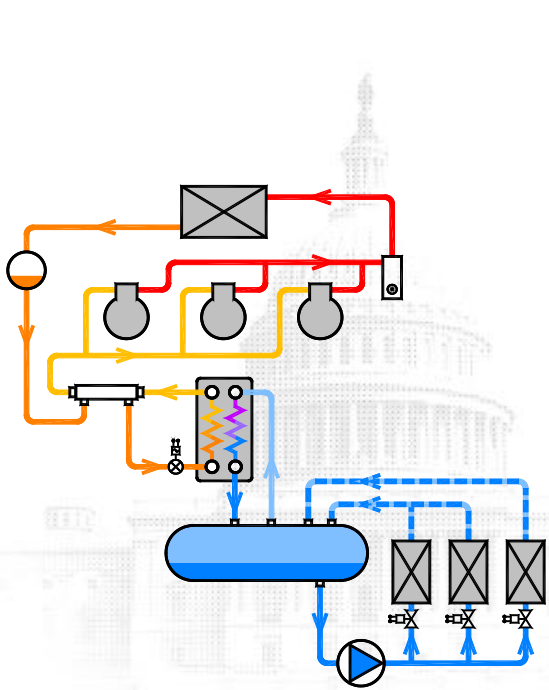




# Advances in CO<sub>2</sub> Supermarket Refrigeration in North America

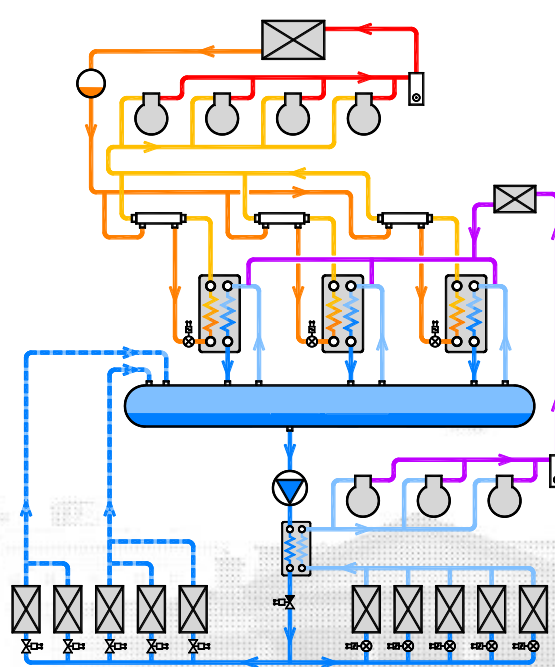
*Scott Martin – Director Sustainable  
Technologies  
Hillphoenix*

