Packaged Terminal Heat Pumps

Webinar – March 12, 2025

nbi new buildings institute

SAN DIEGO LEARN

This webinar was developed in partnership with The LEARN Program.

The LEARN Program is a San Diego-based workforce education and training program that has partnered with New Buildings Institute and AWHI to offer free energy efficiency and electrification webinars. Please visit the LEARN website for more information: www.sandiegolearn.com

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Packaged Terminal Heat Pumps

In today's webinar we'll discuss:

- The advantages and disadvantages of PTHPs
- PTHPs vs PTACs
- Their applications for both new construction and retrofits
- The size of this emerging market

Today’s Panelists

Jonathan Moscatello

Daikin North America

Paul Del Vecchio

Ethos Development LLC

Cody Glavey Weiss

NYSERDA

Packaged Terminal Heat Pumps—PTHPs

New Buildings Institute Webinar 3/12/2025

DAIKIN
AIR INTELLIGENCE

ABOUT

2005: Began selling heat pumps in homes.

2011: With wife Sarah, became owner of a “Ductless Heat Pump Only” contracting company.

2017: Heat pump consultant for utilities and HVAC industry.

2021: Joined Daikin as Utility Relations Manager.

JONATHAN
MOSCATELLO

DAIKIN
AIR INTELLIGENCE

Daikin is the global leader in heating, ventilation and air conditioning (HVAC)

Europe

Daikin Europe N.V. (Belgium: 1972)
- Commercial ACs, Heating products

Daikin Industries (Czech Republic: 2003)
- Residential ACs

Daikin Applied Europe S.p.A. (Italy: 2008)
- Screw and Centrifugal Chillers

Daikin Turkey (2011)
- Residential ACs, Heaters

U.S. & Mexico

Daikin Applied Americas INC. (Staunton, VA; Plymouth, MN: 2007)
- Large Screw Chillers, Centrifugal Chillers

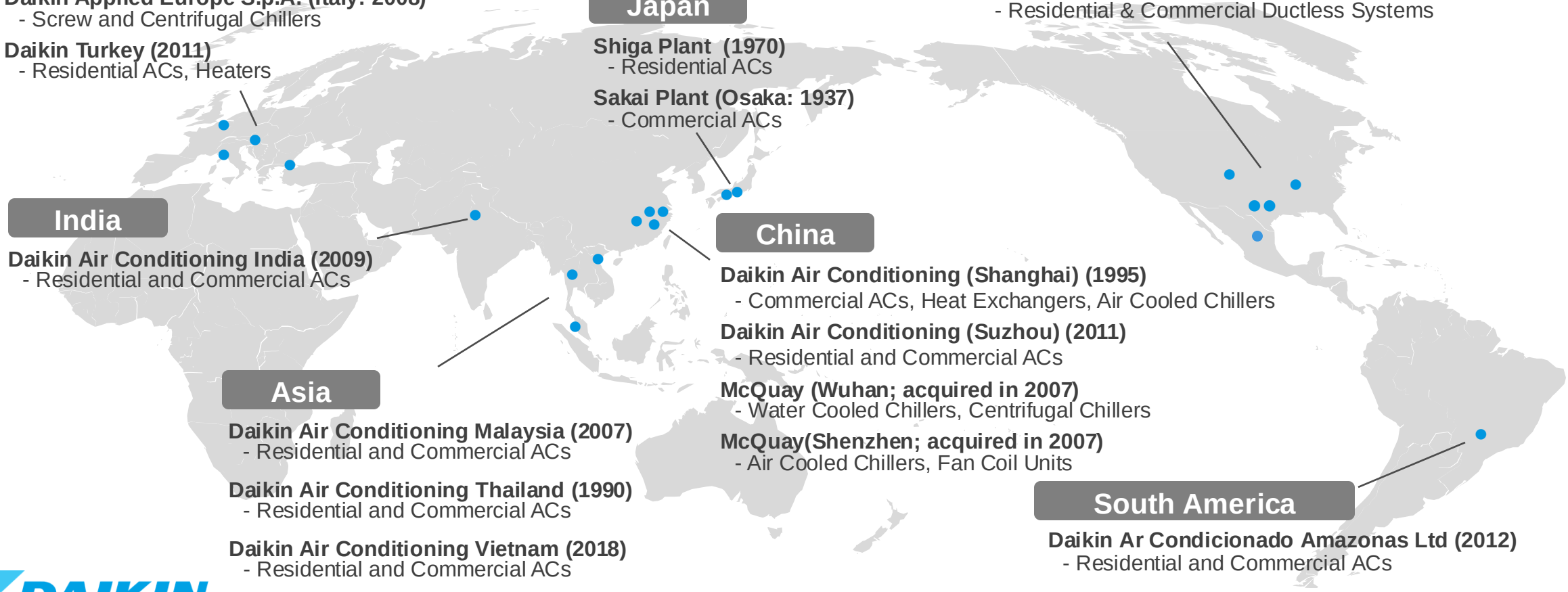
Goodman Global Group Inc. (Houston, TX: 2012)
- Residential & Commercial Unitary Systems

Daikin Manufacturing Mexico, S. de R.L. de C.V
- Residential & Commercial Ductless Systems

Japan

Shiga Plant (1970)
- Residential ACs

Sakai Plant (Osaka: 1937)
- Commercial ACs



India

Daikin Air Conditioning India (2009)
- Residential and Commercial ACs

China

Daikin Air Conditioning (Shanghai) (1995)
- Commercial ACs, Heat Exchangers, Air Cooled Chillers

Daikin Air Conditioning (Suzhou) (2011)
- Residential and Commercial ACs

McQuay (Wuhan; acquired in 2007)
- Water Cooled Chillers, Centrifugal Chillers

McQuay(Shenzhen; acquired in 2007)
- Air Cooled Chillers, Fan Coil Units

Asia

Daikin Air Conditioning Malaysia (2007)
- Residential and Commercial ACs

Daikin Air Conditioning Thailand (1990)
- Residential and Commercial ACs

Daikin Air Conditioning Vietnam (2018)
- Residential and Commercial ACs

South America

Daikin Ar Condicionado Amazonas Ltd (2012)
- Residential and Commercial ACs

DAIKIN AIR INTELLIGENCE

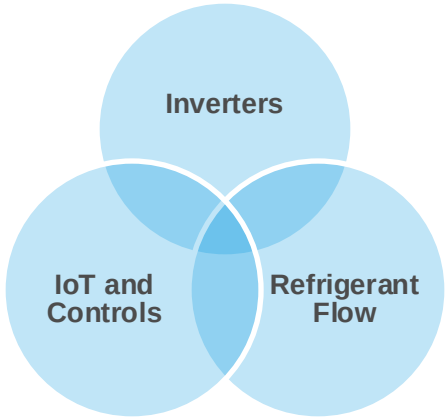
DAIKIN A family of many trusted brands

Daikin's mission: To establish inverter heat pumps as the main technology for HVAC in North America

1

HEAT PUMPS

DAIKIN CORE TECHNOLOGIES



SkyAir

FIT

AURORA

Variable Refrigerant Temperature

LIFE

2

MANUFACTURING CAPABILITY

More than
90
global production bases for localized production

More than
76,000+
EMPLOYEES
80% are outside Japan

Business development in more than
150
countries

76%
of our sales are from outside Japan

Comprehensive AC Manufacturer
Handling both AC equipment and refrigerants

AIR SPECIALISTS

3

MISSION

Environmental Vision 2050

We will reduce the greenhouse gas emissions generated throughout the entire life cycle of our products.

