Pacific Gas and Electric Company ™

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June 23, 2004

BY HAND DELIVERY

Docket Clerk
Docket Office
California Public Utilities Commission
505 Van Ness Avenue, Room 2001
San Francisco, CA 94102

Re: AB 970 OII: Investigation No. 00-11-001

Dear Docket Clerk:

Enclosed for filing are an original and five (5) copies of the "2004 Transmission Ranking Cost Report Of Pacific Gas And Electric Company As Required By Decision 04-06-013."

Please file the original document, date-stamp a copy, and return the endorsed copy in the stamped self-addressed envelope provided for this purpose.

Very truly yours,

/s/
Evelyn C. Lee

ECL:gmj

Enclosures

cc: ALJ Charlotte F. TerKeurst
Commissioner Loretta M. Lynch
All Parties of Record in I.00-11-001

BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF CALIFORNIA

Order Instituting Investigation into Implementation of Assembly Bill 970 Regarding the Identification of Electric Transmission and Distribution Constraints, Actions to Resolve those Constraints, and Related Matters affecting the Reliability of Electric Supply. (U 39 E)	Investigation No. 00-11-001 (Filed November 2, 2000)

2004 TRANSMISSION RANKING COST REPORT OF PACIFIC GAS AND ELECTRIC COMPANY IN COMPLIANCE WITH DECISION 04-06-013

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Attorneys for
PACIFIC GAS AND ELECTRIC COMPANY

Dated: June 23, 2004

BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF CALIFORNIA

Order Instituting Investigation into Implementation of Assembly Bill 970 Regarding the Identification of Electric Transmission and Distribution Constraints, Actions to Resolve those Constraints, and Related Matters affecting the Reliability of Electric Supply. (U 39 E)	Investigation No. 00-11-001 (Filed November 2, 2000)

2004 TRANSMISSION RANKING COST REPORT OF PACIFIC GAS AND ELECTRIC COMPANY IN COMPLIANCE WITH DECISION 04-06-013

This Transmission Ranking Cost Report is being filed and served on parties to the Commission's "Investigation into Implementation of Assembly Bill 970 Regarding the Identification of Electric Transmission and Distribution constraints, etc." in compliance with D.04-06-013, Ordering Paragraph 2.

D.04-06-013 adopted an Interim Methodology for the development and consideration of transmission costs in the procurement of renewable energy resources pursuant to California's Renewable Procurement Standard program. This methodology is to be used by each utility to estimate the capital costs of upgrades to its transmission facilities needed to accommodate interconnection and delivery of power from potential renewable energy builders. These estimates will allow the transmission cost of each project to be considered in the ranking of bids that have been submitted in response to the utility's initial RPS procurement solicitation. PG&E anticipates that parties will file initial comments on this Transmission Ranking Cost Report no later than June 30, 2004. PG&E expects to file reply comments no later than July 7, 2004, as provided by D.04-06-013. PG&E believes that the attached 2004 Transmission Ranking Cost Report fully complies with the Commission's adopted Interim Methodology and will provide a

reliable and fair basis for the consideration of project transmission costs in the ordering of bids by developers of renewable energy resources.

Respectfully submitted,

LINDA L. AGERTER
EVELYN C. LEE

By /s/
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Attorneys for
PACIFIC GAS AND ELECTRIC COMPANY

Dated: June 23, 2004

CERTIFICATE OF SERVICE: ELECTRONIC AND 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, California 94105.

I hereby certify that I have this day served a copy of the pleading(s) designated below by electronic mail on all parties on the **Official Service List for I.00-11-001** who have posted e-mail addresses.

I am also 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 23rd day of June, 2004, I served a true copy of:

2004 TRANSMISSION RANKING COST REPORT OF PACIFIC GAS AND ELECTRIC COMPANY AS REQUIRED BY DECISION 04-06-013

by placing it 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 any party designated as "Appearance" or "State Service" on the **Official Service List for I.00-11-001** who did not post or does not have a valid electronic mail address on file with the CPUC..

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 the 23rd day of June, 2004.

/s/
GERIANNE M. JOHNSON

IMPLEMENTATION OF AB 970 REGARDING THE IDENTIFICATION OF ELECTRIC TRANSMISSION AND DISTRIBUTION CONSTRAINTS, ETC.

