C&I Electrification

April 12, 2023

WE ARE MASS SAVE*:

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Overview

The Commercial HVAC market is complex and requires a diversity of approaches

Challenges, especially costs and technology limitations, are real and building the market to scale will take time

We have developed and implemented thoughtful, deliberate strategies to address the barriers and engage the market to produce progress as quickly as possible

Reaching our electrification goals will require building a market to scale in record time

Commercial HVAC Market

The commercial HVAC market is characterized by many building types, behaviors and motivations, market actors, and project types – this is not residential

BUILDING TYPES & SIZES

great variety of size, form and function

SYSTEM & TECHNOLOGY CONSIDERATIONS

multitude of equipment types and system configurations

BUYER BEHAVIORS & PREFERENCES

varying combinations of economic and non-economic priorities and objectives

MARKET ACTORS

many parties involved in decision making and implementation

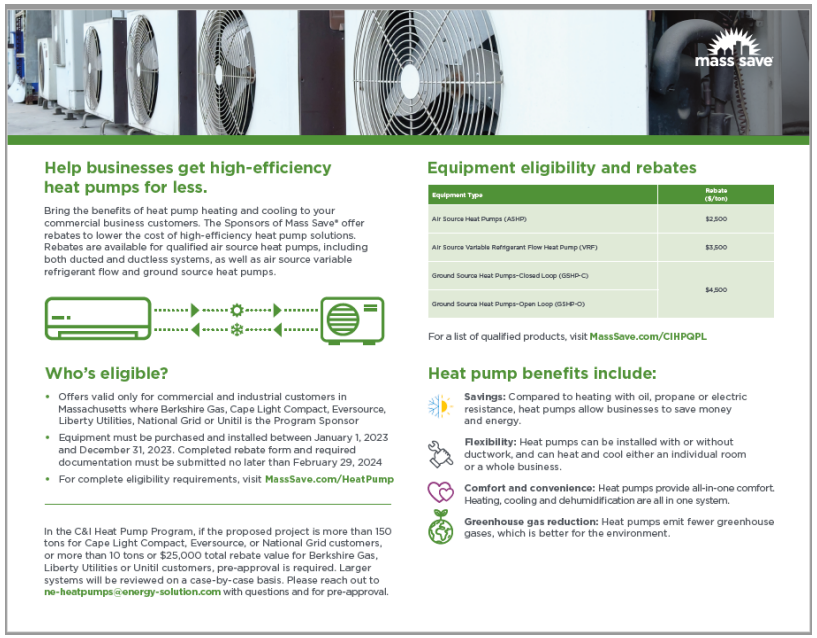
PROJECT TYPES

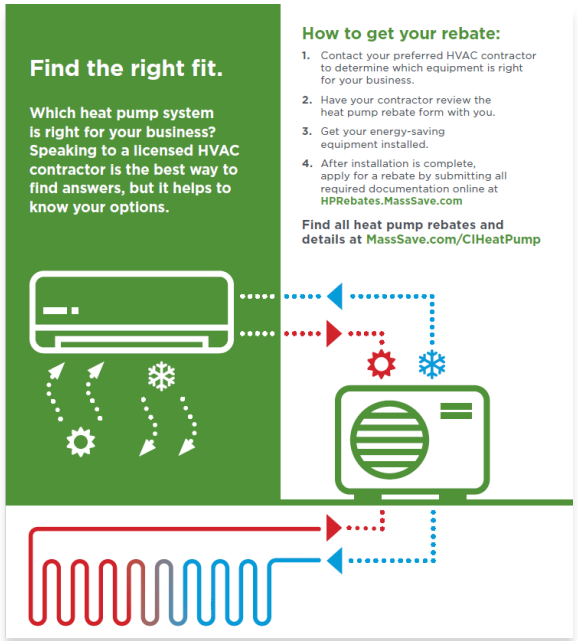
varying scenarios based primarily on equipment status

