

Energy & Store Development Conference

E+SD 2014

September 7-10, 2014
St. Louis Union Station Hotel
St. Louis, MO



THE VOICE OF FOOD RETAIL 

Retailer Experiences with Installed CO₂ Refrigeration Systems

Harrison Horning

Delhaize America / Hannaford

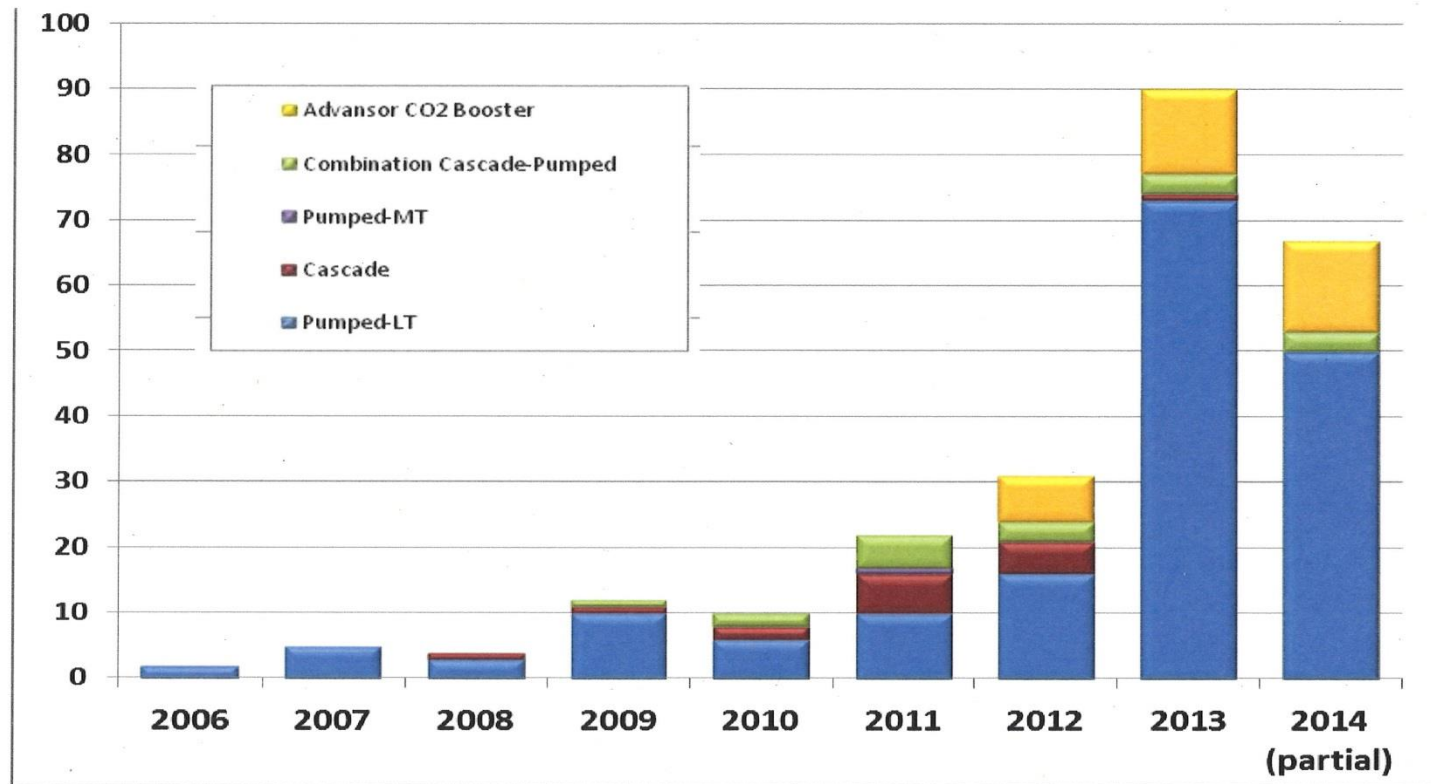
Recent Activity on HFC Alternatives

- ATMOSphere America conference in June
 - Update on natural refrigerant trends
 - Target committed to CO₂ cascade systems
- TCGF Board meeting in July
 - Re-affirmed resolution to start phasing out HFCs
- EPA SNAP:
 - Proposing to stop allowing some high GWP HFC refrigerants in new and retrofit applications
 - Will likely be asked to allow some low GWP HFC refrigerants for new and retrofit applications