I. 00-11-001

2004 TRANSMISSION RANKING COST REPORT

FILED FOR COMMENT
IN COMPLIANCE WITH DECISION 04-06-013

JUNE 23, 2004

2004 TRANSMISSION RANKING COST REPORT OF PACIFIC GAS AND ELECTRIC COMPANY IN COMPLIANCE WITH CPUC DECISION 04-06-013

I. EXECUTIVE SUMMARY

This Transmission Ranking Cost Report is being filed and served on parties to the Commission's "Investigation into Implementation of Assembly Bill 970 Regarding the Identification of Electric Transmission and Distribution constraints, etc." in compliance with Decision (D.)04-06-013, Ordering Paragraph 2.

D.04-06-013 adopted an Interim Methodology for the development and consideration of transmission costs in the procurement of renewable energy resources pursuant to California's Renewable Procurement Standard (RPS) program.[1/] This methodology is to be used by each utility to estimate the capital costs of upgrades to its transmission facilities that would be needed to accommodate interconnection and delivery of power from potential renewable energy builders, and thus estimate the transmission cost of each project for ranking bids that have been submitted in response to the utility's initial RPS procurement solicitation.

A. Purpose of the Transmission Ranking Cost Report is to Support RPS.

The purpose of the Transmission Ranking Cost Report is specific and limited to providing a basis for evaluating the cost of accepting deliveries from the project over the utility transmission system for the purpose of ranking RPS bids. The reported estimates will be used solely to evaluate bids one against the other. The estimates in this Report were not calculated for

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1/ 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. The 20% renewables goal was accelerated to 2010 by the *State Energy Action Plan*. The *Energy Action Plan* is available on-line at http://www.energy.ca.gov/2003_energy_action_plan/index.html

any other purpose, and thus, cannot be relied upon for any other purpose.

- Potential RPS bidders should use the information regarding expected transmission upgrades in developing their bids in response to the initial RPS procurement solicitation from PG&E.
- PG&E will use the transmission cost estimates in the Transmission Ranking Cost Report to evaluate and rank the RPS bids, including the calculation of transmission cost bid adders and the assignment of these adders to specific RPS projects in determining the combination of projects that will meet its approved renewable procurement goals in a least-cost, best-fit manner.

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

It is important to note that the estimates of transmission costs in the Transmission Ranking Cost Report will not be definitive and will not establish the ultimate cost of connecting a renewable resource to the grid. Generation developers seeking to interconnect to the PG&E transmission system will have to apply for interconnection with the CAISO pursuant to Amendment 39 of the CAISO Tariff and participate in the ISO System Impact Study and Facilities Study process. The resultant ISO Interconnection process will accurately identify transmission network upgrades needed to accommodate the added generation. However, since all potential renewable resources projects cannot be expected to have gone through the CAISO Interconnection Process prior to submitting a bid in response to PG&E's renewables solicitation, the Transmission Ranking Cost Report will provide an acceptable basis for ***ranking*** renewable bidders. This 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.

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

This Transmission Ranking Cost Report identifies and provides cost information regarding transmission upgrades needed for potential RPS projects, based on the following inputs:

- Conceptual transmission studies submitted previously pursuant to ALJ Rulings dated March 27, 2003, July 21, 2003 and August 1, 2003;
- 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.

D. Methodological Parameters of the Transmission Ranking Cost Report.

As in the Screening Level Studies filed on August 29, 2003 and on October 29, 2003, the Transmission Ranking Costs presented herein are the result of best efforts to estimate strategies to accommodate potential renewable resources based on reconnaissance-type information and relying extensively on engineering judgment tempered by experience and limited use of the power flow program. Consistent with the earlier Screening Level Studies, this Transmission Ranking Cost Report is based on the following considerations:

- 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[2/] or "Gen-ties" are not covered.
- As in the previous Screening Level Studies, 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 by PG&E, for example, PG&E's Path 15 Rating Studies for power flows in the South to North direction were also used where appropriate.
- The PG&E 2008 and 2010 Summer Peak base case (from the series of base cases prepared for the PG&E 2003 Area Assessment Studies approved by the

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

stakeholders), a Western Electricity Coordinating Council (WECC) 2008 Spring Partial Peak case, and the 2005 Light Autumn case were used as starting points.

