

Alternate Design Energy Cost

The CHP system selected for City Hospital P 1& 2 has the capability to produce 1.21 MW of electricity and 9.6 MMBtu/hr of Steam. With 8,520 operating hours per year, the prime mover consumes 781.4 lbm/hr of natural gas, or 1.34 million therms of natural gas per year. At the same time, it reduces boiler steam production by 9.6 MMBtu/hr, or 1.02 million therms of natural gas per year. As a result, the natural gas consumption of the alternate design will be \$2.29 million per year, \$576,000 more than the existing design (*Appendix i and iii*).

Calculating electricity cost for the alternate design are bit more challenging. City Hospital's electricity provider does not have a "standby" rate for on-site generation. Instead, it impose a "Customer Transition Charge" depended on the percentage of hours which the generator goes off-line in the previous fiscal year. As a result, "standby" electric tariff from two (2) nearby electricity providers are studied.

PECO, provide electric distribution service in southeast Pennsylvania. It imposed a demand charge of \$3.22/kW in addition to base rate. Therefore, the cost of electricity of the alternate design for City Hospital P 1&2 would be \$1.80 million (\$0.133/kWh), an annual saving of \$826,000 (*Appendix iii*).

Bucknell University, located at central Pennsylvania has a similar CHP design in placed. Bucknell pays its utility provider 80% of their demand without CHP in addition to the actual usage. With a 1.21 MW generator in place, and at the rate of \$13.52/kW, it would cost City Hospital \$157,000 annually on "standby" charge. Even so, the electricity cost of alternate design would be \$1.82 million (\$0.134/kWh), an annual saving of \$809,000 (*Appendix iii*). Bucknell's "standby" rate is 1% higher than the PECO's "standby" rate. Hence, the difference is relatively insignificant.

The alternate design would cost City Hospital \$576,000 more for natural gas. Since natural gas cost \$19.50 less per MMBtu than electricity, the alternate design would save City hospital \$250,000 annually in energy cost for P_1&2 alone.