

REFRIGERATED WAREHOUSES  
DISTRIBUTION CENTERS


# CARNOT TRANSCRITICAL CO<sub>2</sub> SYSTEM & NH<sub>3</sub>/CO<sub>2</sub> PACKAGE

*Efficiency, quality and reliability  
built-in all our ecofriendly products*



**CARNOT**  
REFRIGERATION





**“WITH CARNOT’S REFRIGERATION SYSTEM,  
WE HAVE TRIPLED THE VOLUME OF OUR  
WAREHOUSE AND MAINTAINED THE SAME  
LEVEL OF ENERGY CONSUMPTION.”**

**DENIS PAGEAU** *Vice President of business development, Michal Inc.*

# CO<sub>2</sub> SOLUTION BY CARNOT: A SMART, ECOFRIENDLY AND PROFITABLE CHOICE

## PROVEN EFFICIENCY FOR MAJOR SAVINGS

Superior quality, performance  
and energy stability;

Flawless redesign to replace  
existing R-22 solutions;

Smart use of NH<sub>3</sub> TFC cycle (rain cycle) to  
avoid use of compressors most of the year;

Financial savings of up to 50% year after  
year due to the reduction of energy costs,  
maintenance and service costs and the  
elimination of refrigerant fees;

High standstill pressure system.

**Made by the most experienced company in  
CO<sub>2</sub> transcritical solutions in North America,  
the CO<sub>2</sub> refrigeration system by Carnot is  
the smart choice for owners of warehouses  
and distribution centers.**

*"[...] As you know, we have completed our new cold store in Quebec and it is now in the process of taking in cranberries for our customers. At this point they have been frozen by others, but for the upcoming season, we intending to freeze 25 000 000 lbs. which is the capacity of the facility. We accomplished something of a record as the whole project was completed in 17 weeks through a wonderful effort of our contractors as well as the use of many computer assisted projects. Even the pipe welding was done with lasers.*

*It is a 'green' project using fully CO<sub>2</sub> refrigeration (no ammonia) which cannot be used with cranberries as any leak turns the berries black and unusable). Also, as the source of power in Quebec is hydro so we have a zero global warming effect, not to mention very low power rates at least one third what we pay in Massachusetts. So a big competitive advantage and we love doing business in Quebec!*

*The installation of the refrigeration system which consists of three compressor packages each with thirteen compressors was factory built and fully tested offsite in Trois-Rivieres, about sixty miles from our plant by Carnot Refrigeration. They also did all of the installation including evaporators, condensers and all the piping. Having built many cold stores over the years this project was by far and away the best and represents a new era in refrigeration technology. We can't say enough good things about Carnot, and I believe they have a bright future and will become a significant factor in the industry."*

**ROBERT HAMPSON** *Advisor, Manulife*

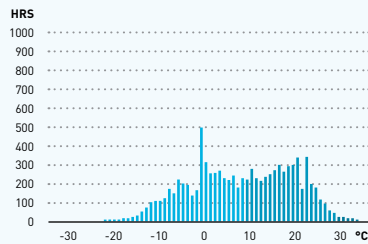
Excerpt from an e-mail addressed to the Chairman of IARW

# CASCADE CO<sub>2</sub>/NH<sub>3</sub> SYSTEM MODEL

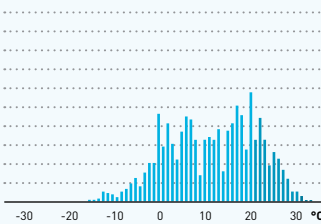
COMPR. STAGE	COOLING CAPACITY		EVAPORATING TEMPERATURE		OUTDOOR TEMPERATURE									
	TR	kW	°F	°C	(°C)	-5	0	5	10	15	20	25	30	35
MT	285	1000	23	-5	kWref	1000	1000	1000	1000	1000	1000	1000	1000	1000
					kW CO <sub>2</sub>	149	149	149	149	149	149	149	149	149
					THR CO <sub>2</sub>	1149	1149	1149	1149	1149	1149	1149	1149	1149
					kW NH <sub>3</sub>	TFC	TFC	TFC	89	91	100	117	141	166
					kW total	149	149	149	238	240	249	266	290	315
					COPr	6.7	6.7	6.7	4.2	4.2	4.0	3.8	3.4	3.2
					COPc	14.4	14.4	14.4	9.0	9.0	8.6	8.1	7.4	6.8
LT	142	500	-20	-29	kWref	500	500	500	500	500	500	500	500	500
					kW CO <sub>2</sub>	201	201	201	201	201	201	201	201	201
					THR CO <sub>2</sub>	701	701	701	701	701	701	701	701	701
					kW NH <sub>3</sub>	TFC	TFC	TFC	54	55	61	71	86	101
					kW total	201	201	201	255	256	262	272	287	303
					COPr	2.5	2.5	2.5	2.0	1.9	1.9	1.8	1.7	1.7
					COPc	6.0	6.0	6.0	4.7	4.7	4.6	4.4	4.2	4.0