DAIKIN AIR INTELLIGENCE

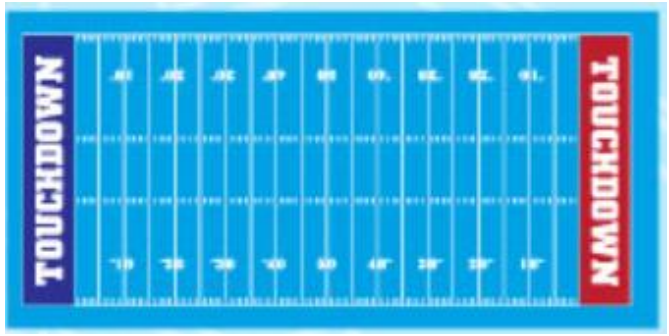
Introducing the Daikin Texas Technology Park (DTTP)

- Located outside of Houston, TX
- Office interiors are LEED Gold certified
- 3rd largest single-level manufacturing facility in North America
- Training center, R&D labs, marketing, engineering, and manufacturing
- Manufacturing location of Amana PTHPs

4 Million Square Feet Under One Roof

=

74 Football Fields, with End Zones



DAIKIN AIR INTELLIGENCE

What’s happening with Amana PTHPs ?

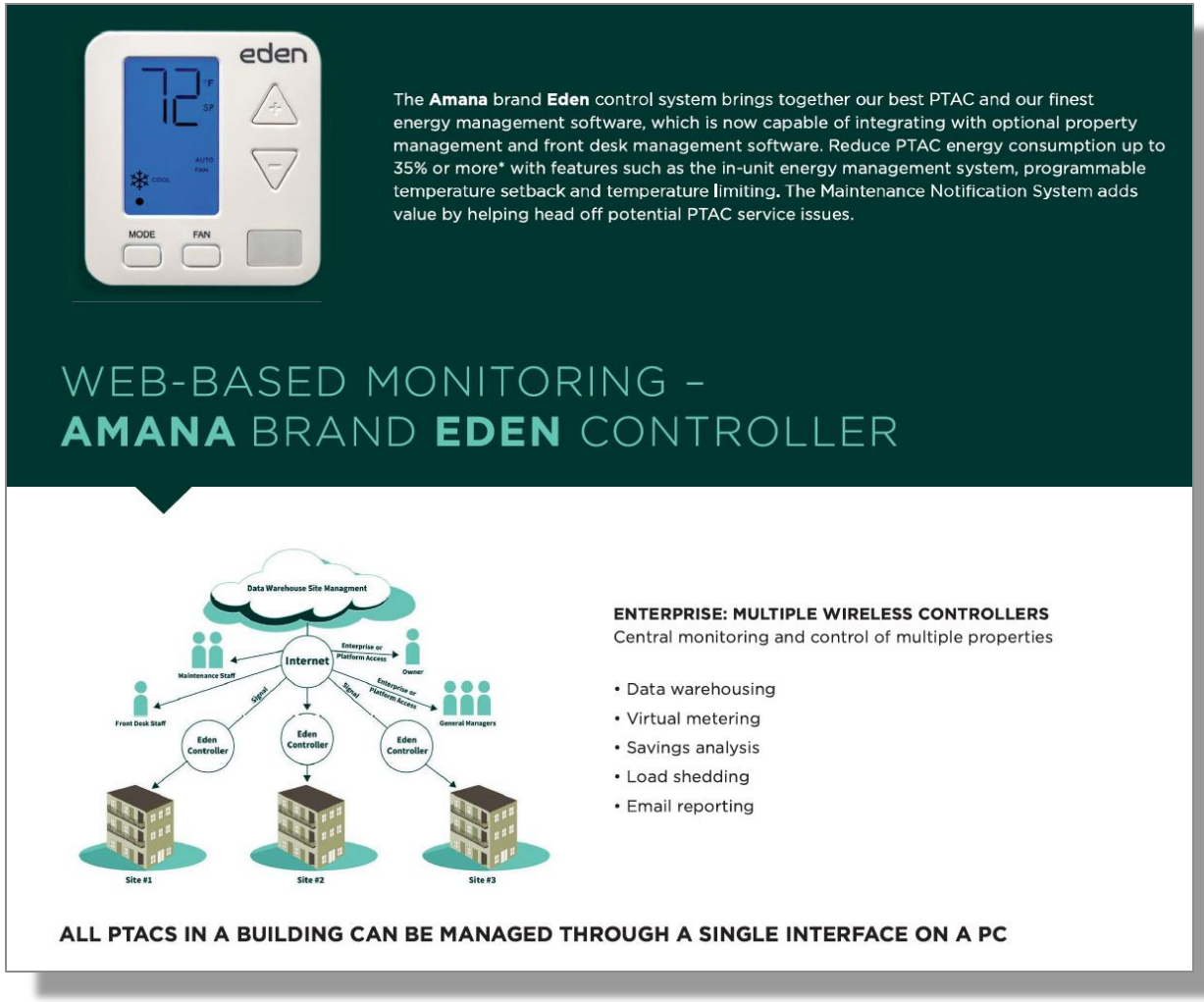
Heating & Air Conditioning Amana PTAC

- We enjoy a roughly 80% market share.
- The overwhelming majority of units are sold as AC models (PTACs) with electric resistance heat. WHY?
  - Extraordinarily price sensitive market and ACs are the lower priced option.
  - Building owners generally do not pay the power bills, therefore no incentive to pay for more expensive PTHPs
  - Most applications are not “owner occupied”. When buildings are owner occupied, the PTHP becomes the best choice
- PTACs and PTHPs represent a small part of the overall HVAC market and of Daikin's business.

