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Company background

Paragon Services is a third-generation family-owned business established in 1979. It performs metal finishing services for the aerospace industry, and it specializes in nondestructive testing, chemical processing, paint application and various supplemental processes.



Project background

Paragon Services' primary facility has a significant consumption of energy, gas and water, leading to considerable utility expenses. Additionally, the hundreds of orders they process annually result in substantial waste generation. Recognizing the potential for both cost savings and a positive environmental impact, Paragon Services initiated five projects aimed at reducing its energy, gas, water and material consumption rates.

Incentives to change

Paragon Services is open to new ideas on how to reduce its usage of water, energy and gas as well as decreasing the amount of hazardous waste created at the facility. Paragon Services is receptive to adopting strategies that align with its operational needs while benefiting the environment.

PROJECTS REVIEWED FOR P2 POTENTIAL

Lighting replacement

Paragon Services currently uses fluorescent bulbs in its primary facility. LED fixtures have been recommended due to their longer life span when compared to fluorescent bulbs. Also, fluorescent bulbs do not maintain the amounts of lumens produced for very long, which impacts the illumination in the facility's workspace. The intern recommended replacing the fluorescent lights with LED lights due to these factors, which could save Paragon Services \$6,753 and 92,519 kWh per year.

Occupancy sensors

Lights within certain rooms at Paragon Services are constantly left on even when the rooms are unoccupied. Occupancy data loggers were used to evaluate the amount of energy being wasted due to this situation. By implementing occupancy sensors to reduce the amount of energy needed, Paragon Services could save 3,167 kWh and \$231 annually.

Air leak audits

Paragon Services uses compressed air on a daily bases but has no maintenance plan for it. No maintenance plan results in constant air leaks that use up energy.

Using the Ultraprobe 9000, 10 air leaks were found at the facility. The air leaks amounted to 47,733 kWh a year, which costs approximately \$3,484 to the company. The intern also recommended implementing maintenance plans to help detect air leaks and fix them to minimize wasted energy.

Paint use reduction

Some of Paragon's painted products require rework for small paint defects. The current rework process involves dispensing two-part paint into disposable cups at a set volume. The volume of paint used is large enough to ensure an accurate two-part paint ratio, but this volume is usually much greater than the volume of paint needed for rework. Because the paints harden quickly, the unused paint is wasted. To prevent waste, reusable dual cartridges were recommended. Dual cartridges keep paint components separate until dispensed at a ratio set by cartridge dimension. This allows rework personnel to dispense and use paint at a volume that is task specific, thereby reducing the amount of paint used and ultimately disposed of. By implementing this project, Paragon could prevent 340 pounds of hazardous waste and save approximately \$7,195 a year in raw material and disposal costs.

PROJECTS REVIEWED FOR P2 POTENTIAL, CONTINUED

Plug and hook cleaning

Parts to be painted are masked with plugs and hung on hooks. Plugs and hooks are reused until layered in enough dried paint that they become unusable, at which point the plugs and hooks are disposed of. However, while being used, the dried paint can chip away and contaminate freshly painted parts, resulting in rework. The intern recommended implementing a weekly ultrasonic cleaning procedure to strip paint from hooks and plugs. This would eliminate the need to purchase replacement items as well as reduce paint rework counts. This could save Paragon \$3,073 per year in purchasing alone, but it could increase water and solvent consumption by 343 and 15.4 gallons respectively. More research is needed to assess project impacts on disposal and rework.

Steam boiler replacement

Paragon's current natural gas-powered steam boiler was thought to be operating inefficiently due to its high capacity and low demand. By gathering and evaluating boiler and utility data, the intern determined that the boiler was substantially oversized for its purpose. This could lead to excessive on/off cycling, directly reducing the boiler's efficiency. The current boiler's burners could be replaced with high turndown ratio burners to dynamically match boiler capacity to its load. Alternatively, the boiler could be replaced with a more appropriately sized boiler. More research is needed to determine the boiler's actual efficiency and resulting benefits.

SUMMARY OF 2023 P2 INTERN RECOMMENDATIONS

Project	Annual estimated environmental impact	Estimated cost savings (\$/year)	Status
Lighting replacement	92,519 kWh 89.7 MTCO ₂ e	\$6,753	Recommended
Occupancy sensors	3,167 kWh 3.1 MTCO ₂ e	\$231	Recommended
Air leak audits	47,733 kWh 46.3 MTCO ₂ e	\$3,484	Recommended
Paint use reduction	340 lbs hazardous waste 67.3 lbs HAPs 132 lbs VOCs	\$7,195	Recommended
Plug and hook cleaning	343 gal water 15.4 gal solvent	\$3,073	More research needed
Steam boiler replacement	Unknown	Unknown	More research needed
Total¹	143,419 kWh 132 lbs of VOCs 67.3 lbs of HAPs 340 lbs HW	\$17,663	
GHG reductions^{1,2}	139 metric tons CO₂e		

¹Does not include projects "not recommended" or where "more research needed."

²EPA P2 GHG Calculator with Cost, 29 November 2022& EPA WARM Tool- Version 15, September, 2022