- The renewable resources assumed in the study are consistent with the results of the RRDR Report published by the CEC on September 30, 2003. These CEC results have been augmented based on information received by PG&E from potential renewables developers in response to PG&E's solicitation for information conducted in 2003 and 2004.
- The study assumed that energy from the renewable resources locations identified would be delivered as part of each "cluster" at Round Mountain, Cottonwood, Cortina, Fulton, Vaca-Dixon, Tesla, Panoche and Midway Substations. (See Attachment 1.).
- The previous Screening Level Studies assumed that PG&E would be the purchaser of the renewable resources located in its service territory in accordance with ALJ Rulings. In accordance with Decision 04-06-013, this study would investigate the proxy facilities needed assuming 1) that PG&E would be the purchaser from renewable resources located within and outside PG&E's service territory; and 2) that PG&E would transmit the energy from renewable resources located north of and in PG&E's service territory to purchasers south of PG&E's service territory.
- If PG&E is the purchaser of renewable resources located north of PG&E's service territory, the associated potential cluster will be Round Mountain Substation. For Projects located south of PG&E's service territory, the associated potential cluster will be PG&E's Midway Substation.
- If SCE, SDG&E or any other entity south of PG&E's service territory is the purchaser, and the renewable resources are located north of and 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.
- Voltage (reactive) Support is required to reliably transmit the generation by renewable resources to the load. This reactive support needed is in addition to the reactive power produced by the generators. To be effective these voltage support devices will be installed at various strategic locations, which are generally at or near the load centers. The levels of voltage support are estimated based on results of past studies and are technology neutral. That is, the estimate assumes that renewable generators at the clusters are capable of producing reactive power typical of synchronous generators.
- This study 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 participating in existing special protection schemes, such as the Path 15 Remedial Action Scheme.

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

1. Use of Clusters.

Consistent with D.04-06-013 Attachment A, 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 needed to accommodate each cluster of renewable resources. For each cluster, PG&E has identified various levels of possible additional transmission capacity and the related costs.[3/] Accordingly, Level 1 would reflect the available transmission capacity taking into account all approved reliability and economic transmission projects, as well as upgrades planned for generation projects in the ISO interconnection queue based on their completed System Impact Studies and Facilities Studies. The next Level and subsequent Levels would reflect the next most cost-effective proxy network upgrade(s). The number of Levels would depend on the number of proxy network upgrades to reasonably accommodate the anticipated total amount of renewable resources in each cluster.

2. Overview of Tables.

The Transmission Ranking Costs are summarized in Tables 1-4. Tables 1 and 2 assume that PG&E is the purchaser of the renewable power. Tables 3 and 4 assume that SCE or SDG&E (or other entities south of PG&E's service territory) is the purchaser.

The Transmission Ranking Costs have been separated into tables 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. Tables 1 and 3 are for use for bid evaluation for periods from June 1 through September 30. Tables 2 and 4 are for use for bid evaluation for periods from October 1

3/ Costs are equal to the total capital cost of the proxy transmission network upgrade project and are stated in $2003 constant dollars. Net present value (NPV) amounts of each alternative would differ.

through May 31. This separation of transmission costs into peak and off-peak periods may allow a potential bidder to take into account potential transmission congestion and accordingly structure the optimal generation profile for its bid.

In addition, the Transmission Ranking Costs are further separated into time periods of between 2005 – 2009; and 2010 and beyond. Transmission Ranking Costs associated with these time periods can be used to further evaluate the renewable resource based on their expected commercial operating dates.

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 would require upgrades are:

- Vaca-Dixon – Contra Costa 230 kV line
- Cottonwood – Vaca-Dixon 230 kV line

Table 1: Transmission Ranking Cost for Potential Generation

Assuming PG&E is the Purchaser

June 1 through September 30

Substation Associated With Cluster Of Potential Generation	Level	January 2005 –December 2009			January 2010 and beyond		
		Maximum MW of Potential Generation In each Level	Cost of Proxy Network Upgrades to accommodate MW Level of Potential Generation ($ millions in 2003 dollars)		Maximum MW of Potential Generation In each Level	Cost of Proxy Network Upgrades to accommodate MW Level of Potential Generation ($ millions in 2003 dollars)	
			Proxy Voltage Support Devices*	Other Proxy Transmission upgrades		Proxy Voltage Support Devices*	Other Proxy Transmission upgrades
Round Mountain 230 kV	1	300	15	0	300	15	0
	2	200	10	232	200	10	232
	3	200	10	101	200	10	101
Cottonwood 230 kV	1	300	15	0	300	15	0
	2	200	10	232	200	10	232
	3	200	10	101	200	10	101
Cortina 115 kV	1	150	8	0	100	5	0
	2	50	3	78	100	5	78
	3	40	2	12	40	2	12
	4	210	11	66	210	11	66
Fulton 230 kV	1	100	5	0	100	5	0
	2	100	5	6	100	5	6
	3	380	19	107	400	20	107
	4	120	6	65	100	5	65
Vaca-Dixon 230 kV	1	300	15	0	300	15	0
	2	100	5	57	100	5	62
	3	200	10	117	200	10	107
Tesla 230 kV	1	1000	50	0	1000	50	0
Panoche 230 kV	1	1000	50	0	1000	50	0
Midway 230 kV	1	1000	50	0	1000	50	0

