BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF CALIFORNIA

Order Instituting Rulemaking to Continue Implementation and Administration of California Renewables Portfolio Standard Program. (U 39 E)	Rulemaking 08-08-009 (Filed August 21, 2008)

DRAFT 2010 TRANSMISSION RANKING COST REPORT OF PACIFIC GAS AND ELECTRIC COMPANY (U 39-E) FOR RENEWABLES PORTFOLIO STANDARD PROCUREMENT

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January 20, 2010

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Pacific Gas and Electric Company (PG&E) files the attached report, entitled "2010 Draft Transmission Ranking Cost Report Of Pacific Gas and Electric Company" in compliance with the Amended Scoping Memo and Ruling of Assigned Commissioner Regarding 2010 RPS Procurement Plans dated November 2, 2009.

Respectfully submitted,

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By: /s/
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I. INTRODUCTION

In support of California's Renewable Portfolio Standard ("RPS") Program, PG&E has initiated its renewable resource procurement process for 2010. This effort included sending a letter on November 13, 2009, requesting initial information for its 2010 RPS solicitation process. Following the practice used and approved for prior Transmission Ranking Cost Reports ("TRCR"), PG&E used the information it received in response to this letter to guide its selection of the clusters to be studied in the development of its 2010 TRCR.

This 2010 TRCR is based on the Methodology adopted in Decision (D.)04-06-013 and further addressed in D.05-07-040 for the development and consideration of transmission costs considered in the selection of resources to meet the RPS.[1/]

This Methodology estimates the capital costs of upgrades to transmission facilities that would be needed to deliver power from potential renewable energy areas, and thus estimates the transmission cost for ranking bids submitted in response to PG&E's 2010 RPS procurement solicitation.

In reviewing the latest load forecast, resources projection, and the anticipated network topology, PG&E has determined that there are no significant changes to these input parameters compared to those used in the 2009 TRCR. Therefore, changes to the power flows would not be significant. Therefore, only updates for impacted clusters were needed for the 2010 TRCR. This is further discussed in Section D below.

A. The Purpose of the TRCR is to Support the RPS Solicitation Process.

The TRCR is intended solely to provide information used in ranking RPS bids in the RPS procurement solicitation process. The TRCR estimates the cost of accepting deliveries from renewable resource projects over the utility transmission system; this cost estimate is used only as one factor in the comparison of solicited bids. The estimates in the 2010 TRCR, as with prior TRCRs, are neither intended nor calculated for any other purpose and must not be relied upon for any other purpose.

- Potential RPS bidders should use the information regarding expected transmission upgrades contained in the TRCR in developing their bids in response to the 2010 RPS procurement solicitation from PG&E.
- PG&E will use the transmission cost estimates in the 2010 TRCR as a factor in evaluating and ranking the bids it receives through the 2010 RPS solicitation.

1/ Initially, the RPS requires certain retail sellers of electricity to increase their sales of electricity from renewable energy by at least 1% per year, so that renewable resources would serve at least 20% of retail sales by 2017 at the latest. In SB 107, enacted by the California Legislature in 2006, that goal was accelerated to 20% of retail sales from renewable energy deliveries by 2010.

This evaluation and ranking process will include calculation of transmission cost bid adders and the assignment of these adders to specific RPS projects, to allow PG&E to determine the combination of projects that will meet its approved renewable procurement goals in a least-cost, best-fit manner[2].

B. Additional Information Is Needed to Determine Project-Specific Costs.

The estimates of transmission costs in this TRCR will not be definitive, and will not establish the ultimate cost of connecting any given renewable resource to the transmission grid. Generation developers seeking to interconnect to the PG&E transmission system must apply for interconnection with the CAISO, in accordance with the requirements of the CAISO tariff (the "CAISO Tariff"), as approved by the Federal Energy Regulatory Commission ("FERC"). These requirements currently include participation in the CAISO's Feasibility Study, System Impact Study, and Facilities Study ("SIS/FS") process. The SIS/FS process is intended to accurately identify transmission network upgrades needed to accommodate the added generation.

Many potential renewable resource projects submitting bids into the 2010 RPS solicitation process will not have initiated or completed the CAISO SIS/FS process, and therefore will not have the projected cost information that results from that process. In the absence of complete interconnection cost information for each bid, the TRCR provides an acceptable basis for comparing the relative interconnection costs associated with those bids. That is, although the TRCR does not provide final interconnection cost data, it does provide sufficient information to allow PG&E to consider the *relative* transmission cost of each resource being bid, as part of the least-cost best-fit analysis needed to *rank* and select renewable resources for development.

C. Inputs to the Report Are Generally A Matter of Record.

This TRCR identifies and provides estimated cost information regarding transmission upgrades needed for potential RPS projects, based on the following inputs:

- Conceptual transmission studies submitted previously pursuant to D.04-06-010 and D.05-07-040;
- Other conceptual transmission studies; and
- System Impact Studies and Facilities Studies prepared for projects that have initiated the CAISO interconnection process.

D. Methodological Parameters of the TRCR.

A mentioned earlier, the 2010 TRCR is an update of the 2009 TRCR. Accordingly, this subsection primarily describes the methodology used to develop the 2009 TRCR and concludes by noting the specific adjustments made for the 2010 TRCR.

2/ Other commercial arrangements may be used in bid evaluation, as specified in PG&E's draft 2010 RPS Solicitation Protocol However, such alternative arrangements are beyond the scope of the TRCR.

As in the 2004, 2005, 2006, 2007 and 2008 TRCRs, which were filed on June 23, 2004, August 3, 2005, March 15, 2006, November 8, 2006 and September 7, 2008, respectively, the cost estimates presented in the 2009 TRCR are the result of best efforts to estimate strategies that would be used to accommodate potential renewable resources. These strategies are based on reconnaissance-type information and rely extensively on engineering judgment, which in turn is tempered by experience and informed by limited, focused usage of the power flow program. Consistent with the earlier screening level studies[3], this TRCR is based on the following considerations:

Scope.

- The assessment covers transmission Network Upgrades from the first point of interconnection of the renewable resources to PG&E's existing transmission system towards the load. Direct Assignment Facilities[4/] or "Gen-ties" are not covered.

Proxy Facilities.

- As in the previous TRCRs, transmission cost estimates are based on proxy facilities that could mitigate potential congestion due to the addition of potential renewable resources. In developing the proxy facilities, results from other studies previously published were also used where appropriate (such as PG&E's Path 15 Rating Studies for power flows in the South to North direction, the Tehachapi Collaborative Study Group Reports filed by Southern California Edison Company ("SCE") on March 16, 2005 and April 17, 2006, and PG&E's 2009 Electric Grid Expansion Plan.).

Base Cases.

- For the 2009 TRCR, the 2013 Summer Peak and Summer Off Peak base cases were developed from the power flow cases that were prepared for the 2008 PG&E Area Assessment Studies to develop PG&E's 2008 Transmission Expansion Plan and represent the transmission network (including transmission projects approved by CAISO or PG&E), load forecast (1-in-5 year adverse weather system peak load for the Summer Peak base case and the summer off peak load for the Summer Off Peak base case), and expected generation retirements for year 2013. These base cases were reviewed and approved by the CAISO. These base cases were then modified to reflect the transmission projects approved as of September 2008, new generation projects that have completed the SIS/FS process, transmission projects approved by the generation developers through completed SIS/FS processes, and the results of PG&E's 2004, 2005, 2006, 2007 and 2008 Renewables Solicitations as of September 2008. For the 2013 Summer Off Peak

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3/ In the 2003 solicitation for information, the utilities were ordered to provide screening level studies to developers who would pay for them. No developer has requested a screening level study since the 2003 Solicitation.

4/ "Direct Assignment Facilities" are transmission facilities necessary to physically and electrically interconnect a new facility to the CAISO Controlled Grid. CAISO Tariff § 5.7.5.

base case, the Path 15 south-north flow was modeled at its WECC Accepted Path Rating of 5,400 MW.

- In developing the 2010 TRCR, PG&E reviewed the latest base cases (developed in 2009) used in its annual assessment studies conducted under the CAISO Planning Process. Comparison of the 2014 and the 2013 (used in the 2009 TRCR study) On-peak power flow cases are as follows:

Major Assumptions	2014 On-peak (to be used for 2010 TRCR)	2013 On-peak case (used in the 2009 TRCR)	Difference
Loads:			
Bay Area[5]	9489 MW	9256 MW	233 MW
Non Bay Area North	9737 MW	9983 MW	-90 MW
Non Bay area South	8148 MW	7939 MW	209 MW
Generation:			
Bay Area	5878 MW	6317 MW	-439 MW
Non Bay Area North	10131 MW	10263 MW	-117 MW
Non Bay Area South	12611 MW	11218 MW	1394 MW
New renewables With completed cost estimate in addition to the 2009 TRCR			
Bay Area	0 MW	--	0 MW
Non Bay Area North	120 MW	--	120 MW
Non Bay Area South	230 MW	--	230 MW

PG&E also reviewed the 2014 power flow cases for transmission upgrades expected to be operational by 2014 and compared that with the transmission upgrades expected for 2013 and found no significant changes between the two cases.

It can be seen that the only significant change is the generation and new renewables located in the non-Bay South. Therefore, only updates to the 2009 TRCR will be needed for the impacted clusters located in Non Bay Area South, specifically, the Carrizo Plains, Midway, Panoche and Gates clusters. Also,

5/ For the purpose of this TRCR, "Bay Area" comprises of East Bay, Diablo, Peninsula, Mission, De Anza, San Jose, areas; "Non Bay North" comprises of Humboldt, North Coast, North Bay, North Valley, Sacramento and Stockton areas; and "Non Bay South" comprises of Stanislaus, Yosemite, Fresno, Kern, Central Coast, Los Padres areas.

because the additional renewables in Non Bay South are predominately solar resources, PG&E does not expect any changes to the 2009 off-peak TRCR.

Renewable Resource Potential.

- The potential renewable resources assumed in the study are consistent with the results of the Renewable Resources Development Report ("RRDR") published by the California Energy Commission ("CEC") on September 30, 2003, and augmented based on the draft result of the CEC's Strategic Value Analysis, published in 2005. These CEC results have been further augmented based on data received by PG&E from potential renewables developers in response to PG&E's solicitations for information conducted in 2003 through 2009.

Clusters.

- The PG&E study performed to develop the TRCR assumed that energy from the potential renewable resources would be delivered to locations close to one of the following "clusters": Bellota, Caribou, Carrizo Plains, Cortina, Cottonwood, Delta Metering Station, Fulton, Gates, Gregg, Helm, Humboldt, Los Banos, Metcalf, Midway, Morro Bay, Newark, Panoche, Pit 1, Rio Oso, Round Mountain, Stagg, Summit Metering Station, Table Mountain, Tesla, Vaca Dixon, and Wilson Substations. Each of these clusters is depicted geographically at Exhibit 1.

Renewable Resources Scenarios.

- In accordance with D. 04-06-013, PG&E's application of the Methodology investigated the proxy facilities needed using two scenarios: 1) assuming PG&E would be the purchaser of energy from renewable resources located within and outside PG&E's service territory; and 2) assuming PG&E would transmit the energy from renewable resources located either in PG&E's service territory, or north and east of PG&E's service territory, to purchasers south of PG&E's service territory.

Associated Clusters Assumed When PG&E is the Assumed Purchaser.

- If PG&E is the assumed purchaser of renewable resources located north of PG&E's service territory, the associated potential cluster would be PG&E's Round Mountain Substation. For generation projects located east of PG&E's service territory, the associated potential cluster would be PG&E's side of Summit Metering Station. For projects located south of PG&E's service territory, the associated potential cluster would be PG&E's Midway Substation.

Associated Clusters Assumed When PG&E is not the Assumed Purchaser.

- If SCE, San Diego Gas & Electric Company ("SDG&E") or any other entity south of PG&E's service territory is the purchaser, and the renewable resources are located north of or in PG&E's service territory, PG&E assumes that the renewable resources will be transmitted from the associated clusters to PG&E's Midway Substation, the point of delivery out of PG&E's service territory.

PG&E's Transmission Ranking Cost from the cluster associated with the renewable resource location should be used by SCE and SDG&E, as appropriate, for complete evaluation.

Reactive Support.

- Voltage (reactive) support is required to reliably transmit energy from generation resources to load. The reactive support needed is in addition to the reactive power produced by the generators. To be effective, voltage support devices would be installed at various strategic locations, which are generally at or near the load centers. The estimated levels of voltage support used in the TRCR are based on results of past studies, and are technology-neutral, assuming that all renewable generators are capable of producing reactive power typical of synchronous generators.

System Reliability.

- The PG&E study performed to develop the TRCR assumes that each renewable resource connected in response to PG&E's resource solicitation would do its share to maintain existing system reliability by operating within applicable nomograms, such as the California-Oregon Interconnection ("COI") Nomogram, and by participating in existing special protection schemes, such as the Path 15 Remedial Action Scheme.

E. Application of the Transmission Ranking Cost Study to RPS Bid Selection.

1. Use of Clusters.

The PG&E study performed to develop the TRCR uses clusters to provide a basis for grouping RPS bids solely for purposes of comparison. Any given resource may ultimately be physically connected to points near, but not necessarily at, the cluster assumed by the study. Consistent with Attachment A of D.04-06-013, PG&E has developed Transmission Ranking Costs based on potential transmission congestion, the associated proxy transmission network upgrades, and the associated capital costs that may be expected to accommodate each cluster of renewable resources. For each cluster, PG&E has identified various levels of possible additional transmission capacity and a projected estimate of related costs.[6/] Level 1 reflects the available transmission capacity, taking into account all approved reliability and economic transmission projects, as well as upgrades planned for generation projects in the CAISO interconnection queue, based on completed SIS/FS processes. The next Level and subsequent Levels reflect the next most cost-effective proxy network upgrade(s). The number of Levels depends on the number of proxy network upgrades reasonably expected to be necessary to accommodate the anticipated total amount of renewable resources in each cluster.

6/ Costs are equal to the total capital cost of the proxy transmission network upgrade project and are stated in 2008 constant dollars. Net present value ("NPV") amounts of each alternative would differ.

2. Overview of Tables.

The Transmission Ranking Costs ("TRC") are summarized in Tables 1 and 2. Table 1 presents calculations using PG&E as the presumed purchaser of the renewable power. Table 2 presents calculations assuming that SCE or SDG&E (or other entities south of PG&E's service territory) is the purchaser. In each table, the Transmission Ranking Costs have been separated into sections that would broadly correspond to system conditions in peak and off-peak periods, so they can be used in least cost-best fit bid evaluation for super-peak, peak and shoulder periods and night periods.[7/] The separation of transmission costs into these periods may allow a potential bidder to take into account potential transmission congestion, and accordingly structure the optimal generation profile for its bid or reflect any potential curtailment it might want to include in its bid. Tables 5-8 are supporting information for the TRCs presented in Tables 1 and 2. Tables 5-8 show the limiting transmission facilities and the associated proxy transmission facilities that produced the TRCs in Tables 1 and 2.

