

1 **BEFORE THE PUBLIC UTILITIES COMMISSION**
2 **OF THE STATE OF CALIFORNIA**
3

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

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18 **INITIAL TESTIMONY OF THE**
19
20 **CALIFORNIA INDEPENDENT SYSTEM OPERATOR CORPORATION**

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22 **PART III**
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27
28 Dated: April 20, 2007
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1 **I. INTRODUCTION**

2

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

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

10

11 **Q. On whose behalf are you submitting this Part III of your testimony?**

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

13

14 **Q. What is the purpose of this testimony?**

15 **A.** The purpose of this Part III of the CAISO initial testimony is to present the results
16 of the intervener-requested alternative scenarios produced by the CAISO pursuant
17 to the Assigned Commissioner and Administrative Law Judge's November 1,
18 2006 Scoping Memo and Ruling (Scoping Memo and Ruling). For easy
19 comparison, the presentation format for the investor-requested results is identical
20 to the one used in the CAISO's March 1, 2007 submission of Part II of its initial
21 testimony.

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1 **Q. Please describe the CAISO process for the development of the intervenor-**
2 **requested scenarios.**

3 **A.** Since November 1, 2006, the CAISO has met with the parties to define the
4 alternatives that the CAISO would model in compliance with the Scoping Memo
5 and Ruling. These discussions have occurred via telephone conference, meetings
6 with parties, and Commission-sponsored workshops. Based on the CAISO's
7 discussions with the parties, Commission staff, and the Assigned Administrative
8 Law Judge, the CAISO has analyzed a number of alternatives suggested by the
9 interveners. The analyses performed by the CAISO on behalf of these interveners
10 entail reliability modeling, renewable energy cost assessment, and production cost
11 modeling. The analysis yields cost and benefit estimates of an alternative resource
12 plan when compared to a base case plan.

13

14 **Q. Have the interveners received the results of the CAISO analysis prior to the**
15 **submission of this Part III of the CAISO's initial testimony?**

16 **A.** The CAISO provided the results of its analyses to parties, subject to appropriate
17 confidentiality agreements. Based on the results provided to parties, the CAISO
18 performed additional analyses on behalf of the parties to correct errors in the
19 CAISO analysis and to modify the modeling assumptions used by the CAISO.
20 The assumptions used in these revised runs were provided by the parties, and the
21 CAISO made every effort to ensure that the modeling results provided to the

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1 parties by the CAISO were consistent with the assumptions specified by the
2 parties.

3

4 **Q. What do the study results convey?**

5 **A.** These results convey benefits estimated by the CAISO for the intervener-
6 requested cases. These estimates are related to reductions in the costs of energy
7 payments, RPS compliance and reliability compliance compared to a base case
8 plan..

9 While each intervener-requested case contains the input data assumptions
10 required by the CAISO's estimation for energy-, RPS- and reliability-related costs
11 and benefits, the analysis does not include project cost information. For example,
12 UCAN requested a case formed by UCAN's own base case modified by Sunrise
13 in 2010 and Green Path North in 2011. However, UCAN did not explicitly
14 specify the case's transmission project cost assumption. Completing the case's
15 cost-effectiveness evaluation by the CAISO would require the CAISO making a
16 project cost assumption, a task that the CAISO has not done for three reasons:

- 17
- 18 • The Scoping Memo and Ruling did not direct the CAISO to supply the
19 project cost assumption for each intervener-requested case.
 - 20 • The CAISO does not have the time or resource to reasonably quantify
each intervener-requested case's project cost for this April 20, 2007 filing.

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- 1 • A project cost assumption unilaterally made by the CAISO would cloud
2 an intervener-requested case's cost and benefit estimates that are to be
3 solely based on the information from the requesting intervener.
4

5 **Q. How will the results be presented?**

6 **A.** To aid in understanding, each intervener's case results will be prefaced by a brief
7 description of the case in question. For ease of comparison and reference, the
8 case results will be presented in tables similar to those set forth in the earlier parts
9 of the CAISO testimony, which contain:

- 10 • Summary of the intervener-requested changes to the CAISO cases.
- 11 • 2015 costs for the base case and alternate case and 2015 benefits for each
12 alternative case, with each benefit defined as the cost difference between the
13 base and alternate cases.
- 14 • Levelized costs for the base case and alternative case and levelized benefits
15 for the alternative case. The levelized benefits incorporate the assumption that
16 annual energy-related benefits are constant in real dollars.
- 17 • A figure showing the annual reliability benefits by component in year 2010
18 dollars.
- 19 • A table showing the inputs that affect the calculation of reliability benefits.
20

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1 **Q. Do these tables reflect the same computational steps used in the CAISO's**
2 **previous testimony?**

3 **A.** Yes. They reflect: (a) energy costs produced from GridView adjusted to remove
4 benefits for customers of non-TAC entities, and (b) the inclusion of the CAISO's
5 estimates of the reliability and RPS benefits.

6

7 **Q. Please explain the adjustment to the GridView results for each intervener-**
8 **requested case.**

9 **A.** Consistent with the CAISO's prior testimony, the adjustment entails the following
10 modifications:

11 • PG&E_BAY and PG&E_VLY load payments are multiplied by 76.9% to
12 adjust for non-TAC customers in the zones.

13 • SOCALIF load payments are multiplied by 99.4% to adjust for non-TAC
14 customers in the zone.

15 • Excess loss payments are multiplied by 88.3% to adjust for non-TAC
16 customers in the PG&E_BAY, PG&E_VLY, SOCALIF, and SANDIEGO
17 zones.

18

19 **Q. Please explain how the CAISO determined the RPS costs for each intervener**
20 **case.**

21 **A.** RPS costs were assigned to each intervener-requested case as follows:

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- 1 • If the case assumes the same full renewable energy development in the
2 Imperial Valley as the CAISO’s Sunrise case, then it has the same RPS cost as
3 the CAISO’s Sunrise and (Green Path + LEAPS) cases.
- 4 • If the case assumes only 600MW of new incremental geothermal in the
5 Imperial Valley (beyond what was already identified in SSG-WI), its RPS cost
6 is the same as the CAISO’s base case and South Bay case.

7

8 **Q. Please explain how the CAISO determined the reliability benefits of each**
9 **intervener-requested case.**

10 **A.** Consistent with the CAISO’s prior testimony, the reliability-must-run (RMR)
11 analysis for each intervener-requested case was done using the following
12 assumptions:

- 13 • Existing RMR contract capacity is utilized fully before construction of any
14 new combustion turbine (CT) capacity.
- 15 • If a new CT is added, levelized payments to that CT are assumed to continue
16 regardless of whether there is a need for that capacity in the subsequent years.
- 17 • SDG&E only needs to contract for RMR capacity on a year by year basis to
18 meet its load requirements, making no payments to keep a generator in
19 operation for future years.

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- 1 • The need for RMR contract capacity or new CTs increases by 65MW per year
2 for all cases, except for the UCAN cases where a lower 55MW per year load
3 growth was explicitly specified.
- 4 • RMR fixed capacity unit costs have a maximum of \$46.21/kW-yr in 2006
5 dollars. The unit cost is escalated by 2% per year to convert to nominal
6 dollars.
- 7 • RMR fixed capacity unit costs vary in proportion to the RMR capacity
8 required, up to the maximum 1440 MW of RMR capacity available. The fixed
9 capacity unit cost is the maximum value described in the prior bullet,
10 multiplied by the “% of Type 2 Cost.” The “% of Type 2 Cost” rises linearly
11 from 21% at an RMR contract capacity requirement of 680 MW to 100% at
12 1440 MW. The percentage is capped at 100%. This variable unit cost
13 methodology was used for the CAISO’s Sunrise case in its March 1, 2007
14 testimony.
- 15 • RMR operating costs vary in proportion to the RMR capacity required, up to
16 the maximum 1440 MW of RMR capacity available. This is a modification in
17 the CAISO methodology that is described in its second Errata to its March 1,
18 2007 testimony and will also be issued on April 20th, 2007.
- 19 • The maximum RMR operating cost is \$60 million per year. This value is
20 constant in nominal dollars.

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- 1 • Reliability benefits are calculated for the years 2010 through 2049. An 8.18%
2 discount rate and 40 year term is used to calculate the levelized values.
3

4 **Q. How are the reliability results presented?**

5 **A.** The last table for each intervener-requested case shows the RMR and CT
6 requirements and costs. To conserve space, however, CT and CT-related
7 transmission costs have been combined, and the benefits (base case cost less
8 alternate case cost) are not shown.

10 **Q. Does this testimony in any way reflect the CAISO's opinion as to the viability
11 or feasibility of any of the intervener-proposed alternatives to Sunrise?**

12 **A.** No. As we have discussed above, the purpose of this testimony is simply to
13 describe each alternative scenario submitted to the CAISO for study (including
14 base case assumptions and comparisons with the CAISO base case); describe the
15 process used by the CAISO to conduct its evaluation; and set forth the results of
16 each study in a format consistent with the presentation used by the CAISO in Part
17 II of its initial testimony.

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1 **II. UCAN-REQUESTED RUNS**

2

3 **A. UCAN Base Case**

4

5 **Q. Please briefly describe UCAN's base case.**

6 **A.** The reliability and economic base cases used for the UCAN analysis originated
7 from the 2015 base year cases in Section 3.3 of the CSRTP report dated July 28,
8 2006. These cases represent the transmission facilities planned for the year 2015
9 and the forecasted summer peak load and energy demand for that year. These
10 cases were updated by the CAISO as described in the January 26, 2007 and
11 March 1, 2007 portions of the CAISO initial testimony. For example, the base
12 cases were updated to include the new plan of service for the Palo Verde-Devers
13 #2 500 kV project. There were also several modifications specified by UCAN
14 that were included in the cases used for their runs.

15

16 **Q. What are the major differences between UCAN's base case and the CAISO's**
17 **base case?**

18 **A.** The two major changes requested by UCAN to the CAISO 2015 base cases
19 described in the CAISO testimony were (1) a lower peak load forecast in the San
20 Diego Area, and (2) a higher amount of renewable generation development in the
21 IID/Imperial County area in the cases without the Sunrise or Green Path North
22 project. The specifications provided by UCAN for their base case are listed

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1 below. Many of the specifications are also in the CAISO case as indicated in the
2 last column of the table.

3

4 ***UCAN assumptions and inputs – base case***

Item	Note	Already in CAISO case?
2) Model SDG&E area renewables & D.G. (per UCAN's load spreadsheet)		N
3) Demand reduction	See item 11 (below) in revisions dated 2/21/07	N
4) Upgrade Path 42 (IID-SCE) from 600 MW to 1500 MW (2010)	Reflected in modeling?	Y
6) Use load forecast per UCAN's load spreadsheet (based on SDG&E's LTPP filing)	Reflected in modeling?	N
7) Check non-CAISO load forecast (for Gridview runs only)	Reflected in modeling?	Y
8) Modify non-CAISO generation per UCAN Data Request 8-1d (for Gridview runs)	See items 6-9 (below) in revisions dated 2/21/07	N
9) Update PVD2 Plan of Service	Reflected in modeling?	Y
10) Monitor and use 1900 MW for North of Miguel limit	Reflected in modeling?	Y
11) South of SONGS path rating (2200 MW normal / 2500 MW emergency)	See item 1 (below) in revisions dated 2/21/07	Y
Revisions to Assumptions		
Include AMI in basecases.	e-mail from D. Marcus, 2/10/07	N
Revise 2015 loads to 4996 MW	e-mail from D. Marcus, 2/10/07	N
Increase "Mexico Light" to 165 MW	e-mail from D. Marcus, 2/10/07	N
Add "confidential" new facilities proposed by SDG&E	e-mail from D. Marcus, 2/13/07	N
Revisions to Assumptions (2/21/07)		
1. Add the Sycamore-Miguel/Otay Mesa SPS (which will be in effect during N-1/G-1 conditions), Miguel 230/138 KV Bank 61, and Encina-Penasquitos #2 230 kV circuit, and loop the existing South Bay-Los Coches 138 kV line into Miguel, all as shown in SDG&E's 10/13/06 "Import Capability Study Report for 2010" at p. 4 and elsewhere (from UCAN DR4-31, SDG&E response of 1/8/07). Assume these measures will be taken with or without Sunrise, and do not impute any incremental cost for them.	e-mail from D. Marcus, 2/19/07	N
2. Add a 3rd 500/230 KV transformer at Miguel, at a capital cost of \$93.6 million per SDG&E's public workpapers from its 1/26/07 filing, and change the Miguel import limit to be 1900 Mw in all hours, without regard for operation of Mexican generation.	e-mail from D. Marcus, 2/19/07	Y (in reference case and SBay

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Item	Note	Already in CAISO case?
3. Compute the Miguel import limit based solely on flow through the Miguel transformers, without regard to flow on the Tijuana-Otay Mesa line, since that line will not contribute to Miguel loadings upon completion of the OMPPA project in 2008.	e-mail from D. Marcus, 2/19/07	Y
4. Keep the Tijuana-Otay Mesa limit at its current level of 800 Mw S-to-N and 408 Mw N-to-S	e-mail from D. Marcus, 2/19/07	Y
5. Add a new 230/69 kV transformer Bank 72 at San Luis Rey as contemplated in the Sunrise plan of service, at a capital cost as shown in SDG&E's 8/4/06 filing on the page following page V-14.	e-mail from D. Marcus, 2/19/07	N (only in Sunrise case)
6. Assume generation at Huntington Beach under 1-in-10 load conditions equal to that in the CSRTP study, 2010 HS pre-project case, revision 3 of May 23, 2006 (855 Mw), as shown in SDG&E's 1/12/07 responses to UCAN DR9-19 and DR9-22a.	e-mail from D. Marcus, 2/19/07	N (840 MW in ISO reference case)
7. Assume the same normal/emergency ratings for the Barre-Ellis line that were used in the CSRTP study of July 2006 (988 MVA normal, 1135 MVA emergency), and assume a capital cost of \$18 million to achieve those ratings.	e-mail from D. Marcus, 2/19/07	Y
8. Keep the N-0 Path 44 limit at its current 2200 Mw level.	e-mail from D. Marcus, 2/19/07	Y
9. The sum of the individual import limits under N-0 conditions will now be 1900 Mw (at Miguel) plus 2200 Mw (at SONGS) plus 800 Mw (at Otay Mesa), or 4900 Mw. However, the overall simultaneous import limit into SDG&E should only be increased from its current 2850 Mw to 3200 Mw, and the 3200 Mw figure should be used in GridView economic analyses.	e-mail from D. Marcus, 2/19/07	N
10. For reliability analyses, keep the CSRTP assumption that under N-1/G-1 conditions both IV-Miguel and IV-ROA will be out of service along with Otay Mesa generation, and generation direct-connected to IV will also be tripped, so that 100% of SDG&E imports will flow over Path 44..	e-mail from D. Marcus, 2/19/07	Y
11. For 1-in-10 loads in 2015, use the load data from SDG&E's Table H-11, with an additional 14.6 Mw of load reduction due to the AMI impact on distribution losses, for a 90/10 peak load (transmission losses included) of 4996 Mw. (For 2010, increase the load reduction due to CSI beyond that in Table H-11 by 2 Mw and the load reduction due to AMI by 9.4 Mw. For 2020, increase the load reduction due to CSI beyond that in Table H-11 by 50 Mw and the load reduction due to AMI by 16.3 Mw.)	e-mail from D. Marcus, 2/19/07	N
12. Do not make any separate adjustments for demand response programs other than those included in SDG&E's Table H-11.	e-mail from D. Marcus, 2/19/07	N/A
13. The natural gas fuel prices used in Gridview should be increased 5.6% for all Arizona gas-fueled generators	e-mail from D. Marcus, 2/20/07	Y

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1 **B. UCAN1: Case 0 + Sunrise (2010)**
2

3 **Q. Please describe Scenario UCAN1.**

4 **A. Scenario UCAN1 modifies UCAN's reliability and economic base cases by the**
5 Sunrise Powerlink plan of service.
6

7 **Q. Besides the difference between UCAN's and the CAISO's base case already**
8 **described, are there additional differences between this UCAN case and the**
9 **CAISO's Sunrise case?**

10 **A. No.**
11

12 **Q. Please summarize the results for Scenario UCAN1.**

13 **A. The results are set forth below. The zero RPS benefit reflects that the CAISO has**
14 assigned the Sunrise RPS cost to both the UCAN base case and alternative case
15 that assume full build out of renewable resources in the Imperial Valley.

