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**E**nergy is the supermarket industry's top operating cost after shelf stock — so every penny saved on energy contributes to improved profit margins.

One of the simplest ways to reduce energy costs is to install controls for the “anti-sweat heaters” on refrigerated display cases to ensure the heaters are used only when necessary. The controls are relatively inexpensive, easy to install and maintain. A store with the equivalent of 36 four-door display cases is projected to save approximately \$15,900 a year, based on an electricity cost of six cents per kilowatt-hour (kWh).

Refrigeration represents over 60 percent of the energy use of a typical grocery store. In recent years, the technology to enhance energy efficiency and performance for commercial refrigeration has drastically improved, with anti-sweat heater controls a prime example. To encourage the use of anti-sweat heater controls, Focus on Energy offers an incentive to install the controls. These projects often result in a payback of one year or less.

#### **WHAT ARE ANTI-SWEAT HEATER CONTROLS?**

Due to basic laws of physics involving humidity, air temperature and dew point, when warm, humid air from a store's interior meets the cold air of a refrigerated display case, condensation occurs. This can lead to ice build-up on door gaskets and to the fogging and “sweating” of the doors, which can not only damage equipment but prevent customers from seeing the products inside the refrigerated case.

To prevent this condensation and “sweating,” the refrigerated display case doors and frames are heated. (Hence the name, “anti-sweat heaters.”) In essence, the heater dries up any warm, humid air that may have gotten trapped inside the display cases during customers' opening and closing of the

doors. Anti-sweat heater controls, in turn, are used to ensure that the doors and frames are heated only when necessary.

#### **WHY THE CONTROLS ARE A GOOD IDEA**

Most anti-sweat heaters operate non-stop 24 hours a day, 365 days a year, even though condensation is a serious problem in Wisconsin only during warm, humid summer days. (Warm air can hold more moisture, which is one reason why humidity tends to be higher in the summer.)

An anti-sweat heater needs to run continuously only when a store's relative humidity reaches 55 percent and condensation is likely. Yet approximately 80 percent of grocery stores run their anti-sweat heaters continuously, regardless of humidity levels, according to a survey by Focus on Energy.

#### **HUMIDITY, CONDENSATION, AND 'SWEATING'**

To understand anti-sweat heater controls, it's helpful to be familiar with a few facts concerning humidity, dew point, and condensation. The same laws of nature govern both the formation of dew on grass during summer nights and the “sweating” of refrigerated display cases.

Overall, a store's relative humidity is closely related to the outdoor dew point. When the outdoor dew point is high, as in summer months, the store's humidity will also be high. Conversely, when the outdoor dew point is low, as is usual in winter, the store's humidity will also be low.

Dew point is the temperature at which condensation, or dew, occurs. It is used to indicate the amount of moisture in the air. The higher the dew point, the higher the moisture content of the air at a given temperature. When the dew point and the air temperature are equal or near equal, it means the air is saturated with moisture and humidity is high.

The dew point can never be higher than the air temperature. If there is a high dew point (meaning a high saturation of moisture in the air) and the air suddenly cools, nature removes the moisture through condensation.

On summer days when a store's relative humidity is high, every time a customer opens the refrigerated display case, warm moist air comes into contact with the cooler air of the refrigeration system. This, in turn, leads to condensation unless an anti-sweat heater is used.

### **HOW THE CONTROLS WORK**

Anti-sweat heaters are used to reduce condensation. Anti-sweat heater controls ensure that the heater is used only when needed.

The controls work one of two ways. They either sense the dew point in a specific area of the display case or they detect actual moisture in the air. They are pre-programmed to heat the doors and frames (sometimes called mullions) only when they detect that dew point or moisture. Generally, the heater is cycled on and off — for instance, a cycle of ten seconds on and thirty seconds off.

Typically, the controls will reduce the use of the anti-sweat heater by two percent for every one percent reduction in a store's relative humidity. For example, in a typical Wisconsin store, relative humidity may approach 55 percent in July but drop to 10 percent in winter months. This 45 percent difference in humidity levels leads to a 90 percent difference in the amount of time the anti-sweat heater needs to run. In other words, while an anti-sweat heater may need to run almost all the time in July, in winter you may need it only 10 percent of the time.

### **POTENTIAL SAVINGS**

Anti-sweat heater controls save money in two ways. First, they reduce the amount of time the anti-sweat heater needs to run. Second, because the anti-sweat heater runs less often, the refrigeration system does not have to compensate for that extra heat generated. Thus there are two areas of energy savings: in the anti-sweat heater and in the operation of the refrigeration system.

It costs about \$85 per refrigerated display case door to buy and install the anti-sweat heater controls; usually there is one control for every case, which typically have three or four doors, depending on their size. Focus on Energy offers an incentive for the controls, which further reduces the installation cost.

One grocery store with 143 refrigerated display-case doors was projected to save 265,000 kWh of electricity over a year. There were 36 electrical circuits with controls, or roughly one for every four-door display case. Here's how the savings would work out at the store, based on varying electrical utility costs.

### **AN EXAMPLE CALCULATION**

Based on a cost of six cents per kWh, the store would save \$15,900 a year on electrical bills. Based on a cost of seven cents per kWh, the store would save \$18,550 a year. Based on a cost of eight cents per kWh, \$21,200 would be saved. Installation costs would be the same, \$12,155 for 143 doors. In all scenarios, the project would pay for itself in less than a year.

Of the 265,000 kWh saved, approximately 155,600 kWh was saved by reducing the amount of time the anti-sweat heater was used. The rest, 109,400 kWh, was saved by reducing the amount of refrigeration needed to compensate for the heat generated by the anti-sweat heater.

### **FOR MORE INFORMATION**

If you're interested in learning more about anti-sweat heater controls or other energy efficiency opportunities, contact Focus on Energy at 800.762.7077 and ask to speak with a member of the Grocery Team or visit [focusonenergy.com](http://focusonenergy.com).