



# BUILDING ELECTRIFICATION WITH GEOTHERMAL HEAT PUMPS



YOUR PRESENTER TODAY

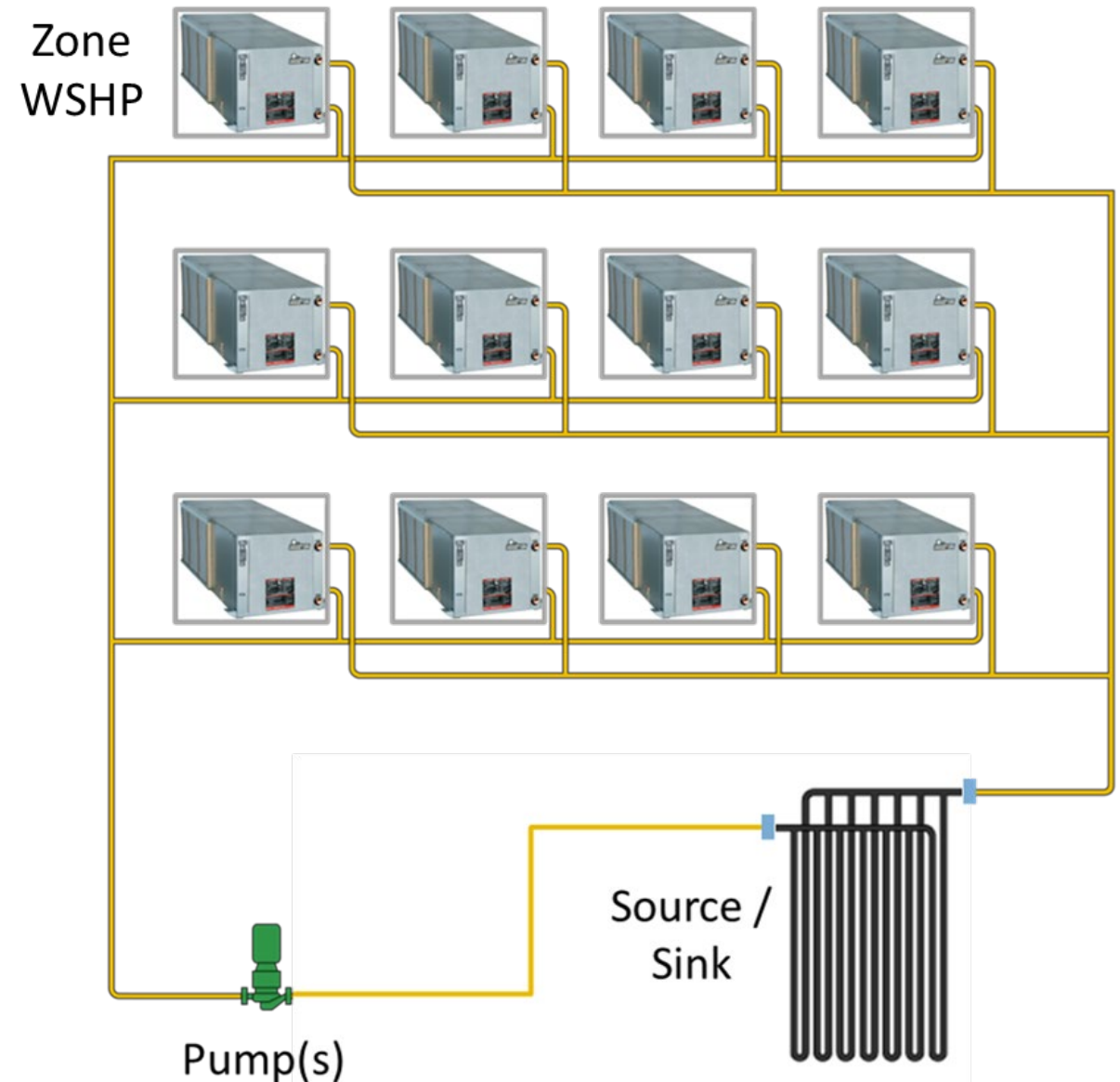
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# WHAT ARE WATER SOURCE HEAT PUMP SYSTEMS?

