5	\$ 396.8	\$ 60.0
2044	1440	1864	98.07	\$ 141.2	\$ 417.0	\$ 60.0	1,440	1,864	98.07	\$ 141.2	\$ 417.0	\$ 60.0
2045	1440	1919	100.03	\$ 144.0	\$ 437.9	\$ 60.0	1,440	1,919	100.03	\$ 144.0	\$ 437.9	\$ 60.0
2046	1440	1974	102.03	\$ 146.9	\$ 459.5	\$ 60.0	1,440	1,974	102.03	\$ 146.9	\$ 459.5	\$ 60.0
2047	1440	2029	104.07	\$ 149.9	\$ 481.7	\$ 60.0	1,440	2,029	104.07	\$ 149.9	\$ 481.7	\$ 60.0
2048	1440	2084	106.16	\$ 152.9	\$ 504.7	\$ 60.0	1,440	2,084	106.16	\$ 152.9	\$ 504.7	\$ 60.0
2049	1440	2139	108.28	\$ 155.9	\$ 528.4	\$ 60.0	1,440	2,139	108.28	\$ 155.9	\$ 528.4	\$ 60.0
1	Levelized			\$ 90.1	\$ 95.8	\$ 60.0				\$ 90.7	\$ 91.9	\$ 59.8

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1 **C. UCANB1: Case 0 + 5X46.6 MW CTS +Sun Path (2010)**

2 **Q. Please describe Scenario UCANB1.**

3 **A.** Scenario UCANB1 modifies UCAN’s base case by including five 46.6-MW CTS
4 and the Sun Path project. This scenario uses the same 2010 and 2015 base cases
5 as UCAN10A1.

6

7 **Q. Please summarize the results for Scenario UCANB1 based on the CAISO
8 Workpaper: UCANB1.xls.**

9 **A.** This scenario has the following benefits:

- 10 • Energy benefit. The levelized energy benefit is \$12M based on GridView
11 runs for year 2010 and 2015. For 2010, the GridView run “UCAN10A2” is
12 used as the base case and “UCAN10B1” is the alternate case. For 2015, the
13 base case is the same as in the CAISO’s April 20, 2007 analyses for UCAN
14 and “UCANB1” is the alternate case. The CAISO assumed linear
15 interpolation of energy-related costs and benefits for the years 2011 through
16 2014. Consistent with the April 20 testimony, the CAISO assumed that
17 energy benefits for years 2016 through 2049 are the same as 2015 in real
18 terms.
- 19 • Reliability benefit. This alternative has a levelized benefit of \$140M per year
20 due to a lower local capacity requirement than the base case. The Sun Path
21 project lowers the local capacity requirement by 1000MW and lowers the
22 reliability-related cost of the alternative by (1) reducing the MW of RMR
23 under contract in the early years, (2) reducing the RMR capacity cost (on a per

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1 MW basis) and RMR operating cost in the early years, and (3) reducing the
2 amount of new CT capacity required in the later years. The alternative also
3 assumes 233MW of new CTs built in 2010. Generally, the CAISO assumes
4 that all RMR is placed under contract before new CTs are added. In this case,
5 UCAN's scenario specified the early construction of the CTs, which partly
6 offsets the benefit of the alternative.

7 • RPS benefit. This alternative does not have any RPS benefit because it does
8 not alter the base case's renewable energy development and RPS compliance.

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		A	B	C
		Costs		Net Benefits
		(\$ millions per year,		(Base case cost -
		UCAN10A2	UCAN10B1	
Summary of 2010 Cost and Benefits				
Energy and Reliability Costs				
1	Customer Payments from Gridview	9,844	9,821	23
2	Less CAISO congestion cost (reduces TAC)	(46)	(44)	(2)
3	Less URG Margin (reduces URG bal acct)	(3,110)	(3,100)	(9)
4	Less IOU excess loss payments	(538)	(535)	(3)
5	Subtotal Energy Cost and Benefit	6,150	6,142	9
6	RMR Capacity Payments	71	2	69
7	RMR Operating Payments	60	8	51
8	CT Capacity Costs	-	20	(20)
9	Transmission cost for new CTs	-	7	(7)
10	Remediation cost to provide reactive support	-	-	-
11	RA Costs to replace CTs and RMR contracts	-	-	-
12	Subtotal Reliability Cost and Benefit	131	37	94
13	Total Energy and Reliability Benefits			103
RPS Procurement Cost				
14	Adjusted RPS Cost	2,215	2,215	-
15	Total Benefits			103

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		A	B	C
		Costs		Net Benefits
		(\$ millions per year,		(Base case cost -
		nominal)		Alt. case cost)
		UCAN base	UCAN B1	
		case		
Summary of 2015 Costs and Benefits				
Energy and Reliability Costs				
1	Customer Payments from Gridview	14,178	14,106	72
2	Less CAISO congestion cost (reduces TAC)	(77)	(52)	(25)
3	Less URG Margin (reduces URG bal acct)	(4,396)	(4,368)	(28)
4	Less IOU excess loss payments	(670)	(661)	(9)
5	Subtotal Energy Cost and Benefit	9,035	9,025	10
6	RMR Capacity Payments	80	6	74
7	RMR Operating Payments	60	20	40
8	CT Capacity Costs	25	22	3
9	Transmission cost for new CTs	9	8	1
10	Remediation cost to provide reactive support	-	-	-
11	RA Costs to replace CTs and RMR contracts	-	-	-
12	Subtotal Reliability Cost and Benefit	173	55	119
13	Total Energy and Reliability Benefits			129
RPS Procurement Cost				
14	Adjusted RPS Cost	4,153	4,153	-
15	Total Benefits			129