# Sustainable CO2 Solutions for HFC Reduction



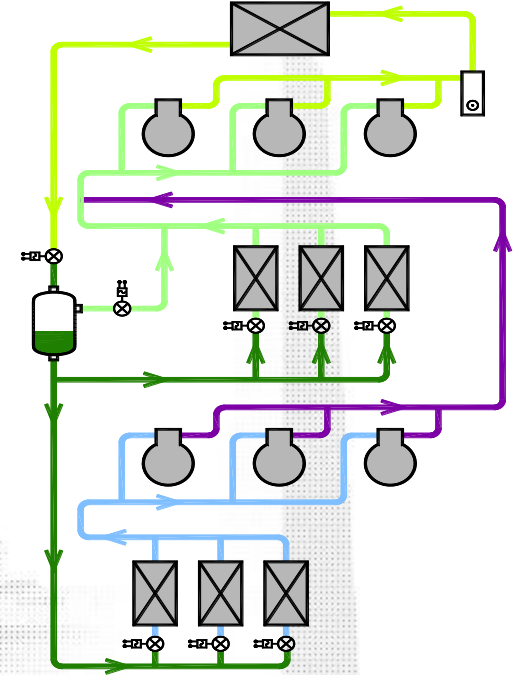
**SNMT2/ SNLT2**  
 Secondary CO2

**HFC Primary Only**  
 (50+% HFC Reduction)



**SNMT2LX**  
 CO2 CASCADE SYSTEM

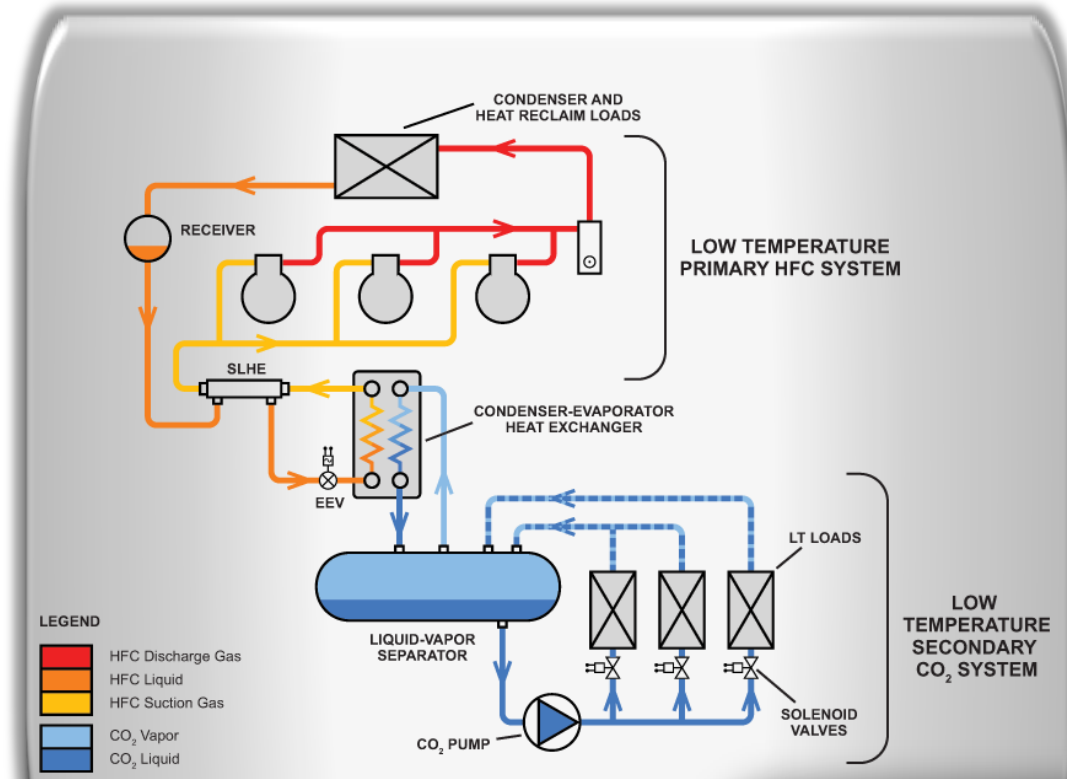
**HFC Primary Only**  
 (60 - 75% HFC Reduction)



**ADVANSOR**  
 by Hill PHOENIX  
 CO2 BOOSTER SYSTEM

**HFC FREE**

# LT2, MT2 – CO2 Secondary (Pumped)



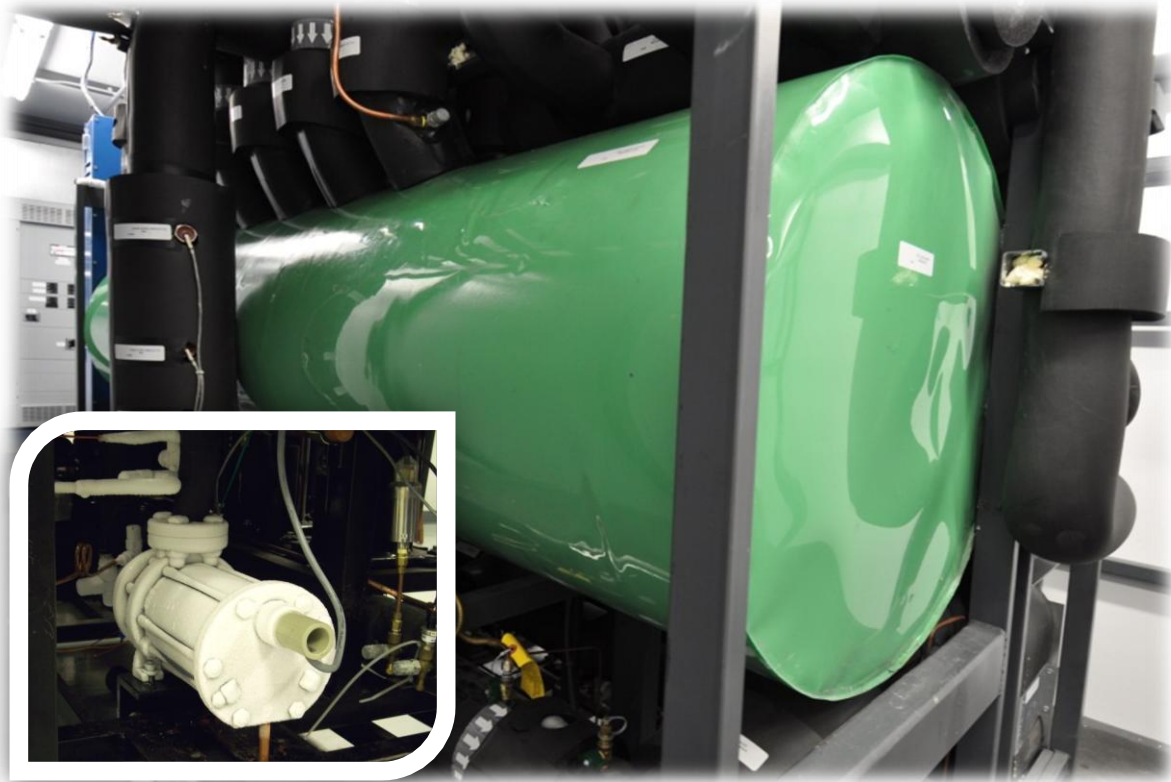
**Liquid CO2 is circulated to provide refrigeration**