Progress is Happening…

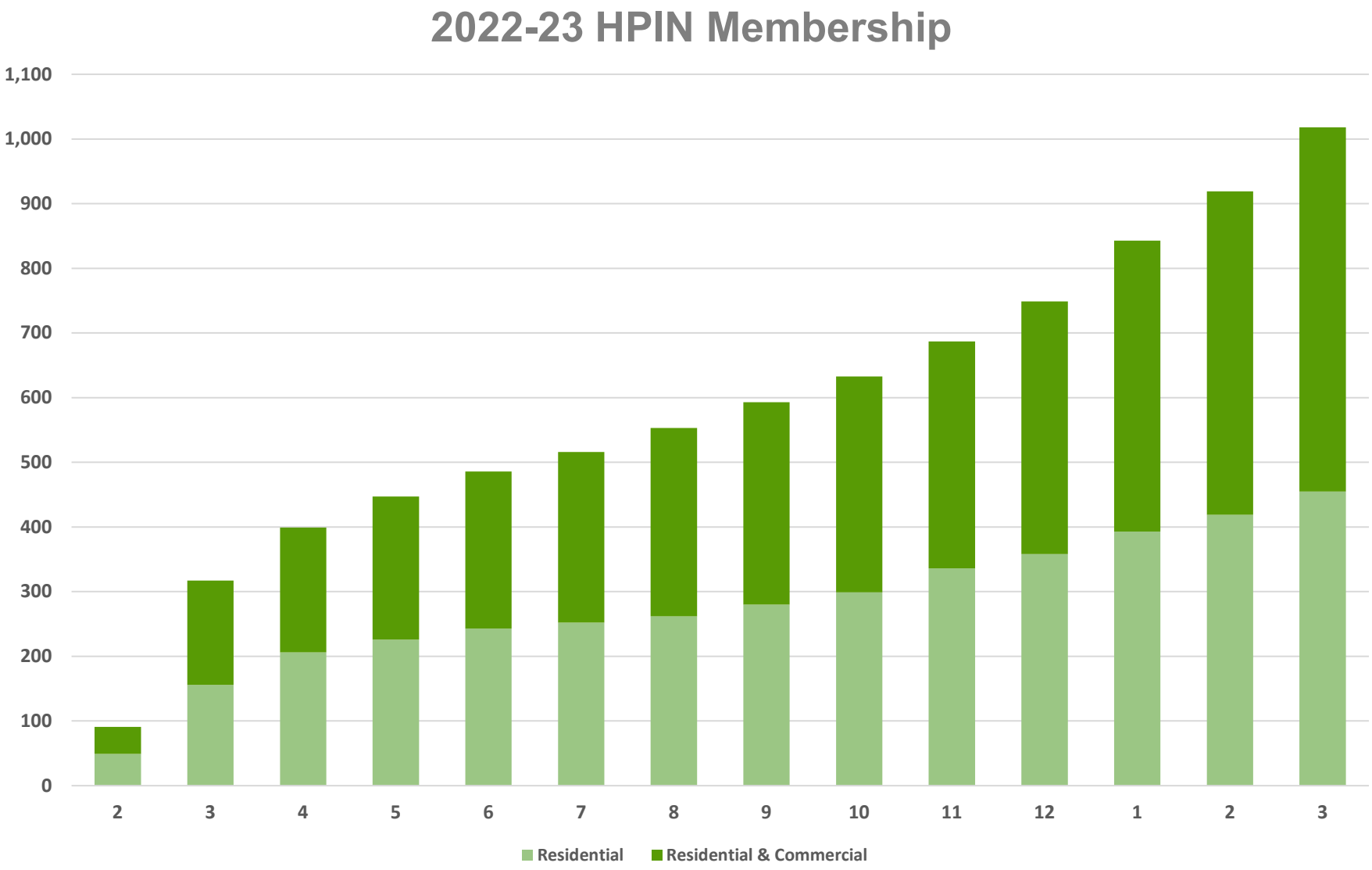
Go-to-market strategy encompasses an array of activities consciously designed to build the market while addressing primary market barriers

