

## FDLE Chiller Replacement

This chiller replacement project is currently under way at the DMS-managed FDLE headquarters facility in Tallahassee. The scope of work is to replace the two 450-ton centrifugal chillers that have been operating since the facility was originally constructed in 1987. The existing chillers are beyond the end of their useful life.

DMS engineers performed a life-cycle cost analysis to evaluate the long-term energy performance and financial performance of several different types of new chiller systems. This analysis evaluated the total cost to own, operate, and maintain each potential chiller option over a 25-year period. DMS concluded that water-cooled centrifugal chillers outfitted with variable speed compressors were the most cost effective option. This same option also happened to be the most energy efficient option analyzed.

DMS engineers then proceeded to conduct a life-cycle cost bid for the purchase of the new chillers, and the results were quite surprising. Although each bid contained the same general type of new equipment (i.e., the water-cooled centrifugal chillers with variable speed compressors), the energy efficiency and long-term cost implications of the bids ranged dramatically. The actual bid results are provided here:

Chiller Bid Results for FDLE Tallahassee (Chiller Equipment Only)

Cost Category	Option #1	Option #2	Option #3
Chiller Bid Price (both chillers)	\$451,004.00	\$321,475.45	\$395,338.00
Extended Warranty & Service	\$54,948.00	\$60,960.00	\$47,160.00
Total First Cost (bid price + warranty)*	\$505,952.00	\$382,435.00	\$442,498.00
Annual Operating Cost	\$111,809.41	\$147,401.37	\$106,100.40
Life-Cycle Operating Cost (present value)	\$1,946,601.86	\$2,566,257.84	\$1,847,207.94
Total 25-Year Life-Cycle Cost (present value)**	\$2,452,553.86	\$2,948,693.29	\$2,289,705.94

\*The Total First Cost = Chiller Bid Price + 5-Year Extended Warranty & Service

\*\*The Total 25-Year Life-Cycle Cost = Total First Cost + Life-Cycle Operating Cost

Looking closely at the bid results it can be seen that Option #2 was the lowest first-cost option at \$382,435, but Option #3 was the most energy efficient based upon the annual operating cost. Option #3 was selected because the simple return on investment (ROI) on the additional first cost will occur in less than two years. The supporting ROI calculation is as follows:

$$ROI \text{ (Option \#3 vs. Option \#2): } (\$442,498.00 - \$382,435.00) \div (\$147,401.37 - \$106,100.40) = 1.45 \text{ years}$$

Choosing Option #3 instead of Option #2 cost \$60,000 more up front, but saves \$658,000 (present value) in life-cycle costs. Further analysis also indicates that even if Option #2 was offered (hypothetically) by its manufacturer at no cost, Option #3 would still be the best choice because it would still provide the lowest total life-cycle cost. Additionally, choosing Option #3 instead of Option #2 saves 430,000 kWh annually, or about six percent of the facility's annual energy consumption.

During the review of the bids, it was found that Option #2 just barely complies with the Florida Energy Code, proving that dramatically exceeding minimum standards can be extraordinarily cost effective.