PUMPING OPTIMIZATION: THE CITY OF LAKEWOOD

Lakewood, California

PROJECT DESCRIPTION

A real-time plot of Pump Head vs. Pump Flow for a single pump, which allows the City of Lakewood to evaluate the operating efficiency of the pump and make adjustments as necessary.

The City of Lakewood in California, which serves drinking water to a population of about 60,000, is working to increase the energy efficiency of its pumping operations. They've recently implemented a multi-year pilot program for real-time pump testing with software provided by Specific Energy. Using this software, the City of Lakewood can monitor the efficiency of pumps—five well pumps and eleven booster pumps from two booster stations—in real time and make changes to pumping operations based on pump efficiencies. With the software implemented, they visualize in real-time the energy intensity (per unit of water, how much energy the pump is using) of each pump in the system and thus can clearly see which pumps are operating more efficiently. With this information, they can adjust pumping loads to pumps that are operating more efficiently. They are also able to better understand which pumps need repairs or replacement and when it makes sense to install variable frequency drives (VFDs). Currently, the main benefit from the software that the City of Lakewood sees is with booster stations with one or more VFDs. With these pumps, the software allows the City of Lakewood to choose to run the most efficient pumps within booster stations, to better control the power frequency of pumps with VFDs, and to identify which pumps are wearing down and/or need to be replaced.

Although the City of Lakewood doesn't yet have final data on energy savings or cost-benefit from the software implementation, they expect the software will save them money overall because the real-time data makes it so clear which booster pumps are most efficient at operating conditions, thus allowing them to adjust operations as necessary. The early benefits have been determining which existing pumps or wells are good candidates for VFDs, as well as better understanding pump conditions.

FINANCES

The City of Lakewood is committed to piloting the software for three years. The costs for the first year included $90,000 for the first year software license and the equipment necessary to set up the system, plus another $4,000 for a SCADA contractor. The cost for the final two years of the program is $9,000 per year, which goes toward the software license. This three-year pilot project will have a total cost of $112,000. For funding the project, The City of Lakewood received an $80,000 incentive from Southern California Edison's Demand Response Program, with the City of Lakewood paying the final $32,000 of project costs.

MAKING THE PROJECT HAPPEN

The City of Lakewood has a culture dedicated to providing the best customer service, sustainable operations, and efficiency. This combination of motivations allows them to pursue efficiency projects such as this pumping optimization project. They were also motivated by financial incentives from Southern California Edison, the local electric utility. These incentives encourage engagement with newer technologies that might otherwise be difficult to justify spending money on. And finally, the City of Lakewood works to keep cost of service as low as possible, which helped motivate them to pilot the pump optimization software as it may lead to significant energy cost savings down the road.

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PUMPING OPTIMIZATION PROJECT

The City of Lakewood

IMPLEMENTATION

The City of Lakewood's water department was the only department involved in implementing this project, but they also needed to coordinate with the City's incentive funding group due to the financial incentive from Southern California Edison. To implement the software, the City of Lakewood first needed to install some hardware at its pumps. The hardware installation included installing power monitors, water level transducers, and dynamic pump optimizers (DPOs), which connect directly to program logic controller (PLC). The DPOs send data to the cloud for analytics. Additionally, they installed power monitors at the pumps to measure specific energy (kWh/mgal), which allows for calculating pump efficiency. The City of Lakewood had to install this hardware on its own, with a SCADA contractor installing the DPOs. There were no permits necessary to implement this project.

CHALLENGES

A challenge that has emerged in implementing this pump optimization software is that Specific Energy doesn't yet have a dashboard set up that combines the booster pumps and well pumps as one full system, which prevents the City of Lakewood from making system-wide pumping adjustments. For now, they are limited to making adjustments amongst the pumps at each booster pump station and with individual pumps that have VFDs. That said, Specific Energy will be creating a custom dashboard for the City of Lakewood that combines the well pump and booster pump information in one location.

However, until they have the full system dashboard showing booster pumps and well pumps together, it'll be difficult to make any further adjustments of the well pumps based on the software data. When the full system dashboard is set up, the new data could potentially allow them to operate different wells at different times. Another early challenge has been measuring the exact cost-benefit of the software, but more data on that will likely emerge in the years to follow.

ADVICE AND LESSONS LEARNED

The City of Lakewood recommends that if a utility has booster stations with multiple pumps, then this pumping optimization software it is a very powerful tool that tells so much that you don't know, especially if you have VFDs. A utility that is looking into using this software should understand its system and be cautious of doing "auto control" (allowing the software to make decisions for the pumping operations). Know that you are the expert of your system, not the company implementing the software. A final note from the City of Lakewood is that the software currently runs in the cloud, which could be a barrier for larger utilities due to data management policies.

LEARN MORE

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