BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF CALIFORNIA

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Order Instituting Rulemaking to Continue Implementation and Administration of California Renewables Portfolio Standard Program.	Rulemaking 06-05-027 (Filed May 25, 2006)

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

Pacific Gas and Electric Company ("PG&E") files the attached report, entitled "2008 Transmission Ranking Cost Report Of Pacific Gas and Electric Company" in compliance with the Assigned Commissioner Ruling and Scoping Memo dated June 15, 2007, and further revised schedule issued by Administrative Law Judge Mattson on August 23, 2007.

Respectfully submitted,

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2008 TRANSMISSION RANKING COST REPORT OF PACIFIC GAS AND ELECTRIC COMPANY

I. INTRODUCTION

In compliance with the Ruling and in support of California's RPS Program, PG&E has initiated its renewable resource procurement process for 2008. This effort included sending a letter on August 1, 2007, requesting initial information for its 2008 RPS solicitation process. Following the practice used and approved for prior Transmission Ranking Cost Reports (TRCRs), PG&E utilized the information that it received in response to this letter to guide its selection of the clusters to be studied in the development of its 2008 TRCR.

This 2008 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 Renewable Portfolio Standard ("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 2008 RPS procurement solicitation.

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 2008 TRCR, as with prior TRCRs, are neither intended nor calculated for any other purpose and cannot 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 2008 RPS procurement solicitation from PG&E.
- PG&E will use the transmission cost estimates in the 2008 TRCR as a factor in evaluating and ranking the bids it receives through the 2008 RPS solicitation. 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].

[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. SB 107, enacted by the California Legislature in 2006, that goal was accelerated to 20% of retail sales from renewable energy deliveries by 2010.

[2] Other commercial arrangements may be used in bid evaluation, as specified in PG&E's 2007 RPS Solicitation Protocol. However, such alternative arrangements are beyond the scope of the TRCR.

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

It is important to note that 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 will have to apply for interconnection with the California Independent System Operator Corporation ("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 2008 RPS solicitation process will not have initiated 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.

As in the 2004, 2005, 2006, and 2007 TRCRs, which were filed on June 23, 2004, August 3, 2005, March 15, 2006 and November 8, 2006, respectively, the cost estimates presented in this 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, 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[3/] 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 ("SCE") on March 16, 2005 and April 17, 2006, and PG&E's 2006 Electric Grid Expansion Plan.).

Base Cases.

- The 2012 Summer Peak and Summer Off Peak base cases were developed from the power flow cases that were prepared for the 2007 PG&E Area Assessment Studies to develop PG&E's 2007 Transmission Expansion Plan and represents 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 2012. These base cases were reviewed and approved by the CAISO. These base cases were then modified to reflect the transmission projects approved as of August 2007, 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 and 2007 Renewables Solicitations as of August 2007. For the 2012 Summer Off Peak base case, the Path 15 south-north flow was modeled at its WECC Accepted Path Rating of 5,400 MW.

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 result of 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, 2004, 2005, 2006 and 2007.

Clusters.

- The PG&E study performed to develop the TRCR assumed that energy from the renewable resources locations identified would be delivered as part of each

[3/] "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.

"cluster" at Bellota, Caribou, Cottonwood, Delta Metering Station, Fulton, Gates, Gregg, Helm, Los Banos, 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.).

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.[4/] 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 depend on the number of proxy network upgrades reasonably expected to be necessary to accommodate the anticipated total amount of renewable resources in each cluster.

2. Overview of Tables.

The Transmission Ranking Costs 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.[5/] The separation of transmission costs into these periods may allow a potential

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[4/] Costs are equal to the total capital cost of the proxy transmission network upgrade project and are stated in 2007 constant dollars. Net present value ("NPV") amounts of each alternative would differ.

[5/] Definitions:
Super-Peak (5x8) = HE (Hours Ending) 13 - 20, Monday - Friday (*except* NERC holidays).
Shoulder = HE 7 - 12, 21 and 22, Monday - Friday (*except* North American Electric Reliability Council ("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.

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.

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

Round Mountain – Table Mountain 500 kV line

Table Mountain - Vaca-Dixon 500 kV line

Los Banos – Gates – Midway 500 kV line

Note that some facilities, which were identified as subject to congestion in the 2006 and 2007 TRCR, are no longer so identified due to transmission upgrades that were proposed in PG&E's 2005 and 2006 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

Vaca Dixon – Tulucay 230 kV line

PG&E will continue to identify transmission projects that are needed for multiple purposes in its 2006 Expansion Plan (for example, transmission reinforcements that would be needed to maintain system reliability and to accommodate renewable resources). PG&E expects to release its 2007 Expansion Plan in December 2007. As transmission projects that will be identified in the 2007 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 ISO and PG&E Management before the 2008 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

2008 Transmission Ranking Cost for Study Year 2012 for Potential Generation Assuming PG&E is the Purchaser

Substation Associated With Cluster of Potential Generation	Level	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 2007 dollars)		Annual Carrying Charges*** ($ millions in 2007 dollars)		Maximum MW of Potential Generation in each Level	Cost of Proxy Network Upgrades to accommodate MW Level of Potential Generation ($ millions in 2007 dollars)		Annual Carrying Charges*** ($ millions in 2007 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	1,000	65	0	15.9	12.2	0	0	0	0.0	0.0
	2						1,000	65	25		
Caribou 230 kV	1	0	0	0	0.0	0.0	150	10	0	2.4	1.8
	2	50	3	327	81.0	61.9	700	46	171	53.2	40.6
	3	1,000	65	33	24.2	18.4	150	10	39	12.0	9.1
Cottonwood 230 kV	1	0	0	0	0.0	0.0	800	52	0	12.8	9.7
	2	1,000	65	266	81.1	62.0	200	13	39	12.8	9.7
Delta Metering Station 115 kV (PP&L)	1	0	0	0	0.0	0.0	0	0	0	0.0	0.0
	2	300	20	18	9.1	6.9	300	20	18	9.1	6.9
Fulton 230 kV	1	750	49	0	12.0	9.1	300	20	0	4.8	3.7
	2						200	13	16	7.2	5.5
										0.0	0.0
Gates 230 kV	1	1,000	65	0	15.9	12.2	0	0	0	0.0	0.0
	2						900	59	1,000	259.7	198.3
	3						350	23	89	27.3	20.9
Gregg 230 kV	1	0	0	0	0.0	0.0	1,000**	65	0	15.9	12.2
	2	450	29	4	8.1	6.2					
	3	250	16	3	4.8	3.6					
	4	50	3	40	10.5	8.0					
	5	250	16	21	9.1	6.9					
Helm Sub 230 kV	1	250	16	0	4.0	3.0	300	20	0	4.8	3.7
	2	300	20	16	8.8	6.7	300	20	20	9.6	7.3