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		A	B	C
Summary of 2015 Cost 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

2

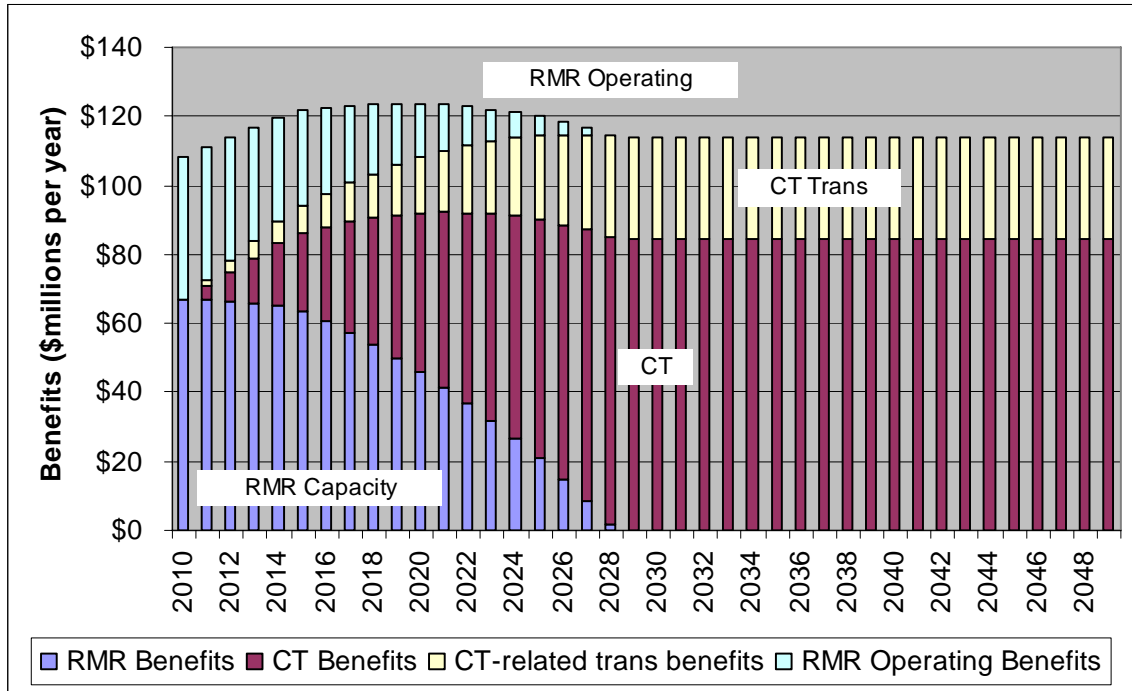
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Summary of Levelized Costs and Benefits		A	B	C
		Costs (\$ millions per year, nominal)		Net Benefits (Base case cost - Alt. case cost)
		UCAN base case	UCAN1	
Energy and Reliability Costs				
1	Customer Payments from Gridview	16,073	16,008	65
2	Less CAISO congestion cost (reduces TAC)	(87)	(62)	(25)
3	Less URG Margin (reduces URG bal acct)	(4,983)	(4,958)	(25)
4	Less IOU excess loss payments	(760)	(751)	(9)
5	Subtotal Energy Cost and Benefit	10,243	10,236	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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1 **Figure 1: UCAN1 Reliability Benefits (Constant Dollars)**



2
3
4
5
6

Based on 55MW/yr load growth
RMR operating costs vary with RMR contract capacity levels. Payment = \$60M/yr *
(RMR contract capacity / 1440 MW), with a maximum of \$60M/yr.

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Year	Base Case (Nominal Dollars)						UCAN1					
	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

**INITIAL TESTIMONY OF
THE CALIFORNIA INDEPENDENT SYSTEM
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1 **C. UCAN14: UCAN Case 0 + Sunrise Project (2010) + Green Path**
2

3 **Q. Please describe Scenario UCAN14.**

4 **A.** Scenario UCAN14 modifies UCAN1 by including the Green Path North
5 transmission project plan.
6

7 **Q. Please summarize the results for Scenario UCAN14.**

8 **A.** The results are set forth below. The zero RPS benefit reflects that the CAISO has
9 assigned the Sunrise RPS cost to both the UCAN base case and alternative case
10 that assume full build out of renewable resources in the Imperial Valley.
11

Summary of 2015 Cost and Benefits		A	B	C
		Costs (\$ millions per year, UCAN base case UCAN14		Net Benefits (Base case cost -
Energy and Reliability Costs				
1	Customer Payments from Gridview	14,178	14,117	61
2	Less CAISO congestion cost (reduces TAC)	(77)	(51)	(26)
3	Less URG Margin (reduces URG bal acct)	(4,396)	(4,374)	(22)
4	Less IOU excess loss payments	(670)	(660)	(10)
5	Subtotal Energy Cost and Benefit	9,035	9,033	2
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			137
RPS Procurement Cost				
14	Adjusted RPS Cost	4,153	4,153	-
15	Total Benefits			137

12
13
14

**INITIAL TESTIMONY OF
THE CALIFORNIA INDEPENDENT SYSTEM
OPERATOR CORPORATION, A.06-08-010
PART III**

1

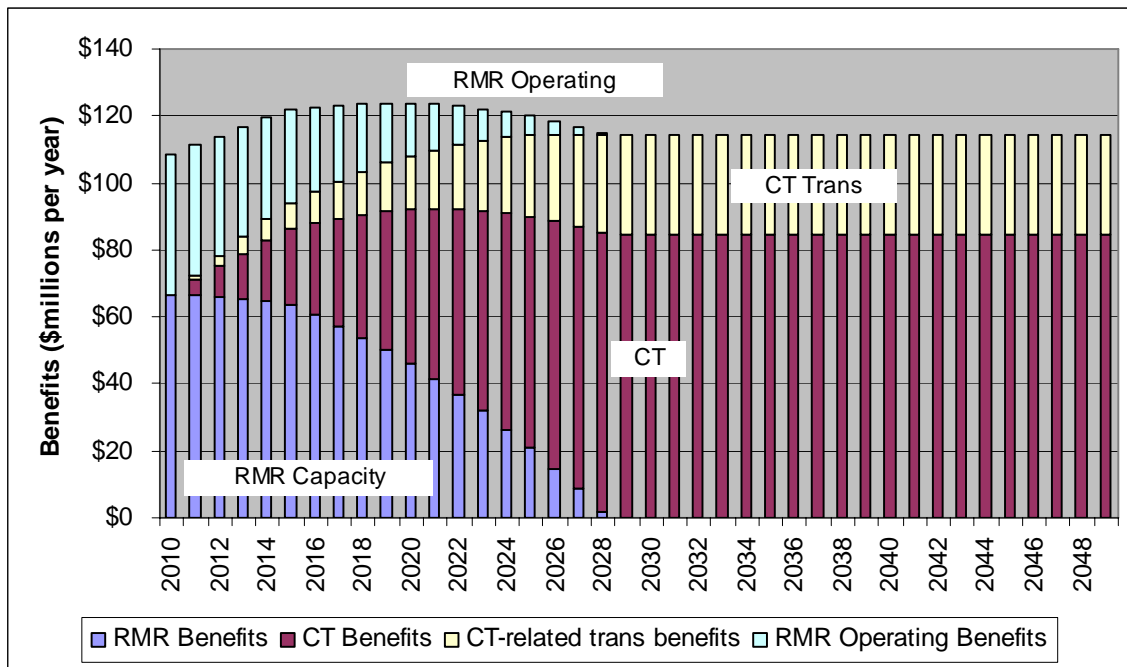
		A	B	C
Summary of Levelized Costs and Benefits		Costs (\$ millions per year, nominal)		Net Benefits (Base case cost - Alt. case cost)
		UCAN base case	UCAN14	
Energy and Reliability Costs				
1	Customer Payments from Gridview	16,073	16,004	69
2	Less CAISO congestion cost (reduces TAC)	(87)	(58)	(29)
3	Less URG Margin (reduces URG bal acct)	(4,983)	(4,958)	(25)
4	Less IOU excess loss payments	(760)	(748)	(12)
5	Subtotal Energy Cost and Benefit	10,243	10,241	3
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			150
RPS Procurement Cost				
14	Adjusted RPS Cost	5,263	5,263	-
15	Total Benefits			150

2

3

4

Figure 2: UCAN14 Reliability Benefits (Constant Dollars)



5

6

**INITIAL TESTIMONY OF
THE CALIFORNIA INDEPENDENT SYSTEM
OPERATOR CORPORATION, A.06-08-010
PART III**

Year	Base Case (Nominal Dollars)						UCAN14					
	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

2

**INITIAL TESTIMONY OF
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1 **D. UCAN5: Case 0 + Mexico Light 165 MW in 2010-2014 only + Sunrise**
2 **(2015)**
3

4 **Q. Please describe Scenario UCAN5.**

5 **A.** Scenario UCAN5 has the same base cases as Scenario UCAN1. However,
6 UCAN5 assumes that the CAISO could import 165 MW of generation from the
7 Mexico CFE control area for the RMR/LCR requirements during the years 2010
8 through 2014. UCAN believes this import would be possible because the Mexico
9 Light project would allow the transfer of 165 MW of generation normally
10 connected to the Imperial Valley 230 kV bus to the Mexico CFE system after the
11 line outage.

12
13 **Q. Please summarize the results for Scenario UCAN5.**

14 **A.** The results are set forth below. The zero RPS benefit reflects that the CAISO has
15 assigned the Sunrise RPS cost to both the UCAN base case and alternative case
16 that assume full build out of renewable resources in the Imperial Valley.

17

**INITIAL TESTIMONY OF
THE CALIFORNIA INDEPENDENT SYSTEM
OPERATOR CORPORATION, A.06-08-010
PART III**

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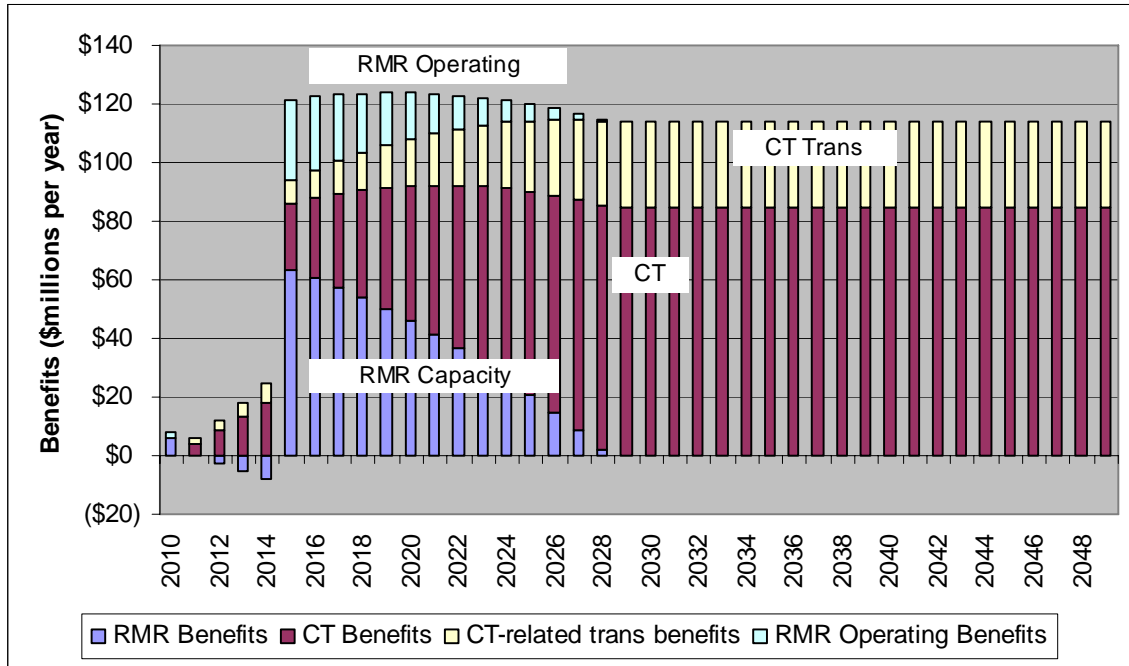
		A	B	C
		Costs		Net Benefits
		(\$ millions per year,		(Base case cost -
		UCAN		
		base case	UCAN5	
Summary of 2015 Cost and Benefits				
Energy and Reliability Costs				
1	Customer Payments from Gridview	14,178	14,120	58
2	Less CAISO congestion cost (reduces TAC)	(77)	(55)	(22)
3	Less URG Margin (reduces 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

3
4

		A	B	C
		Costs		Net Benefits
		(\$ millions per year,		(Base case cost -
		nominal)		Alt. case cost)
		UCAN		
		base case	UCAN5	
Summary of Levelized Costs and Benefits				
Energy and Reliability Costs				
1	Customer Payments from Gridview	16,073	16,008	65
2	Less CAISO congestion cost (reduces TAC)	(87)	(62)	(25)
3	Less URG Margin (reduces URG bal acct)	(4,983)	(4,958)	(25)
4	Less IOU excess loss payments	(760)	(751)	(9)
5	Subtotal Energy Cost and Benefit	10,243	10,236	7
6	RMR Capacity Payments - Levelized	90	67	23
7	RMR Operating Payments - Levelized	60	52	8
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	136	110
13	Total Energy and Reliability Benefits			117
RPS Procurement Cost				
14	Adjusted RPS Cost	5,263	5,263	-
15	Total Benefits			117

**INITIAL TESTIMONY OF
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1 **Figure 3: UCAN5 Reliability Benefits (Constant Dollars)**



2
3

**INITIAL TESTIMONY OF
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Year	Base Case (Nominal Dollars)						UCANS					
	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	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				\$ 66.9	\$ 17.3	\$ 51.1

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1 **E. UCAN18: UCAN Case 0 + LADWP's Green Path North (2011) + Path**
2 **44 Upgrade (350 MW for emergency purposes only, to 2,850 MW) in 2010 +**
3 **Sunrise (2015)**
4

5 **Q. Please describe Scenario UCAN18.**

6 **A.** Scenario UCAN18 has the same base cases as Scenario UCAN14. However, it
7 differs from UCAN14 in two aspects:

- 8 • During the RMR/LCR analysis of the of the Imperial Valley-Miguel 500 kV
9 line outage, UCAN assumed that the WECC Path 44 rating would be
10 increased to 2850 MW.
- 11 • UCAN assumed that the Sunrise project's on line date would be 2015, not
12 2010.

13

14 **Q. Please summarize the results for Scenario UCAN18.**

15 **A.** The results are set forth below. For this scenario, the Sunrise Powerlink is not
16 completed until 2015. The CAISO reliability analysis focused on the year 2015,
17 and with Sunrise modeled the analysis of this scenario did not identify any
18 significant reliability problems. However, assuming that significant renewable
19 development were to occur by 2014 and earlier years, the 2015 results without
20 Sunrise modeled should be used as an indicator of the reliability performance of
21 this scenario. Therefore, based on reliability study results previously provided to
22 UCAN by the CAISO, this scenario can be expected to fail the reliability test due
23 to transient frequency dip violations in Mexico CFE caused by a contingency of
24 the Imperial Valley-Miguel 500 kV line in the year 2014 and potentially earlier.

