



June 18-19, 2014 - San Francisco

*Carnot Refrigeration CO2  
technologies for your applications*

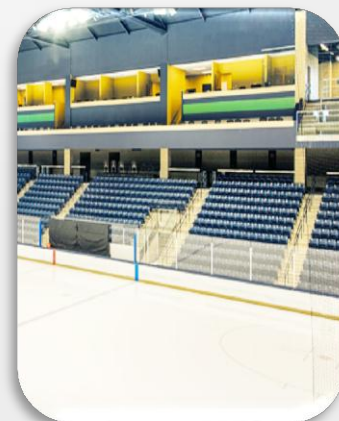
**2008**



**2010**

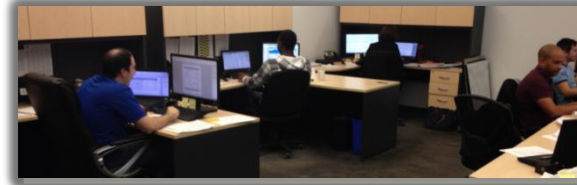


**2011**

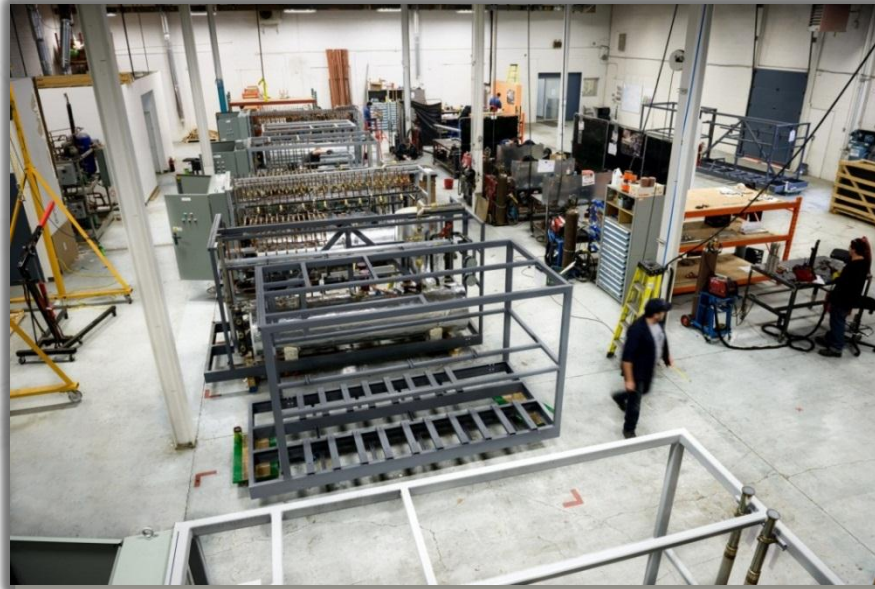


# Our head office in Quebec

15 engineers  
5 technicians  
4 to 30 production employees  
5 administration people