* 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					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 2007 dollars)		Annual Carrying Charges*** ($ millions in 2007 dollars)		Maximum MW of Potential Generation in each Level	Cost of Proxy Network Upgrades to accommodate MW Level of Potential Generation ($ millions in 2007 dollars)		Annual Carrying Charges*** ($ millions in 2007 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
Los Banos 230 kV	1	750	49	0	12.0	9.1	400	26	0	6.4	4.9
	2						800	52	89	34.5	26.4
Midway 230 kV	1	1,400	91	0	22.3	17.1	0	0	0	0.0	0.0
	2	2,600	169	39	51.0	39.0	1,250	81	1,000	265.2	202.6
Morro Bay 230 kV	1	250	16	0	4.0	3.0	0	0	0	0.0	0.0
	2	750	49	43	22.5	17.2	500	33	1,000	253.3	193.5
	3						500	33	43	18.5	14.1
Newark 230 kV	1	500	33	0	8.0	6.1	1,000	65	0	15.9	12.2
Panoche 230 kV	1	1,000	65	0	15.9	12.2	0	0	0	0.0	0.0
	2						600	39	23	15.2	11.6
	3						800	52	89	34.5	26.4
Pit 230 kV	1	200	13	0	3.2	2.4	150	10	0	2.4	1.8
	2	50	3	336	83.3	63.7	50	3	9	3.1	2.4
	3	700	46	18	15.7	12.0	300	20	45	15.7	12.0
	4	700	46	9	13.4	10.2	700	46	39	20.7	15.8
Rio Oso 230 kV	1	0	0	0	0.0	0.0	1,000	65	0	15.9	12.2
	2	350	23	9	7.8	6.0					
	3	250	16	6	5.4	4.1					
Round Mt 230 kV	1	0	0	0	0.0	0.0	600	39	0	9.6	7.3
	2	200	13	327	83.4	63.7	1,200	78	39	28.7	21.9
	3	700	46	266	76.4	58.3					
	4	250	16	39	13.6	10.4					
Stagg 230 kV	1	700	46	0	11.2	8.5	700	46	0	11.2	8.5
Summit Metering Station 115kV	1	0	0	0	0.0	0.0	50	3	0	0.8	0.6
	2	200	13	25	9.3	7.1	700	46	25	17.3	13.2

* 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					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 2007 dollars)		Annual Carrying Charges*** ($ millions in 2007 dollars)		Maximum MW of Potential Generation in each Level	Cost of Proxy Network Upgrades to accommodate MW Level of Potential Generation ($ millions in 2007 dollars)		Annual Carrying Charges*** ($ millions in 2007 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
Table Mt 230 kV	1	0	0	0	0.0	0.0	850	55	0	13.6	10.4
	2	900	59	327	94.6	72.3					
Tesla 230 kV	1	2,000	130	0	31.9	24.4	2,000	130	0	31.9	24.4
Vaca Dixon 230 kV	1	0	0	0	0.0	0.0	1,000	65	0	15.9	12.2
	2	1,000	65	221	70.2	53.7					
Wilson 230 kV	1	400	26	0	6.4	4.9	500**	33	0	8.0	6.1
	2	75	5	16	5.2	4.0					
	3	125	8	2	2.4	1.9					

* 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

2008 Transmission Ranking Cost for Study Year 2012 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)

		Peak and Shoulder Year Round					Night Year Round				
			Cost of Proxy Network Upgrades to accommodate MW Level of Potential Generation ($ millions in 2007 dollars)		Annual Carrying Charges*** ($ millions in 2007 dollars)			Cost of Proxy Network Upgrades to accommodate MW Level of Potential Generation ($ millions in 2007 dollars)		Annual Carrying Charges*** ($ millions in 2007 dollars)	
Level		Maximum MW of Potential Generation In each Level	Proxy Voltage Support Devices*	Other Proxy Transmission upgrades	Based on 10 year contract life	Based on 20 year contract life	Maximum MW of Potential Generation In each Level	Proxy Voltage Support Devices*	Other Proxy Transmission upgrades	Based on 10 year contract life	Based on 20 year contract life
Bellota 230 kV	1	1,000	65	0	15.9	12.2	0	0	0	0.0	0.0
	2						1,000	65	25	22.1	16.9
Caribou 230 kV	1	0	0	0	0.0	0.0	150	10	0	2.4	1.8
	2	50	3	327	81.0	61.9	700	46	171	53.2	40.6
	3	1,000	65	33	24.2	18.4	150	10	39	12.0	9.1
Cottonwood 230 kV	1	0	0	0	0.0	0.0	800	52	0	12.8	9.7
	2	1,000	65	266	81.1	62.0	200	13	39	12.8	9.7
Delta Metering Station 115 kV (PP&L)	1	0	0	0	0.0	0.0	0	0	0	0.0	0.0
	2	300	20	18	9.1	6.9	300	20	18	9.1	6.9
Fulton 230 kV	1	1,000	65	0	15.9	12.2	300	20	0	4.8	3.7
	2						200	0	16	4.0	3.0
Gates 230 kV	1	1,000	65	0	15.9	12.2	0	0	0	0.0	0.0
	2						1,000	65	45	26.9	20.5
Gregg 230 kV	1	0	0	0	0.0	0.0	1,000**	65	0	15.9	12.2
	2	500	33	4	8.9	6.8					
	3	400	26	3	7.1	5.5					
	4	200	13	23	8.9	6.8					
	5	100	7	35	10.3	7.9					

* 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.