- Water Source Heat Pump (WSHP)
- Water Loop Piping
- Water Loop Circulating Pump
- Heat Source
- Heat Sink
- Building and Room controllers



# BENEFITS OF WATER SOURCE HEAT PUMPS

## High Efficiency Operation

Heat pumps operate at extremely high efficiencies

No part-load degradation of central systems

No reheat required

Low fan power

## Independent Zone Comfort Control

Zones can heat or cool on demand, during or after hours, regardless of season, regardless of what other zones are doing. Individual units can serve zones from 200 to 10,000 square feet in size.

## Heat Recovery

Heat is recovered in the closed-loop. Water loop recovers, stores, and recycles wasted energy

## Flexible

Units can be easily moved to accommodate changing requirements

## Units can be Individually Metered

Each tenant pays for what is used

## Defer Construction Costs

Can install most zone units when space is finalized during tenant finish

## Simple 1 or 2-pipe Water Loop

Usually does not require insulation, 1-pipe applications increasing

## Long Equipment Life

Factory-sealed systems, Indoor installation and Moderate loading versus ASHP

## Simple Controls

Can be as simple as a basic thermostat per unit

Easily adapts to cloud-based EMS or BMS control

## Self-Contained Compact Units

Can be hidden within ceilings, installed in closets, or floor mounted

Quiet operation even in exposed applications

## Small Mechanical Rooms

Maximizes rentable space

## No Chillers, Large Central Station AHUs, RTUs, Condensing Units

No operating engineer required

Improves architectural aesthetics and radiated sound

## Redundancy

Failure or maintenance activity on one unit does not affect any others

## Simple Maintenance

Uncomplicated units are easy to service or remove and exchange if required

## Low Installation Costs

4-pipe performance at 2-pipe costs. Easier to design and less complicated to commission