As expected, a number of network facilities requiring upgrades are common to several clusters, depending on the levels of generation added. These common proxy Network Upgrades provide some opportunity for refining the bid ranking, once the bids have been received and analyzed. Some of the common network facilities that are identified as limiting facilities are:

Bellota – Gregg 230 kV lines

Westley – Los Banos 230 kV lines

Table Mountain - Vaca-Dixon 500 kV line

Los Banos – Gates – Midway 500 kV line

Some facilities, which were identified as subject to congestion in the 2007 and 2008 TRCR, are no longer so identified due to transmission upgrades that were proposed in PG&E's 2006 and 2007 Expansion Plans and that were subsequently approved. These facilities include:

Table Mountain – Colgate – Rio Oso 230 kV lines

Vaca Dixon - Shiloh-Contra Costa 230 kV line

Vaca Dixon – Parkway 230 kV line

7/ <u>Definitions:</u>

Super-Peak (5x8) = HE (Hours Ending) 13 - 20, Monday - Friday (*except* North American Electric Reliability Corporation ("NERC") holidays).

Shoulder = HE 7 - 12, 21 and 22, Monday - Friday (*except* NERC holidays); and HE 7 - 22 Saturday, Sunday and *all* NERC holidays.

Night (7x8) = HE 1 - 6, 23 and 24 all days *(including* NERC holidays).

NERC (Additional Off-Peak) Holidays include: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, and Christmas Day. Three of these days, Memorial Day, Labor Day, and Thanksgiving Day occur on the same day each year. Memorial Day is the last Monday in May; Labor Day is the first Monday in September; and Thanksgiving Day is the last Thursday in November. New Year's Day, Independence Day, and Christmas Day, by definition, are predetermined dates each year. However, in the event they occur on a Sunday, the "NERC Additional Off-Peak Holiday" is celebrated on the Monday immediately following that Sunday. However, if any of these days occur on a Saturday, the "NERC Additional Off-Peak Holiday" remains on that Saturday.

Vaca Dixon – Tulucay 230 kV line

PG&E will continue to identify transmission projects that are needed for multiple purposes *(e.g.,,* transmission reinforcements that would be needed to maintain system reliability and to accommodate renewable resources). PG&E has submitted a number of proposed projects to the CAISO for the CAISO 2010 Expansion Plan in November 2009. As transmission projects identified in the 2010 plan have not yet been approved, they are not considered in the PG&E study used to generate this TRCR. However, if they are approved by the CAISO and PG&E Management before the 2010 RPS bids are short-listed, the added transmission capacity associated with these new transmission projects will be assumed to be available for purposes of bid evaluation.

Table 1

2010 Transmission Ranking Cost for Study Year 2014 for Potential Generation Assuming PG&E is the Purchaser

Substation Associated With Cluster of Potential Generation	Level[8]	Peak and Shoulder					Night				
		Year Round					Year Round				
		Maximum MW of Potential Generation In each Level	Cost of Proxy Network Upgrades to accommodate MW Level of Potential Generation ($ millions in 2008 dollars)		Annual Carrying Charges*** ($ millions in 2008 dollars)		Maximum MW of Potential Generation In each Level	Cost of Proxy Network Upgrades to accommodate MW Level of Potential Generation ($ millions in 2008 dollars)		Annual Carrying Charges*** ($ millions in 2008 dollars)	
			Proxy Voltage Support Devices*	Other Proxy Transmission upgrades	Based on 10 year contract life	Based on 20 year contract life		Proxy Voltage Support Devices*	Other Proxy Transmission upgrades	Based on 10 year contract life	Based on 20 year contract life
Bellota 230 kV	1	1000	70	0	17	13	400	28	0	7	5
	2						500	35	28	16	12
	3						100	7	15	5	4
Caribou 230 kV	1	0	0	0	0	0	150	11	0	3	2
	2	50	4	470	116	89	650	46	38	20	16
	3	450	32	38	17	13	200	14	46	15	11
	4	500	35	46	20	15					
Carrizo Plains	1	0	0	0	0	0	0	0	0	0	0
	2	310	22	156	44	33	500	35	1156	292	223
Cortina 230 kV	1	350	25	0	6	5	300	21	0	5	4
	2	450	32	40	18	13	500	35	40	18	14
	3	200	14	59	18	14	200	14	59	18	14
Cottonwood 230 kV	1	0	0	0	0	0	850	60	0	15	11
	2	1150	81	298	93	71	250	18	46	15	12
	3	350	25	46	17	13	200	14	24	9	7
	4						200	14	298	76	58
Delta Metering Station	1	0	0	0	0	0	0	0	0	0	0
	2	500	35	318	86	66	500	35	318	86	66

8/ See Attachment A, D.04-06-013 at page A-5, which established the methodology for the TRCR, including definitions of the Levels used in these Tables.

* Static VAR Compensator (SVC) is used as a proxy for voltage support devices required. The size of the SVC at each Level assumes the capacity in each level will be fully utilized. However, since addition of voltage support devices is less "lumpy" than other transmission facilities, it is separately listed so that the size, and hence, cost can be prorated based on the size of the resource bid.

** The maximum potential generation for these levels assumes that it is cost effective to increase pumping at Helms Pump Storage Plant (PSP) during off-peak (night) periods using the new generation at these clusters. In addition, for the off peak (night) hours for the months of June through September, the maximum MW generation in each level could be increased by another 300 MW when maximum pumping at Helms PSP is likely.

*** Carrying charges in this table are for illustrative purposes only. The actual carrying charge for an individual offer will depend on specifics in the offer submitted.

Substation Associated With Cluster of Potential Generation	Level[8]	Peak and Shoulder Year Round					Night Year Round				
		Maximum MW of Potential Generation In each Level	Cost of Proxy Network Upgrades to accommodate MW Level of Potential Generation ($ millions in 2008 dollars)		Annual Carrying Charges*** ($ millions in 2008 dollars)		Maximum MW of Potential Generation In each Level	Cost of Proxy Network Upgrades to accommodate MW Level of Potential Generation ($ millions in 2008 dollars)		Annual Carrying Charges*** ($ millions in 2008 dollars)	
			Proxy Voltage Support Devices*	Other Proxy Transmission upgrades	Based on 10 year contract life	Based on 20 year contract life		Proxy Voltage Support Devices*	Other Proxy Transmission upgrades	Based on 10 year contract life	Based on 20 year contract life
115 kV											
Fulton 230 kV	1	450	32	0	8	6	300	21	0	5	4
	2	150	11	37	12	9	450	32	37	17	13
	3	500	35	85	29	22	350	25	85	27	20
	4	300	21	258	68	52	400	28	163	47	36
	5	100	7	35	10	8					
Gates 230 kV	1	960	67	0	16	12	0	0	0	0	0
	2						500	35	1000	254	194
	3						300	21	98	29	22
	4						200	14	17	8	6
Gregg 230 kV	1	0	0	0	0	0	200**	14	0	3	3
	2	275	19	4	6	4	400	28	1000	252	193
	3	325	23	7	7	6	400	28	98	31	24
	4	125	9	43	13	10					
	5	275	19	28	12	9					
Helm 230 kV	1	150	11	0	3	2	200	14	0	3	3
	2	600	42	18	15	11	75	5	1000	247	188
	3	150	11	22	8	6	125	9	22	8	6
	4	100	7	12	5	3	600	42	98	34	26
Humboldt 115 kV	1	0	0	0	0	0	0	0	0	0	0
	2	350	25	383	100	76	500	350	383	180	137
	3	150	11	298	76	58					
Los Banos 230 kV	1	550	39	0	9	7	100	7	0	2	1
	2	450	32	17	12	9	475	33	98	32	25
	3						425	30	101	32	25
Metcalf 230 kV	1	1000	70	0	17	13	1000	70	0	17	13
Midway 230 kV	1	1310	92	0	22	16	0	0	0	0	0
	2	250	18	46	15	12	600	42	1000	256	195
	3	1300	91	17	26	20	175	12	98	27	21

* Static VAR Compensator (SVC) is used as a proxy for voltage support devices required. The size of the SVC at each Level assumes the capacity in each level will be fully utilized. However, since addition of voltage support devices is less "lumpy" than other transmission facilities, it is separately listed so that the size, and hence, cost can be prorated based on the size of the resource bid.

** The maximum potential generation for these levels assumes that it is cost effective to increase pumping at Helms Pump Storage Plant (PSP) during off-peak (night) periods using the new generation at these clusters. In addition, for the off peak (night) hours for the months of June through September, the maximum MW generation in each level could be increased by another 300 MW when maximum pumping at Helms PSP is likely.

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Substation Associated With Cluster of Potential Generation	Level[8]	Peak and Shoulder – Year Round					Night – Year Round				
		Maximum MW of Potential Generation In each Level	Cost of Proxy Network Upgrades to accommodate MW Level of Potential Generation ($ millions in 2008 dollars)		Annual Carrying Charges*** ($ millions in 2008 dollars)		Maximum MW of Potential Generation In each Level	Cost of Proxy Network Upgrades to accommodate MW Level of Potential Generation ($ millions in 2008 dollars)		Annual Carrying Charges*** ($ millions in 2008 dollars)	
			Proxy Voltage Support Devices*	Other Proxy Transmission upgrades	Based on 10 year contract life	Based on 20 year contract life		Proxy Voltage Support Devices*	Other Proxy Transmission upgrades	Based on 10 year contract life	Based on 20 year contract life
	4						1075	75	101	43	33
	5						1150	81	46	31	24
Morro 230 kV	1	750	53	0	13	10	0	0	0	0	0
	2	250	18	98	28	22	500	35	1000	254	194
	3						50	4	98	25	19
	4						225	16	98	28	21
	5						725	51	101	37	28
Newark 230 kV	1	1400	98	0	24	18	1500	105	0	26	20
	2	50	4	49	13	10					
	3	50	4	292	73	55					
Panoche 230 kV	1	670	47	0	12	9	0	0	0	0	0
	2	50	4	17	5	4	325	23	26	12	9
	3	50	4	17	5	4	675	47	98	36	27
Pit 1 230 kV	1	0	0	0	0	0	175	12	0	3	2
	2	250	18	470	120	91	50	4	10	3	3
	3	50	4	10	3	3	575	40	10	12	9
	4	700	49	10	15	11	200	14	46	15	11
Rio Oso 230 kV	1	0	0	0	0	0	1000	70	0	17	13
	2	250	18	61	19	15					
	3	200	14	94	27	20					
	4	550	39	38	19	14					
Round Mt 230 kV	1	0	0	0	0	0	600	42	0	10	8
	2	800	56	768	202	154	1400	98	46	35	27
	3	350	25	46	17	13					
	4	850	60	245	75	57					
Stagg 230 kV	1	0	0	0	0	0	650	46	0	11	9
	2	750	53	294	85	65	350	25	10	8	6
	3	250	18	10	7	5					
Summit Metering	1	0	0	0	0	0	75	5	0	1	1
	2	250	18	287	75	57	425	30	287	78	59

* Static VAR Compensator (SVC) is used as a proxy for voltage support devices required. The size of the SVC at each Level assumes the capacity in each level will be fully utilized. However, since addition of voltage support devices is less "lumpy" than other transmission facilities, it is separately listed so that the size, and hence, cost can be prorated based on the size of the resource bid.

** The maximum potential generation for these levels assumes that it is cost effective to increase pumping at Helms Pump Storage Plant (PSP) during off-peak (night) periods using the new generation at these clusters. In addition, for the off peak (night) hours for the months of June through September, the maximum MW generation in each level could be increased by another 300 MW when maximum pumping at Helms PSP is likely.

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			Proxy Voltage Support Devices*	Other Proxy Transmission upgrades	Based on 10 year contract life	Based on 20 year contract life		Proxy Voltage Support Devices*	Other Proxy Transmission upgrades	Based on 10 year contract life	Based on 20 year contract life
Station 115kV	3	250	18	94	27	21					
Table Mt 230 kV	1	0	0	0	0	0	800	56	0	14	10
	2	900	63	470	131	100	200	14	46	15	11
	3	100	7	46	13	10					
Tesla 230 kV	1	0	0	0	0	0	1000	70	0	17	13
	2	1000	70	418	120	91					
Vaca Dixon 230 kV	1	0	0	0	0	0	1000	70	0	17	13
	2	1000	70	378	110	84					
Wilson 230 kV	1	450	32	0	8	6	700**	49	0	12	9
	2	500	35	28	16	12	50	4	12	4	3
	3	50	4	35	9	7	250	18	43	15	11

* Static VAR Compensator (SVC) is used as a proxy for voltage support devices required. The size of the SVC at each Level assumes the capacity in each level will be fully utilized. However, since addition of voltage support devices is less "lumpy" than other transmission facilities, it is separately listed so that the size, and hence, cost can be prorated based on the size of the resource bid.

** The maximum potential generation for these levels assumes that it is cost effective to increase pumping at Helms Pump Storage Plant (PSP) during off-peak (night) periods using the new generation at these clusters. In addition, for the off peak (night) hours for the months of June through September, the maximum MW generation in each level could be increased by another 300 MW when maximum pumping at Helms PSP is likely.

*** Carrying charges in this table are for illustrative purposes only. The actual carrying charge for an individual offer will depend on specifics in the offer submitted.