Level		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 2007 dollars)		Annual Carrying Charges*** ($ millions in 2007 dollars)		Maximum MW of Potential Generation In each Level	Cost of Proxy Network Upgrades to accommodate MW Level of Potential Generation ($ millions in 2007 dollars)		Annual Carrying Charges*** ($ millions in 2007 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
Helm Sub 230 kV	1	250	16	0	4.0	3.0	250	16	0	4.0	3.0
	2	250	16	16	8.0	6.1	350	23	86	26.7	20.4
Los Banos 230 kV	1	1,000	65	0	15.9	12.2	600	39	0	9.6	7.3
	2						1,000	65	89	37.7	28.8
Midway 230 kV	1	1,250	81	0	19.9	15.2	3,000	195	0	47.8	36.5
	2	2,600	169	39	51.0	39.0					
Morro Bay 230 kV	1	250	16	0	4.0	3.0	550	36	0	8.8	6.7
	2	1,250	81	43	30.5	23.3	1,000	65	212	67.9	51.9
Newark 230 kV	1	1,500	98	0	23.9	18.3	1,000	65	0	15.9	12.2
Panoche 230 kV	1	1,500	98	0	23.9	18.3	0	0	0	0.0	0.0
	2						1,300	85	53	33.8	25.8
Pit 230 kV	1	0	0	0	0.0	0.0	150	10	0	2.4	1.8
	2	250	16	327	84.2	64.3	50	3	9	3.1	2.4
	3	50	3	46	12.0	9.2	300	20	45	15.7	12.0
	4	750	49	9	14.2	10.8	700	46	39	20.7	15.8
Rio Oso 230 kV	1	0	0	0	0.0	0.0	1,000	65	0	15.9	12.2
	2	350	23	9	7.8	6.0					
	3	250	16	6	5.4	4.1					
Round Mt 230 kV	1	0	0	0	0.0	0.0	600	39	0	9.6	7.3
	2	200	13	327	83.4	63.7	1,200	78	39	28.7	21.9
	3	700	46	266	76.4	58.3					
	4	250	16	39	13.6	10.4					
Stagg 230 kV	1	700	46	0	11.2	8.5	700	46	0	11.2	8.5
Summit Metering Station 115 kV	1	0	0	0	0.0	0.0	50	3	0	0.8	0.6
	2	1,000	65	25	22.1	16.9	700	46	25	17.3	13.2

* 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.

Level		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 2007 dollars)		Annual Carrying Charges*** ($ millions in 2007 dollars)		Maximum MW of Potential Generation In each Level	Cost of Proxy Network Upgrades to accommodate MW Level of Potential Generation ($ millions in 2007 dollars)		Annual Carrying Charges*** ($ millions in 2007 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
Table Mt 230 kV	1	0	0	0	0.0	0.0	850	55	0	13.6	10.4
	2	1,000	65	327	96.2	73.5					
Tesla 230 kV	1	2,000	130	0	31.9	24.4	2,000	130	0	31.9	24.4
Vaca Dixon 230 kV	1	0	0	0	0.0	0.0	1,000	65	0	15.9	12.2
	2	1,000	65	221	70.2	53.7					
Wilson 230 kV	1	450	29	0	7.2	5.5	450**	29	0	7.2	5.5
	2	100	7	16	5.6	4.3	50	3	7	2.5	1.9

* 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. 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-two renewable resource clusters.

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.[6/] 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:

[6/] 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 resources 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 serves as another data point to be considered when selecting the clusters to be investigated in this 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 this 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.

III. PG&E'S TRANSMISSION RANKING COST STUDY FOR USE IN THE 2008 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 2008 Transmission Ranking Cost Study.

PG&E uses the same methodology in this supplemental study 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 and the 2007 TRCR, filed on November 8, 2006. As such, the 2008 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 bases cases developed in PG&E's 2007 base case series and approved by the CAISO for used in PG&E's Annual Assessment Studies.

These base cases were updated to reflect the current (as of August 2007) 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 when the contracts were finalized.)

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, Cottonwood, Delta Metering Station, Fulton, Gates, Gregg, Helm, Los Banos, 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 2012 Summer Peak and 2012 Summer Off Peak cases using the new assumptions described 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[7/] 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

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[7/] 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).

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.

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

This selection represents one less in the number of clusters than investigated in the 2007 TRCR. The Cortina Cluster was eliminated because of its electrical proximity to Cottonwood

and its elimination could simply bid evaluation. 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 2007 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 2007 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 2008 RFO bid evaluation.

Overall, the 2007 investigation 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 turn out to be 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.

IV. CONCLUSION

PG&E has developed its 2008 TRCR in accordance with the Methodology laid out in Attachment A of D. 04-06-013 and in D.05-7-040. 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: 2008 TRCR
2012 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
Bellota 230 kV	1	1000	65.0	0.0	HURLEY S 230 - PROCTER 230	500	-330	
Caribou 230 kV	1	0	0.0	0.0	TABLE MT 500 - VACA-DIXON 500	0	0	
	2	50	3.3	327.2	BELDENTP 230 - TBL MT D 230	25	-17	Build new Table Mt-Vaca Dixon 230 DCTL (230 kV construction)
	3	1000	65.0	33.5	TABLE MT 500/230 KV XFORMER	500	-330	Reconductor Caribou-Beldon-Table Mt 230 DCTL
Cottonwood 230 kV	1	0	0.0	0.0	CPVSTA 230 - CORTINA 230	0	0	
	2	1000	65.0	265.8	OLINDA 500 - OLINDAW 230	500	-330	Build new Round Mt-Table Mt 230 DCTL
Delta Metering Station 115 kV (PP&L)	1	0	0.0	0.0	DELTA 115 - CASCADE 115	0	0	
	2	300	19.5	17.5	ROUND MT 500 - TABLE MT 500	150	-99	Reconductor Delta-Cottonwood 115
Fulton 230 kV	1	750	48.8	0.0	FULTON 230 - IGNACIO 230	375	-248	

