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A Contractor's Perspective into the World of Co² Refrigeration Systems

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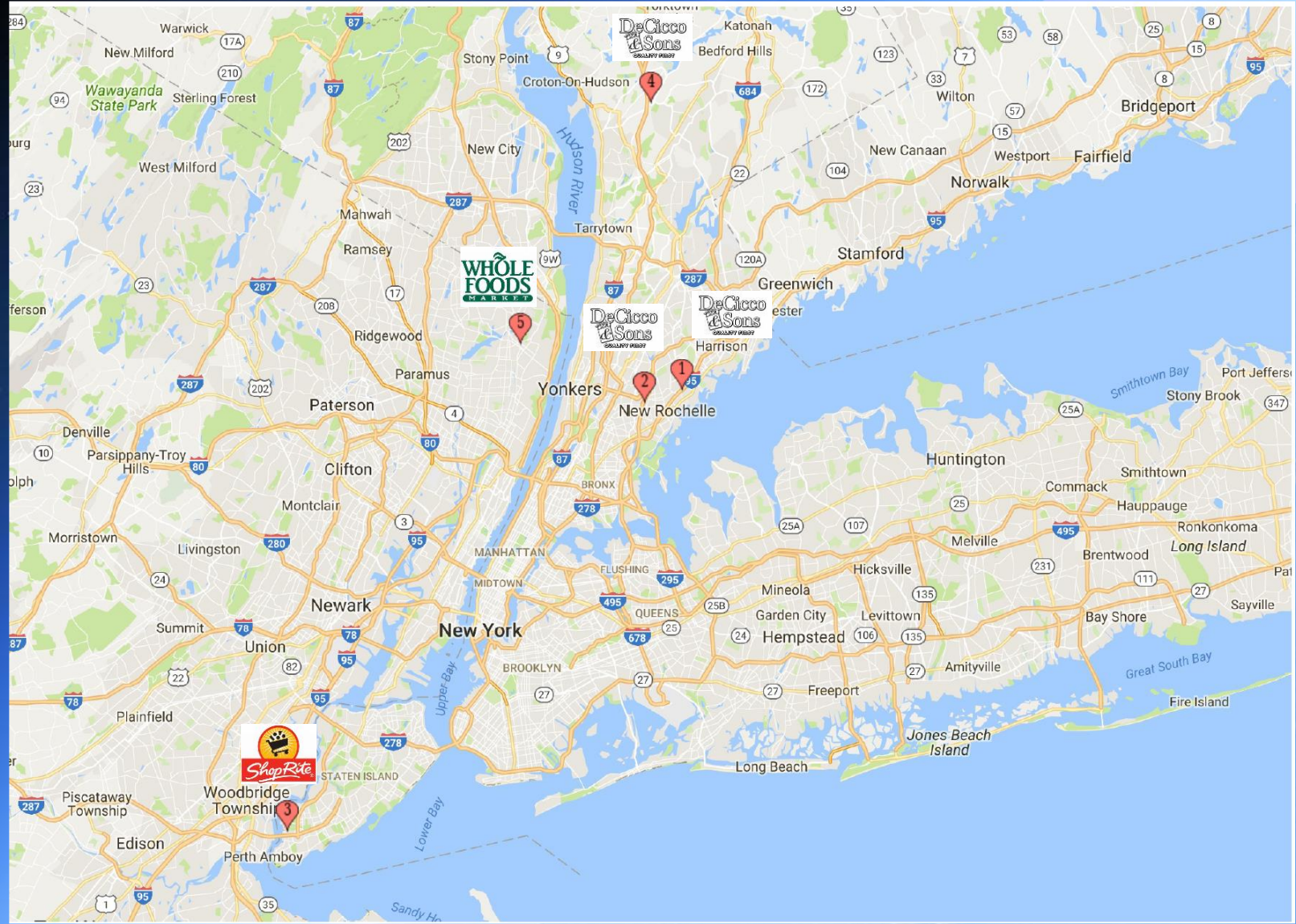


- Incorporated in 1937
- AAA concentrates on rendering the highest quality of installation and services to Supermarkets and Warehouses.
- Our services have expanded to include retail stores, banks, and commissaries.
- Service area covers New York, New Jersey, and Connecticut.
- Technicians use tablets as we are now a paperless company. Our service vehicles are GPS monitored. We have the capability of remotely monitoring or adjusting most Refrigeration controls systems.
- Focus on providing top quality work through education of associates and customers.
- Annual Educational Symposium: We partner with industry leaders such as Hill Phoenix to give our customers insight on new technologies, energy saving practices, proper equipment and operational practices such as Planned Maintenance.