Contractor and customer engagement	Marketing and outreach	Education and training	Program offerings
External and internal resources and relationships	Contractors and customers	Contractors, customers and staff	Simplicity and accessibility





Contractor Engagement



- Our HPIN membership continues to grow steadily
- Surpassed 1,000 members on 3/27

…Modestly, but gaining some momentum

BRIGHT SPOTS

New construction

Avoids most barriers – financial, technical, physical, and product limitations

Process / Industrial electrification

Somewhat unexpected, uncovered through direct outreach to industrial customer; favorable economics

SMALLER / PRESCRIPTIVE RETROFIT PROJECTS

Making increased progress, reaching scale will take time

LARGER / CUSTOM RETROFIT PROJECTS

Still a significant challenge given limited technology fit and cost implications

Small / Prescriptive

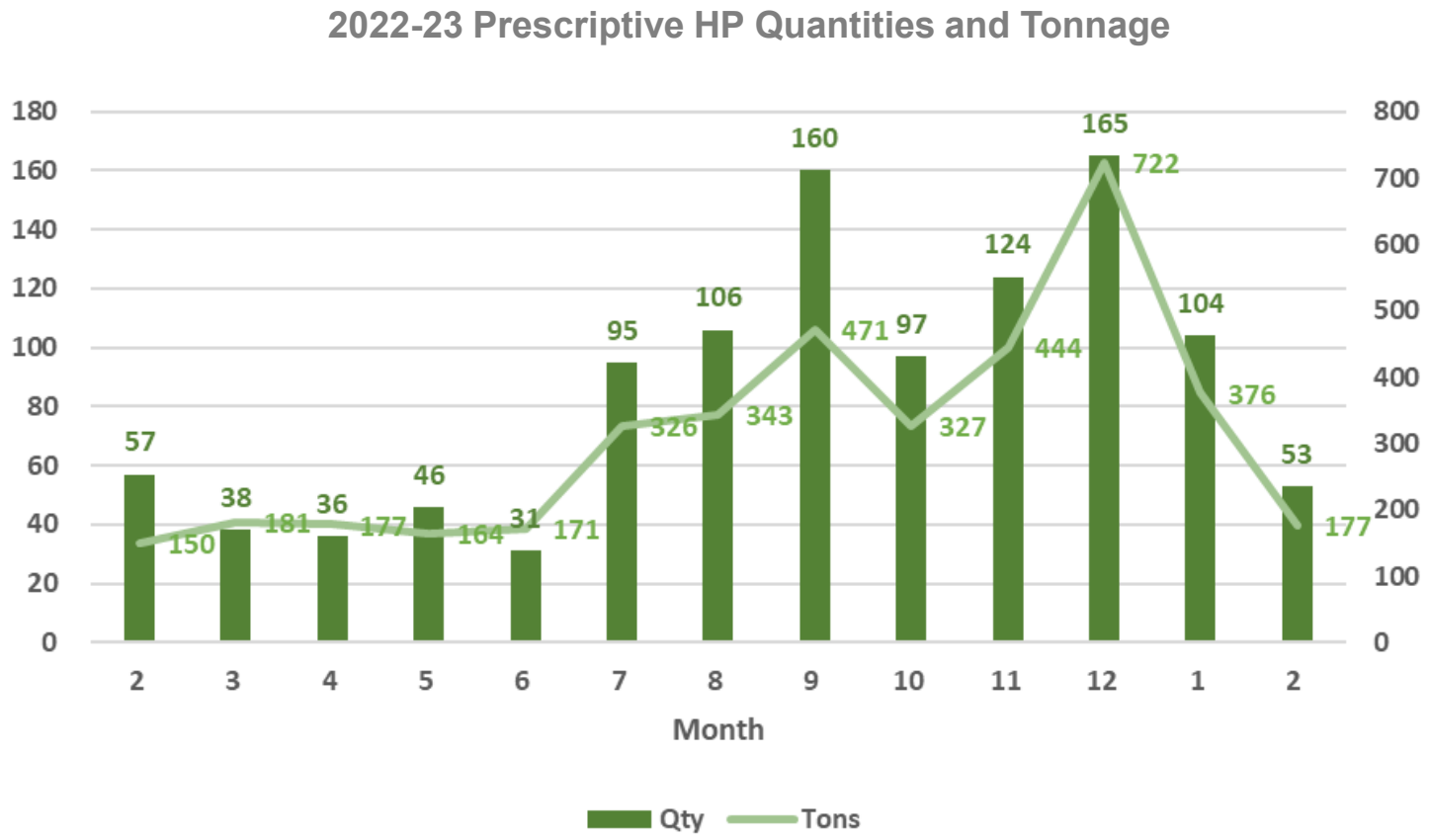
Finding increasing success, but achieving scale quickly will remain a challenge

