

Small Changes in Temperature and Humidity Mean Big Savings For Schools

Controlling costs is a major concern for school districts in general. Money saved as a result of more efficient plant operations can be redirected to applications that more directly impact student outcomes. In the US, K-12 schools alone spend \$6 billion per year on energy costs, more than on textbooks and computers combined (Kanojia, 2018). Of that total, 2% (see figure 1) or \$120 million is spent on refrigeration (Hendron, 2013).

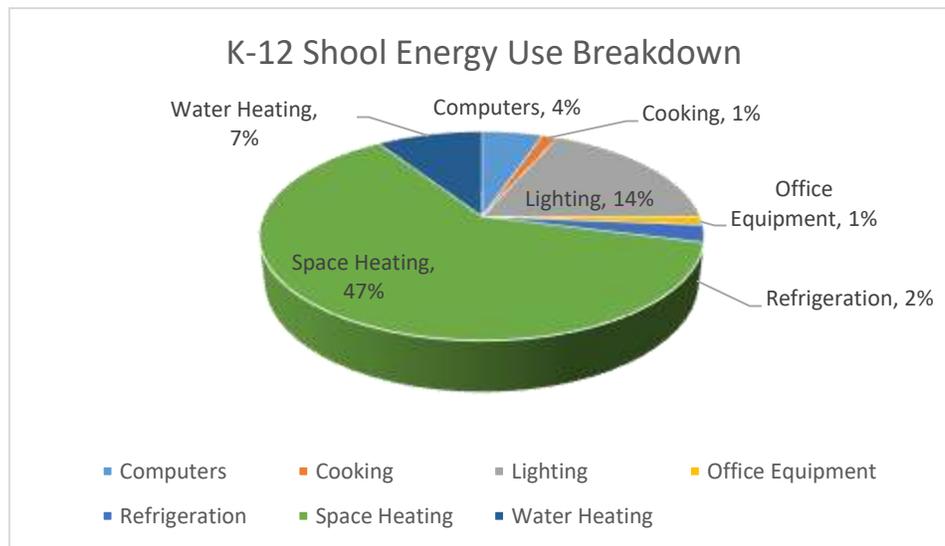


Figure 1: Source: Bob Hendron, National Renewable Energy Laboratory, Golden, Colorado, *Refit Best Practices for K-12 Schools & State Applications*

Greenguard Moisture and Humidity Control Panels absorb moisture and/or humidity. They prevent bacteria, mold, mildew and odor. They are also an ethylene gas sink. When placed inside cold storage areas, i.e. coolers, freezers etc., they effectively inhibit ice buildup on coils, floors and walls, while also extending the shelf-life of produce and flora. To evaluate the validity of these assertions, the manufacturer commissioned a Houston-area air quality and control systems company (**the Company**) to conduct a study involving 2 schools in a large school district in the state of Texas, consisting of 300 schools.

In the previous year, the school district spent a total of \$1,773,831.93 or, on average 5912.77 per school on refrigeration. Two schools, referred to here as School A and School B, were included in the study. The Company tracked, temperature, relative humidity, power in kilowatts per hour (KwH) and product loss, both prior to and after installing Greenguard Moisture and Humidity Control Panels. Let's take a look at what they found.

As reflected in figure 2, the variancesⁱ in before and after cooler temperature and relative humidity were small, 6.2% and -9.8% RH respectively. So small are the

temperature variance, there is almost no daylight between their respective markers on the chart.

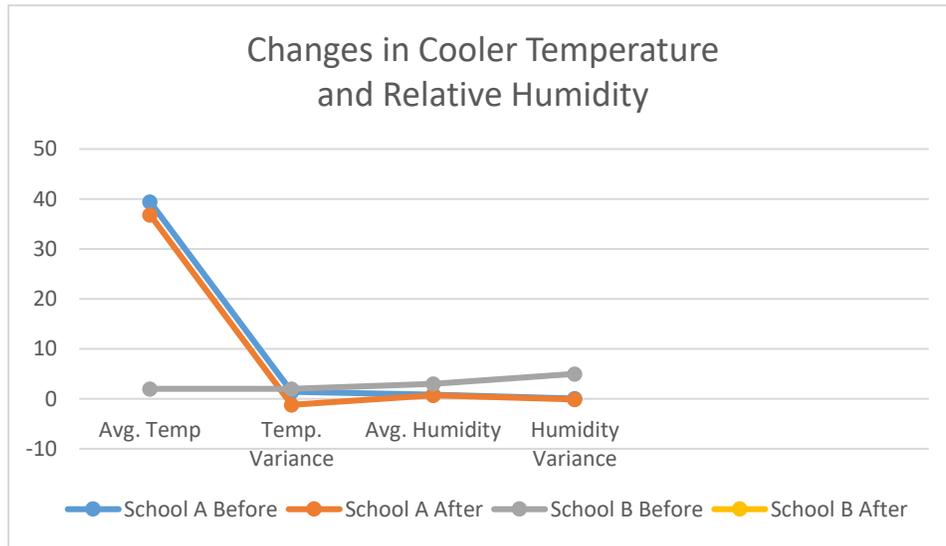


Figure 2: The change in temperature and relative humidity is reflected in the close proximity of their respective markers.

