

Solutions for a Sustainable Future

Adventures in Grocery Shopping



Are you reading this right. Is it really 97 degrees already this early in the summer. The green LED temperature readout just sits there staring back at you. The Grocery Store parking lot is packed with the only spaces being at the extreme outer edges. It seems no one wanted to walk any further than they had to in this oppressive heat. Leaving the comfort and coolness of your car, the heat slams into you like a physical gust of wind. The blacktop excited and alive from the sun's energy throws the heat back up at you. Your eyes make out the hazy waves of heat pouring up into the air. The sweat is already beading down on your forehead, and your back tingles as the first droplets of moisture cascade downward. Just a few feet more and the doors open and a blast of cool, conditioned air, invites you inward to shop.

Factoid: The average American spends more than 30 percent of their monthly budget on food, (U.S. Department of Agriculture). Tallied up, that's a national grocery bill of more than \$2 trillion annually. ...

As you roam aimlessly (at least in my case), around the vast array of choices within the grocery store, trying to remember was it toilet paper or paper towels you were supposed to pick up (me again), has it ever crossed your mind how much energy these supermarkets use to power their refrigeration systems. There are a lot of coolers and freezers in supermarkets and a lot of them are open to the air, which means they are running constantly and using up a significant amount of electricity.



Factoid: There are roughly 231,216 Grocery Stores in the U.S.

According to Energy Star, supermarkets use about 50 kilowatt-hours per year or about \$4 per square foot of space, and considering the average-sized supermarket is about 50,000 square feet, this ends up being around \$200,000 per year in energy bills.

Factoid: This also equates to 1,900 tons of CO2 emissions per store (the equivalent of the emissions of 360 vehicles) being stuffed into our atmosphere's grocery bag every year. For all stores combined roughly 439,310,400 tons of CO2 emissions (the equivalent of 83,237,760 vehicles).

Before mechanical refrigeration systems were introduced, people cooled their food with ice and snow, either found locally or brought down from the mountains. The first cellars were holes dug into the ground and lined with wood or straw and packed with snow and ice: this was the only means of refrigeration for most of history.

Factoid: Historically, one TR (Ton of Refrigeration) was defined as the energy removal rate that will freeze one short ton of water at 0 °C (32 °F) in one day. The unit's value as historically defined is approximately 11,958 Btu/hr (3.505 kW) and has been redefined to be exactly 12,000 Btu/hr (3.517 kW).

Refrigeration is the process of removing heat from an enclosed space, or from a substance, to lower its temperature. A cooler uses the evaporation of a liquid to absorb heat. The liquid, or refrigerant, used evaporates at an extremely low temperature, creating extremely low temperatures. A liquid is rapidly vaporized (through compression) - the quickly expanding vapor requires kinetic energy and draws the energy needed from the immediate area - which loses energy and becomes cooler. Cooling caused by the rapid expansion of gases is the primary means of refrigeration today.

The first known artificial refrigeration was demonstrated by William Cullen at the University of Glasgow in 1748. However, he did not use his discovery for any practical purpose. In 1805, an American inventor, Oliver Evans, designed the first refrigeration machine. The first practical refrigerating machine was built by Jacob Perkins in 1834; it used ether in a vapor compression cycle. An American physician, John Gorrie, built a refrigerator based on Oliver Evans' design in 1844 to make ice to cool the air for his yellow fever patients.

Factoid: Refrigerators from the late 1800s until 1929 used the toxic gases ammonia (NH3), methyl chloride (CH3Cl), and sulfur dioxide (SO2) as refrigerants. Several fatal accidents occurred in the 1920s when methyl chloride leaked out of refrigeration systems.

The most widely used current applications of refrigeration are for the air conditioning of private homes and public buildings, and the refrigeration of foodstuffs in homes, grocery stores, restaurants and large storage warehouses. Dairy products are constantly in need of refrigeration, and it was only discovered in the past few decades that eggs needed to be refrigerated during shipment rather than waiting to be refrigerated after arrival at the grocery store. Meats, poultry and fish all must be kept in climate-controlled environments before being sold. Refrigeration also helps keep fruits and vegetables edible longer.

Factoid: Profit margins in supermarkets are very thin (around 1-3%), it's suggested that a 10% reduction in energy cost can increase net profits by as much as 16%!

I am Jim Steigner (Mr. Comfort), and I just wanted you to know. As always please feel free to contact me at www.mrcomforthvac.com, under the "Ask Mr. Comfort" section. I think I will get the toilet paper too just to be safe.