## Production



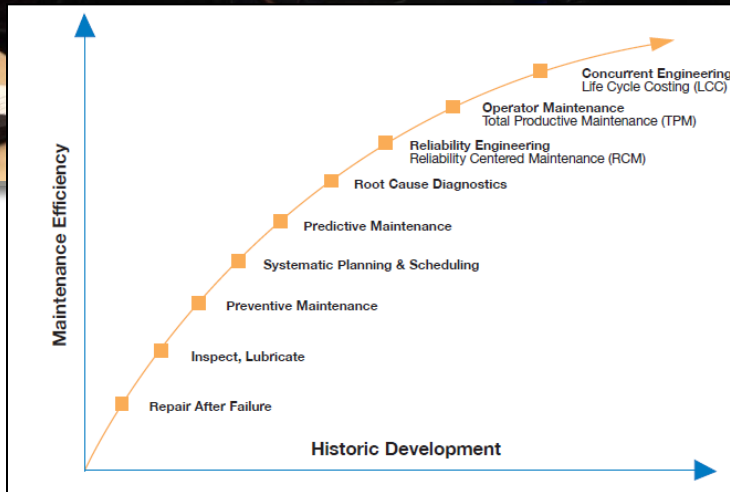
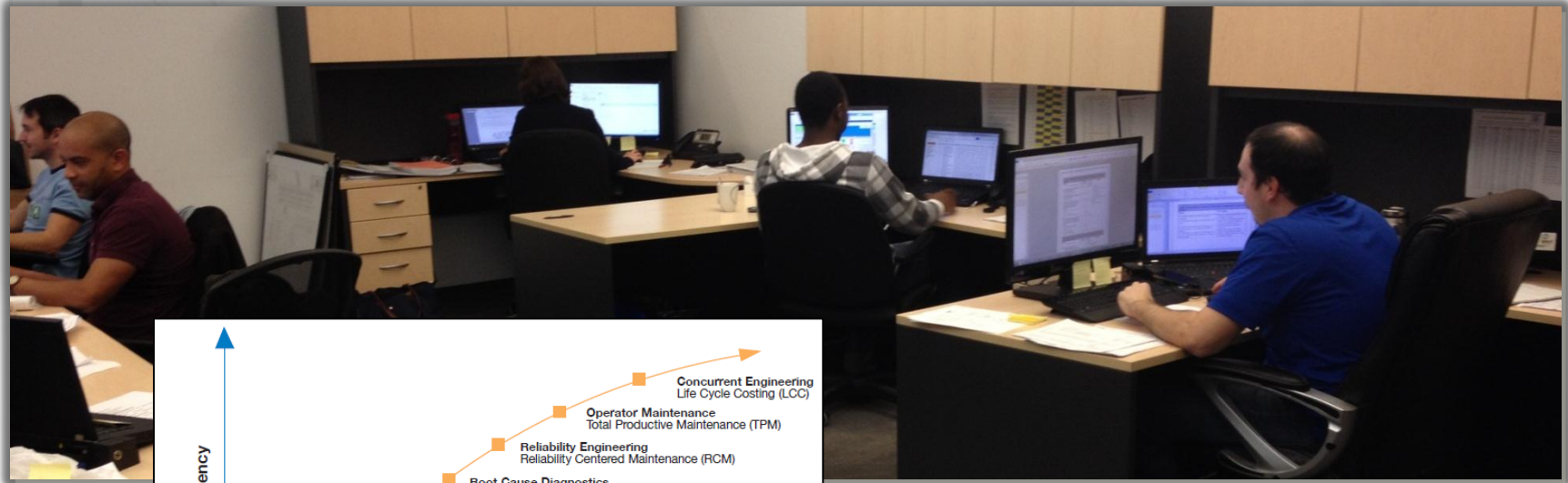
### Capacity :

- 15 racks at the same time
- 9 days per rack at 8 hours per day
- 1825 racks per year (theoretical actual production capacity)



