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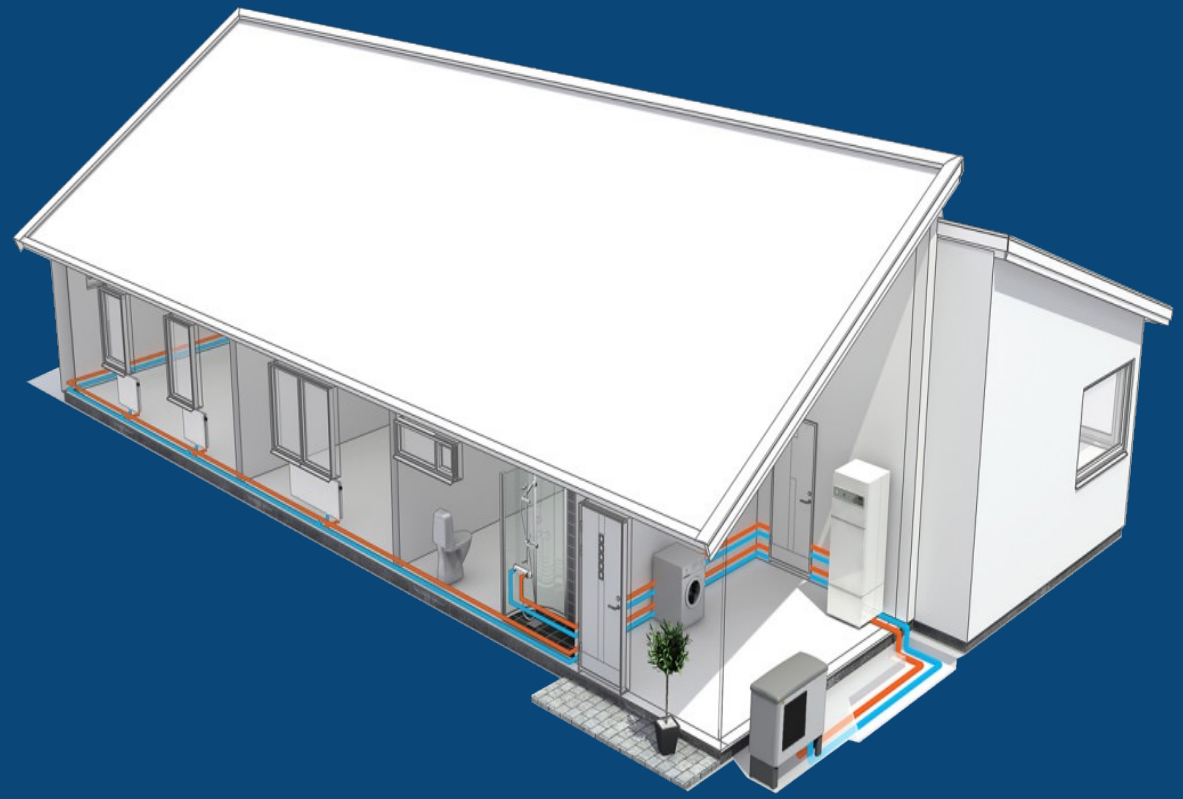
SAN DIEGO LEARN

Air-to-Water Heat Pumps

Replace your Boiler!

Brian Stewart - Electrify Now
Joe Wachunas- Electrify Now, NBI
Edwin Reek, Diakin
Jim Bashford, SpacePak
Mitul Patel, Mitsubishi



Other LEARN courses of interest:

Heat Pump Water Heater Best Practices and Job Aids

Fastrack your understanding of Heat Pumps

DIY Air Sealing Strategies to Reduce Energy Use

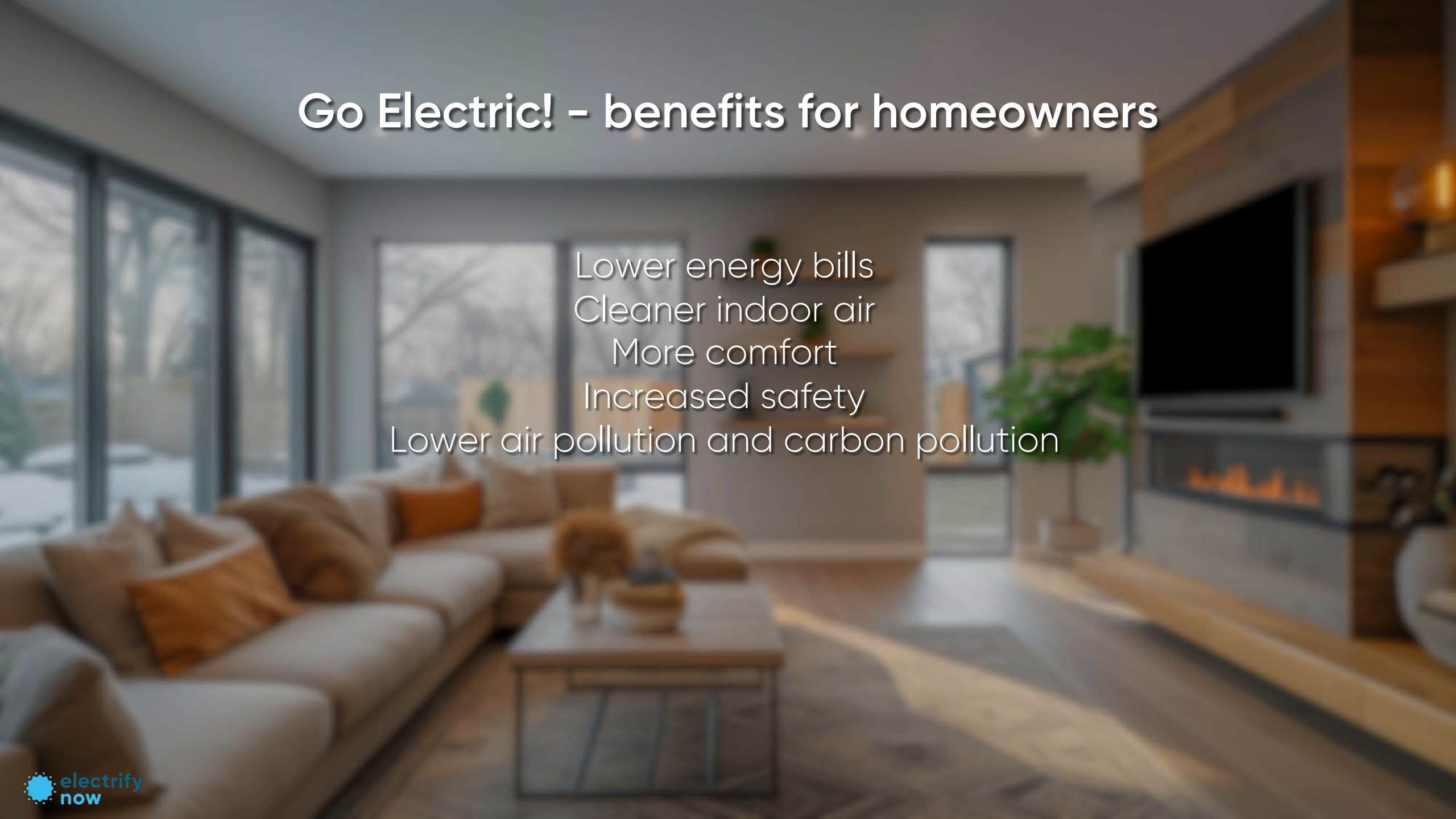
Cost-effective strategies for eliminating energy waste by using readily-available materials.

Whole Home Batteries: Costs, Benefits, and Payback

Battery storage as resilience during outages and long-term financial savings.

SAN DIEGO LEARN

Go Electric! - benefits for homeowners



Lower energy bills
Cleaner indoor air
More comfort
Increased safety
Lower air pollution and carbon pollution

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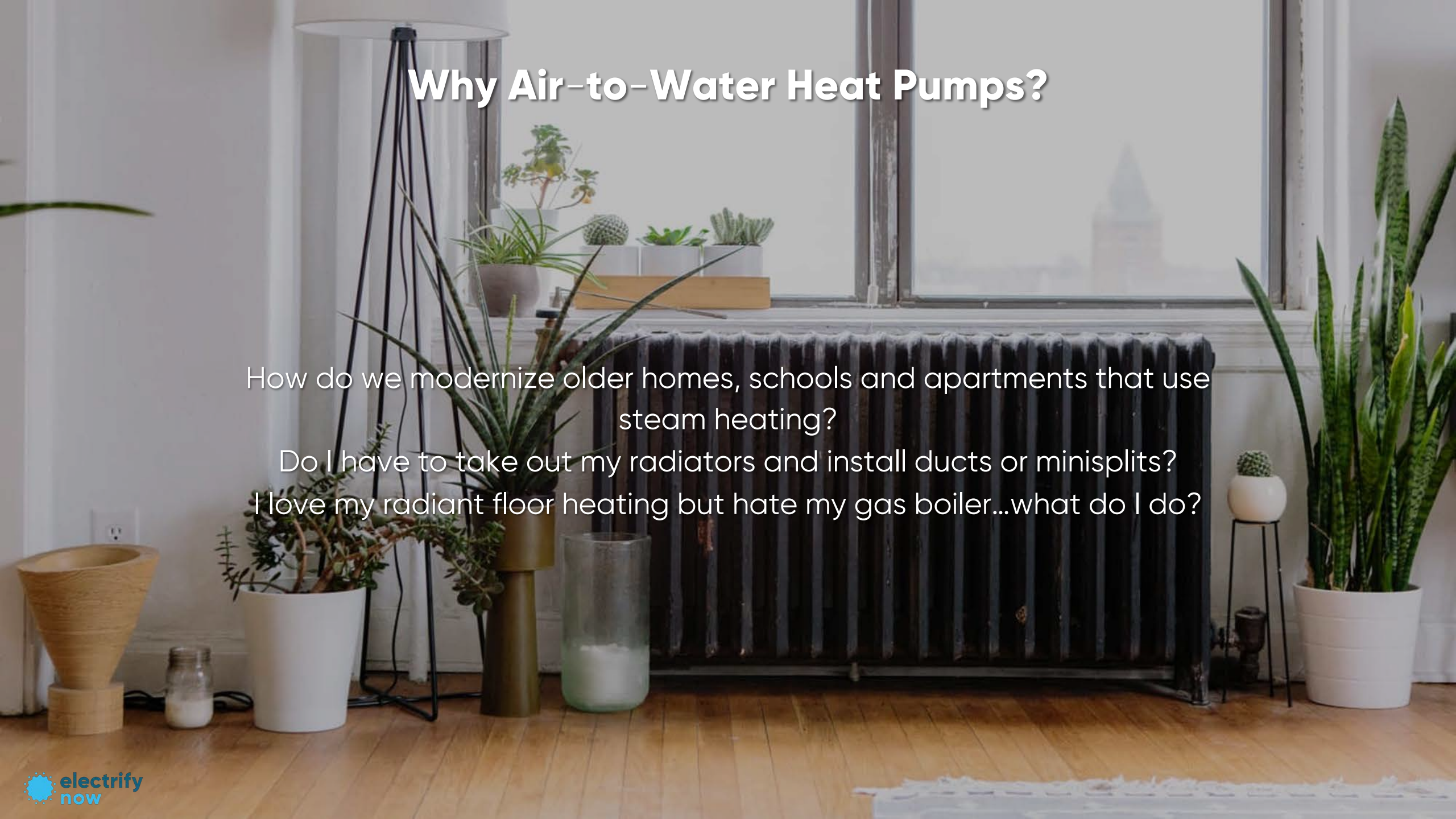
Why Air-to-Water Heat Pumps?