# TRANSCRITICAL CO<sub>2</sub> BOOSTER MODEL

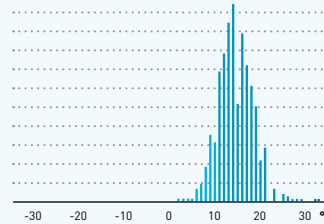
MT	285	1000	23	-5	kWref	1000	1000	1000	1000	1000	1000	1000	1000	1000
					kW	133	133	137	144	187	225	286	378	476
					THR	1809	1809	1816	1826	1895	1956	2053	2201	2358
					COPr	7.5	7.5	7.3	7.0	5.4	4.4	3.5	2.6	2.1
					COPc	24.0	24.0	23.3	22.4	17.7	15.0	12.2	9.6	4.5
LT	142	500	-20	-29	kWref	500	500	500	500	500	500	500	500	500
					kW	176	176	179	183	209	231	268	323	381
					COPr	2.8	2.8	2.8	2.7	2.4	2.2	1.9	1.5	1.3



MONTRÉAL



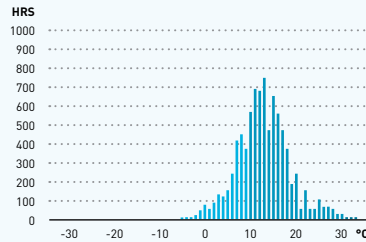
NEW YORK



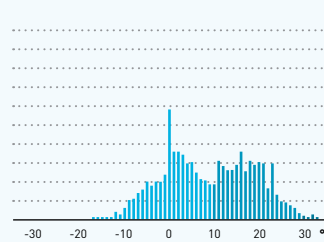
SAN FRANCISCO

- FREE COOLING MODE (CO<sub>2</sub>)
- MECHANICAL MODE
- TRANSCRITICAL OPERATION + PARALLEL COMPRESSION
- SUBCRITICAL OPERATION + PARALLEL COMPRESSION
- SUBCRITICAL MODE

**kWref [kW]** REFRIGERATION CAPACITY  
**THR [kW]** REJECTED CAPACITY  
**kW [kW]** ENERGY CONSUMPTION  
**COPr** REFRIGERATION COEFFICIENT OF PERFORMANCE  
**COPc** COMBINED COEFFICIENT OF PERFORMANCE INCLUDING HEATING OR RAIN CYCLE FREE COOLING



SEATTLE

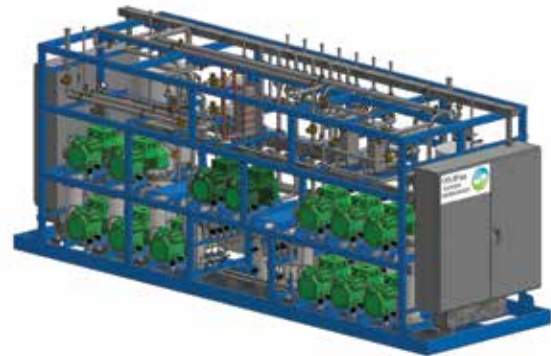


TORONTO

# CO<sub>2</sub> TECHNOLOGY BY CARNOT: A POWERFUL REFRIGERATION SYSTEM

## POWERFUL TECHNOLOGY, QUITE SIMPLY

- Modular solution designed by a highly qualified engineering team;
- Process optimization for increased efficiency;
- Simplified quick-plug installation;
- On-site assistance for equipment start-up;
- Complete training for technical staff;
- Fully automated system.



## A SMART, SUSTAINABLE BUSINESS DECISION

- Harmless refrigerant reduces or eliminates risk of facing environmental or health and safety restrictions in the future;
- Equipment outlasts conventional installations;
- Substantial financial savings are generated throughout equipment life;
- Significant reduction in greenhouse gases (GHG);
- Solution is eligible for current LEED programs.

“CARNOT NOT ONLY HELPED US REDUCE OUR USE OF R-22 AND NH<sub>3</sub>, OUR ENERGY CONSUMPTION AND OUR WATER USE, BUT ALSO THE NEED TO DEPEND ON A CHEMICAL CONDITIONING PROCESS. IT’S A WIN-WIN SITUATION.”

“EXCELLENT SERVICE, QUICK RESPONSE AND VERY COMPETENT STAFF.”