DAIKIN AIR INTELLIGENCE

There is strong interest in PTHPs for beneficial electrification

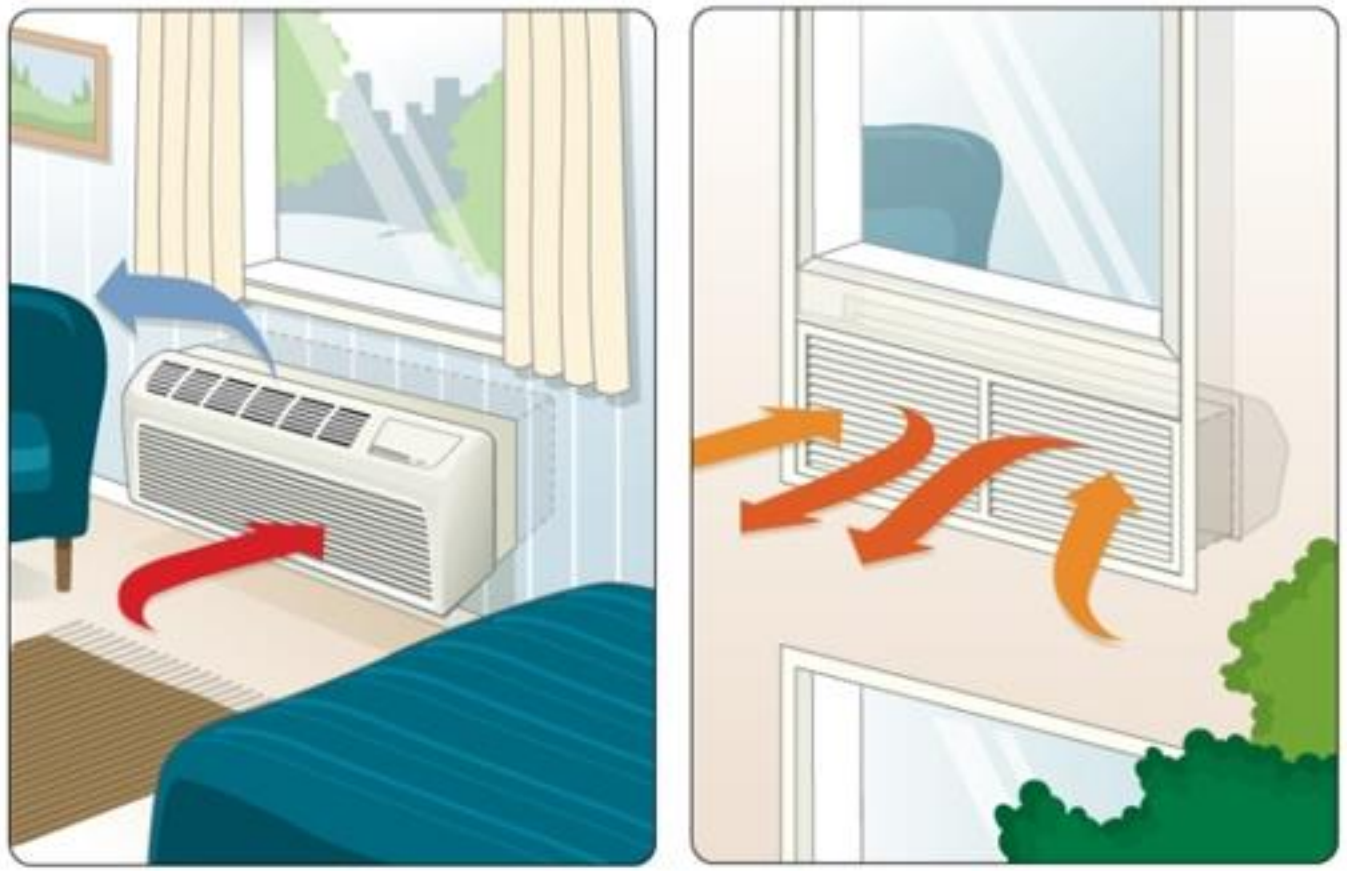
- New construction energy code produces very low heating and cooling requirements or load.
- Zonal heat pump application is more desirable than one large HP—"many tiny heat pumps"
  - Better energy performance
  - With PTHPs > lower "first cost"
- PTHPs and PTACs have improved in sound performance and control options.
- Lots of existing PTACs. These can be converted to PTHPs



DAIKIN AIR INTELLIGENCE

PTHPs are a great choice in new construction, multifamily applications

- Low first cost
- Easy installation
- Highly reliable operation
- Easy to maintain
- Easy to replace
- Their performance matches the needs of the application



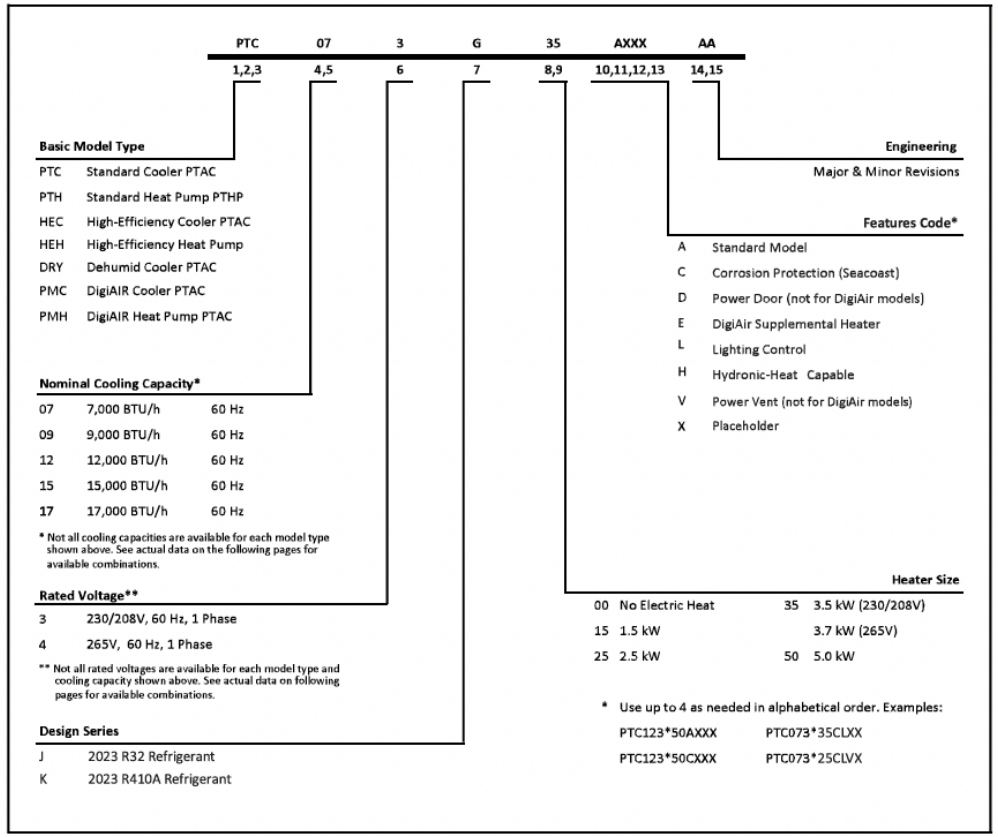
How about retrofitting into existing buildings? *In this case, best in deep retrofits.*

DAIKIN AIR INTELLIGENCE

Lots of HP options are available, now in low GWP refrigerant

- Models are available in 7,000 / 9,000 / 12,000 / 15,000 BTU/H capacities
- Electric resistance supplemental heat is optional.
  - Choose none, 1.5, 2.5, 3.5, or 5.0 kW