How do we modernize older homes, schools and apartments that use steam heating?

Do I have to take out my radiators and install ducts or minisplits?

I love my radiant floor heating but hate my gas boiler...what do I do?

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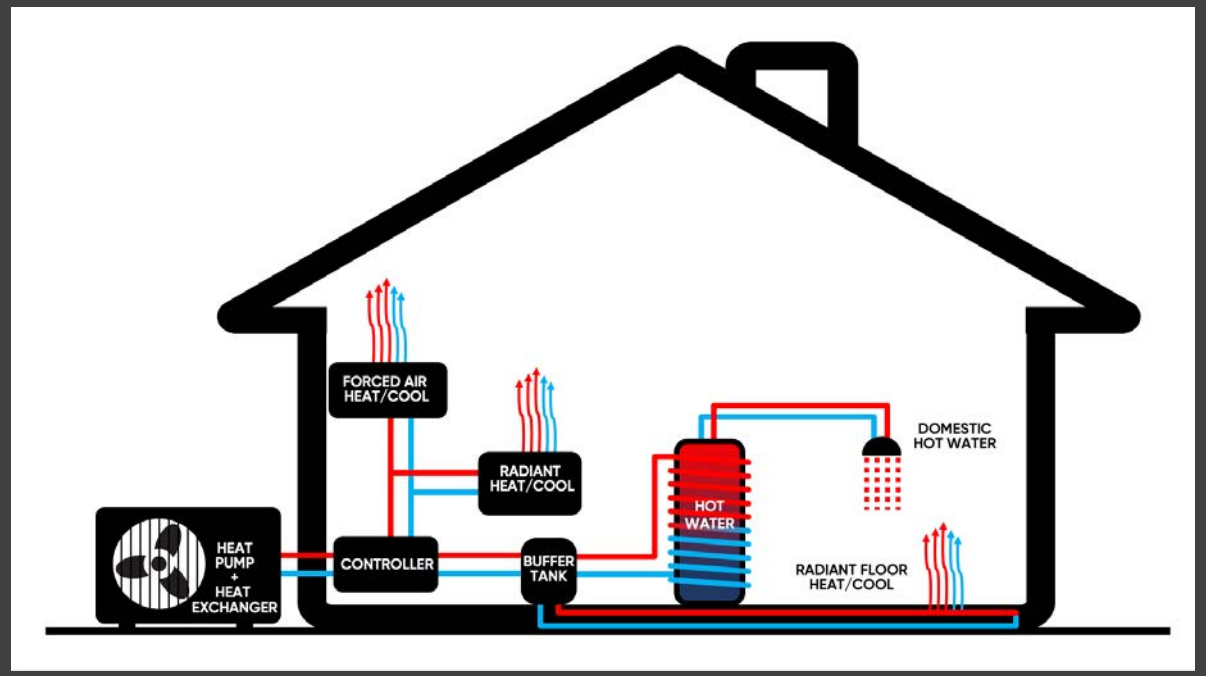
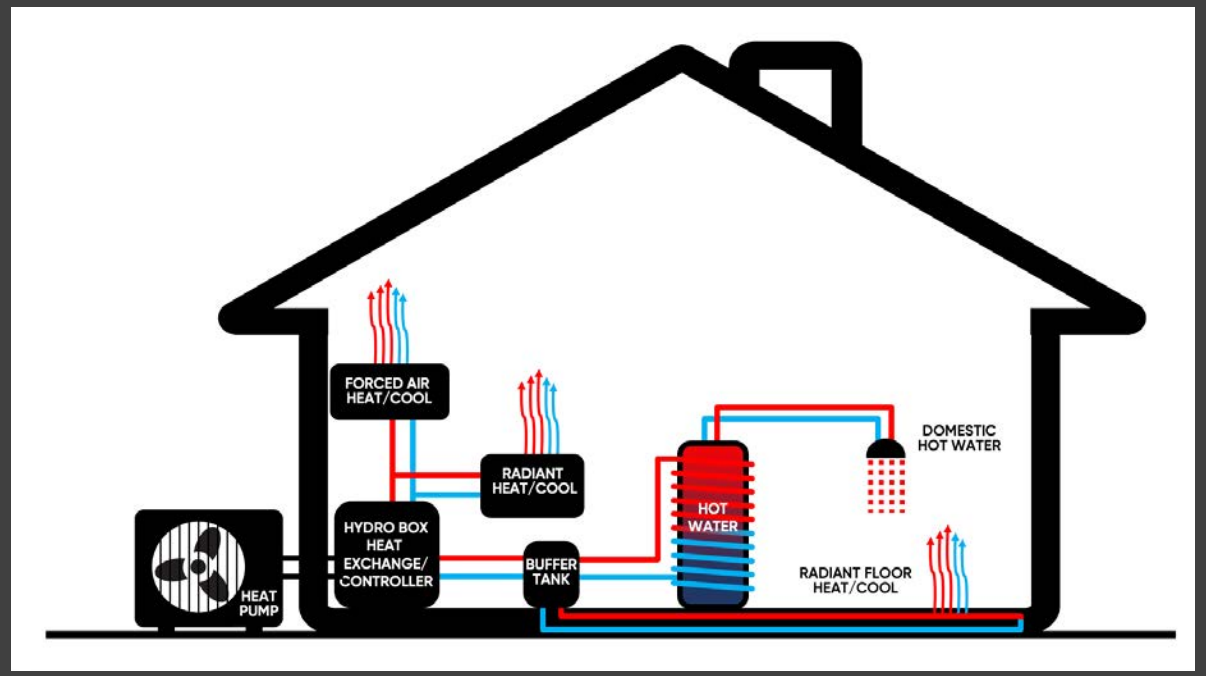
Replaces the boiler and more...

Single heat pump for space heating, air conditioning and water heating



Monobloc/Hydrosplit Air to Water System

- Outdoor unit with refrigerant to water heat exchanger
- Refrigerant in outside unit only
- Water lines connect to controller inside house
- Buffer tank stores energy
- Radiant or forced air heating/cooling



Split System

- Smaller outdoor unit with heat exchanger inside
- Refrigerant lines connect to Hydro Box inside house
- Radiant or forced air heating/cooling

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Air-to-Water Heat Pump Systems

Heat Pump
Monobloc/Split

HydroBox/Controller
W or W/O Heat Exchanger

Water Tanks
Domestic Hot Water, Pre-Heat, Thermal Storage

Emitters
Convection, Radiant, Forced Air

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Integrate with existing hydronic elements

Radiators

Baseboard Heaters

Radiant Floor Loops

Gas Boilers

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Air-to-Water Heat Pump Brands

	Apollo	Arctic Cold Climate	Carrier DHW-A2W	Chiltrix Products	Daikin Altherma	Enertech Advantage	Harvest Thermal Pod	LG Air-to-Water	Mitsubishi Ecodan	SpacePak Solstice
Type	Monobloc	Monobloc	Monobloc	Monobloc	Hydrosplit	Monobloc	Monobloc*	Monobloc	Split	Monobloc
Refrigerant	R32	R32	R32	R32	R32	R454	CO2*	R32	R32	R2454B,R32
DHW Tank Sizes (gallons)	80,120,175	50,80	53,66,79	40,80,105	40,50,80	50,80,120	43,83,119*		60,85	50,115
Space Heating	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Cooling	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Dom. Hot Water	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

*Harvest typically uses
Sanco Heat Pumps
And Water Tanks

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Air-to-Water Heat Pump Benefits

One heat pump to replace boilers and water heaters
Combined space heating and water heating

Heating and cooling
Hydronic systems can do both

More comfort than gas boiler systems
Better temperature control and consistency

High system flexibility
Multiple types of emitters, including existing radiators, can be combined to satisfy the specific needs

Super efficient water heating
More flexible, quieter, faster recovery than HP Water Heaters

Thermal Battery
A buffer tank full of hot water can be used to store energy to take advantage of time of use electric rates

Lower emissions than gas boilers
High efficiency heat pumps reduce emissions compared to gas heating in every region of the US

Less refrigerant
Monobloc systems have no refrigerant lines which reduces the chance of leaks and reduces this cost.

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Guest Panelist

Edwin Reek - Director, Water Heating Solutions - Daikin North America.
Edwin leads the development and introduction of hydronic heat pumps in North America with the objective of providing a portfolio of products to decarbonize and electrify fossil fuel heating and hot water applications. This includes the Daikin Altherma 3H HT air-to-water heat pump for residential applications, and the Mega-Q all-electric commercial hot water generation system.

Jim Bashford, National Sales and Training Manager, SpacePak Inc.
Drawing from thousands of installations across a wide range of climates and buildings, Jim has gathered insights he shares with customers about system design, application, and common use cases for heating, cooling, and domestic hot water to drive the adoption of air-to-water heat pumps in North America.

Mitul Patel, Senior Director, Mitsubishi
Mitel leads the product management of a large HVAC portfolio spanning residential and commercial applications. With over a decade of industry experience, he specializes in product strategy, sustainability, regulatory compliance and market expansion. Mitul holds a BS in Mechanical Enegineering from Georgia Institute of Technology and multiple industry certifications.