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1 In addition, this scenario relies on an increased rating on Path 44 prior to the year
2 2014. Analysis by the CAISO has identified thermal overloads due to several
3 NERC category B contingencies caused by the proposed increase in the Path 44
4 emergency rating. The economic analysis results set forth below have not
5 accounted for these reliability criteria violations. The zero RPS benefit reflects
6 that the CAISO has assigned the Sunrise RPS cost to both the UCAN base case
7 and alternative case that assume full build out of renewable resources in the
8 Imperial Valley.

9

Summary of 2015 Cost and Benefits		A		B	C
		Costs		Net Benefits	
		(\$ millions per year,		(Base case cost -	
		UCAN			
		base case	UCAN18		
Energy and Reliability Costs					
1	Customer Payments from Gridview	14,178	14,117	61	
2	Less CAISO congestion cost (reduces TAC)	(77)	(51)	(26)	
3	Less URG Margin (reduces URG bal acct)	(4,396)	(4,374)	(22)	
4	Less IOU excess loss payments	(670)	(660)	(10)	
5	Subtotal Energy Cost and Benefit	9,035	9,033	2	
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			137	
RPS Procurement Cost					
14	Adjusted RPS Cost	4,153	4,153	-	
15	Total Benefits			137	

10

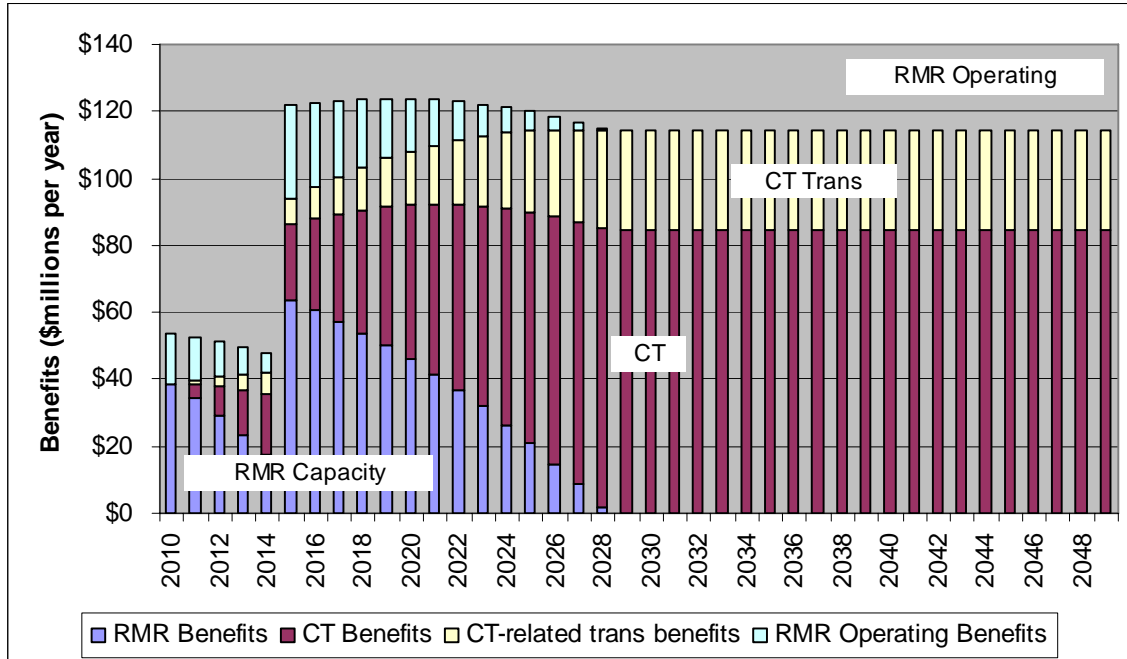
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		A		B		C	
Summary of Levelized Costs and Benefits		Costs				Net Benefits	
		(\$ millions per year, nominal)				(Base case cost - Alt. case cost)	
		UCAN					
		base case	UCAN18				
Energy and Reliability Costs							
1	Customer Payments from Gridview	16,073	16,004			69	
2	Less CAISO congestion cost (reduces TAC)	(87)	(58)			(29)	
3	Less URG Margin (reduces URG bal acct)	(4,983)	(4,958)			(25)	
4	Less IOU excess loss payments	(760)	(748)			(12)	
5	Subtotal Energy Cost and Benefit	10,243	10,241			3	
6	RMR Capacity Payments - Levelized	90	56			34	
7	RMR Operating Payments - Levelized	60	48			12	
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	121			125	
13	Total Energy and Reliability Benefits					128	
RPS Procurement Cost							
14	Adjusted RPS Cost	5,263	5,263			-	
15	Total Benefits					128	

1
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Figure 4: UCAN18 Reliability Benefits (Constant Dollars)



4
5

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Year	Base Case (Nominal Dollars)						UCAN18					
	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	1,069	-	30.83	\$ 33.0	\$ -	\$ 44.5
2011	1440	49	51.02	\$ 73.5	\$ 5.7	\$ 60.0	1,124	-	34.35	\$ 38.6	\$ -	\$ 46.8
2012	1440	104	52.04	\$ 74.9	\$ 12.3	\$ 60.0	1,179	-	38.00	\$ 44.8	\$ -	\$ 49.1
2013	1440	159	53.08	\$ 76.4	\$ 19.3	\$ 60.0	1,234	-	41.78	\$ 51.6	\$ -	\$ 51.4
2014	1440	214	54.14	\$ 78.0	\$ 26.4	\$ 60.0	1,289	-	45.69	\$ 58.9	\$ -	\$ 53.7
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				\$ 56.0	\$ 17.3	\$ 47.5

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1 **F. UCAN2: UCAN Case 0 + Mexico Light 165 MW (2010-2014 only) and**
2 **Path 44 upgrade of 350 MW in 2015, thereby increasing Path 44 emergency**
3 **rating to 2850 MW but leaving the normal rating of 2200 MW unaffected**
4

5 **Q. Please describe Scenario UCAN2.**

6 **A.** Scenario UCAN2 has the same base cases as Scenario UCAN1. This scenario
7 reflects the following UCAN modifications to its base cases:

- 8 • During the RMR/LCR analysis of the of the Imperial Valley-Miguel 500 kV
9 line outage, UCAN assumed that the WECC Path 44 rating would be
10 increased to 2850 MW.
- 11 • For the RMR/LCR requirements during the years 2010 through 2014, UCAN
12 assumed that the CAISO could import 165 MW of generation from the
13 Mexico CFE control area. UCAN believes this import would be possible
14 because the Mexico Light project would allow the transfer of 165 MW of
15 generation normally connected to the Imperial Valley 230 kV bus to the
16 Mexico CFE system after the line outage.

17

18 **Q. Please summarize the results for Scenario UCAN2.**

19 **A.** Based on reliability study results previously provided to UCAN by the CAISO,
20 this case fails the reliability test due to transient frequency dip violations in
21 Mexico CFE caused by a contingency of the Imperial Valley-Miguel 500 kV line.
22 Subsequent analysis by the CAISO has identified thermal overloads due to several
23 NERC category B contingencies caused by the proposed increase in the Path 44

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1 emergency rating. The economic analysis results set forth below have not
2 accounted for these reliability criteria violations. Finally, the zero RPS benefit
3 reflects that the CAISO has assigned the Sunrise RPS cost to both the UCAN base
4 case and alternative case that assume full build out of renewable resources in the
5 Imperial Valley.

6
7

		A		B	C
		Costs		Net Benefits	
Summary of 2015 Cost and Benefits		(\$ millions per year,		(Base 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			-	

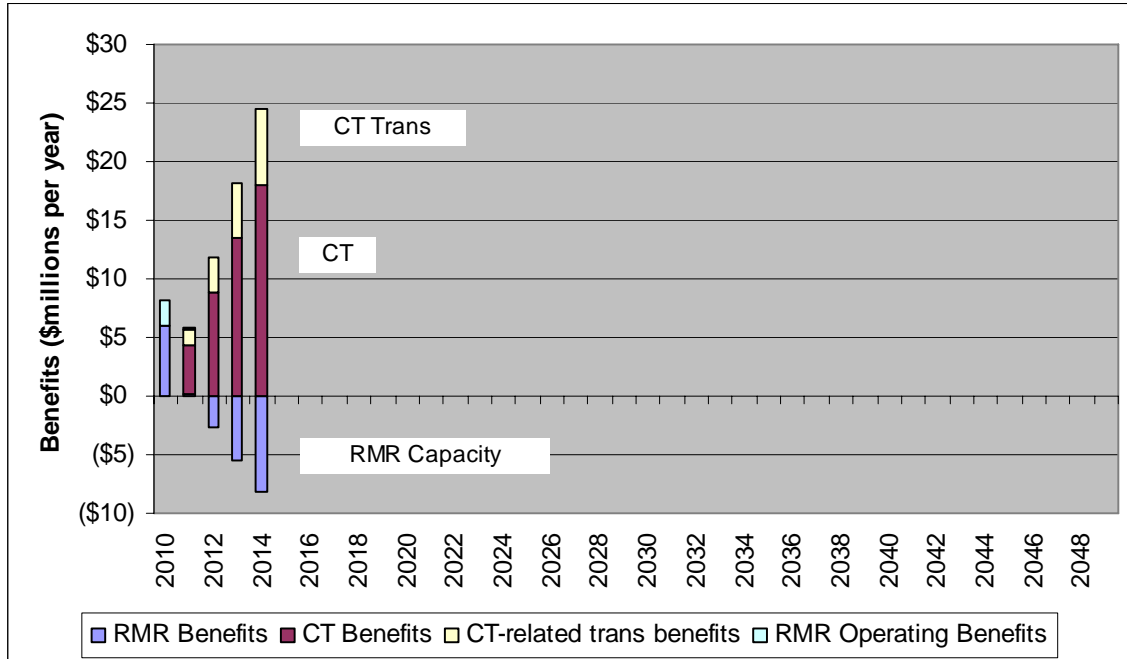
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Summary of Levelized Costs and Benefits		A	B	C
		Costs (\$ millions per year, nominal)		Net Benefits (Base case cost - Alt. case cost)
		UCAN		
		base case	UCAN2	
Energy and Reliability Costs				
1	Customer Payments from Gridview	16,073	16,073	-
2	Less CAISO congestion cost (reduces TAC)	(87)	(87)	-
3	Less URG Margin (reduces URG bal acct)	(4,983)	(4,983)	-
4	Less IOU excess loss payments	(760)	(760)	-
5	Subtotal Energy Cost and Benefit	<u>10,243</u>	<u>10,243</u>	-
6	RMR Capacity Payments - Levelized	86	87	(1)
7	RMR Operating Payments - Levelized	58	58	0
8	CT Capacity Costs - Levelized	62	59	3
9	Transmission cost for new CTs-Levelized	22	21	1
10	Remediation cost to provide reactive support	-	-	-
11	RA Costs to replace CTs and RMR contracts	-	-	-
12	Subtotal Reliability Cost and Benefit	<u>228</u>	<u>224</u>	<u>4</u>
13	Total Energy and Reliability Benefits			<u>4</u>
RPS Procurement Cost				
14	Adjusted RPS Cost	<u>5,263</u>	<u>5,263</u>	-
15	Total Benefits			<u>4</u>

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Figure 5: UCAN2 Reliability Benefits (Constant Dollars)



4
5
6

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Year	Base Case (Nominal Dollars)						UCAN2					
	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

G. UCAN3: 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)

Q. Please describe Scenario UCAN3.

A. Scenario UCAN3 modifies UCAN2 by including LADWP's Green Path North project plan.

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1 **Q. Please summarize Scenario UCAN3.**

2 **A.** Based on reliability study results previously provided to UCAN by the CAISO,
3 this case fails the reliability test due to transient frequency dip violations in
4 Mexico CFE caused by a contingency of the Imperial Valley-Miguel 500 kV line.
5 Subsequent analysis by the CAISO has identified thermal overloads due to several
6 NERC category B contingencies caused by the proposed increase in the Path 44
7 emergency rating. The economic analysis results set forth below have not
8 accounted for these reliability criteria violations. Finally, the zero RPS benefit
9 reflects that the CAISO has assigned the Sunrise RPS cost to both the UCAN base
10 case and alternative case that assume full build out of renewable resources in the
11 Imperial Valley.

		A		B	C	
		Costs			Net Benefits	
		(\$ millions per year,			(Base case cost -	
		UCAN				
		base case	UCAN3			
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)	

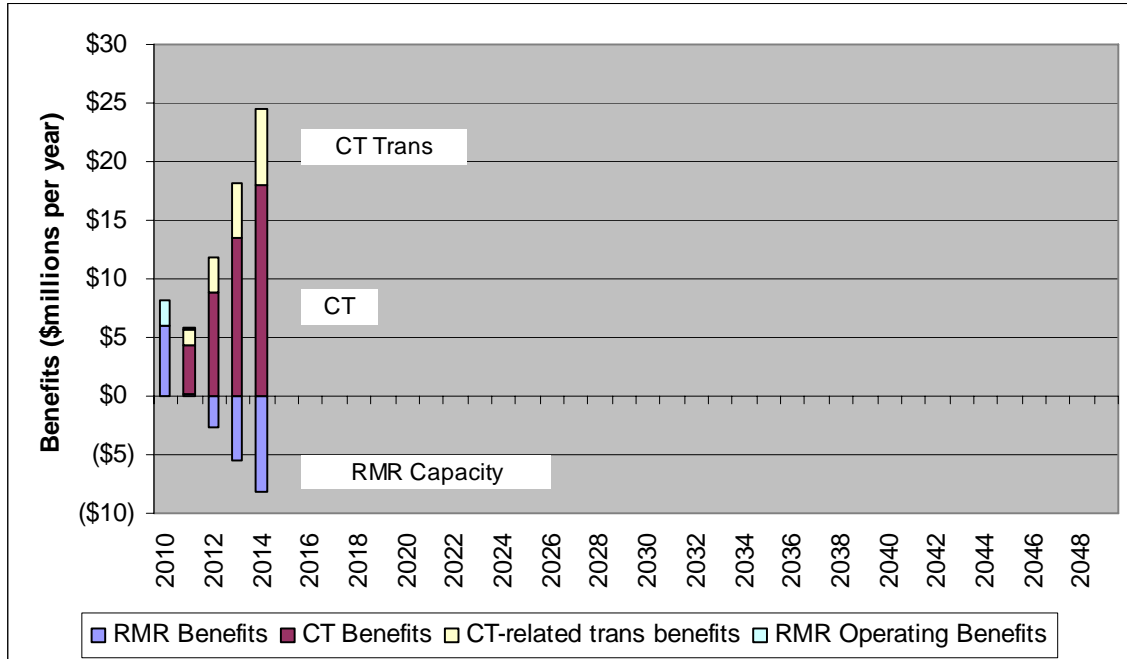
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**INITIAL TESTIMONY OF
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Summary of Levelized Costs and Benefits		A		B	C
		Costs		UCAN3	Net Benefits (Base case cost - Alt. case cost)
		(\$ millions per year, nominal)			
		base case			
Energy and 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	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				(10)
RPS Procurement Cost					
14	Adjusted RPS Cost	5,263	5,263		-
15	Total Benefits				(10)

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Figure 6: UCAN3 Reliability Benefits (Constant Dollars)



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Year	Base Case (Nominal Dollars)						UCAN3					
	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
Levelized				\$ 90.1	\$ 95.8	\$ 60.0				\$ 90.7	\$ 91.9	\$ 59.8

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1 **H. UCAN10: UCAN Case 0 + 5X46.6 MW CTs (2008) + Mexico Light**
2 **165 MW (2016) + LADWP's Green Path North (2011)**
3

4 **Q. Please describe Scenario UCAN10.**

5 **A. Scenario UCAN10 modifies UCAN3 as follows:**

- 6 • Five 46.6 MW CTs were modeled in the San Diego load pocket in year 2008.
- 7 • For the RMR/LCR requirements during the years 2016 and beyond, UCAN
- 8 assumed that the CAISO could import 165 MW of generation from the
- 9 Mexico CFE control area. UCAN believes this import would be possible
- 10 because the Mexico Light project would allow the transfer of 165 MW of
- 11 generation normally connected to the Imperial Valley 230 kV bus to the
- 12 Mexico CFE system after the line outage.