Model Nomenclature



PRODUCT SPECIFICATIONS: HEH R32 J MODELS (HIGH-EFFICIENCY HEAT PUMPS)
COOLING/HEAT PUMP/ELECTRIC HEAT

HEH R32 J Models								
Model[1,5,6,8,9]		HEH073J **AXXX	HEH093J **AXXX	HEH123J **AXXX	HEH153J **AXXX	HEH074J **AXXX	HEH094J **AXXX	HEH124J **AXXX
Cooling								
Voltage[1,3]		230 / 208	230 / 208	230 / 208	230 / 208	265	265	265
Capacity (BTU/h)		7,100 / 7,100	9,000 / 9,000	12,000 / 11,600	14,500 / 14,400	7,300	9,100	12,100
Amps[10]		3.0	3.9	5.4	6.7	2.7	3.35	4.7
Watts[10]		530 / 515	690 / 680	1,015 / 965	1,355 / 1,305	550	700	1,045
EER		13.3 / 13.7	13.0 / 13.2	11.8 / 12.0	10.7 / 11.0	13.3	13	11.6
Heating								
Capacity (BTU/h)		6,300 / 6,100	8,200 / 8,000	11,100 / 10,900	14,400 / 14,200	6,600	8,300	11,600
Amps[10]		3.0	3.9	5.4	6.7	2.7	3.35	4.7
Watts[10]		470 / 455	615 / 600	955 / 935	1,315 / 1,300	495	640	1,000
COP		3.9 / 3.9	3.9 / 3.9	3.4 / 3.4	3.2 / 3.2	3.9	3.8	3.4
Unit without Electric Heater								
Min. circuit amps[2,4,10]		3.7	4.9	7.4	8.5	3.2	4.4	5.8
CFM (cool/ wet coil)	high	330	290	330	400	330	290	330
	low	245	264	245	314	245	264	245
CFM (dry coil)	high	339	312	293	354	339	312	311
	low	339	312	291	354	339	312	311
Ventilated air, CFM (fan only)*		65 - 95	65 - 95	65 - 95	65 - 95	65 - 95	65 - 95	65 - 95
Dehumidifaction (Pints/hr.)		1.7	2.2	1.7	4.4	1.7	2.2	1.7
Net weight (lbs.)		106	102	108	113	103	102	108
Ship weight (lbs.)		115	117	125	130	115	117	125

*Actual vent CFM performance will vary due to application and installation conditions. 95 CFM with Power Vent Fan option (Feature Code "v")

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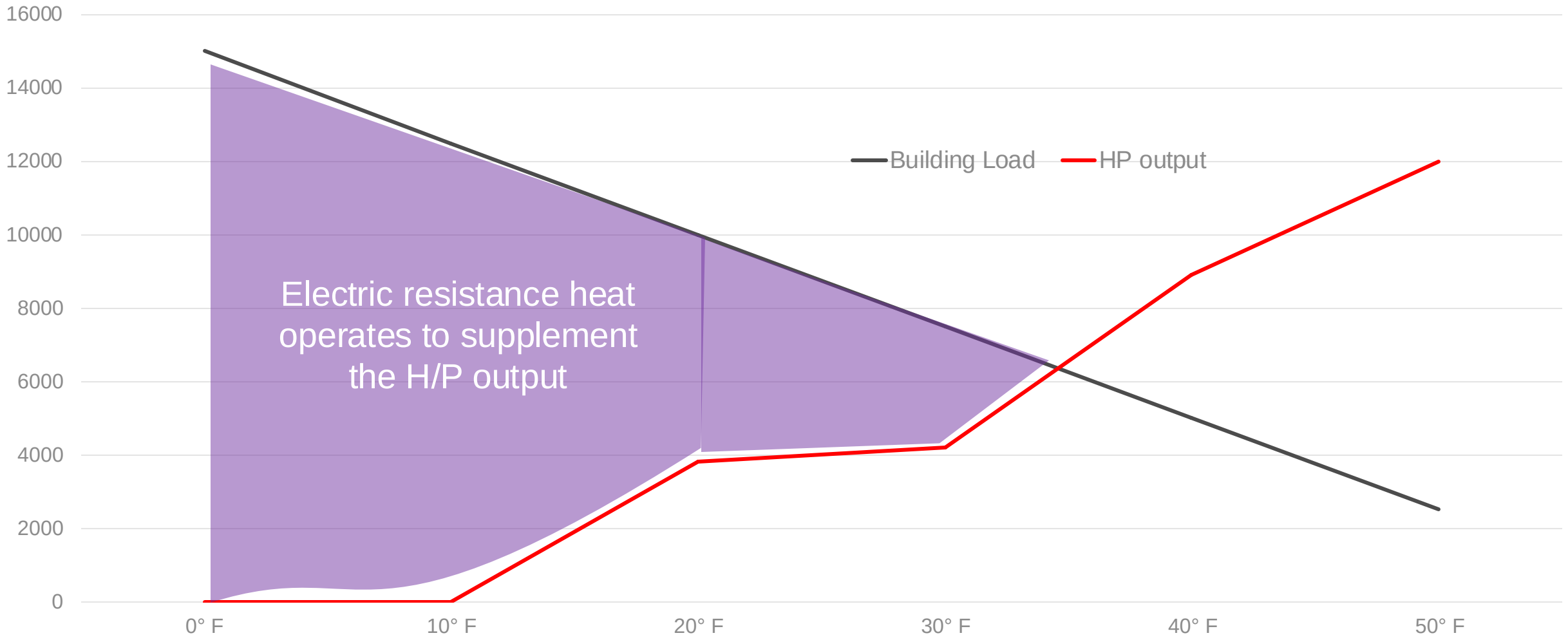
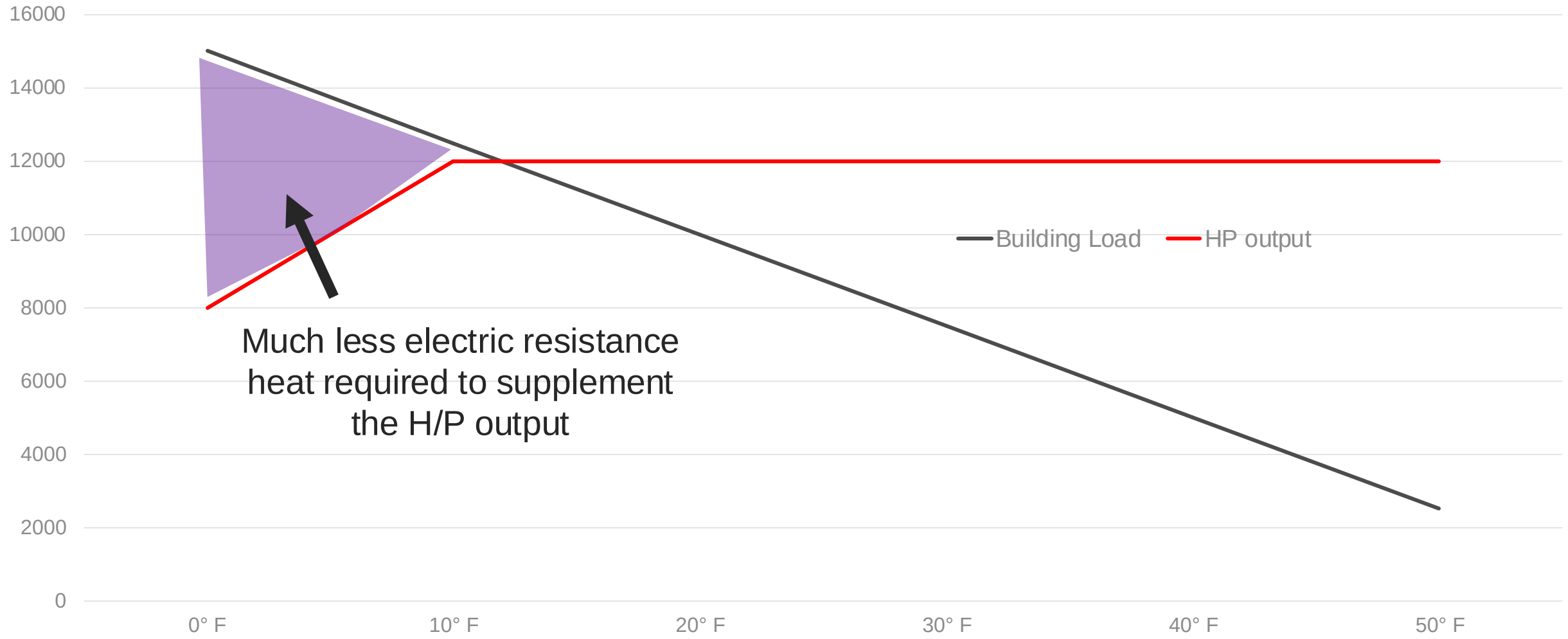
Typical PTHP performance – TODAY with older HP technology