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We have installed one Co² Cascade System and four Transcritical Systems. Our current Transcritical Systems all utilize adiabatic gas coolers to help stay below a supercritical state in the warmer months. Once the installations were completed we continue to maintain the equipment with quality service.





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Planning Stages/Education

Initial and ongoing education both in a classroom setting and hands on in the field help to ease concerns regarding the transition from standard DX or Glycol Systems to the high pressure Co² Refrigeration Systems





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Overcoming Case Controllers



This region of our territory had few case controller stores prior to the introduction of Transcritical Co². This meant that we not only had to train our technicians on the Co² System but also provide training on case controller installation, startup and troubleshooting.



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Installation

The Smaller line sizes help reduce cost and our pipefitters were able to produce more per day.

As with all jobs be sure that piping best practices are adhered to.

The introduction of Mueller XHP copper piping eliminated the need for welders and further reduced costs.



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Startup

Create a start up log of all measures and readings after system has been commissioned.

Include your servicing technicians in the startup so they can familiarize themselves with the site.

Always check and be sure that the system is being charge with refrigerant grade Co2 and that there is no cap charge on the tank.



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Troubleshooting

Be sure that manufacturers guidelines are followed especially where controller networking is concerned.

Verify that controller logging is setup in your controllers. They are very helpful in the troubleshooting process.

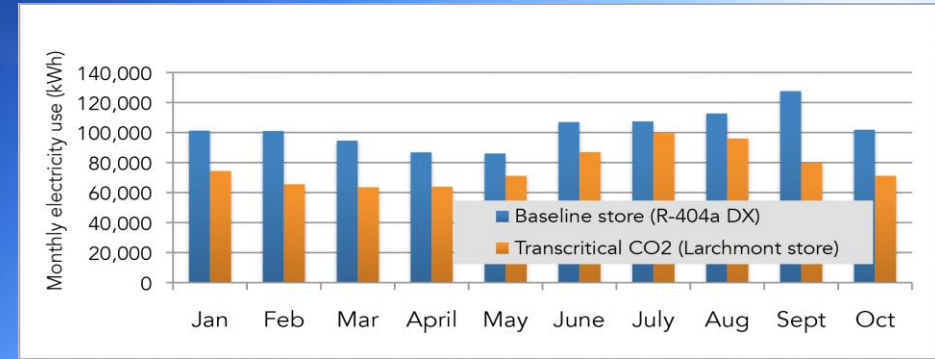
Approach any issues the same as you would any other DX system.



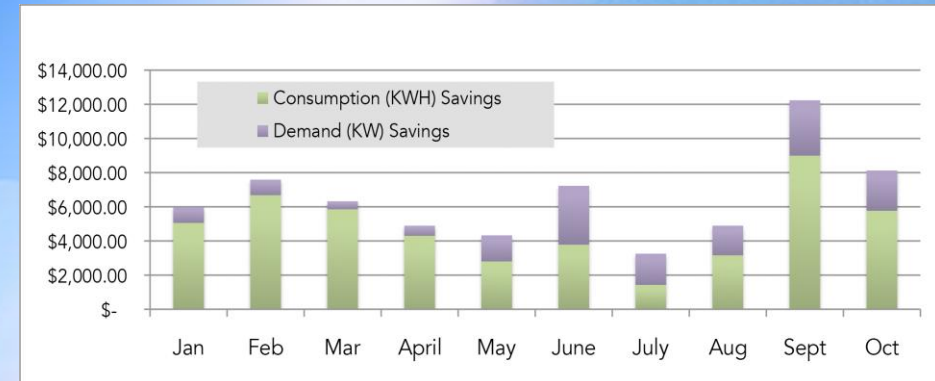
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System Stability, Operation and Energy Savings

System Type: Transcritical CO ₂ Refrigerant: R-744 (carbon dioxide) GWP: 1	
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 Hillphoenix 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.



The Co₂ system uses anywhere from 7 to 37 percent less electricity than the baseline system.



Total cost savings from reduced electricity use and reduced demand was \$64,862 over 10-months, or \$77,834 when annualized.