**50+ % reduction in carbon footprint over traditional HFC-DX technology**

**Simple system design**  
**On/Off solenoid operation for temperature control**



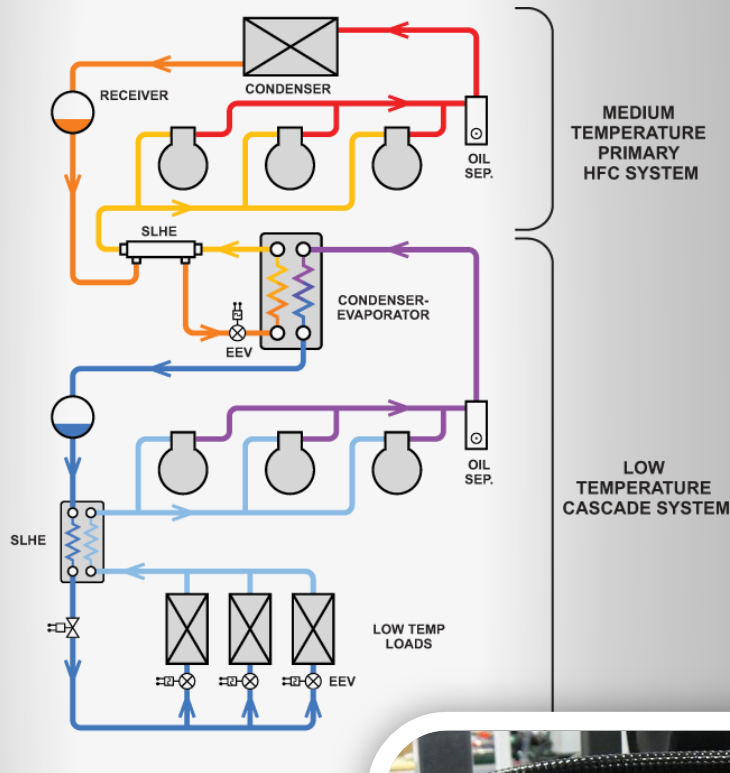
# CO2 Systems Technology - Secondary



SNMT2 - MT CO2 Secondary  
SNLT2 - LT CO2 Secondary



# LTX2 – CO2 Cascade



**Utilizes DX CO2 on the lower cascade and an HFC-based DX system on the upper cascade.**

**60-75% reduction in carbon footprint over traditional HFC-DX technology**

**- Eliminates all LT HFC charge.**





# CO2 Systems Technology - Cascade



Publix.

Walmart 

  
Stop & Shop®

**SUPERVALU**®

  
TARGET

**WHOLE**  
**FOODS**  
MARKET

**sobeys**

 Loblaws

  
Price  
Chopper®

  
SPROUTS  
FARMERS MARKET

**M**  
metro

  
FOOD LION

SNLTX2 - LT CO2 DX Cascade

SNLTX2MT – Combination system

LT CO2 DX Cascade with MT CO2 Secondary

# CO2 Systems in the Americas

**Installations  
Since 2006**

- ~ 100 Secondary
- ~ 30 Cascade





**One refrigerant. So many benefits.**

**ADVANSOR**  **TM**

PART OF THE SECOND NATURE FAMILY BY HILLPHOENIX

**Leading CO<sub>2</sub> technology for refrigeration.**

- 100% environmentally friendly • non-toxic, inflammable
- no ozone depletion • no global warming impact
- low noise • single refrigerant • low cost of installation
- low cost of maintenance • compact design