Future PTHP performance –with new variable speed (inverter) technology



New standards for PTHPs

- AHRI 310/380 – 2017 are the product testing standards that govern PTAC and PTHPs
- This standard is currently under development.
- The new standard will likely include a test procedure for variable capacity, inverter HPs. This will pave the way for PTHPs that can produce heat in colder climates, with less reliance on electric resistance supplemental heat.

THANK YOU!

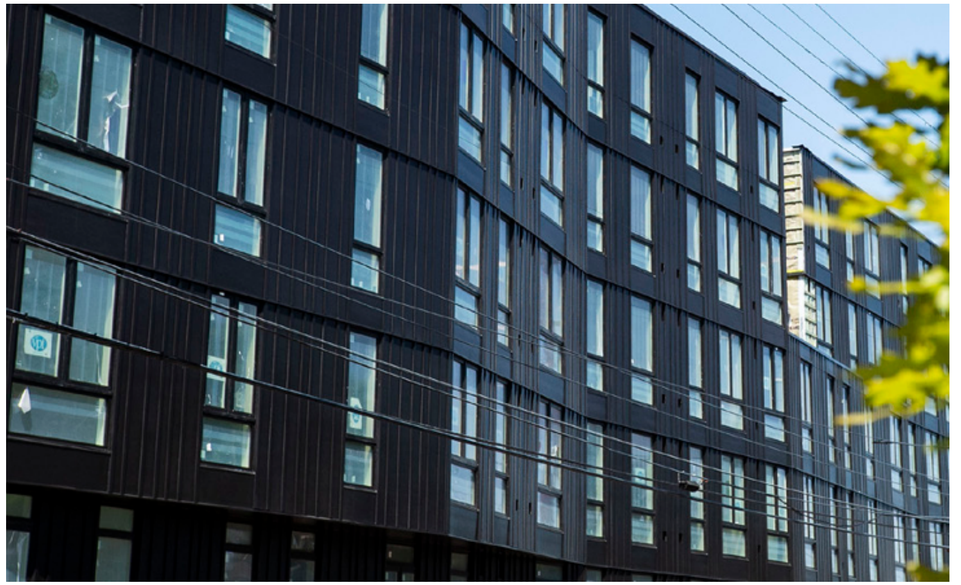
I can be reached for questions about energy efficiency programs and heat pumps at:

Jonathan.Moscatello@daikincomfort.com

JONATHAN
MOSCATELLO
Utility Relations Manager

DAIKIN AIR INTELLIGENCE

Brookland



ethos
DEVELOPMENT

Analog PDX

ethos
DEVELOPMENT

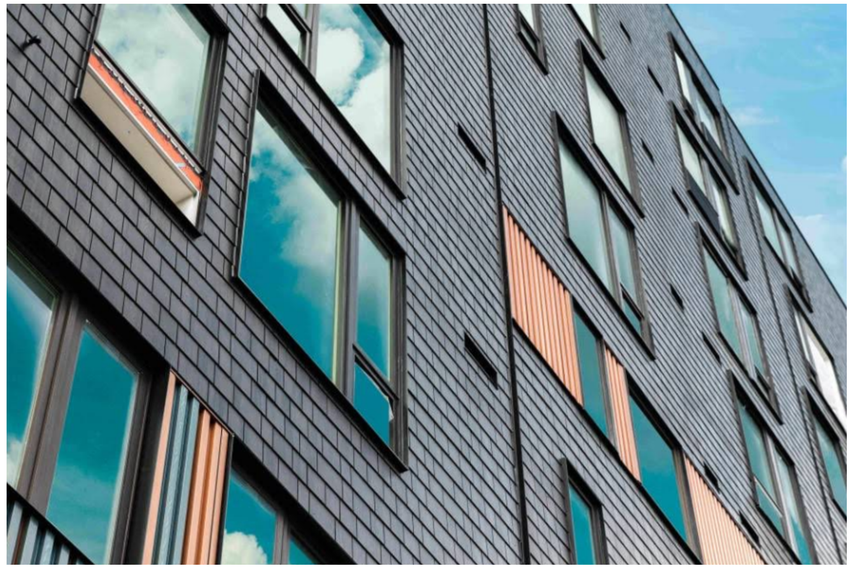
Nomad

ethos
DEVELOPMENT

Fernhill Crossing

ethos
DEVELOPMENT

Analog Tacoma



ethos
DEVELOPMENT

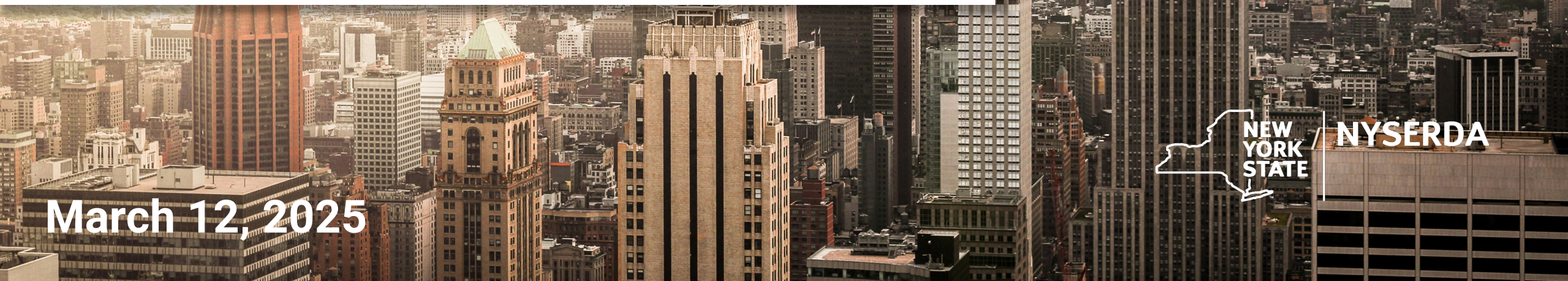
Moraine

ethos
DEVELOPMENT

Clean Heat for All

Packaged Terminal Heat Pump Program

PON 5907



March 12, 2025

NEW YORK STATE | NYSERDA

The Original Clean Heat for All Challenge

The Clean Heat for All: Packaged Terminal Heat Pump Program builds off the success of the Clean Heat for All Challenge.