* 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.

Table 2: Transmission Ranking Cost for Potential Generation

Assuming PG&E is the Purchaser

October 1 through May 31

Substation Associated With Cluster Of Potential Generation	Level	January 2005 –December 2009			January 2010 and beyond		
		Maximum MW of Potential Generation In each Level	Cost of Proxy Network Upgrades to accommodate MW Level of Potential Generation ($ millions in 2003 dollars)		Maximum MW of Potential Generation In each Level	Cost of Proxy Network Upgrades to accommodate MW Level of Potential Generation ($ millions in 2003 dollars)	
			Proxy Voltage Support Devices*	Other Proxy Transmission upgrades		Proxy Voltage Support Devices*	Other Proxy Transmission upgrades
Round Mountain 230 kV	1	200	10	0	200	10	0
Cottonwood 230 kV	1	200	10	0	200	10	0
Cortina 115 kV	1	120	6	0	120	6	0
Fulton 230 kV	1	250	13	0	250	13	0
	2	250	13	65	250	13	65
Vaca-Dixon 230 kV	1	150	8	0	150	8	0
Tesla 230 kV	1	700	35	0	700	35	0
Panoche 230 kV	1	1000	50	0	1000	50	0
Midway 230 kV	1	0	0	0	0	0	0
	2	400	20	227	400	20	219
	3	300	15	66	300	15	64
	4	800	40	140	800	40	155

* 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.

Table 3: Transmission Ranking Cost 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)

June 1 through September 30

Substation Associated With Cluster Of Potential Generation	Level	January 2005 –December 2009			January 2010 and beyond		
		Maximum MW of Potential Generation In each Level	Cost of Proxy Network Upgrades to accommodate MW Level of Potential Generation ($ millions in 2003 dollars)		Maximum MW of Potential Generation In each Level	Cost of Proxy Network Upgrades to accommodate MW Level of Potential Generation ($ millions in 2003 dollars)	
			Proxy Voltage Support Devices*	Other Proxy Transmission upgrades		Proxy Voltage Support Devices*	Other Proxy Transmission upgrades
Round Mountain 230 kV	1	300	15	0	300	15	0
	2	200	10	232	200	10	232
	3	200	10	101	200	10	101
Cottonwood 230 kV	1	300	15	0	300	15	0
	2	200	10	232	200	10	232
	3	200	10	101	200	10	101
Cortina 115 kV	1	150	8	0	100	5	0
	2	50	3	78	100	5	78
	3	40	2	12	40	2	12
	4	210	11	66	210	11	66
Fulton 230 kV	1	100	5	0	100	5	0
	2	100	5	6	100	5	6
	3	380	19	107	400	20	107
	4	120	6	65	100	5	65
Vaca-Dixon 230 kV	1	300	15	0	300	15	0
	2	100	5	57	100	5	62
	3	200	10	117	200	10	107
Tesla 230 kV	1	1000	50	0	1000	50	0
Panoche 230 kV	1	1000	50	0	1000	50	0
Midway 230 kV	1	1000	50	0	1000	50	0

* 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.

Table 4: Transmission Ranking Cost 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)

October 1 through May 31

Substation Associated With Cluster Of Potential Generation	Level	January 2005 –December 2009			January 2010 and beyond		
		Maximum MW of Potential Generation In each Level	Cost of Proxy Network Upgrades to accommodate MW Level of Potential Generation ($ millions in 2003 dollars)		Maximum MW of Potential Generation In each Level	Cost of Proxy Network Upgrades to accommodate MW Level of Potential Generation ($ millions in 2003 dollars)	
			Proxy Voltage Support Devices*	Other Proxy Transmission upgrades		Proxy Voltage Support Devices*	Other Proxy Transmission upgrades
Round Mountain 230 kV	1	200	10	0	200	10	0
Cottonwood 230 kV	1	200	10	0	200	10	0
Cortina 115 kV	1	120	6	0	120	6	0
Fulton 230 kV	1	250	13	0	250	13	0
Vaca-Dixon 230 kV	1	150	8	0	150	8	0
Tesla 230 kV	1	700	35	0	700	35	0
Panoche 230 kV	1	1000	50	0	1000	50	0
Midway 230 kV	1	1000	50	0	1000	50	0

* 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.