Challenges / Strategies

- Both first costs and operating costs – simple, generous incentives
- Customer & contractor awareness – marketing, direct outreach, and education
- Contractor capability & capacity – outreach, relationship building, training

Progress

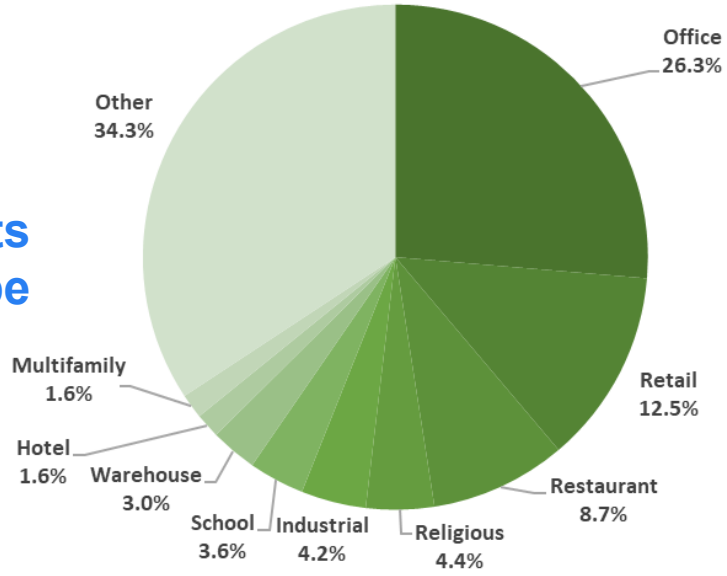
- Significant upturn in volumes late 2022; Q4 = 40%+ of 2022 total



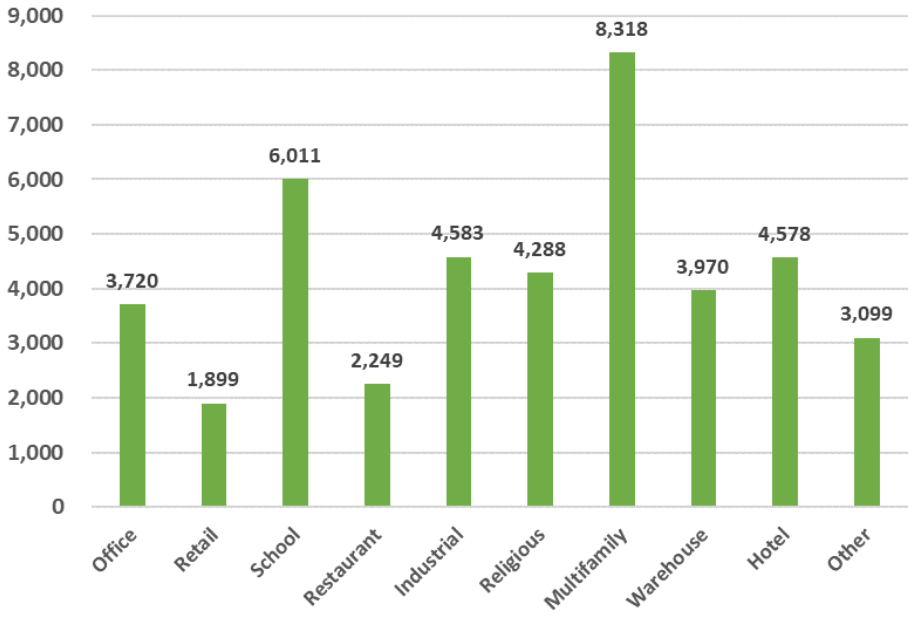
Small / Prescriptive (cont.)

