

Humboldt Area Generation Resource

Background

The Humboldt transmission area covers about 3,000 square miles, and is located at the northwest corner of PG&E's service territory. Eureka and Arcata are among the major electrical load centers.

Electric demand in the Humboldt area typically peaks during the winter months. The expected 1-in-10 winter peak load in 2004 is about 190 MW, including loads served by self-generation facilities. Load growth is minimal in this area, averaging about 1 MW per year.

Humboldt area load is served by local generation and power imported through four long transmission lines. Local generation is summarized in Table 1. It consists of two 50 MW thermal generators and two 15 MW mobile gas turbines owned by PG&E and about 100 MW of other generators. Import is via four transmission lines: two 115 kV lines from Cottonwood in the east, one 60 kV line from Trinity in the east and one 60 kV line from Garberville in the south.

The "Humboldt Long-Term Study", conducted in 2002, found that with the existing generation, the transmission system is sufficient to serve the area load reliably for the next 10 years. However, if 30 MW or more internal generation is retired, the system would not be able to serve the projected 2012 load of 198 MW reliably under emergency condition of losing one transmission facility. If 100 MW or more generation is retired, the 2012 load could not be served even under the normal operating conditions (all facilities in-service.) Therefore either maintaining the generation system or increasing the import capability to compensate for any generation retirement would be needed to continue to serve the Humboldt area load reliably.

The objective of this study is to provide the guidelines from transmission system perspectives for evaluating offers for new generation in the Humboldt area to replace the old and inefficient PG&E generators without upgrading the import capability.

Humboldt Bay Power Plant Replacement

The Humboldt Bay Power Plant consists of four units: two 50 MW thermal generators and two 15 MW gas turbines.

From a transmission perspective, the replacement should have the following characteristics:

Quantity

The quantity (MW) of replacement generation should be similar to the generator it replaces.

Based on the 2002 study, reliability concerns would arise with 30 MW or less generation. Therefore, the replacement quantity should not be less. However, the replacement quantity should not be so large to make Humboldt an exporting area¹. Since the 2002 study showed that the internal generation and load differs by only 15 MW, it is recommended that no more than 150 MW be procured to replace the 130 MW generation from these four units.

Size of unit

The replacement units should not be larger than 50 MW each and the power plant should be designed such that a common event would not cause the loss of multiple units totaling more than 50 MW (e.g., the units share one step-up transformer, one generation outlet line, etc.)

Based on the CAISO Planning Standards, the reliability of a transmission system is determined by its performance under normal (all facilities in service) and contingency conditions (loss of one or more facilities.) In order to meet the normal and the Level B contingency (loss of a transmission line, generator, transformer, or a generation plus a line) criteria, the loss of more than 50 MW would create significant reliability problems that may require upgrades to the import capability. Therefore, it is recommended that a common event would not cause the loss of more than 50 MW.

Location of unit

Humboldt area has an electric transmission system that is comprised of 60 and 115 kV facilities. The thermal capability of the 115 kV lines within the Humboldt area ranges from 60-107 MVA and the 60 kV lines ranges from 20-60 MVA. Depending on the size and location, the transmission system may not be able to accommodate the replacement generation without system upgrades. The transmission proxy costs discussed in this section provide an indication on the magnitude of the system upgrades.

In this study, the system impacts were evaluated one substation at a time. For each new level of generation added to a substation, an equal quantity of generation is reduced from the Humboldt Bay Power Plant. Power flow simulations for the normal and Level B contingency conditions were conducted. The list of Level B contingencies studied is shown in Appendix A. Transmission proxy facilities assume adding a new transformer for an overloaded transformer, reconductoring for an overloaded line, and adding reactive

¹ Even though the Humboldt transmission system can support some export, it is undesirable to do so because most of the export would end up in Cottonwood area. Cottonwood area is resource rich and faces congestion in exporting its resources and any additional resource would exacerbate the problem.

support proportional to the level of new generation (\$50,000 for each MW of generation). The cumulative effect of new generation at more than one substation was not studied.

Figure 1 shows the transmission system and the substations for which transmission proxy costs were determined. The replacement power is assumed to be delivered to the 60 kV bus of these substations. Since the Humboldt and Bridgeville Substations have 115 kV bus, the transmission proxy costs for delivery to the 115 kV bus (specifically designated) were also evaluated. The transmission proxy costs do not include any direct assignment facilities (gen-ties) that would be needed to connect the generation to the bus.

For a copy of Figure 1, please send a request to ARC@pge.com along with the following:

1. State you are requesting a copy of the Humboldt Transmission System Figure 1.
2. Your name.
3. Your title.
4. Name of your company/organization.
5. Your e-mail address at you company/organization.
6. Your company/organization telephone number where you can be reached.

