KUM & GO

KURT DRUFFEL
MECHANICAL ENGINEERING
UNIVERSITY OF WISCONSIN-PLATTEVILLE

COMPANY PROFILE
Kum & Go is the fifth largest privately held convenience store chain in the United States. Based out of West Des Moines, Iowa, Kum & Go employs more than 4,700 associates throughout 430 convenience stores in 11 states. Kum & Go has more than 50 years of dedicated community commitment and shares 10 percent of annual profits with the community. Most notably, Kum & Go leads the industry in customer service and satisfaction.

PROJECT BACKGROUND
Kum & Go teamed up with Pollution Prevention Services to develop innovative solutions for reducing store energy consumption. Previous energy estimates indicated that the plug load equipment accounted for a high percentage of the total energy usage. The first objective was to conduct a plug load energy audit to identify specific equipment issues. A secondary objective was to evaluate other opportunities for energy reduction in the food preparation areas. Focus was placed on the standard 5K Store Design that accounts for 100 of all 430 Kum & Go stores. The intern collected data from multiple stores and gained insight into associate professional knowledge to find opportunities in energy reduction.

INCENTIVES TO CHANGE
Kum & Go is striving to become the top convenience retailer in the country by 2021 and a leader of sustainability practices in the convenience store sector. As the company has grown and added stores, they have continued to improve the efficiency of the buildings and the equipment used, which has resulted in a new store design and improved construction and operational practices. The more efficient stores are the highly-successful 5K-designed stores seen today. Kum & Go is looking to continue the trend of improving the efficiency of its stores.

RESULTS
Plug Load Audit: The intern monitored energy usage of food and beverage equipment in the stores over a period of several weeks. This was conducted through most traffic patterns that the site considered normal. After compiling energy usage and traffic pattern data, the audit showed that energy usage attributable to plug loads accounted for a much lower percentage than what previous estimates indicated.

Dynamic Tint Windows: The first energy reduction opportunity investigated was using dynamic window tinting for the current clear storefront windows. Replacing the current clear storefront windows with windows that are able to adjust tint based on the level of outside daylight could reduce heat loss or gain from direct sunlight and help maintain comfortable ambient air temperatures in the stores.

PROJECT	ANNUAL COST SAVINGS	ENVIRONMENTAL RESULTS	STATUS
PLUG LOAD AUDIT	$3,500 one time savings	--	IMPLEMENTED
DYNAMIC WINDOW TINT	$57,600	699,300 KWH	IN PROGRESS
EQUIPMENT UPDATE	$1,276,800	15,490,200 KWH	RECOMMENDED
THERMOSTAT RANGES	$107,500	1,304,800 KWH	RECOMMENDED

Equipment Update: The typical 5K-designed store is equipped with one convection oven and two conveyor ovens. These pieces of equipment are used to produce a multitude of food products sold out of the Kum & Go stores. To serve customer demand, the ovens run 17 hours a day. Replacing the current convection and conveyor ovens with newer, more energy efficient ovens could result in annual energy savings while maintaining full production capabilities.

Thermostat Ranges: Currently, in-store thermostats can be controlled by the store associates within defined ranges. There is also the ability for office staff to control thermostats remotely from the Kum & Go Store Support Center. Current ranges are set between 68°F to 72°F. This range is very small considering the amount of traffic keeping entry doors open and numerous other variables within the stores. Modifying the allowable range of in-store temperature settings to 66°F to 72°F in the winter months and to 68°F to 76°F through the summer months could save energy usage and associated costs.

ESTIMATED CONVENTIONAL AIR POLLUTANTS DIVERTED IN METRIC TONS
For Implemented and In Progress Recommendations

TOTAL FOR ALL SECTORS						
CO_2	NH_3	NO_X	PM_{10}	$PM_{2.5}$	SO_2	VOC
539.71	0.01	1.04	0.16	0.12	2.12	0.04

ESTIMATED GREENHOUSE GASES DIVERTED IN METRIC TONS

TOTAL FOR ALL SECTORS			
$MTCO_2e$	CH_4	N_20	CFC
606.36	19.93	3.31	3.24

ESTIMATED CONVENTIONAL AIR POLLUTANTS DIVERTED IN METRIC TONS
For Recommendations in Recommended Status

TOTAL FOR ALL SECTORS						
CO_2	NH_3	NO_X	PM_{10}	$PM_{2.5}$	SO_2	VOC
12,970.89	0.14	26.06	3.74	2.77	50.94	0.97

ESTIMATED CONVENTIONAL AIR POLLUTANTS DIVERTED IN METRIC TONS

TOTAL FOR ALL SECTORS			
$MTCO_2e$	CH_4	N_20	CFC
14,572.50	478.97	79.60	77.94