Current Trends – System Type



CO2 Systems by Type – 2014 Actual



Global Context – Preference by Region

Leading regions for CO₂ – HFC hybrid

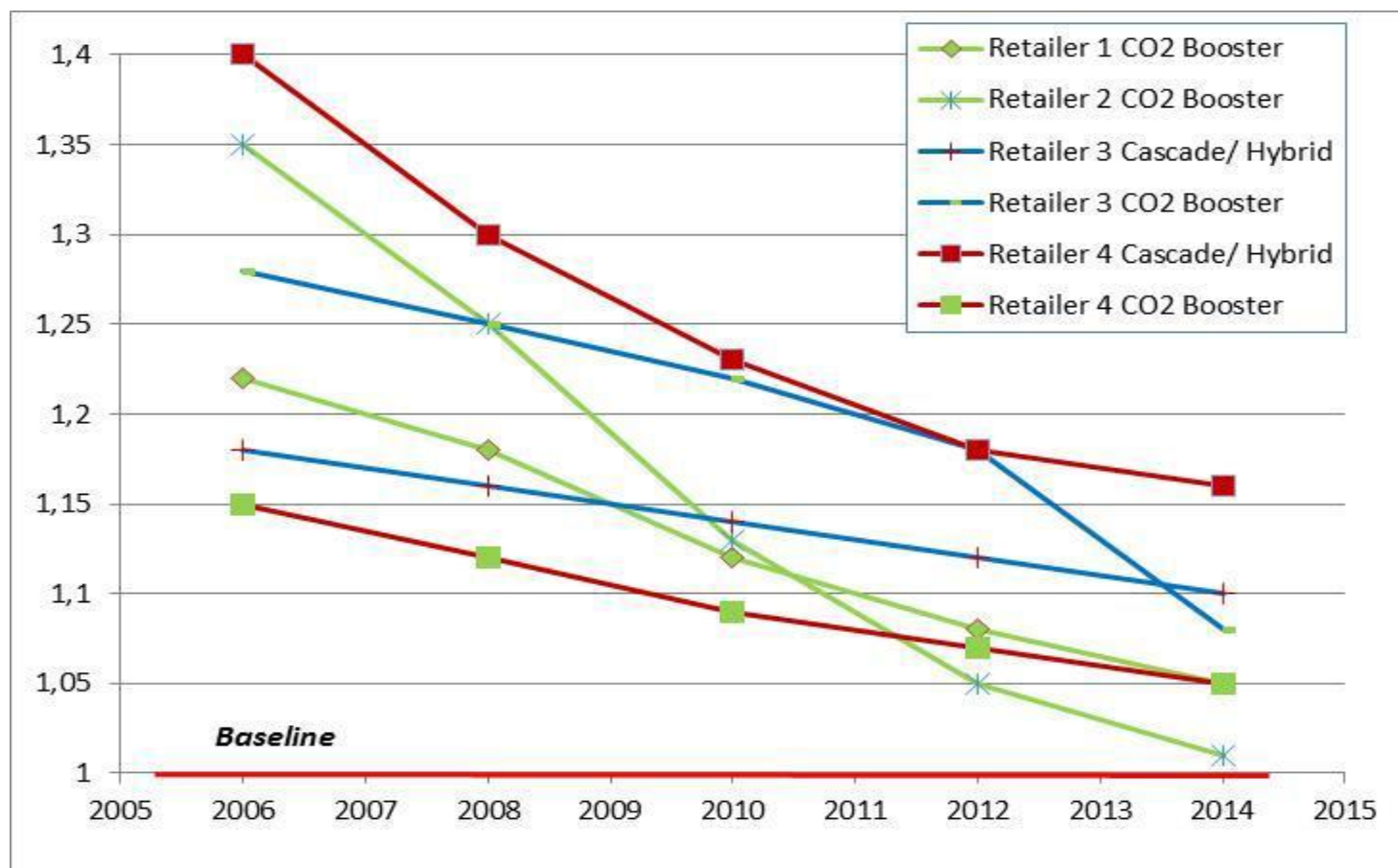
- Eastern Europe
- US
- South America
- China