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Daikin *ALTHERMA* 3 H HT

High Temperature Air-to-Water Heat Pump for Heating, Cooling, and DHW

Daikin *ALTHERMA* 3 H HT | Overview

- 3-in-1 solution for **heating, cooling, and DHW**
- Superior levels of **comfort, energy efficiency, reliability, and control**
- Wide range of applications, including low ambient temperatures
- Daikin's Signature technology, a combination of Daikin's very **high-efficient compressors** and **refrigerant R-32**, to achieve **best in class seasonal efficiency**

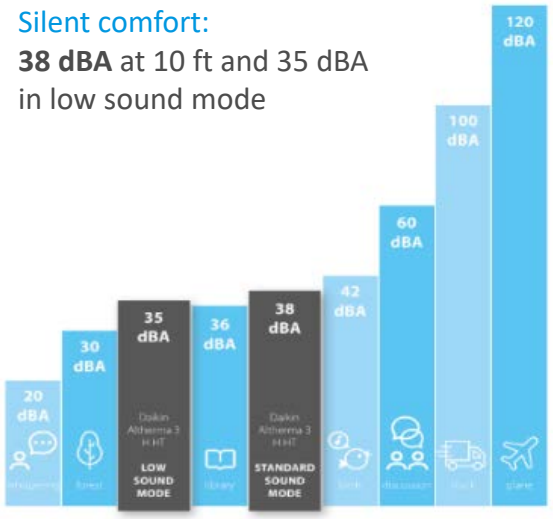
- **Greener performance**
- **Replace** fossil fuels
- Maximize usage of **renewable** energy
- Ensure a healthy and **sustainable** environment and contribute to **carbon neutrality**

R-32 has a much lower Global Warming Potential (GWP), is equivalent in power to standard refrigerants, but achieves higher energy efficiency and lower CO2 emissions. Easy to recover and reuse, R-32 is the perfect solution for attaining new CO2 emission targets.

Daikin *ALTHERMA* 3 H HT | Overview

Outdoor unit + indoor unit + tank

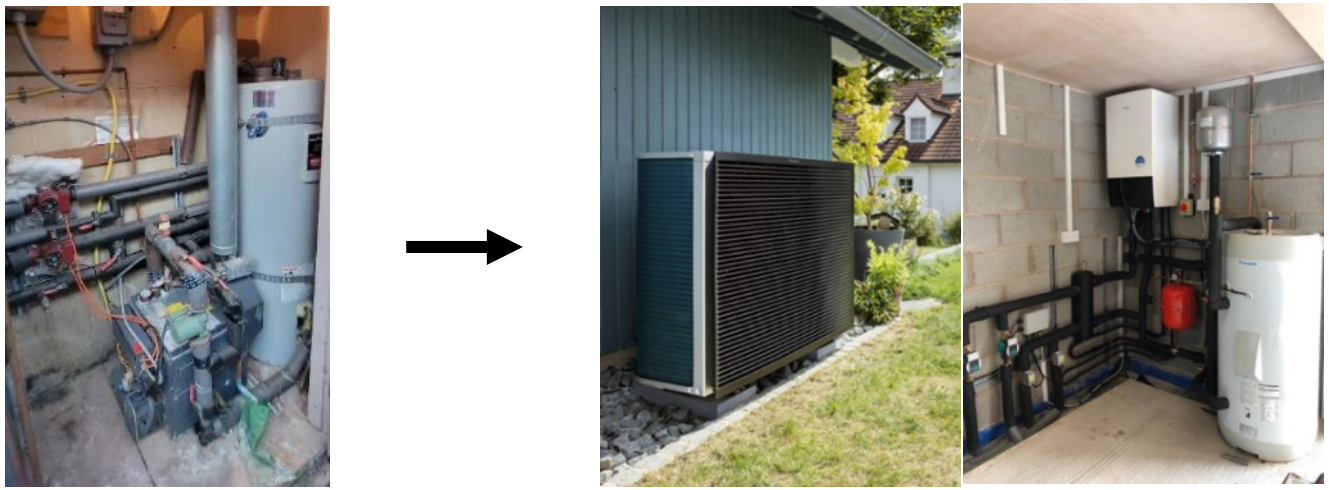
Silent comfort:
38 dBA at 10 ft and 35 dBA
in low sound mode



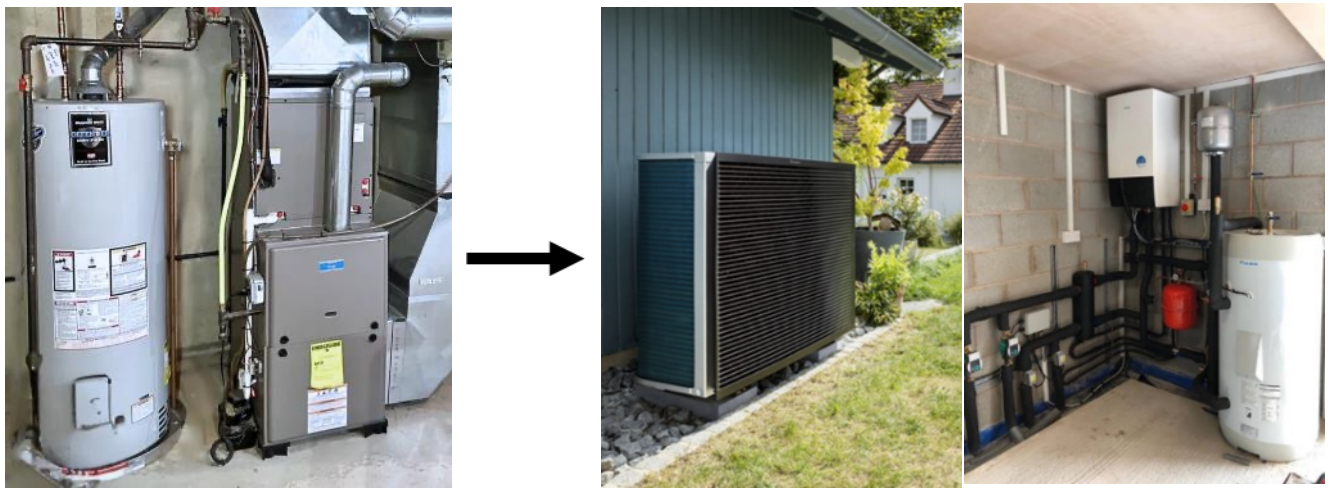
Up to 158°F / 70°C
Leaving Water Temp.

Ambient -18°F / -28°C

- Hydro-split: **all refrigerant contained outside**
- **No refrigerant work required**: "PLUMB n PLAY"
- One Solution – Multiple Combinations
- Best in class performance: COP, LWT, and ambient conditions
- For new buildings, retrofit, and low energy houses
- Timeless design and space-saving installation

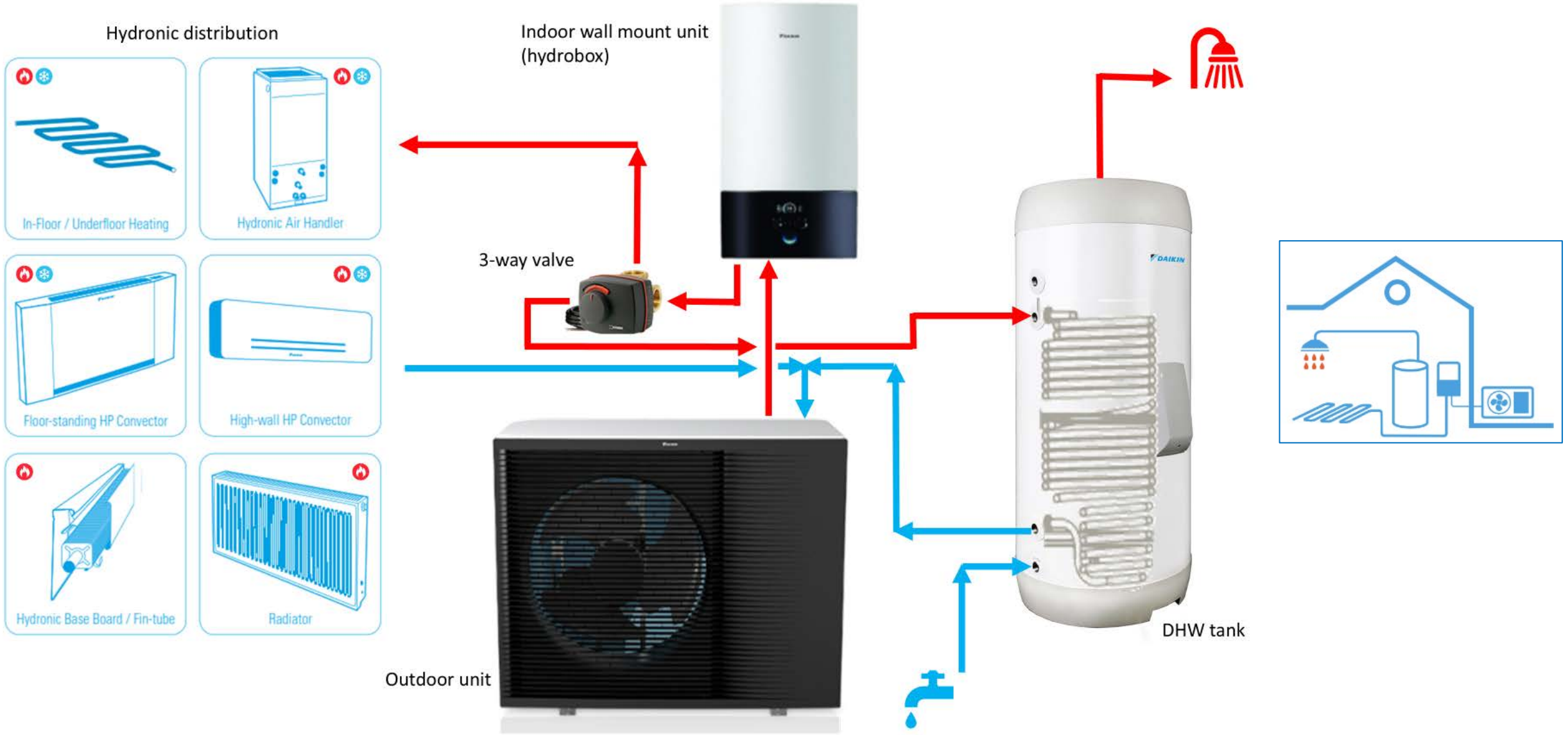


High heating capacities up to 158°F leaving water temperature
⇨ **The ideal boiler replacement**



Gas furnace, A/C unit, and Gas Water Heater replacement
⇨ **Whole home electrification**

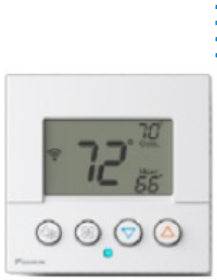
Daikin *ALTHERMA* 3 H HT | Schematic & Emitter options



Daikin *ALTHERMA* 3 H HT | Target Applications

(Combi) Boiler Replacement	Use existing **baseboard/radiators**	✓ ✓
	Use existing **baseboard/radiators + add heat pump convectors** (replacing window AC units or mini splits)	✓ ✓ ✓
	Use existing **in-floor/under-floor** radiant loop	✓ ✓
	Use existing **in-floor/under-floor** radiant loop **+ add heat pump convectors** (replacing window AC units or mini splits)	✓ ✓ ✓
	Replace existing hydronic loop with **heat pump convectors**	✓ ✓ ✓
Gas Furnace / Gas Water Heater Replacement	Replace gas furnace or hydro-air system with **hydronic air handler**, remove AC unit, and replace **DHW tank**	✓ ✓ ✓
New Construction	**In-floor radiant** loop, **heat pump convectors**, or a combination of both	✓ ✓ ✓
	Hydronic air handler for ducted applications	✓ ✓ ✓

