



Article reprint from



Published: January 2016

State of the Art Sustainability

Multiplex Refrigeration System Lays Foundation for Café's Green Mission

Certifiably Green

With the Eco-Cool refrigeration system as a green foundation, the Green Sage Café incorporated additional sustainable elements, including: solar panels, energy-efficient dishwashers and LED lighting. In recognition of its sustainable, state-of-the-art vision, the Green Sage Café earned the distinction of being the GRA's first four-star certified Green Restaurant in the South.

As a result of their success, many other restaurants in the Asheville area have taken on the green mantle. And with the help of grants from the state of North Carolina, 17 restaurants (including the first two of the Green Sage Café's three locations) are now offering sustainable, natural food-based fare in Asheville. The city has become such a bastion of green culinary principles that it was recently named the country's first Green Dining Destination by the GRA. 🌱



Designed with a Copeland Scroll Digital compressor, the Eco-Cool system from RDT serves as a cornerstone of the Green Sage Café's sustainability strategy.



If you're a restaurant owner who decides to put the word "green" in your name, sustainability better be a significant part of your culinary story. After all, when patrons dine at a green restaurant, their standards are raised. They expect locally sourced, natural, organic and sustainably raised foods. And they want a dining experience in an environment that exudes green and supports sustainable principles. The Green Sage Café in Asheville, N.C., embraces this challenge with a green vision that permeates every facet of their operation.

Owned and operated by Randy Talley and Roger Derrough, the Green Sage Café has three locations across Asheville. While their first café incorporated many green elements, its refrigerated fixtures each operated on independent compressors — a refrigeration architecture that Talley identified as an area for improvement in their second restaurant.

"With 10 compressors running on everything from under-counter sandwich stands to reach-in refrigerators, there was a lot of heat being generated and energy wasted, not to mention a lot of noise rattling around the restaurant," he said.

Talley leaned on his background in the natural foods grocery industry to find a better solution. There he had utilized rack refrigeration systems with minimal compressors to provide cooling for multiple fixtures. He wanted to implement a similar architecture — now commonly referred to as multiplexing — but wasn't sure if this technology would translate into his foodservice applications. That's when Talley tapped Refrigeration Design Technologies (RDT), experts in eco-friendly refrigerated system design, to implement a system that would take his second location to the next level of energy efficiency.

"Our goal was to create the greenest restaurant possible. We wanted to cut energy consumption in half without compromising the quality of the food we're serving," Talley said.

Keeping (Eco)-Cool Under Pressure

Brent Dyess, RDT's president, knew that Talley's lofty goals were within reach. Dyess selected RDT's proven Eco-Cool refrigeration system based on the Copeland Scroll Digital™ compressor for the second Green Sage Café location. Eco-Cool was specifically designed to meet the demands of environmentally responsible foodservice outlets, relying on lean multiplex refrigeration architecture to deliver the highest degree of energy efficiency.

The Green Sage Café's unique energy and environmental requirements made it an ideal candidate for the Eco-Cool system. The system minimizes the compressors needed to

provide refrigeration, servicing eight fixtures in the café's medium-temperature suction group with one 4 HP Copeland Scroll Digital compressor. With their ability to digitally modulate capacity from 10 to 100 percent, the Copeland Scroll Digital enables precise matching of refrigeration requirements to the variable operating loads typical of a foodservice application.

Dyess ensured Talley that the benefits of this multiplex architecture would be immediately apparent.

"Instead of eight compressors kicking on and off, pulling full run-load amps each time, you have a single compressor running at only the capacity needed to meet the load. And if all fixtures call for refrigerant, that compressor is capable of handling everything at the same time," Dyess explained.

The medium-temp fixtures covered by the 4 HP Copeland Scroll Digital compressor included:

- Walk-in cooler
- Sandwich stands (2)
- Reach-in refrigerators (2)
- Griddle stand
- Product merchandiser
- Beer cooler

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— Randy Talley, Green Sage Café

Dyess explained that the digital application also substantially reduces the piping required in conventional systems. "Considering we have eliminated numerous one-to-one piping scenarios, we can run piping in a more efficient trunk line configuration," he said.

