Target's Strategy for Natural Refrigerants

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Be Adaptable

CHALLENGES

- Regulatory Requirements
- Energy vs. Global Warming Potential
- Definition of “Low GWP”
- Technical Capabilities

Be Adaptable

There is no silver bullet!

The solution depends on what you're trying to solve for.

Options

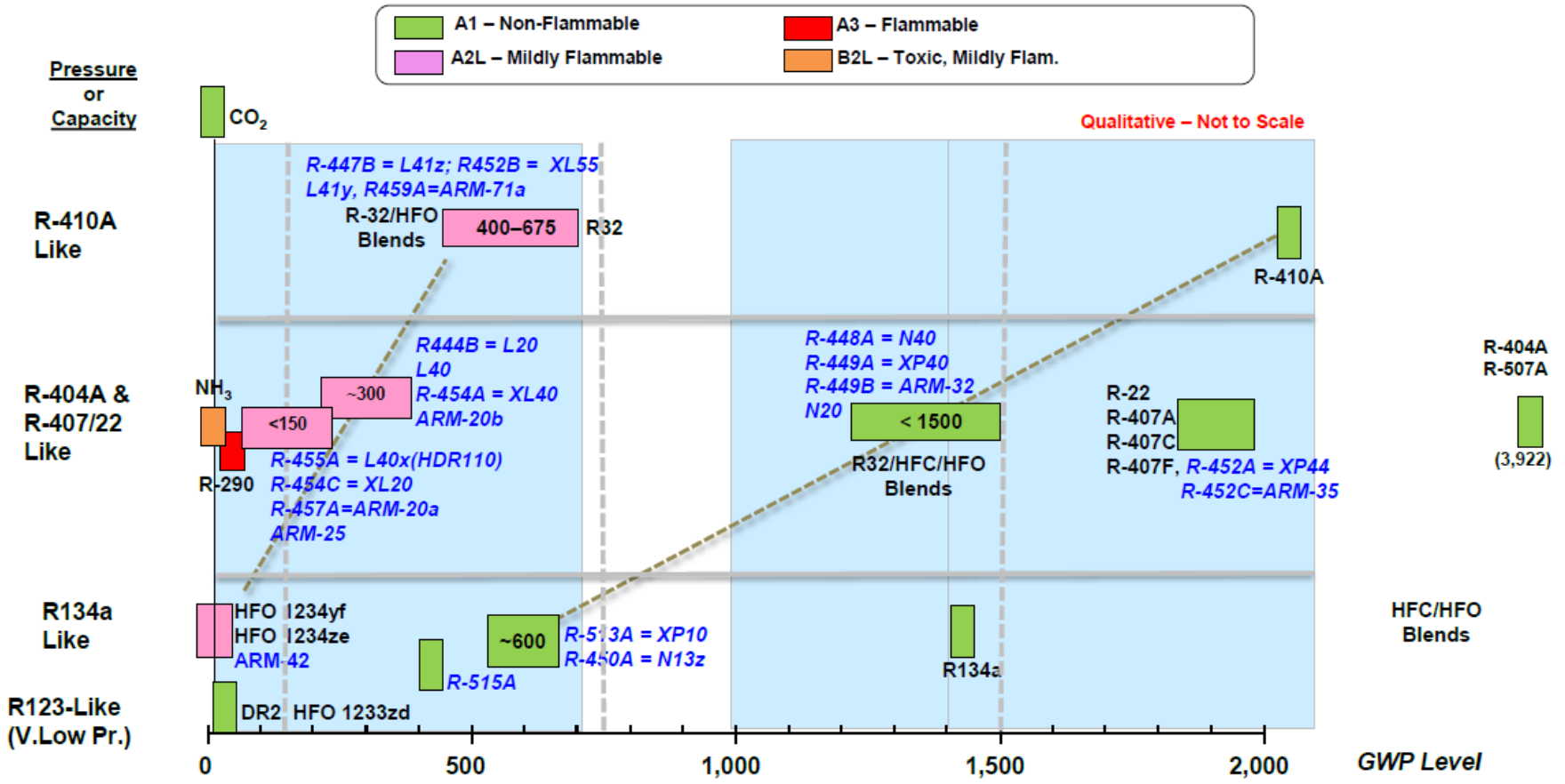
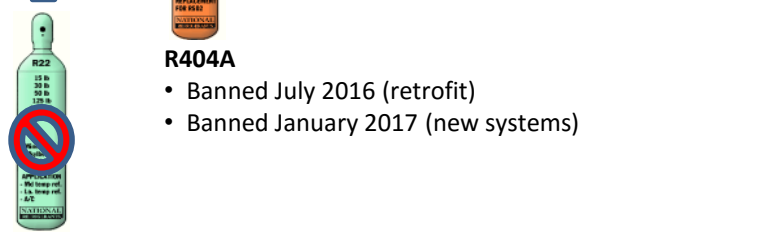