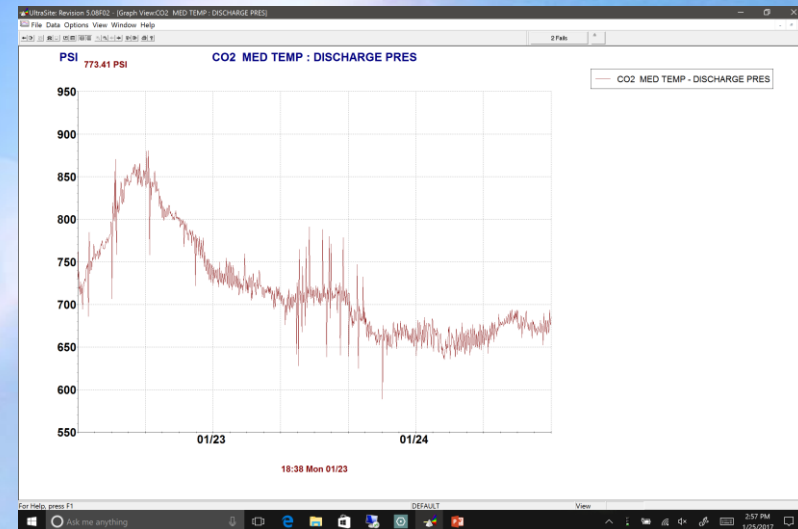
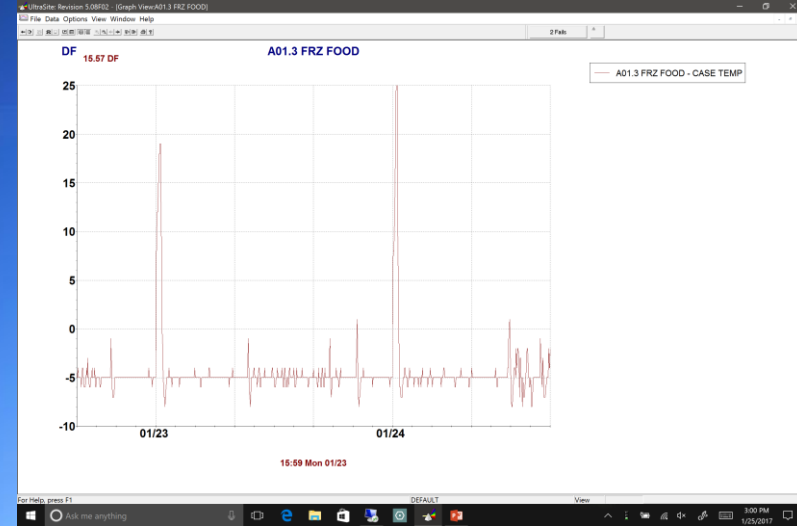
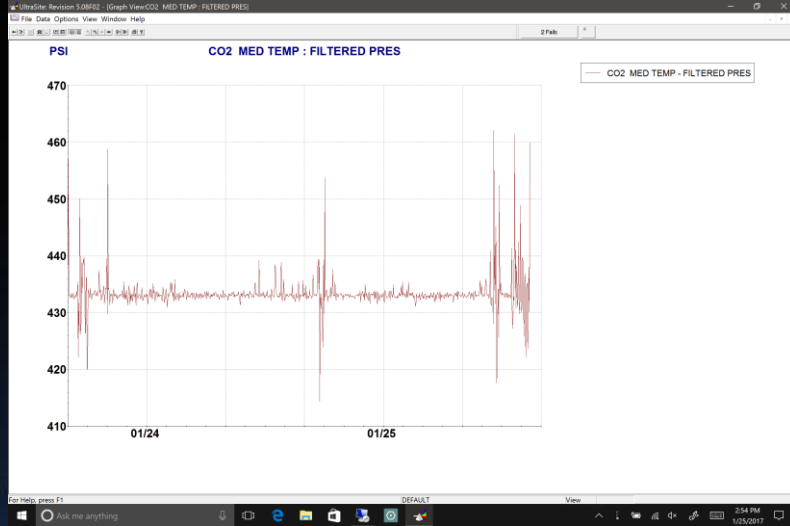


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Maintaining a Successful CO2 Store

- Work with your prospective contractors starting from the design phase.
- Make sure the contractors you choose are on board with the new technologies and are willing to provide training to their team.
- Use manufacturers that are going to stand behind their products and provide the support you and your team need.
- Document conditions and readings at startup to be used as a service tool later.
- Work with your Utility Companies to take advantage of available rebates.
- Maintain accurate as-built drawings to be kept onsite.
- Utilize a controls platform that you and your contractor are familiar with.
- Don't stop educating.



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Looking Ahead



AAA will begin installing our fifth Transcritical System this month with another 3 sites planned in the next two years. One of which will eliminate the Adiabatic Gas Cooler and opt for a Geothermal System to reduce Transcritical operation.



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Questions?