Table 2

2010 Transmission Ranking Cost for Study Year 2014 for Potential Generation Located North of or in PG&E Service Territory

Assuming Delivery to PG&E's Midway Substation (SCE or SDG&E is the Purchaser)

Substation Associated With Cluster Of Potential Generation	Level	Peak and Shoulder – Year Round: Maximum MW of Potential Generation In each Level	Peak and Shoulder – Year Round: Cost of Proxy Network Upgrades to accommodate MW Level of Potential Generation ($ millions in 2008 dollars): Proxy Voltage Support Devices*	Peak and Shoulder – Year Round: Cost of Proxy Network Upgrades to accommodate MW Level of Potential Generation ($ millions in 2008 dollars): Other Proxy Transmission upgrades	Peak and Shoulder – Year Round: Annual Carrying Charges ($ millions in 2008 dollars): Based on 10 year contract life	Peak and Shoulder – Year Round: Annual Carrying Charges ($ millions in 2008 dollars): Based on 20 year contract life	Night – Year Round: Maximum MW of Potential Generation In each Level	Night – Year Round: Cost of Proxy Network Upgrades to accommodate MW Level of Potential Generation ($ millions in 2008 dollars): Proxy Voltage Support Devices*	Night – Year Round: Cost of Proxy Network Upgrades to accommodate MW Level of Potential Generation ($ millions in 2008 dollars): Other Proxy Transmission upgrades	Night – Year Round: Annual Carrying Charges ($ millions in 2008 dollars): Based on 10 year contract life	Night – Year Round: Annual Carrying Charges ($ millions in 2008 dollars): Based on 20 year contract life
Bellota 230 kV	1	1000	70	0	17	13	400	28	0	7	5
	2						525	37	28	16	12
	3						75	5	15	5	4
Caribou 230 kV	1	0	0	0	0	0	150	11	0	3	2
	2	950	67	508	141	108	650	46	38	20	16
Carrizo Plains	1	0	0	0	0	0	25	2	0	0	0
	2	310	22	156	44	33	475	33	156	46	35
Cortina 230 kV	1	350	25	0	6	5	325	23	0	6	4
	2	450	32	40	18	13	125	9	35	11	8
	3	200	14	59	18	14	475	33	59	23	17
	4						75	5	40	11	8
Cottonwood 230 kV	1	0	0	0	0	0	875	61	0	15	11
	2	275	19	283	74	57	225	16	46	15	11
	3	725	51	298	85	65	200	14	24	9	7
	4	500	35	46	20	15	200	14	298	76	58
Delta 115 kV	1	0	0	0	0	0	0	0	0	0	0
	2	500	35	318	86	66	500	35	318	86	66
Fulton 230 kV	1	450	32	0	8	6	325	23	0	6	4
	2	150	11	37	12	9	325	23	37	15	11
	3	500	35	85	29	22	475	33	85	29	22
	4	300	21	258	68	52	375	26	26	13	10
	5	100	7	35	10	8					
Gates 230 kV	1	960	67	0	16	12	0	0	0	0	0
	2						1000	70	65	33	25
Gregg 230 kV	1	0	0	0	0	0	1000**	70	0	17	13
	2	300	21	4	6	5					
	3	400	28	7	9	7					
	4	200	14	43	14	11					

* Static VAR Compensator (SVC) is used as a proxy for voltage support devices required. The size of the SVC at each Level assumes the capacity in each level will be fully utilized. However, since addition of voltage support devices is less "lumpy" than other transmission facilities, it is separately listed so that the size, and hence, cost can be prorated based on the size of the resource bid.

** The maximum potential generation for these levels assumes that it is cost effective to increase pumping at Helms Pump Storage Plant (PSP) during off-peak (night) periods using the new generation at these clusters. In addition, for the off peak (night) hours for the months of June through September, the maximum MW generation in each level could be increased by another 300 MW when maximum pumping at Helms PSP is likely.

*** Carrying charges in this table are for illustrative purposes only. The actual carrying charge for an individual offer will depend on specifics in the offer submitted.

Substation Associated With Cluster Of Potential Generation	Level	Peak and Shoulder — Year Round: Maximum MW of Potential Generation In each Level	Peak and Shoulder — Year Round: Cost of Proxy Network Upgrades to accommodate MW Level of Potential Generation ($ millions in 2008 dollars): Proxy Voltage Support Devices*	Peak and Shoulder — Year Round: Cost of Proxy Network Upgrades to accommodate MW Level of Potential Generation ($ millions in 2008 dollars): Other Proxy Transmission upgrades	Peak and Shoulder — Year Round: Annual Carrying Charges ($ millions in 2008 dollars): Based on 10 year contract life	Peak and Shoulder — Year Round: Annual Carrying Charges ($ millions in 2008 dollars): Based on 20 year contract life	Night — Year Round: Maximum MW of Potential Generation In each Level	Night — Year Round: Cost of Proxy Network Upgrades to accommodate MW Level of Potential Generation ($ millions in 2008 dollars): Proxy Voltage Support Devices*	Night — Year Round: Cost of Proxy Network Upgrades to accommodate MW Level of Potential Generation ($ millions in 2008 dollars): Other Proxy Transmission upgrades	Night — Year Round: Annual Carrying Charges ($ millions in 2008 dollars): Based on 10 year contract life	Night — Year Round: Annual Carrying Charges ($ millions in 2008 dollars): Based on 20 year contract life
	5	75	5	28	8	6					
	6	25	2	23	6	5					
Helm 230 kV	1	125	9	0	2	2	250	18	0	4	3
	2	650	46	18	16	12	750	25	22	11	9
	3	225	16	22	9	7					
Humboldt 115 kV	1	0	0	0	0	0	0	0	0	0	0
	2	375	26	383	100	77	500	35	383	103	78
	3	125	9	298	75	57					
Los Banos 230 kV	1	875	61	0	15	11	325	23	0	6	4
	2	125	9	98	26	20	675	47	98	36	27
Metcalf 230 kV	1	1000	70	0	17	13	1000	70	0	17	13
Midway 230 kV	1	1135	79	0	19	14	1725	121	0	30	23
	2	1725	121	46	41	31	1275	89	46	33	25
Morro 230 kV	1	825	58	0	14	11	500	35	0	9	7
	2	200	14	98	28	21	1000	70	98	41	32
	3	475	33	114	36	28					
Newark 230 kV	1	1275	89	0	22	17	1500**	105	0	26	20
	2	125	9	49	14	11					
	3	100	7	292	73	56					
Panoche 230 kV	1	770	54	0	13	10	0	0	0	0	0
	2						700	49	84	33	25
	3						300	21	98	29	22
Pit 1 230 kV	1	0	0	0	0	0	175	12	0	3	2
	2	325	23	283	75	57	50	4	10	3	3
	3	75	5	10	4	3	575	40	10	12	9
	4	600	42	10	13	10	200	14	46	15	11
Rio Oso 230 kV	1	0	0	0	0	0	1000	70	0	17	13
	2	250	18	61	19	15					
	3	200	14	94	27	20					
	4	550	39	38	19	14					
Round Mt 230 kV	1	0	0	0	0	0	600	42	0	10	8
	2	150	11	470	118	90	1400	98	46	35	27
	3	675	47	298	85	65					
	4	325	23	46	17	13					
	5	850	60	245	75	57					
Stagg 230 kV	1	750	53	0	13	10	0	0	0	0	0
	2	250	18	10	7	5	650	46	10	14	10

* Static VAR Compensator (SVC) is used as a proxy for voltage support devices required. The size of the SVC at each Level assumes the capacity in each level will be fully utilized. However, since addition of voltage support devices is less "lumpy" than other transmission facilities, it is separately listed so that the size, and hence, cost can be prorated based on the size of the resource bid.

** The maximum potential generation for these levels assumes that it is cost effective to increase pumping at Helms Pump Storage Plant (PSP) during off-peak (night) periods using the new generation at these clusters. In addition, for the off peak (night) hours for the months of June through September, the maximum MW generation in each level could be increased by another 300 MW when maximum pumping at Helms PSP is likely.

*** Carrying charges in this table are for illustrative purposes only. The actual carrying charge for an individual offer will depend on specifics in the offer submitted.

Substation Associated With Cluster Of Potential Generation	Level	Peak and Shoulder Year Round: Maximum MW of Potential Generation In each Level	Peak and Shoulder Year Round: Cost of Proxy Network Upgrades to accommodate MW Level of Potential Generation ($ millions in 2008 dollars): Proxy Voltage Support Devices*	Peak and Shoulder Year Round: Cost of Proxy Network Upgrades to accommodate MW Level of Potential Generation ($ millions in 2008 dollars): Other Proxy Transmission upgrades	Peak and Shoulder Year Round: Annual Carrying Charges ($ millions in 2008 dollars): Based on 10 year contract life	Peak and Shoulder Year Round: Annual Carrying Charges ($ millions in 2008 dollars): Based on 20 year contract life	Night Year Round: Maximum MW of Potential Generation In each Level	Night Year Round: Cost of Proxy Network Upgrades to accommodate MW Level of Potential Generation ($ millions in 2008 dollars): Proxy Voltage Support Devices*	Night Year Round: Cost of Proxy Network Upgrades to accommodate MW Level of Potential Generation ($ millions in 2008 dollars): Other Proxy Transmission upgrades	Night Year Round: Annual Carrying Charges ($ millions in 2008 dollars): Based on 10 year contract life	Night Year Round: Annual Carrying Charges ($ millions in 2008 dollars): Based on 20 year contract life
Summit Metering Station 115 kV	1	0	0	0	0	0	75	5	0	1	1
	2	250	18	287	75	57	425	30	287	78	59
	3	250	18	94	27	21					
Table Mt 230 kV	1	0	0	0	0	0	800	56	0	14	10
	2	900	63	470	131	100	200	14	46	15	11
	3	50	4	46	12	9					
	4	50	4	245	61	46					
Tesla 230 kV	1	1000	70	0	17	13	1000	70	0	17	13
Vaca Dixon 230 kV	1	0	0	0	0	0	1000	70	0	17	13
	2	1000	70	245	77	59					
Wilson 230 kV	1	500	35	0	9	7	625**	44	0	11	8
	2	500	35	28	16	12	50	4	12	4	3
	3	0	0	0	0	0	325	23	43	16	12

* Static VAR Compensator (SVC) is used as a proxy for voltage support devices required. The size of the SVC at each Level assumes the capacity in each level will be fully utilized. However, since addition of voltage support devices is less "lumpy" than other transmission facilities, it is separately listed so that the size, and hence, cost can be prorated based on the size of the resource bid.

** The maximum potential generation for these levels assumes that it is cost effective to increase pumping at Helms Pump Storage Plant (PSP) during off-peak (night) periods using the new generation at these clusters. In addition, for the off peak (night) hours for the months of June through September, the maximum MW generation in each level could be increased by another 300 MW when maximum pumping at Helms PSP is likely.

*** Carrying charges in this table are for illustrative purposes only. The actual carrying charge for an individual offer will depend on specifics in the offer submitted.

II. DEVELOPMENT OF THE TRANSMISSION RANKING COST REPORT

A. Procedural History.

SB 1078 established the California Renewables Portfolio Standard Program and the objective that 20% of electricity sold to California customers would be procured from eligible renewable energy resources by 2017. In 2006, SB 107 was enacted, accelerating the procurement objective to 20% of retail sales from eligible renewable resources by 2010 with flexible compliance. SB 1038 required the CEC to complete a renewable resource plan and required the Commission to complete a renewable resource transmission plan. Both reports were required to be submitted to the Legislature by December 1, 2003. Accordingly, the Commission's transmission plan was based on the CEC's renewable resource plan.

B. PG&E's Conceptual Transmission Studies for Renewable Resource Bidders.

A key element in PG&E's methodology is the identification of clusters at which renewable generators may be expected to appear. This section describes the various indicia of potential renewable resource generator development that have led PG&E to identify twenty-six renewable resource clusters for the 2010 TRCR.

1. Studies Completed as of July 30, 2003

Pursuant to the January 29, 2003, Administrative Law Judge's ("ALJ's") Ruling and Notice of Evidentiary Hearings on Tehachapi Transmission Project in the Commission's Investigation (I.) 00-11-001, PG&E invited developers who might wish to interconnect eligible renewable energy projects to the PG&E-owned transmission system to apply for and fund transmission conceptual studies, including project cost estimates. PG&E's solicitation noted that project-specific information from such studies might be included in the renewables transmission plan report that the Commission was required to submit to the Legislature by December 1, 2003. (Public Utilities Code § 383.6).

Five potential renewable resource developers responded to PG&E's March 2003 solicitations, describing a total of twelve projects representing 2,562 MW. Of these, seven projects representing 1102 MW were located within PG&E's service territory. Three projects representing 220 MW were located in PacifiCorp's service territory, with proposed interconnection points at Bonneville Power Administration-owned substations. Two projects representing 1240 MW were located outside California and were excluded from the Screening Level Evaluation.

2. CEC Renewable Resource Assessment Reported Dated July 1, 2003.

The February 26, 2003, ALJ's Ruling in I.00-11-001 determined that the CEC's Preliminary Renewable Resource Assessment ("PRRA") would assess a level of renewable development in 2005 and 2008 sufficient to allow PG&E, SCE, SDG&E, and any other "obligated entities" to achieve the incremental RPS goals embodied in Senate Bill 1078. This CEC assessment was intended to provide the basis for a reconnaissance level analysis of current and potential transmission The CEC published its PRRA on July 1, 2003. The PRRA resource assessment identified renewable megawatt additions for the transmission plan's target years

(2005, 2008 and 2017) by technology type and by county where renewable resources are deemed most likely to locate. PG&E has relied on the PRRA as the basis of its reconnaissance level analysis of current and potential transmission congestion due to the interconnection of potential renewable resources. PG&E filed its Screening Level Study required by SB 1038 on August 29, 2003.

3. Administrative Law Judge Rulings Dated July 21, 2003 and August 1, 2003 - Revised Scope of Study Based on CEC PRRA.

The ALJ's rulings of July 21, 2003, and August 1, 2003, further required utilities to develop a conceptual renewables transmission plan for 2017 (similar to the conceptual transmission plans developed for 2005 and 2008), to address the effect of accelerating realization of the 20% RPS Goal from 2017 to 2010, and to report on the transmission needs for potential renewable resources that would still exist after attainment of the RPS Goal.

4. CEC Renewable Resource Development Report Dated September 30, 2003.

The CEC's draft Renewable Resource Development Report ("RRDR") provided the Commission with an update to the PRRA on July 1, 2003. This RRDR expanded the scope to include the energy needs of the rest of the state (publicly owned electric utilities, other IOUs, and other electric service providers). By comparison, the original PRRA had focused on the energy needs of the investor owned utilities ("IOUs") and electric service providers ("ESPs") for transmission planning purposes. The RRDR also included a plausible RPS compliance scenario for the entire state, using data from existing and proposed projects.[9/] Adjustments were made to the estimates of renewable energy resources needed to meet RPS obligations, the amount of proposed renewable projects, and the installed renewable capacity within California and the WECC. The CEC's estimate of renewable resource capacity required to meet the RPS of 20% by 2010 on a statewide level and remaining potential renewable resources are summarized in Table 3:

9/ The RRDR states "The data for the proposed projects date back as far as June 1998 from the Energy Commission's first New Account auction to as recent as projects participating in the 2003 Interim Procurement. A limited amount of projects were filtered out if they did not appear to be plausible or 'real' projects. Most of the proposed projects do not have contracts and are not yet under construction. Data on proposed projects were gathered from solicitations for new electric providers to IOU and/or municipal electric utilities. The following data sources were used: the Energy Commission's New Renewable Resources Account database, California Power Authority Letters of Intent, Southern California Public Power Authority (SCPPA) Request for Proposals (RFP) and the 2003 Northern California Power Association (NCPA) RFP." As such, there is not sufficient information in the RRDR to ascertain the amounts and number of "proposed" renewable resource projects that may have initiated the interconnection or permit application process.