II. DEVELOPMENT OF THE TRANSMISSION RANKING COST REPORT

A. Procedural History.

SB 1078 established the California Renewables Portfolio Standard Program (RPS) and the objective that 20% of electricity sold to California customers will be procured from eligible renewable energy resources by 2017. SB 1038 requires the CEC to complete a renewable resource plan and requires the CPUC to complete a renewable resource transmission plan. Both reports must be submitted to the Legislature by December 1, 2003. Accordingly, the CPUC's transmission plan is to be based on the CEC's renewable resource plan.

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

1. Studies Completed as of July 30, 2003.

Pursuant to the January 29, 2003 ALJ's Ruling and Notice of Evidentiary Hearings on Tehachapi Transmission Project in CPUC 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 CPUC is 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 service territory with proposed interconnection points at Bonneville Power Administration-owned substations. Two projects representing 1240 MW are 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) will assess a level of renewable development in 2005 and 2008 sufficient to allow Pacific Gas & Electric, Southern California Edison, San Diego Gas & Electric, 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. CPUC 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 CPUC 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.[4/] Adjustments were made to the estimates of

4/ 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

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 5:

Table 5. 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. CPUC 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 CPUC Renewables Transmission Report. Accordingly, PG&E prepared and filed its Supplemental Screening Level Study Required by SB 1038 on October 29, 2003.

6. CPUC 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

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the 2003 Northern California Power Association (NCPA) RFP." As such, there is not sufficient information to ascertain the amounts and number of "proposed" renewable resource projects that may have initiated the interconnection or permit application process.

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

III. PG&E'S TRANSMISSION RANKING COST STUDY

On June 9, 2004, the CPUC issued Decision 04-06-013 adopting the Methodology For Development And Consideration Of Transmission Costs In Initial Renewable Portfolio Standard Procurement (Interim Methodology) to be undertaken pursuant to Pub. Util. Code § 399.14. This Decision also ordered Pacific Gas and Electric Company (PG&E) to prepare and file a Transmission Ranking Cost Report consistent with the Interim 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."

The previous Screening Level Studies assumed that PG&E would be the purchaser of the renewable resources located in its service territory in accordance with ALJ Rulings. In accordance with Decision 04-06-013, the instand study investigates 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 and in PG&E's service territory to purchasers south of PG&E's service territory.

A. Limitations, Assumptions and Methodology Underlying PG&E's 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. As such, the Transmission Ranking Costs developed herein carry the same limitations, concerns and uncertainties as the conceptual transmission plans in the earlier study.

1. Power Flow Base Cases.

In the earlier Screening Level Study, PG&E had developed benchmark power flow base cases from the PG&E 2005 Summer Peak base case (from the series of base cases prepared for the PG&E 2003 Area Assessment Studies approved by the stakeholders) and a WECC 2008 Spring Partial Peak case. PG&E had used these benchmark cases to estimate the network upgrades, which would be needed to accommodate the renewable resource scenarios identified in the PRRA and the RRDR by the CEC:

- 2005 Summer Peak
- 2008 Spring Partial Peak
- 2010 Summer Peak
- 2010 Spring Partial Peak

The above cases all simulate prevalent power flow at Midway to be in the north to south direction (from PG&E to SCE). Because this Transmission Ranking Cost Study will also examine the scenario where PG&E would purchasing renewable resources from outside PG&E's service territory, a new case was added to include off-peak system conditions when the prevalent power flow is expected to be in the south to north direction between PG&E and SCE. This case is based on a WECC 2005 Light Autumn power flow base case (WECC 2005 LA1) prepared for

the 2003 WECC Annual Study Program. This case and the above benchmark power flow base cases were updated to reflect the current (as of May 2004) 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.

