



# Beacon EmbeddedWorks



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## Organization Background

Beacon EmbeddedWorks (Beacon) was founded in 1960 in Minneapolis, Minnesota. Today, Beacon is in Eden Prairie, Minnesota and employs 80 people at a 50,000 square-foot facility. Beacon designs, manufactures, and continuously supports custom System-on-Modules, or small computer boards used for processing, graphics, memory, and WiFi and Bluetooth connectivity. These boards primarily serve the medical, aerospace, and defense industries.



*"This internship has been an incredible opportunity for me, and I am so grateful to everyone at MnTAP and Beacon for all the support they provided. I learned a lot about manufacturing and it's exciting to know that some of my projects have been, or will be, actually implemented at Beacon." ~ NM*

## Project Background

Beacon is a member of the discoverIE Group, which aims to reduce natural gas consumption and lower Scope 1 and 2 emissions as part of its sustainability goals. The project investigated strategies for reducing energy consumption and emissions to achieve these objectives. In addition, Beacon seeks to reduce water use in manufacturing to ensure their water storage tank can supply humidification and the multistage board washer. With bathroom renovations scheduled for late August 2025, there is also an opportunity to install low-flow fixtures.

## SOLUTIONS

*This project identified more recommendations than could be covered in this executive summary. Please see the table for the full list of recommendations.*

### Shut Off Final Rinse Automatically

Beacon's multistage board washer should turn on and off automatically when it senses boards on the conveyor belt. However, water was flowing continually in the final rinse stage of the washer even when boards were not in the machine. An automatic shutoff setting was enabled to prevent the unnecessary flow of heated water and save 190,000 gallons of water, 11,500 kilowatt-hours (kWh), and \$1,800 per year. The reverse osmosis (RO) flow rate was increased by 43% to better meet the washer's water needs

without increasing overall water use since the RO reject rate remained unchanged.

### Install Irrigation Rain Sensor

Beacon installed a rain sensor on their irrigation system to prevent irrigation when rainfall has already met the lawn's watering needs. The sensor was set to prevent irrigation after a half inch of rain and continue preventing automatic watering until the sensor was dry. If new grass is not planted in future summers, Beacon can adjust the sensor to shut off after a quarter inch of rain to achieve greater water savings. The half-inch rain sensor settings will save 20,100 gallons and \$115 per year.

### Install Low-Flow Bathroom Fixtures

The bathrooms have never been cohesively renovated and have older fixtures, meaning some fixtures use more water than current standards. Installing WaterSense 1.28 gallons per flush (gpf) toilets and 0.5 gpf urinals are recommended. Since measurements revealed that faucets averaged 1.4 gallons per minute (gpm), or 0.1 gallons gpm below the WaterSense rating, Beacon should choose a lower-flow 0.5 gpm replacement to avoid increasing faucet water use. Implementing both will save Beacon 150,000 gallons, 1,220 kWh and \$930 per year.

### Purchase Renewable Electricity

To align with discoverIE Group's goal to reduce Scope 2 emissions, Beacon was interested in exploring ways to reduce carbon dioxide (CO<sub>2</sub>) emissions associated with

# Solutions

generating the electricity it uses. By purchasing renewable electricity through Xcel Energy's Renewable\*Connect program, Beacon could reduce or eliminate Scope 2 emissions by up to 237 metric tons of carbon dioxide equivalent (MTCO<sub>2</sub>e) annually.

## Install Dual Fuel RTUs

Some of Beacon's rooftop units (RTU) are set to be replaced this year. Beacon can choose to replace these RTUs with dual fuel RTUs that use an air source heat pump during moderately cold temperatures and switch to natural gas during extreme cold. This would lower natural gas use for heating, though savings would vary depending on the temperature at which natural gas replaces the air source heat pump.

## Repair Compressed Air Leaks

A compressed air study performed by a contractor identified 10 compressed air leaks. An Xcel Energy rebate covered the cost of the compressed air study. Beacon is currently repairing these leaks for total savings of 14,400 kWh and \$1,500 per year

*"Nina brought smiles to Beacon staff with her positive attitude and willingness to get involved and learn. For each project, Nina successfully worked with staff and external suppliers, galvanized actions, assumed responsibility, and delivered strategies to save water, energy, and real dollars. I can't encourage other companies enough to take part in the MnTAP intern program. We're a better organization for having gone through it with Nina."*

*~ John Bolduc,  
Senior Manufacturing Manager*



Recommendation	Annual Reduction	Annual Savings	Status
Shut off final rinse automatically	190,000 gal water 11,500 kWh	\$1,800	Implemented
Install irrigation rain sensor	20,100 gal water	\$115	Implemented
Install low-flow bathroom fixtures	150,000 gal water 1,220 kWh	\$930	Planned
Purchase renewable electricity	237 MTCO <sub>2</sub> e	NA	Recommended
Install dual fuel RTUs	TBD	TBD	Further investigation needed
Repair compressed air leaks	14,400 kWh	\$1,500	Implementing
Change irrigation billing	NA	\$475	Implemented
Install demand control ventilation	2,360 kWh 3,350 therms	\$3,200	Tentatively recommended
Improve reverse osmosis system and add softening	1,450 gal water	NA	Recommended

**MnTAP Advisor:** Laura Sevcik, Engineer