Leading regions for CO₂ Transcritical

- Northern Europe
- UK
- Japan
- Canada

Current Trends – Cost

Total Store Cost Premium Multiplier (comma = period)



What does this mean for us?

- Follow (and anticipate?) regulation
- Company commitments
- Pilot projects
- Planning and budgeting
- Operation and maintenance
- Monitoring performance
- Tracking progress
- Long-term planning?

Transcritical CO₂ Booster System

- Pilot project (to explore...)
- New Hannaford store in Turner, ME
- Opened July 2013
- One year of operation
- Good reliability and maintenance
- Energy performance data
- (Europe has 3,000 of these already.)

Transcritical CO₂ Pilot: Turner, Maine



36,000 gsf Supermarket



Looks “normal” to a customer

Transcritical CO₂ Pilot: Turner, Maine



Good reliability, as hoped...



Good energy performance, as expected

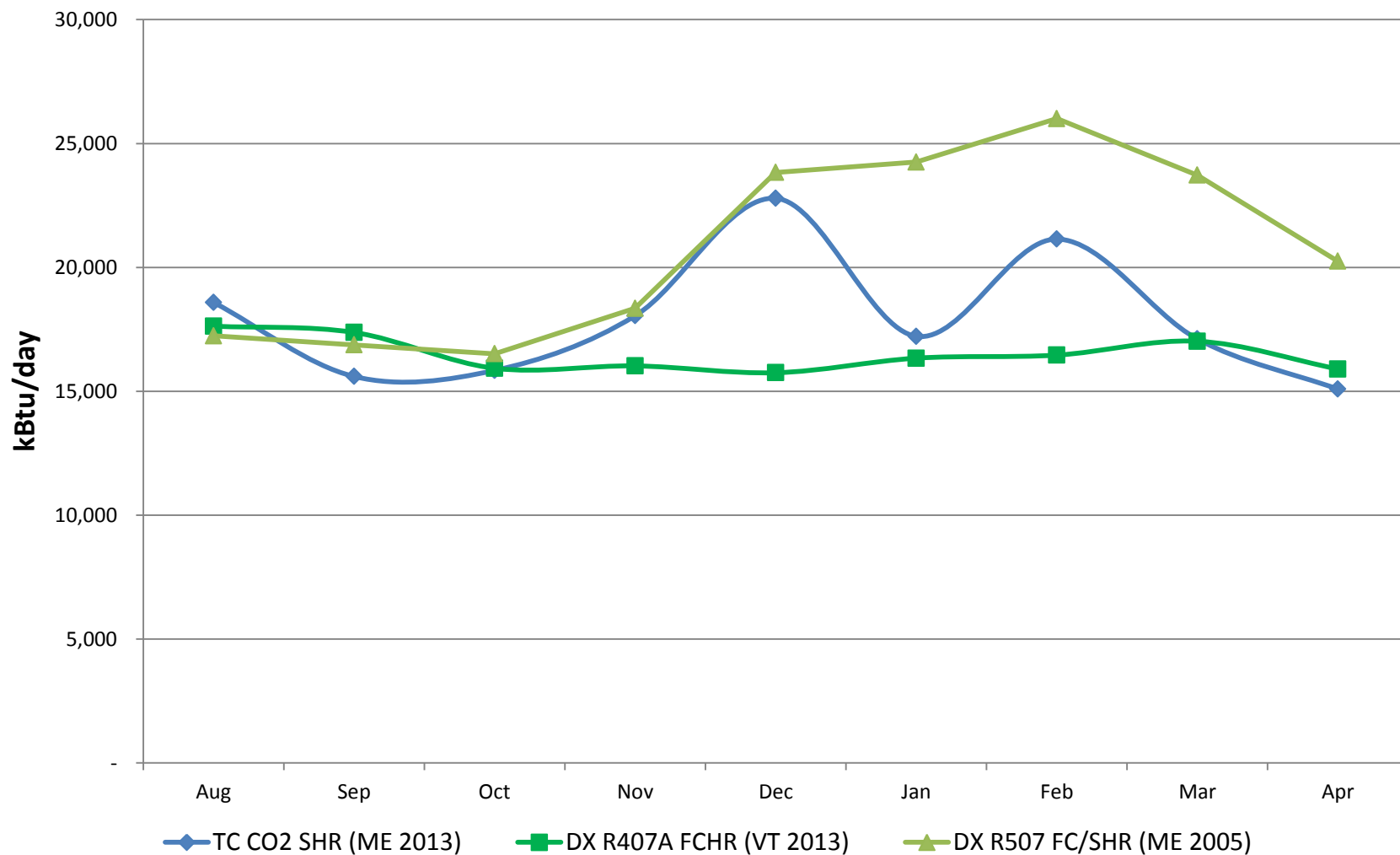
Energy Performance Data

Three 36,000 gsf Hannaford stores compared:

- Transcritical CO₂ rack with series heat reclaim; Turner, Maine; new in 2013
- DX R407A, three racks, full-condensing (parallel) heat reclaim (glycol); Bradford, Vermont; new in 2013
- DX R507, three racks, combination of series and full-condensing (parallel) heat reclaim (direct); Portland, Maine; new in 2005