Table 5: 2008 TRCR
2012 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)		Proxy Transmission Facility description			
						Proxy Voltage Support Devices*		
			Proxy Voltage Support Devices*	Other Proxy Transm. upgrades	Limiting elements	SVC Qmax (MVAR)	SVC Qmin (MVAR)	Other Proxy Transmission upgrades
Gates 230 kV	1	1000	65.0	0.0	PANOCHE 230 - GATES 230	500	-330	
Gregg 230 kV	1	0	0.0	0.0	BORDEN 230 - GREGG 230	0	0	
	2	450	29.3	3.9	STOREY 1 230 - GREGG 230	225	-149	Reconductor Borden-Gregg 230 DCTL
	3	250	16.3	3.1	MELONES 230 - COTTLE A 230 & BULRD_EC 230 - KEARNEY 230	125	-83	Reconductor Storey-Borden 230 DCTL
	4	50	3.3	39.6	WARNERVL 230 - COTTLE B 230 & STOREY 1 230 - WILSON 230	25	-17	Reconductor Malone-Cottle 230 & Panoche-McMullin-Kearney 230
	5	250	16.3	20.8	BELLOTA 230 - COTTLE B 230	125	-83	Reconductor Wilson-Storey 230 DCTL & Cottle-Warnerville 230 DCTL
Helm Sub 230 kV	1	250	16.3	0.0	PANOCHE 230 - HELM 230	125	-83	
	2	300	19.5	16.4	STRD JCT 70 - SCHLNDLR 70	150	-99	Reconductor Panoche-Helm 230
Los Banos 230 kV	1	750	48.8	0.0	WESTLEY 230 - LOSBANOS 230	375	-248	
Midway 230 kV	1	1400	91.0	0.0	MIDWAY 500/230 KV XFORMER	700	-462	
	2	2600	169.0	39.0	GATES 230 - MIDWAY 230	1300	-858	Build new 500/230 xformer
Morro Bay 230 kV	1	250	16.3	0.0	TEMPLETN 230 - MORROBAY 230	125	-83	
	2	750	48.8	43.0	MORROBAY 230 - MIDWAY 230	375	-248	Reconductor Morro Bay-Gates DCTL (Templeton in between)

Table 5: 2008 TRCR
2012 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
Newark 230 kV	1	500	32.5	0.0	NEWARK D 230 - NEWARK E 230	250	-165	
Panoche 230 kV	1	1000	65.0	0.0	WESTLEY 230 - LOSBANOS 230	500	-330	
Pit 1 230 kV	1	200	13.0	0.0	TABLE MT 500 - VACA-DIXON 500	100	-66	
	2	50	3.3	327.2	PIT 3 230 - ROUND MT 230	25	-17	Build new Table Mt-Vaca Dixon 230 DCTL (230 kV construction)
	3	50	3.3	9.3	BRNY_FST 230 - PIT 1 230	25	-17	Reconductor Pit 3-Round Mt 230 DCTL
	4	700	45.5	9.1	MAXWELL 500 - TRACY 500	350	-231	Reconductor Pit 1-Pit 3 230 DCTL
Rio Oso 230 kV	1	0	0.0	0.0	RIO OSO 230 - ATLANTC 230	0	0	
	2	350	22.8	9.2	RIO OSO 230 - GOLDHILL 230	175	-116	Reconductor Rio Oso-Atlantic 230 DCTL
	3	250	16.3	5.8	RIO OSO 230 - BRIGHTON 230	125	-83	Reconductor Atlantic-Goldhill 230 DCTL
Round Mt 230 kV	1	0	0.0	0.0	TABLE MT 500 - VACA-DIXON 500	0	0	
	2	200	13.0	327.2	ROUND MT 500 - TABLE MT 500	100	-66	Build new Table Mt-Vaca Dixon 230 DCTL (230 kV construction)
	3	700	45.5	265.8	ROUND MT 500/230 KV XFORMER	350	-231	Build new Round Mt-Table Mt 230 DCTL
	4	250	16.3	39.0	MAXWELL 500 - TRACY 500	125	-83	Build new Round Mt 500/230 kV xformer
Stagg 230 kV	1	700	45.5	0.0	STAGG 230 - EIGHT MI 230	350	-231	

Table 5: 2008 TRCR
2012 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)		Proxy Transmission Facility description			
						Proxy Voltage Support Devices*		
			Proxy Voltage Support Devices*	Other Proxy Transm. upgrades	Limiting elements	SVC Qmax (MVAR)	SVC Qmin (MVAR)	Other Proxy Transmission upgrades
Summit Metering Station 115 kV	1	0	0.0	0.0	CHCGO PK 115 - HIGGINS 115	0	0	
	2	200	13.0	25.1	RIO OSO 115 - BRNSWKTP 115	100	-66	Reconductor Summit-Drum-Brunswick-Placer 115 kV lines
Table Mt 230 kV	1	0	0.0	0.0	TABLE MT 500 - VACA-DIXON 500	0	0	
	2	900	58.5	327.2	TABLE MT 500/230 KV XFORMER	450	-297	Build new Table Mt-Vaca Dixon 230 DCTL (230 kV construction)
Tesla 230 kV	1	2000	130.0	0.0	PIT 4 230 - PIT 4 JT 230	1000	-660	
Vaca Dixon 230 kV	1	0	0.0	0.0	VACA-DIXON 500 - TESLA 500	0	0	
	2	1000	65.0	221.4	GATES 500 - MIDWAY 500	500	-330	Build new Vaca Dixon-Tesla 230 DCTL
Wilson 230 kV	1	400	26.0	0.0	MELONES 230 - COTTLE A 230	200	-132	
	2	75	4.9	16.4	WARNERVL 230 - COTTLE B 230	38	-25	Reconductor Malone-Cottle 230
	3	125	8.1	1.8	BELLOTA 230 - COLLLE A 230	63	-41	Reconductor Cottle-Warnerville 230 DCTL