Chart courtesy of Emerson Climate Technologies

Refrigerant Strategy



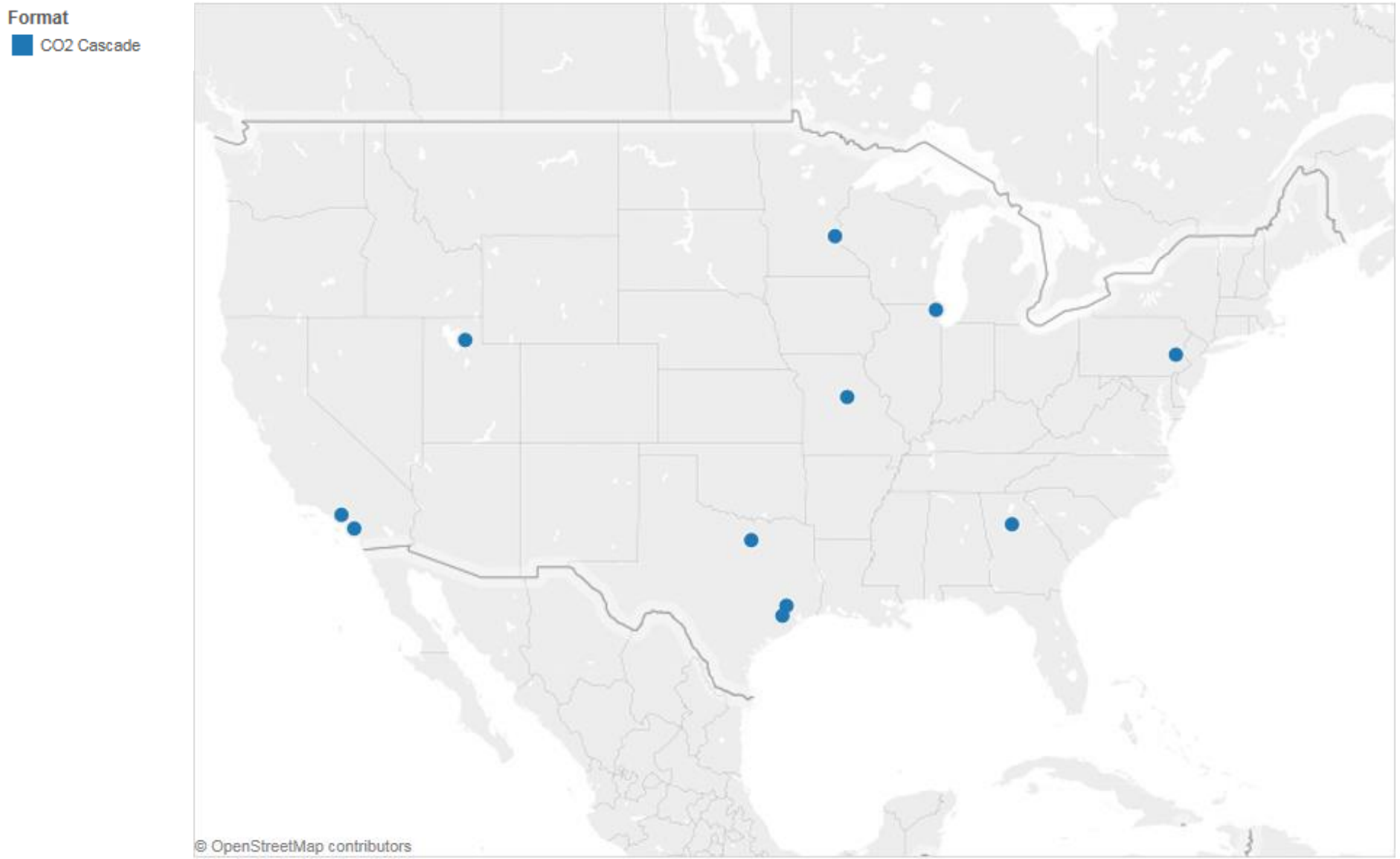
R22
- Banned 2010

R404A
- Banned July 2016 (retrofit)
- Banned January 2017 (new systems)