However, as shown in Figure 3, these small changes express themselves profoundly in their effect on projected annual power consumptionⁱⁱ, and as such, annual cooling cost. For instance both school were using over 59,000 KWH at a cost in excess of \$5900 per year for refrigeration. After installing the Greenguard panels, power usage and cooling cost were reduced by 23.8%. Power usage decreased by over 14,000 KWH. Cooling cost fell by over \$1400

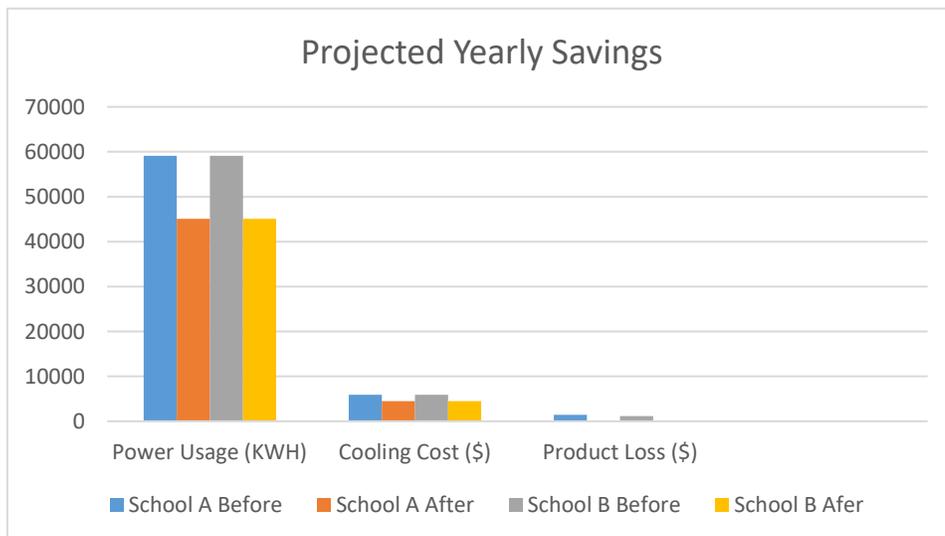


Figure 3: Small changes in temperature and relative humidity led to significant reductions in power usage, cooling cost and product loss.

To put a finer point on it, that means that every percentage point drop in relative humidity reduces power consumption by approximately 880 KWH.

The Company also attempted to measure how effectively Greenguard Moisture and Humidity Control Panels absorb ethylene, the volatile gas that causes produce and flora to ripen and ultimately rot, spoil and/or die. However, in lieu of using an ethylene gas meter, the Company looked at some equally compelling data, specifically the daily amount of product loss, before and after installing the panels. Was produce and other food stuff staying fresher longer? The answer can be found in Figure 3.

Before installing Greenguard Moisture and Humidity Control Panels, School A and School B were incurring product losses of \$1453.12 and 1139.07 respectively, per year. After the panels were installed, product loss decreased an average of 89%, to an average of approximately \$144 per year, for the two schools. In fact, so precipitous was the drop, it gives a whole new meaning to “off the chart.”

In short, this study, and others like it, demonstrates that the Greenguard Effect is real including:

- Lower humidity.
- Less mold and mildew.
- Less ice buildup.
- Lower temperatures.
- Lower cooling cost
- Extended product shelf life.
- Less cross-contamination.

Greenguard Moisture and Humidity Control Panels are an elegant, i.e. effective, efficient and sustainable, solution, applicable at virtually every stage in the cold storage supply chain.

Finally, when the Company calculated the costs reduction for the two schools and applied them to all 300 schools in the district it projected a total savings of nearly \$412,000 by year two (2), as a result of the Greenguard Effect.

ⁱ Based on an optimal temperature of 38° F and optimal humidity of 78% RH

ⁱⁱ Analysis based upon a 5 ton cooler/freezer system producing 55,000 BTU.