



COLORADO INDUSTRIAL ENERGY CHALLENGE

Improving Efficiency, Reducing Costs and Emissions

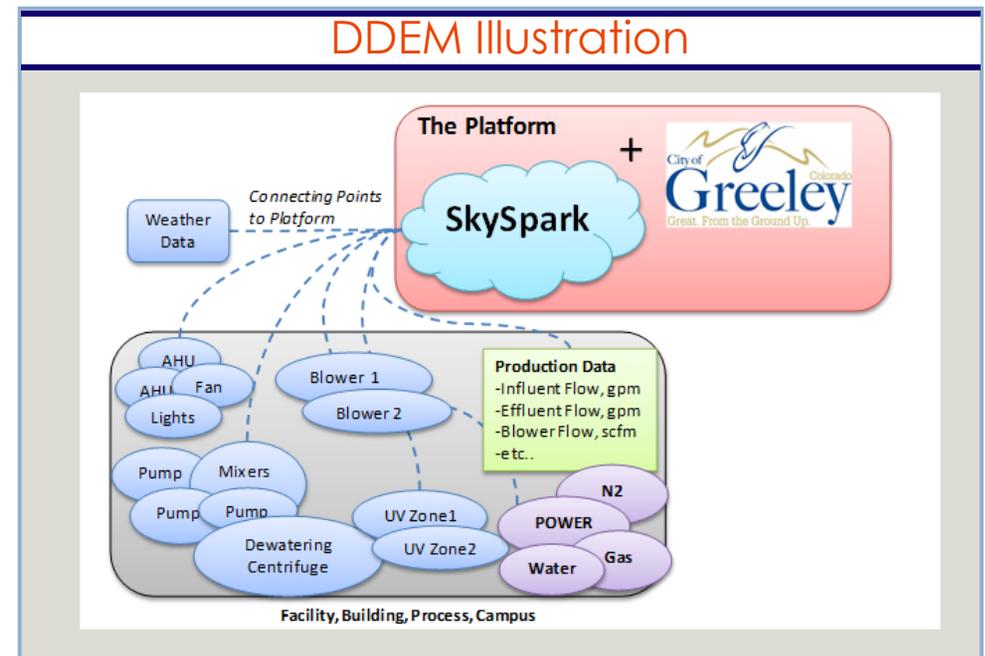
PROFILES IN INDUSTRIAL ENERGY EFFICIENCY

Data-Driven Energy Management Helps the City of Greeley Track and Save Energy

Overview of Data-Driven Energy Management

Data-driven energy management (DDEM) entails developing automated systems to collect, analyze and present real-time (or near real-time) energy data in order to facilitate better operating practices and to help identify new opportunities to reduce energy consumption. DDEM also helps facilities to measure energy savings over time.

Implementing DDEM may require installation of additional sensors or sub-meters, and requires a software platform such as SkySpark to analyze and display real-time energy data.



Quick Facts

Location: City of Greeley Water Pollution Control Facility

Plant Discharge Point: Cache La Poudre River

Population Served: 95,600 (2012 Census)



Process Data Tracking

The Greeley WPCF tracked and collected robust real-time process data using a SCADA system and stored the information in a SQL database. However, the real time data was not typically viewed by operators until a day after it was collected.

Energy Data Tracking

Prior to implementing a data-driven energy management plan, the Greeley WPCF tracked monthly energy consumption per million gallons of treated effluent (kWh/MG), using energy data derived from utility bills. This allowed operators and facility managers to analyze trends in monthly consumption vs. gallons treated. However, monthly data is too coarse to diagnose and correct daily performance issues, or to establish a facility baseline model for energy consumption to track performance over time in a meaningful way. In addition, the facility's main power meter was not functioning properly and was not providing 15-minute interval power data to the facility operators.

As part of their participation in the Colorado Industrial Energy Challenge, the WPCF set a goal to reduce energy consumption by 20% from 2011-2016. The facility had already implemented a series of projects to reduce energy consumption; from 2011-2012, the facility had successfully reduced energy consumption by 11%. In order to further optimize energy performance at the facility and achieve their 20% energy reduction goal, the WPCF worked with ETC Group, an international energy efficiency consulting firm, to establish a data-driven energy management strategy.

Implementing Data-Driven Energy Management at the Greeley WPCF

The fundamental goal of data-driven energy management is to collect energy-specific data and maximize its value. To do this, ETC group assisted the Greeley WPCF by installing the necessary hardware and software to pilot a DDEM system at the facility.

Hardware

In order to effectively manage energy consumption, a variety of sub-meters that continuously collect data are needed to acquire an accurate breakdown of energy use. For the Greeley WPCF, this meant replacing broken sub-meters and integrating additional sub-meters, which provide power and consumption data in 15-minute intervals. As a result, data managers are able to continuously manage energy usage and adjust equipment to achieve optimal energy efficiency. The Greeley WPCF had expressed interest in updating its sub-meters in the future; the implementation of DDEM helped expedite these equipment upgrades.

Software

DDEM requires meaningful and actionable display of real-time data. The Greeley WPCF is using the SkySpark software to tie the information together in a user-friendly visual display which allows site operators to effectively interpret data, identify opportunities, and adjust operations as needed. (Other similar software products are available.)

DDEM Costs and Savings

Hardware costs

In total, the Greeley WPCF will spend an estimated \$40,000 dollars upgrading and calibrating sub-meters in 2013. However, the city would have done most of these upgrades even without implementing DDEM.

Software costs

Initial cost of the SkySpark software is about \$900-\$1 100, depending on number of data points, with an additional maintenance fee of about \$200 per year. Custom integration and engineering support are additional costs.

Savings

ETC Group estimates that implementing DDEM will typically result in energy savings of 3-5%, although greater savings are also possible.

In 2012, the Greeley WPCF's total electricity costs were about \$390,000. A 3-5% energy reduction from implementing DDEM would save the facility about \$12,000-\$19,500 per year.

Benefits from Implementing DDEM

Whole-facility Monitoring

Whole facility monitoring using data-driven energy management enables the facility to develop a normalized facility baseline model. In the case of the Greeley WPCF, the energy data indicated that influent flow and outside air temperature are the likely drivers of energy consumption at the plant. Therefore, these two variables were used to establish a baseline energy model of energy consumption, which can then be used to continuously monitor performance and measure energy savings from projects or other operating improvements. Creating a baseline energy model thus allows the facility to continuously work towards meeting its 20% energy saving goals.

Operator-level Monitoring

The sub-meters installed at the Greeley WPCF provide visibility into performance levels required to manage operations and maintain energy savings gains. Facility staff are able to analyze power consumption in real-time, enabling them to make smarter operating decisions and save energy on a daily basis. By monitoring equipment such as influent pumps, aeration basin blowers, and RAS (return activated sludge)/WAS (waste activated sludge) pumps, the staff is able to discover performance-related maintenance issues and identify optimum pump staging and control. Operator-level monitoring also enables energy managers to establish system-level metrics to monitor performance, identify saving opportunities, manage saving gains, and verify improvements.

For More Information

ETC Group

Chris Binger
Senior Engineer
801-278-1927
cbinger@etcgrp.com

SWEEP

Neil Kolwey
Senior Associate
303-499-0213
nkolwey@swenergy.org