**OPTIMIZED TECHNOLOGY,  
SUPERIOR RELIABILITY AND SAFETY**

Elimination of ignition and toxicological hazards that occur with other refrigerants;

Designed in compliance with the highest quality standards in the industry;

Strict quality control in a controlled environment;

Highly reliable processes tried and tested in the most extreme conditions;

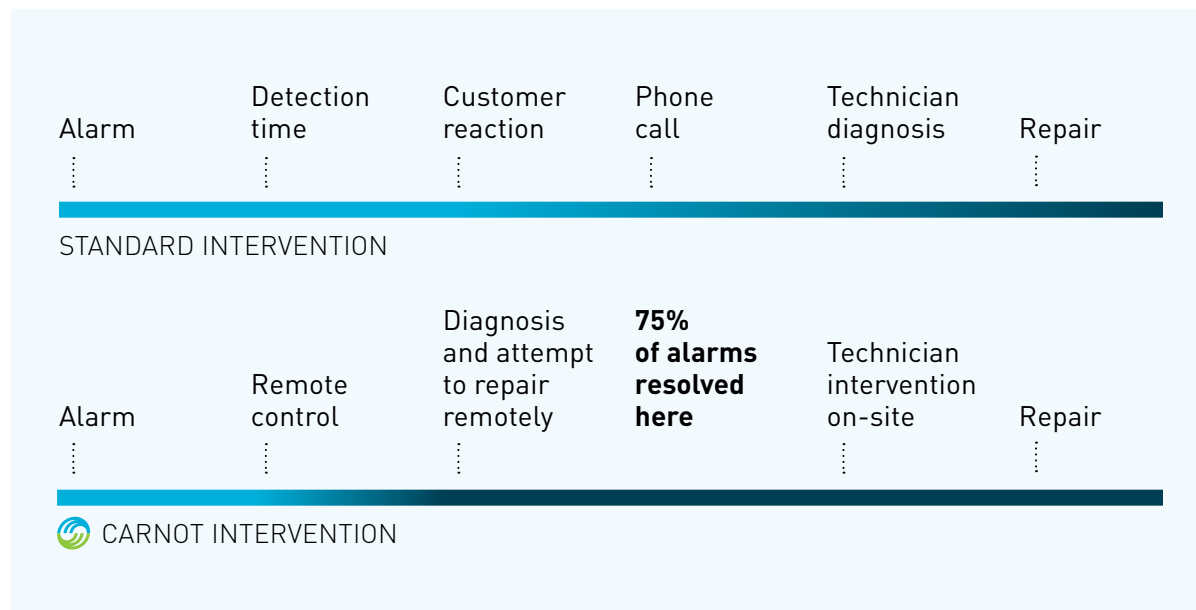
**REAL-TIME REMOTE ASSISTANCE**

Remote controlled equipment and alarm system;

Real-time monitoring and performance reports by a highly qualified team;

24/7 technical support, quick and efficient interventions.

**35% FASTER INTERVENTION**



# CO<sub>2</sub> TECHNOLOGY BY CARNOT: CUSTOMIZE YOUR SYSTEM

## □ HEAT RECOVERY /RCINTELLIGENT

Reuse the energy created by your process using a custom heat recovery strategy for major financial savings year after year.

## □ CO<sub>2</sub> RAIN CYCLE

Use the natural cycle of evaporation and condensation of CO<sub>2</sub> to avoid overusing compressors for major savings on operating costs.

## □ GAS COOLER /CONDENSER

Different options available for optimal performance and durability.

## □ STAINLESS STEEL

Stainless steel covering and piping.

## □ ENCLOSURE FOR OUTSIDE INSTALLATION

Weatherproof construction.

## □ ENERGY METER WITH DISPLAY

Real-time display of your refrigeration consumption.

## □ INTERNET MODULE

To closely monitor your process using your smartphone or computer.

## □ TURNKEY INSTALLATION

For peace of mind, done by professionals to meet your needs, from design to start-up.



# CARNOT: A PIONEER IN TRANSCRITICAL CO<sub>2</sub> AND NH<sub>3</sub>/CO<sub>2</sub> REFRIGERATION AND COOLING SYSTEMS

Carnot Refrigeration has proven itself regarding the performance of its CO<sub>2</sub> transcritical refrigeration system. With the longest-lasting legacy of high quality demonstrations across North American and Europe since 2008, CO<sub>2</sub> refrigeration technology by Carnot Refrigeration has set standards with its efficiency, profitability, sustained performance in the most extreme conditions, simplicity and operational reliability.

## NOTEWORTHY FACTS

Installations performed throughout North-America and Europe;

Daily savings for our clients;

Highly qualified engineers who are constantly trying to set higher standards for CO<sub>2</sub> refrigeration technology;

Standards and certifications including CSA, UL and CE;

Awards and recognition from recognized organizations such as ASHRAE and EPA;

Competent customer service team focused on customer satisfaction.





“CO<sub>2</sub> IS NOURISHMENT FOR TREES: SYNTHETIC MOLECULES ARE NOT.”

MARC-ANDRÉ LESMERISES *CEO of Carnot, United Nations conference*

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# QUESTIONS INFORMATION

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