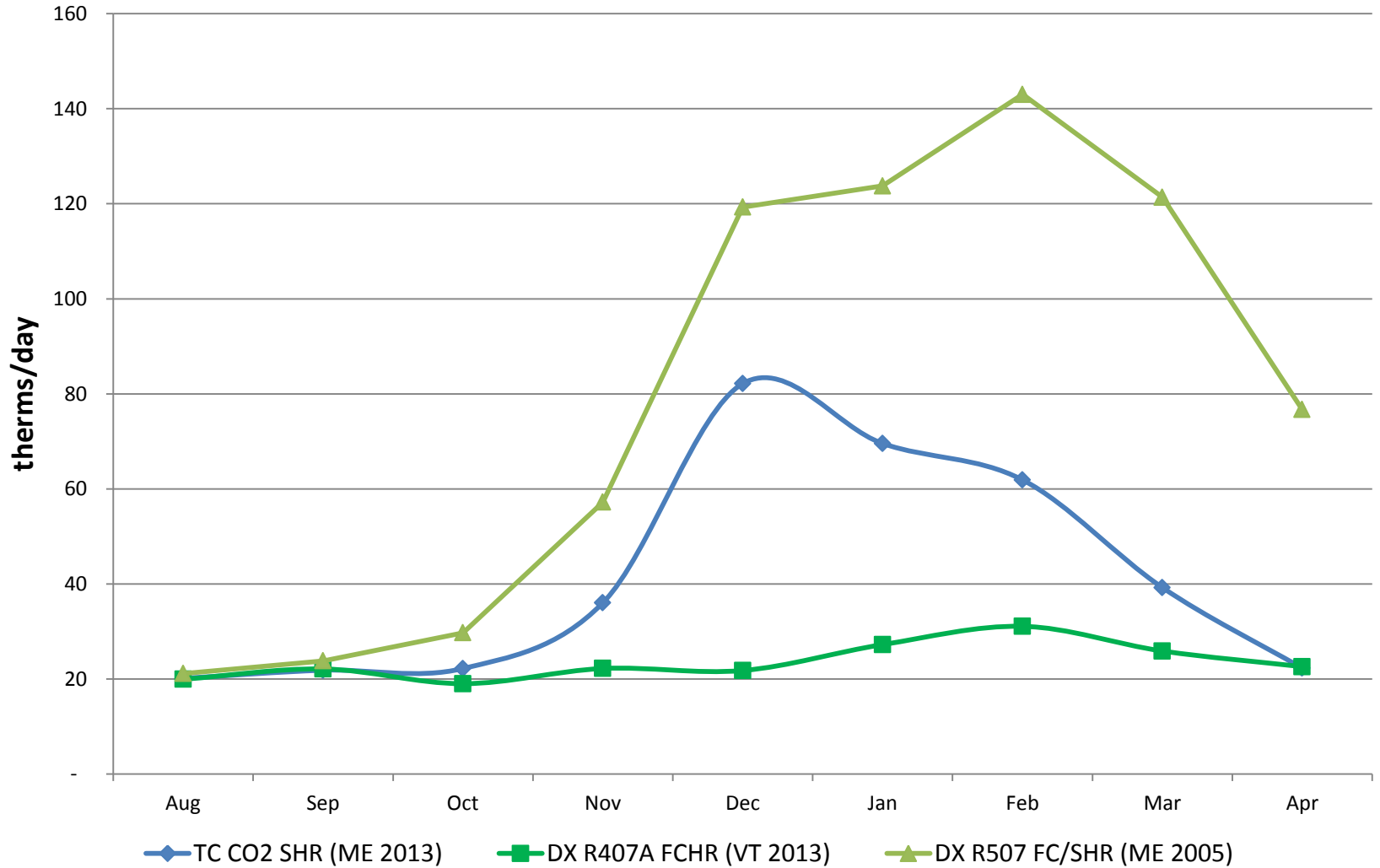
Store Total Energy Comparison - TC CO₂ vs. DX