Table 3. Plausible Renewable Energy Supply Scenario to meet Estimated Statewide 20% RPS Demand by 2010 with Resources Located in California (MW)

	2005 (MW)	2008 (MW)	2010 (MW)	2017 (MW)	Total (MW)
PG&E	420	355	50	200	1,025
SCE	875	2,452	1,645	1,110	6,082
IID	120	140	150	40	450
SDG&E	220	210	-	-	430
TOTAL	1,635	3,157	1,845	1,350	7,987

In the PG&E service territory, compared to the PRRA, the RRDR scenario assumes that the development of renewable resources in Solano and Alameda Counties would accelerate, and the renewable resource development in Modoc and Siskiyou Counties would be slower.

5. Commission Administrative Law Judge Rulings Dated October 15, 2003—Revised Schedule and Approach of Study Based on CEC RRDR.

The ALJ Ruling of October 15, 2003, modified the schedule and approach to be used for the Commission Renewables Transmission Report. Accordingly, PG&E prepared and filed its Supplemental Screening Level Study Required by SB 1038 on October 29, 2003.

6. Commission Administrative Law Judge Rulings Dated March 18, 2004 on Renewable Resource Information to Prepare the Transmission Ranking Cost Report.

Pursuant to ALJ Ruling dated March 18, 2004, PG&E undertook a supplemental solicitation for information from developers of eligible renewable energy projects. In response to this supplemental solicitation, PG&E received information from nine developers, proposing a total of forty-one projects representing 4,313.5 MW. Of these, fourteen projects representing 736 MW were located within PG&E's service territory. Twenty-five projects representing 3477.5 MW were located in Southern California. Two projects representing 100 MW were located in PacificCorp's service territory, with proposed interconnection points at Bonneville Power Administration owned substations. PG&E used this information to supplement the information available earlier in developing the clusters for the 2004 Transmission Ranking Cost Report.

On March 18, 2005, PG&E sent another letter of solicitation for information to developers regarding eligible renewable energy projects expected to commence delivery to the PG&E-owned transmission system by January 2010. PG&E received responses from four developers by the closing date of March 28, 2005, for sixteen generation projects totaling 2,905 MW. Of these, six projects, totaling 671 MW, are expected to be in the PG&E service area, three projects, totaling 732 MW, are expected to be located north of the PG&E service area but within California, and seven projects, totaling 1,502 MW, are expected to be located in Southern California. PG&E used this information to supplement the information available earlier in developing the clusters for the 2004 Transmission Ranking Cost Report.

7. Commission Decision 05-07-040 directed the utilities to apply the same Methodology, as modified by that decision, in preparing their 2005 Transmission Ranking Cost Reports.

In D.05-07-040, the Commission directed the utilities to apply the same methodology, as modified by that decision, in preparing their 2005 Transmission Ranking Cost Reports. In addition, it directed the utilities to specify and explain the carrying costs, in addition to capital costs, of transmission upgrades identified in the reports. Accordingly, PG&E calculates the carrying costs -- or costs of ownership -- for proposed capital expenditures. These costs are then discounted to a present value using a discount rate that takes into account the time value of money over the anticipated life of the project. The components used in the determination of the carrying cost typically include capital investment, operation and maintenance expenses, taxes, insurance, and depreciation.

8. CEC Strategic Value Analysis Draft Consultant Report published in July 2005.

CEC Strategic Value Analysis shows the possible locations by county and magnitudes of the economic potential of the renewable resources. Exhibit 2 is a map showing a potential distribution scenario of renewable resources. This served as another data point considered when PG&E selected the clusters investigated in the 2006 TRCR.

Table 4: RPS Requirements listed in CEC Consultant Draft Report on Strategic Value Analysis CEC-500-2005-106

		2003		2004		2005			
LSE	2001 estimated renewable baseline (GWh/yr)	2003 actual (GWh/yr)	% of 2003 APT	2004 actual (GWh/yr)	% of 2004 APT	2005 IOU expected (GWh/yr)	2005 needed to be on course for 20% by 2010 (GWh/yr)	2010 20% of demand forecast (GWh/yr)	2017 20% of demand forecast (GWh/yr)
PG&E	6,719	8,828	101%	8,591	91%	9,087	9,633	15,879	17,280
SCE	11,364	12,497	104%	13246	104%	13,634	14,560	15,934	17,340
SDG&E	146	550	285%	678	160%	884	1,285	3,462	3,767
DA & Rest of state	7,587	4,853		4,676			13,132	20,885	22,727
Total		26,728		27,191			38,610	56,160	61,114

9. Commission Assigned Commissioner and Administrative Law Judge's Ruling in OIR. 04-04-026, dated November 9, 2005, directed the utilities to apply the Methodology in D.04-06-010 and D.05-07-040 in preparing their 2006 Transmission Ranking Cost Reports

Pursuant to Assigned Commissioner and Administrative Law Judge's Ruling, dated November 9, 2005, on January 31, 2006, PG&E issued a letter soliciting information from developers regarding eligible renewable energy projects expected to commence delivery to the PG&E-owned transmission system by January 2010. By the closing date of February 7, 2006, PG&E received only one response, which came from a single developer; that response representing two generation projects, totaling 70 MW. Both projects are expected to be located north of PG&E's service area, with one of these two projects expected in California. PG&E used this information to supplement the information available earlier in developing the clusters for the 2006 TRCR.

10. Assigned Commissioner Ruling and Scoping Memo, dated August 21, 2006, as modified by the subsequent Administrative Law Judge's Ruling on Filing of Draft 2007 RPS Procurement Plans, dated September 14, 2006, in R.06-05-027

Pursuant to Assigned Commissioner Ruling and Scoping Memo, dated August 21, 2006, as modified by the subsequent Administrative Law Judge's Ruling on Filing of Draft 2007 RPS Procurement Plans, dated September 14, PG&E issued a letter on October 2, 2006, soliciting information from developers regarding eligible renewable energy projects expected to commence delivery to the PG&E-owned transmission system by January 2011. By the closing date of October 10, 2006, PG&E received responses from five developers, representing twenty-one generation projects totaling up to 3,039 MW. Of these, four projects, totaling 462 MW, are expected to be in the Pacific Northwest, one project representing 500 MW is expected to locate in Mexico, seven projects, totaling 1,212 MW, are expected to be in northern California, and 8 projects, totaling 865 MW, are expected to be in southern California. PG&E used this information to supplement information available earlier in developing the clusters for the 2007 Transmission Ranking Cost Report.

11. Assigned Commissioner Ruling and Scoping Memo, dated June 15, 2007, as modified by the subsequent revised schedules provided via Administrative Law Judge's Rulings on July 16, 2007, August 7th, 2007 and August 23, 2007. and the Assigned Commissioner's Ruling on July 31st, 2007.

Pursuant to Assigned Commissioner Ruling and Scoping Memo, dated June 15, 2007, as modified by the aforementioned rulings, PG&E issued a letter on August 1, 2007, soliciting information from developers regarding eligible renewable energy projects expected to commence delivery to the PG&E-owned transmission system by January 2012. By the closing date of August 9, 2007, PG&E received responses from three developers, representing six generation projects totaling up to 1,139 MW. Of these, two projects, totaling 499 MW, are expected to be in the Pacific Northwest, one project representing 400 MW is expected to locate in Mexico, and three projects, totaling 240 MW, are expected to be in Central and Southern California. PG&E

used this information to supplement information available earlier in developing the clusters for the 2008 Transmission Ranking Cost Report.

12. The Amended Scoping Memo and Ruling of Assigned Commissioner Regarding 2009 RPS Procurement Plans dated June 20, 2008

Pursuant to Assigned Commissioner Ruling and Scoping Memo, dated June 20, 2008, PG&E issued a letter on August 6, 2008, soliciting information from developers regarding eligible renewable energy projects expected to commence delivery to the PG&E-owned transmission system by January 2013. By the closing date of August 13, 2008 and subsequent late submittals, PG&E received responses from three developers, representing seventeen generation projects totaling up to 4,126 MW**.** Of these, two projects, totaling 40 MW, are expected to be in PG&E's Service Area in Central California, twelve projects, totaling 2,806 MW, are expected to be outside PG&E Service Area in Central and Southern California, and three projects, totaling 1,280 MW, are expected to be located in the Desert Southwest. PG&E used this information to supplement information available earlier in developing the clusters for the 2009 Transmission Ranking Cost Report**.**

13. CPUC Decision 09-06-018 and the Amended Scoping Memo and Ruling of the Assigned Commissioner Regarding 2010 RPS Procurement Plans dated November 2, 2009 in CPUC rulemaking (R.) 08-08-009.

Pursuant to Assigned Commissioner Ruling and Scoping Memo, dated November 2, 2009, PG&E issued a letter on November 13, 2009 soliciting information from developers regarding eligible renewable energy projects expected to commence delivery to the PG&E-owned transmission system by January 2014. By the closing date of November 20, 2009 and subsequent late submittals, PG&E received responses from 2 developers, representing 19 generation projects totaling up to 1639 MW**.** Of these, 1 project, totaling 51 MW, is expected to be in PG&E's Service Area; 15 projects, totaling 910 MW, are expected to be outside PG&E Service Area in Southern California; 4 projects, totaling 228 MW, are expected to be located in the Pacific Northwest; and 2 projects, totaling 450 MW, are expected to be located in the Desert Southwest. PG&E used this information to supplement information available earlier in developing the clusters for the 2010 Transmission Ranking Cost Report**.**

III. PG&E'S TRANSMISSION RANKING COST STUDY FOR USE IN THE 2010 RPS SOLICITATION

On June 9, 2004, the Commission issued D. 04-06-013, adopting the "Methodology for Development and Consideration of Transmission Costs in Initial Renewable Portfolio Standard Procurement" (the "Methodology"), which is to be undertaken pursuant to Pub. Util. Code § 399.14. This decision also ordered PG&E to prepare and file a TRCR consistent with the Methodology within 14 days of the effective date of the Decision. It states in relevant part:

> In its Transmission Ranking Cost Report, each utility should identify and provide cost information regarding transmission upgrades needed for potential RPS projects, based on conceptual

> transmission studies submitted previously in this proceeding, other conceptual transmission studies, and System Impact Studies and Facilities Studies prepared for projects that have initiated the California Independent System Operator (ISO) interconnection process.

To be consistent with D. 04-06-013, the study undertaken by PG&E investigated the proxy facilities needed assuming, first, that PG&E would be the purchaser from renewable resources located within and outside PG&E's service territory, and, second, that PG&E would transmit the energy from renewable resources located north of or in PG&E's service territory to a PG&E point of delivery for purchasers south of PG&E's service territory.

A. Limitations, Assumptions and Methodology Underlying PG&E's 2010 Transmission Ranking Cost Study.

PG&E developed the 2010 TRCR from the 2009 TRCR, which used the same methodology as it did in the earlier Screening Level Studies, filed on August 29, 2003, and on October 29, 2003; in the 2004 TRCR, filed on June 23, 2004; the 2005 TRCR, filed on August 3, 2005; and the 2006 TRCR, filed on March 15, 2006, the 2007 TRCR, filed on November 8, 2006, and the 2008 TRCR, filed on September 7, 2008. The 2010 Transmission Ranking Costs developed herein involve the same limitations and uncertainties as the conceptual transmission plans in the earlier studies.

1. Power Flow Base Cases.

PG&E used the Summer Peak and Summer Off Peak base cases developed in PG&E's 2007 base case series and approved by the CAISO for use` in PG&E's Annual Assessment Studies.

These base cases were updated to reflect the current (as of December 2009) projects:

- Generation projects in the CAISO Interconnection Queue that have completed the System Impact Studies and Facilities Studies, and the associated transmission upgrades in accordance with the signed agreements.
- Approved reliability and economic transmission upgrades.
- The results of PG&E's prior Renewables Solicitations conducted since 2004 once the RPS contracts have been executed.)

2. Substation Associated With Cluster of Potential Generation.

Based on information received from the developers and the CEC's PRRA and RRDR, as well as the CEC's draft Strategic Value Analysis Report, published in July 2005, PG&E has selected Bellota, Caribou, Carrizo Plains, Cortina, Cottonwood, Delta Metering Station, Fulton, Gates, Gregg, Helm, Humboldt, Los Banos, Metcalf, Midway, Morro Bay, Newark, Panoche, Pit 1, Rio Oso, Round Mountain, Stagg, Summit Metering Station, Table Mountain, Tesla, Vaca-Dixon, and Wilson Substations (see Exhibit 1) as the cluster locations from which the transmission impact of the renewable resources identified are analyzed. If PG&E is assumed to be the purchaser, for renewable resources located north of PG&E's service territory, the associated potential cluster will be PG&E's Round Mountain Substation. For projects located south of PG&E's service territory, the associated potential cluster will be PG&E's Midway Substation. For projects located east of PG&E's service territory, the associated potential cluster will be PG&E's side of Summit Metering Station.

If SCE, SDG&E or an entity south of PG&E's service territory is assumed to be the purchaser, and the renewable resources are located north of or in PG&E's service territory, the point of delivery out of PG&E's service territory will be PG&E's Midway Substation. As in the case where PG&E is assumed to be the purchaser, the point of receipt for renewable resources located north of PG&E's service territory is assumed to be PG&E's Round Mountain Substation, and the point of receipt for renewable resources located east of PG&E's service territory is assumed to be PG&E's side of Summit Metering Station. PG&E's Transmission Ranking Cost herein from the cluster associated with the renewable resource location should be submitted to SCE and SDG&E, as appropriate, in response to solicitation by SCE or SDG&E for complete evaluation.

3. Potential Network Upgrades and Proxy Facilities.

PG&E ran the 2013 Summer Peak and 2013 Summer Off Peak cases using the updated assumptions set forth on page 4, above. As in the earlier TRCR studies, because of the limited time and data available for this evaluation, only power flow (steady state) cases representing normal (all facilities in service) operating conditions were run. For each cluster, PG&E tested the need for network upgrades based on the same criteria used in the earlier TRCR studies. As was done earlier, transmission facilities that may experience transmission problems during single contingencies were identified by comparing the normal loadings to a loading threshold of 80% of normal facility rating. That is, if a transmission facility under normal operating conditions is loaded to 80% or more of its normal rating, then it is an indication that overload may exist during single contingency conditions, and transmission upgrades could be needed.

