

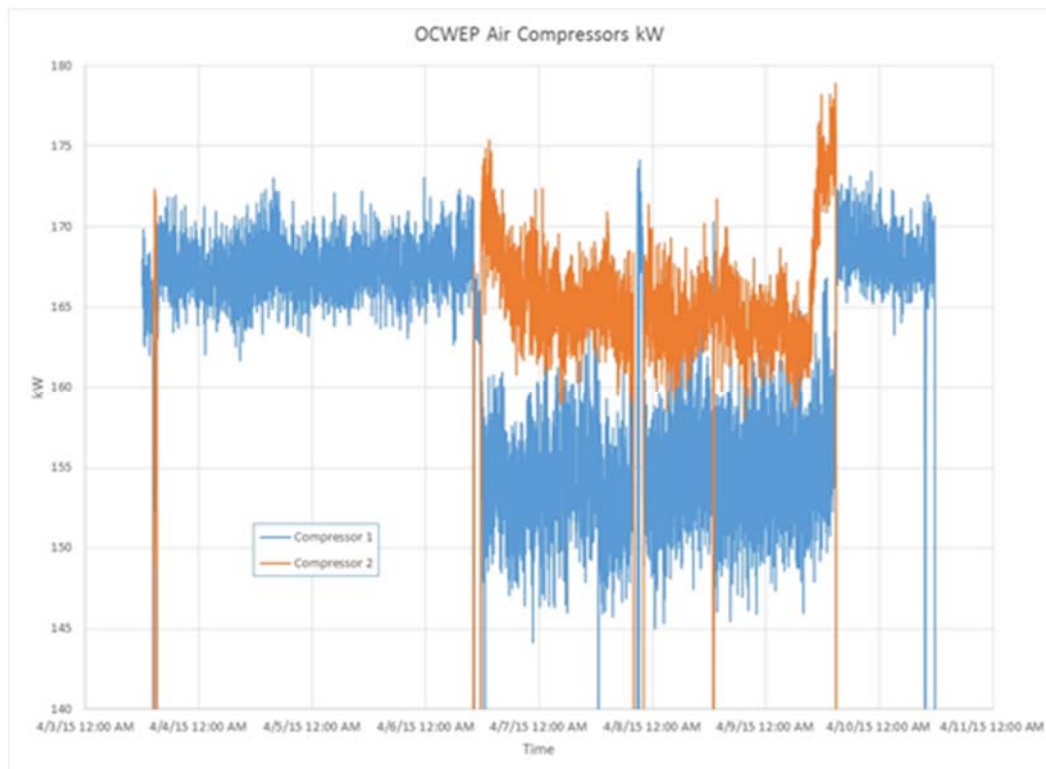


To: Onondaga County Water Environmental Protection
From: Jim Olcott, P.E.
Subject: Preliminary Compressed Air Analysis
Date: May 19, 2015

1. Background

C&S was asked to evaluate a sound attention solution for OCWEP's Baldwinsville Treatment Facility. Upon reviewing the originally proposed solution of an intake silencer, C&S felt the sound was not emanating from the intake of the air compressors but rather from the structural vibration caused by the prime movers. C&S felt attenuation on the intake would have little effect on this vibration. C&S then examined the potential of upgrading the air compressors to remove the cause of the sound at the source. A brochure for a potential replacement product is attached to this memo. C&S installed a true three phase power meter on each of the units over the course of a week. During this period OCWEP operators agreed to run the two machine simultaneously to demonstrate the load profile during excess noise period.

Based on this investigation and subsequent discussions with OCWEP it was determined that the machines are producing compressed air at 50 psi with relatively unregulated flow. This means there is no modulation within the process. The machines simply produce as much air as possible based on the outlet configuration. The figure below demonstrates the results of the metering.



2. Preliminary Calculations

The current configuration will not realize the benefit of a new variable frequency drive machine due to the fact that the units only produce at a single flow. This means that the only savings estimate which can be calculated is that of a newer machine which produces more cfm with less horsepower. The following equation quantifies this opportunity:

kWe = Existing kW of running compressors
CFMe = Estimated existing air flow (cfm)
CFMp = Estimated proposed air flow (cfm) at equivalent kWe
Hr = Run hours of two units
R = Utility blended rate per kWh
S = Cost Savings

Where,

$$S = ((kWe) - (CFMe / CFMp) \times kWe) \times Hr \times R$$

Therefore,

$$S = (325 \text{ kW} - (1,634 \text{ cfm} / 2,064 \text{ cfm}) \times 325 \text{ kW}) \times 8,760 \text{ hrs} \times \$0.10 / \text{kWh}$$

$$S = \$59,313 / \text{yr}$$

Installation Estimate

Without considering the specific conditions onsite and without considering any unique configuration at the facility C&S estimated the following project cost. This pricing does not include any professional services required by OCWEP.

(2x) oilfree VFD machines,	\$190,000
Installation mechanical	\$25,000
Installation electrical	<u>\$35,000</u>
	\$250,000

3. Recommendation

The analysis above is simply intended to demonstrate the potential of the opportunity at its worst case scenario. The effort does not capture the real benefit of this type of solution which would be the utilization of the machines to their fullest extent by enabling the modulation of the load based on the process' oxygen demand. At our last meeting, C&S approximated this additional benefit by simply assuming a 30% average modulation would capture an additional \$75,000, and assuming this modulation comes with a \$50,000 cost effort, the final project outline would be as follows.

Project Cost	\$300,000
Project Savings	\$134,000
Incentive	\$65,000
Payback	1.8 years

C&S recommends that we:

- a. **Quantify the actual load profile throughout the various seasons.** This will help establish the ideal configuration. Not only will this provide additional energy savings but it will ensure the lowest maintenance and capital cost. Additionally, this load analysis will include consideration of various size compressors to ensure the ideal system configuration in order to optimize the system's operations.
- b. **Explore a partnership with National Grid to participate in the funding this work as a design-build project contracted through National Grid.** C&S can initiate the process with National Grid and lead OCWEP through the process. In a design-build scenario, this project might require 6 to 10 months to complete. The primary source of uncertainty in the schedule is the finalizing of the contractual agreement. As a frame of reference, a design-bid-build project might require 10 to 12 months to complete.
- c. **Explore the option of securing a National Grid efficiency grant and letting C&S perform an Article 9 turn-key (professional services) project through one of its existing WEP contracts.** The project might take 4 to 5 months to complete using this arrangement. As a frame of reference, a design-bid-build project might require 10 to 12 months to complete.

Disclaimer The only values that have been completely vetted are the actual existing consumption of the compressors for the three days of operation. The incentive kWh rate is an estimate at this time. National Grid will be consulted for the actual incentive rate. We note that the existing consumption was measured during a non-peak period and that actual annual savings will likely be greater than calculated. Although the installation seems fairly straight forward, actual removal and installation has not been scoped, and no unique situations have been identified such as asbestos abatement or structural concerns. Interaction with the building's heating system was also not considered within this analysis.