Three Similar 36,000 gsf Supermarkets - Different Refrigeration Systems



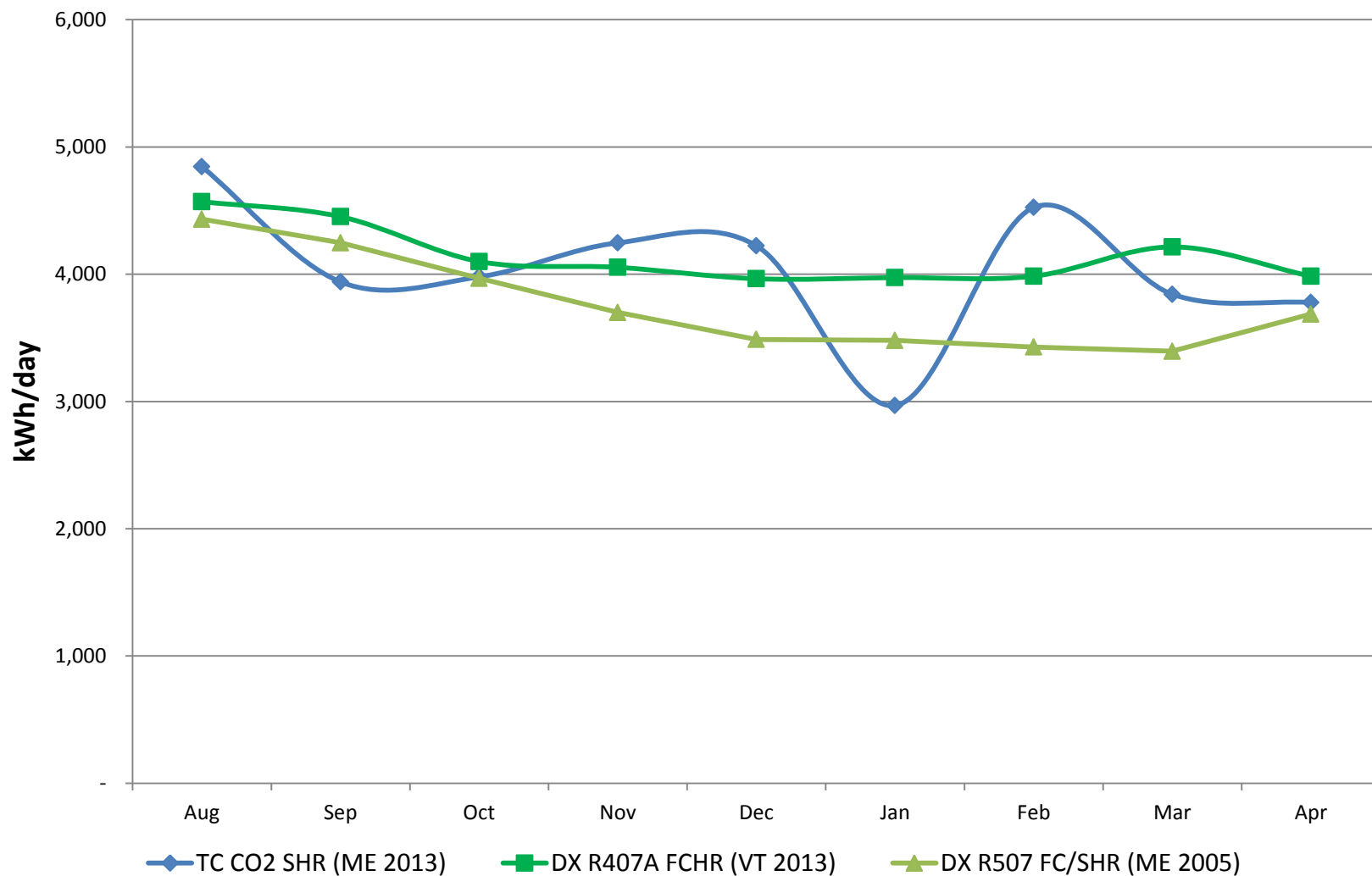
Store Gas Energy Comparison - TC CO₂ vs. DX