Based on the system conditions simulated, PG&E determined that the four power flow base cases used in earlier Screening Level Studies should be used to develop Transmission Ranking Costs for peak periods from June 1 through September 30. The new 2005 Light Autumn power flow base case should be used for the off-peak periods from October 1 through May 31. In addition, for purpose of bid evaluation, the results from the 2008 cases would be used for peak conditions between 2005 and 2009; results from the 2010 cases would be used for peak conditions for time periods from 2010 and beyond; and the results from the 2005 Light Autumn case would be used for off-peak time periods from 2005 and beyond.

2. Substation Associated With Cluster Of Potential Generation.

Based on information received from the developers and the CEC's PRRA and RRDR, PG&E has selected Round Mountain, Cottonwood, Cortina, Fulton, Vaca-Dixon, Tesla, Panoche and Midway Substations as the cluster locations from which the transmission impact of the renewable resources identified are analyzed.

If PG&E is the purchaser, for renewable resources located north of PG&E's service territory, the associated potential cluster will be Round Mountain Substation. For Projects located south of PG&E's service territory, the associated potential cluster will be PG&E's Midway Substation.

If SCE, SDG&E or an entity south of PG&E's service territory is the purchaser, and the renewable resources are located north of and 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 the purchaser, the point of receipt for renewable resources located north of PG&E's service territory is assumed to be Round Mountain Substation. 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 then ran the 2005 Light Autumn case and reran the 2008 and 2010 cases using the new assumptions. As in the earlier Screening Level 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 Screening Level 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 of 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).

If no transmission facility in the impacted area[5/] 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. Using 1,000 MW as the cut off is reasonable. Since the amounts in any cluster are determined based on a simplified methodology, there could be other limits that could have been reached 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 beyond California.

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 needed for local reliability level in the load centers), the power

5/ 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).

flows on transmission ties to areas outside PG&E service territory that are electrically farthest away from the cluster under study would be adjusted.

The Transmission Ranking Cost Study 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 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 Transmission Ranking Cost 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 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:

- Round Mountain 230 kV
- Cottonwood 230 kV
- Cortina 115 kV
- Fulton 230 kV
- Vaca-Dixon 230 kV
- Tesla 230 kV
- Panoche 230 kV
- Midway 230 kV

Tables 6 – 8 show the results of the analysis. 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, the older gas-fired generation will be displaced first, up to the point where the generation is needed for local reliability level 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 Midway Substation turn out to be the same whether

PG&E is the purchaser of the renewable resources or the transmission provider to transmit the renewable resources to their purchaser to the south of PG&E service territory, as expected.

Consequently, the cluster around Midway 230 kV bus is the only one that could exhibit different impacts depending on whether PG&E is the purchaser or the transmission provider of the renewable resources, and only during off-peak conditions, when the prevalent power flow is from SCE to PG&E (in the south to north direction). Table 8 shows that purchasing renewable resources from projects south of PG&E 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 is expected to be in the opposite direction of the prevailing power flows.