## Simple Low-Pressure Duct Systems

Air is not mixed between zones

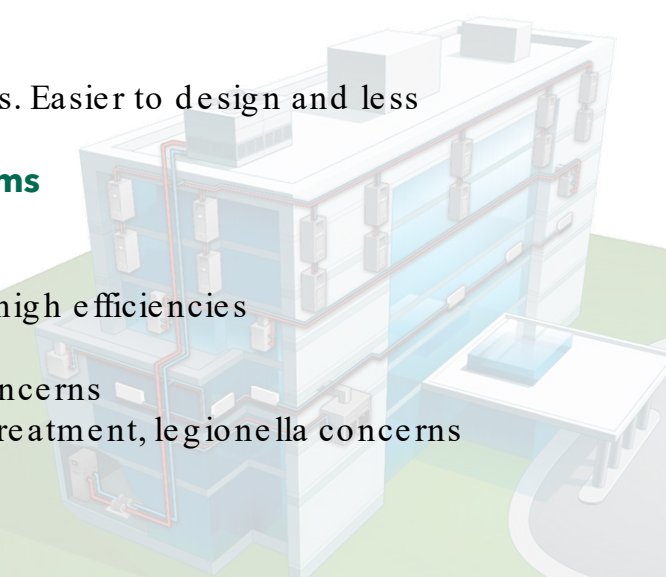
## Can Utilize Geothermal Energy

Heat pumps operate at extremely high efficiencies

No fossil fuel input

No sound and vibration control concerns

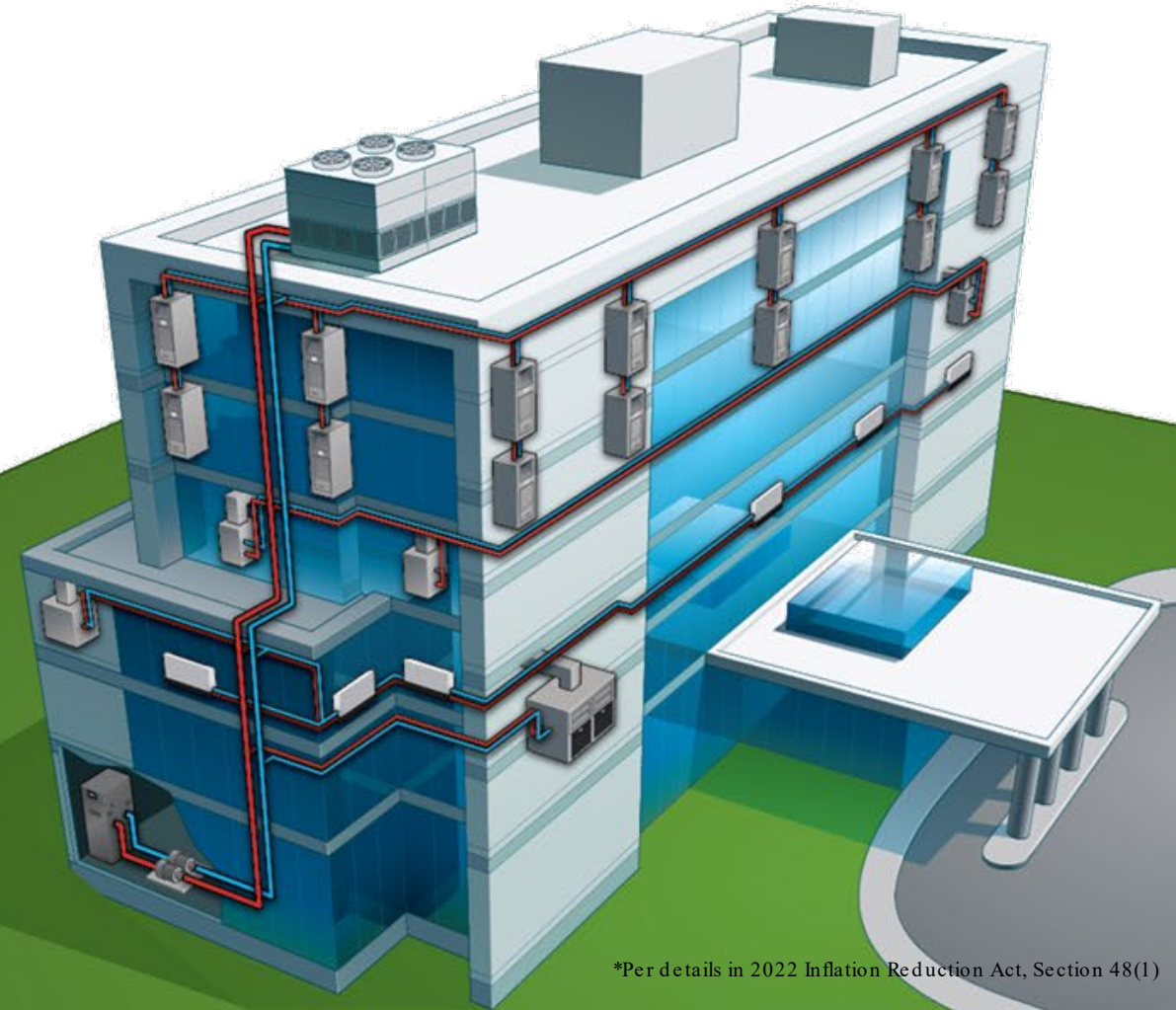
No water consumption, chemical treatment, legionella concerns





# KEY ADVANTAGES OF WATER SOURCE HEAT PUMPS

- ✓ **Independent Zone Control, Service, and Energy Metering**
- ✓ **Unaffected by Outdoor Weather Conditions**
  - ✓ **Water Side Heat Recovery Efficiency**
- ✓ **Packaged Systems With Small Refrigerant Charge**