# Customer service at your service

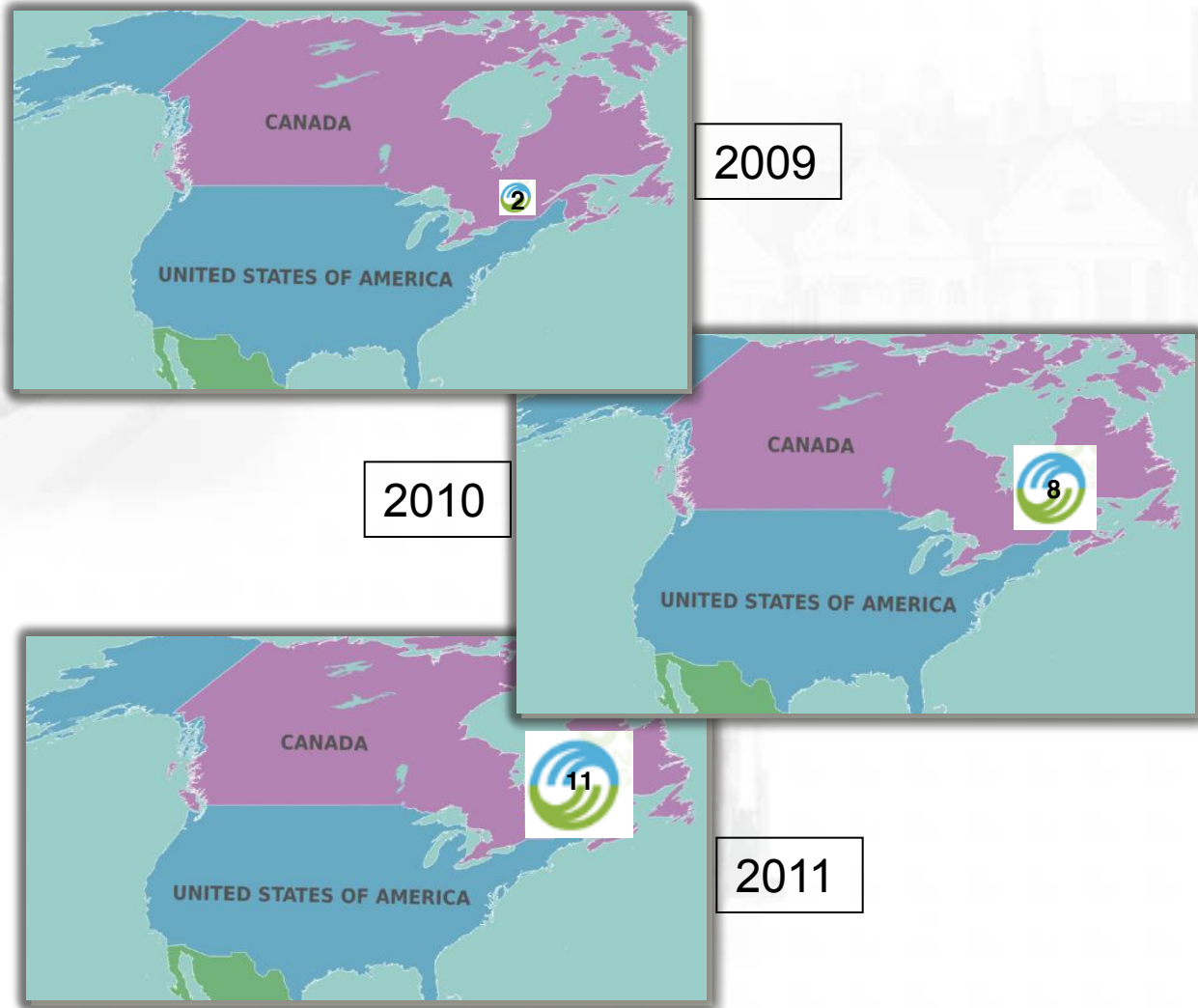
- Remote supervision
- Energy commissioning
- Engineering retroaction
- Educational tool



***Learning curve***

It is this **experience** and this **quality** of customer service that has enabled us to work with **25 different service contractors**. **And to continually enhance our systems**

# The deployment of the Carnot's strength in supermarkets: 5 years of history in supermarkets



# The deployment of the Carnot's strength in supermarkets: 5 years of history in supermarkets

2013



2014



## Engineering



### Product lines:

#### Super Market

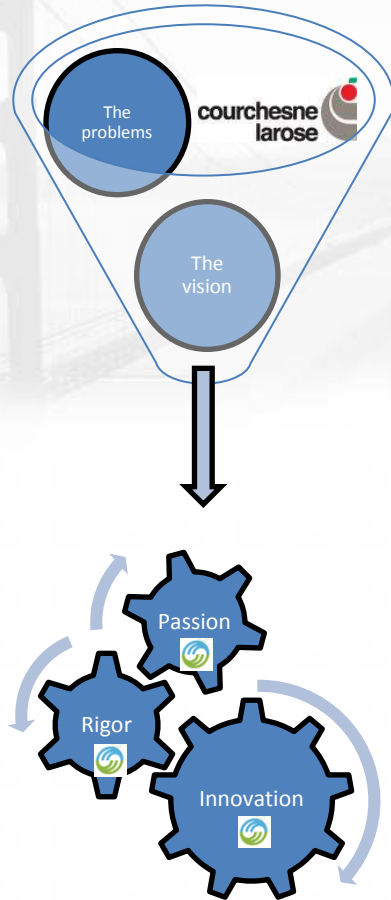
- HFC/Glycol
- HFC/CO<sub>2</sub>
- **Transcritical CO<sub>2</sub>** version