Table 6: 2008 TRCR
2012 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	0	0.0	0.0	WARNERVL 230 - WILSON 230	0	0	
	2	1000	65.0	25.1	BELLOTA 230 - COTTLE B 230	500	-330	Reconductor Wilson-Warnerville 230 DCTL
Caribou 230 kV	1	150	9.8	0.0	CARIBOU 230 - BELDENTP 230	75	-50	
	2	700	45.5	171.4	TABLE MT 500/230 KV XFORMER	350	-231	Build new Caribou-Beldon-Table Mt 230 DCTL
	3	150	9.8	39.0	CARBOU M 230 - CARIBOU 115	75	-50	Build new 500/230 xformer
Cottonwood 230 kV	1	800	52.0	0.0	OLINDA 500 - OLINDAW 230	400	-264	
	2	200	13.0	39.0	COTWD_E 230 - ROUND MT 230	100	-66	Build new 500/230 xformer
Delta Metering Station 115 kV (PP&L)	1	0	0.0	0.0		0	0	
	2	300	19.5	17.5	GIRVAN 60 - ANDERSON 60	150	-99	Reconductor Delta-Cottonwood 115
Fulton 230 kV	1	300	19.5	0.0	T22_93 230 - LAKEVILE 230	150	-99	
	2	200	13.0	16.2	SOBRANTE 115 - MORAGA 115	100	-66	Reconductor Fulton-Lakeville 230
Gates 230 kV	1	0	0.0	0.0	HENTAP1 230 - GATES 230	0	0	
	2	900	58.5	1000.0	WESTLEY 230 - LOSBANOS 230	450	-297	Build new Midway-Gregg 500 kV
	3	350	22.8	88.6	TESLA 500 - LOSBANOS 500	175	-116	Build new Los Banos-Westley 230 DCTL

Table 6: 2008 TRCR
2012 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
Gregg 230 kV	1	1000	65.0	0.0	WESTLEY 230 - LOSBANOS 230	500	-330	
Helm Sub 230 kV	1	300	19.5	0.0	HELM 230 - MC CALL 230	150	-99	
	2	300	19.5	19.7	PANOCHE 230 - HELM 230	150	-99	Reconductor Helm-McCall 230
Los Banos 230 kV	1	400	26.0	0.0	WESTLEY 230 - LOSBANOS 230	200	-132	
	2	800	52.0	88.6	ORO LOMA 115 - EL NIDO 115	400	-264	Build new Los Banos-Westley 230 DCTL
Midway 230 kV	1	0	0.0	0.0	GATES 500 - MIDWAY 500	0	0	
	2	1250	81.3	1000.0	WESTLEY 230 - LOSBANOS 230	625	-413	Build new Midway-Gregg 500 kV
Morro Bay 230 kV	1	0	0.0	0.0	GATES 500 - MIDWAY 500	0	0	
	2	500	32.5	1000.0	TEMPLETN 230 - MORROBAY 230	250	-165	Build new Midway-Gregg 500 kV
	3	500	32.5	43.0	WESTLEY 230 - LOSBANOS 230	250	-165	Reconductor Morro Bay-Gates DCTL (Templeton in between)
Newark 230 kV	1	1000	65.0	0.0	NEWARK D 230 - NEWARK E 230	500	-330	
Panoche 230 kV	1	0	0.0	0.0	PANOCHE 230 - MCMULLN1 230	0	0	
	2	600	39.0	23.2	WESTLEY 230 - LOSBANOS 230	300	-198	Reconductor Panoche-McMullin-Kearney 230
	3	800	52.0	88.6	PANOCHE 230 - HELM 230	400	-264	Build new Los Banos-Westley 230 DCTL

Table 6: 2008 TRCR
2012 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
Pit 1 230 kV	1	150	9.8	0.0	PIT 3 230 - ROUND MT 230	75	-50	
	2	50	3.3	9.3	SPI-BRNY 230 - PIT 3 230	25	-17	Reconductor Pit 3-Round Mt 230 DCTL
	3	300	19.5	44.6	ROUND MT 500/230 KV XFORMER	150	-99	Build new Pit 1-Pit 3 230 DCTL
	4	700	45.5	39.0	OLINDA 500 - OLINDAW 230	350	-231	Build new 500/230 xformer
Rio Oso 230 kV	1	1000	65.0	0.0	TABLE MT 500/230 KV XFORMER	500	-330	
Round Mt 230 kV	1	600	39.0	0.0	ROUND MT 500/230 KV XFORMER	300	-198	
	2	1200	78.0	39.0	OLINDA 500/230 KV XFORMER	600	-396	Build new 500/230 xformer
Stagg 230 kV	1	700	45.5	0.0	STAGG 230 - EIGHT MI 230	350	-231	
Summit Metering Station 115 kV	1	50	3.3	0.0	DRUM 115 - BRNSWCKP 115	25	-17	
	2	700	45.5	25.1	PLACER 115 - BELL PGE 115	350	-231	Reconductor Summit-Drum-Brunswick-Placer 115 kV lines
Table Mt 230 kV	1	850	55.3	0.0	TABLE MT 500/230 KV XFORMER	425	-281	
Tesla 230 kV	1	2000	130.0	0.0	TESLA E 230 - TESLA D 230	1000	-660	

Table 6: 2008 TRCR
2012 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*		Other Proxy Transmission upgrades
						SVC Qmax (MVAR)	SVC Qmin (MVAR)	
Vaca Dixon 230 kV	1	1000	65.0	0.0	VACA-DIXON 500/230 KV FORMER	500	-330	
Wilson 230 kV	1	500	32.5	0.0	STOREY 1 230 - GREGG 230	250	-165	