Project Examples – Lots of small, almost residential scale buildings – small offices, restaurants, religious, retail, service

Prescriptive HP Projects by Building Type



Avg HP Project SqFt by Building Type



Large / Custom: Challenges

Technology

- No cold climate RTUs on market – hybrid solutions only
- 1-to-1 equipment replacement not available for hydronic systems

Physical / Practical

- Significant HVAC distribution system upgrades required
- Structural upgrades may be necessary
- Potential decrease in usable space
- Electrical service upgrades may be required

Installed cost and Operating costs

- Capital equipment is expensive
  - Retrofits not feasible
- Cost of electricity vs cost of gas

Customer considerations

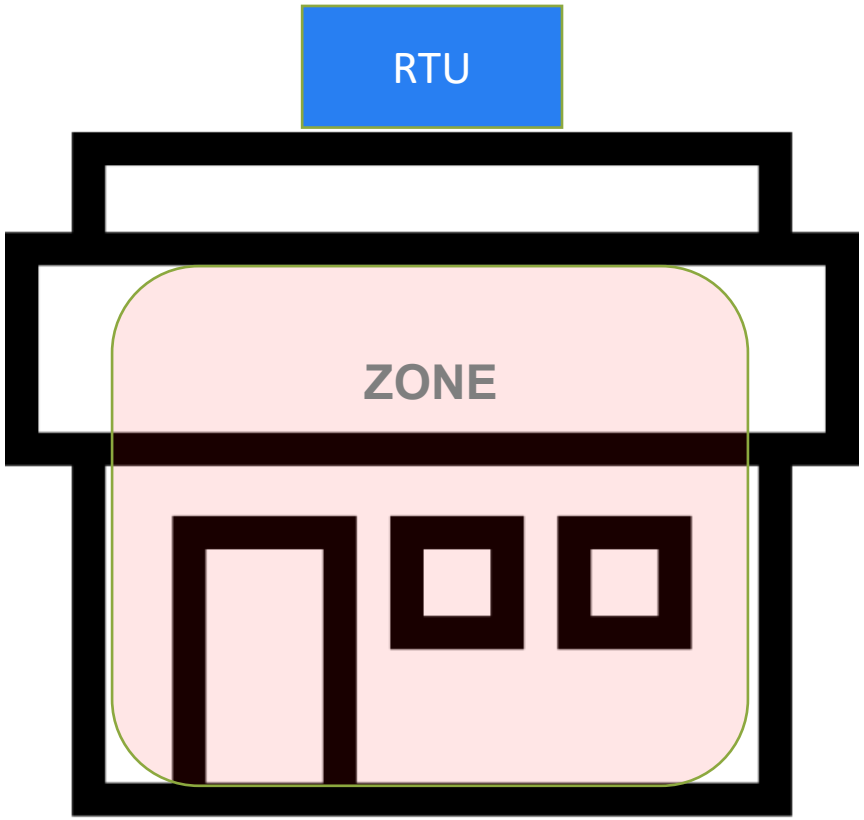
- Long decision-making timelines
- Emergency power needs

Large Building and System Types

Building Types:
Big Box Stores, Retail, Restaurants, Strip Malls, Warehouses

- No cold climate products
  - Hybrid solutions only
- Higher installed costs
- Increased operating cost
- Long lead times

Single Zone Air Systems



Large Building and System Types (cont.)