Daikin *ALTHERMA* 3 H HT | Lineup



24V DaikinOne thermostat

- **D2271**

Indoor unit (hydro-box)

- **UTBX040EF6VJ**

- ❑ 33” x 17” x 15” (h x w x d)
- ❑ 40,000 Btu
- ❑ 6kW electric BACKUP heater (steps 2kW, 4kW, 6kW)

Outdoor unit

- **UPRA036DAVK**
- **UPRA043DAVK**

- ❑ 40” x 50” x 21” (h x w x d)
- ❑ 36,000 Btu
- ❑ 43,000 Btu

Indirect tank

- **UHWS40D3VJ**
- **UHWS50D3VJ**
- **UHWS80D3VJ**

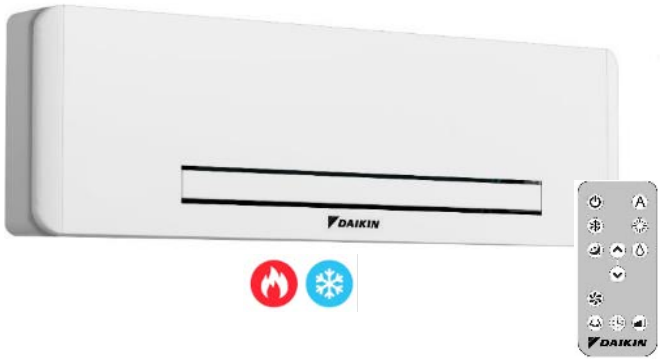
- ❑ 23” diameter
- ❑ 40 gal
- ❑ 50 gal
- ❑ 80 gal
- ❑ 3kW electric BOOSTER heater

Daikin *ALTHERMA* 3 H HT | Lineup

Floor standing heat pump convector

- **FWXV03ATSBUR**
- **FWXV05ATSBUR**
- **FWXV07ATSBUR**
- **FWXV03ATSBUL**
- **FWXV05ATSBUL**
- **FWXV07ATSBUL**

- ❑ 3,000 Btu
- ❑ 5,000 Btu
- ❑ 7,000 Btu
- ❑ Onboard controller, fully modulating fan speed, thermostat, and touch panel



High wall heat pump convector

- **FWXT03ATSBUCR**
- **FWXT05ATSBUCR**
- **FWXT07ATSBUCR**
- **FWXT03ATSBUCL**
- **FWXT05ATSBUCL**
- **FWXT07ATSBUCL**

- ❑ 3,000 Btu
- ❑ 5,000 Btu
- ❑ 7,000 Btu
- ❑ Onboard controller, fully modulating fan speed, thermostat, and IR remote control

Hydronic Air Handler

- ❑ Third party
- ❑ 4 capacity sizes from 18,000 – 60,000 Btu

Accessories: 2-way and 3-way motorized valves, and connection pieces






Daikin *ALTHERMA* 3 H HT

Elevate **Comfort**. Elevate **Quiet**. Elevate **Possibilities**

Edwin Reek
Director, Water Heating Solutions

DAIKIN COMFORT TECHNOLOGIES NORTH AMERICA, INC.
M: (281) 841-9192 | **E:** edwin.reek@daikincomfort.com

May 20, 2026

SPACE PAK®

Lessons from Experience:

Air-to-Water Application & Design for New England & Beyond

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Air-to-water heat pumps, what are they?

SpacePak's AWHP Innovation Leadership Timeline

single speed compressors

first governmental acknowledgement

variable speed compressors, higher efficiencies

2011

SpacePak introduces first Solstice AWHPs, "reverse-cycle chillers"

SE & SCM

2014

Launch of first cold climate model, the Solstice Extreme & SSIC integrated control

LAHP

2018

First State-Level Rebate Program

Efficiency Vermont

2019

DOE & EPA recognize Cold Climate AWHPs as Emerging Technology worthy of future Energy Star Program

ENERGY STAR 2019
Emerging Technology Award

2022

Launch of next-gen models - Solstice Inverter Series

And 10-year compressor warranty

SIM & SIS

2024

Launch of next-gen cold climate model, Solstice Inverter Extreme

ILAHP

higher water temps, lower GWP

market validation

federal performance standard, increased adoption, higher water temps & retrofits

2024

Launch of Solstice R32 Series

CC32

2026

Launch of Solstice R454B Series

(High Temp)

HP454B

2026

First Air-to-Water Heat Pump Summit hosted in Burlington, VT

Pending Milestones

ETA: 2027

Establishment of federal AWHP AHRI heating standard

AHRI CERTIFIED®
www.ahridirectory.org

ETA: 2030

Natural R290 refrigerant, high temperature heating

GWP = 3

"THE FUTURE PROOF SOLUTION"

LESSONS FROM EXPERIENCE

Why Water? The Most Flexible, Efficient & Future-Ready Solution

WHY WATER?

- Ultimate design flexibility
- Ease of zoning
  (limited only by one's ability to size systems)
- Water carries more BTUs
  (per physical pipe size)
- Integrates with existing
  hydronic, solar, geothermal
- Partial load capabilities
  (vary water temperatures and flows)
- Simpler maintenance
  Water vs DX... No reclaiming
- Not restricted in length and
  lift of line set (monobloc)
- Superior dehumidification

IDEAL DELIVERED WATER TEMPERATURES FOR HEATING & DHW

Modern hydronic systems are designed for ≤ 120°F supply water

80°F 90°F 100°F 110°F 120°F 130°F 140°F 150°F 160°F 170°F 180°F 190°F 200°F

OPTIMAL RANGE FOR AIR-TO-WATER HEAT PUMPS

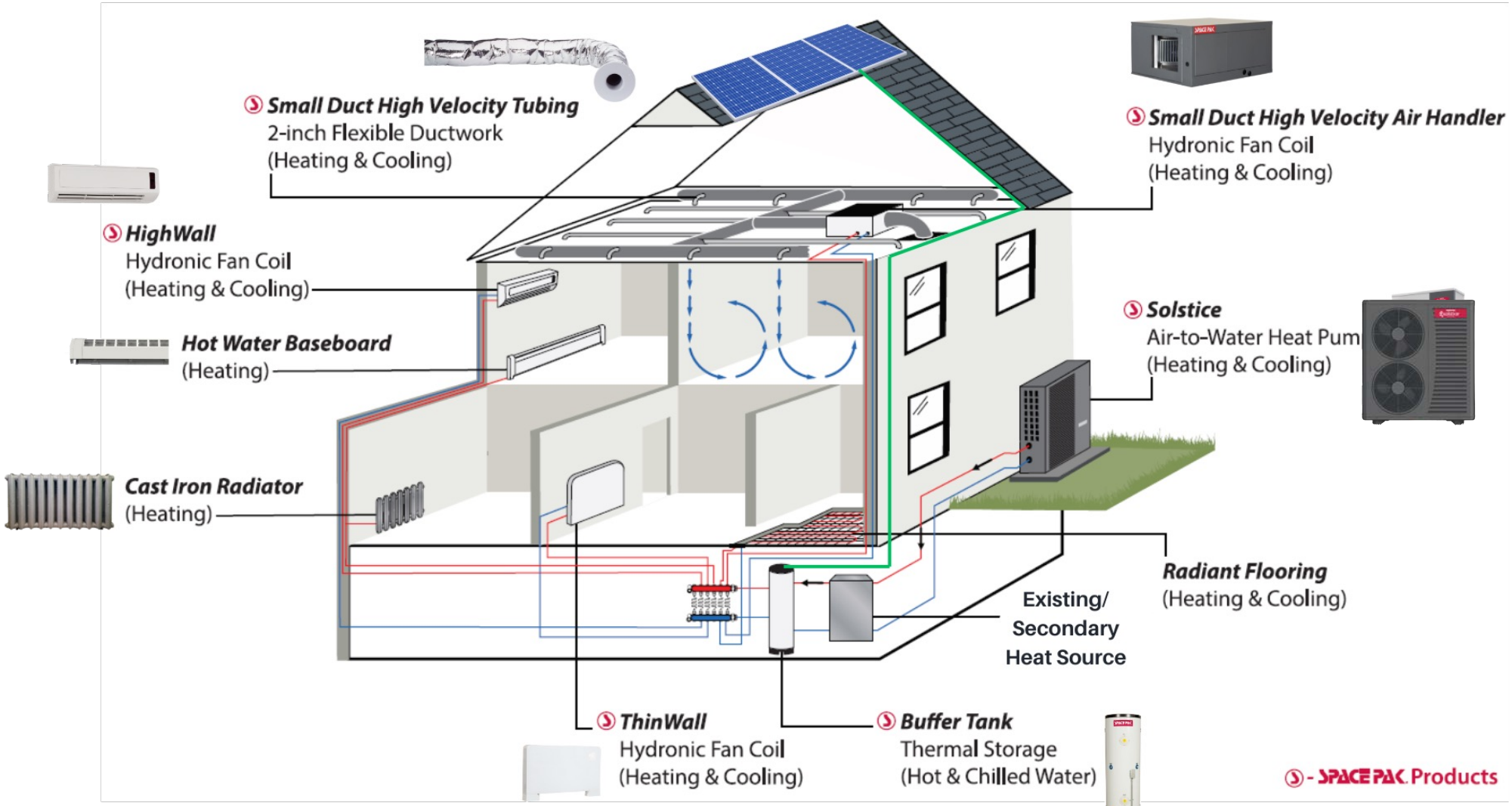
NOT RECOMMENDED FOR HEAT PUMPS

80°F – 140°F	140°F – 160°F (Supply Water Temperature)	160°F – 200°F
• Radiant floor heating (bare slab) • Covered heated slab • Thin slab radiant • Above-floor tube & plate • Underfloor tube & plate • Wall heating • Ceiling heating • Panel radiators • SpacePak WCSP air handler	• Panel radiators • High temperature fan coils • Hybrid retrofit systems	• Traditional cast iron radiators • Traditional fin-tube baseboard

SpacePak ATW Systems

- ✓ High efficiency in low temperature systems
- ✓ Capable of **delivering up to 150°F water**

Hydronics Offer Complete System Integration



SPACEPAK HYDRONIC SYSTEMS: DESIGNED FOR YOUR HOME. BUILT FOR THE FUTURE.

WILL THIS WORK IN MY HOUSE?