13

14 **Q. Please summarize the results for Scenario UCAN10.**

15 **A. Based on reliability study results previously provided to UCAN by the CAISO,**

16 this case fails the reliability test due to transient frequency dip violations in

17 Mexico CFE caused by a contingency of the Imperial Valley-Miguel 500 kV line.

18 The economic analysis results set forth below have not accounted for these

19 reliability criteria violations. Finally, the zero RPS benefit reflects that the CAISO

20 has assigned the Sunrise RPS cost to both the UCAN base case and alternative

21 case that assume full build out of renewable resources in the Imperial Valley.

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		A	B	C
		Costs		Net Benefits
		(\$ millions per year,		(Base case cost -
		UCAN		
		base case	UCAN10	
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)	(0)
4	Less IOU excess loss payments	(670)	(668)	(2)
5	Subtotal Energy Cost and Benefit	<u>9,035</u>	<u>9,048</u>	(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	<u>173</u>	<u>173</u>	-
13	Total Energy and Reliability Benefits			(13)
RPS Procurement Cost				
14	Adjusted RPS Cost	<u>4,153</u>	<u>4,153</u>	-
15	Total Benefits			(13)

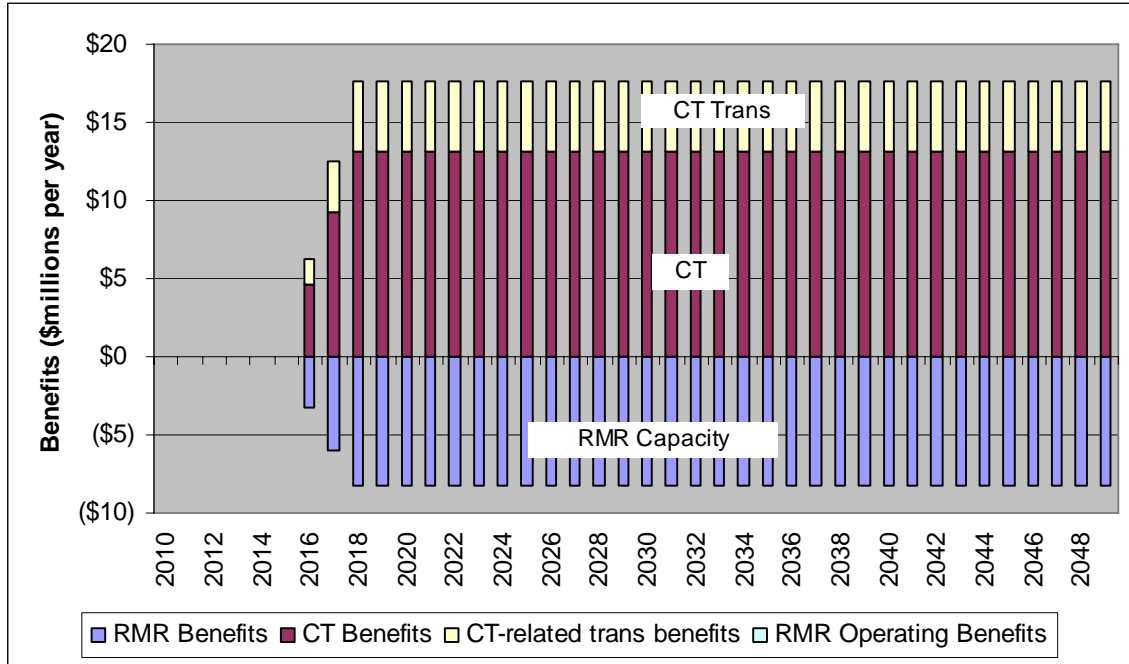
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		A	B	C
		Costs		Net Benefits
		(\$ millions per year,		(Base case cost -
		nominal)		Alt. case cost)
		UCAN		
		base case	UCAN10	
Summary of Levelized Costs and Benefits				
Energy and Reliability Costs				
1	Customer Payments from Gridview	16,073	16,067	7
2	Less CAISO congestion cost (reduces TAC)	(87)	(69)	(18)
3	Less URG Margin (reduces URG bal acct)	(4,983)	(4,983)	(0)
4	Less IOU excess loss payments	(760)	(758)	(2)
5	Subtotal Energy Cost and Benefit	<u>10,243</u>	<u>10,258</u>	(14)
6	RMR Capacity Payments - Levelized	90	97	(7)
7	RMR Operating Payments - Levelized	60	60	-
8	CT Capacity Costs - Levelized	71	61	10
9	Transmission cost for new CTs-Levelized	25	21	4
10	Remediation cost to provide reactive support	-	-	-
11	RA Costs to replace CTs and RMR contracts	-	-	-
12	Subtotal Reliability Cost and Benefit	<u>246</u>	<u>239</u>	7
13	Total Energy and Reliability Benefits			(7)
RPS Procurement Cost				
14	Adjusted RPS Cost	<u>5,263</u>	<u>5,263</u>	-
15	Total Benefits			(7)

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Figure 7: UCAN10 Reliability Benefits (Constant Dollars)



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Year	Base Case (Nominal Dollars)						UCAN10					
	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	1,440	49	51.02	\$ 73.5	\$ 5.7	\$ 60.0
2012	1440	104	52.04	\$ 74.9	\$ 12.3	\$ 60.0	1,440	104	52.04	\$ 74.9	\$ 12.3	\$ 60.0
2013	1440	159	53.08	\$ 76.4	\$ 19.3	\$ 60.0	1,440	159	53.08	\$ 76.4	\$ 19.3	\$ 60.0
2014	1440	214	54.14	\$ 78.0	\$ 26.4	\$ 60.0	1,440	214	54.14	\$ 78.0	\$ 26.4	\$ 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	1,505	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	279	58.61	\$ 94.1	\$ 37.3	\$ 60.0
2019	1440	489	59.78	\$ 86.1	\$ 66.7	\$ 60.0	1,605	334	59.78	\$ 95.9	\$ 45.5	\$ 60.0
2020	1440	544	60.97	\$ 87.8	\$ 75.7	\$ 60.0	1,605	389	60.97	\$ 97.9	\$ 54.1	\$ 60.0
2021	1440	599	62.19	\$ 89.6	\$ 85.0	\$ 60.0	1,605	444	62.19	\$ 99.8	\$ 63.0	\$ 60.0
2022	1440	654	63.44	\$ 91.3	\$ 94.6	\$ 60.0	1,605	499	63.44	\$ 101.8	\$ 72.2	\$ 60.0
2023	1440	709	64.71	\$ 93.2	\$ 104.7	\$ 60.0	1,605	554	64.71	\$ 103.9	\$ 81.8	\$ 60.0
2024	1440	764	66.00	\$ 95.0	\$ 115.0	\$ 60.0	1,605	609	66.00	\$ 105.9	\$ 91.7	\$ 60.0
2025	1440	819	67.32	\$ 96.9	\$ 125.8	\$ 60.0	1,605	664	67.32	\$ 108.0	\$ 102.0	\$ 60.0
2026	1440	874	68.67	\$ 98.9	\$ 136.9	\$ 60.0	1,605	719	68.67	\$ 110.2	\$ 112.6	\$ 60.0
2027	1440	929	70.04	\$ 100.9	\$ 148.4	\$ 60.0	1,605	774	70.04	\$ 112.4	\$ 123.7	\$ 60.0
2028	1440	984	71.44	\$ 102.9	\$ 160.4	\$ 60.0	1,605	829	71.44	\$ 114.7	\$ 135.1	\$ 60.0
2029	1440	1039	72.87	\$ 104.9	\$ 172.7	\$ 60.0	1,605	884	72.87	\$ 117.0	\$ 147.0	\$ 60.0
2030	1440	1094	74.33	\$ 107.0	\$ 185.5	\$ 60.0	1,605	939	74.33	\$ 119.3	\$ 159.2	\$ 60.0
2031	1440	1149	75.81	\$ 109.2	\$ 198.7	\$ 60.0	1,605	994	75.81	\$ 121.7	\$ 171.9	\$ 60.0
2032	1440	1204	77.33	\$ 111.4	\$ 212.4	\$ 60.0	1,605	1,049	77.33	\$ 124.1	\$ 185.1	\$ 60.0
2033	1440	1259	78.88	\$ 113.6	\$ 226.5	\$ 60.0	1,605	1,104	78.88	\$ 126.6	\$ 198.7	\$ 60.0
2034	1440	1314	80.45	\$ 115.9	\$ 241.2	\$ 60.0	1,605	1,159	80.45	\$ 129.1	\$ 212.7	\$ 60.0
2035	1440	1369	82.06	\$ 118.2	\$ 256.3	\$ 60.0	1,605	1,214	82.06	\$ 131.7	\$ 227.3	\$ 60.0
2036	1440	1424	83.70	\$ 120.5	\$ 271.9	\$ 60.0	1,605	1,269	83.70	\$ 134.3	\$ 242.3	\$ 60.0
2037	1440	1479	85.38	\$ 122.9	\$ 288.1	\$ 60.0	1,605	1,324	85.38	\$ 137.0	\$ 257.9	\$ 60.0
2038	1440	1534	87.08	\$ 125.4	\$ 304.8	\$ 60.0	1,605	1,379	87.08	\$ 139.8	\$ 274.0	\$ 60.0
2039	1440	1589	88.83	\$ 127.9	\$ 322.0	\$ 60.0	1,605	1,434	88.83	\$ 142.6	\$ 290.6	\$ 60.0
2040	1440	1644	90.60	\$ 130.5	\$ 339.8	\$ 60.0	1,605	1,489	90.60	\$ 145.4	\$ 307.8	\$ 60.0
2041	1440	1699	92.41	\$ 133.1	\$ 358.2	\$ 60.0	1,605	1,544	92.41	\$ 148.3	\$ 325.5	\$ 60.0
2042	1440	1754	94.26	\$ 135.7	\$ 377.2	\$ 60.0	1,605	1,599	94.26	\$ 151.3	\$ 343.9	\$ 60.0
2043	1440	1809	96.15	\$ 138.5	\$ 396.8	\$ 60.0	1,605	1,654	96.15	\$ 154.3	\$ 362.8	\$ 60.0
2044	1440	1864	98.07	\$ 141.2	\$ 417.0	\$ 60.0	1,605	1,709	98.07	\$ 157.4	\$ 382.4	\$ 60.0
2045	1440	1919	100.03	\$ 144.0	\$ 437.9	\$ 60.0	1,605	1,764	100.03	\$ 160.6	\$ 402.6	\$ 60.0
2046	1440	1974	102.03	\$ 146.9	\$ 459.5	\$ 60.0	1,605	1,819	102.03	\$ 163.8	\$ 423.4	\$ 60.0
2047	1440	2029	104.07	\$ 149.9	\$ 481.7	\$ 60.0	1,605	1,874	104.07	\$ 167.0	\$ 444.9	\$ 60.0
2048	1440	2084	106.16	\$ 152.9	\$ 504.7	\$ 60.0	1,605	1,929	106.16	\$ 170.4	\$ 467.2	\$ 60.0
2049	1440	2139	108.28	\$ 155.9	\$ 528.4	\$ 60.0	1,605	1,984	108.28	\$ 173.8	\$ 490.1	\$ 60.0
1	Levelized			\$ 90.1	\$ 95.8	\$ 60.0				\$ 96.6	\$ 81.9	\$ 60.0
2												

I. UCAN12: UCAN Case 0 + 5X46.6 MW CTs (2008) + Path 44 Upgrade (350 MW to emergency rating only in 2016)

Q. Please describe Scenario UCAN12.

A. Scenario UCAN12 modifies UCAN’s reliability and economic base cases as follows:

- Five 46.6 MW combustion turbines were modeled in the San Diego load pocket in 2008.

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- 1 • For the RMR/LCR requirements during the years 2016 and beyond, UCAN
2 assumed that the WECC Path 44 rating would be increased to 2850 MW.
3

4 **Q. Please summarize the results for Scenario UCAN12.**

5 **A.** Based on reliability study results previously provided to UCAN by the CAISO,
6 this case fails the reliability test due to transient frequency dip violations in
7 Mexico CFE caused by a contingency of the Imperial Valley-Miguel 500 kV line.
8 Subsequent analysis by the CAISO has identified thermal overloads due to several
9 NERC category B contingencies caused by the proposed increase in the Path 44
10 emergency rating. The economic analysis results set forth below have not
11 accounted for these reliability criteria violations. Finally, the zero RPS benefit
12 reflects that the CAISO has assigned the Sunrise RPS cost to both the UCAN base
13 case and alternative case that assume full build out of renewable resources in the
14 Imperial Valley.

15

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		A	B	C
Summary of 2015 Cost and Benefits		Costs		Net Benefits
		(\$ millions per year, UCAN base case UCAN12)		(Base case cost -
Energy and Reliability Costs				
1	Customer Payments from Gridview	14,178	14,150	28
2	Less CAISO congestion cost (reduces TAC)	(77)	(71)	(6)
3	Less URG Margin (reduces URG bal acct)	(4,396)	(4,386)	(10)
4	Less IOU excess loss payments	(670)	(668)	(2)
5	Subtotal Energy Cost and Benefit	9,035	9,025	11
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			11
RPS Procurement Cost				
14	Adjusted RPS Cost	4,153	4,153	-
15	Total Benefits			11

		A	B	C
Summary of Levelized Costs and Benefits		Costs		Net Benefits
		(\$ millions per year, nominal) UCAN base case UCAN12)		(Base case cost - Alt. case cost)
Energy and Reliability Costs				
1	Customer Payments from Gridview	16,073	16,041	32
2	Less CAISO congestion cost (reduces TAC)	(87)	(81)	(7)
3	Less URG Margin (reduces URG bal acct)	(4,983)	(4,972)	(11)
4	Less IOU excess loss payments	(760)	(758)	(2)
5	Subtotal Energy Cost and Benefit	10,243	10,231	12
6	RMR Capacity Payments - Levelized	86	86	-
7	RMR Operating Payments - Levelized	58	58	-
8	CT Capacity Costs - Levelized	62	62	-
9	Transmission cost for new CTs-Levelized	22	22	-
10	Remediation cost to provide reactive support	-	-	-
11	RA Costs to replace CTs and RMR contracts	-	-	-
12	Subtotal Reliability Cost and Benefit	228	228	-
13	Total Energy and Reliability Benefits			12
RPS Procurement Cost				
14	Adjusted RPS Cost	5,263	5,263	-
15	Total Benefits			12

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4

There are no reliability benefits for UCAN12.

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1 **J. UCAN 32: Case 0 + 5X46.6 MW CTS in 2008 + LADWP's Green Path**
2 **North (2011) + South Bay Repower (2010)**
3

4 **Q. Please describe Scenario UCAN32.**

5 **A. Scenario UCAN32 modifies UCAN's base cases by including:**

- 6 • Five 46.6 MW CTs in the San Diego load pocket in year 2008.
- 7 • LADWP's Green Path North in 2011.
- 8 • The South Bay repowering project in 2010.
- 9

10 **Q. Please summarize the results for Scenario UCAN32.**

11 **A. The results are set forth below. The zero RPS benefit reflects that the CAISO has**
12 assigned the Sunrise RPS cost to both the UCAN base case and alternative case
13 that assume full build out of renewable resources in the Imperial Valley.

