WaterWorld



# FREESE AND NICHOLS HELPS DFW AIRPORT ESTABLISH ENERGY-USE REDUCTION PLAN

Energy Analysis Finds Elevated Storage Tank Would Save 1.6 Million Kilowatt Hours and Decrease CO2 Emissions by 2,030 Tons

### Model Development and Conversion

When the Dallas/Fort Worth International Airport (DFW) engineering staff explored opportunities for cost savings in DFW's water system, it retained Freese and Nichols, Inc., a Fort Worth civil and environmental engineering firm, to update the airport's water and wastewater models and analyze its capital improvement plan. Freese and Nichols first converted, developed, and calibrated the existing water and wastewater system models. It successfully accomplished this using the GIS-ID (to maintain associations between records in the source file and elements in the model) and the modeling building tools in Bentley's WaterGEMS and SewerGEMS software. The model development and conversion tools enabled engineers to update and maintain the model as the system grew, providing a cost-effective method for switching software packages. And, as an added benefit, WaterGEMS

and SewerGEMS integrated easily with the Bentley products already in use at DFW.

The airport's water system functions as a closed system in which pressure is controlled by transferring water between the two pump stations, recycling it into ground storage tanks. The unique valve and system pressure monitoring techniques available in WaterGEMS helped reduce the amount of time previously required by calibration efforts, further increasing the value of converting the water model to WaterGEMS.

**Energy Savings**

Freese and Nichols engineers determined that adding an elevated storage tank in the airport's 2009 Water Capital Improvement Plan would improve energy efficiency. They then used the energy cost analysis tools in WaterGEMS to calculate the amount of electricity the tank would save DFW airport. They compared the operation of the system with and without an elevated storage tank under maximum-day and average-day operating scenarios.

During maximum daily demand frequent pumping is still required, as illustrated in Figure 1. The graph does not show a significant divergence until approximately 10 p.m., when water demand decreases and the elevated storage tank allows for reduced pumping. The engineers found that over a 48-hour period the elevated storage tank reduces energy consumption by approximately 35 percent.

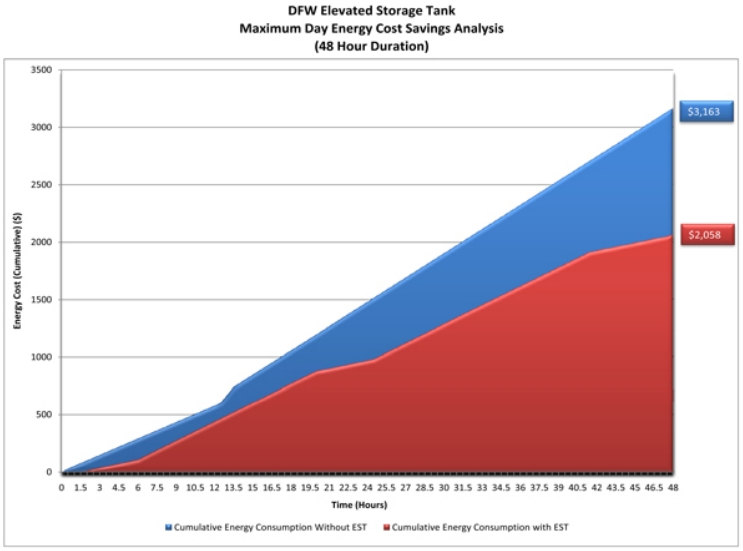


*Fig. 1: An illustration of cost savings experienced during maximum daily demand*

Figure 2 illustrates the cost savings during

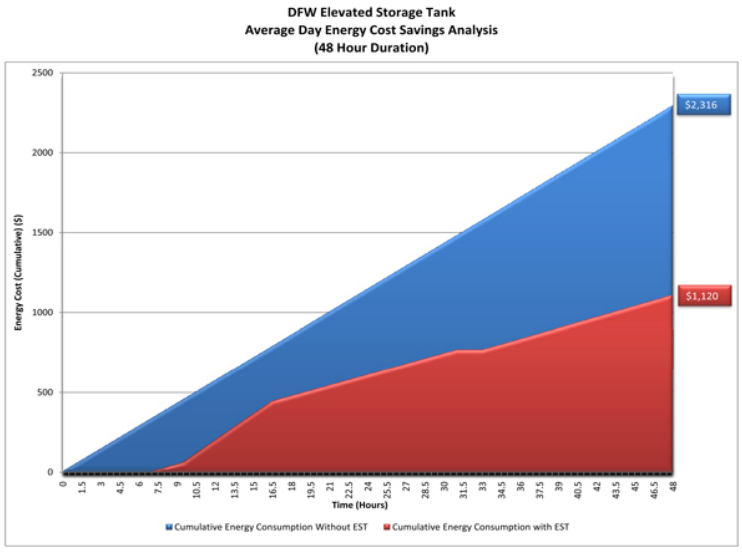


*Fig. 2: An illustration of cost savings experienced during average daily demand*

average-daily demand provided by the elevated storage tank and the energy savings calculated in WaterGEMS. The tank completely eliminates the need for pumping during low demand periods. Without the elevated storage tank, the pumps would still be required to operate during off-peak hours to maintain system pressure. The estimated reduction in energy consumption is approximately 51 percent, which would save about $117,000 in energy costs per year at current water usage rates.

## Environmental Benefits

The energy cost analysis provided by WaterGEMS is evidence of a positive cost-to-benefit ratio in energy savings over the life of the elevated tank. It is estimated that the elevated tank would reduce the number of kilowatt hours by 1.6 million. It would also have the net effect of reducing the carbon footprint of the DFW airport by 2,030 tons of CO2 per year, which is equivalent to removing the carbon emissions of more than 2,000 cars for an entire year.

For more information about WaterGEMS, visit www.bentley.com/WaterGEMS