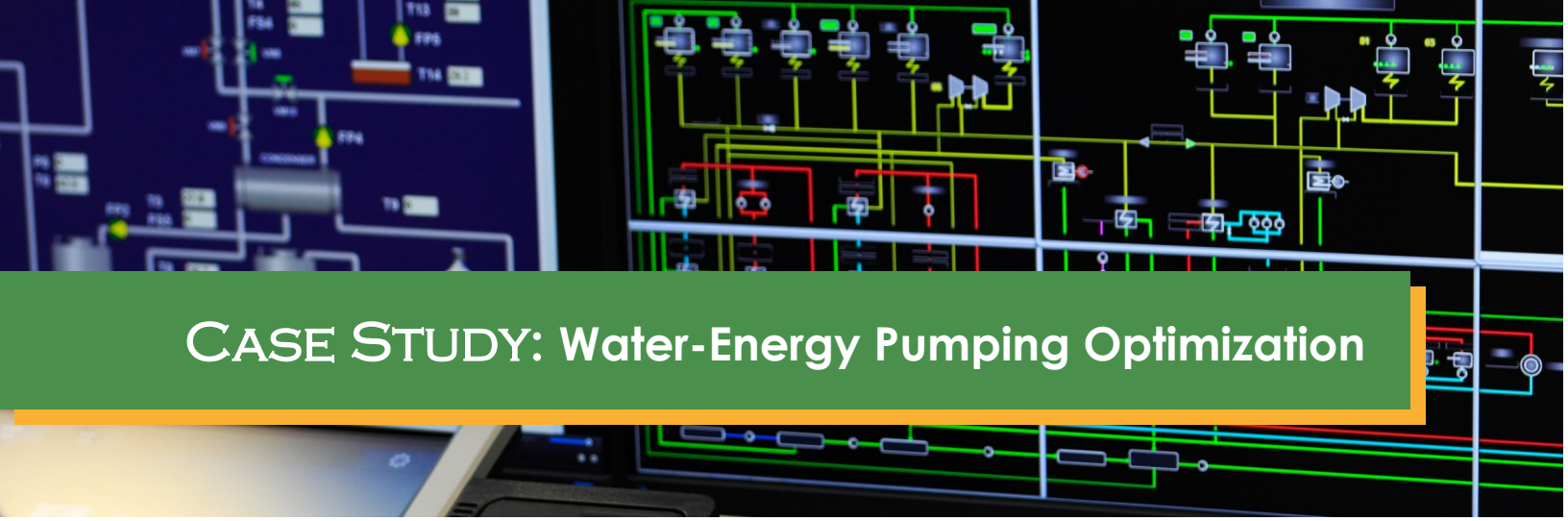


CASE STUDY: Water-Energy Pumping Optimization

Introduction

The San Jose Water Company is a public utility which serves 220,000 customers in the Greater San Jose metropolitan area. Their 102 water pumping stations pump approximately 50,000 million gallons per year. The utility consumes about 56.4 million kWh of electrical energy annually.

BASE Energy Inc., in collaboration with the San Jose Water Company (SJWC) and Pacific Gas and Electric Co. (PG&E), performed a feasibility study for implementing an energy-pumping optimization algorithm through a Supervisory Control and Data Acquisition (SCADA) System using real-time energy consumption data.

Project Background

Three well pump stations at SJWC were selected to be monitored for the study. All well pump stations pump into the same water pressure zone. The operation of each pump station is based on the station's discharge pressure. The set points change by time-of-day and by season to reduce time-of-use energy costs.

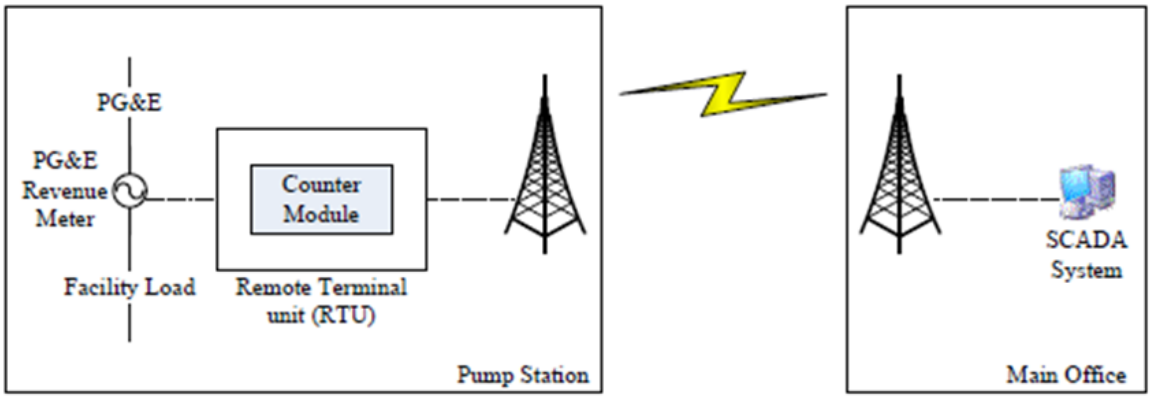
The existing PG&E revenue meters were connected to the facility's existing SCADA system to monitor electrical energy consumption of the pumps at each station. Pumping electrical energy consumption was measured and evaluated under the existing pump control scheme.

The aggregate flow and energy consumption from all pump stations showed energy intensities ranging from 1,518 kWh/MG to 1,730 kWh/MG. Analysis of energy intensity at various stations' flow rates for the three pump stations showed that the greatest pumping optimization opportunity is from correctly sequencing individual pumps in the stations. This could be achieved by using an optimization algorithm to select the combination of pumps with the lowest pumping energy intensity (kWh/MG) capable of delivering the required flow rate.

BASE ENERGY

BASE Energy, Inc.

Case Study: Water-Energy Pumping Optimization



Proposed Results

Based on the annual water demand profile, the potential pumping energy intensity after implementation of the proposed optimization was calculated. The estimated savings for the three monitored well pump stations include:

- 313,237 kWh/yr, representing 6% of the current electrical energy usage
- $35,588/yr energy cost savings*
- $6,450 project cost

*assuming an energy unit cost of $0.12/kWh

Additional Opportunities

Two secondary opportunities were also identified at the facility which would further reduce pumping energy intensity:

- Distribute water across more than one pump station before turning on a second pump in any given station, saving a potential 0.6%
- Run pumps with high flow, modulating with on/off control, rather than pumps with lower flow continuously, saving a potential 5.2%

BASE ENERGY

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