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AJINOMOTO HEALTH & NUTRITION NORTH AMERICA, INC.

EDDYVILLE

2024 28-WEEK CO-OP PROJECT

COMPANY PROFILE:

Ajinomoto Health & Nutrition North America, Inc. (Ajinomoto), founded in 1909, is a Japanese-based food and amino acid producer with more than 34,000 employees worldwide and annual sales exceeding ten billion dollars. Dedicated to its mission to improve the health of humankind, Ajinomoto produces high quality products to resolve food and health issues globally. Ajinomoto is the world's largest producer of monosodium glutamate (MSG), a flavor enhancer that is naturally present in many foods. The location in Eddyville, Iowa, focuses on the production of MSG as well as amino acids for farm animal consumption, including lysine, threonine, and tryptophan.

PROJECT BACKGROUND

The objective of the 28-week co-op is to analyze the water chiller system at the Heartland plant and find points of inefficiency, research potential solutions and recommend further action. The intern focused on the buildup of scale within the chillers that is caused by the hard water that is used in the system. The first half of the project has been spent establishing a baseline while the second half will be used for researching solutions along with creating an action plan for the aforementioned solutions.

INCENTIVES TO CHANGE

As a company, Ajinomoto has been committed to sustainability and the reduction of greenhouse gasses. Ajinomoto has the goal of reducing their environmental impact 50 percent by 2030 and increase the life expectancy of one billion people. From an environmental perspective, this project aims to substantially reduce the water usage by the cooling towers, which will decrease the stress placed on the deep wells and the Des Moines River that Ajinomoto draws from. This would also result in a decrease in electric costs, as the chillers would be using less power and running more efficiently. Along with both of these benefits, the amount of water lost in the system should be reduced.

PROJECTS

The issues that Ajinomoto is facing regarding the efficiency of the chillers and the amount of water being used by cooling towers can be explained by one source. That source is the amount of minerals in the water, commonly referred to the hardness of the water. The intern, in collaboration with the senior engineer and sustainability engineer, has determined that the water needs to have the minerals removed in order for the project to have quantifiable results. This is due to the water hardness being determined to have a substantial effect on both the efficiency of the chillers and the amount of water used by the cooling towers. This process is known as softening the water. This conclusion has narrowed the potential recommendations down to two possible solutions.

Cold Lime Softening

A cold lime softening (CLS) system is the first and most effective way to remove the hardness from the water. A CLS system uses lime crystals to react with the ions in the water, namely calcium and magnesium, turning them into solids that form a sludge that sinks to the bottom of the machine before being removed and disposed of. This system has many benefits such as being scalable, meaning it can be added onto in the future. Along with this, the amount of times water can be cycled through the cooling towers before needing to be discharged would be almost double thus significantly decreasing the amount of water that is needed to be pumped into the cooling towers as make up water. The CLS system also could produce enough clean soft water to provide for the entire Ajinomoto plant, thus eliminating the need for outside sources of soft water currently being used and have been a source of cost in the past.

Reverse Osmosis Refurbishment/Expansion

Another option to clean the water is to increase the Reverse Osmosis (RO) skid water usage which is currently being underclocked in terms of filtering capacity. This water is cleaner than the CLS water and has a lower initial cost, however, the space is more limited and there is a theoretical limit to how much water can be produced from the RO skids. The skids use RO to pull out the ions and other debris to be disposed of. This system has many of the same benefits as the CLS system such as reducing or eliminating dependency on outside sources of water and reduced make-up water needs. This can be accomplished by doing one or both of the following, refurbishing older RO skids and running them at normal rates instead of underclocking them or installing new skids next to the current ones. Both options may be implemented over time, however, the one with the shortest timeline would be refurbishing older models and adjusting the amount of flow that goes through the skids.

Next Steps

For the remainder of the 28 weeks, the intern will continue to collect relevant data and refine the baseline model. Following this, the intern will calculate the theoretical environmental and economic benefits of each option previously mentioned. This will be accompanied by communicating with vendors about obtaining quotes for the different projects and eventually choosing which appears to be the best and formally recommending that to Ajinomoto. After a recommendation has been made, the intern will spend the remainder of the co-op term finalizing documentation and preparing the project to start after the end of the internship or further modeling so future projects can be easily assessed on feasibility.