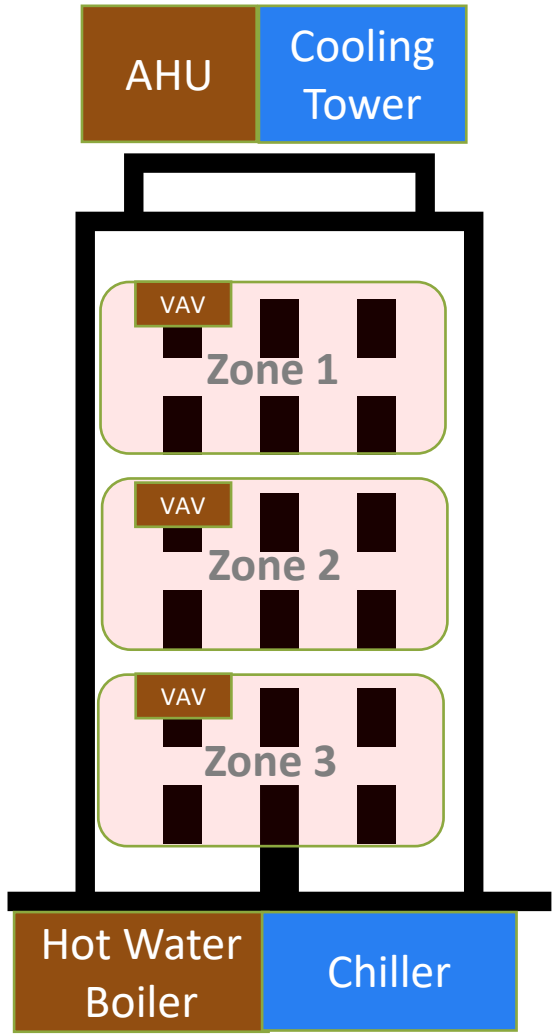
Building Types:

Large Offices, Hospitals, Labs, Schools*, Public Buildings*, Dormitories*

may be heating only

- No practical, drop in solution for hydronic systems
  - Available HPs can't meet water temperature requirements
    - Currently in R&D phase
  - Would require disruptive replacement of distribution system (coils, pipes, pumps, etc.)
  - If cooling tower removed, cooling efficiency will be reduced
- Terminal units (VAV boxes / FPT units)
  - No economically feasible option
  - Disruptive retrofit