- New construction or retrofit
- Room-by-room load calculation (most important)
- Heat, cool, domestic hot water
- Hydronic or forced air
- Radiant, baseboard, fan coils, etc.
- Water temperature required to meet load
- Single source electric or dual fuel

APPLICATION EXAMPLES "VERSATILITY"

- Radiant heating/cooling
- Hydronic heating
- Forced air heating and cooling
- Centralized domestic hot water
- Snow melting
- Pool heating
- Dehumidification
  - Mushroom farms
- Process cooling
  - Milk processing & distilleries
- Projects with limited interior or exterior space
- Projects with exterior facade restrictions

UNLIMITED. DESIGN. FLEXIBILITY.

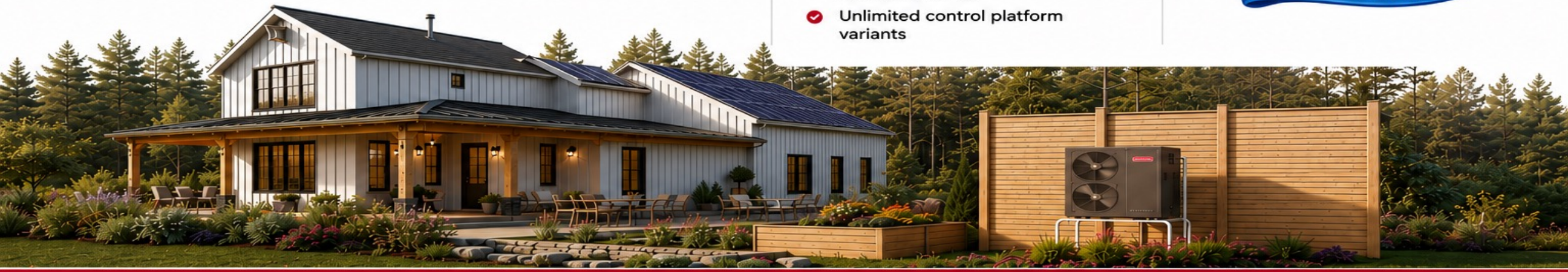
DESIGN FREEDOM AT IT'S FINEST.

- Heat, cool, domestic hot water from same outdoor unit
- Easy integration of thermal storage, solar and dual fuel back up
- Mix and match emitters: radiant, ducted forced air and ductless fan coils
- Remote mount up to 600 ft away (on roofs, under decks or below grade when rules allow)
- Superior dehumidification with chilled water
- Ideal for zoning and future expandability
- High performance heating down to -22°F
- Compatible with existing heating systems
- Ideal for curb appeal and historic districts
- Unlimited control platform variants

A FOREVER HOME SHOULD BE FUTURE-PROOF.

Is a system truly sustainable if it's vulnerable to future regulations?

Unlike traditional heat pumps, permanent hydronic distribution systems offer a safe and environmentally friendly option, meeting the standards of both today and tomorrow.

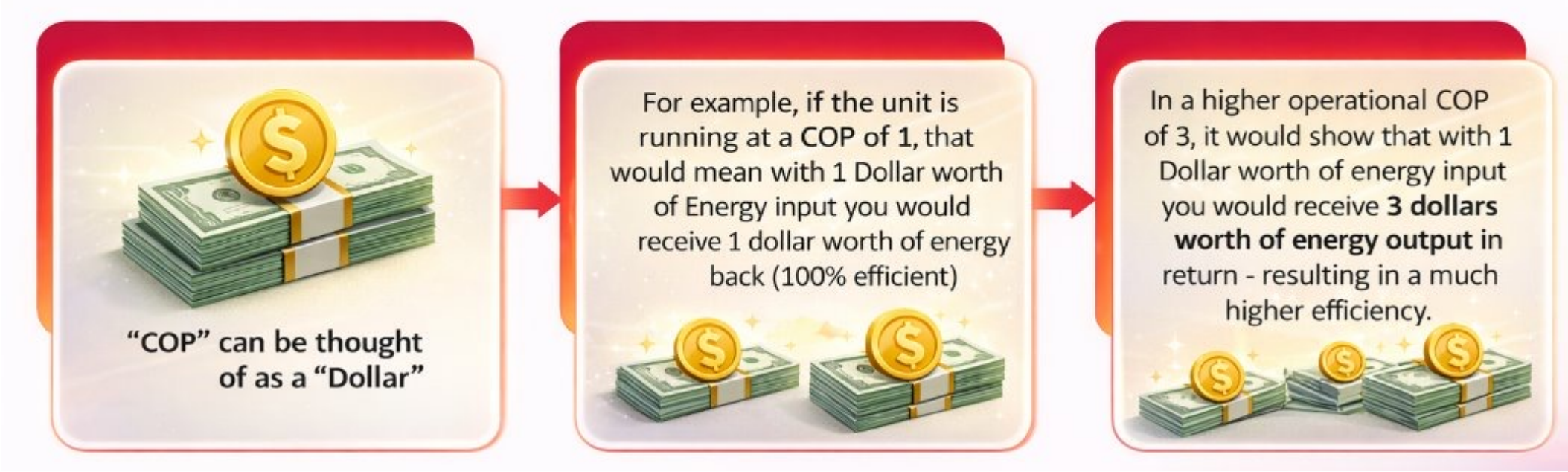


COMFORT TODAY. CONFIDENCE TOMORROW. | SPACEPAK.COM

“COP” The measure of efficiency in AWHP equipment

A COP is defined as the relationship between the power (kW) that is drawn out of the heat pump as heated or chilled water, and the power (kW) that is supplied to the compressor.

With variable-speed compressors and fans, paired with properly sized buffer tanks, these units are designed to operate at peak efficiency at all times.



SPACEPAK COLD CLIMATE HEAT PUMPS

High-Temp & Extreme Cold Performance • Heating & Cooling • Domestic Hot Water

SOLSTICE R454B SERIES

Cold Climate High-Temp Air-to-Water Heat Pump

PERFORMANCE & EFFICIENCY

- ✓ Reliable delivered water temperatures up to **150°F**
- ✓ High performance heating down to -22°F
- ✓ Low GWP R454B refrigerant with reduced refrigerant volume
- ✓ Improved operating efficiencies and system performance

ADVANCED SYSTEM DESIGN

- ✓ Inverter-driven EVI compressor technology
- ✓ Future-proof monobloc design
- ✓ Flexible installation — unit placement up to 600 ft from building

QUIET OPERATION

- ✓ One of the quietest units in the market
- ✓ 43 dB(A) sound level at 3 ft

Model Capacity	Heating Capacity (BTU/h)
3.5 Ton	8,000 – 46,000
5 Ton	12,000 – 73,500

Intuitive Touch Screen Control

SOLSTICE R32 SERIES (CC32)

Cold Climate Air-to-Water Heat Pump

COLD CLIMATE PERFORMANCE

- ✓ Available in 3 system sizes
- ✓ Monobloc design – eco-friendly & future-ready
- ✓ Heating, cooling, and domestic hot water capability

EXTREME COLD PERFORMANCE

- ✓ Reliable heating operating down to -22°F (-30°C)
- ✓ Water supply temperatures exceeding 140°F (54°C)

ENVIRONMENTAL ADVANTAGES

- ✓ ODP = 0 (Zero Ozone Depletion Potential)
- ✓ Low GWP refrigerant (R32 – GWP 675)

ULTRA-QUIET OPERATION

- ✓ As low as 41 dBA @ 1 meter (CC32-18)

	CC32-18	CC32-40	CC32-60
Cooling	1.5	3	4.3
BTUh	22,827	41,219	70,461

Integrated system controls & monitoring

SPACEPAK HYDRONIC SYSTEM SOLUTIONS

High-Efficiency • Hydronic-Based • No Refrigerant • Heating & Cooling

STAINLESS STEEL BUFFER TANKS

Built-In Electric Backup

- Stabilizes system water volume
- Reduces heat pump short cycling
- Improves overall efficiency
- Integrated electric backup heat (3 kW standard)
- 304 Stainless Steel Inner Tank
- Galvanized Steel Outer Jacket
- High-Density Polyurethane Foam Insulation
- Four-Port Open Tank Design
- Available Sizes: 13, 26, 40, 80, 119 Gallons (Max Flow: 36–60 GPM depending on model)
- 10-Year Warranty

HIGHWALL FAN COIL (HW)

Hydronic Heating & Cooling

- Hydronic Based – No Refrigerant
- EC Motor with Step-Less Speed Modulation
- Auto-Swing Damper for Uniform Air Distribution
- Whisper Quiet (33–58 dB)
- Operates with water temps as low as 120°F for heating and up to 50°F for cooling
- Stainless Steel Flexible Hose Connections
- Condensate Drip Pans for Chilled-Water Applications
- Heating Capacity: 8,100 – 25,700 BTU/h
- Cooling Capacity: 7,300 – 13,100 BTU/h
- 5-Year Warranty

THINWALL FAN COIL (HTW)

Hydronic Heating & Cooling

- Hydronic Simplicity – No Refrigerant
- Low Water Temperature Operation
- Heating water temps down to 120°F
- Cooling water temps up to 50°F
- Tempered Glass Front with Touch Screen Display
- Whisper-Quiet Operation
- Space-Saving Slim Profile
- Cross-Flow Blower with Integrated Air Guiding Technology
- ECM Blower Motor
- Heating Capacity: 8,700 – 32,000 BTU/h
- Cooling Capacity: 3,400 – 14,800 BTU/h
- 5-Year Warranty

HYDRONIC AIR HANDLER (WCSP)

- Hydronic Air Handler for Heating & Cooling Systems
- Multiple Sizes for 2 to 5 Nominal Tons
- High-Performance Blower
- Low Static Operation
- Easy Installation & Service Access

HIGH EFFICIENCY

Advanced EC motors and hydronic technology for maximum comfort and energy savings.

QUIET OPERATION

Whisper-quiet performance for residential and light commercial applications.

RELIABLE & DURABLE

Built with quality components and backed by industry-leading warranties.

SPACEPAK SYSTEM SOLUTIONS

High-Performance Equipment • Advanced Control • Built for Reliability

SOLSTICE STAND

Stronger Support. Elevated Performance.

500 POUND CAPACITY
Built to support heavy-duty systems.

VIBRATION DAMPENING MOUNTS
Reduces vibration for quieter operation and longer life.

DURABLE CONSTRUCTION
Extruded aluminum with a powder coated finish.

12 INCH HEIGHT
Keeps your system elevated for proper clearance & drainage.

FULLY ADJUSTABLE LEGS
Level on any surface with secure, adjustable support.

ADJUSTABLE LEGS
Secure, level support on any surface.

EXTRUDED ALUMINUM
Strong, lightweight, and built to last.

VIBRATION DAMPENING MOUNTS
Engineered to minimize noise and protect your system.