Table 7: 2008 TRCR
2012 Super Peak, Peak and Shoulder 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	1000	65.0	0.0	HURLEY S 230 - PROCTER 230	500	-330	
Caribou 230 kV	1	0	0.0	0.0	TABLE MT 500 - VACA-DIXON 500	0	0	
	2	50	3.3	327.2	BELDENTP 230 - TBL MT D 230	25	-17	Build new Table Mt-Vaca Dixon 230 DCTL (230 kV construction)
	3	1000	65.0	33.5	TABLE MT 500/230 KV XFORMER	500	-330	Reconductor Caribou-Beldon-Table Mt 230 DCTL
Cottonwood 230 kV	1	0	0.0	0.0	CPVSTA 230 - CORTINA 230	0	0	
	2	1000	65.0	265.8	OLINDA 500 - OLINDAW 230	500	-330	Build new Round Mt-Table Mt 230 DCTL
Delta Metering Station 115 kV (PP&L)	1	0	0.0	0.0	DELTA 115 - CASCADE 115	0	0	
	2	300	19.5	17.5	ROUND MT 500 - TABLE MT 500	150	-99	Reconductor Delta-Cottonwood 115
Fulton 230 kV	1	1000	65.0	0.0	FULTON 230 - T22_93 230	500	-330	
Gates 230 kV	1	1000	65.0	0.0	GATES 230 - MIDWAY 230	500	-330	
Gregg 230 kV	1	0	0.0	0.0	BORDEN 230 - GREGG 230	0	0	
	2	500	32.5	3.9	STOREY 1 230 - GREGG 230	250	-165	Reconductor Borden-Gregg 230 DCTL
	3	400	26.0	3.1	BULRD_EC 230 - KEARNEY 230	200	-132	Reconductor Storey-Borden 230 DCTL
	4	200	13.0	23.2	STOREY 1 230 - WILSON 230 & MELONES 230 - COTTLE A 230	100	-66	Reconductor Panoche-McMullin-Kearney 230
	5	100	6.5	35.4	GREGG 230 - HERNDON 230	50	-33	Reconductor Wilson-Storey 230 DCTL & Malone-Cottle 230
Helm Sub 230 kV	1	250	16.3	0.0	HELM 70 - STRD JCT 70	125	-83	
	2	250	16.3	16.4	STRD JCT 70 - SCHLNDLR 70	125	-83	Reconductor Panoche-Helm 230

Table 7: 2008 TRCR
2012 Super Peak, Peak and Shoulder 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
Los Banos 230 kV	1	1000	65.0	0.0	WESTLEY 230 - LOSBANOS 230	500	-330	
Midway 230 kV	1	1250	81.3	0.0	MIDWAY 500/230 KV XFORMER	625	-413	
	2	2600	169.0	39.0		1300	-858	Build new 500/230 xformer
Morro Bay 230 kV	1	250	16.3	0.0	TEMPLETN 230 - MORROBAY 230	125	-83	
	2	1250	81.3	43.0	CARRIZO 115 - SN LS OB 115	625	-413	Reconductor Morro Bay-Gates DCTL (Templeton in between)
Newark 230 kV	1	1500	97.5	0.0	GATES 500 - MIDWAY 500	750	-495	
Panoche 230 kV	1	1500	97.5	0.0	PANOCHE 230 - DS AMIGO 230	750	-495	
Pit 1 230 kV	1	0	0.0	0.0	TABLE MT 500 - VACA-DIXON 500	0	0	
	2	250	16.3	327.2	PIT 3 230 - ROUND MT 230	125	-83	Build new Table Mt-Vaca Dixon 230 DCTL (230 kV construction)
	3	50	3.3	45.6	BRNY_FST 230 - PIT 1 230	25	-17	Build new Pit 3-Round Mt 230 DCTL
	4	750	48.8	9.1	MAXWELL 500 - TRACY 500	375	-248	Reconductor Pit 1-Pit 3 230 DCTL
Rio Oso 230 kV	1	0	0.0	0.0	RIO OSO 230 - ATLANTC 230	0	0	
	2	350	22.8	9.2	RIO OSO 230 - GOLDHILL 230	175	-116	Reconductor Rio Oso-Atlantic 230 DCTL
	3	250	16.3	5.8	RIO OSO 230 - BRIGHTON 230	125	-83	Reconductor Atlantic-Goldhill 230 DCTL
Round Mt 230 kV	1	0	0.0	0.0	TABLE MT 500 - VACA-DIXON 500	0	0	
	2	200	13.0	327.2	ROUND MT 500 - TABLE MT 500	100	-66	Build new Table Mt-Vaca Dixon 230 DCTL (230 kV construction)
	3	700	45.5	265.8	ROUND MT 500 - RD MT 1M 500	350	-231	Build new Round Mt-Table Mt 230 DCTL
	4	250	16.3	39.0	MAXWELL 500 - TRACY 500	125	-83	Build new 500/230 xformer

Table 7: 2008 TRCR
2012 Super Peak, Peak and Shoulder 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
Stagg 230 kV	1	700	45.5	0.0	STAGG 230 - EIGHT MI 230	350	-231	
Summit Metering Station 115 kV	1	0	0.0	0.0	CHCGO PK 115 - HIGGINS 115	0	0	
	2	1000	65.0	25.1	GOLDHILL 115 - HORSHE2 115	500	-330	Reconductor Summit-Drum-Brunswick-Placer 115 kV lines
Table Mt 230 kV	1	0	0.0	0.0	TABLE MT 500 - VACA-DIXON 500	0	0	
	2	1000	65.0	327.2	TABLE MT 500/230 KV XFORMER	500	-330	Build new Table Mt-Vaca Dixon 230 DCTL (230 kV construction)
Tesla 230 kV	1	2000	130.0	0.0	GATES 500 - MIDWAY 500	1000	-660	
Vaca Dixon 230 kV	1	1000	65	$0	VACA-DIXON 500/230 KV XFORMER	500	-330	
Wilson 230 kV	1	450	29	$0	STOREY 1 230 - GREGG 230	225	-149	
	2	50	3	$4	STOREY 1 230 - GREGG 230	25	-17	Reconductor Borden-Gregg 230 DCTL

Table 8: 2008 TRCR
2012 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
Bellota 230 kV	1	0	0.0	0.0	WARNERVL 230 - WILSON 230	0	0	
	2	1000	65.0	25.1	BELLOTA 230 - COTTLE B 230	500	-330	Reconductor Wilson-Warnerville 230 DCTL
Caribou 230 kV	1	150	9.8	0.0	CARIBOU 230 - BELDENTP 230	75	-50	
	2	700	45.5	171.4	TABLE MT 500/230 KV XFORMER	350	-231	Build new Caribou-Beldon-Table Mt 230 DCTL
	3	150	9.8	39.0	CARBOU M 230 - CARIBOU 115	75	-50	Build new 500/230 xformer
Cottonwood 230 kV	1	800	52.0	0.0	OLINDA 500/230 KV XFORMER	400	-264	
	2	200	13.0	39.0	COTWD_E 230 - ROUND MT 230	100	-66	Build new 500/230 xformer
Delta Metering Station 115 kV (PP&L)	1	0	0.0	0.0	DELTA 115 - CASCADE 115	0	0	
	2	300	19.5	17.5	GIRVAN 60 - ANDERSON 60	150	-99	Reconductor Delta-Cottonwood 115
Fulton 230 kV	1	300	19.5	0.0	T22_93 230 - LAKEVILE 230	150	-99	
	2	200	13.0	16.2	SOBRANTE 115 - MORAGA 115			Reconductor Fulton-Lakeville 230
Gates 230 kV	1	0	0.0	0.0	HENTAP1 230 - GATES 230	0	0	
	2	1000	65.0	44.7	GATES 230 - GATES11M 13.8	500	-330	Build new Gates-Henreitta 230
Gregg 230 kV	1	1000	65.0	0.0	STOREY 1 230 - GREGG 230	500	-330	