14

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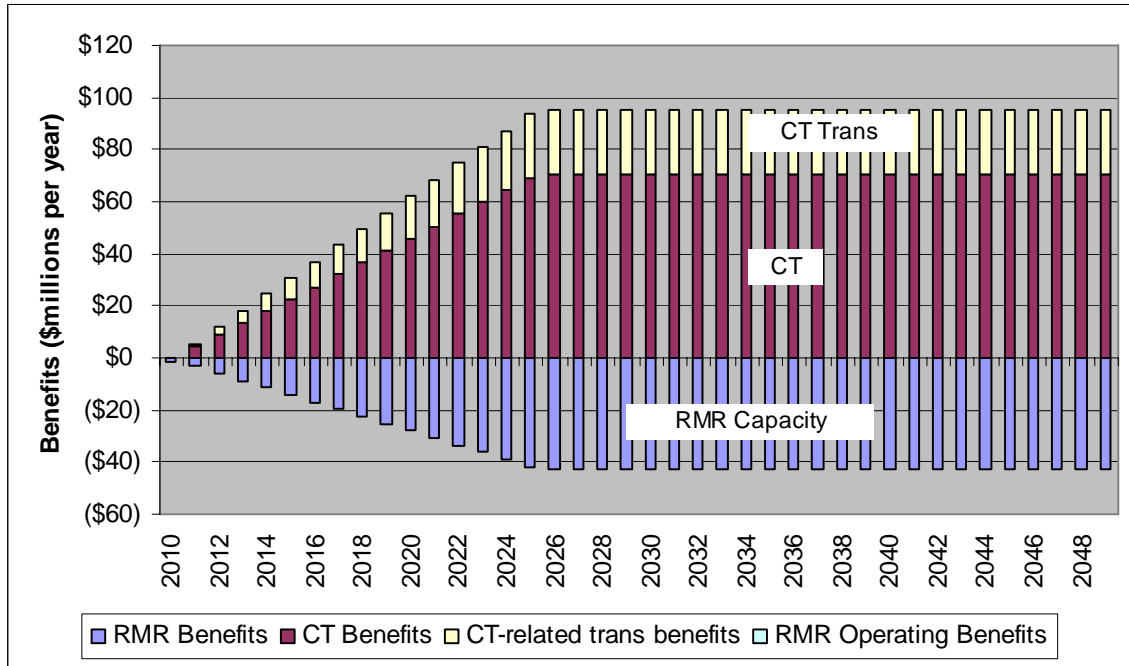
		A	B	C
		Costs		Net Benefits
		(\$ millions per year,		(Base case cost -
		UCAN		
		base case	UCAN32	
Summary of 2015 Cost and Benefits				
Energy and Reliability Costs				
1	Customer Payments from Gridview	14,178	14,099	79
2	Less CAISO congestion cost (reduces TAC)	(77)	(58)	(19)
3	Less URG Margin (reduces URG bal acct)	(4,396)	(4,370)	(26)
4	Less IOU excess loss payments	(670)	(662)	(8)
5	Subtotal Energy Cost and Benefit	9,035	9,009	26
6	RMR Capacity Payments	80	95	(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	155	18
13	Total Energy and Reliability Benefits			44
RPS Procurement Cost				
14	Adjusted RPS Cost	4,125	4,125	-
15	Total Benefits			44

3
4
5

		A	B	C
		Costs		Net Benefits
		(\$ millions per year,		(Base case cost -
		nominal)		Alt. case cost)
		UCAN		
		base case	UCAN32	
Summary of Levelized Costs and Benefits				
Energy and Reliability Costs				
1	Customer Payments from Gridview	16,073	15,984	89
2	Less CAISO congestion cost (reduces TAC)	(87)	(66)	(22)
3	Less URG Margin (reduces URG bal acct)	(4,983)	(4,954)	(29)
4	Less IOU excess loss payments	(760)	(751)	(9)
5	Subtotal Energy Cost and Benefit	10,243	10,214	30
6	RMR Capacity Payments - Levelized	90	123	(32)
7	RMR Operating Payments - Levelized	60	60	-
8	CT Capacity Costs - Levelized	71	18	53
9	Transmission cost for new CTs-Levelized	25	6	19
10	Remediation cost to provide reactive support	-	-	-
11	RA Costs to replace CTs and RMR contracts	-	-	-
12	Subtotal Reliability Cost and Benefit	246	207	39
13	Total Energy and Reliability Benefits			69
RPS Procurement Cost				
14	Adjusted RPS Cost	5,321	5,321	-
15	Total Benefits			69

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1 **Figure 8: UCAN32 Reliability Benefits (Constant Dollars)**



2
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Year	Base Case (Nominal Dollars)						UCAN32					
	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	1,450	-	50.02	\$ 72.5	\$ -	\$ 60.0
2011	1440	49	51.02	\$ 73.5	\$ 5.7	\$ 60.0	1,505	-	51.02	\$ 76.8	\$ -	\$ 60.0
2012	1440	104	52.04	\$ 74.9	\$ 12.3	\$ 60.0	1,560	-	52.04	\$ 81.2	\$ -	\$ 60.0
2013	1440	159	53.08	\$ 76.4	\$ 19.3	\$ 60.0	1,615	-	53.08	\$ 85.7	\$ -	\$ 60.0
2014	1440	214	54.14	\$ 78.0	\$ 26.4	\$ 60.0	1,670	-	54.14	\$ 90.4	\$ -	\$ 60.0
2015	1440	269	55.23	\$ 79.5	\$ 33.9	\$ 60.0	1,725	-	55.23	\$ 95.3	\$ -	\$ 60.0
2016	1440	324	56.33	\$ 81.1	\$ 41.6	\$ 60.0	1,780	-	56.33	\$ 100.3	\$ -	\$ 60.0
2017	1440	379	57.46	\$ 82.7	\$ 49.7	\$ 60.0	1,835	-	57.46	\$ 105.4	\$ -	\$ 60.0
2018	1440	434	58.61	\$ 84.4	\$ 58.0	\$ 60.0	1,890	-	58.61	\$ 110.8	\$ -	\$ 60.0
2019	1440	489	59.78	\$ 86.1	\$ 66.7	\$ 60.0	1,945	-	59.78	\$ 116.3	\$ -	\$ 60.0
2020	1440	544	60.97	\$ 87.8	\$ 75.7	\$ 60.0	2,000	-	60.97	\$ 121.9	\$ -	\$ 60.0
2021	1440	599	62.19	\$ 89.6	\$ 85.0	\$ 60.0	2,055	-	62.19	\$ 127.8	\$ -	\$ 60.0
2022	1440	654	63.44	\$ 91.3	\$ 94.6	\$ 60.0	2,110	-	63.44	\$ 133.9	\$ -	\$ 60.0
2023	1440	709	64.71	\$ 93.2	\$ 104.7	\$ 60.0	2,165	-	64.71	\$ 140.1	\$ -	\$ 60.0
2024	1440	764	66.00	\$ 95.0	\$ 115.0	\$ 60.0	2,220	-	66.00	\$ 146.5	\$ -	\$ 60.0
2025	1440	819	67.32	\$ 96.9	\$ 125.8	\$ 60.0	2,275	-	67.32	\$ 153.2	\$ -	\$ 60.0
2026	1440	874	68.67	\$ 98.9	\$ 136.9	\$ 60.0	2,293	37	68.67	\$ 157.5	\$ 5.8	\$ 60.0
2027	1440	929	70.04	\$ 100.9	\$ 148.4	\$ 60.0	2,293	92	70.04	\$ 160.6	\$ 14.7	\$ 60.0
2028	1440	984	71.44	\$ 102.9	\$ 160.4	\$ 60.0	2,293	147	71.44	\$ 163.8	\$ 24.0	\$ 60.0
2029	1440	1039	72.87	\$ 104.9	\$ 172.7	\$ 60.0	2,293	202	72.87	\$ 167.1	\$ 33.6	\$ 60.0
2030	1440	1094	74.33	\$ 107.0	\$ 185.5	\$ 60.0	2,293	257	74.33	\$ 170.4	\$ 43.6	\$ 60.0
2031	1440	1149	75.81	\$ 109.2	\$ 198.7	\$ 60.0	2,293	312	75.81	\$ 173.8	\$ 54.0	\$ 60.0
2032	1440	1204	77.33	\$ 111.4	\$ 212.4	\$ 60.0	2,293	367	77.33	\$ 177.3	\$ 64.7	\$ 60.0
2033	1440	1259	78.88	\$ 113.6	\$ 226.5	\$ 60.0	2,293	422	78.88	\$ 180.9	\$ 75.9	\$ 60.0
2034	1440	1314	80.45	\$ 115.9	\$ 241.2	\$ 60.0	2,293	477	80.45	\$ 184.5	\$ 87.5	\$ 60.0
2035	1440	1369	82.06	\$ 118.2	\$ 256.3	\$ 60.0	2,293	532	82.06	\$ 188.2	\$ 99.6	\$ 60.0
2036	1440	1424	83.70	\$ 120.5	\$ 271.9	\$ 60.0	2,293	587	83.70	\$ 191.9	\$ 112.1	\$ 60.0
2037	1440	1479	85.38	\$ 122.9	\$ 288.1	\$ 60.0	2,293	642	85.38	\$ 195.8	\$ 125.0	\$ 60.0
2038	1440	1534	87.08	\$ 125.4	\$ 304.8	\$ 60.0	2,293	697	87.08	\$ 199.7	\$ 138.5	\$ 60.0
2039	1440	1589	88.83	\$ 127.9	\$ 322.0	\$ 60.0	2,293	752	88.83	\$ 203.7	\$ 152.4	\$ 60.0
2040	1440	1644	90.60	\$ 130.5	\$ 339.8	\$ 60.0	2,293	807	90.60	\$ 207.8	\$ 166.8	\$ 60.0
2041	1440	1699	92.41	\$ 133.1	\$ 358.2	\$ 60.0	2,293	862	92.41	\$ 211.9	\$ 181.7	\$ 60.0
2042	1440	1754	94.26	\$ 135.7	\$ 377.2	\$ 60.0	2,293	917	94.26	\$ 216.1	\$ 197.2	\$ 60.0
2043	1440	1809	96.15	\$ 138.5	\$ 396.8	\$ 60.0	2,293	972	96.15	\$ 220.5	\$ 213.2	\$ 60.0
2044	1440	1864	98.07	\$ 141.2	\$ 417.0	\$ 60.0	2,293	1,027	98.07	\$ 224.9	\$ 229.8	\$ 60.0
2045	1440	1919	100.03	\$ 144.0	\$ 437.9	\$ 60.0	2,293	1,082	100.03	\$ 229.4	\$ 246.9	\$ 60.0
2046	1440	1974	102.03	\$ 146.9	\$ 459.5	\$ 60.0	2,293	1,137	102.03	\$ 234.0	\$ 264.7	\$ 60.0
2047	1440	2029	104.07	\$ 149.9	\$ 481.7	\$ 60.0	2,293	1,192	104.07	\$ 238.6	\$ 283.0	\$ 60.0
2048	1440	2084	106.16	\$ 152.9	\$ 504.7	\$ 60.0	2,293	1,247	106.16	\$ 243.4	\$ 302.0	\$ 60.0
2049	1440	2139	108.28	\$ 155.9	\$ 528.4	\$ 60.0	2,293	1,302	108.28	\$ 248.3	\$ 321.6	\$ 60.0
Levelized				\$ 90.1	\$ 95.8	\$ 60.0				\$ 122.5	\$ 24.2	\$ 60.0

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1 **K. UCAN22: Case 0 + South Bay Repower (2010) + LADWP's Green**
2 **Path North (2011)**
3

4 **Q. Please describe Scenario UCAN22.**

5 **A. Scenario UCAN22 removes the five 46.6 MW combustion turbines in the San**
6 **Diego load pocket from Scenario UCAN32.**

7

8 **Q. Please summarize the results Scenario UCAN22.**

9 **A. The results are set forth below. The zero RPS benefit reflects that the CAISO has**
10 **assigned the Sunrise RPS cost to both the UCAN base case and alternative case**
11 **that assume full build out of renewable resources in the Imperial Valley.**

12

		A	B	C
		Costs		Net Benefits
Summary of 2015 Cost and Benefits		(\$ millions per year,		(Base case cost -
		UCAN	UCAN22)
		base case	UCAN22)
Energy and Reliability Costs				
1	Customer Payments from Gridview	14,178	14,130	48
2	Less CAISO congestion cost (reduces TAC)	(77)	(60)	(17)
3	Less URG Margin (reduces URG bal acct)	(4,396)	(4,379)	(17)
4	Less IOU excess loss payments	(670)	(664)	(6)
5	Subtotal Energy Cost and Benefit	9,035	9,027	9
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			26
RPS Procurement Cost				
14	Adjusted RPS Cost	4,153	4,153	-
15	Total Benefits			26

13

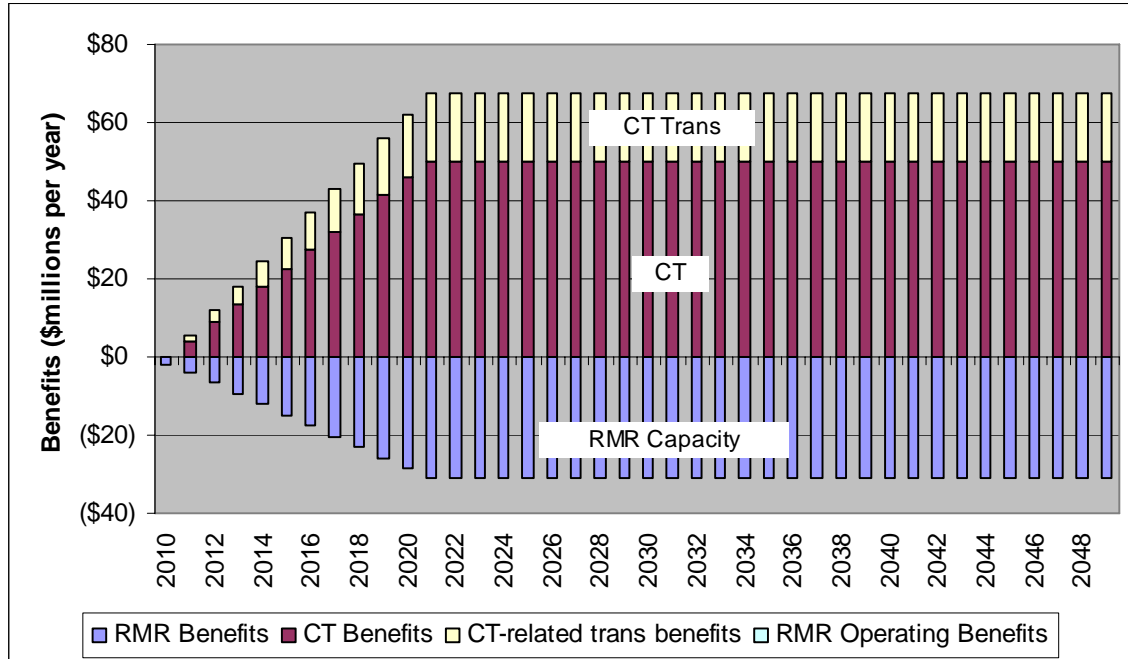
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		A		B	C	
		Costs (\$ millions per year, nominal)			Net Benefits (Base case cost - Alt. case cost)	
Summary of Levelized Costs and Benefits		UCAN base case		UCAN22		
Energy and Reliability Costs						
1	Customer Payments from Gridview	16,073	16,019		55	
2	Less CAISO congestion cost (reduces TAC)	(87)	(69)		(19)	
3	Less URG Margin (reduces URG bal acct)	(4,983)	(4,964)		(19)	
4	Less IOU excess loss payments	(760)	(753)		(7)	
5	Subtotal Energy Cost and Benefit	10,243	10,234		10	
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				41	
RPS Procurement Cost						
14	Adjusted RPS Cost	5,263	5,263		-	
15	Total Benefits				41	

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Figure 9: UCAN22 Reliability Benefits (Constant Dollars)