FEATURES & BENEFITS

- 500 pound capacity
- Vibration dampening mounts
- Extruded aluminum construction
- Powder coated
- All necessary hardware included
- 12 inch height off ground
- Maintains SpacePak minimum requirements
- Specifically designed for larger footprint of Solstice heat pumps
- Color matched to Solstice heat pumps
- Fully adjustable legs
- Made in the USA

SOLSTICE STAND
45ACSSTAND-12

MADE IN THE USA

SPACEPAK SYSTEM INTERFACE CONTROL (SSIC)

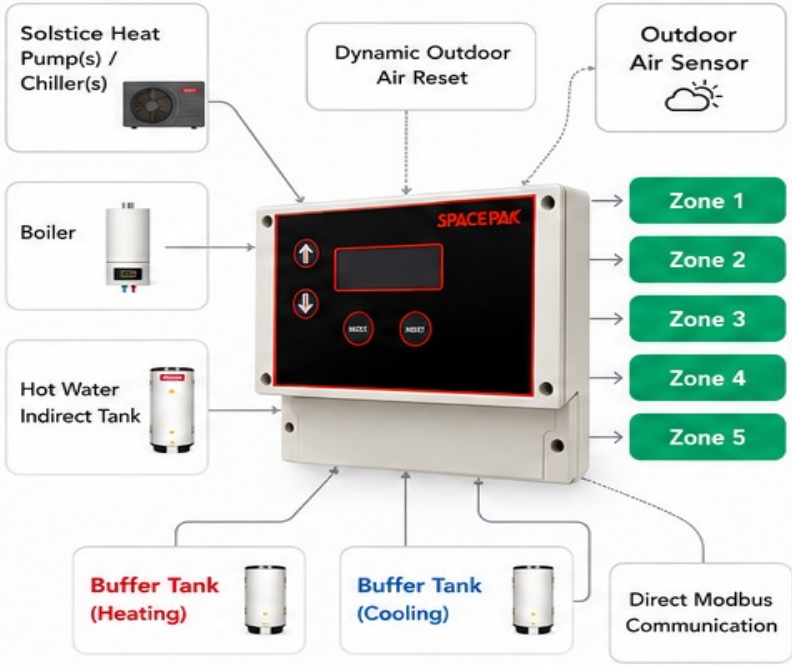
Smart Control. Maximum Flexibility.

SIMULTANEOUS CONTROL
of Hot & Cold Storage Tanks

STAGING & UNIT ROTATION
Support for up to 20 Solstice Units
x20

MULTIPLE RUN MODES
OA Switchover | Buffer Tank Priority
Boiler Help | Master Zone

MULTI-ZONE CAPABILITY
Up to 5 Inputs –
Flexible system design



COMPATIBLE WITH

Radiant Floors / Panels | Ducted Air Handlers / Fan Coils | Ductless Fan Coils | Panel Radiators | Baseboard | Convectors

Controlling Hybrid Systems

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RTFM
SPACE PAK

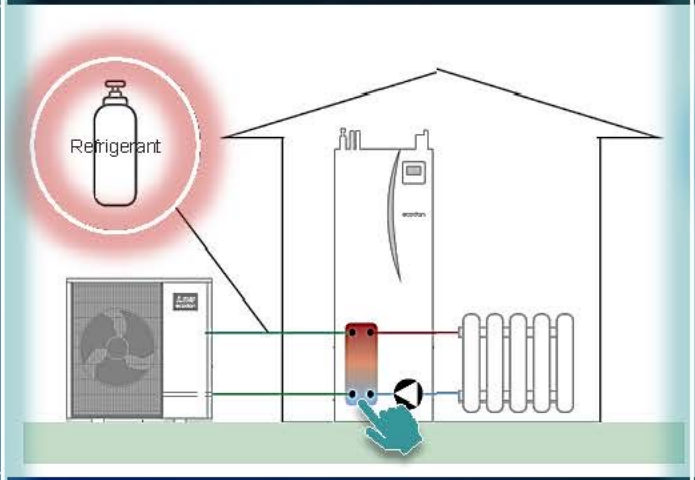
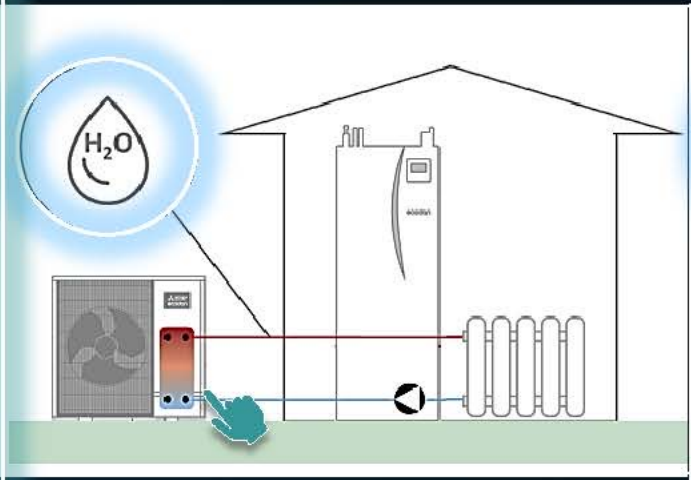
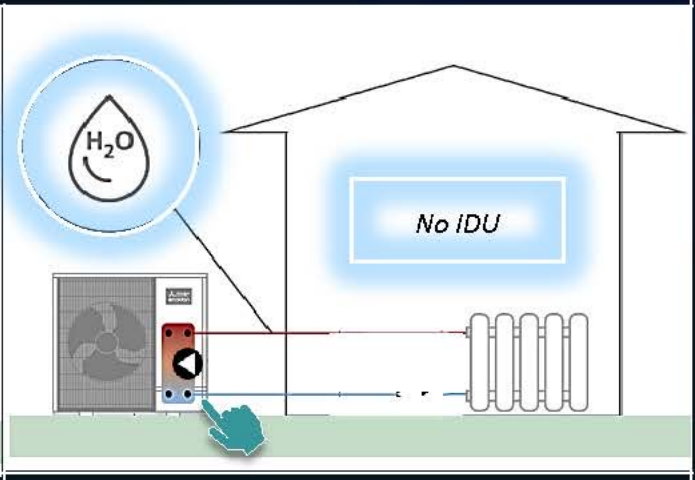
Thank you!

MITSUBISHI ELECTRIC TRANE HVAC US

Limitless

AIR-TO-WATER HEAT PUMPS

Types of Air-To-Water Heat Pump Systems

MELSHI category	Refrigerant-Split = Ecodan	Hydro split (Packaged)	Monobloc
Commonly called	Split	Packaged / Monobloc	
			
Piping connection	Refrigerant	Water	Water
HEX	Indoor unit	Outdoor unit	Outdoor unit
Pump	Indoor unit	Indoor unit	Outdoor unit

TYPES OF ATW SYSTEMS: SPLIT VS MONOBLOC

Ecodan Refrigerant-Split System

Less heat loss
- Smaller pipes = less surface area = less heat loss

Longer max piping length: up to 164ft

Vertical piping feasible up to 100ft max height
- Suitable for multi-family buildings

No water to freeze between IDU and ODU
- Refrigerant piping

Self-sufficient system include key water circuit components
- Pumps, expansion vessel, booster heater
- Indoor commissioning and service in a warm environment

Tailored to HVAC contractor: *Refrigerant piping + water piping*

Hydro-split and Monobloc System

Higher Heat loss
- Larger pipes = larger surface area for heat to escape

Large pumps required to extend piping

Vertical separation is difficult/requires many pumps

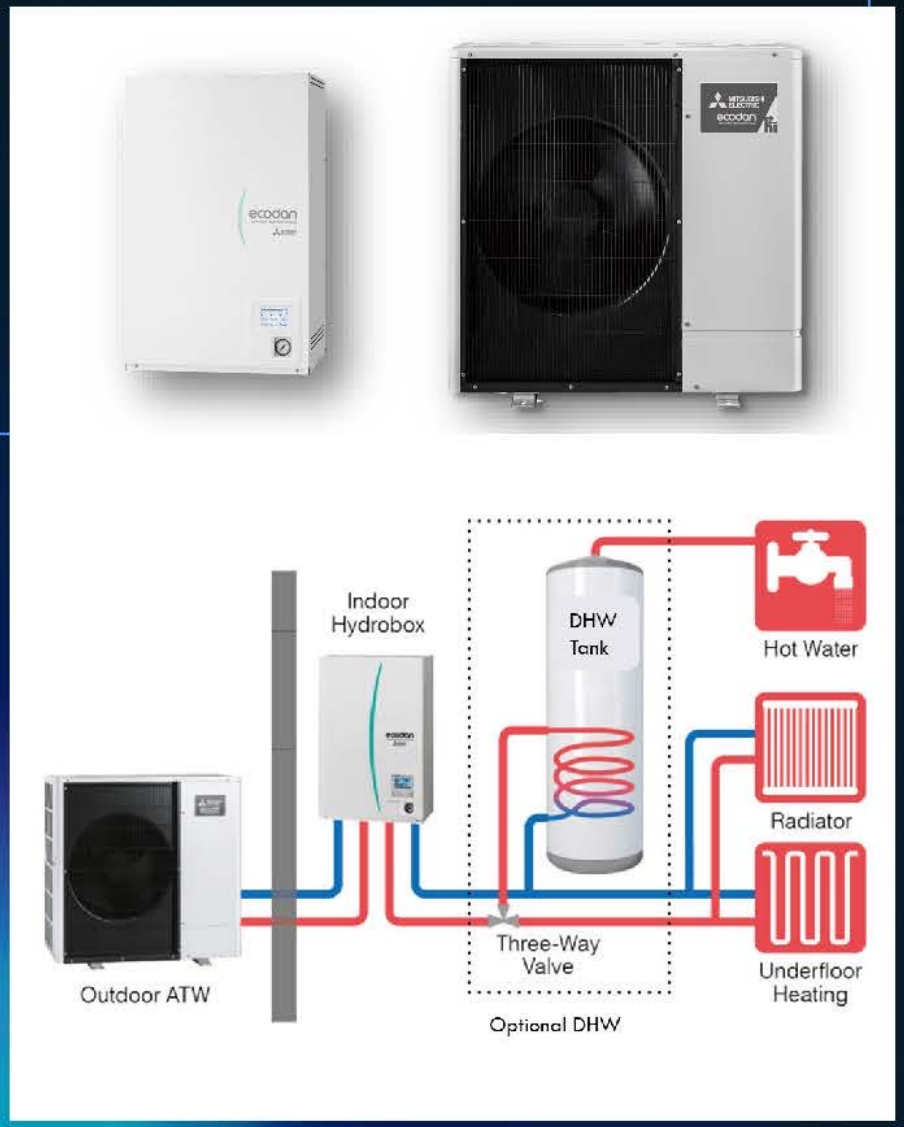
Water pipes are prone to freezing
- Glycol is needed: messy, causes pump issues/seal damage, costly
- Heat trace on pipes is costly

Some components may be included in the outdoor unit or need local supply
- Service and repair must be conducted outdoors even in cold conditions.