Surprising Energy Savings

Dyess originally estimated that the system would provide the restaurant up to 30 percent in annual energy savings. But when

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— Brent Dyess, RDT

the Green Restaurant Association (GRA) evaluated the Green Sage Café's environmental profile for certification purposes, they commissioned RDT to perform an independent, third-party study on the Eco-Cool system. The results were surprising.

The UL energy study simulated a foodservice application, comparing a multiplex system (with one Copeland Scroll Digital compressor servicing six fixtures) to a conventional system. The study replicated actual foodservice conditions, such as varying demands and frequent refrigerator door openings and closings. The data revealed that in 90 °F ambient conditions, the Copeland Scroll Digital-based Eco-Cool system delivered 48 percent energy savings.

The study demonstrates that as the ambient temperature rises above 90 °F, the energy savings will decrease slightly. But as

Dyess explained, at temperatures below 90 °F, the potential for energy savings will continue to rise above the 48 percent mark.

Keeping Cool and Getting Into Hot Water

The multiplex refrigeration system also helped Green Sage Café owners check other significant items off their sustainability list. By placing the Eco-Cool unit outside the restaurant and removing condenser surface areas that are present on each fixture in conventional systems, they eliminated 53,856 BTUH of heat, or the equivalent of 4.5 tons of air conditioning. Not only does this contribute to the café's eco-friendly footprint, it helps create a better dining experience for patrons and improved working conditions for the staff.

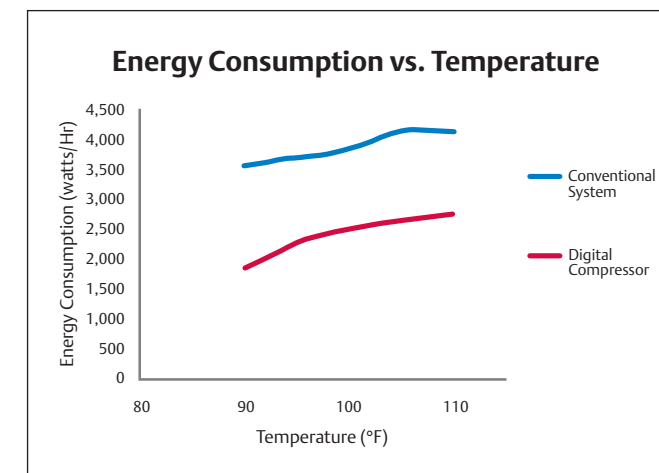
Another advantage of the Eco-Cool refrigeration system was its ability to capture waste heat and divert it into a heat exchanger that provided heating for the restaurant's hot water tank.

"We had used solar panels for hot water heating in our first location, but this heat reclamation system was even more effective," Talley explained. "This system takes care of all of our hot water requirements," he added.

For the RDT team, the concept of heat reclamation just makes good environmental sense.

"If our customers see the value in reusing a natural by-product of the refrigeration system, then we recommend it," Dyess said. "Green Sage Café had the vision and commitment to utilize every available natural resource," he added.

Energy Consumption Comparison: Copeland Scroll Digital Compressor vs. Conventional System



Temperature (°F)	Energy Consumption (watts/hr)				
	90	95	100	105	110
Conventional System	3,571	3,712	3,849	4,143	4,142
Digital Compressor	1,852	2,275	2,508	2,648	2,756
Delta	1,719	1,437	1,341	1,495	1,386
Energy Saved (%)	48%	39%	35%	36%	33%

An independent UL study of RDT's Eco-Cool unit compares a conventional compressor system with the Copeland Scroll Digital compressor. At 90 °F ambient temperatures, the digital scroll compressor saves 48 percent on energy.