• future-proof solution

**Fresh thinking.  
Responsible solutions.**

**Hillphoenix**®

A DOVER™ COMPANY

709 Sigman Road, Conyers GA 30013  
770-285-3264  
hillphoenix.com



*“... a window of opportunity”*



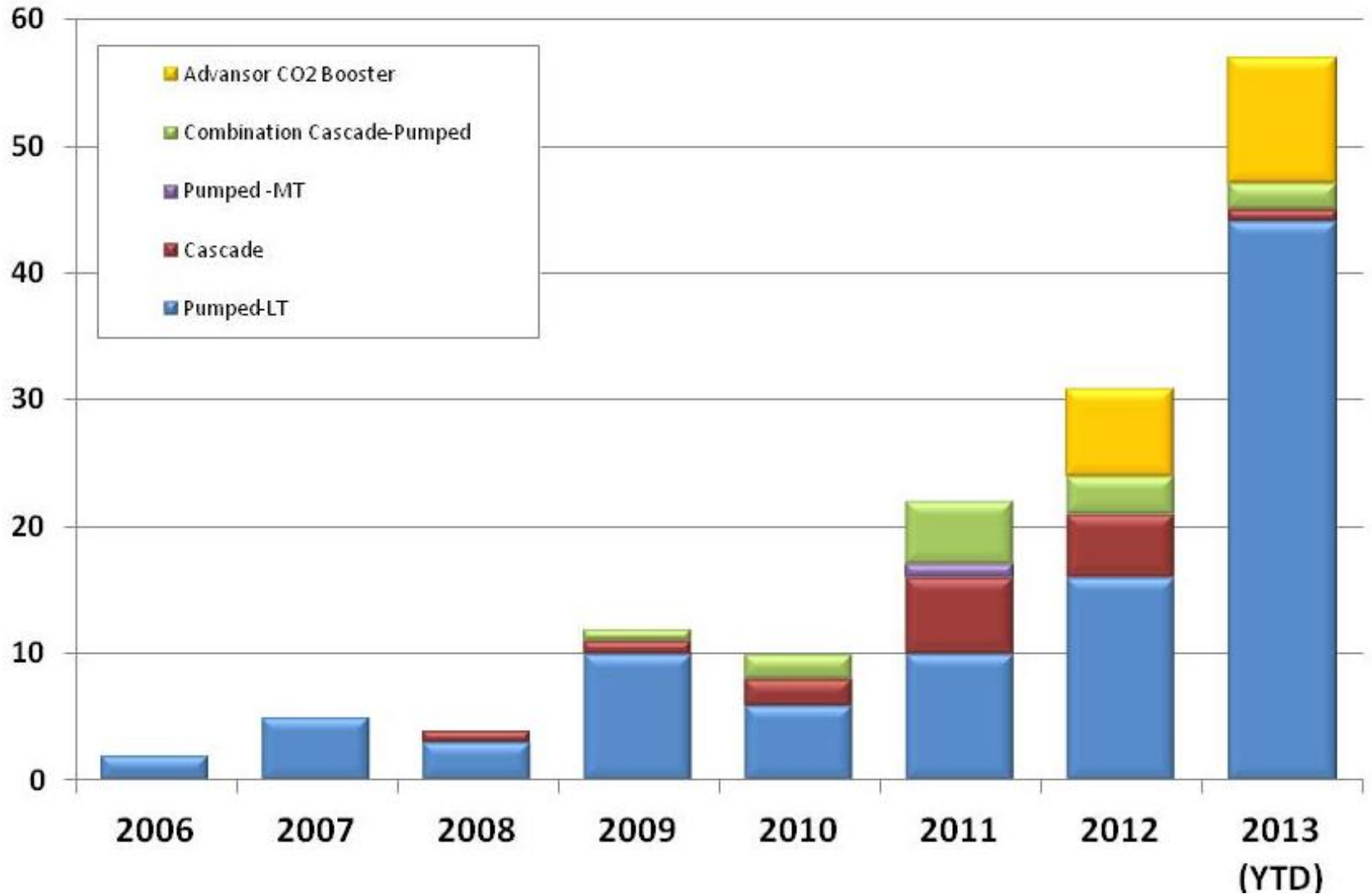
**ADVANSOR**<sup>TM</sup>



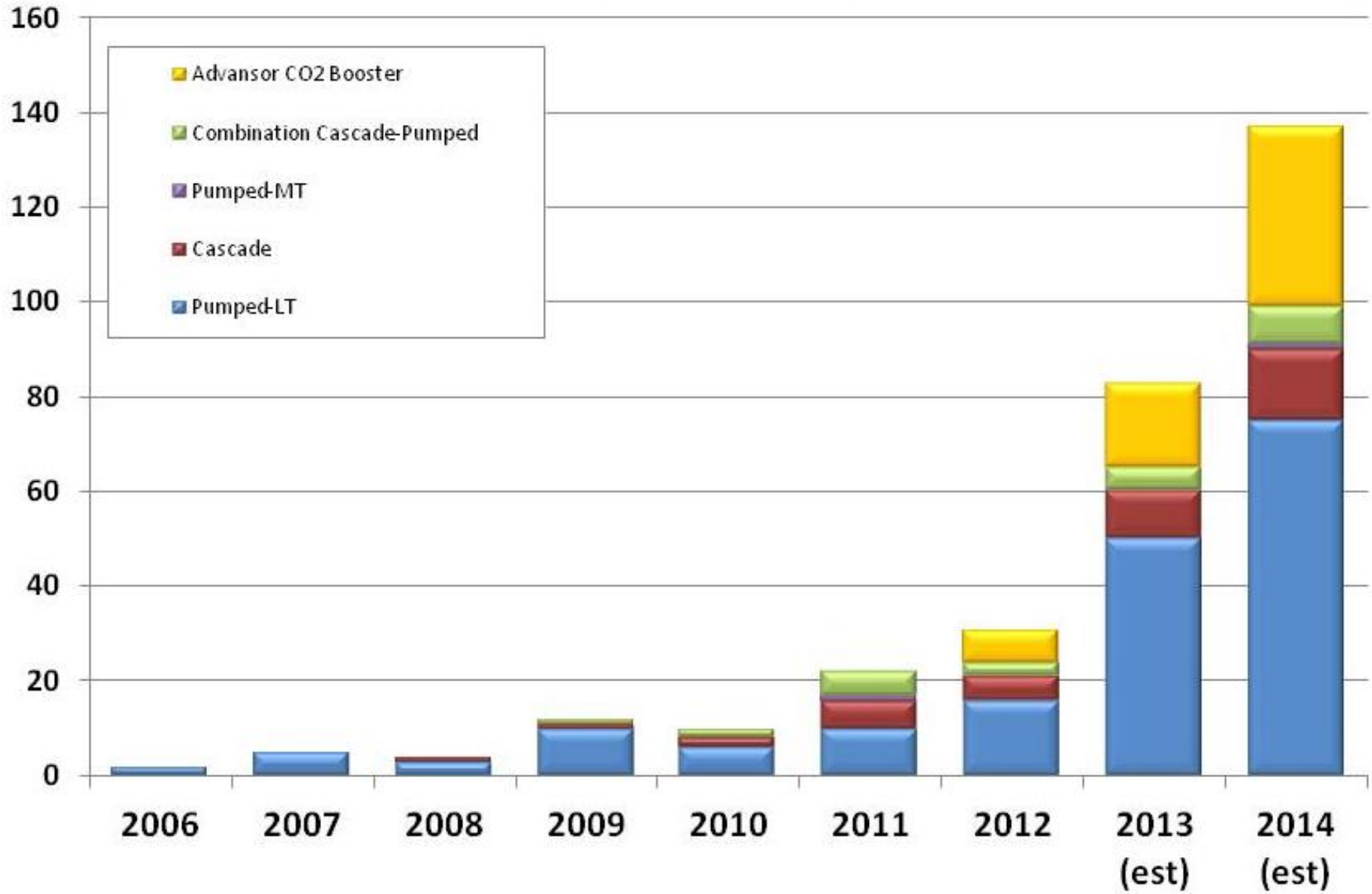
by Hillphoenix

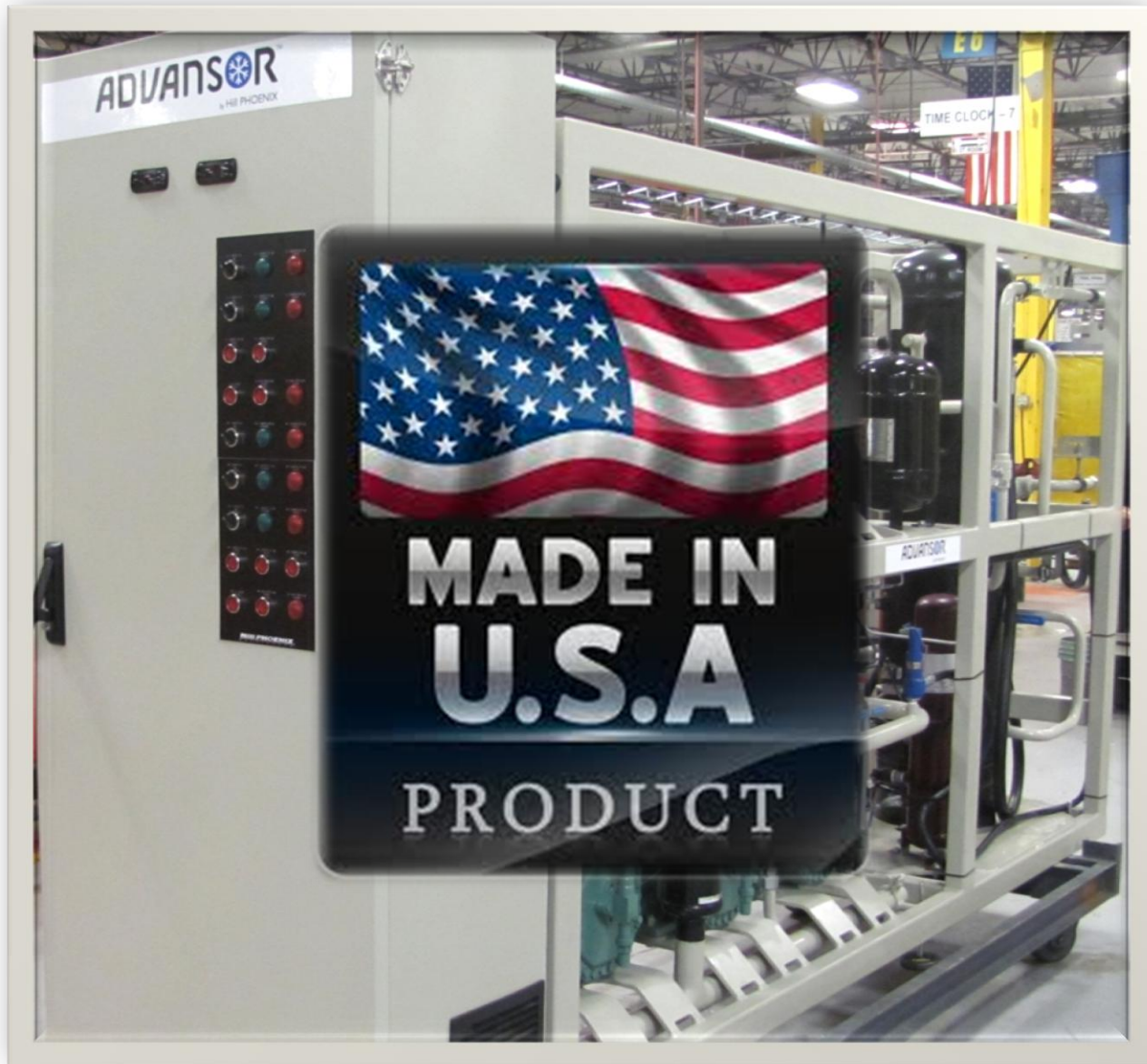
*~ 800 systems in 12 countries ~ 20 in North America*

# CO2 Systems by Type – Actual



# CO2 Systems by Type – Forecast







## UL Press Release

**Hillphoenix**

A  **DOVER** COMPANY

**For Immediate Release**

**December 10, 2012**

Media Contact:  
Erica Stephens  
Weaver Stephens Group  
[erica@weaverstephens.com](mailto:erica@weaverstephens.com)  
770-429-1058

### **Advansor by Hillphoenix CO<sub>2</sub> Booster Refrigeration Systems Receive UL Listing**

*HFC-free CO<sub>2</sub> transcritical refrigeration by Hillphoenix is  
now available in North America.*

ATLANTA – Hillphoenix Inc., a Dover Company, is pleased to announce that its Advansor by Hillphoenix CO<sub>2</sub> Booster Refrigeration System has received UL listing in both the United States and Canada. With this new designation, HFC-free CO<sub>2</sub> transcritical refrigeration by Hillphoenix is now available to customers in North America.

