

# Transmission Proxy Costs

## Introduction

PG&E will consider the impacts on the electric transmission system in its evaluation of the Offer. One of the impacts relates to the capability of the transmission system to deliver the full output of the Offer from the first point of interconnection with the PG&E transmission system to serve load reliably. If there were insufficient capability, network upgrades would be needed. Network upgrades include transmission lines, transformer banks, substation breakers, voltage support devices and other equipment needed to transfer the generation output to the customer load. The specific network upgrades and their costs, if needed, are determined from the System Impact Study (SIS) and Facility Study (FS) of the CAISO Generating Unit Interconnection Procedure.

PG&E will use the cost estimates from the SIS/FS for evaluation. For projects that do not yet have completed SIS/FS, PG&E will use the preliminary results of the SIS/FS pending the availability of the completed studies, and if the preliminary results are not available, PG&E will use the transmission proxy costs for interim evaluation. This paper provides a description of the transmission proxy costs.

## Method

The transmission proxy costs are based on the method that was filed in compliance with CPUC Decision 04-06-013 and the method is summarized below:

- The assessment covers transmission network upgrades from the first point of interconnection of the resource to PG&E's transmission system towards the load. Direct Assignment facilities or "gen-ties" are not covered.
- The study assumed that energy from the resource would be delivered to the 230 kV bus at one of the substations listed in the next section.
- The cost estimates are based on proxy facilities that could mitigate potential congestion due to the addition of the potential resource. In developing the proxy facilities, results from other studies previously published by PG&E would be used where appropriate.

Only power flow (steady state) cases representing normal (all facilities in service) operating conditions were run. Significant changes (5 MW or higher) in flows on the transmission facilities due to the addition of 100 MW of generation to the 230 kV bus of the substation were noted and the results would be extrapolated to higher generation levels, up to about 1,000 MW.

Transmission facilities that may experience transmission problems during single contingencies were identified by comparing their loadings to the

threshold of 80% of their normal facility ratings. 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 an 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 is expected. For example, if a large resource is expected, a 500 kV line initially operated as two 230 kV circuits will be chosen over a 230 kV double circuit tower line (DCTL).

- The PG&E 2008 and 2010 Summer Peak base case, a Western Electricity Coordinating Council (WECC) 2008 Spring Partial Peak case, and the 2005 Light Autumn case were used as starting points (the same base cases used in the study in compliance with CPUC Decision 04-06-013.) These cases were updated to reflect current (as of May 2004) 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 and approved reliability and economic transmission upgrades.
- Voltage (reactive) Support is required to reliably transmit the generation to the load. This reactive support is needed in addition to the reactive power produced by a typical synchronous generator. 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 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 Offers. For this evaluation, each 100 MW of new generation is assumed to require a +50/-30 MVAR static var compensator (SVC) at a cost of \$5 million for voltage support. Thus, in addition to the transmission proxy costs listed in Table 1, voltage support costs proportional to the size of the generation would also be included in the evaluation.

- This study assumes that each 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.

### **Transmission Proxy Costs**

PG&E has developed the transmission proxy costs at the 230 kV level for seventeen substations as shown in Table 1. The locations<sup>1</sup> of these are shown in Figure 1.

The transmission proxy costs for the peak and off peak periods<sup>2</sup> are included in Table 1. For each substation, PG&E has identified several levels of possible additional transmission capacity and the related costs. Level 1 reflects the available transmission capacity after 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 SIS/FS studies. Thus, Level 1 would have no network upgrade costs except those associated with reactive power support. The next and subsequent levels reflect the next most cost-effective proxy network upgrade(s). The number of levels depends on the number of proxy network upgrades needed to accommodate up to about 1,000 MW new generation in each substation.

### **Applications of Transmission Proxy Costs**

It is important to note that the transmission proxy costs will be used solely for the purpose of ranking and evaluating Offers. The actual transmission network upgrade costs for a specific project, determined by the SIS/FS, may differ from the transmission proxy costs and PG&E is not responsible or liable for the deviation between estimated and actual costs.

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<sup>1</sup> PG&E has no prior knowledge where the new resources may be located and the substation selections are based on their locations (near gas transmission lines and spread out within NP15) and size (have 230 kV bus).

<sup>2</sup> Peak period is HE (hours ending) 7-22, Monday – Friday (except NERC holidays) for months Jun – Sep. Off peak period is the other hours.

**Table 1. Transmission Proxy Costs**

Substation @ 230 kV Bus	Peak period			Off peak period	
	Level	Max MW gen in each Level	Proxy facility costs (million)	Max MW gen in each Level	Proxy facility costs (million)
Bellota	1	550		0	
	2	450	\$30	100	\$57
	3			900	\$19
Cortina	1	200		0	
	2	800	\$72	1000	\$72
Cottonwood	1	300		200	
	2	200	\$232	800	\$185
	3	200	\$101		
Fulton	1	100		250	
	2	100	\$6	250	\$65
	3	400	\$107	500	\$50
	4	300	\$65		
Gregg	1	750		300	
	2	250	\$7	650	\$39
Los Banos	1	600		1000	
	2	400	\$7		
Metcalf	1	250		1000	
	2	600			
Moss Landing	1	1000		1000	
Newark	1	75		1000	
	2	925	\$122		
Panoche	1	1000		1000	
Rio Oso	1	0		200	
	2	650	\$20	400	\$47
	3			400	\$109
Round Mt	1	300		200	
	2	200	\$232	200	\$119
	3	200	\$101	600	\$116
San Mateo	1	1000		1000	
Table Mt	1	0		0	
	2	1000	\$36	400	\$191
	3			600	\$19
Tesla	1	1000		700	
	2			300	\$45
Vaca Dixon	1	300		150	
	2	100	\$62	850	\$50
	3	200	\$107		
Wilson	1	450		0	
	2	550	\$19	1000	\$47

**Figure 1. Locations of Substations**