The proxy transmission facilities deemed needed to correct potential transmission congestion would be determined based on the lesser cost facilities similar to the congested facilities, or the following:

60 kV line for renewable resources less than 100 MW

115 kV line for renewable resources between 100 and 200 MW

230 kV line for renewable resources between 200 and 600 MW

500 kV line for renewable resources 600 MW and higher

Consideration would be given also to the existing system configuration where the potential congestion is identified, and future development expected. For example, if a large amount of renewable resources is expected beyond the present solicitation, a 500 kV line initially operated as two 230 kV circuits will be chosen over a 230 kV double circuit tower line (DCTL).

PG&E also augments the information thus developed with information from other transmission planning studies to the extent they are available. If no transmission facility in the impacted area[10/] would be loaded to at or above 80% of normal rating in the scenario, the renewable generation in the cluster would be increased to a point where loading on at least one transmission facility would reach 80% of normal rating or when the resource addition in a cluster would reach 1,000 MW unless other information is available. Using 1,000 MW as the cut off is reasonable, since the maximum amounts in any cluster are determined based on a simplified methodology, and thus there could be other limits that could have been reached (such as voltage stability) that have not been identified. In any case, addition of over 600 MW in a cluster would require a proxy 500 kV line, which could trigger impacts and costs beyond California; such impacts cannot be addressed using this simplified methodology.

4. Load and Resource Balance, Reactive Support and other Operational Considerations.

To maintain load and resource balance while increasing the generation in each cluster, generation outside the impacted area would be decreased based on the same principle used for incorporating the generation in the CAISO Interconnection Queue. If there is more identified renewable generation after all available gas-fired generators have been decreased or shut down (while maintaining the generation level needed for local reliability in the load centers), the power flows on transmission ties to areas outside PG&E's service territory that are electrically farthest away from the cluster under study would be adjusted.

The study performed for the TRCR assumes that the renewable resources connecting to each cluster would exhibit the reactive capability of synchronous generators. Experience from past studies shows that voltage (reactive) support is required to reliably transmit the renewable resources to the load centers with the addition of any resources, including synchronous generators, located away from the load centers. To be effective, these voltage support devices would be assumed to have been installed at various strategic locations, which are generally at or near the load centers. The levels of voltage support are estimated based on proxy devices and the results of past studies, and are technology neutral. Because the voltage support devices are not as "lumpy" as the other transmission facilities, they can be estimated *pro rata* with the renewable resource bids.

Due to the lack of specific detailed information associated with all the potential renewable projects that may respond to PG&E's RPS solicitation, this TRCR study employed very simplified methodologies. To avoid unnecessary addition of transmission network upgrades, PG&E assumes that each renewable project that is successful in winning the bid solicitation will do its share to maintain existing reliability of the system by participating in the applicable nomograms and existing special protection schemes, such as the Path 15 Remedial Action Scheme.

10/ For renewable projects where PG&E is the purchaser, an impacted area is defined by identifying all transmission facilities in the same transmission planning area and/or adjacent neighboring Transmission Planning Areas where the cluster is located (i.e., electrically close to the cluster) . For Renewables bidding to deliver to southern California, the impacted area will include the system going to the point of delivery (in this case, PG&E's Midway Substation).

B. Transmission Ranking Cost Study Results.

Based on the information gathered on the possible locations of renewable resources that could bid in response to PG&E's upcoming RPS solicitation, PG&E has selected the following PG&E substation buses to be representative clusters from which PG&E would develop Transmission Ranking Costs:

Bellota
Caribou
Carrizo Plains
Cortina
Cottonwood
Delta Metering Station
Fulton
Gates
Gregg
Helm
Humboldt
Los Banos
Metcalf
Midway
Morro Bay
Newark
Panoche
Pit 1
Rio Oso
Round Mountain
Summit Metering Station
Stagg
Table Mountain
Tesla
Vaca Dixon
Wilson

This selection represents four more in the number of clusters than investigated in the 2009 TRCR. In addition, because of the updated network changes and the projected new resources resulting from the prior Resource Solicitations in the base cases and the new resources in the CAISO Interconnection Queue that have since completed the SIS/FS process, transmission capacity for some clusters has been decreased from their levels in the 2008 TRCR. However, this decrease is offset by transmission capacity shown to be available in other clusters. Tables 5 - 8 show the results of the analysis. Several transmission projects being proposed in the 2008 PG&E Transmission Expansion Plan may provide added transmission capacity for additional generation at some clusters. The added transmission capacity associated with these new transmission projects will be included in bid evaluation if they are approved by the CAISO and PG&E management before the 2010 RFO bid evaluation.

Overall, the 2008 investigation (which resulted in the 2009 TCR) shows more congestion on the 500 kV system. This is an indication that the lower voltage system may be reaching its limit and that simple solutions, such as reconductoring, may not be enough to support development of renewable resources beyond the RPS goal of 20%, assuming renewable resources continue to locate far away from the load centers. The inclusion of information contained within this TRCR in the RPS bid evaluation process is essential to the procurement of renewable resources based on least cost, best fit principles; this TRCR should also be used as a reference for the development of major transmission projects to connect those renewable resources that meet the least cost best fit criteria.

As mentioned above, to maintain load and resource balance while increasing the generation in each cluster, generation outside the impacted area will be decreased based on the same principle used for incorporating the generation in the CAISO Interconnection Queue. That is, older gas-fired generation will be displaced first, up to the point where the generation is needed for local reliability in the load centers. If there is more identified renewable generation after all available gas-fired generators have been decreased or shut down (again while maintaining generation needed for local reliability), the power flows will be adjusted on transmission ties to areas outside PG&E service territory that are electrically farthest away from the cluster under study.

Because of the amount of renewable resources added in each cluster, there appears to be more gas-fired generators that would need to be decreased or shut down as more and more renewable resources are added. Consequently, the transmission tie line flows to areas outside PG&E service territory would need to be adjusted. Since only the ties farthest away from the impacted areas would be adjusted (so as not to influence the study results for the impacted area), the Midway -Vincent 500 kV lines between PG&E and SCE would be adjusted for the clusters in the PG&E service territory north of Tesla Substation. Midway is also the point of delivery to entities south of PG&E service territory. Because of this coincidence, the Transmission Ranking Costs for clusters north of PG&E’s Tesla Substation are the same, regardless of whether PG&E is the assumed purchaser of the renewable resources or simply providing the transmission to transmit the renewable resources to their purchaser(s) to the south of PG&E’s service territory, as expected.

Consequently, the clusters south of Tesla are the only ones that could exhibit different impacts depending on whether PG&E is the assumed purchaser of or simply providing the transmission for the renewable resources. During peak conditions, this difference stems from whether the assumed generation from the cluster in question would increase the power flowing enough to cause potential overloads on the transmission facilities between Los Banos and Tesla, which are likely the limiting elements since Path 15 Upgrades became operational. Power scheduled to flow to SCE is not expected to impact these facilities. During off-peak conditions, when the prevalent power flow is from SCE to PG&E (in the south-to-north direction), purchasing renewable resources from projects south of PG&E’s service territory during off-peak conditions will likely encounter significant transmission congestion because any such purchases will add to the prevailing power flow. On the other hand, transmitting renewable power to parties south of PG&E's service territory under such off-peak conditions is not expected to encounter much transmission congestion, because such power transfers are expected to be in the opposite direction of the prevailing power flows.

Finally, PG&E compared the major input parameters for the 2010 TRCR with those of the 2009 TRCR, and found that the changes would not significantly impact the Transmission Ranking costs determined in 2009 for the Clusters as shown in Tables 1 and 2 above. Minor updates were made to account for the changes in load, resources and transmission configuration.

IV. CONCLUSION

PG&E has developed its 2010 TRCR in accordance with the Methodology laid out in Attachment A of D. 04-06-013 and in D.05-07-040. The Transmission Ranking Costs developed in this report will allow PG&E to perform the needed least-cost best-fit analysis to rank and select renewable resources for development considering the transmission cost of the resource being bid.

Table 5: 2010 TRCR
2014 Super Peak, Peak and Shoulder Periods where PG&E is the Purchaser

Substation Associated With Cluster of Potential Generation	Level	Maximum MW of Potential Generation In each Level	Cost of Proxy Network Upgrades to accommodate MW Level of Potential Generation ($ millions in 2007 dollars)		Limiting elements	Proxy Transmission Facility description		
						Proxy Voltage Support Devices*		
			Proxy Voltage Support Devices*	Other Proxy Transm. upgrades		SVC Qmax (MVAR)	SVC Qmin (MVAR)	Other Proxy Transmission upgrades
Bellota 230 kV	1	1000	70	0	BELLOTA 230-COTTLE B 230	500	-333	
Caribou 230 kV	1	0	0	0	TABLE MT 500-VACA-DIX 500	0	0	
	2	50	4	470	CARIBOU 230-BELDENTP 230	25	-17	Build new Table Mt-Vaca Dixon 230 DCTL (230 kV config)
	3	450	32	38	Table Mt 500/230 kV xformer	225	-150	Reconductor Caribou-Beldon-Table Mt 230 DCTL
	4	500	35	46	TABLE MT 500-TESLA 500	250	-167	Build new 500/230 xformer
Carrizo Plains 115 kV	1	0	0	0	TEMBLOR 115-BELRIDGE 115	50	-33	
	2	310	22	156	ATASCDRO 70-SN LS OB 70	200	-133	Build new Midway-Carrizo Plains 230
Cortina 230 kV	1	350	25	0	CORTINA 230-VACA-DIX 230	175	-117	
	2	450	32	40	CPVSTA 230-VACA-DIX 230	225	-150	Reconductor Cortina-Vaca Dixon 230 DCTL
	3	200	14	59	HPLND JT 60-CLVRDLJT 60	100	-67	Reconductor CPVSta-Cortina 230 DCTL
Cottonwood 230 kV	1	0	0	0	CPVSTA 230-CORTINA 230	0	0	
	2	1150	81	298	OLINDA 500-OLINDAW 230	575	-383	Build new Round Mt-Table Mt 230 DCTL

Table 5: 2010 TRCR
2014 Super Peak, Peak and Shoulder Periods where PG&E is the Purchaser

Substation Associated With Cluster of Potential Generation	Level	Maximum MW of Potential Generation In each Level	Cost of Proxy Network Upgrades to accommodate MW Level of Potential Generation ($ millions in 2007 dollars)		Limiting elements	Proxy Transmission Facility description		
						Proxy Voltage Support Devices*		
			Proxy Voltage Support Devices*	Other Proxy Transm. upgrades		SVC Qmax (MVAR)	SVC Qmin (MVAR)	Other Proxy Transmission upgrades
	3	350	25	46	COTWD_F 230-COTWDWAP 230	175	-117	Build new 500/230 xformer
Delta Metering Station 115 kV	1	0	0	0	CASCADE 60-OREGNTRL 60	0	0	
	2	500	35	318	LOMS JCT 60-DESCHUTS 60	250	-167	Build new Delta-Cottonwood 230 DCTL
Fulton 230 kV	1	450	32	0	T22_93 230-LAKEVILE 230	225	-150	
	2	150	11	37	FULTON 230-IGNACIO 230	75	-50	Reconductor Fulton-Lakeville 230
	3	500	35	85	CROCKETT 230-SOBRANTE 230	250	-167	Reconductor Fulton-Ignacio 230
	4	300	21	258	FULTON 230-FULTON 115	150	-100	Build new Crocket-Sobrante 230 DCTL
	5	100	7	35	FULTON 230-FULTON 115	50	-33	Build new 230/115 xformer
Gates 230 kV	1	960	67	0	WESTLEY 230-LOSBANOS 230	500	-333	
Gregg 230 kV	1	0	0	0	BORDEN 230-GREGG 230	0	0	
	2	275	19	4	STOREY 1 230-GREGG 230	138	-92	Reconductor Borden-Gregg 230 DCTL
	3	325	23	7	STOREY 1 230-WILSON 230	163	-108	Reconductor Storey-Borden 230 DCTL
	4	125	9	43	WARNERVL 230-WILSON 230	63	-42	Reconductor Wilson-Storey 230 DCTL
	5	275	19	28	KEARNEY 230-HERNDON 230	138	-92	Reconductor Wilson-Warnerville 230 DCTL

Table 5: 2010 TRCR
2014 Super Peak, Peak and Shoulder Periods where PG&E is the Purchaser

Substation Associated With Cluster of Potential Generation	Level	Maximum MW of Potential Generation In each Level	Cost of Proxy Network Upgrades to accommodate MW Level of Potential Generation ($ millions in 2007 dollars)		Limiting elements	Proxy Transmission Facility description		
			Proxy Voltage Support Devices*	Other Proxy Transm. upgrades		Proxy Voltage Support Devices* SVC Qmax (MVAR)	Proxy Voltage Support Devices* SVC Qmin (MVAR)	Other Proxy Transmission upgrades
Helm 230 kV	1	150	11	0	HELM 70-STRD JCT 70	75	-50	
	2	600	42	18	HELM 230-MC CALL 230	300	-200	Reconductor Panoche-Helm 230
	3	150	11	22	STOREY 1 230-GREGG 230	75	-50	Reconductor Helm-McCall 230
	4	100	7	12	PANOCHE 230-DS AMIGO 230	50	-33	Reconductor Gregg-Borden-Storey 230 DCTL
Humboldt 115 kV	1	0	0	0	Cottonwood-Humboldt 115 kV	0	0	
	2	350	25	383	ROUND MT 500-TABLE MT 500	175	-117	Build new Cottonwood-Humboldt 230 kV DCTL
	3	150	11	298	EEL RIVR 60-NEWBURG 60	75	-50	Build new Round Mt-Table Mt 230 DCTL
Los Banos 230 kV	1	550	39	0	WESTLEY 230-LOSBANOS 230	275	-183	
	2	450	32	17	CHEVPIPE 70-LOS BANS 70	225	-150	Reconductor Los Banos-Westley 230 DCTL
Metcalf 230 kV	1	1000	70	0	LS ESTRS 230-METCALF 230	500	-333	
Midway 230 kV	1	1310	92	0	MIDWAY 500-MIDWAY 230	725	-483	
	2	250	18	46	WESTLEY 230-LOSBANOS 230	125	-83	Build new 500/230 xformer
	3	1300	91	17	TRES VAQ 230-TESLA C 230	650	-433	Reconductor Los Banos-Westley 230 DCTL
Morro Bay	1	750	53	0	GATES 230-MORROBAY 230	375	-250	

Table 5: 2010 TRCR
2014 Super Peak, Peak and Shoulder Periods where PG&E is the Purchaser