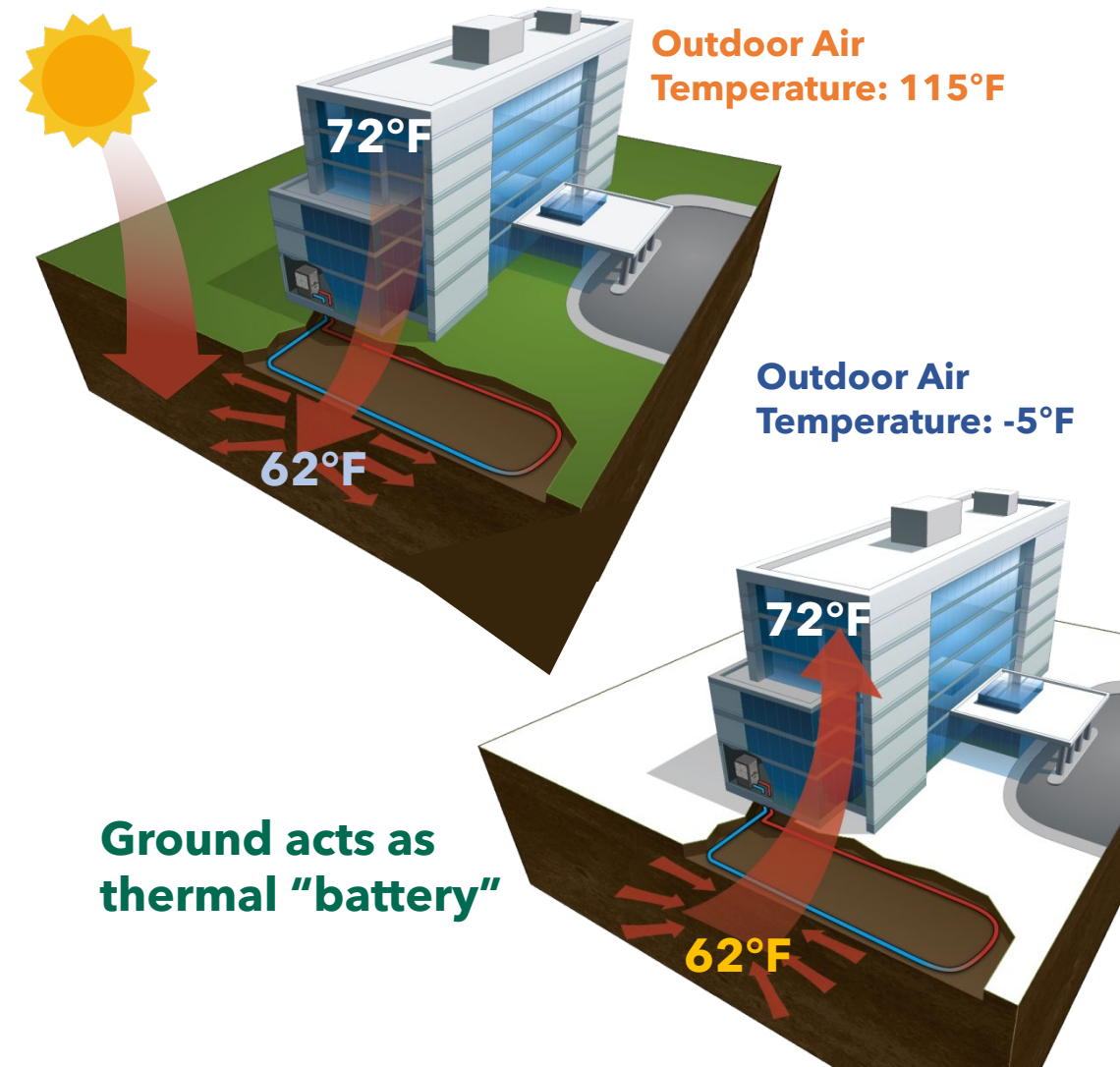


# GROUND SOURCE LOOP HEAT PUMP

- ✓ **Eliminate Cooling Towers**
- ✓ **Fossil Fuel Free Heating**
- ✓ **Ultra-Efficient Cooling and Heating Solution**
- ✓ **Eligible for 2022 IRA Federal Tax Credits**

(up to 50%+ of total GHP system cost\*)