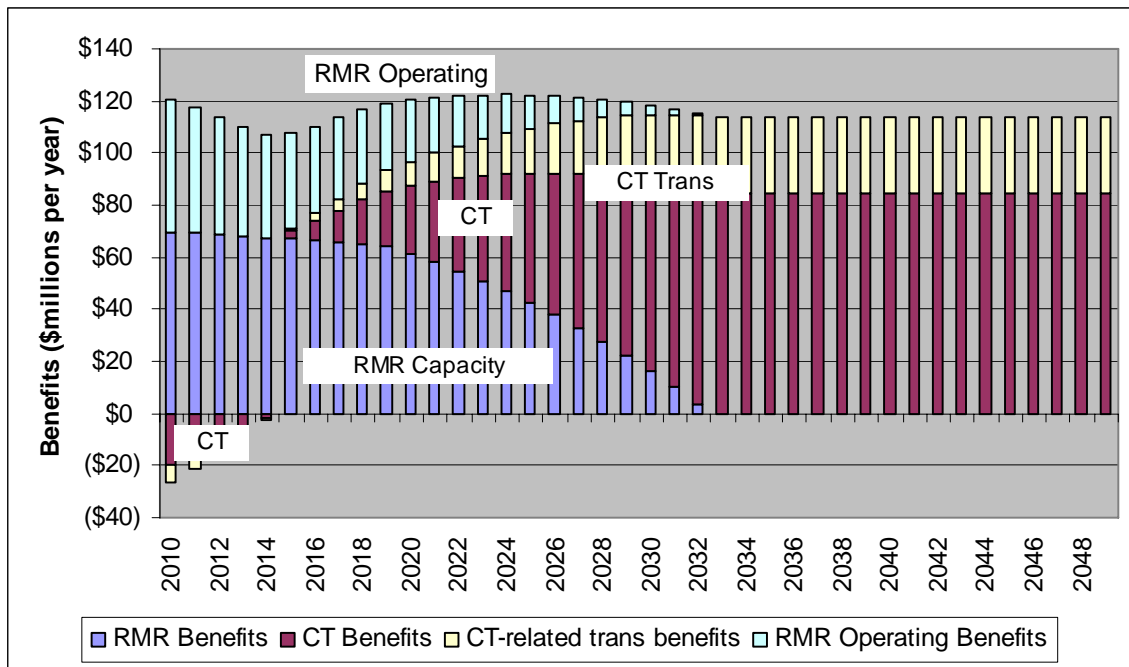
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		A	B	C
Summary of Levelized Costs and Benefits		Costs		Net Benefits
		(\$ millions per year, nominal)		(Base case cost - Alt. case cost)
		Base	Alternatives	
Energy and Reliability Costs				
1	Customer Payments from Gridview	15,434	15,361	72
2	Less CAISO congestion cost (reduces TAC)	(82)	(59)	(24)
3	Less URG Margin (reduces URG bal acct)	(4,797)	(4,769)	(28)
4	Less IOU excess loss payments	(745)	(736)	(9)
5	Subtotal Energy Cost and Benefit	9,809	9,798	12
6	RMR Capacity Payments - Levelized	90	32	58
7	RMR Operating Payments - Levelized	60	30	30
8	CT Capacity Costs - Levelized	71	32	39
9	Transmission cost for new CTs-Levelized	25	11	14
10	Remediation cost to provide reactive support	-	-	-
11	RA Costs to replace CTs and RMR contracts	-	-	-
12	Subtotal Reliability Cost and Benefit	246	106	140
13	Total Energy and Reliability Benefits			152
RPS Procurement Cost				
14	Adjusted RPS Cost	5,263	5,263	-
15	Total Benefits			152

