

Energy Optimization by Correcting Low Refrigerant Charge



“ The SiteSense digital twin monitoring platform identified a hidden low refrigerant charge and reduced energy costs by \$1,200 per day. ”

OVERVIEW

A large U.S. cold-storage distribution facility operating a centrally controlled ammonia refrigeration plant leveraged the SiteSense platform to better understand system performance and monitor electrical consumption. Continuous monitoring through the platform revealed increasing electricity consumption, unusual compressor operation and deviations from expected refrigeration performance. Investigation using the systems digital twins, further revealed abnormal operating patterns consistent with a low refrigerant charge, prompting a full diagnostic review and targeted corrective action which resulted in substantial cost savings.

ENERGY CHALLENGES

SiteSense digital twin analytics detected abnormal compressor loading that did not correspond with expected refrigeration demand. The models flagged a mismatch between system energy consumption and predicted evaporator performance, prompting a deeper review of the low-temperature system. Some other symptoms were, fluctuating suction pressure, and temperature instability.

ROOT-CAUSE DIAGNOSIS: LOW REFRIGERANT CHARGE

Further investigation revealed a loss of liquid seal on the evaporator feed trees, which allowed vapor to recirculate through the system. Instead of absorbing heat and providing refrigeration, the compressors were recompressing vapor, creating energy consumption without producing useful cooling. This condition caused the compressors to work harder than necessary while delivering reduced refrigeration capacity.

COMPANY AT A GLANCE

INDUSTRY	Cold Storage & Distribution
LOCATION	Massachusetts, US
ELECTRICITY USAGE	More than 600,000 kWh/Month

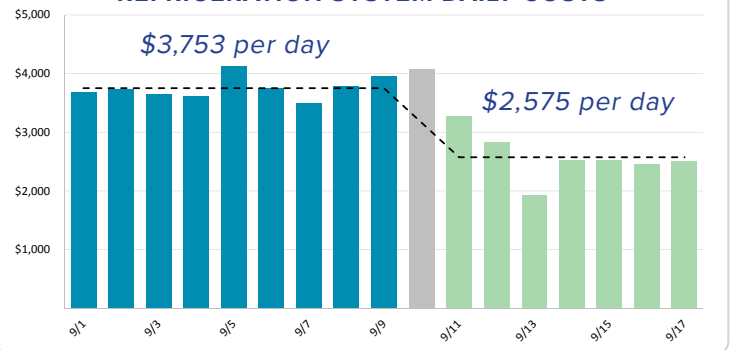
CORRECTIVE ACTIONS IMPLEMENTED

- Recharged refrigerant to proper operating levels
- Verified vessel feed operation and control setpoints
- Verified suction and liquid feeds across evaporators

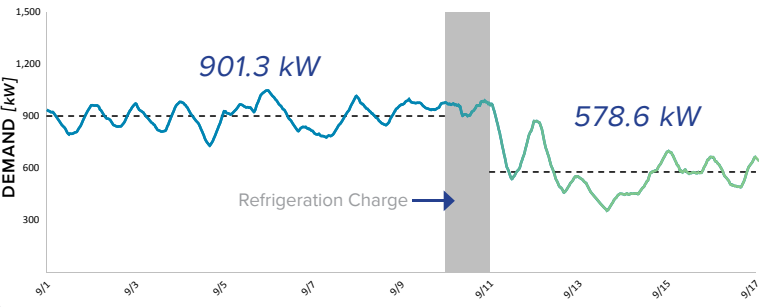
RESULTS: CLEAR & RAPID PERFORMANCE IMPROVEMENT

After correcting the refrigerant charge, utility bills confirmed that overall electricity consumption decreased by nearly 20%, resulting in more than **\$22,000 in savings within a single month**. On a daily basis, energy usage declined by **7,743 kWh (-35.8%)**, peak demand was **reduced by 173 kW (-14.6%)**, and average daily energy costs **dropped by \$1,176 (-31.4%)**. The monitoring system now continues to flag anomalies before they escalate.

REFRIGERATION SYSTEM DAILY COSTS



REFRIGERATION SYSTEM POWER DRAW



Supercharge your Energy Champions.

Grab a demo with one of our experts to see if the SafetyAmp platform is right for your team.

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