

OTTER TAIL POWER COMPANY

Docket No: EL24-017

Response to: SD Public Utilities Commission

Analyst: Joseph Rezac

Date Received: May 23, 2024

Date Due: June 06, 2024

Date of Response: June 04, 2024

Responding Witness: Jason A. Grenier, Manager Retail Energy Solutions - (218) 739-8639

Data Request:

Provide additional information regarding the 2023 Custom Energy Efficiency Program. Outline what type of measures and equipment were installed and how the corresponding energy and demand savings were derived.

Attachments: 0Response:

Two projects were included in the 2023 Custom Energy Efficiency Program. A project summary and the correlating calculations are outlined below.

Waste Water Treatment Plant Redesign

A large customer commissioned a project to replace their anaerobic single pass up-flow (UF) system with a new Dissolved Air Flotation (DAF) system to treat wastewater coming from the main plant. The original system utilized 3 x 125 Horsepower (HP) UF membrane pumps and 3 x 3 HP permeate pumps to run water through UF membranes. The efficient system removed the UF membranes and achieves the same results with a DAF system that operates with a 7.5 HP sludge pump, a 15 HP effluent pump, and a 25 HP recirculation pump. The difference in pumping power between the two systems results in significant plant energy savings. This project aligned well with the corporations ongoing sustainability goals and accomplishments.

This project produces an annual kWh savings of 1,489,192 and summer peak reduction of 188.88 kW. These savings numbers were derived by our Commercial/Industrial Electrical System Engineer who utilized the MN Technical Reference Manual 3.3 guidelines to calculate the usage of the original system and the efficient system. The Commercial/Industrial Electrical System Engineer then calculated the savings based upon the usage difference of the two systems.

$$kW = \frac{n \times HP \times 0.746 \times LF \times PF}{EFF}$$

$$kWh = kW \times Hours$$

OLD UF Membrane System	Number (n)	HP	Efficiency	Load Factor (LF)	Power Factor (PF)	Hours			kW	kWh
UF Membrane Pumps	3	125	0.954	0.8	0.9	7884			211	1,664,565
Permeate Pump	3	3	0.875	0.8	0.9	7884			6	43,556
TOTAL									217	1,708,122
NEW DAF System	Number (n)	HP	Efficiency	Load Factor (LF)	Power Factor (PF)	Hours			kW	kWh
Sludge Pumps	1	7.5	0.902	0.8	0.9	7884			4	35,211
Effluent Pumps	1	15	0.917	0.8	0.9	7884			9	69,269
Recirc Pump	1	25	0.925	0.8	0.9	7884			15	114,450
TOTAL									28	218,930

Variable Frequency Drive (VFD)

A customer installed a VFD on an 800 HP fan to reduce the fan speed. The project was sub metered prior to and after completion of the project. The System Engineer based savings on the evaluation of actual meter data that is extrapolated to an annual usage value. Annual savings were calculated as the difference in usage between pre-M&V annual usage and the post M&V annual usage.

Pre M&V Peak Summer	761 kW	Pre M&V Energy Use	6,670,519 kWh
Post M&V Peak Summer	621 kW	Post M&V Energy Use	5,440,849 kWh
Peak Summer Reduction	140 kW	Annual Energy Reduction	1,229,670 kWh