System Type: Transcritical CO_2
Refrigerant: R-744 (carbon dioxide)
GWP: 1

NORTH AMERICAN SUSTAINABLE REFRIGERATION COUNCIL

DeCicco & Sons Larchmont, NY

Charge Size	1,000 pounds
Store Size	24,000 sq ft
Refrigeration Capacity	MT: 919,000 BTU LT: 103,000 BTU Total system capacity: 1,022,000 BTU
System Location	Rack is indoors in the basement
ASHRAE Climate Zone	4
Average Electricity Cost	$0.188/kWh & $25-$30/kW *Utility:* Con Edison
Baseline for Comparison?	Yes. Similar size store with R-404a system
Key Characteristics	This is a Hilllphoenix transcritical CO_2 system utilizing a BAC adiabatic pre-cooler (i.e. a hybrid gas cooler that works using both evaporation and air to reject heat); goal of pre-cooling is to make CO_2 a more efficient option in warmer ambient climates.

SYSTEM BASICS

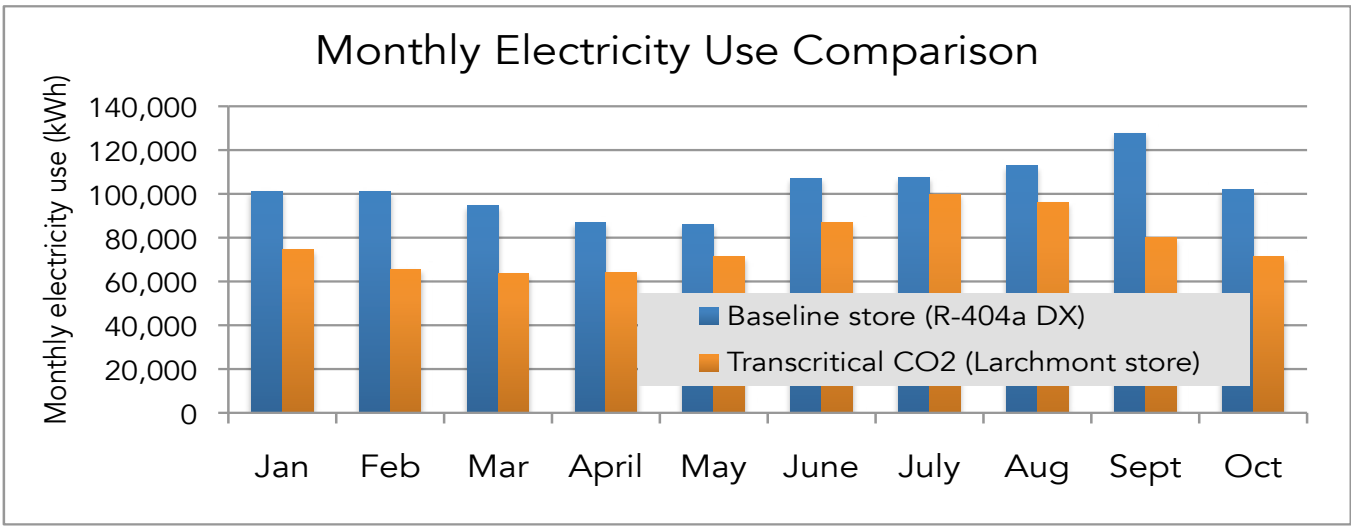
DeCicco & Sons installed a state-of-the-art transcritical CO_2 booster system with adiabatic pre-cooling to help improve the efficiency of the CO_2 refrigerant in warmer months of the year.