R134a
- SNAP delisted 2019 (select applications)
- California HFC phase-down

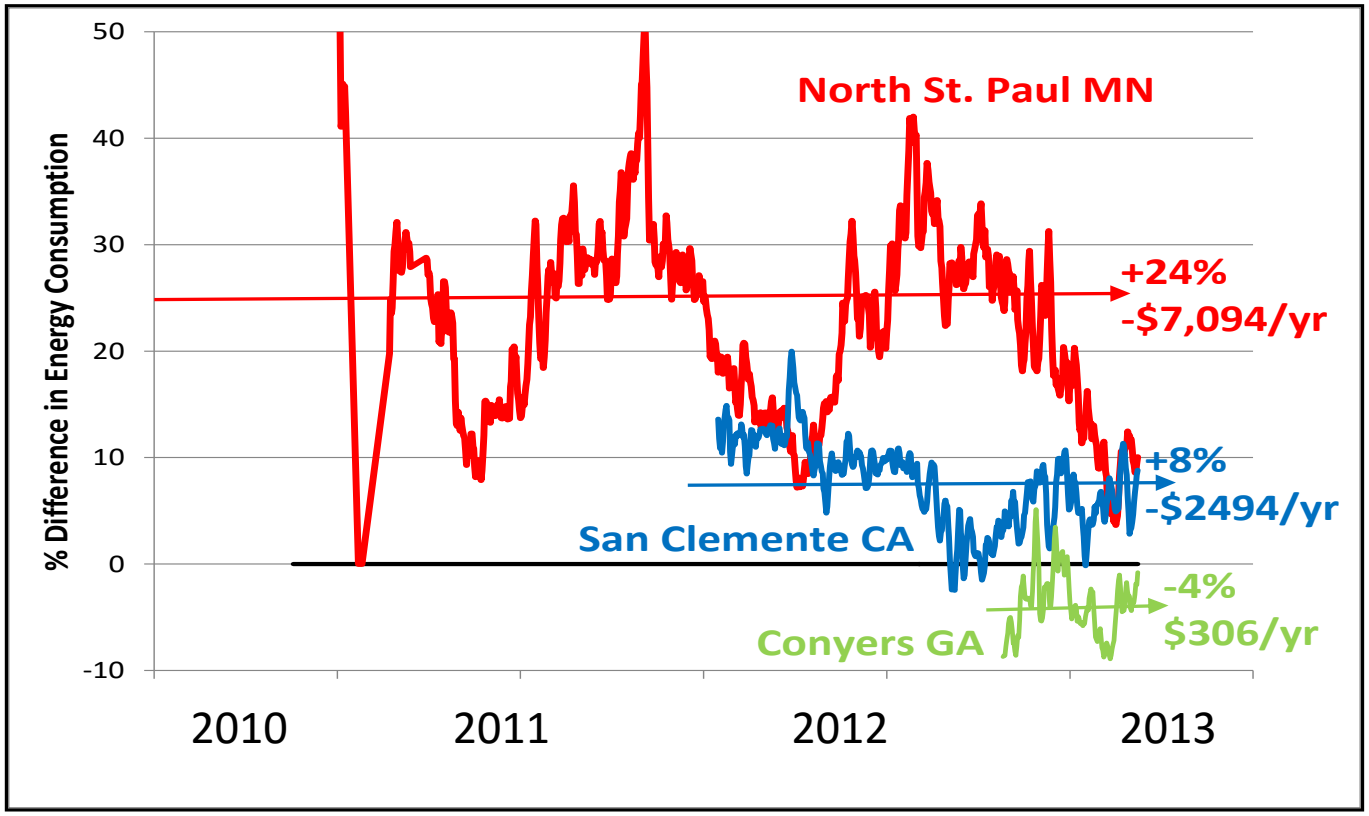
New refrigerants
- **R744 (CO_2)**
- **R290 (Hydrocarbon)**
- **HFO-Blends**
- **Ammonia**