# CO2 Systems Technology – Booster System



**Overwaitea**  
*B.C.'s very own food people.*

**WHOLE  
FOODS  
MARKET**

*Angelo  
Caputo's*  
Since 1958  
*Fresh Markets*

**save on foods**  
& *more*

**URBAN  
FARE**



**ADVANSOR**<sup>TM</sup>  
by Hill PHOENIX

**Loblaws**

*Longo's*

**Cooper's Foods**  
*your store*

# FACTS about Advansor CO2 Booster “Sweet Spot”



## Fact

Booster systems are more efficient when operating subcritical

## Fact

Hillphoenix is working on new technology and designs to have Advansor systems impacted less by ambient conditions

## Lower Gas Cooler Temperatures

- Adiabatic Gas Cooler will allow for many more subcritical operating hours
- Theoretical Annual Energy Savings:
  - Atlanta – 12%
  - Miami – 20%
  - San Antonio – 22%

## Parallel Compression of CO2 Flash Gas

- Theoretical Annual Energy Savings:
  - 15% in Warm Southern Climates





# CO2 Min 50 vs HFC Min 70

\$16,992 Annual Savings

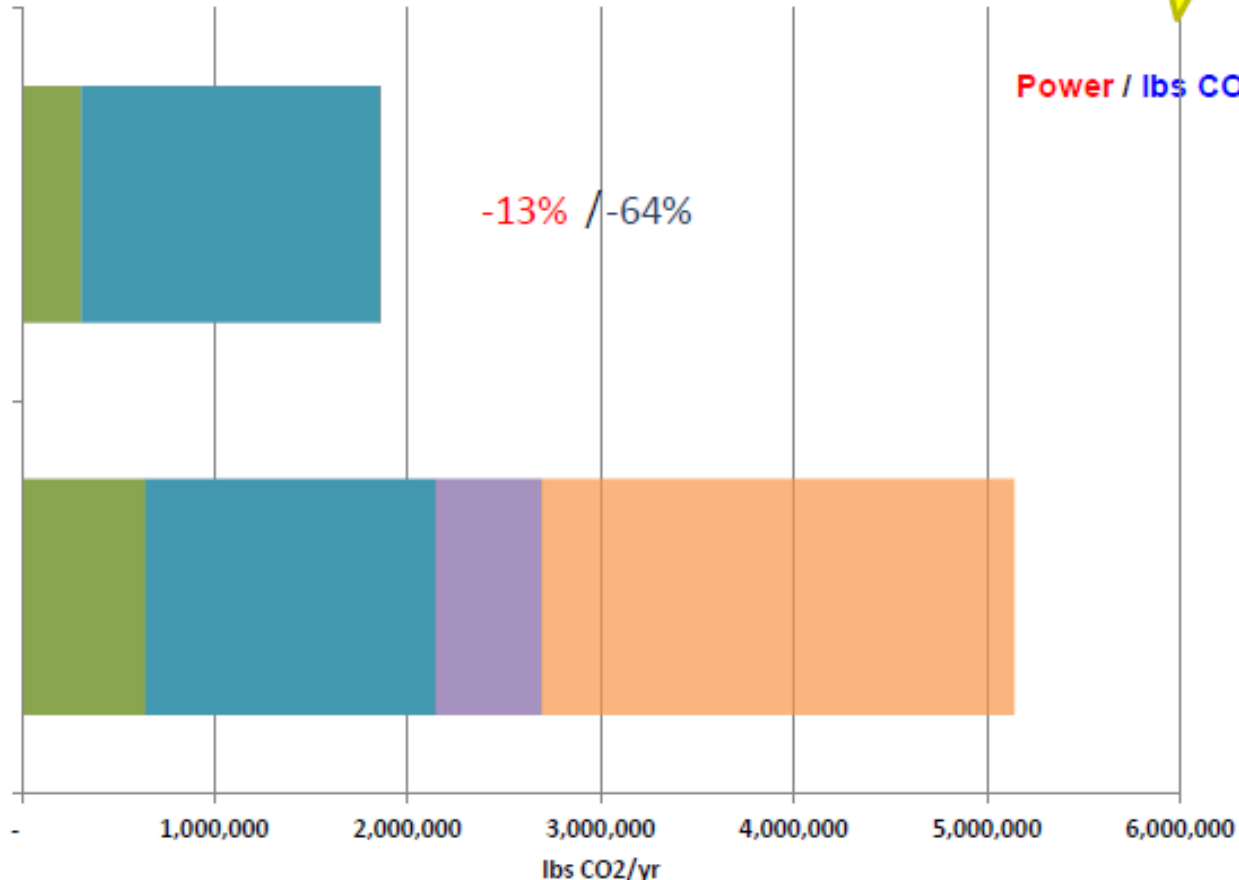
Pittsburgh

Power / lbs CO2/yr

50°F Min Tc (EXVs) → CO2 Booster

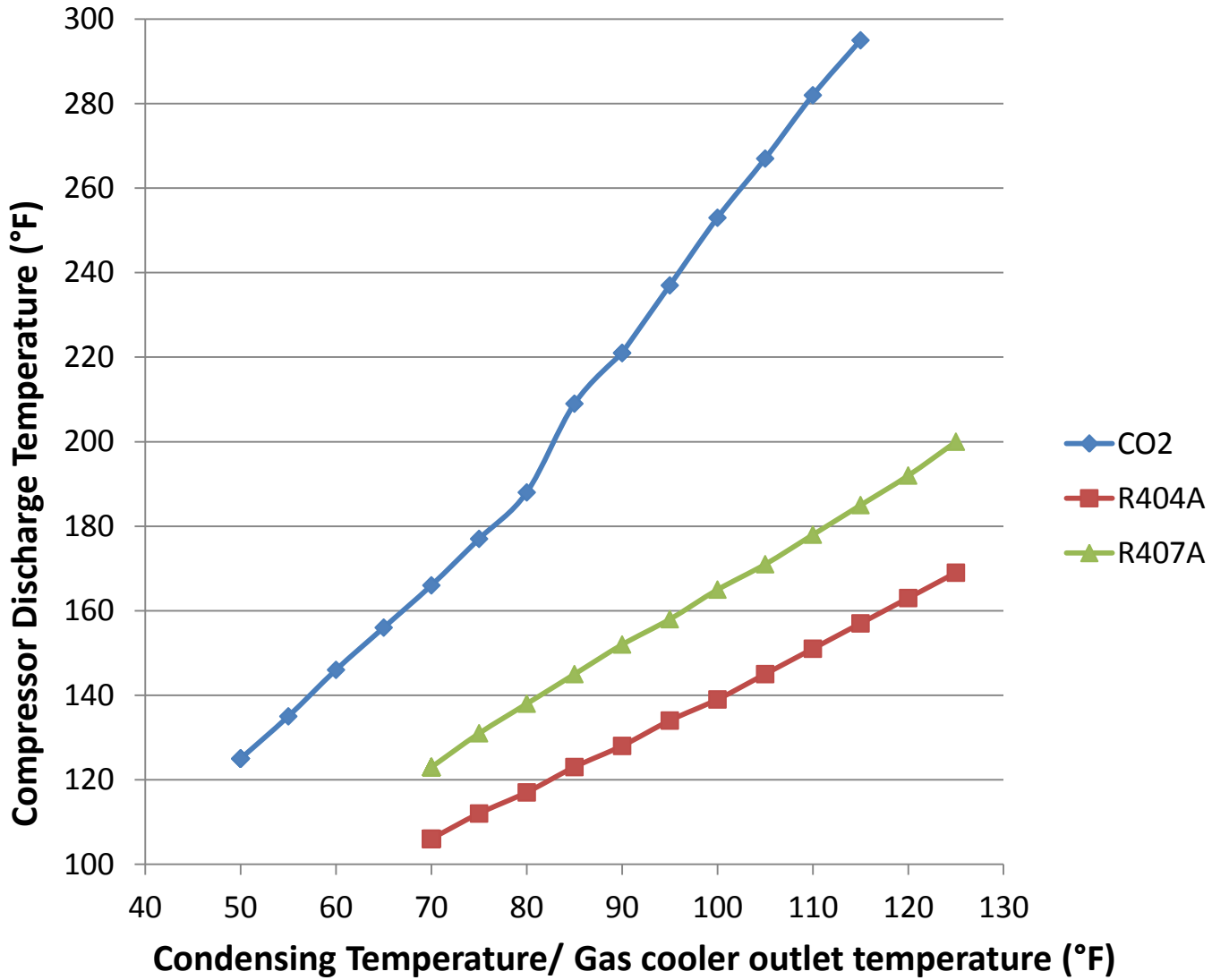
-13% / -64%

70°F Min Tc (TXVs) → HFC Min 70



- LT Indirect
- MT Indirect
- LT Direct
- MT Direct

# Compressor Discharge for Heat Reclaim





ATMO  
sphere  
the Business Case  
natural refrigerants

Thank you!