



BETTERBRICKS
Bottom line thinking on energy.

WHAT'S THE "GREENEST" THING YOU CAN DO FOR A GROCERY STORE? ...TUNE-UP THE REFRIGERATION

SUMMARY

Refrigeration equipment in a grocery store is designed to keep perishable food cold through rain or shine, every hour of every day. In the past, designers focused their efforts mostly on reliability, ensuring that compressors and condensers could keep up on the hottest day of the year. This has worked fine... until recently. Energy prices have escalated to a point where they are eating into profits. Operating costs have become a real concern. At the same time, customers are more interested in sustainability and the carbon footprint of their favorite store. A big part of the answer is energy efficiency.



Check and adjust valve (TXV) settings.

Tuning up your refrigeration equipment can help address these challenges. By carefully reviewing and optimizing a system's setup you can quickly:

- Reduce the store's electric bill by 3-10% — that's an average of \$8,000 a year.
- Trim the store's carbon footprint by hundreds of thousands of pounds of CO₂ annually.
- Boost reliability and summer peak capacity of the system.

IN DEPTH

During a tune-up procedure, a technician takes a detailed look at the system as a whole with a two-part objective: minimize the refrigeration load and then meet the remaining load as efficiently as possible. It's not about upgrading equipment or changing out parts to get better performance. It's more like fine tuning a car for a race. Based on the conditions at a particular track, technicians adjust the pressure of each tire, the stiffness of the suspension on each wheel and the spoiler setup. Their aim is to minimize wasted energy and get the most out of the fuel that goes into the engine. It's the same with a refrigeration system (if, admittedly, a little less exciting). A few days of effort focused on efficiency can produce significant gains, especially in the Northwest, where we enjoy relatively cool weather much of the time (compared to, say, Phoenix or Atlanta).

Tune-up details vary by system, but they usually follow these five steps:

On the *demand side* of the system—the cases and walk-ins—minimize unnecessary contributions to refrigeration load:

1. Check the setpoints in low temperature cases. A setting of -20°F works the compressors much harder than -10°F and forces the cases to draw more heat out of the store, inflating both electric and gas bills. Decide on a setpoint policy and follow it consistently.
2. Keep supply and return air grilles clear and clean. Don't allow product to block returns. Restricted airflow in cases drives up both electric and gas bills. Cleaning grilles even monthly can have a sound payback.
3. Check and adjust the setting of the thermostatic expansion valves (TXVs) in each case. The TXV regulates the flow of refrigerant through the cooling coil. Correct setting of the valve increases the effectiveness of the coil, which takes a load off the compressor by reducing the flow rate of refrigerant through the compressor.

On the *supply side*—the compressor rack and condensers—optimize the control setup for efficient operation under part-load conditions. Refrigeration systems are engineered to “keep foods cold” during peak load conditions. These are when outside temperatures are at their highest, which may be only a few hours of a few days a year. All other operation is at part-load conditions.

1. Adjust head pressure controls so that compressor discharge pressure is no higher than it needs to be for proper compressor and TXV operation. This often means running the condenser fans harder, but the extra fan energy is more than offset by the savings in compressor energy. The compressor rack is the biggest energy user in the store. Carefully managing head pressure is often the biggest single step you can take to reduce energy cost.
2. The final step is to review suction pressure setpoints. Once case temp settings are optimized and expansion valves are set, suction pressure doesn't need to be as low to keep the case at its setpoint. Raising suction temperature reduces workload on the compressors.

Other improvements that involve equipment upgrades and controls can further boost reliability and efficiency—things like antisweat heat control, defrost optimization, condenser fan VFD's and LED case lighting. Many local utilities offer incentives to help cover the cost of such equipment.

A refrigeration tune-up is a worthwhile investment, often paying for itself in a few months, then reducing energy bills by thousands of dollars a year.

THE BOTTOM LINE:

- A refrigeration tune-up can reduce the store's electric bill by 3-10%.
- A refrigeration tune-up can boost reliability and summer peak capacity of the system.
- During a tune-up procedure, a technician takes a detailed look at the system as a whole with a two-part objective: minimize the refrigeration load, and then meet the remaining load as efficiently as possible.
- During a tune-up look for other opportunities to further boost reliability and efficiency through equipment upgrades. Check with your local utility for incentives to help cover the cost of such equipment.