Table 6: 2008 Summer Peak where PG&E is the Purchaser

Substation Associated With Cluster Of Potential Generation	Level of gen in cluster	Maximum MW of Potential Generation In each Level	Cost of Proxy Network Upgrades to accommodate MW Level of Potential Generation ($ millions in 2003 dollars)		Proxy Facilities	Limiting element(s)
			Proxy Voltage Support Devices*	Other Proxy Transm. upgrades		
Round Mt. 230 kV	1	300	15	0	SVC (+150,-100 MVAR)	Shasta-Flanagan Keswick Flanagan 230 kV Montezuma-CCPP 230 kV
	2	200	10	175 57	Cottonwood-Vaca 230 kV Montezuma-CCPP SVC (+100, -67 MVAR)	Shasta-Flanagan Keswick-Flanagan 230 kV Russell-CC Sub 230
	3	200	10	46 55	2nd Cottonwood-Vaca 230 kV Vaca-Montezuma 230 kV SVC (+100, -67 MVAR)	Shasta-Flanagan Keswick-Flanagan 230 kV Russell-CC Sub 230
Cottonwood 230 kV	1	300	15	0	SVC (+150, -100 MVAR)	Shasta-Flanagan 230 kV Montezuma-CCPP 230 kV
	2	200	10	175 57	Cottonwood-Vaca 230 kV Montezuma-CCPP SVC (+100, -67 MVAR)	Shasta-Flanagan Keswick-Flanagan 230 kV Russell-CC Sub 230
	3	200	10	46 55	2nd Cottonwood-Vaca 230 kV Vaca-Montezuma 230 kV SVC (+100, -67 MVAR)	Shasta-Flanagan Keswick-Flanagan 230 kV Russell-CC Sub 230
Cortina 115 kV	1	150	8	0	SVC (+75, -50 MVAR)	Cortina-Cache Jct 115kV Cache-Highland 115kV Montezuma-CCPP 230 kV
	2	50	3	17 4 57	Cortina-Cache Jct 115 kV Cache Jct-Highland 115kV Montezuma-CCPP 230 kV SVC (+25, -17 MVAR)	Cortina-Indian Valley- Lucerne 115kV
	3	40	2	5 7	2nd Cortina-Cache Jct 115kV Lucern-Cache Jct 115kV SVC (+20, -13 MVAR)	Fulton-Eagle Rock 115kV Russell-CCPP 230 kV
	4	210	11	11 55	Fulton-Eagle Rock 115kV Vaca-Montezum 230kV SVC (+105, -70 MVAR)	Cortina 230/115 kV transformer
Fulton 230 kV	1	100	5	0	SVC (+50, -33 MVAR)	Konocti-Eagle Rock 60kV
	2	100	5	6	Konocti-Eagle Rock 60kV SVC (+50, -33 MVAR)	Montezuma-CCPP 230 kV Russell-CC Sub 230 kV
	3	380	19	107	Vaca-CCPP 230kV SVC (+190, -127 MVAR)	Fulton-Ignacio 230kV
	4	120	6	65	Fulton-Lakeville 230kV SVC (+60, -40 MVAR)	Russell-CC Sub 230kV
Vaca-Dixon 230 kV	1	300	15	0	SVC (+150, -100 MVAR)	Montezuma-CCPP 230kV
	2	100	5	57	Montezuma-CCPP 230kV SVC (+50, -33 MVAR)	Russell-CC Sub 230kV Vaca-Tulucay 230kV
	3	200	10	55 62	Vaca-Montezuma 230kV Vaca-Tulucay 230kV SVC (+100, -67 MVAR)	Russell-CC Sub 230kV
Tesla 230 kV	1	1000	50	0	SVC (+500, -333 MVAR)	
Panoche 230 kV	1	1000	50	0	SVC (+500, -333 MVAR)	
Midway 230 kV	1	1000	50	0	SVC (+500, -333 MVAR)	

Table 7: 2010 Summer Peak where PG&E is the Purchaser

Substation Associated With Cluster Of Potential Generation	Level of gen in cluster	Maximum MW of Potential Generation In each Level	Cost of Proxy Network Upgrades to accommodate MW Level of Potential Generation ($ millions in 2003 dollars)		Proxy Facilities	Limiting element(s)
			Proxy Voltage Support Devices*	Other Proxy Transm. upgrades		
Round Mt. 230 kV	1	300	15	0	SVC (+150,-100 MVAR)	Shasta-Flanagan 230 kV Montezuma-CCPP 230 kV
	2	200	 10	175 57	Cottonwood-Vaca 230 kV Montezuma-CCPP 230 kV SVC (+100, -67 MVAR)	Keswick-Eureka 115 kV Keswick-Flanagan 230 kV Russell-CC Sub 230
	3	200	 10	46 55	2nd Cottonwood-Vaca 230 kV Vaca-Montezuma 230 kV SVC (+100, -67 MVAR)	Shasta-Flanagan 230 kV Keswick-Flanagan 230 kV Russell-CC Sub 230
Cottonwood 230 kV	1	300	15	0	SVC (+150, -100 MVAR)	Shasta-Flanagan 230 kV Montezuma-CCPP 230 kV
	2	200	 10	175 57	Cottonwood-Vaca 230 kV Montezuma-CCPP SVC (+100, -67 MVAR)	Keswick-Eureka 115 kV Keswick-Flanagan 230 kV Russell-CC Sub 230
	3	200	 10	46 55	2nd Cottonwood-Vaca 230 kV Vaca-Montezuma 230 kV SVC (+100, -67 MVAR)	Shasta-Flanagan 230 kV Keswick-Flanagan 230 kV Russell-CC Sub 230?
Cortina 115 kV	1	100	5	0	SVC (+50, -33 MVAR)	Cortina-Cache Jct 115kV Cache Jct-Highland 115kV Montezuma-CCPP 230 kV
	2	100	 5	17 4 57	Cortina-Cache Jct 115 kV Cache Jct-Highland 115kV Montezuma-CCPP 230 kV SVC (+50, -33 MVAR)	Cortina-Indian Valley- Lucerne 115kV
	3	40	 2	5 7	2nd Cortina-Cache Jct 115kV Lucern-Cache Jct 115kV SVC (+20, -13 MVAR)	Fulton-Eagle Rock 115kV Russell-CCPP 230 kV
	4	210	 11	11 55	Fulton-Eagle Rock 115kV Vaca-Montezum 230kV SVC (+105, -70 MVAR)	Cortina 230/115 kV transformer
Fulton 230 kV	1	100	5	0	SVC (+50, -33 MVAR)	Konocti-Eagle Rock 60kV
	2	100	 5	6	Konocti-Eagle Rock 60kV SVC (+50, -33 MVAR)	Montezuma-CCPP 230 kV Russell-CC Sub 230 kV
	3	400	 20	107	Vaca-CCPP 230kV SVC (+200, -133 MVAR)	Fulton-Ignacio 230kV
	4	100	 5	65	Fulton-Lakeville 230kV SVC (+50, -33 MVAR)	Russell-CC Sub 230kV
Vaca-Dixon 230 kV	1	300	15	0	SVC (+150, -100 MVAR)	Vaca-Tulucay 230kV
	2	100	 5	62	Vaca-Tulucay 230 kV SVC (+50, -33 MVAR)	Montezuma-CCPP 230kV Russell-CC Sub 230kV
	3	200	 10	107	Vaca-CCPP 230kV SVC (+100, -67 MVAR)	Russell-CC Sub 230kV
Tesla 230 kV	1	1000	50	0	SVC (+500, -333 MVAR)	
Panoche 230 kV	1	1000	50	0	SVC (+500, -333 MVAR)	
Midway 230 kV	1	1000	50	0	SVC (+500, -333 MVAR)	