Three Similar 36,000 gsf Supermarkets - Different Refrigeration Systems



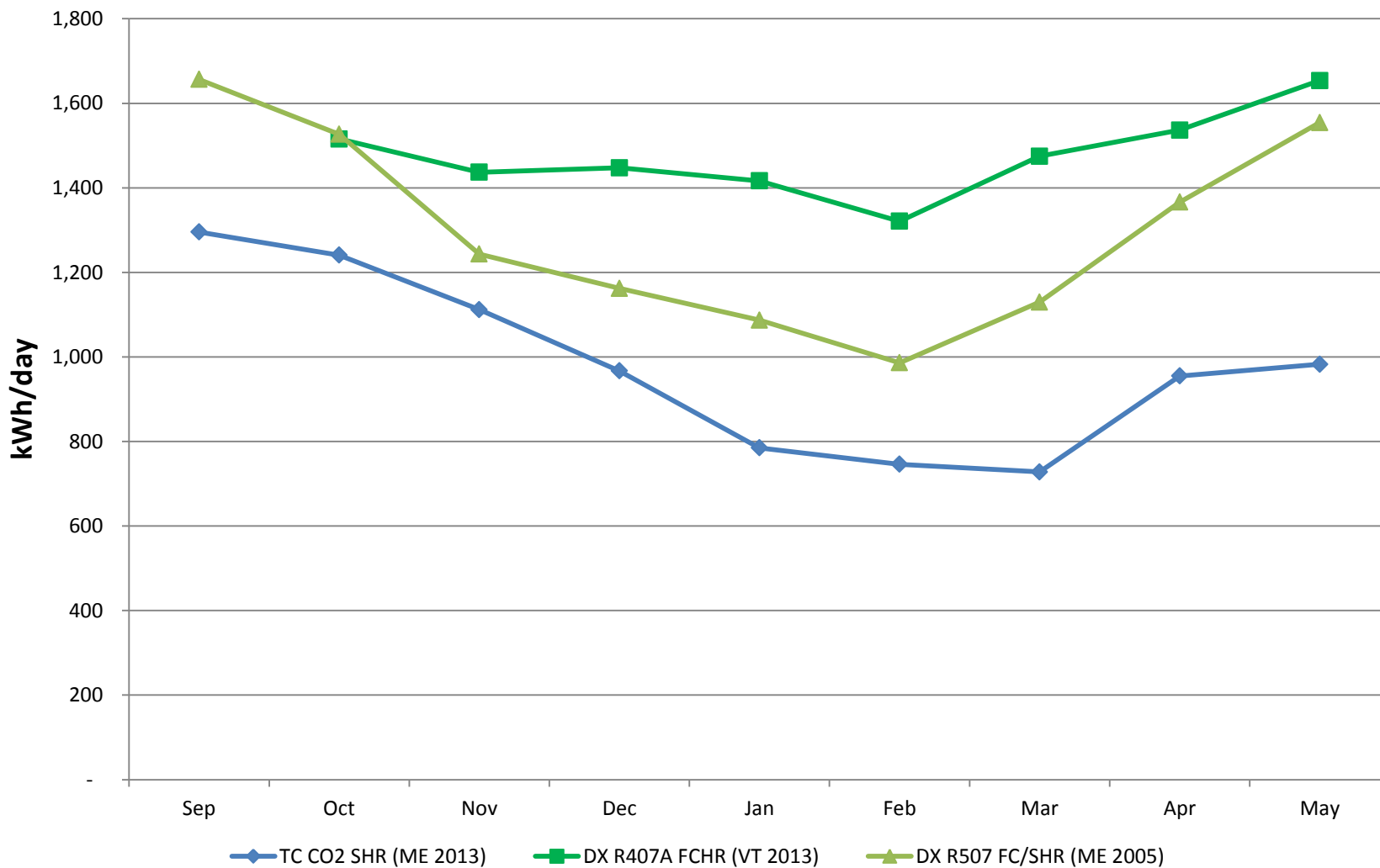
Store Electric Energy Comparison - TC CO₂ vs. DX