Substation Associated With Cluster of Potential Generation	Level	Maximum MW of Potential Generation In each Level	Cost of Proxy Network Upgrades to accommodate MW Level of Potential Generation ($ millions in 2007 dollars)		Limiting elements	Proxy Transmission Facility description		
						Proxy Voltage Support Devices*		
			Proxy Voltage Support Devices*	Other Proxy Transm. upgrades		SVC Qmax (MVAR)	SVC Qmin (MVAR)	Other Proxy Transmission upgrades
230 kV	2	250	18	98	MORROBAY 230-Q239SWST 230	125	-83	Reconductor Morro Bay-Gates DCTL (Templeton in between)
Newark 230 kV	1	1400	98	0	NEWARK E 230-NWK DIST 230	700	-467	
	2	50	4	49	NWK DIST 230-LS ESTRS 230	25	-17	Build new Newark-Newark Dist 230 DCTL
	3	50	4	292	TESLA E 230-WESTLEY 230	25	-17	Build new Newark-Los Esteros 230 DCTL
Panoche 230 kV	1	670	47	0	PANOCHE 230-DS AMIGO 230	450	-300	
	2	50	4	17	WESTLEY 230-LOSBANOS 230	25	-17	Reconductor Panoche-Dos Amigo 230 DCTL
	3	50	4	17	LOSBANOS 230-PANOCHE 230	25	-17	Reconductor Los Banos-Westley 230 DCTL
Pit 1 230 kV	1	0	0	0	TABLE MT 500-VACA-DIX 500	0	0	
	2	250	18	470	COTWD_F 230-BRNY_FST 230	125	-83	Build new Table Mt-Vaca Dixon 230 DCTL (230 kV config)
	3	50	4	10	Q074SWST 230-ROUND MT 230	25	-17	Reconductor Pit 3-Round Mt 230 DCTL
	4	700	49	10	ROUND MT 500-RD MT 1M 500	350	-233	Reconductor Pit 1-Pit 3 230 DCTL
Rio Oso 230 kV	1	0	0	0	RIO OSO 230-ATLANTC 230	0	0	
	2	250	18	61	RIO OSO 230-BRIGHTON 230	125	-83	Reconductor Rio Oso-Atlantic 230 DCTL
	3	200	14	94	RIO OSO 230-GOLDHILL 230	100	-67	Reconductor Rio Oso-Brighton 230 DCTL
	4	550	39	38	ATLANTC 230-GOLDHILL 230	275	-183	Reconductor Atlantic-Goldhill 230 DCTL

Table 5: 2010 TRCR
2014 Super Peak, Peak and Shoulder Periods where PG&E is the Purchaser

Substation Associated With Cluster of Potential Generation	Level	Maximum MW of Potential Generation In each Level	Cost of Proxy Network Upgrades to accommodate MW Level of Potential Generation ($ millions in 2007 dollars)		Limiting elements	Proxy Transmission Facility description		
						Proxy Voltage Support Devices*		
			Proxy Voltage Support Devices*	Other Proxy Transm. upgrades		SVC Qmax (MVAR)	SVC Qmin (MVAR)	Other Proxy Transmission upgrades
Round Mt 230 kV	1	0	0	0	CPVSTA 230-CORTINA 230	0	0	
	2	800	56	768	TABLE MT 500-VACA-DIX 500	400	-267	Build new Round Mt-Table Mt 230 DCTL
	3	350	25	46	RD MT 1M 500-ROUND MT 230	175	-117	Build new Table Mt-Vaca Dixon 230 DCTL (230 kV config)
	4	850	60	245	TABLE MT 500-TESLA 500	425	-283	Build new 500/230 xformer
Stagg 230 kV	1	0	0	0	TESLA E 230-NEWARK D 230	0	0	
	2	750	53	294	STAGG 230-EIGHT MI 230	375	-250	Build new Tesla-Newark 230 DCTL
	3	250	18	10	STAGG-J2 230-TESLA E 230	125	-83	Reconductor Stagg-8Mile 230 DCTL
Summit Metering Station 115 kV	1	0	0	0	CHCGO PK 115-HIGGINS 115	0	0	
	2	250	18	287	RIO OSO 115-BRNSWKTP 115	125	-83	Build new Summit-Placer 230 DCTL
	3	250	18	94	RIO OSO 115-BRNSWCKP 115	125	-83	Reconductor Rio Oso-Brighton 230 DCTL
Table Mt 230 kV	1	0	0	0	TABLE MT 500-VACA-DIX 500	0	0	
	2	900	63	470	TABLE MT 500-TB MT 1M 500	450	-300	Build new Table Mt-Vaca Dixon 230 DCTL (230 kV config)
	3	100	7	46	TBL MT D 230-TBL MT E 230	50	-33	Build new 500/230 xformer
Tesla 230 kV	1	0	0	0	TESLA E 230-NEWARK D 230	0	0	
	2	1000	70	418	STOREY 2 230-WILSON 230	500	-333	Build new Sunol 500
Vaca Dixon 230 kV	1	0	0	0	VACA-DIX 230-PARKWAY 230	0	0	
	2	1000	70	378	STOREY 2 230-BORDEN 230	500	-333	Build new Collinsville 500

Table 5: 2010 TRCR
2014 Super Peak, Peak and Shoulder Periods where PG&E is the Purchaser

Substation Associated With Cluster of Potential Generation	Level	Maximum MW of Potential Generation In each Level	Cost of Proxy Network Upgrades to accommodate MW Level of Potential Generation ($ millions in 2007 dollars)		Limiting elements	Proxy Transmission Facility description		
						Proxy Voltage Support Devices*		
			Proxy Voltage Support Devices*	Other Proxy Transm. upgrades		SVC Qmax (MVAR)	SVC Qmin (MVAR)	Other Proxy Transmission upgrades
Wilson 230 kV	1	450	32	0	WARNERVL 230-WILSON 230	225	-150	
	2	500	35	28	WARNERVL 230-WRNRVLLE 115	250	-167	Reconductor Wilson-Warnerville 230 DCTL
	3	50	4	35	WARNERVL 230-COTTLE B 230	25	-17	Build new 230/115 xformer

Table 6: 2010 TRCR
2014 Night Periods where PG&E is the Purchaser

Substation Associated With Cluster of Potential Generation	Level	Maximum MW of Potential Generation In each Level	Cost of Proxy Network Upgrades to accommodate MW Level of Potential Generation ($ millions in 2007 dollars)		Limiting elements	Proxy Transmission Facility description		
						Proxy Voltage Support Devices*		
			Proxy Voltage Support Devices*	Other Proxy Transm. upgrades		SVC Qmax (MVAR)	SVC Qmin (MVAR)	Other Proxy Transmission upgrades
Bellota 230 kV	1	400	28	0	Wilson-Warnerville 230 DCTL	200	-133	
	2	500	35	28	Bellota-Cottle 230 DCTL	250	-167	Wilson-Warnerville 230 DCTL
	3	100	7	15		50	-33	Bellota-Cottle 230 DCTL
Caribou 230 kV	1	150	11	0	Caribou-Beldon-Table Mt 230 DCTL	75	-50	
	2	650	46	38	500/230 xformer	325	-217	Caribou-Beldon-Table Mt 230 DCTL
	3	200	14	46	500/230 xformer	100	-67	500/230 xformer
Carrizo Plains 115 kV	1	0	0	0	GATES 500-MIDWAY 500	0	0	
	2	500	35	1156	Midway-Temblor 230 kV	250	-167	C3ET Project
Cortina 230 kV	1	300	21	0	Cortina-Vaca Dixon 230 DCTL	150	-100	
	2	500	35	40	CPVSta-Cortina 230 DCTL	250	-167	Cortina-Vaca Dixon 230 DCTL
	3	200	14	59		100	-67	CPVSta-Cortina 230 DCTL
Cottonwood 230 kV	1	850	60	0	Olinda 500/230 V xformer	425	-283	
	2	250	18	46	Cottonwood-Round Mt 230 kV DCTL	125	-83	500/230 xformer
	3	200	14	24	Round Mt-Table Mt 230 DCTL	100	-67	Cottonwood-Round Mt 230 kV DCTL
	4	200	14	298	Round Mt 500/230 xformer	100	-67	Round Mt-Table Mt 230 DCTL
Delta Metering Station 115 kV	1	0	0	0	Delta-Cascade-Cottonwood 115 kV	0	0	
	2	500	35	318	Cottonwood 230/115 kV xformer	250	-167	Delta-Cottonwood 230 DCTL

Table 6: 2010 TRCR
2014 Night Periods where PG&E is the Purchaser

Substation Associated With Cluster of Potential Generation	Level	Maximum MW of Potential Generation In each Level	Cost of Proxy Network Upgrades to accommodate MW Level of Potential Generation ($ millions in 2007 dollars)		Limiting elements	Proxy Transmission Facility description		
			Proxy Voltage Support Devices*	Other Proxy Transm. upgrades		Proxy Voltage Support Devices* SVC Qmax (MVAR)	Proxy Voltage Support Devices* SVC Qmin (MVAR)	Other Proxy Transmission upgrades
Fulton 230 kV	1	300	21	0	Fulton-Lakeville 230	150	-100	
	2	450	32	37	FULTON 230-IGNACIO 230	225	-150	Fulton-Lakeville 230
	3	350	25	85	LAKEVILE 230-VACA-DIX 230	175	-117	Fulton-Ignacio 230
	4	400	28	163		200	-133	Lakeville-Vaca Dixon 230
Gates 230 kV	1	0	0	0	LOSBANOS 500-MIDWAY 500	0	0	
	2	500	35	1000	Los Banos-Westley 230 DCTL	250	-167	C3ET Project
	3	300	21	98	Tesla-Westley 230 DCTL	150	-100	Los Banos-Westley 230 DCTL
	4	200	14	17		100	-67	Tesla-Westley 230 DCTL
Gregg 230 kV	1	200	14	0	LOSBANOS 500-MIDWAY 500	100	-67	
	2	400	28	1000	WESTLEY 230-LOSBANOS 230	200	-133	C3ET Project
	3	400	28	98	LOSBANOS 500-GATES 500	200	-133	Los Banos-Westley 230 DCTL
Helm 230 kV	1	200	14	0	LOSBANOS 500-MIDWAY 500	100	-67	
	2	75	5	1000	HELM 230-MC CALL 230	38	-25	C3ET Project
	3	125	9	22	WESTLEY 230-LOSBANOS 230	63	-42	Helm-McCall 230
	4	600	42	98	TESLA 500-LOSBANOS 500	300	-200	Los Banos-Westley 230 DCTL
Humboldt 115 kV	1	0	0	0	Numerous 60 kV and 115 kV Facilities	0	0	
	2	500	35	383		250	-167	Cottonwood-Humboldt 230 kV DCTL
Los Banos 230 kV	1	100	7	0	WESTLEY 230-LOSBANOS 230	50	-33	
	2	475	33	98	TESLA 500-LOSBANOS 500	238	-158	Los Banos-Westley 230 DCTL
	3	425	30	101		213	-142	Tesla-Westley 230 DCTL
Metcalf 230 kV	1	1000	70	0	LS ESTRS 230-METCALF 230	500	-333	

Table 6: 2010 TRCR
2014 Night Periods where PG&E is the Purchaser

Substation Associated With Cluster of Potential Generation	Level	Maximum MW of Potential Generation In each Level	Cost of Proxy Network Upgrades to accommodate MW Level of Potential Generation ($ millions in 2007 dollars)		Limiting elements	Proxy Transmission Facility description		
						Proxy Voltage Support Devices*		
			Proxy Voltage Support Devices*	Other Proxy Transm. upgrades		SVC Qmax (MVAR)	SVC Qmin (MVAR)	Other Proxy Transmission upgrades
Midway 230 kV	1	0	0	0	Gates-Midway 500 kV and Los Banos-Midway 500 kV	0	0	
	2	600	42	1000	Los Banos-Westley 230 DCTL	300	-200	C3ET Project
	3	175	12	98	Tesla-Westley 230 DCTL	88	-58	Los Banos-Westley 230 DCTL
	4	1075	75	101	Midway 500/230 kV xformer	538	-358	Tesla-Westley 230 DCTL
	5	1150	81	46		575	-383	500/230 xformer
Morro Bay 230 kV	1	0	0	0	Gates-Midway 500 kV and Los Banos-Midway 500 kV	0	0	
	2	500	35	1000	GATES 230-MORROBAY 230	250	-167	C3ET Project
	3	50	4	98	WESTLEY 230-LOSBANOS 230	25	-17	Morro Bay-Gates DCTL (Templeton in between)
	4	225	16	98	TESLA 500-LOSBANOS 500	113	-75	Los Banos-Westley 230 DCTL
	5	725	51	101		363	-242	Tesla-Westley 230 DCTL
Newark 230 kV	1	1500	105	0	CASTROVL 230-NEWARK E 230	750	-500	
Panoche 230 kV	1	0	0	0	Panoche-McMullin-Kearney 230	0	0	
	2	325	23	26	Los Banos-Westley 230 DCTL	163	-108	Panoche-McMullin-Kearney 230
	3	675	47	98	TESLA 500-LOSBANOS 500	338	-225	Los Banos-Westley 230 DCTL
Pit 1 230 kV	1	175	12	0	Pit 3-Round Mt 230 DCTL	88	-58	
	2	50	4	10	Pit 1-Pit 3 230 DCTL	25	-17	Pit 3-Round Mt 230 DCTL
	3	575	40	10	Round Mt 500/230 kV xformer	288	-192	Pit 1-Pit 3 230 DCTL
	4	200	14	46		100	-67	500/230 xformer

Table 6: 2010 TRCR
2014 Night Periods where PG&E is the Purchaser

Substation Associated With Cluster of Potential Generation	Level	Maximum MW of Potential Generation In each Level	Cost of Proxy Network Upgrades to accommodate MW Level of Potential Generation ($ millions in 2007 dollars)		Limiting elements	Proxy Transmission Facility description		
						Proxy Voltage Support Devices*		
			Proxy Voltage Support Devices*	Other Proxy Transm. upgrades		SVC Qmax (MVAR)	SVC Qmin (MVAR)	Other Proxy Transmission upgrades
Rio Oso 230 kV	1	1000	70	0	RIO OSO 230-BRIGHTON 230	500	-333	
Round Mt 230 kV	1	600	42	0	Round Mt 500/230 kV xformer	300	-200	
	2	1400	98	46		700	-467	500/230 xformer
Stagg 230 kV	1	650	46	0	STAGG 230-STAGG-H 230	325	-217	
	2	350	25	10		175	-117	Stagg-8Mile 230 DCTL
Summit Metering Station 115 kV	1	75	5	0	CHCGO PK 115-HIGGINS 115	38	-25	
	2	425	30	287	RIO OSO 115-BRNSWKTP 115	213	-142	Summit-Placer 230 DCTL
Table Mt 230 kV	1	800	56	0	Table Mt 500/230 kV xformer	400	-267	
	2	200	14	46				500/230 xformer
Tesla 230 kV	1	1000	70	0		500	-333	
Vaca Dixon 230 kV	1	1000	70	0		500	-333	
Wilson 230 kV	1	700	49	0	Gregg-Borden-Storey 230 DCTL			
	2	50	4	12	Wilson-Storey 230 DCTL			Gregg-Borden-Storey 230 DCTL
	3	250	18	43	WESTLEY 230-LOSBANOS 230			Wilson-Storey 230 DCTL

