



25 & 26 June - Atlanta, Georgia

The Path to Transcritical

*TC or not TC
That is the question.*



Ken Welter, PE

The Journey

- 3-Rack, DX HFC Prototype
 - *3,000 lbs HFC, 2.56 lbs / MBH*
- Cascade CO₂, Glycol Secondary MT, HFC Primary
 - *1,200 lbs HFC, 1.22 lbs / MBH*
- Cascade CO₂, DX HFC Medium Temp
 - *1,200 lbs HFC, 1.25 lbs / MBH*
- Single Rack / Single Liquid Line
 - *1,500 lbs HFC, 1.11 lbs / MBH*

The Destination

- **Transcritical CO₂ Trial, Giant #2743-Springfield, VA**
- **Design decisions**
 - Circuit Piping (dedicated circuits or loop piping)
 - Low-temp Defrost (hot gas or electric)
 - Gas Cooler (dry or evaporative pre-cooling)
- **First Cost Comparison to DX HFC Single Rack Prototype**
 - 180% Compression Gear (rack and gas cooler)
 - 130% Cases, Unit Coolers & Controls
 - 93% Refrigeration Install
 - 94% Electrical Install

The Discovery

- **Installation**

- Rough piping and final connection of suction and liquid lines was faster and less expensive than HFC loop piping.
- Stainless steel discharge gas piping was faster, but more expensive than multi-condenser HFC system.

- **Equipment**

- Compressor rack and gas cooler were better quality of construction than typical HFC equipment.
- Case manufacturers not fully up to the task of installing case controllers/EEVs with consistent quality.
- Coordinate evaporator specifications with system manufacturer.

- **Start-up**

- Not an incremental process. Once the system is charged, it has to stay running.
- Be prepared for surprises.

- **Training**

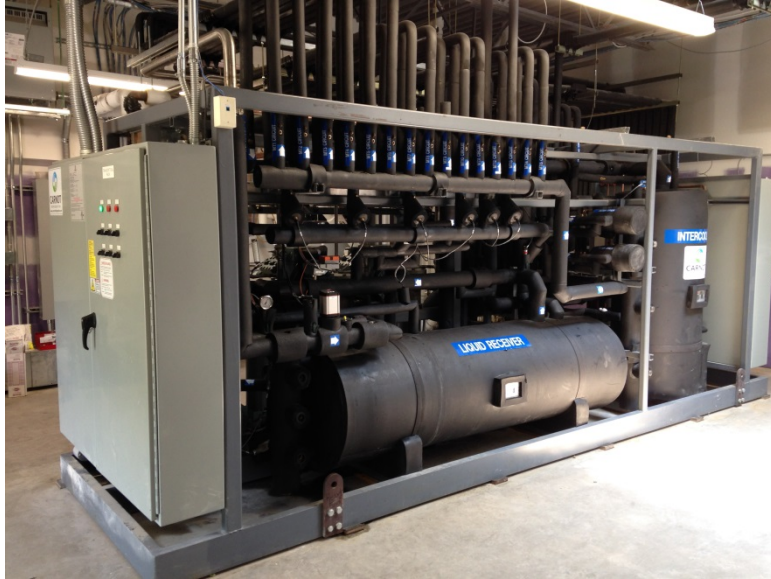
- Mostly on the fly during factory assisted start-up.

- **Operation / Energy Performance**

- Time will tell



Giant #2743-Springfield, VA



“*What’s past is prologue*”

William Shakespeare – *The Tempest*

- **CFC’s & HCFC’s**
 - Regulated
 - Phased-out
- **HFC’s**
 - Regulated
 - Phasing-out
- **HFO’s**
 - ??????

