Cemstone

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Organization Background

Cemstone is a family-owned concrete company that is headquartered in Mendota Heights, MN. Cemstone takes pride in their sustainability and won the environmental excellence award from the National Ready Mix Concrete Association (NRMCA) in 2022 and has had a plant recognized by the NRMCA Environmental Excellence Awards Program each year since 2015.

"This internship allowed me to develop my engineering skills that are difficult to develop in a classroom setting. These skills include communication of ideas, economic analysis of projects, and analysis of industrial equipment. I'm thankful to MnTAP and Cemstone for giving me the opportunity to grow as an engineer." ~ DM

Project Background

Cemstone and MnTAP had previously partnered together on a water conservation project. The next step was to work on energy efficiency. The Cemstone Companies have many types of facilities across multiple states, so three different facilities were analyzed to maximize read-across potential. A mining site, a ready-mix concrete plant, and a bagging site were all assessed for energy efficiency opportunities.

Incentives To Change

As a family-owned company, Cemstone prioritizes having a positive impact on its local community. This includes continuous improvement and decreasing environmental impact. Additionally, as the concrete industry shifts towards requiring Environmental Product Declarations (EPDs), Cemstone has additional motivation to set and meet aggressive sustainability goals.

SOLUTIONS

Reduce Mixer Energy Usage (Ready-Mix and Bagging)

Reducing the speed of the concrete mixers by 50% saves a total of 4.5% of the mixers' annual energy consumption. This recommendation can be utilized at a total of 12 facilities. Additionally, the energy usage of the bagging powder mixer can be reduced by reprogramming the batching controls. This will lead to a 95% reduction in idle time. These actions will save a combined 115,000 kWh and $9,400 per year.

Optimize Compressed Air (Ready-Mix and Bagging)

During a compressed air audit at the ready-mix and bagging facilities, 41 cumulative air leaks were discovered. At the bagging facility, the pressure has been lowered, and the temperature of the intake air can be reduced for further savings. Cumulatively, these actions will save 102,500 kWh and $8,680 annually.

Solutions

Insulation of Heating Equipment (Mining, Ready-Mix, and Bagging)

Hot water heaters and storage tanks can be insulated to reduce energy use. This recommendation can be implemented at a total of 43 Cemstone locations. Additionally, savings can be obtained by covering the opening of the sand heater which is currently exposed to the atmosphere. There are six locations utilizing this technology. Savings from insulation recommendations total 400,000 therms, 2,500 kWh, and $318,000 annually.

"Working with Daniel and the MnTAP program was a great success. The real solutions and data we gained through this are valuable and will help the Cemstone Companies move closer to achieving our sustainability goals. Daniel showed that he is a very quick learner and was able to work with a variety of people to achieve all he was asked to do. It was a great experience partnering with MnTAP, and we would encourage other companies to look into it"

~Alex Olin
Environmental, Facilities, and Engineering Manager
Cemstone

Additional Opportunities

Additional energy savings can be obtained by reducing ready-mix conveyor belt cleaning time for sand products to one minute (42 sites) and reducing lighting usage (two sites). Additional cost savings can be found through the installation of capacitors across the three facilities studied in this report. Finally, solar panels can be installed on the roof of the mining front office.

Recommendation	Annual Reduction	Annual Savings	Status
Reduce Mixer Energy Usage	115,000 kWh	$9,400	Recommended
Optimize Compressed Air	102,500 kWh	$8,680	Implementing
Reduce Ready-Mix Conveyor Decontamination Time	380,000 kWh	$31,000	Recommended
Implement Cold-Adaptive Enzymes in Starch Hydrolysis	TBD	TBD	Recommended
Reduce Lighting Usage	14,700 kWh	$1,300	Recommended
Insulate Heating Equipment	400,000 therms 2,500 kWh	$318,000	Recommended
Improve Power Factor	N/A	$35,150	Planned
Install Solar Panels	N/A	$1,300	Future Project

MnTAP Advisor: Gabrielle Martin, Associate Engineer