#### Distribution Center

- NH<sub>3</sub>/Glycol
- HFC/Glycol
- NH<sub>3</sub>/CO<sub>2</sub>
- **Transcritical CO<sub>2</sub>** version

#### Ice rinks

- NH<sub>3</sub>/Secondary fluid
- NH<sub>3</sub>/CO<sub>2</sub>
- HFC/CO<sub>2</sub>
- **Transcritical CO<sub>2</sub>**/Secondary fluid
- **Transcritical CO<sub>2</sub>**/Recirculated CO<sub>2</sub>



## NH<sub>3</sub>/CO<sub>2</sub> REFRIGERATION SYSTEM AT COURCHESNE LAROSE (MICHAL INC.)



### INTRODUCTION

The major task of food processing applications today is to ensure the freshness of perishable goods. Storages are used to smooth out peaks and troughs in production, allowing a more continuous supply to customers, and help maintain the quality of produce.

The warehouse of Courchesne Larose (Michal Inc.) is spread over an area of 100,000 ft<sup>2</sup> with 40 ft. of height, able to accommodate 2 069 945 kg (4 563 442 lbs) of food per day. It includes 22 ripening rooms for bananas, a main dock with 19 garage doors, a banana dock with 3 garage doors. The temperature in the rooms varies between 0 and 15°C.

Carnot Refrigeration Inc. has designed and manufactured an ideal system for this warehouse. Our refrigeration system with NH<sub>3</sub>/CO<sub>2</sub> has a great advantage because it greatly minimizes environmental impacts. Although this system is recent, it should be emphasized that Carnot Refrigeration Inc. has integrated innovative new technologies, namely the total recovery of the heat rejected by compressors.



### ABOUT THE COMPANY

Since 2008, Carnot Refrigeration has been leading the CO<sub>2</sub> market in Canada. The company offers integrated services for the design, manufacturing and installation of high quality and eco-efficient CO<sub>2</sub> systems for supermarkets, industrial applications and ice rinks.

More information at:  
[www.carnotrefrigeration.com](http://www.carnotrefrigeration.com)

### CONTACT INFORMATION

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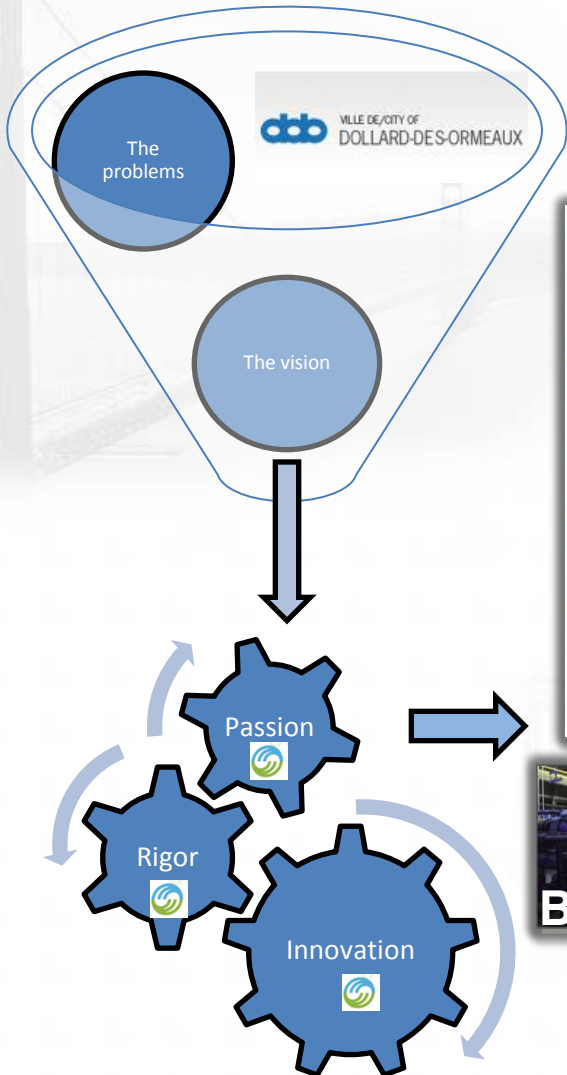
### ABOUT THE SYSTEM