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Year	Base Case (Nominal Dollars)						UCAN10B1					
	RMR Contract (MW)	New CT (MW)	RMR Contract Price (\$/kW-yr)	RMR Contract Cost (\$M)	New CT and Trans Cost (\$M)	RMR Operating Cost (\$M)	RMR Contract (MW)	New CT (MW)	RMR Contract Price (\$/kW-yr)	RMR Contract Cost (\$M)	New CT and Trans Cost (\$M)	RMR Operating Cost (\$M)
2010	1434	0	49.71	\$ 71.3	\$ -	\$ 59.8	201	233	10.72	\$ 2.2	\$ 26.6	\$ 8.4
2011	1440	49	51.02	\$ 73.5	\$ 5.7	\$ 60.0	256	233	10.93	\$ 2.8	\$ 27.1	\$ 10.7
2012	1440	104	52.04	\$ 74.9	\$ 12.3	\$ 60.0	311	233	11.15	\$ 3.5	\$ 27.7	\$ 13.0
2013	1440	159	53.08	\$ 76.4	\$ 19.3	\$ 60.0	366	233	11.38	\$ 4.2	\$ 28.2	\$ 15.3
2014	1440	214	54.14	\$ 78.0	\$ 26.4	\$ 60.0	421	233	11.60	\$ 4.9	\$ 28.8	\$ 17.5
2015	1440	269	55.23	\$ 79.5	\$ 33.9	\$ 60.0	476	233	11.84	\$ 5.6	\$ 29.4	\$ 19.8
2016	1440	324	56.33	\$ 81.1	\$ 41.6	\$ 60.0	531	233	12.07	\$ 6.4	\$ 29.9	\$ 22.1
2017	1440	379	57.46	\$ 82.7	\$ 49.7	\$ 60.0	586	233	12.31	\$ 7.2	\$ 30.5	\$ 24.4
2018	1440	434	58.61	\$ 84.4	\$ 58.0	\$ 60.0	641	233	12.56	\$ 8.1	\$ 31.2	\$ 26.7
2019	1440	489	59.78	\$ 86.1	\$ 66.7	\$ 60.0	696	233	13.80	\$ 9.6	\$ 31.8	\$ 29.0
2020	1440	544	60.97	\$ 87.8	\$ 75.7	\$ 60.0	751	233	17.54	\$ 13.2	\$ 32.4	\$ 31.3
2021	1440	599	62.19	\$ 89.6	\$ 85.0	\$ 60.0	806	233	21.43	\$ 17.3	\$ 33.1	\$ 33.6
2022	1440	654	63.44	\$ 91.3	\$ 94.6	\$ 60.0	861	233	25.47	\$ 21.9	\$ 33.7	\$ 35.9
2023	1440	709	64.71	\$ 93.2	\$ 104.7	\$ 60.0	916	233	29.65	\$ 27.2	\$ 34.4	\$ 38.2
2024	1440	764	66.00	\$ 95.0	\$ 115.0	\$ 60.0	971	233	34.00	\$ 33.0	\$ 35.1	\$ 40.5
2025	1440	819	67.32	\$ 96.9	\$ 125.8	\$ 60.0	1,026	233	38.51	\$ 39.5	\$ 35.8	\$ 42.8
2026	1440	874	68.67	\$ 98.9	\$ 136.9	\$ 60.0	1,081	233	43.18	\$ 46.7	\$ 36.5	\$ 45.0
2027	1440	929	70.04	\$ 100.9	\$ 148.4	\$ 60.0	1,136	233	48.03	\$ 54.6	\$ 37.2	\$ 47.3
2028	1440	984	71.44	\$ 102.9	\$ 160.4	\$ 60.0	1,191	233	53.05	\$ 63.2	\$ 38.0	\$ 49.6
2029	1440	1039	72.87	\$ 104.9	\$ 172.7	\$ 60.0	1,246	233	58.25	\$ 72.6	\$ 38.7	\$ 51.9
2030	1440	1094	74.33	\$ 107.0	\$ 185.5	\$ 60.0	1,301	233	63.65	\$ 82.8	\$ 39.5	\$ 54.2
2031	1440	1149	75.81	\$ 109.2	\$ 198.7	\$ 60.0	1,356	233	69.23	\$ 93.9	\$ 40.3	\$ 56.5
2032	1440	1204	77.33	\$ 111.4	\$ 212.4	\$ 60.0	1,411	233	75.01	\$ 105.8	\$ 41.1	\$ 58.8
2033	1440	1259	78.88	\$ 113.6	\$ 226.5	\$ 60.0	1,440	259	78.88	\$ 113.6	\$ 46.6	\$ 60.0
2034	1440	1314	80.45	\$ 115.9	\$ 241.2	\$ 60.0	1,440	314	80.45	\$ 115.9	\$ 57.6	\$ 60.0
2035	1440	1369	82.06	\$ 118.2	\$ 256.3	\$ 60.0	1,440	369	82.06	\$ 118.2	\$ 69.1	\$ 60.0
2036	1440	1424	83.70	\$ 120.5	\$ 271.9	\$ 60.0	1,440	424	83.70	\$ 120.5	\$ 81.0	\$ 60.0
2037	1440	1479	85.38	\$ 122.9	\$ 288.1	\$ 60.0	1,440	479	85.38	\$ 122.9	\$ 93.3	\$ 60.0
2038	1440	1534	87.08	\$ 125.4	\$ 304.8	\$ 60.0	1,440	534	87.08	\$ 125.4	\$ 106.1	\$ 60.0
2039	1440	1589	88.83	\$ 127.9	\$ 322.0	\$ 60.0	1,440	589	88.83	\$ 127.9	\$ 119.4	\$ 60.0
2040	1440	1644	90.60	\$ 130.5	\$ 339.8	\$ 60.0	1,440	644	90.60	\$ 130.5	\$ 133.1	\$ 60.0
2041	1440	1699	92.41	\$ 133.1	\$ 358.2	\$ 60.0	1,440	699	92.41	\$ 133.1	\$ 147.4	\$ 60.0
2042	1440	1754	94.26	\$ 135.7	\$ 377.2	\$ 60.0	1,440	754	94.26	\$ 135.7	\$ 162.1	\$ 60.0
2043	1440	1809	96.15	\$ 138.5	\$ 396.8	\$ 60.0	1,440	809	96.15	\$ 138.5	\$ 177.5	\$ 60.0
2044	1440	1864	98.07	\$ 141.2	\$ 417.0	\$ 60.0	1,440	864	98.07	\$ 141.2	\$ 193.3	\$ 60.0
2045	1440	1919	100.03	\$ 144.0	\$ 437.9	\$ 60.0	1,440	919	100.03	\$ 144.0	\$ 209.7	\$ 60.0
2046	1440	1974	102.03	\$ 146.9	\$ 459.5	\$ 60.0	1,440	974	102.03	\$ 146.9	\$ 226.7	\$ 60.0
2047	1440	2029	104.07	\$ 149.9	\$ 481.7	\$ 60.0	1,440	1,029	104.07	\$ 149.9	\$ 244.3	\$ 60.0
2048	1440	2084	106.16	\$ 152.9	\$ 504.7	\$ 60.0	1,440	1,084	106.16	\$ 152.9	\$ 262.5	\$ 60.0
2049	1440	2139	108.28	\$ 155.9	\$ 528.4	\$ 60.0	1,440	1,139	108.28	\$ 155.9	\$ 281.4	\$ 60.0
Levelized				\$ 90.1	\$ 95.8	\$ 60.0				\$ 32.4	\$ 43.3	\$ 30.3

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1 **D. UCANB3: Case 0 + 5X46.6 MW CTS + Mexico Light 165 MW (2016)**
2 **+ Green Path (2011)**

3 **Q. Please describe Scenario UCANB3.**

4 **A.** Scenario UCANB3 modifies UCAN’s base case by including five 46.6-MW CTS,
5 165 MW increase in import capability due to the Mexico Light project and the
6 Green Path project. This scenario uses the same 2010 and 2015 base cases as
7 UCAN10A1 described in the previous UCAN case.