4
5

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Year	Base Case (Nominal Dollars)						UCAN22					
	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	1,461	-	50.02	\$ 73.1	\$ -	\$ 60.0
2011	1440	49	51.02	\$ 73.5	\$ 5.7	\$ 60.0	1,516	-	51.02	\$ 77.3	\$ -	\$ 60.0
2012	1440	104	52.04	\$ 74.9	\$ 12.3	\$ 60.0	1,571	-	52.04	\$ 81.8	\$ -	\$ 60.0
2013	1440	159	53.08	\$ 76.4	\$ 19.3	\$ 60.0	1,626	-	53.08	\$ 86.3	\$ -	\$ 60.0
2014	1440	214	54.14	\$ 78.0	\$ 26.4	\$ 60.0	1,681	-	54.14	\$ 91.0	\$ -	\$ 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
Levelized				\$ 90.1	\$ 95.8	\$ 60.0				\$ 117.2	\$ 37.9	\$ 60.0

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2

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1 **L. UCAN30: Case 0 + 5X46.6 MW CTs in 2008 + LADWP's Green Path**
 2 **North (2011) + South Bay Repower (2010)) + Sunrise (2010)**
 3

4 **Q. Please describe Scenario UCAN30.**

5 **A. Scenario UCAN30 modifies Scenario UCAN32 by adding the Sunrise plan of**
 6 **service.**

7

8 **Q. Please summarize the results for Scenario UCAN30.**

9 **A. The results are set forth below. The zero RPS benefit reflects that the CAISO has**
 10 **assigned the Sunrise RPS cost to both the UCAN base case and alternative case**
 11 **that assume full build out of renewable resources in the Imperial Valley.**

12

13

		A		B	C
		Costs		Net Benefits	
		(\$ millions per year,		(Base case cost -	
		UCAN			
		base case	UCAN30		
Summary of 2015 Cost and Benefits					
Energy and Reliability Costs					
1	Customer Payments from Gridview	14,178	14,082	96	
2	Less CAISO congestion cost (reduces TAC)	(77)	(47)	(30)	
3	Less URG Margin (reduces URG bal acct)	(4,396)	(4,360)	(36)	
4	Less IOU excess loss payments	(670)	(658)	(12)	
5	Subtotal Energy Cost and Benefit	9,035	9,017	19	
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			153	
RPS Procurement Cost					
14	Adjusted RPS Cost	4,153	4,153	-	
15	Total Benefits			153	

14

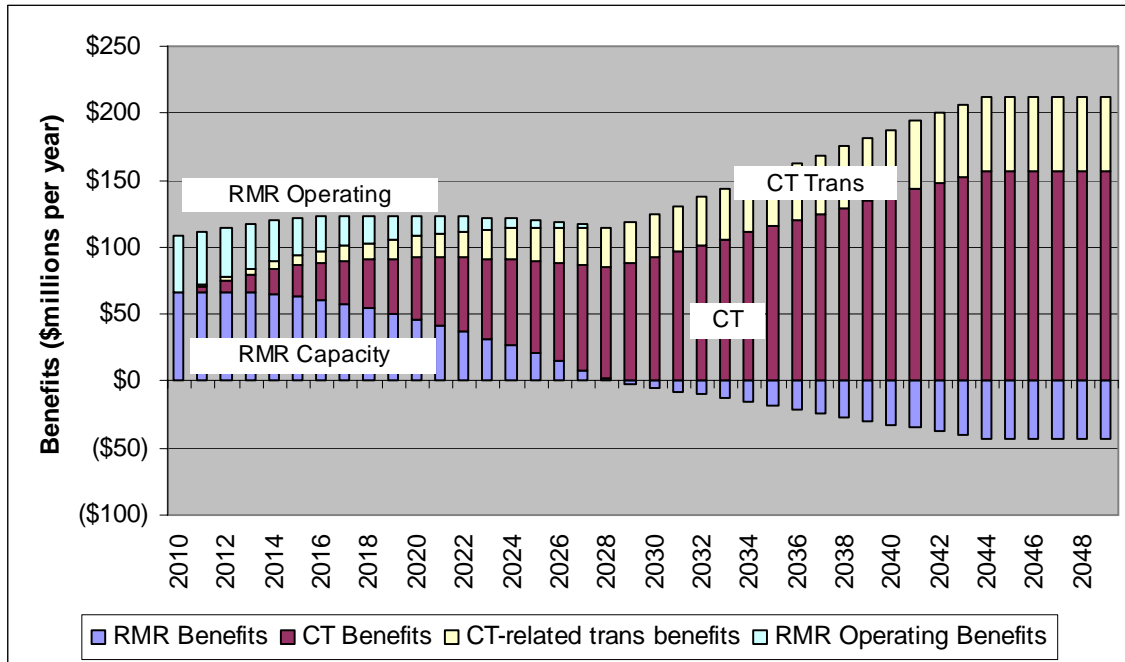
15

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Summary of Levelized Costs and Benefits		A		B	C
		Costs		UCAN30	Net Benefits
		(\$ millions per year, nominal)			
		UCAN base case			(Base case cost - Alt. case cost)
Energy and Reliability Costs					
1	Customer Payments from Gridview	16,073	15,964		109
2	Less CAISO congestion cost (reduces TAC)	(87)	(53)		(34)
3	Less URG Margin (reduces URG bal acct)	(4,983)	(4,943)		(40)
4	Less IOU excess loss payments	(760)	(746)		(14)
5	Subtotal Energy Cost and Benefit	10,243	10,222		21
6	RMR Capacity Payments - Levelized	90	50		40
7	RMR Operating Payments - Levelized	60	39		21
8	CT Capacity Costs - Levelized	71	1		70
9	Transmission cost for new CTs-Levelized	25	0		25
10	Remediation cost to provide reactive support	-	-		-
11	RA Costs to replace CTs and RMR contracts	-	-		-
12	Subtotal Reliability Cost and Benefit	246	90		156
13	Total Energy and Reliability Benefits				177
RPS Procurement Cost					
14	Adjusted RPS Cost	5,263	5,263		-
15	Total Benefits				177

1
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Figure 10: UCAN30 Reliability Benefits (Constant Dollars)



5
6

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Year	Base Case (Nominal Dollars)			UCAN30								
	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	1,479	-	72.87	\$ 107.8	\$ -	\$ 60.0
2030	1440	1094	74.33	\$ 107.0	\$ 185.5	\$ 60.0	1,534	-	74.33	\$ 114.0	\$ -	\$ 60.0
2031	1440	1149	75.81	\$ 109.2	\$ 198.7	\$ 60.0	1,589	-	75.81	\$ 120.5	\$ -	\$ 60.0
2032	1440	1204	77.33	\$ 111.4	\$ 212.4	\$ 60.0	1,644	-	77.33	\$ 127.1	\$ -	\$ 60.0
2033	1440	1259	78.88	\$ 113.6	\$ 226.5	\$ 60.0	1,699	-	78.88	\$ 134.0	\$ -	\$ 60.0
2034	1440	1314	80.45	\$ 115.9	\$ 241.2	\$ 60.0	1,754	-	80.45	\$ 141.1	\$ -	\$ 60.0
2035	1440	1369	82.06	\$ 118.2	\$ 256.3	\$ 60.0	1,809	-	82.06	\$ 148.4	\$ -	\$ 60.0
2036	1440	1424	83.70	\$ 120.5	\$ 271.9	\$ 60.0	1,864	-	83.70	\$ 156.0	\$ -	\$ 60.0
2037	1440	1479	85.38	\$ 122.9	\$ 288.1	\$ 60.0	1,919	-	85.38	\$ 163.8	\$ -	\$ 60.0
2038	1440	1534	87.08	\$ 125.4	\$ 304.8	\$ 60.0	1,974	-	87.08	\$ 171.9	\$ -	\$ 60.0
2039	1440	1589	88.83	\$ 127.9	\$ 322.0	\$ 60.0	2,029	-	88.83	\$ 180.2	\$ -	\$ 60.0
2040	1440	1644	90.60	\$ 130.5	\$ 339.8	\$ 60.0	2,084	-	90.60	\$ 188.8	\$ -	\$ 60.0
2041	1440	1699	92.41	\$ 133.1	\$ 358.2	\$ 60.0	2,139	-	92.41	\$ 197.7	\$ -	\$ 60.0
2042	1440	1754	94.26	\$ 135.7	\$ 377.2	\$ 60.0	2,194	-	94.26	\$ 206.8	\$ -	\$ 60.0
2043	1440	1809	96.15	\$ 138.5	\$ 396.8	\$ 60.0	2,249	-	96.15	\$ 216.2	\$ -	\$ 60.0
2044	1440	1864	98.07	\$ 141.2	\$ 417.0	\$ 60.0	2,293	11	98.07	\$ 224.9	\$ 2.5	\$ 60.0
2045	1440	1919	100.03	\$ 144.0	\$ 437.9	\$ 60.0	2,293	66	100.03	\$ 229.4	\$ 15.1	\$ 60.0
2046	1440	1974	102.03	\$ 146.9	\$ 459.5	\$ 60.0	2,293	121	102.03	\$ 234.0	\$ 28.2	\$ 60.0
2047	1440	2029	104.07	\$ 149.9	\$ 481.7	\$ 60.0	2,293	176	104.07	\$ 238.6	\$ 41.8	\$ 60.0
2048	1440	2084	106.16	\$ 152.9	\$ 504.7	\$ 60.0	2,293	231	106.16	\$ 243.4	\$ 55.9	\$ 60.0
2049	1440	2139	108.28	\$ 155.9	\$ 528.4	\$ 60.0	2,293	286	108.28	\$ 248.3	\$ 70.6	\$ 60.0
1	Levelized			\$ 90.1	\$ 95.8	\$ 60.0				\$ 50.2	\$ 0.9	\$ 38.5

III. RPCC-Requested Runs

Q. Please describe the base case assumptions for the RPCC-requested runs.

A. The RPCC's base case assumptions are the same as those used in the CAISO's testimony.

Q. Please describe RPCC's alternative scenarios.

A. Listed below, RPCC's alternative scenarios reflect:

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- 1 (a) Changes to the Sunrise plan of service.
- 2 (b) Some transmission projects proposed by SDG&E but not yet approved
- 3 by the CAISO. These projects initially included only the Encina-
- 4 Penasquitos #2 230 kV line project.
- 5 (c) Additional changes to the 138 kV transmission system around Miguel
- 6 and Los Coches substations, after runs for (a) and (b) were completed.
- 7 The results for (c) are not yet available and are the subject of the Motion for
- 8 Extension filed by the CAISO on April 20, 2007.

9

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1 **A. RPC1: Add one 230/138kV and 230/69kV transformer at Sycamore**
2 **Canyon and one 230/69kV transformer at Miguel Substation; assume**
3 **Encina-Penasquitos #2 is built**
4

5 **Q. Please describe Scenario RPC1.**

6 **A.** This scenario changes the Sunrise Powerlink project plan of service to (a)
7 eliminate the Sycamore Canyon-Penasquitos 230 kV underground circuit, (b)
8 install one 230/138kV and one additional 230/69kV transformer at Sycamore
9 Canyon, and (c) install one additional 230/69kV transformer at Miguel
10 Substation.

11

12 **Q. Please summarize the results for Scenario RPC1.**

13 **A.** With 3000 MW imports into the San Diego area and Otay Mesa modeled forced
14 out of service, a contingency overload on the Pomerado – Sycamore 69kV # 2
15 line was identified. This line is overloaded under the Category C contingency on
16 the Sycamore 69kV “S” bus. The loading is increased by approximately 15%
17 with the proposed alternative.

18

19 **B. RPC2: Loop in Mission-Miguel 230kV lines into Sycamore Canyon**
20 **Sub., and add one 230/69kV transformer at Miguel Sub.; assume Encina-**
21 **Penasquitos #2 is built**
22

23 **Q. Please describe Scenario RPC2.**

24 **A.** This scenario changes the Sunrise Powerlink project plan of service to eliminate
25 the Sycamore Canyon-Penasquitos 230 kV underground circuit and reconfigure

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1 the transmission network (so that the two existing Mission-Miguel 230 kV
2 circuits terminate at Sycamore Canyon instead of Mission), and install one
3 additional 230/69kV transformer at Miguel Substation.
4

5 **Q. Please summarize the results for Scenario RPCC2.**

6 **A.** With 3000 MW imports into the San Diego area and one San Onofre unit modeled
7 forced out of service, nine 138 kV and 69 kV transmission line contingency
8 overloads were identified, the result of changing the Sunrise plan of service.
9

10 **IV. LS Power-requested Runs**

11 **A. Scenarios LS Power1 and LS Power2**
12

13 **Q. Please describe Scenario LS Power 1.**

14 **A.** Scenario LS Power 1 is the base case for the LS Power scenarios. It uses the
15 reliability information from the CAISO testimony. The scenario's economic case
16 assumes major reductions in generation development throughout the WECC.
17

18 **Q. Please describe Scenario LS Power 2.**

19 **A.** Under the generation development assumptions specified by LS Power, this case
20 is formed by adding the Sunrise plan of service to the CAISO's South Bay
21 repower case.
22
23

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- 1 **Q. Please summarize the results for Scenario LS Power2.**
- 2 **A.** The results are set forth below. The zero RPS benefit reflects that the CAISO has
- 3 assigned the RPS costs from the CAISO's base case to the LS Power base case
- 4 and alternative.

		A	B	C
		Costs (\$ millions per year,		Net Benefits (Base case cost -
Summary of 2015 Cost and Benefits		LS base case	LS Power2	
Energy and Reliability Costs				
1	Customer Payments from Gridview	14,680	14,651	29
2	Less CAISO congestion cost (reduces TAC)	(30)	(31)	1
3	Less URG Margin (reduces URG bal acct)	(4,537)	(4,526)	(11)
4	Less IOU excess loss payments	(586)	(582)	(4)
5	Subtotal Energy Cost and Benefit	9,528	9,512	16
6	RMR Capacity Payments	114	114	-
7	RMR Operating Payments	60	60	-
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	174	174	-
13	Total Energy and Reliability Benefits			16
RPS Procurement Cost				
14	Adjusted RPS Cost	4,125	4,125	-
15	Total Benefits			16

5
6

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Summary of Levelized Costs and Benefits		A	B	C
		Costs (\$ millions per year, nominal)		Net Benefits (Base case cost - Alt. case cost)
		LS base case	LS Power2	
Energy and Reliability Costs				
1	Customer Payments from Gridview	16,643	16,610	33
2	Less CAISO congestion cost (reduces TAC)	(34)	(35)	1
3	Less URG Margin (reduces URG bal acct)	(5,143)	(5,131)	(12)
4	Less IOU excess loss payments	(665)	(660)	(5)
5	Subtotal Energy Cost and Benefit	10,801	10,784	18
6	RMR Capacity Payments - Levelized	120	120	-
7	RMR Operating Payments - Levelized	58	58	-
8	CT Capacity Costs - Levelized	47	47	-
9	Transmission cost for new CTs-Levelized	16	16	-
10	Remediation cost to provide reactive support	-	-	-
11	RA Costs to replace CTs and RMR contracts	-	-	-
12	Subtotal Reliability Cost and Benefit	241	241	-
13	Total Energy and Reliability Benefits			18
RPS Procurement Cost				
14	Adjusted RPS Cost	5,321	5,321	-
15	Total Benefits			18

1
2

There are no reliability benefits for the alternative relative to the base case.

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1 **B. LS Power3: Economic scenario 3 (2015): Scenario 2 (2015), remove**
2 **LS Power Re-power (620 MW), and add 620 MW Palo Verde plant**
3

4 **Q. Please describe Scenario LS Power 3.**

5 **A.**This scenario modifies Scenario LS Power2 by replacing the South Bay
6 repowering project with 620 MW of generation connected to Palo Verde
7 substation.

8
9 **Q. Please summarize the results for Scenario LS Power3.**

10 **A.**The results are set forth below. The zero RPS benefit reflects that the CAISO has
11 assigned the RPS costs from the CAISO's base case to the LS Power base case
12 and alternative.