This challenge was a partnership between the **New York City Housing Authority** (NYCHA), the New York Power Authority (NYPA) and **NYSERDA**.

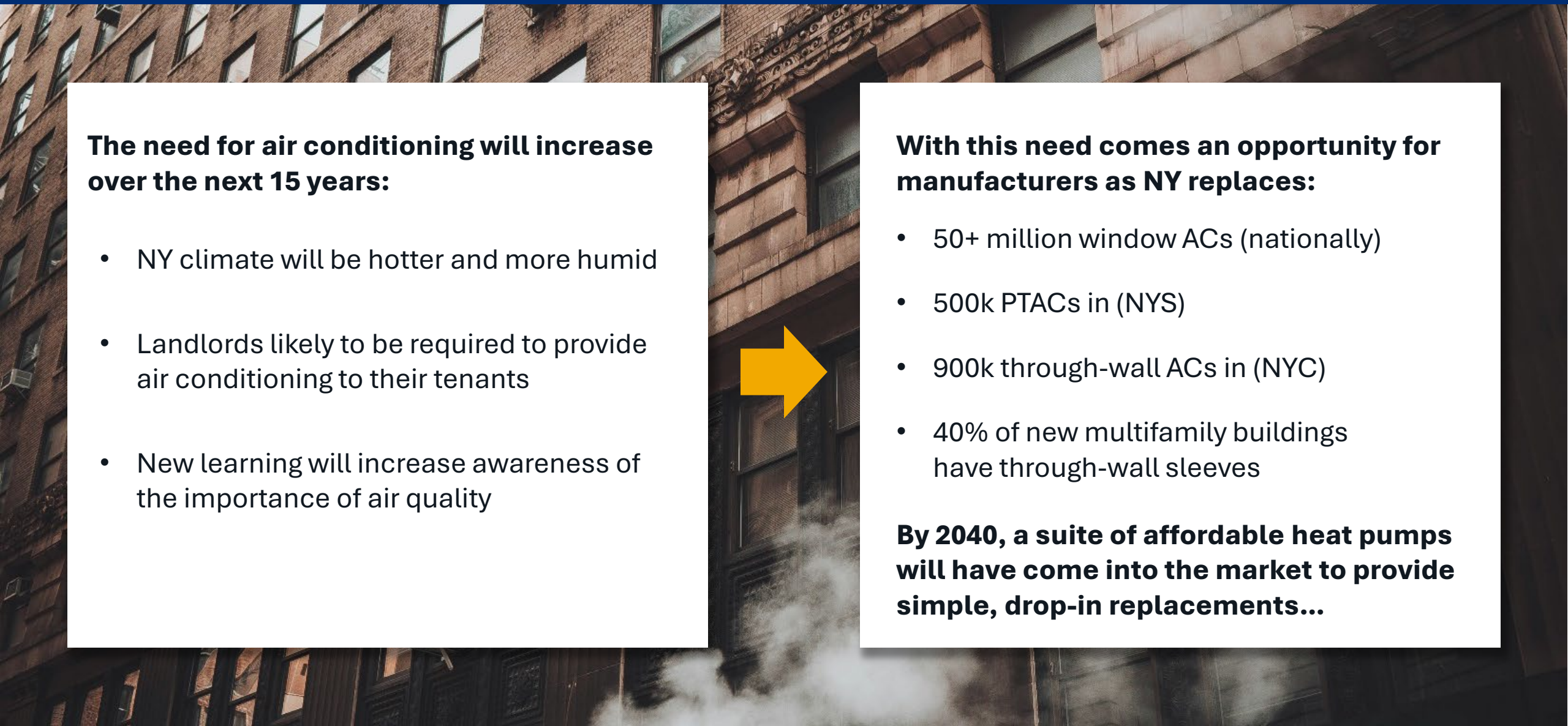
The packaged window heat pumps developed for the challenge at NYCHA's Woodside apartments delivered over **75%** heating energy savings per square foot in the first winter heating season.

The success of the NYCHA demonstration helped to validate the potential for decentralized, cold-climate heat pump solutions and inspired the PTHP Program.

NEW YORK CITY HOUSING AUTHORITY

NEW YORK STATE OF OPPORTUNITY. | NY Power Authority

New York's heating and cooling needs will be very different in 2040



The need for air conditioning will increase over the next 15 years:

- NY climate will be hotter and more humid
- Landlords likely to be required to provide air conditioning to their tenants
- New learning will increase awareness of the importance of air quality

With this need comes an opportunity for manufacturers as NY replaces:

- 50+ million window ACs (nationally)
- 500k PTACs in (NYS)
- 900k through-wall ACs in (NYC)
- 40% of new multifamily buildings have through-wall sleeves

By 2040, a suite of affordable heat pumps will have come into the market to provide simple, drop-in replacements…

Why Wait?

Let’s work together to build the superior products that meet the performance and feature needs of the market, **now**.

- High-efficiency heating and cooling
- Do not require major electrical upgrades
- Improve indoor air quality
- Quiet operation

Then let’s get them into as many New Yorker’s homes as possible - as quickly as possible.

PTHP Program Objective

The program seeks to drive innovation of high-efficiency, cold-climate rated packaged terminal heat pumps (PTHPs) by fostering collaborating between HVAC manufacturers and NYS building owners and operators.

