Industry
Food & Beverage

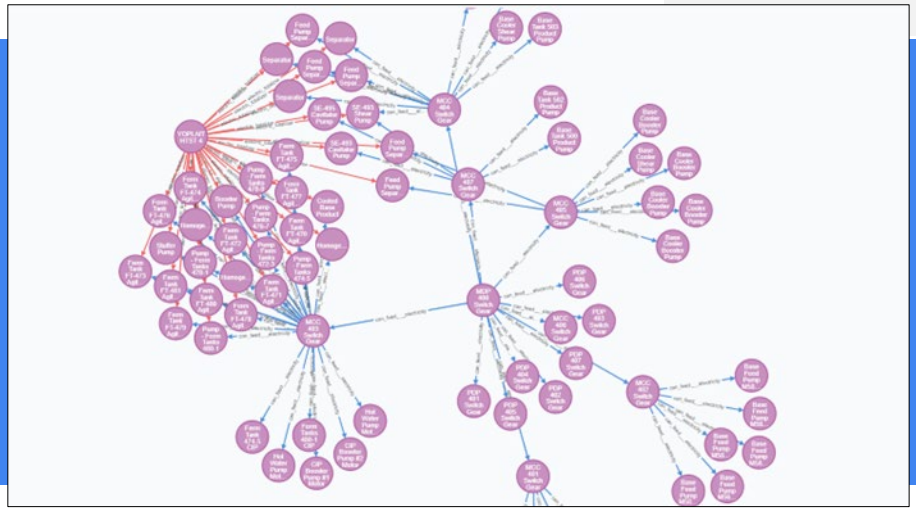
Applications
Data Modeling
Data Analytics

Solutions
Energy Efficiency

CESMII
THE SMART MANUFACTURING INSTITUTE

PROJECT CASE STUDY

Inferential Modeling for Driving Out Energy Waste



PROJECT LEAD

ThinkIQ

PROJECT TEAM

General Mills

PROJECT OBJECTIVE

The goal of this project is to drive out wasted energy in manufacturing facilities by implementing software technology that detects unknown or unexpected energy consumption on the shop floor.

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Machine Learning Algorithms Expected to Reduce General Mills Energy Bills by $480,000 Annually

BENEFITS TO OUR NATION

Improving energy efficiency in the food and beverage industry will significantly reduce the industry's carbon footprint, contributing to the US's overall efforts to combat climate change.

Additionally, slight operational improvements will lead to increased competitiveness and profitability, creating more manufacturing jobs and driving American economic growth.

BENEFITS TO INDUSTRY

Tools created from this project are expected to contribute toward a 2% reduction in energy usage when implemented across General Mills broadly. For General Mills North American plants, a 2% improvement in energy costs represents an annual savings of $480,000.

According to the US Energy Information Administration (EIA), the food and beverage manufacturing industry is one of the most energy-intensive manufacturing sectors in the country, accounting for approximately 8% of the total energy consumed by all manufacturers. The EIA also reports that the industry spent over $9 billion on energy in 2018, which represents a significant portion of the industry's operating costs. A 2% reduction in energy utilization for the food and beverage industry would result in savings of $180 million annually.

PROJECT DESCRIPTION

TECHNICAL APPROACH

Create and apply new data modeling and analytics technology to quickly point manufacturers to energy saving opportunities by identifying periods of high unknown energy consumption.

ACCOMPLISHMENTS

- Developed a broadly applicable ontology for modeling energy consumption.
- Developed specific example models of common equipment – motors, drives, packaging equipment, etc.
- Developed a user interface that enables users to quickly build energy consumption models and acquire data.
- Developed an analysis interface that enables users to quickly identify unexpected and unknown energy consumption and deviations from baselines.
- Demonstrated working energy models and usage within a factory environment.

DELIVERABLES

- Develop machine learning and data centric analytics and initial machine learning capabilities to be implemented in the manufacturing process.
- Development, testing and CESMII platform integration of Semantic model of energy usage linked to material ledger, analytics tools to detect anomalies, and user interfaces.
- Demonstrate the generalized semantic model focused on equipment and energy objects in a workshop with CESMII.

REUSABLE OUTCOMES / SM MARKETPLACE

- Equipment and process energy models for a generic factory environment
- Pump SM profile
- Mixer SM profile
- Tank SM profile
- Python based machine learning predictive tools for power consumption and estimating energy usage at equipment and plant level
- Energy management tools for the CESMII SMIP

RESULTS

↓ 2%

2% expected reduction in energy utilization when implementing smart manufacturing tools at General Mills Chanhassen plant.

↑ $480k

2% expected reduction in energy utilization for General Mills North American plants translates to an annual savings of $480,000.

↑ $180 M

A 2% reduction in energy usage for US food and beverage manufacturers will result in $180 million in annual savings.

PROJECT DETAIL
Budget Period: BP4
Submission Date: 5/03/2021
Sub-Award (contract) Number:
4550 G WA312
SOPO: 234

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