13

14

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		A	B	C
Summary of 2015 Cost and Benefits		Costs		Net Benefits
		(\$ millions per year, LS base case LSPower3)		(Base case cost -
Energy and Reliability Costs				
1	Customer Payments from Gridview	14,680	14,695	(15)
2	Less CAISO congestion cost (reduces TAC)	(30)	(31)	2
3	Less URG Margin (reduces URG bal acct)	(4,537)	(4,542)	6
4	Less IOU excess loss payments	(586)	(587)	1
5	Subtotal Energy Cost and Benefit	9,528	9,534	(7)
6	RMR Capacity Payments	114	114	-
7	RMR Operating Payments	60	60	-
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	174	174	-
13	Total Energy and Reliability Benefits			(7)
RPS Procurement Cost				
14	Adjusted RPS Cost	4,125	4,125	-
15	Total Benefits			(7)

		A	B	C
Summary of Levelized Costs and Benefits		Costs		Net Benefits
		(\$ millions per year, nominal)		(Base case cost - Alt. case cost)
		LS base case	LSPower3	
Energy and Reliability Costs				
1	Customer Payments from Gridview	16,643	16,660	(17)
2	Less CAISO congestion cost (reduces TAC)	(34)	(35)	2
3	Less URG Margin (reduces URG bal acct)	(5,143)	(5,150)	7
4	Less IOU excess loss payments	(665)	(666)	1
5	Subtotal Energy Cost and Benefit	10,801	10,809	(8)
6	RMR Capacity Payments - Levelized	120	120	-
7	RMR Operating Payments - Levelized	58	58	-
8	CT Capacity Costs - Levelized	47	47	-
9	Transmission cost for new CTs-Levelized	16	16	-
10	Remediation cost to provide reactive support	-	-	-
11	RA Costs to replace CTs and RMR contracts	-	-	-
12	Subtotal Reliability Cost and Benefit	241	241	-
13	Total Energy and Reliability Benefits			(8)
RPS Procurement Cost				
14	Adjusted RPS Cost	5,321	5,321	-
15	Total Benefits			(8)

2
3
4

There are no reliability benefits for the alternative relative to the base case.

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1 **V. ASPEN-Requested Runs**

2

3 **Q. Has the CAISO performed GridView analyses for the ASPEN cases?**

4 A. No. ASPEN did not request GridView analyses for their scenarios. Accordingly,
5 the energy-related benefits are not presented herein.

6 **A. ASPEN1: CAISO Base Case + 500/230kV Substation at San Felipe**
7 **instead of Central**

8

9 **Q. Please describe Scenario ASPEN1.**

10 A. Scenario ASPEN1 modifies the CAISO's base case by (a) eliminating the Central
11 Substation, (b) installing 500/230 kV transformers and San Felipe Substation, and
12 (c) replacing the two Central-Sycamore Canyon 230 kV lines with two San
13 Felipe-Sycamore Canyon 230 kV lines.

14

15 **Q. Please summarize the results Scenario ASPEN1.**

16 A. Scenario ASPEN1 was analyzed under the assumption of 3000 MW of San Diego
17 area imports. No criteria violations were identified for this scenario.

18 **B. ASPEN2: CAISO Base Case + 9 X 46.6 MW CT's + Mexico Light 165**
19 **MW (2011)**

20

21 **Q. Please describe Scenario ASPEN2.**

22 A. Scenario ASPEN2 modifies the CAISO's base case as follows:

- 23 • Use 165 MW of imports from Mexico CFE to reduce the CT need in the San
24 Diego load pocket. Aspen believes this import may be possible because the
25 Mexico Light project would allow the transfer of 165 MW of generation

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1 normally connected to the Imperial Valley 230 kV bus to the Mexico CFE
2 system after the line outage.

- 3 • Add nine 46.6 MW CTs in the San Diego area to meet the minimum local
4 capacity requirements for the area.

5

6 **Q. Please summarize the results for Scenario ASPEN2.**

7 **A.** The ASPEN2 scenario results were similar to the results found for the CAISO
8 reference case.

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1 **C. ASPEN10: CAISO Base Case + 500 kV line in 2010 via SWPL route**
2 **to Boulevard wind 500/230 substation, 500 MW Eastern S/D wind + 2x230kV**
3 **lines from Boulevard Substation to Sycamore Canyon**
4

5 **Q. Please describe Scenario ASPEN10.**

6 A. This scenario modifies the CAISO Sunrise case by:

- 7 • Eliminating the Imperial Valley-San Felipe and San Felipe-Central 500 kV
8 lines;
- 9 • Eliminating the San Felipe and Central Substations;
- 10 • Adding a 500 kV line from Imperial Valley 500 kV station to a new 500 kV
11 bus installed at the existing Boulevard substation;
- 12 • Adding 500 MW of wind generation at the Boulevard substation; and
- 13 • Adding two Boulevard-Sycamore Canyon 230 kV lines.

14

15 **Q. Please summarize the results for Scenario ASPEN10.**

16 A. Scenario ASPEN10 was analyzed under the assumption of 3000 MW of San
17 Diego area imports. No criteria violations were identified for this scenario.

18

19 **D. ASPEN13: CAISO Base Case + 500 kV line in 2010 via SWPL route**
20 **to Boulevard wind 500/230 substation, 500 MW Eastern S/D wind + 2x230kV**
21 **lines from Boulevard Substation to Los Coches**
22

23 **Q. Please describe Scenario ASPEN13.**

24 A. ASPEN13 is the same as ASPEN 10 with the following exceptions:

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- 1 • A different routing of the 2X230kV lines to Los Coches, rather than Sycamore
2 Canyon; and
- 3 • A Miguel- Mission 230 kV line and a Miguel Sycamore Canyon 230 kV line
4 looped into the new 230 kV bus at Los Coches substation.

5

6 **Q. Please summarize the results Scenario ASPEN13.**

7 **A.** Scenario ASPEN13 was analyzed under the assumption of 3000 MW of San
8 Diego area imports. No criteria violations were identified for this scenario.

9

10 **VI. MGRA-Requested Runs**

11 **A. MGRA1: LADWP Green Path North**

12

13 **Q. Please describe Scenario MGRA1.**

14 **A.** From a reliability perspective, this case is similar to the CAISO's base case
15 because MGRA asked the CAISO to assume a sufficient amount of new CTs in
16 the San Diego area to meet that area's local capacity needs. Unlike the CAISO's
17 base case, however, Scenario MGRA1 assumes the Green Path North project plan
18 of service, along with 2500 MW of renewable development in the IID/Imperial
19 County area.

20

21 **Q. Please summarize the results for Scenario MGRA1**

22 **A.** This case fails the reliability test due to transient frequency dip violations in
23 Mexico CFE caused by a contingency of the Imperial Valley-Miguel 500 kV line.

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1 A GridView run was not requested by MRW for this scenario. Therefore,
2 economic results are not provided.

3 **B. MGRA2: LADWP Green Path North + Sunrise**

4 **Q. Please describe Scenario MGRA2**

5 **A.** Scenario MGRA2 modifies the CAISO's Sunrise case by including the Green
6 Path North plan of service.

7
8 **Q. Please summarize the results for Scenario MGRA2.**

9 **A.** The results are set forth below. The RPS benefit reflects that the CAISO has used
10 its base case RPS costs for the MGRA base case, and the Sunrise RPS costs for
11 the MGRA2 alternative.

		A		B	C	
		Costs			Net Benefits	
		(\$ millions per year,			(Base case cost -	
		Base Case				
		0A	MGRA2			
Energy and Reliability Costs						
1	Customer Payments from Gridview	13,877	13,778		100	
2	Less CAISO congestion cost (reduces TAC)	(98)	(72)		(26)	
3	Less URG Margin (reduces URG bal acct)	(4,185)	(4,154)		(30)	
4	Less IOU excess loss payments	(713)	(697)		(15)	
5	Subtotal Energy Cost and Benefit	8,882	8,854		27	
6	RMR Capacity Payments	80	31		49	
7	RMR Operating Payments	60	42		18	
8	CT Capacity Costs	53	-		53	
9	Transmission cost for new CTs	19	-		19	
10	Remediation cost to provide reactive support	-	-		-	
11	RA Costs to replace CTs and RMR contracts	-	-		-	
12	Subtotal Reliability Cost and Benefit	211	72		138	
13	Total Energy and Reliability Benefits				166	
RPS Procurement Cost						
14	Adjusted RPS Cost	4,125	4,153		(28)	
15	Total Benefits				138	

13

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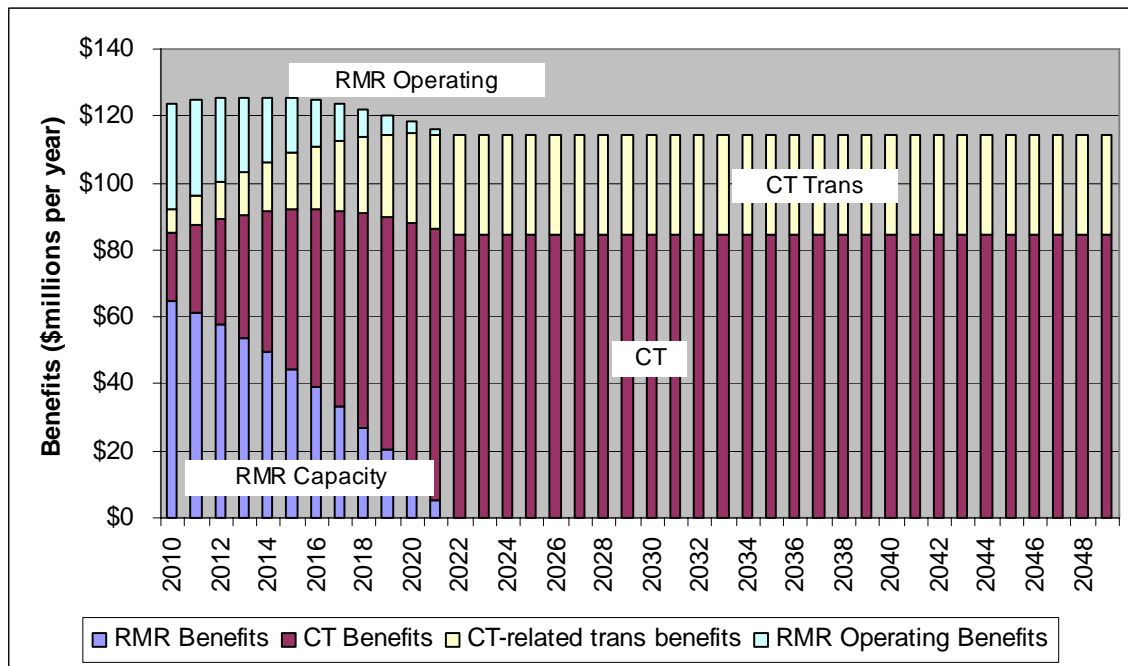
Summary of Levelized Costs and Benefits		A		B	C
		Costs		Net Benefits	Net Benefits
		(\$ millions per year, nominal)			
Base Case		0A	MGRA2		
Energy and Reliability Costs					
1	Customer Payments from Gridview	15,732	15,619		113
2	Less CAISO congestion cost (reduces TAC)	(112)	(82)		(30)
3	Less URG Margin (reduces URG bal acct)	(4,744)	(4,709)		(34)
4	Less IOU excess loss payments	(808)	(791)		(17)
5	Subtotal Energy Cost and Benefit	10,069	10,038		31
6	RMR Capacity Payments - Levelized	90	60		30
7	RMR Operating Payments - Levelized	60	48		12
8	CT Capacity Costs - Levelized	110	31		79
9	Transmission cost for new CTs-Levelized	39	11		28
10	Remediation cost to provide reactive support	-	-		-
11	RA Costs to replace CTs and RMR contracts	-	-		-
12	Subtotal Reliability Cost and Benefit	299	149		149
13	Total Energy and Reliability Benefits				180
RPS Procurement Cost					
14	Adjusted RPS Cost	5,321	5,263		58
15	Total Benefits				238

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Figure 11: MGRA2 Reliability Benefits (Constant Dollars)



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Year	Base Case (Nominal Dollars)						MGRA2					
	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	1440	240	50.02	\$ 72.0	\$ 27.4	\$ 60.0	680	-	10.72	\$ 7.3	\$ -	\$ 28.3
2011	1440	305	51.02	\$ 73.5	\$ 35.5	\$ 60.0	745	-	14.36	\$ 10.7	\$ -	\$ 31.0
2012	1440	370	52.04	\$ 74.9	\$ 43.9	\$ 60.0	810	-	18.15	\$ 14.7	\$ -	\$ 33.8
2013	1440	435	53.08	\$ 76.4	\$ 52.7	\$ 60.0	875	-	22.08	\$ 19.3	\$ -	\$ 36.5
2014	1440	500	54.14	\$ 78.0	\$ 61.8	\$ 60.0	940	-	26.16	\$ 24.6	\$ -	\$ 39.2
2015	1440	565	55.23	\$ 79.5	\$ 71.2	\$ 60.0	1,005	-	30.39	\$ 30.5	\$ -	\$ 41.9
2016	1440	630	56.33	\$ 81.1	\$ 81.0	\$ 60.0	1,070	-	34.78	\$ 37.2	\$ -	\$ 44.6
2017	1440	695	57.46	\$ 82.7	\$ 91.1	\$ 60.0	1,135	-	39.34	\$ 44.7	\$ -	\$ 47.3
2018	1440	760	58.61	\$ 84.4	\$ 101.6	\$ 60.0	1,200	-	44.06	\$ 52.9	\$ -	\$ 50.0
2019	1440	825	59.78	\$ 86.1	\$ 112.5	\$ 60.0	1,265	-	48.96	\$ 61.9	\$ -	\$ 52.7
2020	1440	890	60.97	\$ 87.8	\$ 123.8	\$ 60.0	1,330	-	54.04	\$ 71.9	\$ -	\$ 55.4
2021	1440	955	62.19	\$ 89.6	\$ 135.5	\$ 60.0	1,395	-	59.30	\$ 82.7	\$ -	\$ 58.1
2022	1440	1020	63.44	\$ 91.3	\$ 147.6	\$ 60.0	1,440	20	63.44	\$ 91.3	\$ 2.9	\$ 60.0
2023	1440	1085	64.71	\$ 93.2	\$ 160.2	\$ 60.0	1,440	85	64.71	\$ 93.2	\$ 12.5	\$ 60.0
2024	1440	1150	66.00	\$ 95.0	\$ 173.2	\$ 60.0	1,440	150	66.00	\$ 95.0	\$ 22.6	\$ 60.0
2025	1440	1215	67.32	\$ 96.9	\$ 186.6	\$ 60.0	1,440	215	67.32	\$ 96.9	\$ 33.0	\$ 60.0
2026	1440	1280	68.67	\$ 98.9	\$ 200.5	\$ 60.0	1,440	280	68.67	\$ 98.9	\$ 43.9	\$ 60.0
2027	1440	1345	70.04	\$ 100.9	\$ 214.9	\$ 60.0	1,440	345	70.04	\$ 100.9	\$ 55.1	\$ 60.0
2028	1440	1410	71.44	\$ 102.9	\$ 229.8	\$ 60.0	1,440	410	71.44	\$ 102.9	\$ 66.8	\$ 60.0
2029	1440	1475	72.87	\$ 104.9	\$ 245.2	\$ 60.0	1,440	475	72.87	\$ 104.9	\$ 79.0	\$ 60.0
2030	1440	1540	74.33	\$ 107.0	\$ 261.1	\$ 60.0	1,440	540	74.33	\$ 107.0	\$ 91.6	\$ 60.0
2031	1440	1605	75.81	\$ 109.2	\$ 277.6	\$ 60.0	1,440	605	75.81	\$ 109.2	\$ 104.6	\$ 60.0
2032	1440	1670	77.33	\$ 111.4	\$ 294.6	\$ 60.0	1,440	670	77.33	\$ 111.4	\$ 118.2	\$ 60.0
2033	1440	1735	78.88	\$ 113.6	\$ 312.2	\$ 60.0	1,440	735	78.88	\$ 113.6	\$ 132.3	\$ 60.0
2034	1440	1800	80.45	\$ 115.9	\$ 330.4	\$ 60.0	1,440	800	80.45	\$ 115.9	\$ 146.8	\$ 60.0
2035	1440	1865	82.06	\$ 118.2	\$ 349.1	\$ 60.0	1,440	865	82.06	\$ 118.2	\$ 161.9	\$ 60.0
2036	1440	1930	83.70	\$ 120.5	\$ 368.5	\$ 60.0	1,440	930	83.70	\$ 120.5	\$ 177.6	\$ 60.0
2037	1440	1995	85.38	\$ 122.9	\$ 388.6	\$ 60.0	1,440	995	85.38	\$ 122.9	\$ 193.8	\$ 60.0
2038	1440	2060	87.08	\$ 125.4	\$ 409.3	\$ 60.0	1,440	1,060	87.08	\$ 125.4	\$ 210.6	\$ 60.0
2039	1440	2125	88.83	\$ 127.9	\$ 430.6	\$ 60.0	1,440	1,125	88.83	\$ 127.9	\$ 228.0	\$ 60.0
2040	1440	2190	90.60	\$ 130.5	\$ 452.7	\$ 60.0	1,440	1,190	90.60	\$ 130.5	\$ 246.0	\$ 60.0
2041	1440	2255	92.41	\$ 133.1	\$ 475.4	\$ 60.0	1,440	1,255	92.41	\$ 133.1	\$ 264.6	\$ 60.0
2042	1440	2320	94.26	\$ 135.7	\$ 498.9	\$ 60.0	1,440	1,320	94.26	\$ 135.7	\$ 283.9	\$ 60.0
2043	1440	2385	96.15	\$ 138.5	\$ 523.1	\$ 60.0	1,440	1,385	96.15	\$ 138.5	\$ 303.8	\$ 60.0
2044	1440	2450	98.07	\$ 141.2	\$ 548.1	\$ 60.0	1,440	1,450	98.07	\$ 141.2	\$ 324.4	\$ 60.0
2045	1440	2515	100.03	\$ 144.0	\$ 573.9	\$ 60.0	1,440	1,515	100.03	\$ 144.0	\$ 345.7	\$ 60.0
2046	1440	2580	102.03	\$ 146.9	\$ 600.6	\$ 60.0	1,440	1,580	102.03	\$ 146.9	\$ 367.8	\$ 60.0
2047	1440	2645	104.07	\$ 149.9	\$ 628.0	\$ 60.0	1,440	1,645	104.07	\$ 149.9	\$ 390.6	\$ 60.0
2048	1440	2710	106.16	\$ 152.9	\$ 656.3	\$ 60.0	1,440	1,710	106.16	\$ 152.9	\$ 414.1	\$ 60.0
2049	1440	2775	108.28	\$ 155.9	\$ 685.5	\$ 60.0	1,440	1,775	108.28	\$ 155.9	\$ 438.5	\$ 60.0
1	Levelized			\$ 90.2	\$ 148.5	\$ 60.0				\$ 60.2	\$ 41.4	\$ 47.7