The major advantages of this technology are summarized as follows:

- Totally eliminate the use of HFC's and / or HCFC's.
- Reduce the ammonia quantity drastically without energy penalty.
- Reduce piping and insulation size by more than half and the related labour and material cost by 31.5%.
- Reduce the use of parasismic hangers and the structural need to support the pipes.
- Ammonia confined to the mechanical room.
- Provide full heat reclaim (if needed) for space heating or water heating (domestic or process).



# Business Case Ice Rink



# Business Case Supermarket

Congress of the United States  
Washington, DC 20515  
December 3, 2013

The Honorable Gina McCarthy  
Administrator  
Environmental Protection Agency  
Arist Rios Federal Building  
1300 Pennsylvania Avenue, NW  
Room 3000  
Washington, DC 20460

Dear Administrator McCarthy,

We are writing to ask your agency to pursue commonsense policies that accelerate the phase down of hydrofluorocarbons (HFCs) in this country and globally. We believe the agency can ensure we continue to have affordable, safe refrigeration and air conditioning, while also driving greenhouse gas emissions down.

Since its ratification in 1989, the Montreal Protocol has been an example of a highly successful multi-national environmental initiative. Under the Montreal Protocol, U.S. corporations and corporations in participating countries agreed to replace ozone-depleting products – such as Chlorofluorocarbons (CFCs) and Hydrochlorofluorocarbons (HCFCs) – used globally in refrigerants, aerosols and solvents. As a result, we have seen a 97% reduction in the global consumption of controlled ozone-depleting substances.

Today, most countries are choosing to replace CFCs and HCFCs with HFC compounds because HFCs have been found to be a safe and efficient alternative. The United States has already made the transition to HFCs, meaning HFCs are now used in a majority of our air conditioners and refrigerators found in our homes, cars, hospitals, and supermarkets. Developing countries participating in the Montreal Protocol are now starting to make their transitions – ramping up their use of HFCs. As a result, the global use of HFCs is expected to grow rapidly in the coming years. The increased HFC use is good for the ozone layer, but evidently not good for our climate. Unfortunately, it is now determined that HFC compounds can have a very high global warming potential. Should their use go unchecked, it is estimated that HFCs could account for approximately 20 percent of greenhouse gas pollution by 2060. So by using HFCs, we are addressing one global environmental problem, while contributing to another.

Our experience with the Montreal Protocol has shown the global community can work together to save the environment without disrupting the market place. That is why using the Montreal Protocol regime to transition the global use of HFCs to materials that are safe for the ozone and safe for our climate makes sense and why we applaud the Administration's efforts to do so. We believe this process will give our country and the world the most flexibility and cost-effective path toward reducing HFCs.

As we wait for global action, some sectors in this country and in other countries are already beginning to transition away from HFCs, influenced by regulation, voluntary programs and a growing suite of alternatives. For example, many home refrigerators and window air conditioning units have changed over to hydrocarbon refrigerants. Transitions are also being seen in vending machines, supermarkets, motor vehicle air conditioning, and insulating foams. In fact, a Hannaford supermarket just opened in Turner, Maine that is the first HFC-free supermarket in the country. It is estimated that the new system will reduce the store's carbon footprint by 3.4 million pounds of carbon dioxide equivalent every year and will save the store money in the long run in repair and energy costs. Not all sectors have a clear transition, but for some sectors there are clear, safe alternatives to HFCs.

Recognizing that it may take some time to amend the Montreal Protocol and incorporate these changes into US regulations, we believe the EPA does not need to wait to implement smart policies that can help accelerate these transitions in the United States and globally. We encourage you to focus your agency on HFC applications where technology solutions and alternative products are already available or soon to be in the market, similar to what the European Union has done with their Mobile Air Conditioning Directive. The agency should look to where market transitions are already underway – like in Turner, Maine – and where EPA action could hasten the pace of those transitions, both domestically and elsewhere. We think that such actions would not only have significant cost-effective environmental benefits but would also strengthen the Administration's hand in the Montreal Protocol negotiations. Thank you for your efforts in this area and we look forward to working with you on this issue in the future.