Table 8: 2008 TRCR
2012 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 Sub 230 kV	1	250	16.3	0.0	HELM 230 - MC CALL 230	125	-83	
	2	350	22.8	86.0	PANOCHE 230 - HELM 230	175	-116	Build new Helm-McCall 230
Los Banos 230 kV	1	600	39.0	0.0	WESTLEY 230 - LOSBANOS 230	300	-198	
	2	1000	65.0	88.6	LOSBANOS 230 - DS AMIGO 230	500	-330	Build new Los Banos-Westley 230 DCTL
Midway 230 kV	1	3000	195.0	0.0		1500	-990	
Morro Bay 230 kV	1	550	35.8	0.0	TEMPLETN 230 - MORROBAY 230	275	-182	
	2	1000	65.0	212.0	MORROBAY 230 - MIDWAY 230	500	-330	Build new Morro Bay-Gates DCTL (Templeton in between)
Newark 230 kV	1	1000	65.0	0.0	NEWARK D 230 - NEWARK E 230	500	-330	
Panoche 230 kV	1	0	0.0	0.0	HENRIETA 230 - HENRITTA 70 & BULRD_EC 230 - KEARNEY 230	0	0	
	2	1300	84.5	53.2	PANOCHE 230 - HELM 230	650	-429	Build new 230/115 xformer & reconductor Panoche-McMullin-Kearney 230
Pit 1 230 kV	1	150	9.8	0.0	PIT 3 230 - ROUND MT 230	75	-50	
	2	50	3.3	9.3	SPI-BRNY 230 - PIT 3 230	25	-17	Reconductor Pit 3-Round Mt 230 DCTL
	3	300	19.5	44.6	ROUND MT 500/230 KV XFORMER	150	-99	Build new Pit 1-Pit 3 230 DCTL
	4	700	45.5	39.0	OLINDA 500/230 KV XFORMER	350	-231	Build new 500/230 xformer
Rio Oso 230 kV	1	1000	65.0	0.0	TABLE MT 500/230 KV XFORMER	500	-330	

Table 8: 2008 TRCR
2012 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
Round Mt 230 kV	1	600	39.0	0.0	ROUND MT 500/230 KV XFORMER	300	-198	
	2	1200	78.0	39.0	OLINDA 500/230 KV XFORMER	600	-396	Build new 500/230 xformer
Stagg 230 kV	1	700	45.5	0.0	STAGG 230 - EIGHT MI 230	350	-231	
Summit Metering Station 115 kV	1	50	3.3	0.0	SUMMIT 1 120 - DRUM 115	25	-17	
	2	700	45.5	25.1	GOLDHILL 115 - HORSHE2 115	350	-231	Reconductor Summit-Drum-Brunswick-Placer 115 kV lines
Table Mt 230 kV	1	850	55.3	0.0	TABLE MT 500/230 KV XFORMER	425	-281	
Tesla 230 kV	1	2000	130.0	0.0	TESLA E 230 - TESLA D 230	1000	-660	
Vaca Dixon 230 kV	1	1000	65.0	0.0	VACA-DIXON 500/230 KV XFORMER	500	-330	
Wilson 230 kV	1	450	29.3	0.0	STOREY 1 230 - GREGG 230	225	-149	
	2	50	3.3	3.9	STOREY 1 230 - GREGG 230	25	-17	Reconductor Borden-Gregg 230 DCTL