Three Similar 36,000 gsf Supermarkets - Different Refrigeration Systems



Rack Electric Energy Comparison - TC CO₂ vs. DX

Three Similar 36,000 gsf Supermarkets - Different Refrigeration Systems



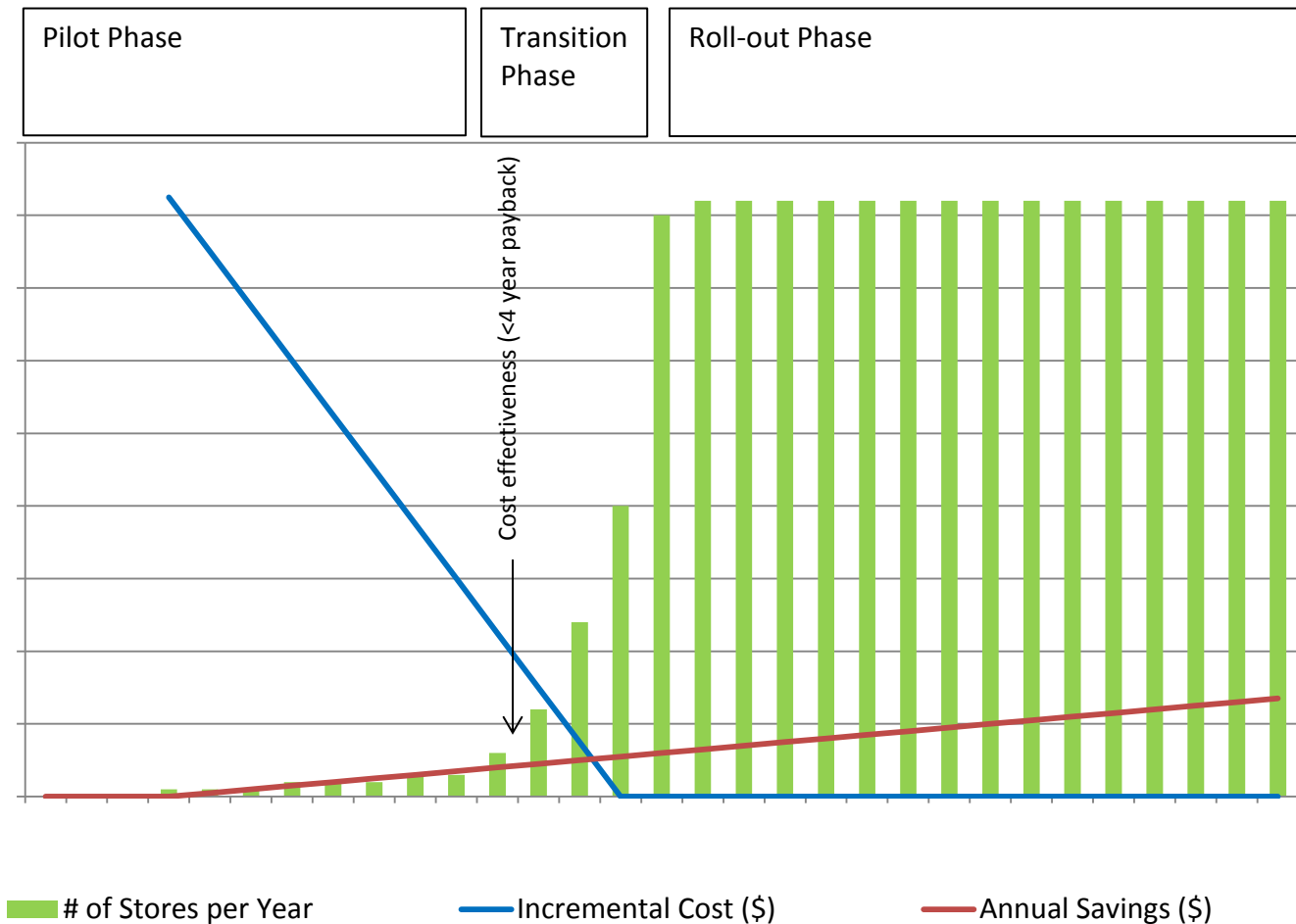
Key Learnings to Date – TC CO₂

- Project economics depends on many variables
- Energy performance can be good
- Maintenance can be manageable
- We can learn a lot from Europe and Canada and other parts of the world

What's next for us?

- Planning more pilot projects in new Hannaford and Food Lion stores
- Considering remodels/retrofits at Hannaford if...
 - Existing systems and equipment at end-of-life,
 - Plenty of space for new equipment (roof?),
 - Good proposals from suppliers,
 - Etc...
- Meanwhile, continuing with ODS phaseout, leak reductions, lower GWP HFCs, etc.
- Contemplating an HFC phaseout...

Hypothetical HFC Phaseout - Supermarkets



Total Cost of Ownership Depends On...

- Up-front cost vs. baseline
- Annual savings vs. baseline
 - Energy expenses (based on performance and climate)
 - Maintenance and refrigerant expenses
- Type of equipment and useful life
- Government regulations, codes, incentives
- Size of stores/systems
- New stores vs. remodels/retrofits
- Supplier and contractor performance
- Financial parameters, etc...

Thank you!