CO_2 Cascade Systems



CO_2 Cascade Systems

Energy Progression



CO_2 Transcritical Systems

CO_2 Transcritical Systems

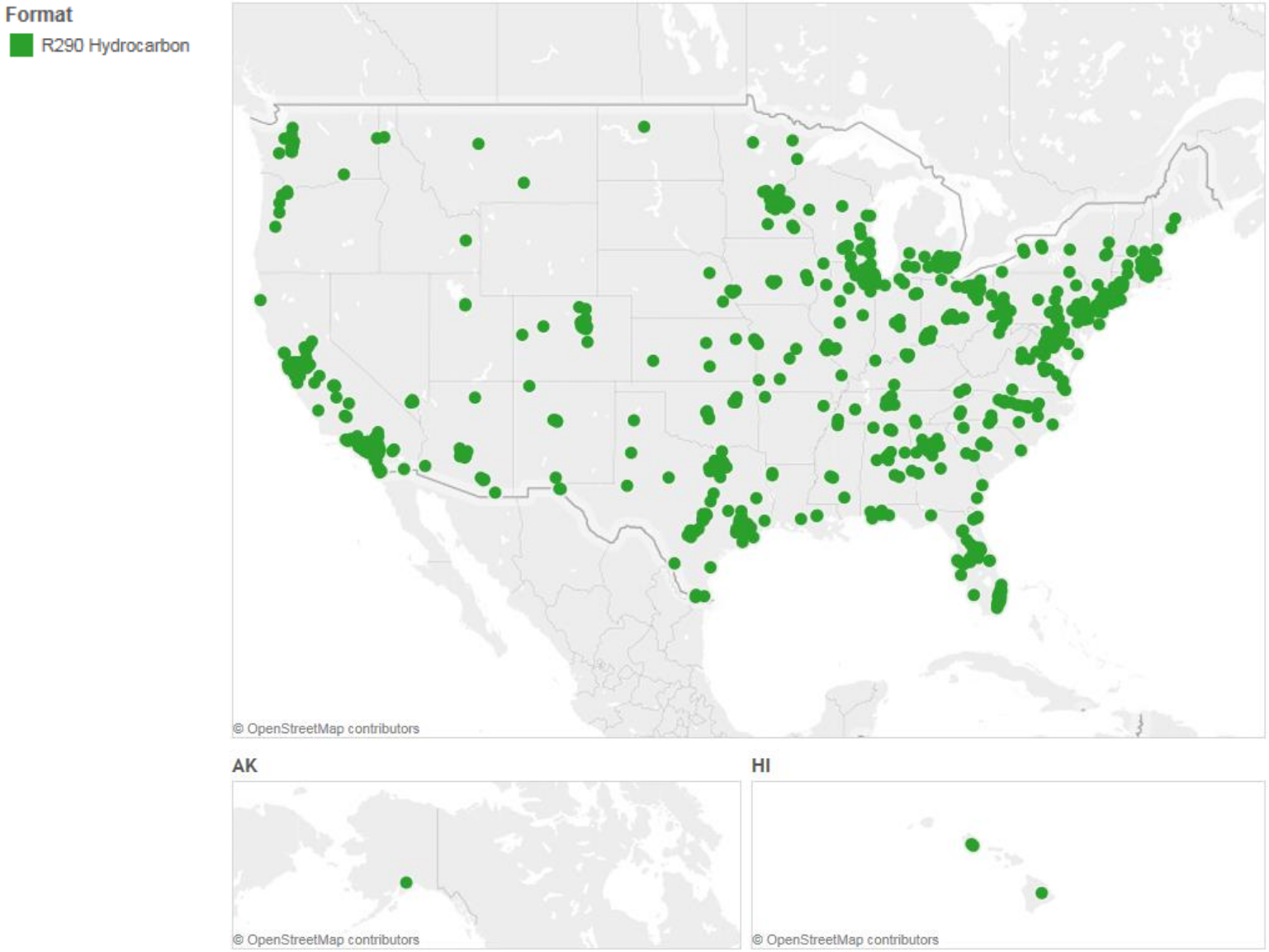
Marin City, CA

Minneapolis, MN

CO_2 Transcritical Systems

How Do Transcritical Systems Compare to Other Systems in Target Stores

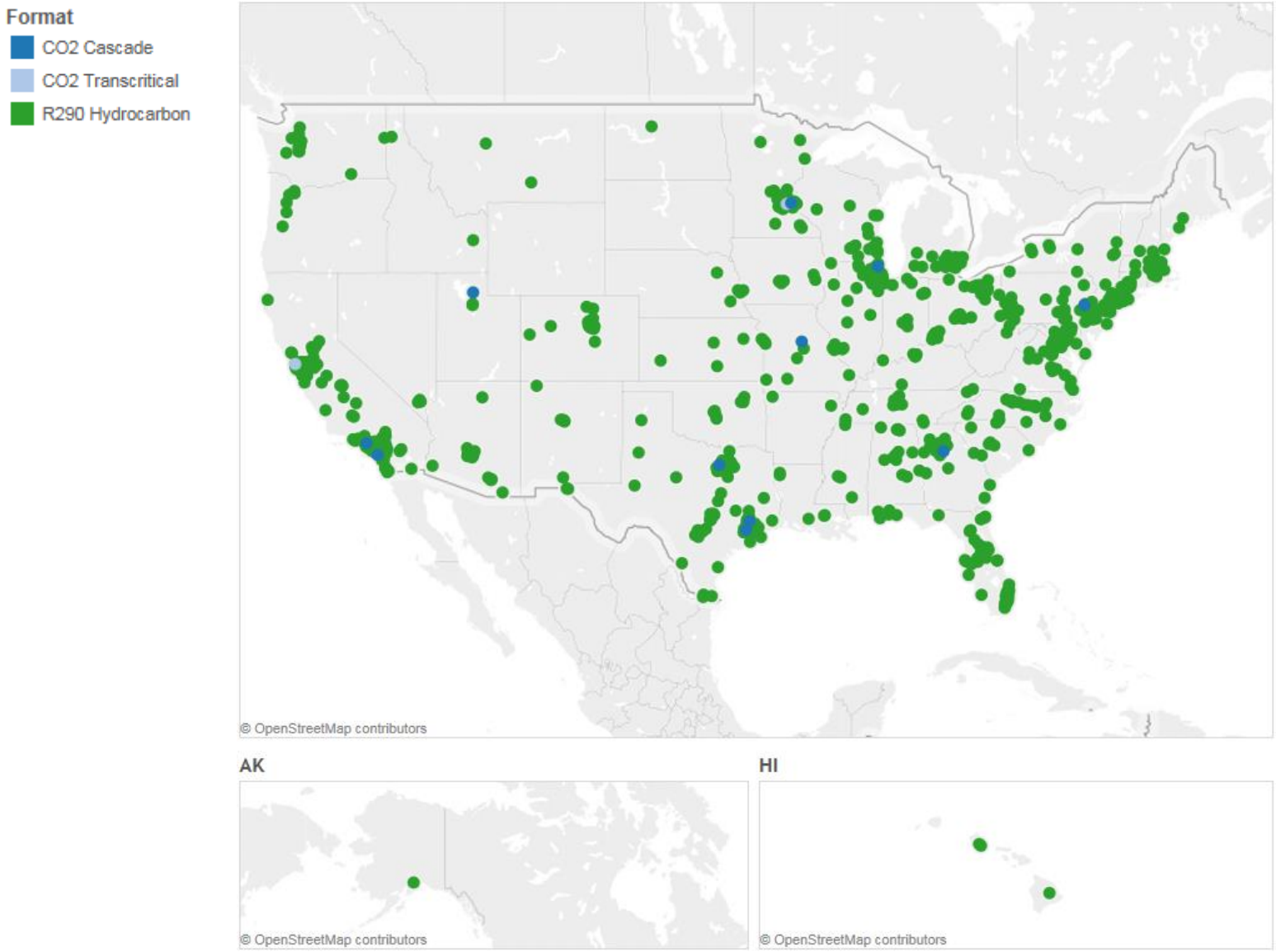
R290 Hydrocarbon Stores



R290 Hydrocarbon Stores

Beverage Cooler Test	R134a	R744 (CO_2)	R290 (propane)
Power (kW)	0.092	0.069	0.043
Annual cost (@$.10/kW-Hr)	$ 80.59	$ 60.44	$ 37.67
Average Case Temp (°F)	40.4	39.9	39.7
Energy Savings	**Baseline**	**25%**	**53%**

All Natural Refrigerants



Next Steps

- Continue SuperTarget conversion strategy
- Continue New Store strategy:
  - CO_2 Cascade for Prototype
  - HFO-Blend Self-Contained for small formats
- Continue to install Hydrocarbon Self-Contained when allowed
- Work with industry partners to increase hydrocarbon charge limits
- Evaluate effectiveness of CO2 Transcritical systems for future use
- Continue to evaluate new refrigerants and technologies