Table 8: 2005 Light Autumn Case where PG&E is the Purchaser

Substation Associated With Cluster Of Potential Generation	Level of gen in cluster	Maximum MW of Potential Generation In each Level	Cost of Proxy Network Upgrades to accommodate MW Level of Potential Generation ($ millions)		Proxy Facilities	Limiting element(s)
			Proxy Voltage Support Devices*	Other Proxy Transm. upgrades		
Round Mt. 230 kV	1	200	10	0	SVC (+100, -67 MVAR)	Vaca-Tesla 500 kV
Cottonwood 230 kV	1	200	10	0	SVC (+100, -67 MVAR)	Olinda-Tracy 500 kV
Cortina 115 kV	1	120	6	0	SVC (+60, -40 MVAR)	Cortina 230/115 kV transformer
Fulton 230 kV	1	250	13	0	SVC (+125, -83 MVAR)	Fulton-Ignacio 230kV
	2	250	13	65	Fulton-Lakeville 230kV SVC (+125, -83 MVAR)	Russell-CC Sub 230kV
Vaca-Dixon 230 kV	1	150	8	0	SVC (+75, -50 MVAR)	Vaca-Tesla500 kV
Tesla 230 kV	1	700	35	0	SVC (+350, -250 MVAR)	Tesla-Metcalf 500 kV
Panoche 230 kV	1	1000	50	0	SVC (+500, -333 MVAR)	
Midway 230 kV	1	0	0	0	0	Gates-Midway 500kV Simitropic-Alpaugh 115kV Gates-Henriatta 230kV McKittrick-Temblor 70kV
	1	400	20	134 93	2 Midway-Gates 230kV (500kV constructed) 2 Gates-Panoche 230kV (500kV constructed) SVC (+200, -133 MVAR)	Los Bannos-Westley 230 kV
	2	300	15	66	2 Los Banos-Westley 230 kV (500kV constructed) and Los Banos 500/230 kV transformer SVC (+150, -100 MVAR)	Los Banos-Tesla 500 kV Westley-Tesla 230 kV
	3	800	40	20 77 63	From Midway-Tesla 500kV by: • Upgrading Midway-Panoche, and Los Banos-Westley to 500 kV operation. • Adding Los Banos-Panoche 500 kV segment • Adding Tesla-Westley 500kV segment SVC (+400, -267 MVAR)	

IV. CONCLUSION

PG&E has developed its 2004 Transmission Ranking Cost Report in accordance with the Interim Methodology laid out in Attachment A of Decision 04-06-013.

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.

Attachment 1

PG&E Substations Associated with Renewable Resource Clusters