Hydronic Systems



Real Project Example – Town Hall

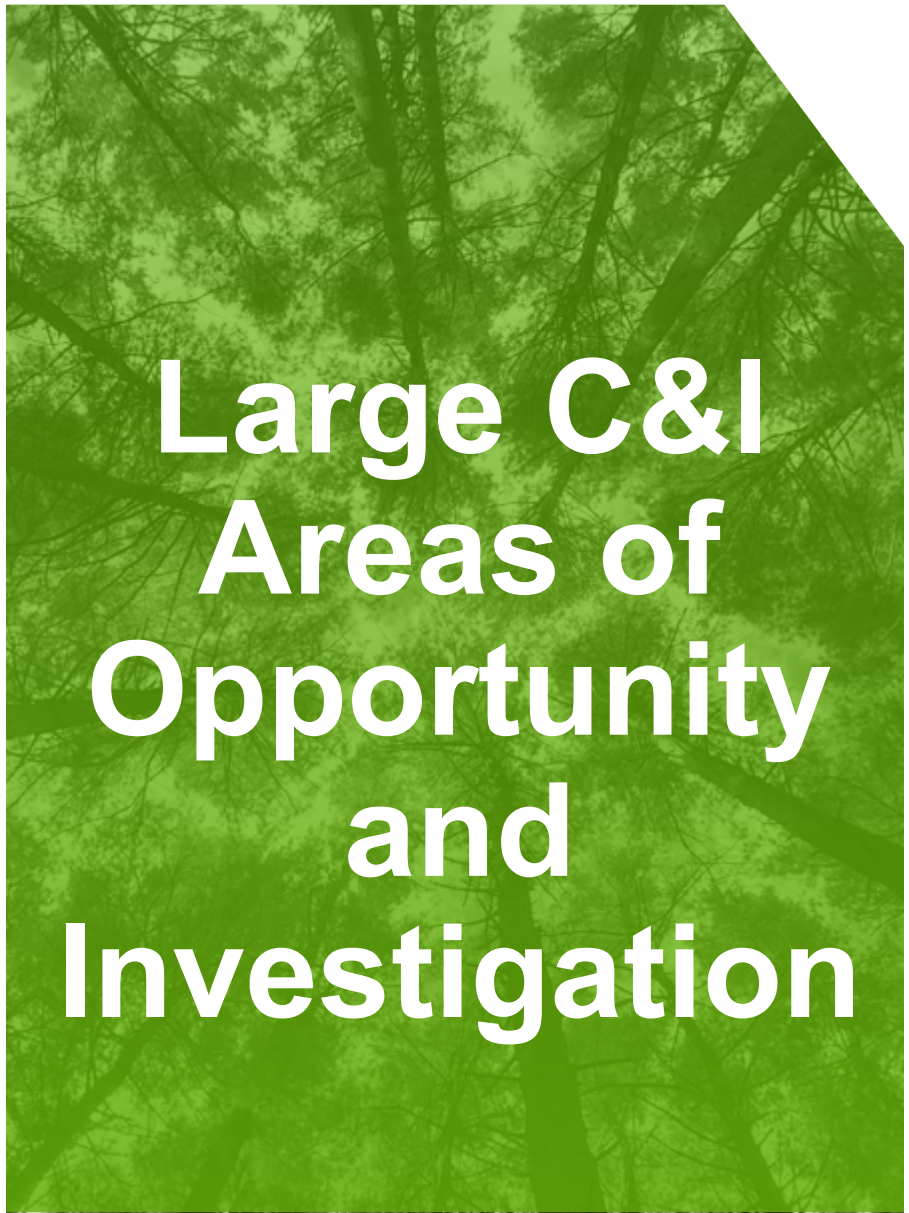
Custom Electrification

Hydronic Systems

Existing
- Air conditioned (water cooled chiller)
- Gas boilers
- Historic building (circa 1800s)
- 28,000 sq. ft.

Proposed
- Full electrification
  - adding large generator
- Air-to-water heat pump (cooling penalty)
- Ventilation capacity upgrade
- Changing distribution system

Impacts
- Incremental Cost: **$1.5 million**
- Energy cost impact: $14,000 increase annually
- Gas savings: 10,680 therms [**$7 per lifetime therm saved**]
  - **Energy Efficiency: ~$1 per lifetime therm saved**



Large C&I Areas of Opportunity and Investigation

Large Commercial

- “Very High Efficiency HVAC”
- Existing water source heat pump buildings
- Hybrid Solutions
- Manufacture engagement