Table 2 summarizes the transmission proxy costs for these substations. For each substation, PG&E has identified two levels of possible additional transmission capacity and the related costs. Level 1 reflects the available transmission capacity. Thus, Level 1 is expected to have no network upgrade costs except those associated with reactive power support. Level 2, if necessary, reflects the proxy upgrade(s) to accommodate the additional generation beyond the Level 1. The total of Level 1 and 2 generation would be 50 MW except for Arcata (100 MW), Humboldt (150 MW), Bridgeville 115 (100 MW) and Humboldt 115 (100 MW.) The transmission proxy costs for the peak and off peak periods² are included in Table 2. Also included in Table 2 are the costs of the upgrades if the upgrades for the off peak period are different from the peak period.

It is important to note that the transmission proxy costs will be used solely for the purpose of ranking and evaluating Offers. The transmission network upgrade costs for a specific project would be determined by the SIS/FS and would be the basis upon which the interconnection would be implemented. Therefore, the SIS/FS costs may differ from the transmission proxy costs and PG&E is not responsible or liable for this difference.

² The 2009 winter peak and 2009 summer off peak (roughly 50% of winter peak load) base cases were used to in this study.

Table 1. Generation in Humboldt Area

Generation Facility	Type	Normal Schedule (MW)	Capacity (MW)
Pacific Lumber-Scotia (QF)	Biomass	10	20
Pacific Lumber-Carlotta (QF)	Biomass	10	20
Fairhaven Power (QF)	Biomass	16	17.3
Kekawaka (QF)	Hydro	5 (During winter months)	5
Ultra Power Blue Lake	Biomass	0	11.4
Louisiana Pacific (Arcata) LP Samoa	Biomass	12	25
Humboldt Bay Power Plant Unit No. 1	Thermal	50	51
Humboldt Bay Power Plant Unit No. 2	Thermal	50	52
Humboldt Mobile Gas Turbine Unit No. 1	Thermal	15	15
Humboldt Mobile Gas Turbine Unit No. 2	Thermal	15	15
Total		183	231.7

Table 2. Transmission Proxy Costs

Substation	Peak Period			Off Peak Period			
	Level MW	Max MW gen in each level	Proxy facility costs (\$000)	Level MW	Max MW gen in each level	Proxy facility costs (\$000)	Proxy facility different from Peak (\$000)
Arcata	1	70		1	50		
	2	30	5,025	2	50	5,025	0
Bridgeville	1	0		1	30	0	
	2	50	36,000	2	20	18,000	0
Eel River	1	50		1	45		
	2			2	5	2,100	2,100
Eureka	1	50		1	45		
	2			2	5	1,100	1,100
Fort Seward	1	0		1	35		
	2	50	27,240	2	15	22,900	21,600
Fruitland	1	0		1	25		
	2	50	30,340	2	25	22,400	18,000
Garberville	1	0		1	35		
	2	50	39,300	2	15	33,000	21,600
Hoopa	1	0		1	20		
	2	50	31,400	2	30	8,400	0
Humboldt	1	150		1	100		
	2			2	50	18,000	18,000
Maple Creek	1	0		1	40		
	2	50	7,800	2	10	4,900	2,100
Orick	1	30		1	30		
	2	20	7,320	2	20	7,320	0
Rio Dell	1	15		1	0		
		35	20,140		50	7,320	0
Trinidad	1	35		1	30		
		15	3,820		20	3,820	0
Willow Creek	1	0		1	35		
	2	50	11,800	2	15	8,900	2,100
Bridgeville 115	1	0		1	80		
	2	100	37,080	2	20	18,000	0
Humboldt 115	1	0		1	60		
	2	100	18,000	2	40	18,000	0

Appendix A. Level B Contingencies

#	Contingency (loss of the following facilities)
1	Garberville-Birdgeville 60
2	Humboldt Bay-Rio Dell Jct 60
3	Bridgeville-Rio Dell Jct 60
4	Rio Dell Jct-Rio Dell 60
5	Fairhaven-LP Samoa 60
6	Maple Creek-Trinity 60
7	Humboldt-Arcata-Janes Creek 60
8	Eureka-Eureka A 60
9	Humboldt-Humboldt Bay 115
10	Humboldt-Bridgeville 115
11	Humboldt-Trinity 115
12	Bridgeville-Cottonwood 115
13	Orick-Essex Jct 60
14	Arcata-Essex Jc-Fairhaven 60
15	Humboldt-Fairhaven 60
16	Humboldt-Eureka 60
17	Humboldt-Humboldt Bay #2 60
18	Humboldt-Humboldt Bay #1 60
19	Humboldt-Maple Creek 60
20	Humboldt Bay-Eureka 60
21	Maple Creek-Hoopa 60
22	Garberville-Willits 60
23	Bridgeville 115/60 transformer
24	Humboldt 115/60 transformer (1)
25	Humboldt 115/13 transformer
26	Humboldt 115/60 transformer (2)
27	Pac. Lumber 2 gen
28	Humboldt TT #1 gen (syn cond)
29	Humboldt 1 gen (50 MW)
30	Humboldt 2 gen (50 MW)
31	LP Somoa gen
32	Fairhaven gen
33	Pac. Lumber 1 gen
34	Humboldt 2 gen + Bridgeville-Cottonwood 115
35	Humboldt 2 gen + Humboldt-Trinity 115
36	Fairhaven gen + Humboldt-Arcata-Janes Creek 60