Table 7: 2010 TRCR
2014 Super Peak, Peak and Shoulder Periods where SCE or SDG&E is the Purchaser

Substation Associated With Cluster of Potential Generation		Maximum MW of Potential Generation In each Level	Cost of Proxy Network Upgrades to accommodate MW Level of Potential Generation ($ millions in 2007 dollars)		Limiting elements	Proxy Transmission Facility description		
			Proxy Voltage Support Devices*	Other Proxy Transm. upgrades		Proxy Voltage Support Devices* SVC Qmax (MVAR)	SVC Qmin (MVAR)	Other Proxy Transmission upgrades
Bellota 230 kV	1	1000	70	0	BELLOTA 230-COTTLE B 230	500	-333	
Caribou 230 kV	1	0	0	0	Caribou-Beldon-Table Mt 230 DCTL and Table Mt - Vaca 500 kV	0	0	
	2	950	67	508		475	-317	Caribou-Beldon-Table Mt 230 DCTL and Table Mt-Vaca Dixon 230 DCTL (230 kV config)
Carrizo Plains 115 kV	1	0	0	0	San Luis Obispo - Carrizo 115 kV	50	-33	
	2	310	22	156	Midway - Temblor 115 kV	200	-133	Midway-Carizo 230
Cortina 230 kV	1	350	25	0	CORTINA 230-VACA-DIX 230	175	-117	
	2	450	32	40	CPVSTA 230-VACA-DIX 230	225	-150	Cortina-Vaca Dixon 230 DCTL
	3	200	14	59	HPLND JT 60-CLVRDLJT 60	100	-67	CPVSta-Cortina 230 DCTL
Cottonwood 230 kV	1	0	0	0	TABLE MT 500-VACA-DIX 500	0	0	
	2	275	19	283	ROUND MT 500-TABLE MT 500	138	-92	Table Mt-Vaca Dixon 230 SCTL (500 kV config)
	3	725	51	298	OLINDA 500-OLINDAW 230	363	-242	Round Mt-Table Mt 230 DCTL
	4	500	35	46	COTWD_F 230-COTWDWAP 230	250	-167	500/230 xformer
Delta Metering Station 115 kV	1	0	0	0	Delta-Cascade-Cottonwood 115 kV	0	0	
	2	500	35	318		250	-167	Delta-Cottonwood 230 DCTL

Table 7: 2010 TRCR
2014 Super Peak, Peak and Shoulder Periods where SCE or SDG&E is the Purchaser

Substation Associated With Cluster of Potential Generation		Maximum MW of Potential Generation In each Level	Cost of Proxy Network Upgrades to accommodate MW Level of Potential Generation ($ millions in 2007 dollars)		Limiting elements	Proxy Transmission Facility description		
			Proxy Voltage Support Devices*	Other Proxy Transm. upgrades		Proxy Voltage Support Devices*		Other Proxy Transmission upgrades
						SVC Qmax (MVAR)	SVC Qmin (MVAR)	
Fulton 230 kV	1	450	32	0	Fulton-Lkaeville 230 kV	225	-150	
	2	150	11	37	FULTON 230-IGNACIO 230	75	-50	Fulton-Lakeville 230
	3	500	35	85	CROCKETT 230-SOBRANTE 230	250	-167	Fulton-Ignacio 230
	4	300	21	258	FULTON 230-FULTON 115	150	-100	Crocket-Sobrante 230 DCTL
	5	100	7	35		50	-33	230/115 xformer
Gates 230 kV	1	960	67	0	Gates 500/230 kV xformer	500	-333	
Gregg 230 kV	1	0	0	0	BORDEN 230-GREGG 230	0	0	
	2	300	21	4	STOREY 2 230-BORDEN 230	150	-100	Borden-Gregg 230 DCTL
	3	400	28	7	STOREY 1 230-WILSON 230	200	-133	Storey-Borden 230 DCTL
	4	200	14	43	WARNERVL 230-WILSON 230	100	-67	Wilson-Storey 230 DCTL
	5	75	5	28	KEARNEY 230-HERNDON 230	38	-25	Wilson-Warnerville 230 DCTL
	6	25	2	23	GREGG 230-HERNDON 230	13	-8	Herndon-Kearney 230 DCTL
Helm 230 kV	1	125	9	0	Helm - Shindler 70 kV	63	-42	
	2	650	46	18	HELM 230-MC CALL 230	325	-217	Panoche-Helm 230
	3	225	16	22	PANOCHE 230-HELM 230	113	-75	Helm-McCall 230
Humboldt 115 kV	1	0	0	0	Numerous 115 kV Facilities between Humboldt - Cottonwood	0	0	
	2	375	26	383	ROUND MT 500-TABLE MT 500	188	-125	Cottonwood-Humboldt 230 kV DCTL
	3	125	9	298		63	-42	Round Mt-Table Mt 230 DCTL
Los Banos 230 kV	1	875	61	0	WESTLEY 230-LOSBANOS 230	438	-292	
	2	125	9	98	GATES 500-MIDWAY 500	63	-42	Los Banos-Westley 230 DCTL

Table 7: 2010 TRCR
2014 Super Peak, Peak and Shoulder Periods where SCE or SDG&E is the Purchaser

Substation Associated With Cluster of Potential Generation		Maximum MW of Potential Generation In each Level	Cost of Proxy Network Upgrades to accommodate MW Level of Potential Generation ($ millions in 2007 dollars)		Limiting elements	Proxy Transmission Facility description		
			Proxy Voltage Support Devices*	Other Proxy Transm. upgrades		Proxy Voltage Support Devices*		Other Proxy Transmission upgrades
						SVC Qmax (MVAR)	SVC Qmin (MVAR)	
Metcalf 230 kV	1	1000	70	0	GATES 500-MIDWAY 500	500	-333	
Midway 230 kV	1	1135	79	0	Midway 500/230 kV xformer	638	-425	
	2	1725	121	46		863	-575	500/230 xformer
Morro 230 kV	1	825	58	0	GATES 230-MORROBAY 230	413	-275	
	2	200	14	98	Morro Bay - Midway 230 kV	100	-67	Morro Bay-Gates DCTL (Templeton in between)
	3	475	33	114		238	-158	Morro Bay-Midway 230 DCTL
Newark 230 kV	1	1,275	89	0	NWK DIST 230-LS ESTRS 230	638	-425	
	2	125	9	49	NEWARK E 230-NWK DIST 230	63	-42	Newark-Newark Dist 230 DCTL
	3	100	7	292	GATES 500-MIDWAY 500	50	-33	Newark-Los Esteros 230 DCTL
Panoche 230 kV	1	770	54	0		500	-333	
Pit 1 230 kV	1	0	0	0	TABLE MT 500-VACA-DIX 500	0	0	
	2	325	23	283	Pit 1 - Pit 3 230 kV	163	-108	Table Mt-Vaca Dixon 230 SCTL (500 kV config)
	3	75	5	10	Pit 3 - Round Mt 230 kV	38	-25	Pit 1-Pit 3 230 DCTL
	4	600	42	10	Round Mt 500/230 kV xformer	300	-200	Pit 3-Round Mt 230 DCTL
Rio Oso 230 kV	1	0	0	0	RIO OSO 230-ATLANTC 230	0	0	
	2	250	18	61	RIO OSO 230-BRIGHTON 230	125	-83	Rio Oso-Atlantic 230 DCTL
	3	200	14	94	ATLANTC 230-GOLDHILL 230	100	-67	Rio Oso-Brighton 230 DCTL
	4	550	39	38		275	-183	Atlantic-Goldhill 230 DCTL
Round Mt	1	0	0	0	TABLE MT 500-VACA-DIX 500	0	0	

Table 7: 2010 TRCR
2014 Super Peak, Peak and Shoulder Periods where SCE or SDG&E is the Purchaser

Substation Associated With Cluster of Potential Generation		Maximum MW of Potential Generation In each Level	Cost of Proxy Network Upgrades to accommodate MW Level of Potential Generation ($ millions in 2007 dollars)		Limiting elements	Proxy Transmission Facility description		
			Proxy Voltage Support Devices*	Other Proxy Transm. upgrades		Proxy Voltage Support Devices* SVC Qmax (MVAR)	Proxy Voltage Support Devices* SVC Qmin (MVAR)	Other Proxy Transmission upgrades
230 kV	2	150	11	470	ROUND MT 500-TABLE MT 500	75	-50	Table Mt-Vaca Dixon 230 DCTL (230 kV config)
	3	675	47	298	Round Mt 500/230 kV xformer	338	-225	Round Mt-Table Mt 230 DCTL
	4	325	23	46	TABLE MT 500-TESLA 500	163	-108	500/230 xformer
	5	850	60	245		425	-283	Vaca Dixon-Tesla 230 DCTL
Stagg 230 kV	1	750	53	0	STAGG 230-STAGG-H 230	375	-250	
	2	250	18	10		125	-83	Stagg-8Mile 230 DCTL
Summit Metering Station 115 kV	1	0	0	0	Summit - Drum - Placer 115 kV	0	0	
	2	250	18	287	RIO OSO 230-BRIGHTON 230	125	-83	Summit-Placer 230 DCTL
	3	250	18	94		125	-83	Rio Oso-Brighton 230 DCTL
Table Mt 230 kV	1	0	0	0	TABLE MT 500-VACA-DIX 500	0	0	
	2	900	63	470	Table Mt 500/230 kV xformer	450	-300	Table Mt-Vaca Dixon 230 DCTL (230 kV config)
	3	50	4	46	TABLE MT 500-TESLA 500	25	-17	500/230 xformer
	4	50	4	245	TBL MTX1 230-TBL MT E 230	25	-17	Vaca Dixon-Tesla 230 DCTL
Tesla 230 kV	1	1,000	70	0	TESLA E 230-WESTLEY 230	500	-333	
Vaca Dixon 230 kV	1	0	0	0	VACA-DIX 230-BAHIA 230	0	0	
	2	1,000	70	245	C.COSTA 230-WND MSTR 230	500	-333	Vaca Dixon-Tesla 230 DCTL
Wilson 230 kV	1	500	35	0	WARNERVL 230-WILSON 230	250	-167	
	2	500	35	28		250	-167	Wilson-Warnerville 230 DCTL

Table 8: 2010 TRCR
2014 Night Periods where SCE or SDG&E is the Purchaser

Substation Associated With Cluster of Potential Generation	Level	Maximum MW of Potential Generation In each Level	Cost of Proxy Network Upgrades to accommodate MW Level of Potential Generation ($ millions in 2007 dollars)		Limiting elements	Proxy Transmission Facility description		
						Proxy Voltage Support Devices*		
			Proxy Voltage Support Devices*	Other Proxy Transm. upgrades		SVC Qmax (MVAR)	SVC Qmin (MVAR)	Other Proxy Transmission upgrades
Bellota 230 kV	1	400	28	0	WARNERVL 230-WILSON 230	200	-133	
	2	525	37	28	BELLOTA 230-COTTLE B 230	263	-175	Wilson-Warnerville 230 DCTL
	3	75	5	15	WARNERVL 230-COTTLE B 230	38	-25	Bellota-Cottle 230 DCTL
Caribou 230 kV	1	150	11	0	Caribou - Table Mt 230 kV	75	-50	
	2	650	46	38	TABLE MT 500-TB MT 1M 500	325	-217	Caribou-Beldon-Table Mt 230 DCTL
Carrizo Plains 115 kV	1	25	2	0	San Luis Obispo - Carrizo 115 kV	13	-8	
	2	475	33	156	Midway - Temblor 115 kV	238	-158	Midway-Carizo 230
Cortina 230 kV	1	325	23	0	CORTINA 230-CORTINA 115	163	-108	
	2	125	9	35	CPVSTA 230-CORTINA 230	63	-42	Cortina 230/115 kV xformer
	3	475	33	59	CORTINA 230-VACA-DIX 230	238	-158	CPVSta-Cortina 230 DCTL
	4	75	5	40	GYSRJCT1 60-FTCHMTNP 60	38	-25	Cortina-Vaca Dixon 230 DCTL
Cottonwood 230 kV	1	875	61	0	OLINDA 500-OLINDAW 230	438	-292	

Table 8: 2010 TRCR
2014 Night Periods where SCE or SDG&E is the Purchaser

Substation Associated With Cluster of Potential Generation	Level	Maximum MW of Potential Generation In each Level	Cost of Proxy Network Upgrades to accommodate MW Level of Potential Generation ($ millions in 2007 dollars)		Limiting elements	Proxy Transmission Facility description		
						Proxy Voltage Support Devices*		
			Proxy Voltage Support Devices*	Other Proxy Transm. upgrades		SVC Qmax (MVAR)	SVC Qmin (MVAR)	Other Proxy Transmission upgrades
	2	225	16	46	COTWD_E 230-ROUND MT 230	113	-75	500/230 xformer
	3	200	14	24	RD MT 1M 500-ROUND MT 230	100	-67	Cottonwood-Round Mt 230 kV DCTL
	4	200	14	298		100	-67	Round Mt-Table Mt 230 DCTL
Delta Metering Station 115 kV	1	0	0	0	DELTA 115-CASCADE 115	0	0	
	2	500	35	318	ANDERSON 60-COTTONWD 60	250	-167	Delta-Cottonwood 230 DCTL
Fulton 230 kV	1	325	23	0	Fulton - Lakeville 230 kV	163	-108	
	2	325	23	37	FULTON 230-IGNACIO 230	163	-108	Fulton-Lakeville 230
	3	475	33	85	LAKEVILE 230-VACA-DIX 230	238	-158	Fulton-Ignacio 230
	4	375	26	26	SNTA RSA 115-STNY PTP 115	188	-125	Lakeville-Vaca Dixon 230
Gates 230 kV	1	0	0	0	McCall-Henrietta-Gates 230 kV	0	0	
	2	1,000	70	65		500	-333	Gates-Henreitta 230
Gregg 230 kV	1	1,000	70	0		500	-333	