8
9 **Q. Please summarize the results for Scenario UCANB3 based on the CAISO**
10 **Workpaper: UCANB3.xls.**

11 **A.** This scenario has the following benefits:

12 • Energy benefit. The levelized energy benefit is -\$11M. These results are
13 based on 2010 GridView run using UCAN10A2 as the base case and
14 UCAN10B3 as the alternate case. The 2015 GridView base and alternate case
15 results are from UCAN10, previously provided in the CAISO’s April 20, 2007
16 testimony.

17 The CAISO assumed linear interpolation of energy-related costs and
18 benefits for the years 2011 through 2014. Consistent with the April 20
19 testimony, the CAISO also assumed that energy benefits for years 2016
20 through 2049 are the same as estimated for 2015 in real terms.

21 • Reliability benefit. This alternative has a reliability related levelized benefit
22 of \$11M per year due to higher RMR capacity at a lower cost than new CT
23 capacity. The alternative differs from the base case by (1) having 269MW of

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1 new CT capacity added in 2010 (instead of 2015), and (2) having a higher
2 RMR capacity of 1605MW (instead of the 1440MW) beginning in 2016. In
3 2010 through 2014, the alternate case has more CT capacity under contract
4 than the base case plan, so the alternative case has higher reliability cost.
5 Both cases have the same CT/RMR capacity under contract in 2015, so the
6 costs are the same in that year. After 2015, the alternate plan has more RMR
7 but less CT capacity under contract than the base case, resulting in a lower
8 cost. Over 40 years, the cost savings from the higher RMR capacity available
9 outweighs the cost penalty of the early CT construction, so the net effect is a
10 small positive reliability benefit.

11 • RPS benefit. This alternative does not have any RPS benefit because it does
12 not alter the base case's renewable energy development and RPS compliance.

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		A	B	C
Summary of 2010 Cost and Benefits		Costs (\$ millions per year,		Net Benefits (Base case cost -
		UCAN10A2	UCAN10B3	-)
Energy and Reliability Costs				
1	Customer Payments from Gridview	9,844	9,834	10
2	Less CAISO congestion cost (reduces TAC)	(46)	(44)	(1)
3	Less URG Margin (reduces URG bal acct)	(3,110)	(3,107)	(3)
4	Less IOU excess loss payments	(538)	(537)	(1)
5	Subtotal Energy Cost and Benefit	6,150	6,146	5
6	RMR Capacity Payments	71	42	30
7	RMR Operating Payments	60	49	11
8	CT Capacity Costs	-	23	(23)
9	Transmission cost for new CTs	-	8	(8)
10	Remediation cost to provide reactive support	-	-	-
11	RA Costs to replace CTs and RMR contracts	-	-	-
12	Subtotal Reliability Cost and Benefit	131	121	10
13	Total Energy and Reliability Benefits			15
RPS Procurement Cost				
14	Adjusted RPS Cost	2,215	2,215	-
15	Total Benefits			15

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		A	B	C
Summary of 2015 Costs and Benefits		Costs (\$ millions per year, nominal)		Net Benefits (Base case cost - Alt. case cost)
		UCAN base case	UCAN10	-
Energy and Reliability Costs				
1	Customer Payments from Gridview	14,178	14,172	6
2	Less CAISO congestion cost (reduces TAC)	(77)	(61)	(16)
3	Less URG Margin (reduces URG bal acct)	(4,396)	(4,395)	(0)
4	Less IOU excess loss payments	(670)	(668)	(2)
5	Subtotal Energy Cost and Benefit	9,035	9,048	(13)
6	RMR Capacity Payments	80	80	-
7	RMR Operating Payments	60	60	-
8	CT Capacity Costs	25	25	-
9	Transmission cost for new CTs	9	9	-
10	Remediation cost to provide reactive support	-	-	-
11	RA Costs to replace CTs and RMR contracts	-	-	-
12	Subtotal Reliability Cost and Benefit	173	173	-
13	Total Energy and Reliability Benefits			(13)
RPS Procurement Cost				
14	Adjusted RPS Cost	4,153	4,153	-
15	Total Benefits			(13)

