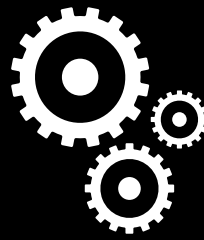


PRINCIPAL FINANCIAL GROUP



OMAR SANOUSI
MECHANICAL ENGINEERING
IOWA STATE UNIVERSITY



COMPANY PROFILE

Principal Financial Group is a global financial investment management leader founded in 1879. The company employs around 14,600 people worldwide and manages retirement assets across equities, fixed income, and real estate investments in 11 countries, including the United States. Headquartered in Des Moines, Iowa, the company continues to attract customers, delivering more than \$19 billion in positive net cash flows in 2016 alone and increasing assets under management to \$592 billion. These achievements have allowed Principal to climb the Fortune 500 List, where they are currently ranked 227th. The company is also a 500 Climate Disclosure Project (CDP) Leader.

PROJECT BACKGROUND

The focus of the 2017 Pollution Prevention Intern project was to assess processes and procedures within specified areas of Principal's corporate campus operations and recommend strategies that will reduce energy and water consumption to advance Principal's sustainability program. Specifically, the intern focused on evaluating the practices of Principal's campus food services contract vendors to identify energy savings. In addition, the intern analyzed Principal's cooling tower water treatment processes and controls and evaluated strategies to reduce the cooling towers' make-up water intake and blowdown.

INCENTIVES TO CHANGE

Principal Financial Group maintains being "environmentally responsible" as one of the company's operating fundamentals. Their goal is to improve communities through global sustainability initiatives that reduce the company's carbon footprint and water usage. They are striving to increase the energy efficiency of their operations by adopting a science-based greenhouse gas reduction goal. In 2016, Principal reduced their overall carbon emissions by 25 percent, exceeding their goal to reduce baseline 2011 carbon emissions by 10 percent.

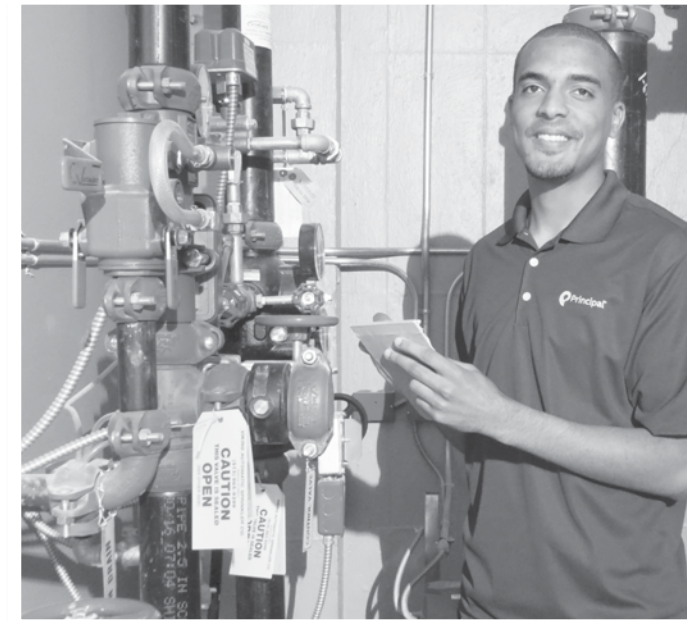
RESULTS

Café Appliances and Electronics:

Walk-In Cooler: An analysis was done of the café's numerous walk-in coolers that are used to store all perishable food products. The intern found some of these coolers were underutilized or unused, even though all were running continuously. A decommissioning plan

was developed to eliminate the energy consumption of the unused coolers. Controls and the temperature-increase alarm systems of the coolers were improved to eliminate potential product loss in case of a cooler failure.

Dishwasher: The kitchen dishwashers were also evaluated by the intern. The dishwashers are equipped with an energy-saving feature that puts them in stand-by mode



kitchen hoods modulate the performance of the make-up air unit inside the cafeteria. The kitchen hoods are each equipped with a temperature sensor system that allows the exhaust fans to operate continuously in a set range of temperatures until the hood reaches a satisfactory temperature. The make-up air unit itself consists of an electrical preheat, a chilled water cooling coil, and a supply fan equipped with a variable frequency drive and an airflow measuring station.

The energy audit of the ventilation system identified inefficiencies with the controls of the temperature system that allowed the exhaust fans and make-up air unit to operate continuously outside of normal kitchen working hours. Modifying the controls to set operating hours will help optimize efficiency of the ventilation system and reduce energy usage. Installation of a variable frequency drive (VFD) and a smoke optic sensor, in addition to the existing temperature sensor, would achieve further energy savings.

Cooling Tower Improvements: The intern analyzed the performance, water consumption, and treatment controls of the three main corporate campus cooling towers and identified several strategies to minimize their water consumption. Two of the cooling towers were not equipped with make-up and blowdown water gauges. The installation of a gauge meter will eliminate the uncertainty in the overall water consumption of the towers. The intern also designed a detailed strategic maintenance plan to minimize leaks and reduce the total make-up water usage of the towers. Cleaning the cooling towers twice a year and maintaining up-to-date recirculation rates will improve the current water treatment process, increase the efficiency of the towers, and reduce water consumption.

between wash cycles. This default stand-by mode was found to be set at two hours before automatically shutting down. The control settings could be modified to optimize the amount of time the dishwashers are able to enter a reduced power mode and to automatically shut down when not in operation for a set duration.

Large Screen TV's: Numerous large screen TV's throughout the café were left on 24 hours a day, 7 days a week. An operational change was made to ensure the TV's were only on during café operating hours, yielding additional energy savings.

Café Ventilation System Improvements: The café's ventilation system consists of a variety of different components. Exhaust fans installed in the numerous

PROJECT	ANNUAL COST SAVINGS	ANNUAL ENVIRONMENTAL RESULTS	STATUS
CAFÉ APPLIANCES AND ELECTRONICS	\$8,385	121,200 kWh	IN PROGRESS
CAFÉ VENTILATION SYSTEM IMPROVEMENTS	\$5,000	55,275 kWh	RECOMMENDED
COOLING TOWER IMPROVEMENTS	\$3,000	1,200,000 gallons	IN PROGRESS