Table 8: 2010 TRCR
2014 Night Periods where SCE or SDG&E is the Purchaser

Substation Associated With Cluster of Potential Generation	Level	Maximum MW of Potential Generation In each Level	Cost of Proxy Network Upgrades to accommodate MW Level of Potential Generation ($ millions in 2007 dollars)		Limiting elements	Proxy Transmission Facility description		
						Proxy Voltage Support Devices*		
			Proxy Voltage Support Devices*	Other Proxy Transm. upgrades		SVC Qmax (MVAR)	SVC Qmin (MVAR)	Other Proxy Transmission upgrades
Helm 230 kV	1	250	18	0	HELM 230-MC CALL 230	125	-83	
	2	750	53	22	WESTLEY 230-LOSBANOS 230	375	-250	Helm-McCall 230
Humboldt 115 kV	1	0	0	0	Numerous 115 kV and 60 kV lines	0	0	
	2	500	35	383		250	-167	Cottonwood-Humboldt 230 kV DCTL
Los Banos 230 kV	1	1,000	70	0		500	-333	
Metcalf 230 kV	1	1,000	70	0		500	-333	
Midway 230 kV	1	1,725	121	0	MIDWAY 500-MIDWAY 230	863	-575	
	2	1,275	89	46		638	-425	Midway 500/230 kV xformer
Morro 230 kV	1	500	35	0	Morro Bay_Gates 230 kV DCTL	250	-167	
	2	1,000	70	98		500	-333	Morro Bay-Gates DCTL (Templeton in between)
Newark 230 kV	1	1,500	105	0		750	-500	

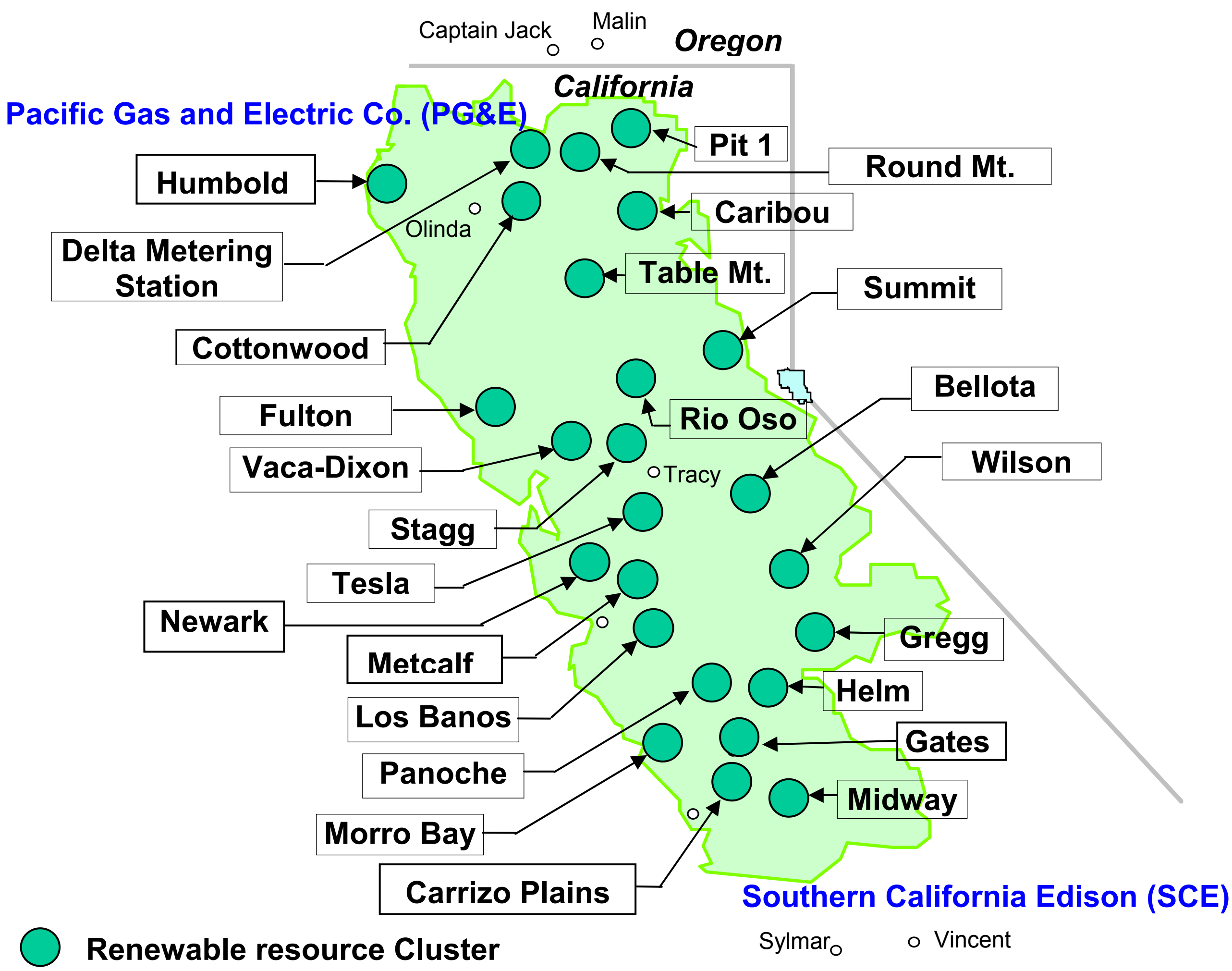
Table 8: 2010 TRCR
2014 Night Periods where SCE or SDG&E is the Purchaser

Substation Associated With Cluster of Potential Generation	Level	Maximum MW of Potential Generation In each Level	Cost of Proxy Network Upgrades to accommodate MW Level of Potential Generation ($ millions in 2007 dollars)		Limiting elements	Proxy Transmission Facility description		
						Proxy Voltage Support Devices*		
			Proxy Voltage Support Devices*	Other Proxy Transm. upgrades		SVC Qmax (MVAR)	SVC Qmin (MVAR)	Other Proxy Transmission upgrades
Panoche 230 kV	1	0	0	0	HENRIETA 230-HENRITTA 70	0	0	
	2	700	49	84	KEARNEY 230-HERNDON 230	350	-233	230/115 xformer
	3	300	21	98	Panoche-McMullen-Kearney 230 kV	150	-100	Herndon-Kearney and Panoche-McMullin-Kearney 230 kV DCTL
Pit 1 230 kV	1	175	12	0	PIT 3 230-ROUND MT 230	88	-58	
	2	50	4	10	Pit 1 - Pit 3 230	25	-17	Pit 3-Round Mt 230 DCTL
	3	575	40	10	RD MT 1M 500-ROUND MT 230	288	-192	Pit 1-Pit 3 230 DCTL
	4	200	14	46		100	-67	500/230 xformer
Rio Oso 230 kV	1	1,000	70	0	RIO OSO 230-BRIGHTON 230	500	-333	
Round Mt 230 kV	1	600	42	0	RD MT 1M 500-ROUND MT 230	300	-200	
	2	1,400	98	46	OLINDA 500-OLINDAW 230	700	-467	Round Mt 500/230 kV xformer
Stagg 230 kV	1	0	0	0	STAGG 230-STAGG-H 230	0	0	
	2	650	46	10		325	-217	Stagg-8Mile 230 DCTL

Table 8: 2010 TRCR
2014 Night Periods where SCE or SDG&E is the Purchaser

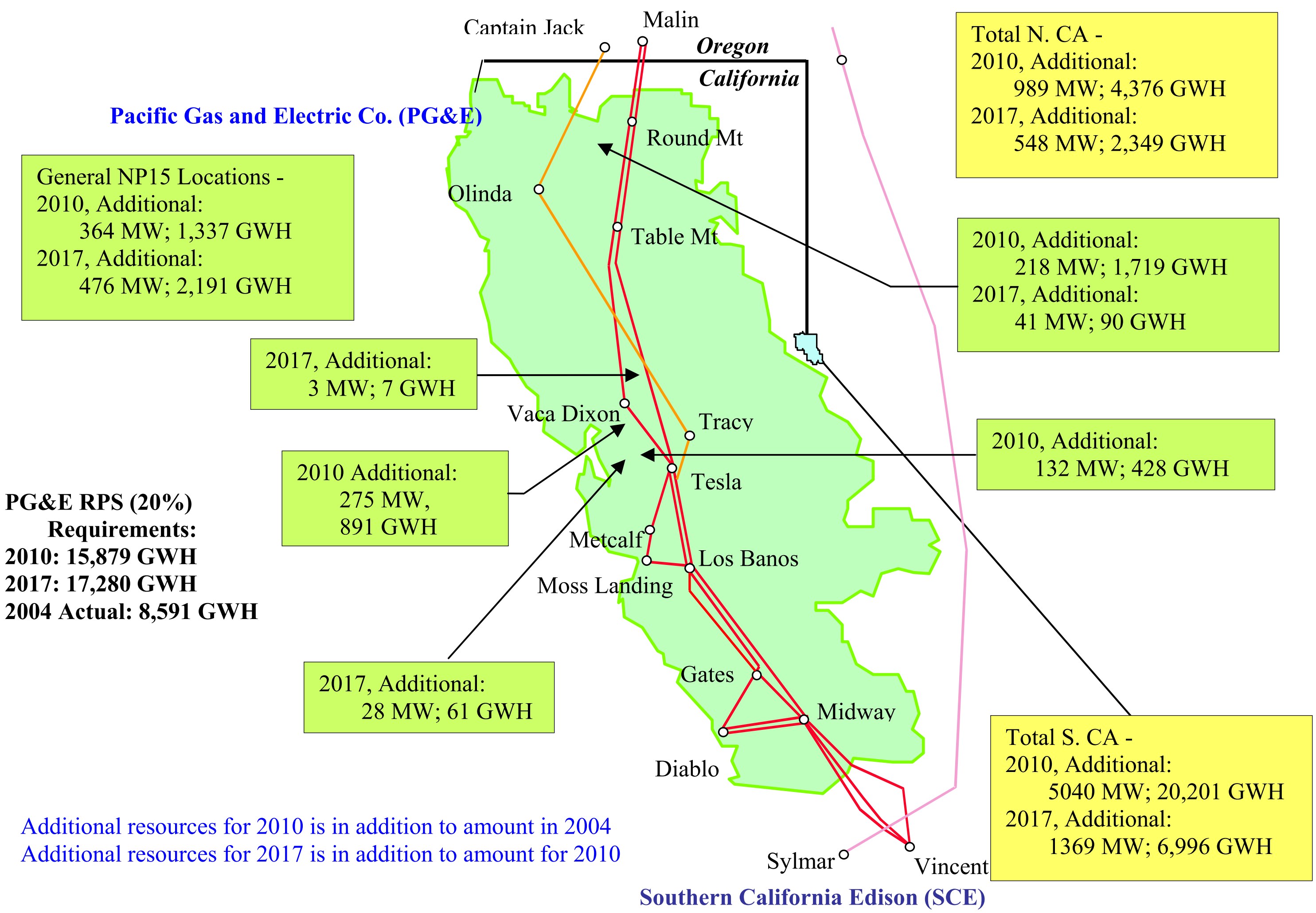
Substation Associated With Cluster of Potential Generation	Level	Maximum MW of Potential Generation In each Level	Cost of Proxy Network Upgrades to accommodate MW Level of Potential Generation ($ millions in 2007 dollars)		Limiting elements	Proxy Transmission Facility description		
			Proxy Voltage Support Devices*	Other Proxy Transm. upgrades		Proxy Voltage Support Devices* SVC Qmax (MVAR)	Proxy Voltage Support Devices* SVC Qmin (MVAR)	Other Proxy Transmission upgrades
Summit Metering Station 115 kV	1	75	5	0	Numerous 115 kV lines between Summit, Drum, Placer and Rio Oso	38	-25	
	2	425	30	287		213	-142	Summit-Placer 230 DCTL
Table Mt 230 kV	1	800	56	0	TB MT 1M 500-TBL MTX1 230	400	-267	
	2	200	14	46		100	-67	Table Mt 500/230 kV xformer
Tesla 230 kV	1	1,000	70	0	TESLA E 230-TESLA D 230	500	-333	
Vaca Dixon 230 kV	1	1,000	70	0	Vaca Dixen 500/2330 kV xformer	500	-333	Vaca Dixen 500/230 kV xformer
Wilson 230 kV	1	625	44	0	STOREY 1 230-GREGG 230	313	-208	
	2	50	4	12	STOREY 1 230-WILSON 230	25	-17	Gregg-Borden-Storey 230 DCTL
	3	325	23	43		163	-108	Wilson-Storey 230 DCTL

Exhibit 1
PG&E Substations Associated with Renewable Resource Clusters for 2010 TRCR



Exhbit 2

Renewable Resource Potential based on CEC Consultant Draft Report on Strategic Value Analysis, CEC-500-2005-106 (7/1/05 workshop)



VERIFICATION

I am an employee of Pacific Gas And Electric Company, a corporation, and am authorized to make this verification on its behalf. I have read the foregoing "Draft 2010 Transmission Ranking Cost Report of Pacific Gas and Electric Company (U 39-E) for Renewables Portfolio Standard Procurement" dated January 20, 2010. The statements in the foregoing document are true of my own knowledge, except as to matters which are therein stated on information and belief, and as to those matters I believe them to be true.

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

Executed on this 20th day of January, 2010 at San Francisco, California

/s/

Jon Eric Thalman
Pacific Gas and Electric Company

CERTIFICATE OF SERVICE BY ELECTRONIC MAIL OR U.S. MAIL

I, the undersigned, state that I am a citizen of the United States and am employed in the City and County of San Francisco; that I am over the age of eighteen (18) years and not a party to the within cause; and that my business address is Pacific Gas and Electric Company, Law Department B30A, 77 Beale Street, San Francisco, CA 94105.

I am readily familiar with the business practice of Pacific Gas and Electric Company for collection and processing of correspondence for mailing with the United States Postal Service. In the ordinary course of business, correspondence is deposited with the United States Postal Service the same day it is submitted for mailing.

On the 20th day of January 2010, I served a true copy of:

DRAFT 2010 TRANSMISSION RANKING COST REPORT OF PACIFIC GAS AND ELECTRIC COMPANY (U 39-E) FOR RENEWABLES PORTFOLIO STANDARD PROCUREMENT

[XX] By Electronic Mail – serving the enclosed via e-mail transmission to each of the parties listed on the official service list for R.08-08-009 with an e-mail address.

[XX] By U.S. Mail – by placing the enclosed for collection and mailing, in the course of ordinary business practice, with other correspondence of Pacific Gas and Electric Company, enclosed in a sealed envelope, with postage fully prepaid, addressed to those parties listed on the official service list for R.08-08-009 without an e-mail address.

I certify and declare under penalty of perjury under the laws of the State of California that the foregoing is true and correct.

Executed on this 20th day of January 2010 at San Francisco, California.

/s/

AMY S. YU