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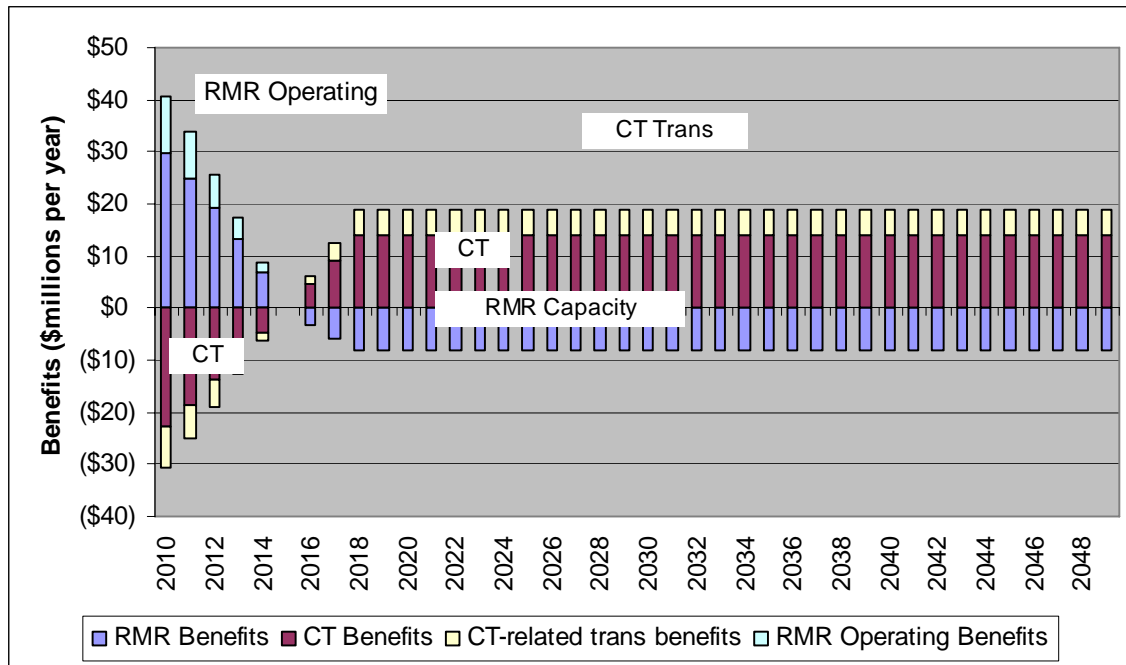
**INITIAL TESTIMONY OF THE CALIFORNIA INDEPENDENT SYSTEM
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1

Summary of Levelized Costs and Benefits		A		B	C
		Costs (\$ millions per year, nominal)		Net Benefits (Base case cost - Alt. case cost)	
		Base	Alternative		
Energy and Reliability Costs					
1	Customer Payments from Gridview	15,434	15,426		8
2	Less CAISO congestion cost (reduces TAC)	(82)	(67)		(15)
3	Less URG Margin (reduces URG bal acct)	(4,797)	(4,796)		(1)
4	Less IOU excess loss payments	(745)	(743)		(2)
5	Subtotal Energy Cost and Benefit	9,809	9,820		(11)
6	RMR Capacity Payments - Levelized	90	90		0
7	RMR Operating Payments - Levelized	60	58		2
8	CT Capacity Costs - Levelized	71	65		6
9	Transmission cost for new CTs-Levelized	25	23		2
10	Remediation cost to provide reactive support	-	-		-
11	RA Costs to replace CTs and RMR contracts	-	-		-
12	Subtotal Reliability Cost and Benefit	246	235		11
13	Total Energy and Reliability Benefits				(0)
RPS Procurement Cost					
14	Adjusted RPS Cost	5,263	5,263		-
15	Total Benefits				(0)