Tailored to plumber: *Water piping only*

ecodan ATW Heat Pump Product Overview

New



- Refrigerant Split System (R32 refrigerant)
- 3-in-1: Hydronic heating, cooling, and Domestic Hot Water
- 2-ton, 3-ton, and 4-ton capacity line-up
- Hyper Heating technology with heating operation down to -22F and 100% heating capacity at 5F
- Heating: Max flow temperature: 158F (even at low ambient temperatures)
  Cooling: Min flow temperature: 41F
- All-in-one Hydrobox: Includes all of the key water circuit components: pump, expansion vessel, magnetic filter, booster heater, and plate HEX
- Boiler interlock with smart auxiliary/back-up control
- User friendly controller with multiple inputs/outputs to control 3rd party components
- Whisper silent operation

ecodan PRODUCT OVERVIEW

Outdoor Unit

- WUZ-SA24NMZ
- WUZ-SA36NMZ
- WUZ-SA48NMZ

Indoor Unit Hydrobox

- ERSF-NM6E

Indirect tank
(highly recommended)

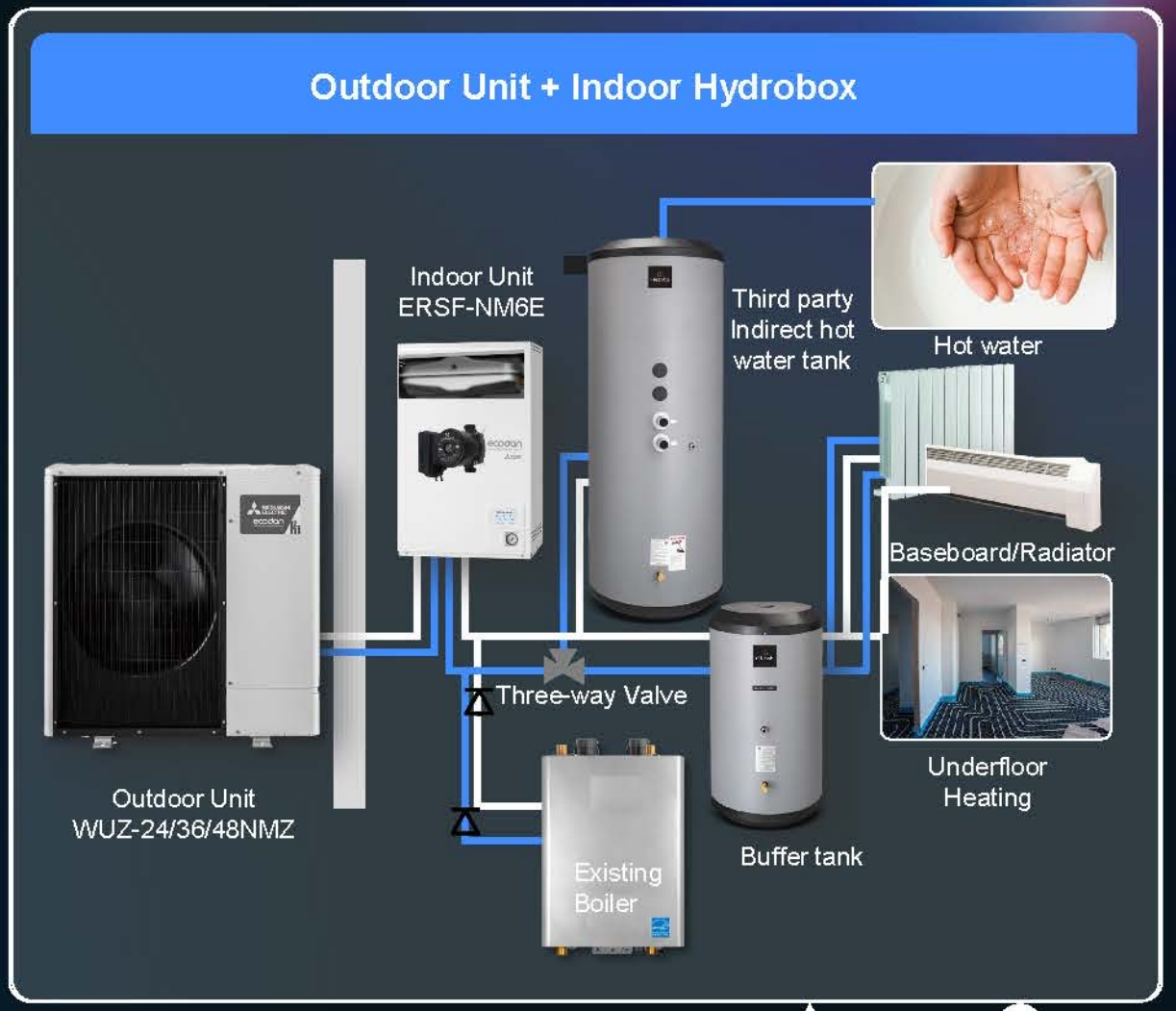
- ME-60-HO
- ME-60-HO-H
- ME-85-XHO
- ME-85-XHO-H

Buffer tank*

- Capacity is based on Application needs

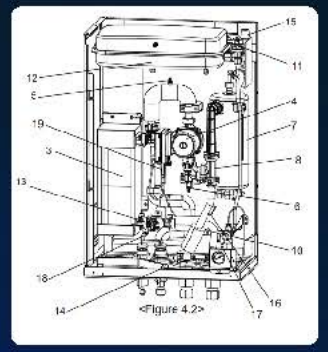
*Buffer tanks are not supplied by METUS.
METUS recommends buffer tanks for all retrofit applications:

- Provides hydraulic separation (easier to troubleshoot)
- Prevents short cycling (helps in new construction too)



Hydrobox Unit Components

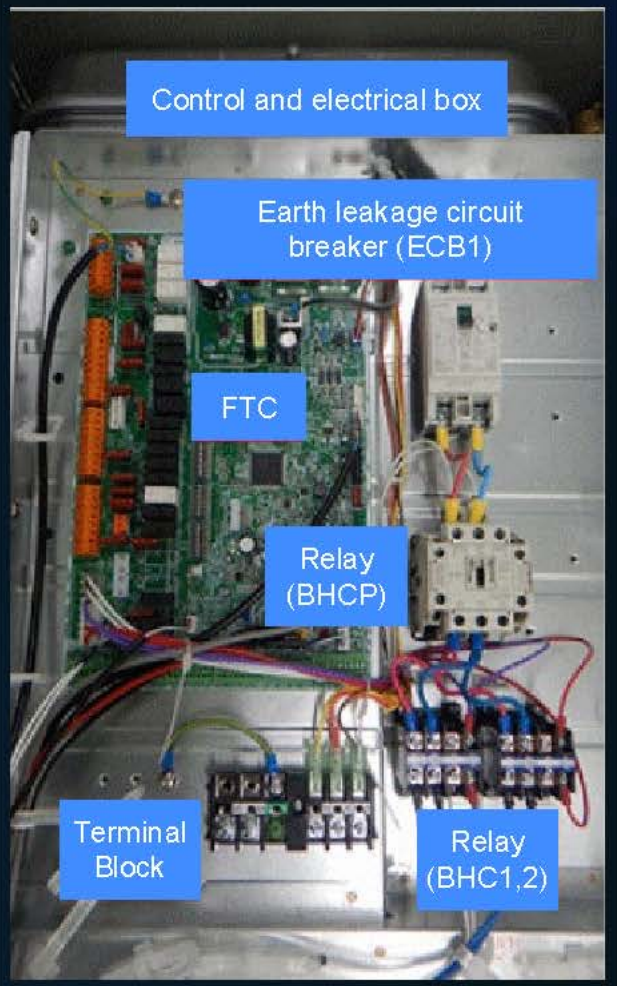
Hydrobox : All-in-one Solution

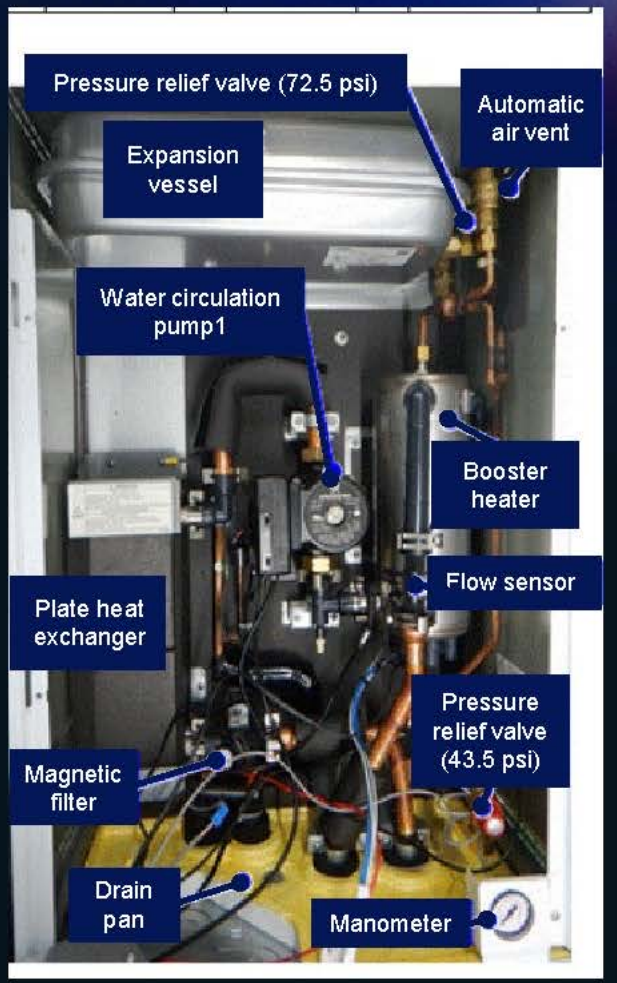


Plug and play solution

Easy installation and maintenance
- All-in-one Compact Hydrobox
- Front-accessible components

