

## Project Summary

### **Comparison of Vertical Display Cases: Energy and Productivity Impacts of Glass Doors vs. Open Display Cases (ASHRAE 1402-RP)**



Supermarkets have one of the highest energy uses per square foot for commercial buildings. Half of that energy is attributed to the store's refrigeration system, which include refrigerated display cases or merchandisers. In a typical supermarket a large segment of refrigerated display cases used for medium temperature (20 to 40 °F) food merchandising are open multi-deck vertical display cases. For open display cases, air infiltration through the "air curtain" account for up to 80% of the cooling load. Reducing the infiltration will lead to a reduction in the cooling load and the store's overall energy consumption. One way to reduce the air filtration is to use refrigerated cases with glass doors.

It has been estimated that use of glass door display cases would reduce the cooling load on a typical eight-foot display case by 50 to 70% and has the potential to reduce both the annual energy use and the peak electric load for a typical supermarket by 11 to 15%. The U.S. Department of Energy estimates that total supermarket energy usage is 0.33 quads per year (1 quad = 1,000,000,000,000 Btu's). If 80% of stores were to convert their medium temperature display cases to glass door cases, the savings would be significant at about 0.04 quads per year. That equates to the electricity provided by 7.5 coal-fired power plants at 250 mega-watts each per year.

Currently, glass door display cases have only had limited success in penetration the market dominated by open vertical display cases. This is attributed to the perception that the addition of doors will reduce shopper impulse buying. Yet it is difficult to find any hard evidence to support this perception.

This ARTI co-funded ASHRAE research project will compare typical open display cases to typical glass-door display cases to quantify the differences in the overall energy consumption and the food product sales from each.

The results of this research will allow supermarket designers to make an informed decision whether to use glass door vertical display cases or open vertical display cases. Electric utilities can leverage this information as a basis for developing new incentive programs to accelerate adoption of more sustainable supermarket designs.