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1 **VII. TNHC-Requested Runs**

2 **A. TNHC1 LEAPS Project**

3

4 **Q. Please describe Scenario TNHC1.**

5 **A. Scenario TNHC1 modifies the CAISO's base case by including the LEAPS**

6 project plan of service and removing 565 MWs of CTs in the San Diego area.

7

8 **Q. Please summarize the results for Scenario TNHC1.**

9 **A.** With 3000 MW of imports in the San Diego area, the CAISO did not identify any

10 major stability or post-transient criteria violations. However, the CAISO's

11 Second Errata provides a discussion on thermal reliability criteria violations

12 caused at this import level with the IV-Miguel 500 kV line out of service.

13 Finally, the zero RPS benefit reflects that the CAISO has assigned the RPS costs

14 from the CAISO's base case to the TNHC base case and alternative.

15

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		A	B	C
Summary of 2015 Cost and Benefits		Costs (\$ millions per year,		Net Benefits (Base case cost -
		TNHC Base Case	TNHC2 (LEAPS)	
Energy and Reliability Costs				
1	Customer Payments from Gridview	13,816	13,788	29
2	Less CAISO congestion cost (reduces TAC)	(137)	(126)	(11)
3	Less URG Margin (reduces URG bal acct)	(4,159)	(4,150)	(9)
4	Less IOU excess loss payments	(709)	(707)	(1)
5	Subtotal Energy Cost and Benefit	8,811	8,804	7
6	RMR Capacity Payments	80	80	-
7	RMR Operating Payments	60	60	-
8	CT Capacity Costs	53	6	47
9	Transmission cost for new CTs	19	2	16
10	Remediation cost to provide reactive support	-	-	-
11	RA Costs to replace CTs and RMR contracts	-	-	-
12	Subtotal Reliability Cost and Benefit	211	148	63
13	Total Energy and Reliability Benefits			70
RPS Procurement Cost				
14	Adjusted RPS Cost	4,125	4,125	-
15	Total Benefits			70

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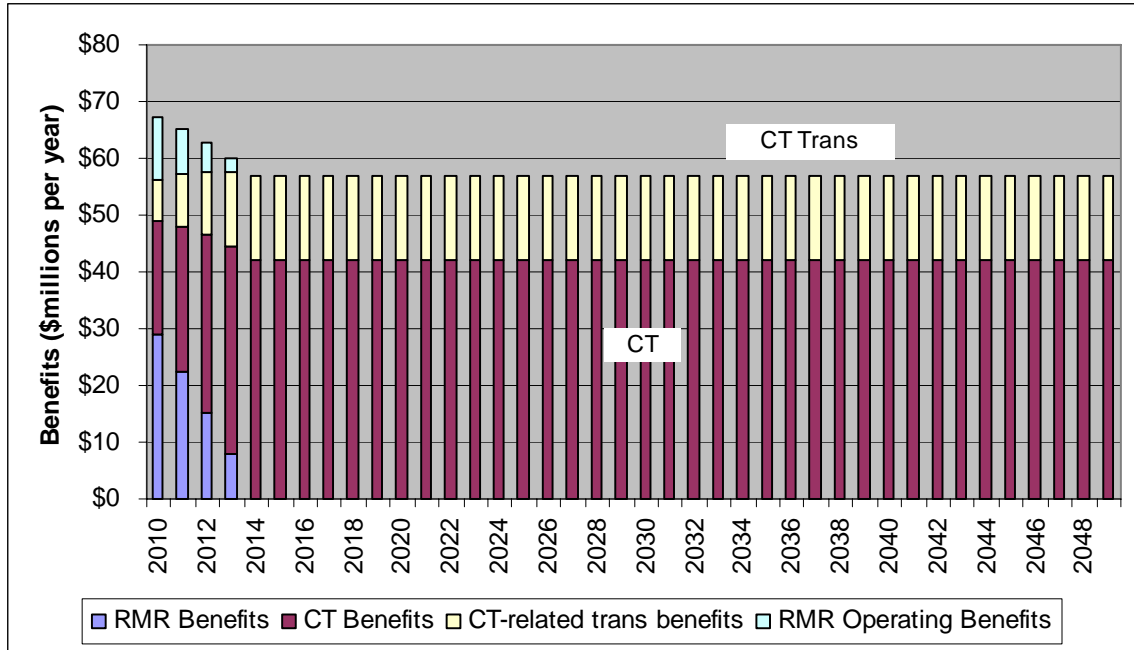
		A	B	C
Summary of Levelized Costs and Benefits		Costs (\$ millions per year, nominal)		Net Benefits (Base case cost - Alt. case cost)
		TNHC Base Case	TNHC2 (LEAPS)	
Energy and Reliability Costs				
1	Customer Payments from Gridview	15,663	15,631	33
2	Less CAISO congestion cost (reduces TAC)	(155)	(143)	(13)
3	Less URG Margin (reduces URG bal acct)	(4,715)	(4,705)	(10)
4	Less IOU excess loss payments	(804)	(802)	(2)
5	Subtotal Energy Cost and Benefit	9,989	9,981	8
6	RMR Capacity Payments - Levelized	90	85	6
7	RMR Operating Payments - Levelized	60	58	2
8	CT Capacity Costs - Levelized	110	61	49
9	Transmission cost for new CTs-Levelized	39	21	17
10	Remediation cost to provide reactive support	-	-	-
11	RA Costs to replace CTs and RMR contracts	-	-	-
12	Subtotal Reliability Cost and Benefit	299	225	73
13	Total Energy and Reliability Benefits			82
RPS Procurement Cost				
14	Adjusted RPS Cost	5,321	5,321	-
15	Total Benefits			82

3

4

5 **Figure 12: TNHC1 Reliability Benefits (Constant Dollars)**

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Year	Base Case (Nominal Dollars)						TNHC2 (LEAPS)					
	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	1440	240	50.02	\$ 72.0	\$ 27.4	\$ 60.0	1,180	-	36.57	\$ 43.2	\$ -	\$ 49.2
2011	1440	305	51.02	\$ 73.5	\$ 35.5	\$ 60.0	1,245	-	40.73	\$ 50.7	\$ -	\$ 51.9
2012	1440	370	52.04	\$ 74.9	\$ 43.9	\$ 60.0	1,310	-	45.05	\$ 59.0	\$ -	\$ 54.6
2013	1440	435	53.08	\$ 76.4	\$ 52.7	\$ 60.0	1,375	-	49.51	\$ 68.1	\$ -	\$ 57.3
2014	1440	500	54.14	\$ 78.0	\$ 61.8	\$ 60.0	1,440	-	54.14	\$ 78.0	\$ -	\$ 60.0
2015	1440	565	55.23	\$ 79.5	\$ 71.2	\$ 60.0	1,440	65	55.23	\$ 79.5	\$ 8.2	\$ 60.0
2016	1440	630	56.33	\$ 81.1	\$ 81.0	\$ 60.0	1,440	130	56.33	\$ 81.1	\$ 16.7	\$ 60.0
2017	1440	695	57.46	\$ 82.7	\$ 91.1	\$ 60.0	1,440	195	57.46	\$ 82.7	\$ 25.6	\$ 60.0
2018	1440	760	58.61	\$ 84.4	\$ 101.6	\$ 60.0	1,440	260	58.61	\$ 84.4	\$ 34.8	\$ 60.0
2019	1440	825	59.78	\$ 86.1	\$ 112.5	\$ 60.0	1,440	325	59.78	\$ 86.1	\$ 44.3	\$ 60.0
2020	1440	890	60.97	\$ 87.8	\$ 123.8	\$ 60.0	1,440	390	60.97	\$ 87.8	\$ 54.2	\$ 60.0
2021	1440	955	62.19	\$ 89.6	\$ 135.5	\$ 60.0	1,440	455	62.19	\$ 89.6	\$ 64.6	\$ 60.0
2022	1440	1020	63.44	\$ 91.3	\$ 147.6	\$ 60.0	1,440	520	63.44	\$ 91.3	\$ 75.3	\$ 60.0
2023	1440	1085	64.71	\$ 93.2	\$ 160.2	\$ 60.0	1,440	585	64.71	\$ 93.2	\$ 86.4	\$ 60.0
2024	1440	1150	66.00	\$ 95.0	\$ 173.2	\$ 60.0	1,440	650	66.00	\$ 95.0	\$ 97.9	\$ 60.0
2025	1440	1215	67.32	\$ 96.9	\$ 186.6	\$ 60.0	1,440	715	67.32	\$ 96.9	\$ 109.8	\$ 60.0
2026	1440	1280	68.67	\$ 98.9	\$ 200.5	\$ 60.0	1,440	780	68.67	\$ 98.9	\$ 122.2	\$ 60.0
2027	1440	1345	70.04	\$ 100.9	\$ 214.9	\$ 60.0	1,440	845	70.04	\$ 100.9	\$ 135.0	\$ 60.0
2028	1440	1410	71.44	\$ 102.9	\$ 229.8	\$ 60.0	1,440	910	71.44	\$ 102.9	\$ 148.3	\$ 60.0
2029	1440	1475	72.87	\$ 104.9	\$ 245.2	\$ 60.0	1,440	975	72.87	\$ 104.9	\$ 162.1	\$ 60.0
2030	1440	1540	74.33	\$ 107.0	\$ 261.1	\$ 60.0	1,440	1,040	74.33	\$ 107.0	\$ 176.3	\$ 60.0
2031	1440	1605	75.81	\$ 109.2	\$ 277.6	\$ 60.0	1,440	1,105	75.81	\$ 109.2	\$ 191.1	\$ 60.0
2032	1440	1670	77.33	\$ 111.4	\$ 294.6	\$ 60.0	1,440	1,170	77.33	\$ 111.4	\$ 206.4	\$ 60.0
2033	1440	1735	78.88	\$ 113.6	\$ 312.2	\$ 60.0	1,440	1,235	78.88	\$ 113.6	\$ 222.2	\$ 60.0
2034	1440	1800	80.45	\$ 115.9	\$ 330.4	\$ 60.0	1,440	1,300	80.45	\$ 115.9	\$ 238.6	\$ 60.0
2035	1440	1865	82.06	\$ 118.2	\$ 349.1	\$ 60.0	1,440	1,365	82.06	\$ 118.2	\$ 255.5	\$ 60.0
2036	1440	1930	83.70	\$ 120.5	\$ 368.5	\$ 60.0	1,440	1,430	83.70	\$ 120.5	\$ 273.1	\$ 60.0
2037	1440	1995	85.38	\$ 122.9	\$ 388.6	\$ 60.0	1,440	1,495	85.38	\$ 122.9	\$ 291.2	\$ 60.0
2038	1440	2060	87.08	\$ 125.4	\$ 409.3	\$ 60.0	1,440	1,560	87.08	\$ 125.4	\$ 309.9	\$ 60.0
2039	1440	2125	88.83	\$ 127.9	\$ 430.6	\$ 60.0	1,440	1,625	88.83	\$ 127.9	\$ 329.3	\$ 60.0
2040	1440	2190	90.60	\$ 130.5	\$ 452.7	\$ 60.0	1,440	1,690	90.60	\$ 130.5	\$ 349.3	\$ 60.0
2041	1440	2255	92.41	\$ 133.1	\$ 475.4	\$ 60.0	1,440	1,755	92.41	\$ 133.1	\$ 370.0	\$ 60.0
2042	1440	2320	94.26	\$ 135.7	\$ 498.9	\$ 60.0	1,440	1,820	94.26	\$ 135.7	\$ 391.4	\$ 60.0
2043	1440	2385	96.15	\$ 138.5	\$ 523.1	\$ 60.0	1,440	1,885	96.15	\$ 138.5	\$ 413.5	\$ 60.0
2044	1440	2450	98.07	\$ 141.2	\$ 548.1	\$ 60.0	1,440	1,950	98.07	\$ 141.2	\$ 436.3	\$ 60.0
2045	1440	2515	100.03	\$ 144.0	\$ 573.9	\$ 60.0	1,440	2,015	100.03	\$ 144.0	\$ 459.8	\$ 60.0
2046	1440	2580	102.03	\$ 146.9	\$ 600.6	\$ 60.0	1,440	2,080	102.03	\$ 146.9	\$ 484.2	\$ 60.0
2047	1440	2645	104.07	\$ 149.9	\$ 628.0	\$ 60.0	1,440	2,145	104.07	\$ 149.9	\$ 509.3	\$ 60.0
2048	1440	2710	106.16	\$ 152.9	\$ 656.3	\$ 60.0	1,440	2,210	106.16	\$ 152.9	\$ 535.2	\$ 60.0
2049	1440	2775	108.28	\$ 155.9	\$ 685.5	\$ 60.0	1,440	2,275	108.28	\$ 155.9	\$ 562.0	\$ 60.0
Levelized				\$ 90.2	\$ 148.5	\$ 60.0				\$ 84.6	\$ 82.6	\$ 58.0

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Q. Does this conclude the CAISO Initial Testimony, Part III?

A. Yes, it does.

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 III, to each party in Docket No. A.06-08-010.

Executed on April 20, 2007 at Folsom, California.

/s/Susan L. Montana

Susan L. Montana

An Employee of the California
Independent System Operator

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