*The program will support the **product development** and **field demonstration** of PTHPs that:*

- Are compatible with existing through-wall sleeves to retrofit PTACs and through-the-wall ACs
- Are compatible with existing building electric infrastructure and will not require street level electric service upgrades
- Offer flexible solutions to installation, maintenance and condensate management for the diverse NYS multifamily, senior living, condo, co-op and hospitality building stock
- Incorporate advanced features that will improve resident comfort, control and indoor air quality

The PTHP Program will accelerate PTHP development and adoption

1 Manufacturer Partnerships

Select a limited number of manufacturer proposals for heat pumps that meet the needs of NY buildings

2 Product Development

Support selected manufacturers to develop advanced PTHP products

3 Field Demonstrations

Work with manufacturers and building owners to fund field demonstrations and collect and publish performance results

4 Market Adoption

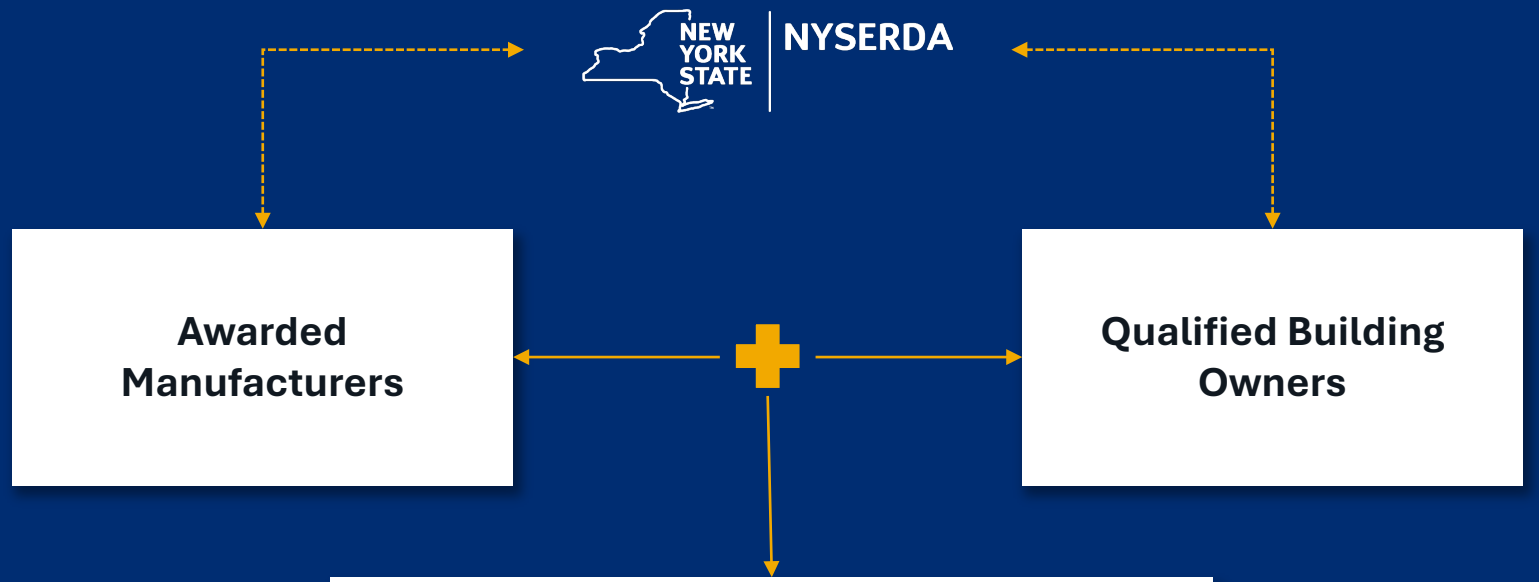
Run an early adopter program to drive large-scale market adoption

PON 5907 - Manufacturers

- Up to $1,250,000 in funding per awarded product
- Proposals **do not** require final demonstration plans
- Proposal **do** require estimated demonstration costs on a per-dwelling unit basis (3 PTHP per DU)

RFQL 5937 – Building Owners

- $0 - No funding attached
- Qualify potential demonstration sites
- Outline preliminary retrofit project plans



Demonstration Teaming

- NYSERDA available to facilitate
- ☑ Final demonstration team
- ☑ Proposed demonstration plan

Demonstrations

- All funding provided to building owners for field demonstrations will come through manufacturers from funds awarded through PON 5907

Classic PTAC

Typical Dimensions

- ≥ 16” H x ≥ 42” W (10 CFR 431.92.)

Typical Features

- Gas or electric resistance heating
- Air conditioning
- > 40 dBA

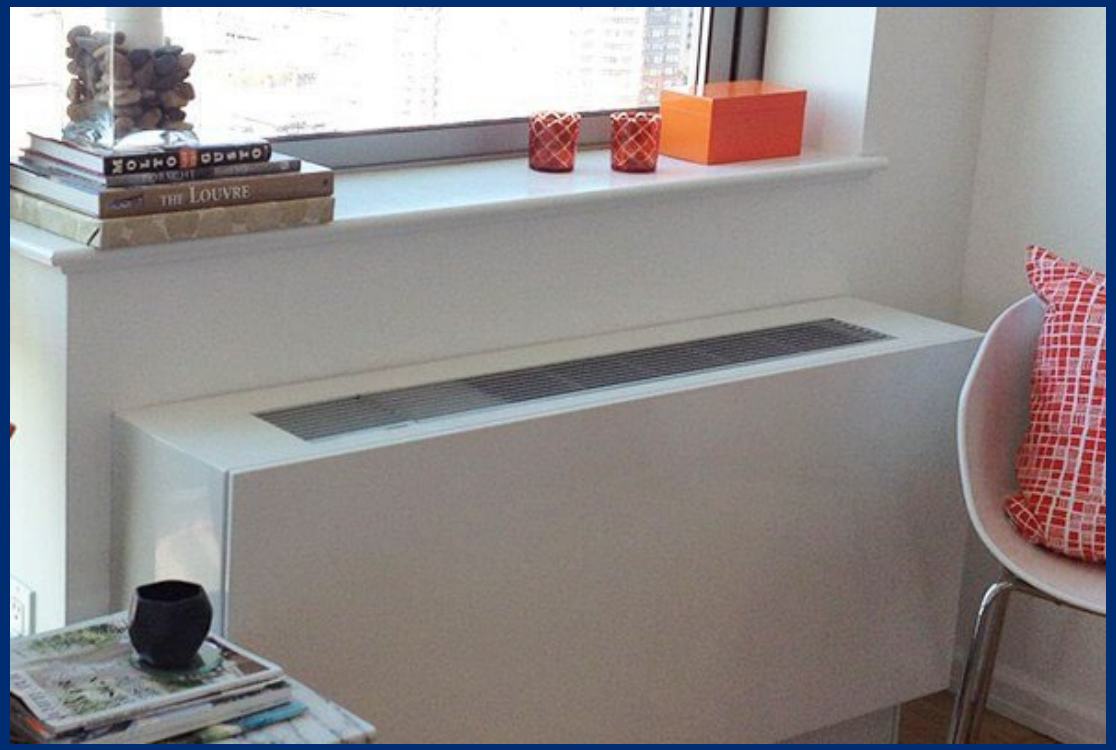
Estimated Addressable Market

- 500,000 units shipped annually in the US

Key Building Types

- Multifamily
- Hospitality
- Senior Living

Hydronic PTAC



Typical Dimensions

- 16" H x 42" W
- 15 1/2" H x 40 3/4" W
- 15 1/2" H x 36 3/4" W

Typical Features

- Hydronic heating coils
- Air conditioning

Estimated Addressable Market

- 500,000 in NYS

Key Building Types

- Multifamily, post 1990’s

Through-Wall AC

Typical Dimensions

- 14 1/4" H x 24 1/4" W
- 15 3/4" H x 26" W
- 15 3/4" H x 23 3/4"

Typical Features

- Air conditioning
- No heating

Estimated Addressable Market

- 900,000 in NYC

Key Building Types

- Multifamily
- Small Commercial

PTHP technical requirements were developed through collaboration with manufacturers, industry experts, and owner operators.