2

3



4

5

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Year	Base Case (Nominal Dollars)			UCAN10B3								
	RMR Contract (MW)	New CT (MW)	RMR Contract Price (\$/kW-yr)	RMR Contract Cost (\$M)	New CT and Trans Cost (\$M)	RMR Operating Cost (\$M)	RMR Contract (MW)	New CT (MW)	RMR Contract Price (\$/kW-yr)	RMR Contract Cost (\$M)	New CT and Trans Cost (\$M)	RMR Operating Cost (\$M)
2010	1434	0	49.71	\$ 71.3	\$ -	\$ 59.8	1,165	269	35.80	\$ 41.7	\$ 30.7	\$ 48.5
2011	1440	49	51.02	\$ 73.5	\$ 5.7	\$ 60.0	1,220	269	39.42	\$ 48.1	\$ 31.3	\$ 50.8
2012	1440	104	52.04	\$ 74.9	\$ 12.3	\$ 60.0	1,275	269	43.16	\$ 55.0	\$ 31.9	\$ 53.1
2013	1440	159	53.08	\$ 76.4	\$ 19.3	\$ 60.0	1,330	269	47.04	\$ 62.6	\$ 32.6	\$ 55.4
2014	1440	214	54.14	\$ 78.0	\$ 26.4	\$ 60.0	1,385	269	51.06	\$ 70.7	\$ 33.2	\$ 57.7
2015	1440	269	55.23	\$ 79.5	\$ 33.9	\$ 60.0	1,440	269	55.23	\$ 79.5	\$ 33.9	\$ 60.0
2016	1440	324	56.33	\$ 81.1	\$ 41.6	\$ 60.0	1,505	269	56.33	\$ 84.8	\$ 34.6	\$ 60.0
2017	1440	379	57.46	\$ 82.7	\$ 49.7	\$ 60.0	1,560	269	57.46	\$ 89.6	\$ 35.3	\$ 60.0
2018	1440	434	58.61	\$ 84.4	\$ 58.0	\$ 60.0	1,605	269	58.61	\$ 94.1	\$ 36.0	\$ 60.0
2019	1440	489	59.78	\$ 86.1	\$ 66.7	\$ 60.0	1,605	324	59.78	\$ 95.9	\$ 44.2	\$ 60.0
2020	1440	544	60.97	\$ 87.8	\$ 75.7	\$ 60.0	1,605	379	60.97	\$ 97.9	\$ 52.7	\$ 60.0
2021	1440	599	62.19	\$ 89.6	\$ 85.0	\$ 60.0	1,605	434	62.19	\$ 99.8	\$ 61.6	\$ 60.0
2022	1440	654	63.44	\$ 91.3	\$ 94.6	\$ 60.0	1,605	489	63.44	\$ 101.8	\$ 70.8	\$ 60.0
2023	1440	709	64.71	\$ 93.2	\$ 104.7	\$ 60.0	1,605	544	64.71	\$ 103.9	\$ 80.3	\$ 60.0
2024	1440	764	66.00	\$ 95.0	\$ 115.0	\$ 60.0	1,605	599	66.00	\$ 105.9	\$ 90.2	\$ 60.0
2025	1440	819	67.32	\$ 96.9	\$ 125.8	\$ 60.0	1,605	654	67.32	\$ 108.0	\$ 100.4	\$ 60.0
2026	1440	874	68.67	\$ 98.9	\$ 136.9	\$ 60.0	1,605	709	68.67	\$ 110.2	\$ 111.1	\$ 60.0
2027	1440	929	70.04	\$ 100.9	\$ 148.4	\$ 60.0	1,605	764	70.04	\$ 112.4	\$ 122.1	\$ 60.0
2028	1440	984	71.44	\$ 102.9	\$ 160.4	\$ 60.0	1,605	819	71.44	\$ 114.7	\$ 133.5	\$ 60.0
2029	1440	1039	72.87	\$ 104.9	\$ 172.7	\$ 60.0	1,605	874	72.87	\$ 117.0	\$ 145.3	\$ 60.0
2030	1440	1094	74.33	\$ 107.0	\$ 185.5	\$ 60.0	1,605	929	74.33	\$ 119.3	\$ 157.5	\$ 60.0
2031	1440	1149	75.81	\$ 109.2	\$ 198.7	\$ 60.0	1,605	984	75.81	\$ 121.7	\$ 170.2	\$ 60.0
2032	1440	1204	77.33	\$ 111.4	\$ 212.4	\$ 60.0	1,605	1,039	77.33	\$ 124.1	\$ 183.3	\$ 60.0
2033	1440	1259	78.88	\$ 113.6	\$ 226.5	\$ 60.0	1,605	1,094	78.88	\$ 126.6	\$ 196.9	\$ 60.0
2034	1440	1314	80.45	\$ 115.9	\$ 241.2	\$ 60.0	1,605	1,149	80.45	\$ 129.1	\$ 210.9	\$ 60.0
2035	1440	1369	82.06	\$ 118.2	\$ 256.3	\$ 60.0	1,605	1,204	82.06	\$ 131.7	\$ 225.4	\$ 60.0
2036	1440	1424	83.70	\$ 120.5	\$ 271.9	\$ 60.0	1,605	1,259	83.70	\$ 134.3	\$ 240.4	\$ 60.0
2037	1440	1479	85.38	\$ 122.9	\$ 288.1	\$ 60.0	1,605	1,314	85.38	\$ 137.0	\$ 255.9	\$ 60.0
2038	1440	1534	87.08	\$ 125.4	\$ 304.8	\$ 60.0	1,605	1,369	87.08	\$ 139.8	\$ 272.0	\$ 60.0
2039	1440	1589	88.83	\$ 127.9	\$ 322.0	\$ 60.0	1,605	1,424	88.83	\$ 142.6	\$ 288.6	\$ 60.0
2040	1440	1644	90.60	\$ 130.5	\$ 339.8	\$ 60.0	1,605	1,479	90.60	\$ 145.4	\$ 305.7	\$ 60.0
2041	1440	1699	92.41	\$ 133.1	\$ 358.2	\$ 60.0	1,605	1,534	92.41	\$ 148.3	\$ 323.4	\$ 60.0
2042	1440	1754	94.26	\$ 135.7	\$ 377.2	\$ 60.0	1,605	1,589	94.26	\$ 151.3	\$ 341.7	\$ 60.0
2043	1440	1809	96.15	\$ 138.5	\$ 396.8	\$ 60.0	1,605	1,644	96.15	\$ 154.3	\$ 360.6	\$ 60.0
2044	1440	1864	98.07	\$ 141.2	\$ 417.0	\$ 60.0	1,605	1,699	98.07	\$ 157.4	\$ 380.1	\$ 60.0
2045	1440	1919	100.03	\$ 144.0	\$ 437.9	\$ 60.0	1,605	1,754	100.03	\$ 160.6	\$ 400.3	\$ 60.0
2046	1440	1974	102.03	\$ 146.9	\$ 459.5	\$ 60.0	1,605	1,809	102.03	\$ 163.8	\$ 421.1	\$ 60.0
2047	1440	2029	104.07	\$ 149.9	\$ 481.7	\$ 60.0	1,605	1,864	104.07	\$ 167.0	\$ 442.6	\$ 60.0
2048	1440	2084	106.16	\$ 152.9	\$ 504.7	\$ 60.0	1,605	1,919	106.16	\$ 170.4	\$ 464.7	\$ 60.0
2049	1440	2139	108.28	\$ 155.9	\$ 528.4	\$ 60.0	1,605	1,974	108.28	\$ 173.8	\$ 487.6	\$ 60.0
1	Levelized			\$ 90.1	\$ 95.8	\$ 60.0				\$ 89.8	\$ 87.9	\$ 57.5

2

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1 **Q. Did UCAN ask the CAISO to perform reliability studies for any of the**
2 **UCAN alternatives addressed in this testimony?**

3

4 **A.** Yes. The CAISO was asked to perform reliability analyses on UCAN alternatives
5 D1 (South Bay repowering is built in addition to Sunrise Powerlink), and B1 (five
6 46.6 MW CTs are built in addition to Sunrise Powerlink) using the power system
7 model for the year 2015.