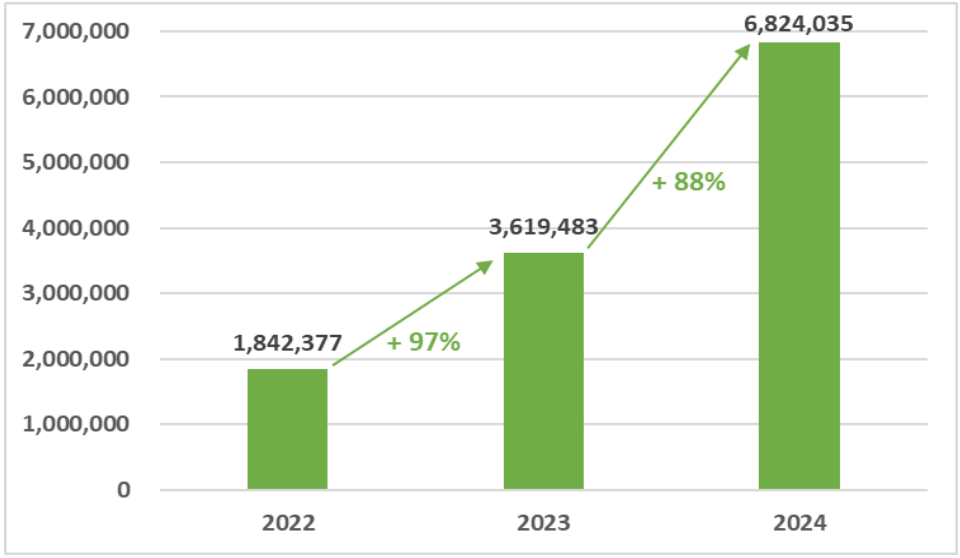
Process / Industrial

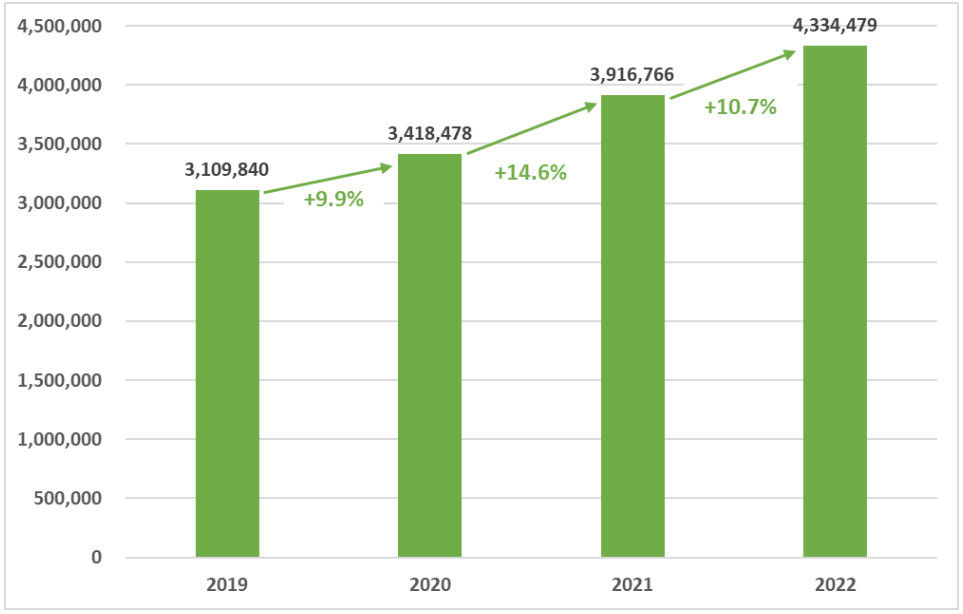
- Shoe manufacturing
- Food processing
- Pharmaceuticals

What's Next – Additions & Expansions

- Expand offerings to address specific market opportunities
- Additional targeted marketing/messaging/outreach
- Continued growth of market capability / capacity
- Continue to build awareness of HP technology and offerings as well as understanding and interest among customers and contractors

C&I Net Lifetime MMBtu Savings (Planned)





US Unitary HP Shipments
(Source: AHRI)

Thank you

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BERKSHIRE GAS
An AVANGRID Company

Cape Light Compact

EVERSOURCE

Liberty

nationalgrid

Unitil