Easy to Set-up and Manage Controls
- Intuitive color remote controller





ecodan System Function Overview: FTC = the Brain

Outdoor

FTC

Output signal

3-way valve, etc

Remote Controller

Input signal

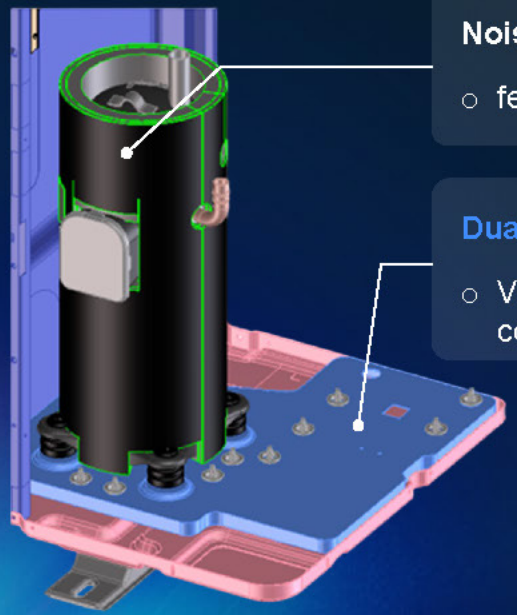
Thermistor, Room thermostat, etc

MITSUBISHI ELECTRIC TRANE HVAC US

ecodan® OUTDOOR UNIT DESIGN

Dual Anti-vibration and 6-layer sound jacket

Anti-vibration structure contributes to reduced operating noise and achieves whisper silent operation (43 dbA)



Noise reduction insulation

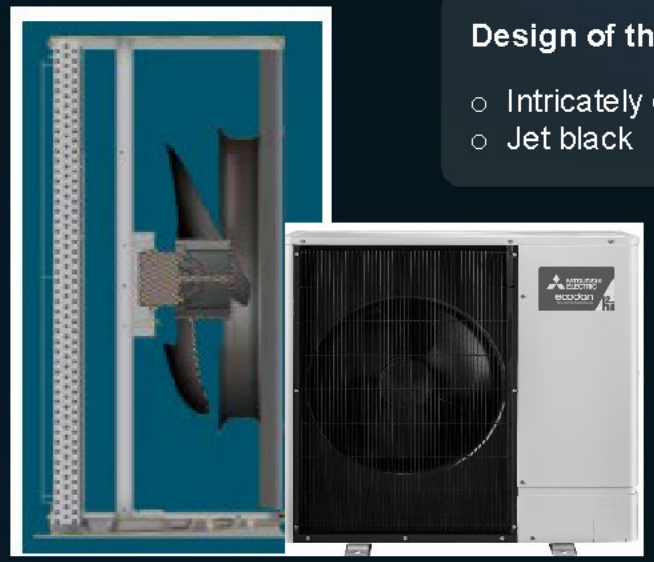
- felt x 3 & rubber x 3 (6-layer structure)

Dual anti-vibration measures

- Vibration dampener systems on compressor and bottom plate

Cabinet designed for silent operation

The elegantly designed outdoor unit, with its discreetly tucked-away fan, blends in with the ambiance.



Design of the grill

- Intricately designed tight mesh
- Jet black

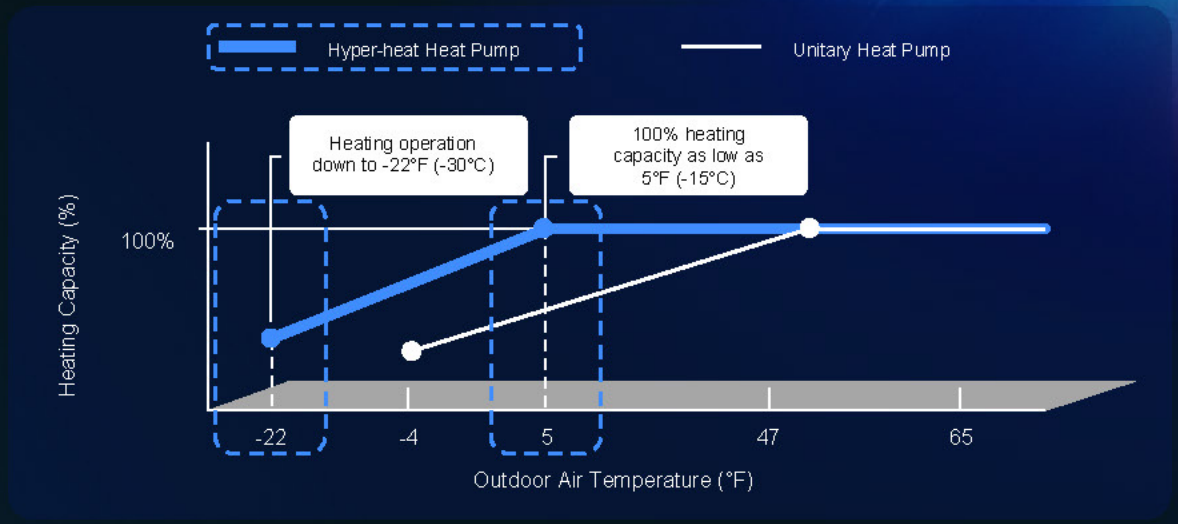
Larger fan

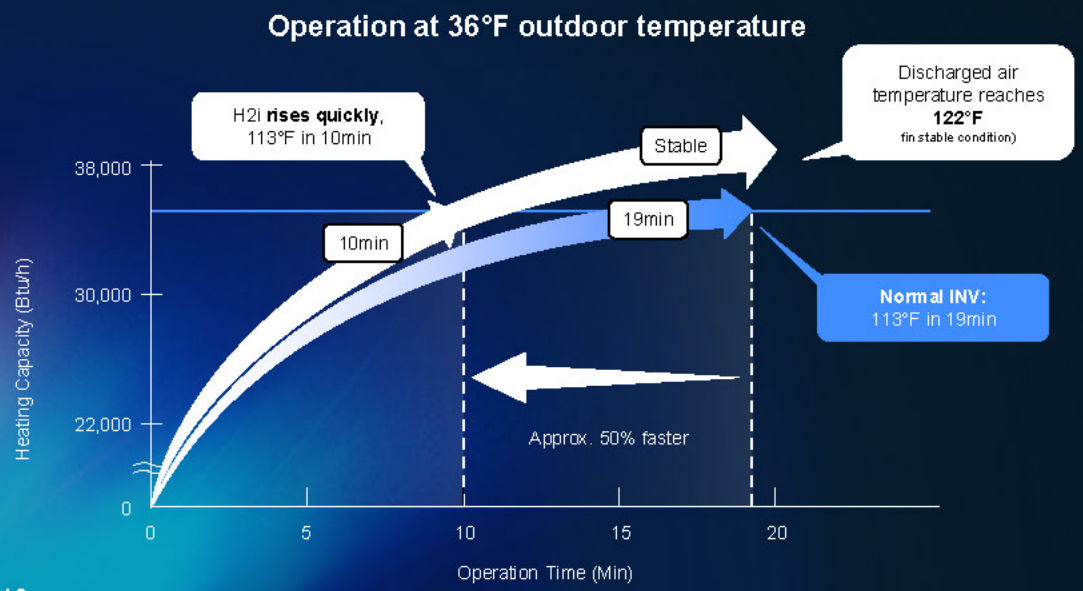
- Optimized bell-mouth
- Low fan speed to reduce noise while maintaining airflow/HX

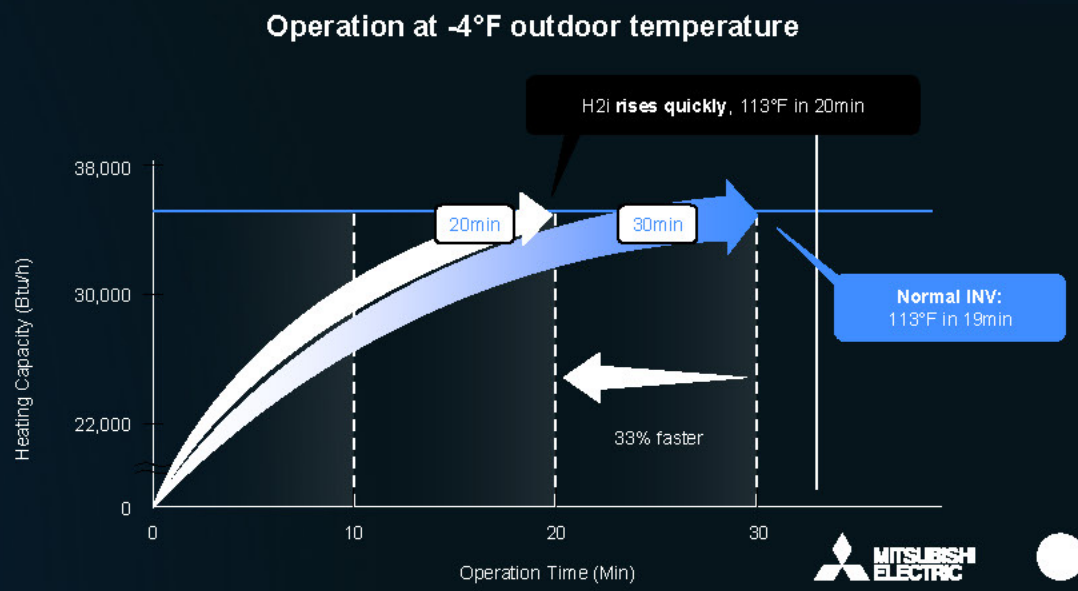
Mitsubishi Electric Key Technology: Hyper-Heating

Benefits of Flash Injection:

- Achieve set point temperature faster
- No oversizing
- Maintains efficiency
- Faster recovery after defrost cycle
- No overheating of compressor







MITSUBISHI ELECTRIC TRANE HVAC US

ecodan BENEFITS OF THE ECODAN SYSTEM

- Hyper heating
  100% heating at 5F
  Guaranteed to -22F
- High water flow temperature (158F/70C)
  Cold water flow temp (41F/5C)
- Efficient, high COPs
- Boiler interlocking control
- FTC: Smart Controller with multiple inputs/outputs to control 3rd party components
- Easy to Set-up and Manage Controls (Intuitive remote controller)

- Simplified installation “All-in-one” Hydrobox Solution
- 3-in-1: Heating, cooling and DHW
- Very quiet
- Magnetic filter,
  protects the HEX and Pump
- Aesthetically pleasing design (IDU and ODU)
- No glycol

WHY AIR-TO-WATER HEAT PUMPS?

The case for ATW heat pumps…

Fossil Fuel Bans
- Strong state & consumer interest in sustainability & resiliency

Building Energy Codes
- Lower design heating loads (25-40 to 10-15 Btu/hr/ft2)

Discernment in Comfort
- Significant % of homeowners dissatisfied with the comfort of their current HVAC system

Electrification
- Strong interest in “net zero” homes/buildings
- All electric w/ solar PV systems
- Clean Energy Generation/Grid Resiliency

Interest in Indoor Environment Quality
- No off-gassing/fumes/CO concerns

Extensive ATW Heat Pump Incentives
- $400 – $2,000/ton
- Up to $10,000/system

MITSUBISHI ELECTRIC TRANE HVAC US

Limitless

Thank You!