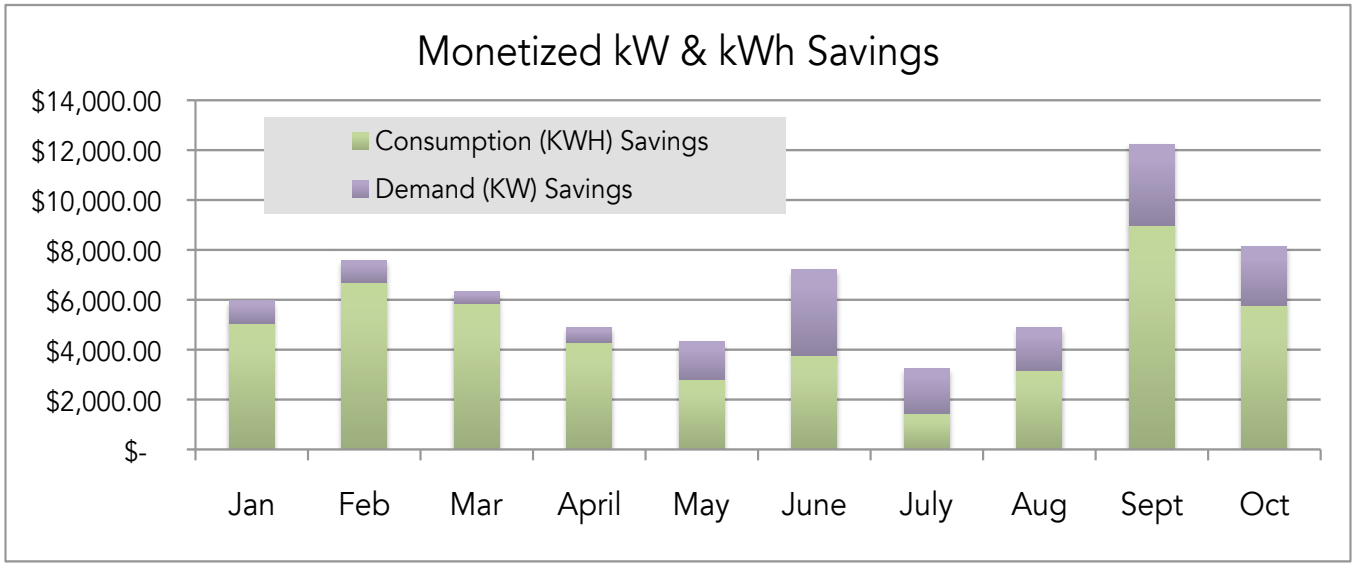
Up and running in January 2016, this system was built to maximize efficiencies. It takes advantage of the high temperature waste heat and redirects it to the HVAC system. The store also installed solar panels in June 2016, uses LED lights, has doors on most cases, uses photo sensors and motion sensors and has motorized and automated night curtains, (thus ensuring that the energy benefits of night curtains are fully realized).

In addition, this system uses electric defrost and has a sub-meter on nearly every device or panel, allowing for very precise energy use measurements. The energy savings and demand reduction shown on the next page are compared to a similar sized R-404a system in the same climate zone.

While the upfront cost of this R-744 system was 20-30% more than a typical HFC DX system (with case controllers), the installation costs were slightly less. The expected maintenance costs are about the same, while the cost of CO_2 is less than that of HFC refrigerants.

ENERGY & PERFORMANCE DeCicco's has 10 months of store-wide electricity and demand data from its new Larchmont store and a comparable store using R-404a. The CO_2 system uses anywhere from 7 to 37 percent *less* electricity than the baseline system. In addition to the kWh savings, Larchmont sees a decrease in monthly demand. Total cost savings from reduced electricity use and reduced demand was $64,862 over 10-months, or $77,834 when annualized.

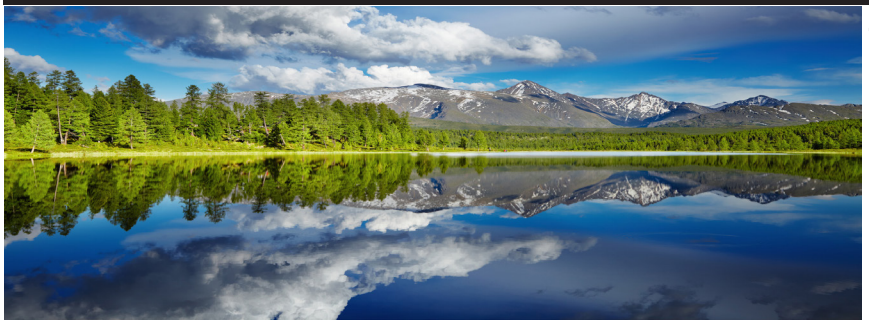




"I think that the CO2 system with the adiabatic gas cooler is a great investment, in fact I've already installed two more. I think the energy savings is terrific."

-John DeCicco Jr.

Want to learn more about this CO_2 system with adiabatic pre-cooling? Contact **johnjr@deciccos.com**



The North American Sustainable Refrigeration Council is a 501(c)(3) nonprofit dedicated to advancing natural refrigerants and creating a more sustainable future for retail food refrigeration.

Learn more at http://nasrc.org