Exhibit 1
PG&E Substations Associated with Renewable Resource Clusters

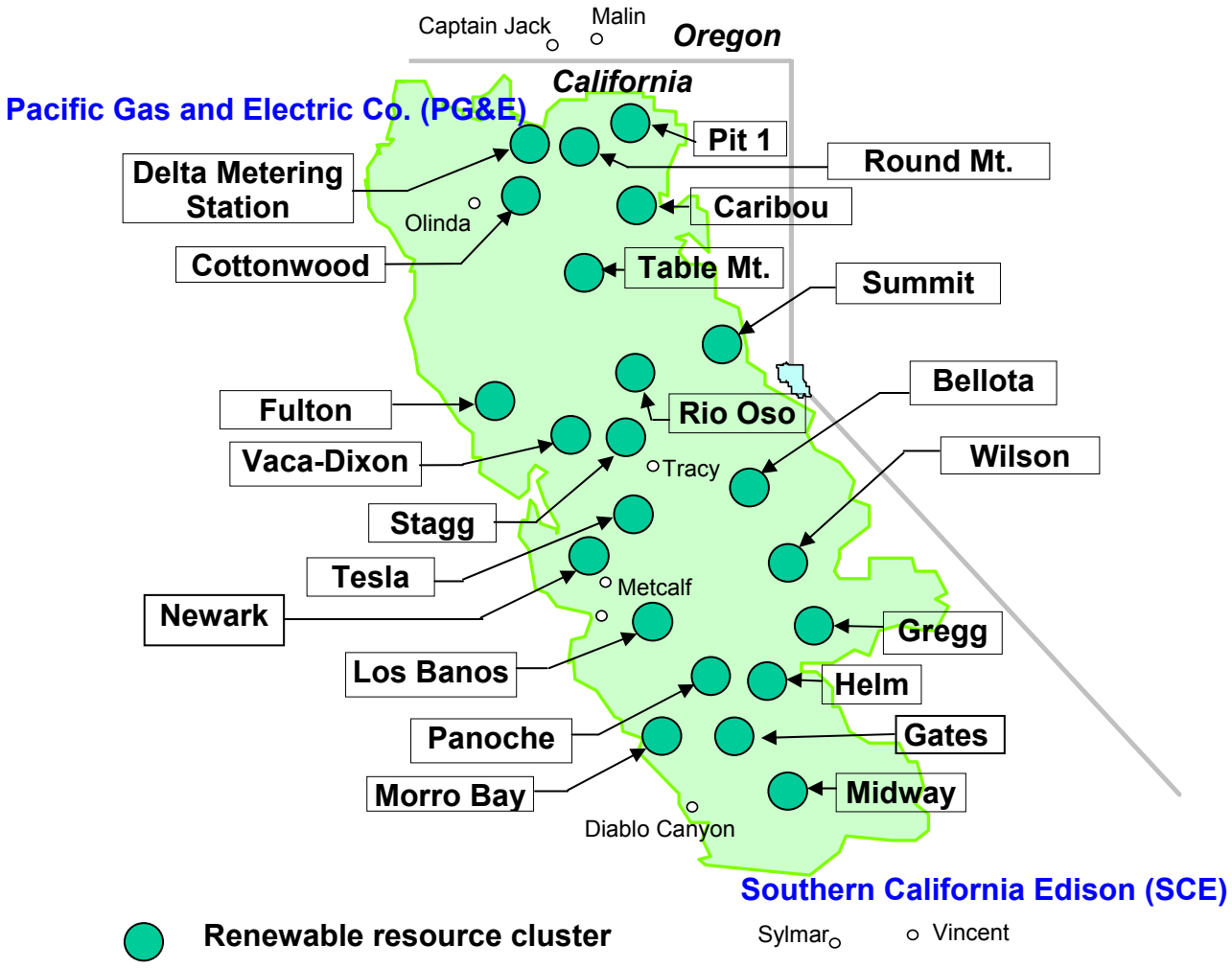
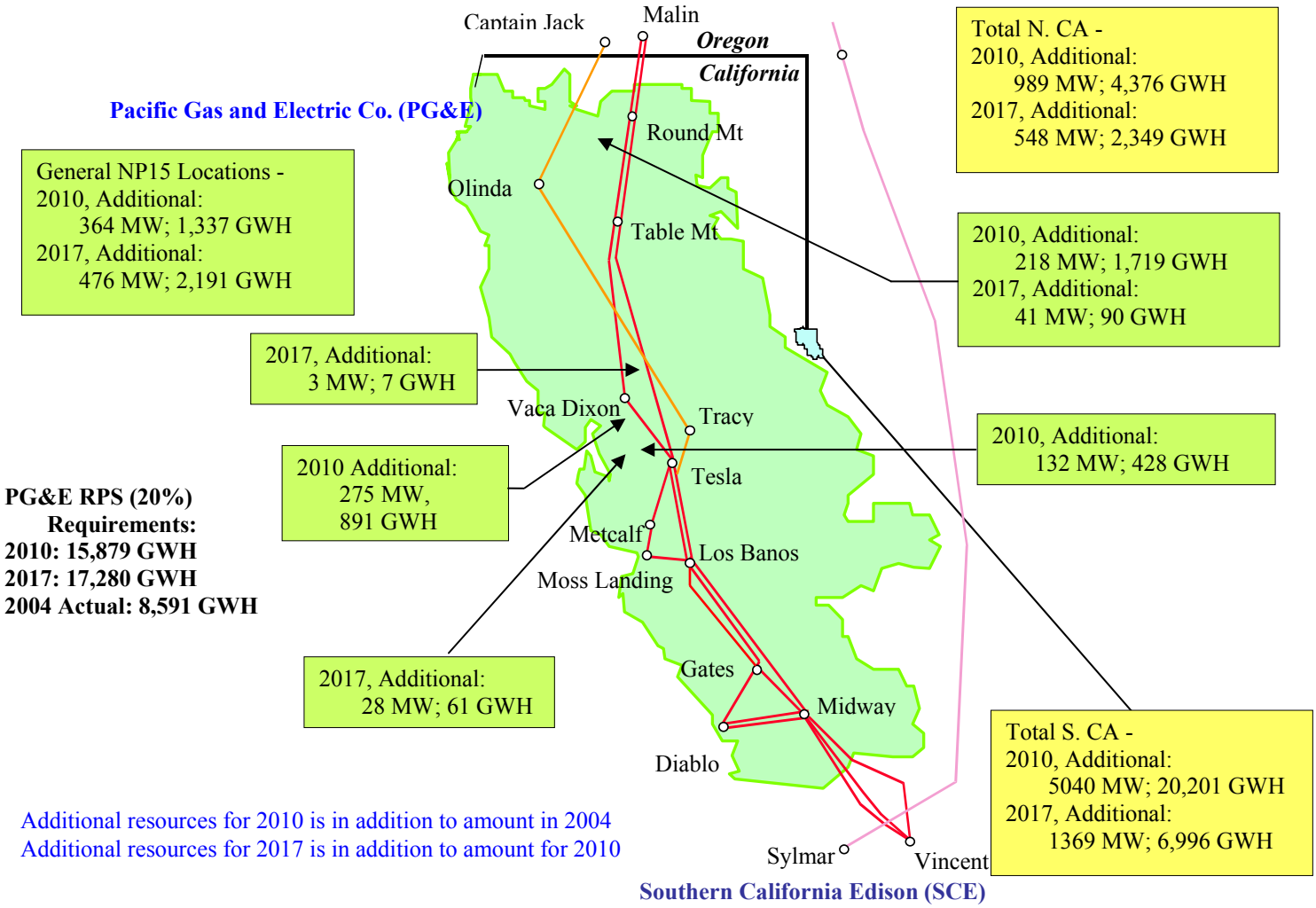


Table 8: 2008 TRCR
2012 Night Periods where SCE or SDG&E is the Purchaser

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 documents dated September 7, 2007. The statements in the foregoing documents 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 7th day of September, 2007 at San Francisco, California

/s/

Ben Morris
Manager, Strategic and Technical Services,
Electric Asset Strategy
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 7th day of September 2007, I caused to be served a true copy of:

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.06-05-027 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.06-05-027 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 7th day of September, 2007 at San Francisco, California.

/s/
STEPHANIE LOUIE

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