8

9 **Q. Were these studies conducted?**

10 **A.** No. During a conference call with UCAN, the CAISO explained to UCAN that,
11 based on studies already described in the CAISO testimony, the Sunrise project
12 was sufficient to ensure that the reliability criteria would be met in the year 2015.
13 Therefore, it is the CAISO's position that the addition of the generation capacity
14 in alternatives D1 and B1 to the 2015 case with Sunrise Powerlink is not likely to
15 result in the CAISO identifying reliability criteria violations. UCAN agreed that
16 this representation would be acceptable in lieu of the reliability analyses.

17

18 **IV. RPCC-REQUESTED EVALUATIONS.**

19

20 **Q. What are the three alternatives proposed by RPCC?**

21 **A.** The RPCC-requested analyses are based on updated alternatives as specified in an
22 RPCC e-mail dated April 29, 2007. These analyses are based on the latest 2010

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1 Heavy Summer (HS) power flow case that SDG&E updated and sent to the
2 CAISO on April 24, 2007. The transmission alternatives are as follows:

3 1. RPCC Alternative No. 1: The Sunrise project without the proposed Sycamore
4 Canyon – Penasquitos 230kV line. In lieu of this 230kV line, RPCC proposes
5 to install a third 230/69kV 224 MVA at Sycamore Canyon Substation.

6 2. RPCC Alternative No. 2: The Sunrise project without the proposed Sycamore
7 Canyon – Penasquitos 230kV line. RPCC proposes to replace the two 230kV
8 lines from Miguel to Mission Substation with (a) a double circuit transmission
9 line (DCTL) from Sycamore Canyon to Mission Substation; and (b) a third
10 230/69kV 224 MVA at Miguel Substation.

11 3. RPCC Alternative No. 3: The Sunrise project without the proposed Sycamore
12 Canyon – Penasquitos 230kV line. RPCC proposes to install (a) 3-ohm 69kV
13 series reactors on the load side of the two existing 230/69kV transformers at
14 Sycamore Canyon; and (b) a third 230/69kV 224 MVA transformer at
15 Escondido Substation.

16

17 **Q. What were the analyses that the CAISO performed for the above three**
18 **alternatives for RPCC?**

19 A. The CAISO performed transient stability, post-transient and power flow analyses
20 for the three RPCC alternatives for two import scenarios: (a) 3500 MW import to
21 the San Diego area with the Southwest Power Link (SWPL) out of service, and
22 (b) 4200 MW import to the San Diego area with the Southwest Power Link

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1 (SWPL) in service. The results are compared against the results of the Sunrise
2 Power Link power flow cases for the 3500 MW and 4200 MW import levels.

3 For the 3500 MW import power flow case, the CAISO performed an N-1
4 contingency analysis since the SWPL line and the largest combined cycle
5 generating plant (Otay Mesa) are already taken out of service. NERC/WECC
6 Category C (N-1-1, or in other words, Category B contingency, manual system
7 adjustment, followed by another Category B contingency) reliability standards are
8 applied.

9 For the 4200 MW import power flow case, the CAISO performed N-1 and
10 N-2 contingency analysis since the SWPL line remains in service. The largest
11 combined cycle power plant (Otay Mesa) is taken out of service for this scenario.
12 In addition, the analysis assumes inefficient generation so that Encina steam
13 generating units are taken out of service and the balance is made of imports to
14 SDG&E.

15

16 **Q. What conclusions can be drawn from the preceding reliability study results?**

17 1. A. When compared to the Sunrise Power Link Project, the following
18 conclusions can be drawn: Power flow analysis results:

19 a) RPCC Alternative 1:

20 With 3500 MW import to the San Diego area, RPCC Alternative No. 1
21 does not cause any *new* or additional thermal loading impacts to the CAISO-
22 controlled grid. There is a slight increase in loading (1%) for the Ash Tap –
23 Felicita 69kV line No. 1 under the contingency of Escondido – Ash 69kV line.

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1 However, the contingency loading on the affected line is within its emergency
2 line rating .

3 With 4200 MW import into the San Diego area, the case with RPCC
4 Alternative No. 1 modeled resulted in the following overloads that did not occur
5 in the case with the Sycamore Canyon-Penasquitos 230 kV line modeled. Poway
6 – Pomerado 69kV line was overloaded during the N-2 contingency of Palomar
7 (PEN) – Escondido Nos. 1 & 2 230kV lines. In addition, Pomerado – Sycamore
8 69kV line was identified to be overloaded under Category C contingency of
9 Sycamore 69kV bus, Sycamore – Chicarita 138kV line was overloaded under the
10 Category B contingency of the Penasquitos 230/138kV transformer.

11

12 b) RPCC Alternative No.2:

13 With 3500 MW import to SDG&E, RPCC Alternative No. 2 does not
14 cause any *new* or additional thermal loading impacts to the CAISO-controlled
15 grid. In general, there is a slight increase in facility loading (2%) but they are
16 within emergency rating. The RPCC Alternative No. 2 also exacerbates a pre-
17 existing contingency overloading on the Melrose Tap – San Luis Rey 69kV line
18 by 4%, but the overload also occurs with the Sunrise Power Link Project.