With best personal regards, we are

Sincerely yours,

*Tom Carper*  
Tom Carper  
U.S. Senator

*Scott Peters*  
Scott Peters  
Member of Congress

*Alan Lowenthal*  
Alan Lowenthal  
Member of Congress

*Gregory Meeks*  
Gregory Meeks  
Member of Congress

*Patrick Fitzmaurice*  
Patrick Fitzmaurice  
U.S. Senator

*Christopher A. Coons*  
Christopher A. Coons  
U.S. Senator

*William Whitehouse*  
William Whitehouse  
U.S. Senator

*Christopher Murphy*  
Christopher Murphy  
U.S. Senator

*Robert Menendez*  
Robert Menendez  
U.S. Senator

*Burton Roemer*  
Burton Roemer  
U.S. Senator

*Edward Markey*  
Edward Markey  
U.S. Senator

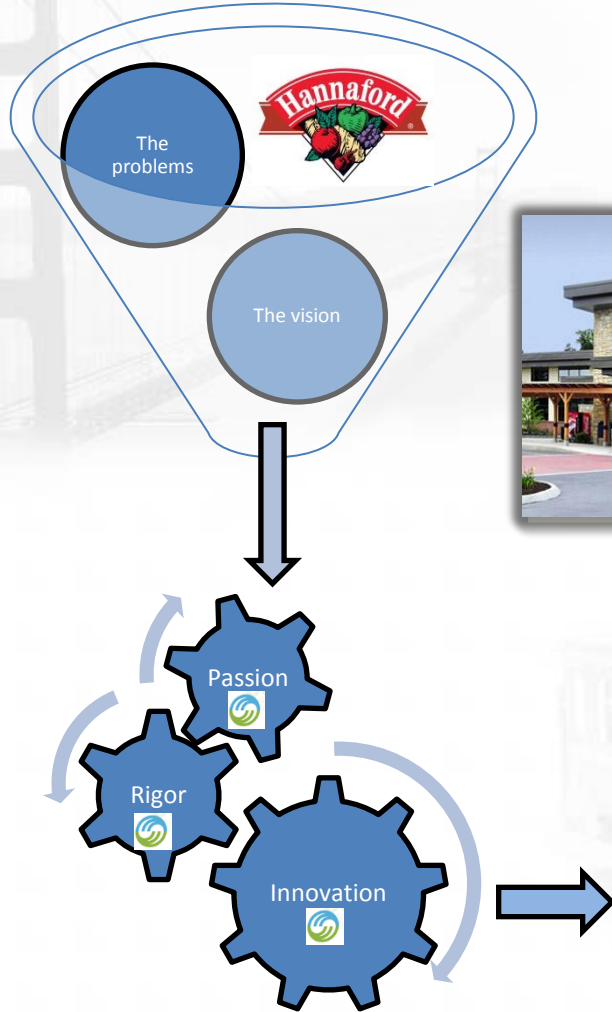
*Kristen L. Gilliland*  
Kristen L. Gilliland  
U.S. Senator

*Anna T. Lujan*  
Anna T. Lujan  
Member of Congress

*Susan A. Davis*  
Susan A. Davis  
Member of Congress

*Matt Cartwright*  
Matt Cartwright  
Member of Congress

*Paul D. Toomey*  
Paul D. Toomey  
Member of Congress



**"Best of the Best" Prize 2013**

## Reliable and Efficient



“Best of the Best” Prize 2013



“ASHRAE Best Technology – Industrial facility” Prize 2010



“GreenChill Platine” Certification 2013

“Prix Energia” Prize 2013

“Étude du Canmet”



“Innovation & Développement” Prize 2013



“Cleantech Next10” Prize 2012



“Développement technologique & Innovation” Prize 2012



business case

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**natural refrigerants**

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Thank you very much!