CASE STUDY:

INDUSTRIAL WWTP – BIOPROCESS AERATION CONTROL SYSTEM (BACS) APPLICATION

CITY OF QUINCY, WA

INSTALL DATE: JUNE 2015

SYNOPSIS

Energy efficient blowers and BioChem's BACS control system were installed at this industrial wastewater treatment plant case. These combined technologies are providing the plant a 57% savings in energy. That is equivalent to a $97,000 reduction in electric power use per year. Thus, the investment including rebates from the Grant County Public Utility District will be fully recovered in just over 3.5 years.

BACKGROUND

The plant treats just over 3MGD using two alternating-duty, sequencing batch reactors (SBR). The project was originally initiated by the failure of one of the plant's 600hp, multi-stage centrifugal blowers. Based on BioChem's recommendation, two 320hp positive displacement blowers with variable frequency drives were installed; so that the output of the blowers could be paced to the variable loads associated with the waste stream and SBR process. BioChem provided its patented, self-tuning BACS control software, equipped the main control panel with customized HMI, and integrated the plant's local blower and other control room functions to this panel using Ethernet and Modbus RTU communication. BioChem partnered with Pace Engineering and Atlas Copco on this project.

CHALLENGE

This project presented various challenges; mostly having to do with the physical space to locate the blowers, different communication protocols within the plant, and the need to program an airflow "floor" into the control algorithm in the interest of maintaining minimum mixing even during periods of otherwise low process oxygen demand. These minimum aeration rates for mixing had to be customized for the unique shape and aerator characteristics of each basin. These challenges were well within the grasp and technical expertise of BioChem engineers. Even though SBRs are generally among the least complicated of treatment processes, and even though this plant's cost of energy is less than half the national average, the savings were still dramatic in size.

EXECUTION

BioChem's Bioprocess Aeration Control System (BACS) was installed to tackle the challenges in this project.

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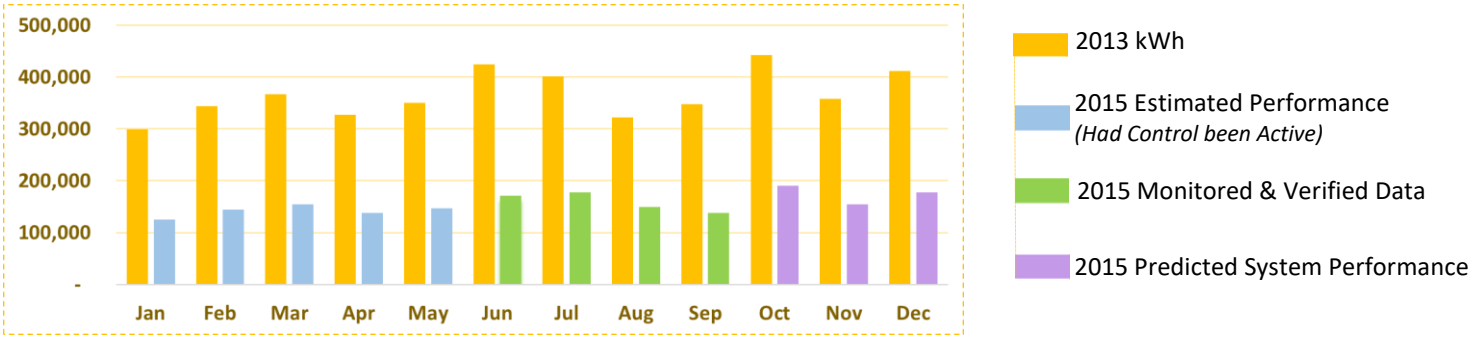
EXECUTION CONTD.

- BioChem designed and provided the main control panel supporting Modbus, Ethernet IP and analog 4-20mA communication protocols, tying all systems seamlessly together.
- Installed and customized (according to minimum mixing requirements) its patented, energy saving BACS control software.
- Completed full integration and commissioning with less than a week on site.
- Performance results were monitored over a four-month monitoring and verification period against a prior year baseline.

RESULT

Observed and documented (Pace Engineering) power savings of 57% were achieved with no degradation of process performance. These savings, which translate to $97K annually. That saving, coupled with a $240K rebate awarded by the public utility, provide a payback period on the entire project (blowers, VFDs, instruments, software) of just over 3.5 years.

Quincy Energy Savings Projections



Quincy Power Saving

	2013 Power Use (k Wh)	2015 Power Use (k Wh)	Power Reduction (k Wh)
Jun	424,200	171,000	253,200
Jul	401,400	177,600	223,800
Aug	321,600	148,800	172,800
Sep	347,400	138,000	209,400
Total *(Jun - Sep)*	1,494,600	635,400	859,200

Quincy Cost Saving

	2013 Power Cost	2015 Power Cost	Cost Savings
Jun	$11,670	$4,704	$6,966
Jul	$11,170	$4,942	$6,228
Aug	$9,554	$4,421	$5,133
Sep	$8,995	$3,573	$5,422
Total *(Jun - Sep)*	$41,389	$17,640	$23,749

57%