19 With 4200 MW import into SDG&E, RPCC Alternative No. 2 caused a
20 number of *new* contingency overloading concerns for the following transmission
21 facilities:

- 22 • Chollas – Paradise 69kV #1 line (loading that is marginal with its
23 emergency line rating)

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- 1 • Double Tap – Friars 138kV #1 line
- 2 • El Cajon – Jamacha 69kV #1 line
- 3 • Jamacha – Miguel 69kV #1 line
- 4 • Loveland – Alpine 69kV #1 line
- 5 • Miguel Tap – Miguel 69kV #1 line
- 6 • Paradise – Miguel 69kV #1 line (loading that is marginal with its
- 7 emergency line rating)
- 8 • San Luis Rey 230/69kV No. 3 transformer

9

10 c) RPCC Alternative No.3:

11 With 3500 MW import to SDG&E, RPCC Alternative No. 3 caused a
12 number of *new* contingency overloading concerns for the following transmission
13 facilities):

- 14 • Bernardo Tap – Lake Hodges 69kV #1 line
- 15 • Felicita Tap – Bernardo 69kV #1 line
- 16 • Sycamore Canyon – Carlton Hills 138kV #1 line

17 With 4200 MW import into SDG&E, RPCC Alternative No. 3 caused a
18 number of *new* contingency overloading concerns for the following transmission
19 facilities:

- 20 • Bernardo – Felicita Tap 69kV #1 line (loading that is marginal with its
- 21 emergency line rating)
- 22 • Chicarita – Sycamore Canyon 138kV #1 line

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- 1 • Double Tap – Friars 138kV #1 line
- 2 • Felicita Tap – Bernardo 69kV #1 line
- 3 • Granite Tap – Los Coches 69kV #1 line
- 4 • Los Coches – El Cajon 69kV #1 line

5

6 2. Transient stability and Post-transient analysis results:

7

8 Transient stability and Post-transient analyses were performed for both the 3500
9 MW and 4200 MW import cases for all three RPCC alternatives and for the case
10 with the SDG&E proposed Sunrise Powerlink plan of service which includes the
11 Sycamore Canyon-Penasquitos 230 kV line. The results for all four alternatives
12 were similar and are described below.

13

14 a. Transient Stability Results

15 For the 3500 MW import case, since it already included the largest generation
16 (Otay Mesa) and the most critical N-1 contingency (SWPL line), the next
17 contingencies that were evaluated were Category B contingencies. The analyses
18 were then Category C due to G-1/N-1-1 (Category B contingency, manual
19 adjusted, then followed by the next Category B contingency). The analyses were
20 then compared against the NERC/WECC Category C reliability standards. The
21 study results indicated compliance with both NERC and WECC’s “Disturbance
22 Performance Table of Allowable Effects on Other Systems”.

23

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1 For the 4200 MW import case, the case started with the largest G-1 (Otay Mesa)
2 and was then adjusted manually. Categories B and C contingencies were
3 evaluated for this power flow case. The study results indicated compliance with
4 both NERC and WECC Category B and C reliability standards.

5

6 b. Post-transient analysis results

7 Post-transient analysis was performed to determine compliance with WECC
8 reliability standards. For the 3500 MW case, the post-transient voltage deviation
9 study results were compliant with WECC's "Disturbance Performance Table of
10 Allowable Effects on Other Systems", with changes of 10% or less for Category
11 C contingencies. For the 4200 MW case, the post-transient voltage deviation
12 results were generally compliant with WECC reliability standards, with changes
13 of 5% or less for Category B contingencies (for SCE buses, the standards are 7%
14 or less for G-1/N-1 contingencies), or 10% for Category C contingencies.
15 However, for the Imperial Valley-Miguel 500 kV line outage some voltage
16 deviations slightly exceeded the 5% limit. It is expected that either generation
17 tripping for this outage or adjustments to the local shunt capacitor control settings
18 would effectively correct this problem.

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1 **Q. Of the three RPCC alternatives, which alternative has the best reliability**
2 **performance?**

3 **A.** Based on the study results, RPCC Alternative No. 1 has the best reliability
4 performance because it caused the least number of new thermal overloading
5 concerns.

6

7 **Q. What is the cost for RPCC Alternative No. 1 (installing a third 230/69kV 224**
8 **MVA transformer) and for mitigating identified thermal overload on the**
9 **Poway – Pomerado 69kV line, the Pomerado – Sycamore 69kV and the**
10 **Sycamore – Chicarita 138kV lines?**

11 **A.** The CAISO does not have cost information necessary to provide a cost estimate
12 for RPCC Alternative No.1.

13

14 **Q. Based on the study results, can RPCC's Alternative 1 replace SDG&E's**
15 **proposed Sycamore – Penasquitos 230kV line?**

16 **A.** If the transmission upgrades, as identified above (i.e., third 230/69kV transformer
17 at Sycamore Canyon, and overload mitigation for the Poway – Pomerado 69kV,
18 Pomerado – Sycamore 69kV and Sycamore – Chicarita 138kV lines), cost less
19 than the proposed 230kV line then these alternative upgrades together can be
20 considered an adequate substitute for the Sycamore – Penasquitos 230kV
21 underground line.

22 **Q. Does this conclude your testimony?**

23 **A.** Yes. This concludes the CAISO Initial Testimony, Part IV.

CERTIFICATE OF SERVICE

I hereby certify that I have served, by electronic and United States mail, a copy of the foregoing Testimony Of The California Independent System Operator Corporation, Part IV, to each party in Docket No. A.06-08-010.

Executed on May 14, 2007 at Folsom, California.

/s/Susan L. Montana

Susan L. Montana

An Employee of the California
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