Midea

GE APPLIANCES a Haier company

ephoca

ICE AIR World Class Comfort

GREE

DAIKIN

FRIEDRICH

GRADIENT

Manufacturers

EMPIRE STATE REALTY TRUST

L+M Development Partners

Equity Residential

FAIRSTEAD

RELATED

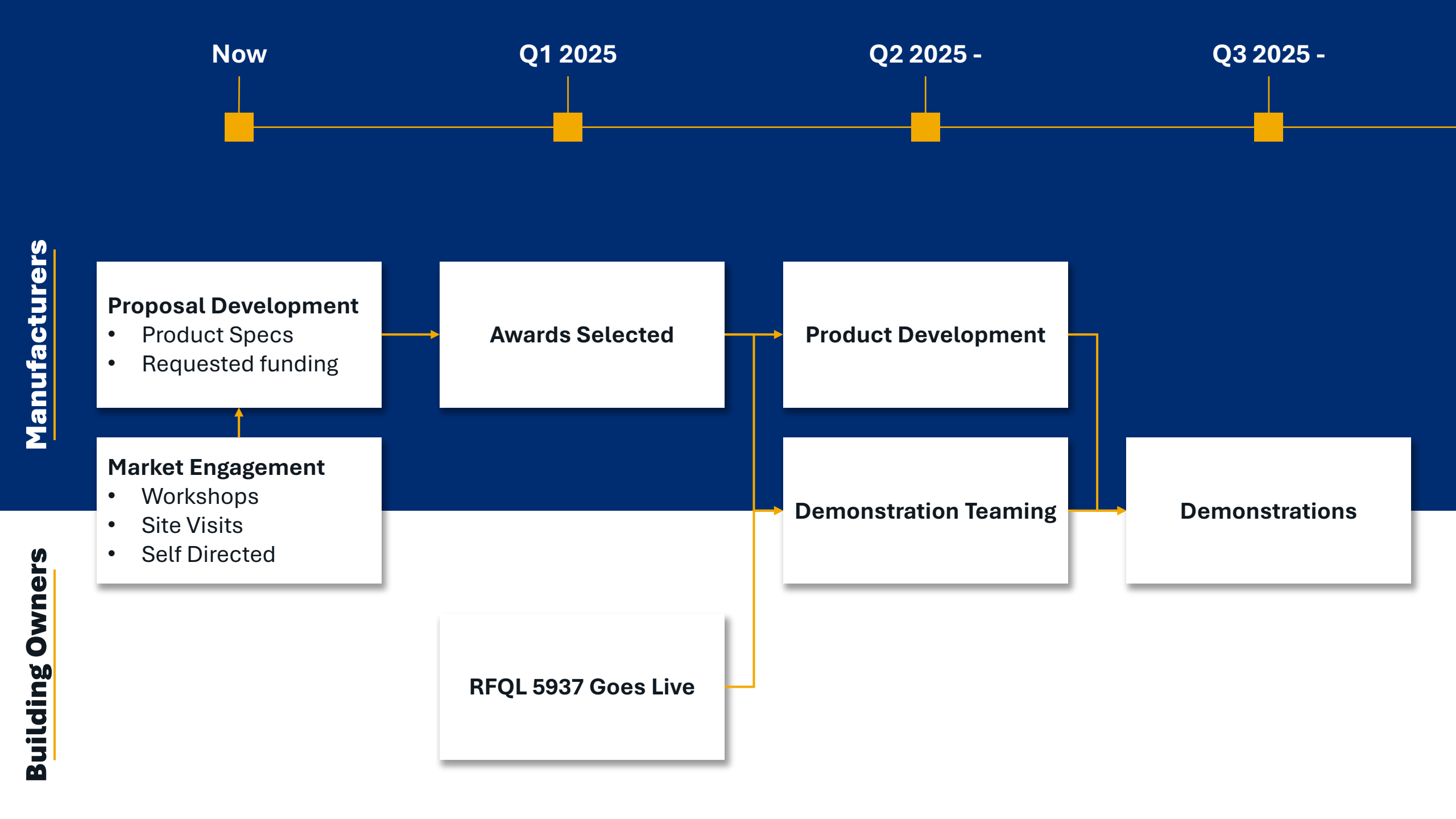
Rudin

Owners and Operators

PTHP technical requirements developed through collaboration with manufacturers, industry experts, and end-users

PTHP Product Technical Requirements

- A collaboration between NYS building owners and operators, multifamily co-ops, hospitality franchise owners, and service providers identified the design constraints and technical specifications critical to the development of feasible, yet ambitious PTHP equipment.
- Key features include:
    - Compatible with existing through-wall openings
    - No electrical infrastructure upgrades
    - High-efficiency (Seasonal COP of 3.0+, SEER2 of 18.0)
    - 100% heating capacity to 5° without electric resistance heating
    - Latent cooling / dehumidification
    - Quiet operation (35 dB(A))
    - Energy recovery ventilation
    - Flexible condensate management approaches for diverse building needs
    - Ease of installation and maintenance
    - High levels of air sealing
    - Demand response capable
    - Mesh network compatible


Now
Q1 2025
Q2 2025 -
Q3 2025 -
Manufacturers
Proposal Development
• Product Specs
• Requested funding
Awards Selected
Product Development
Market Engagement
• Workshops
• Site Visits
• Self Directed
Demonstration Teaming
Demonstrations
Building Owners
RFQL 5937 Goes Live

Contact us

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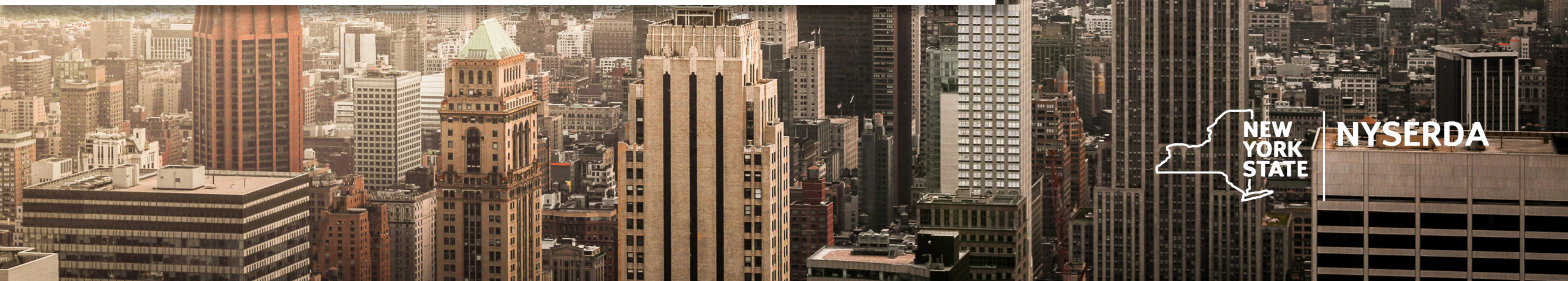

NEW YORK STATE | NYSERDA

Thank You