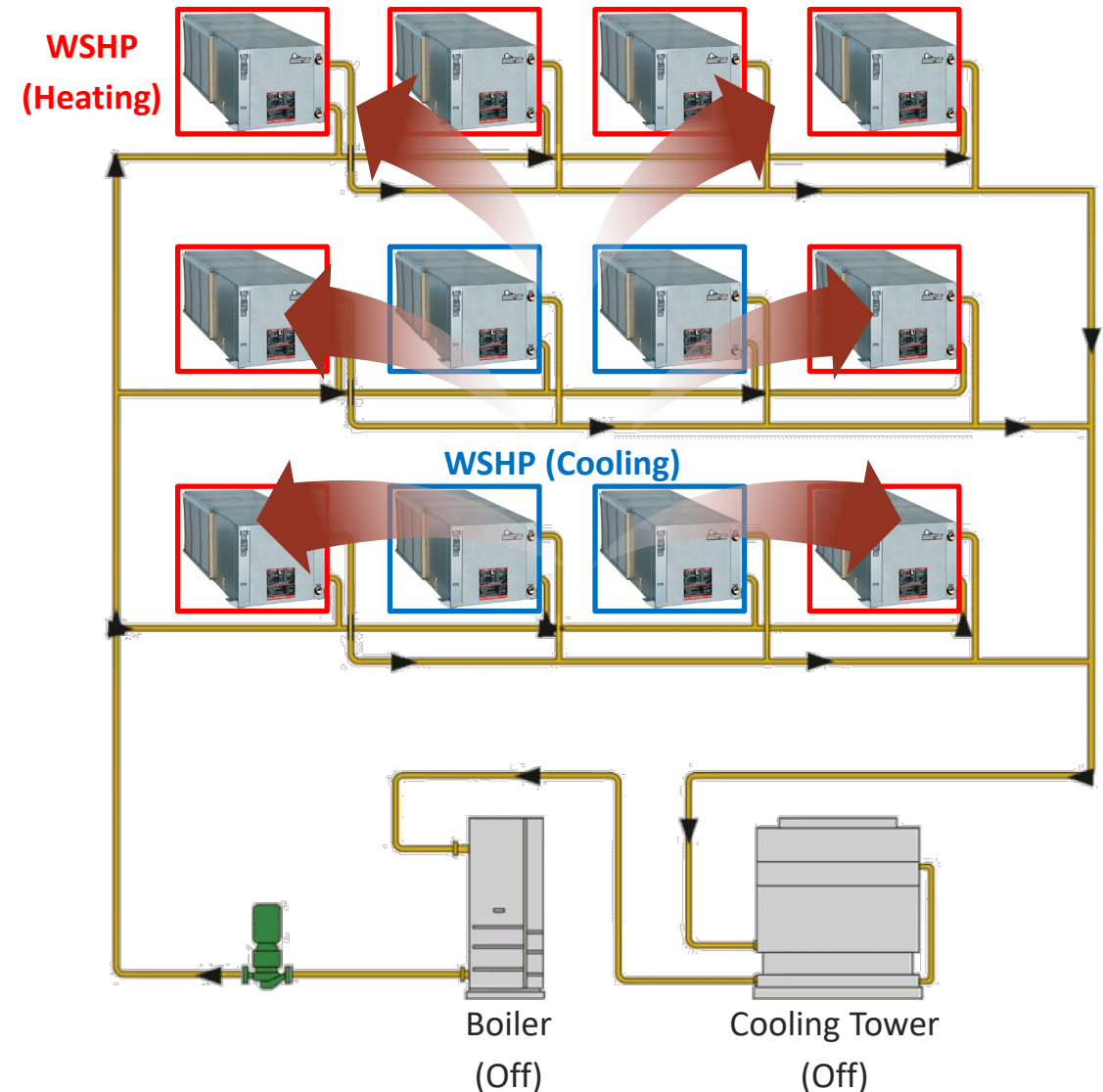
\*Per details in 2022 Inflation Reduction Act, Section 48(1)



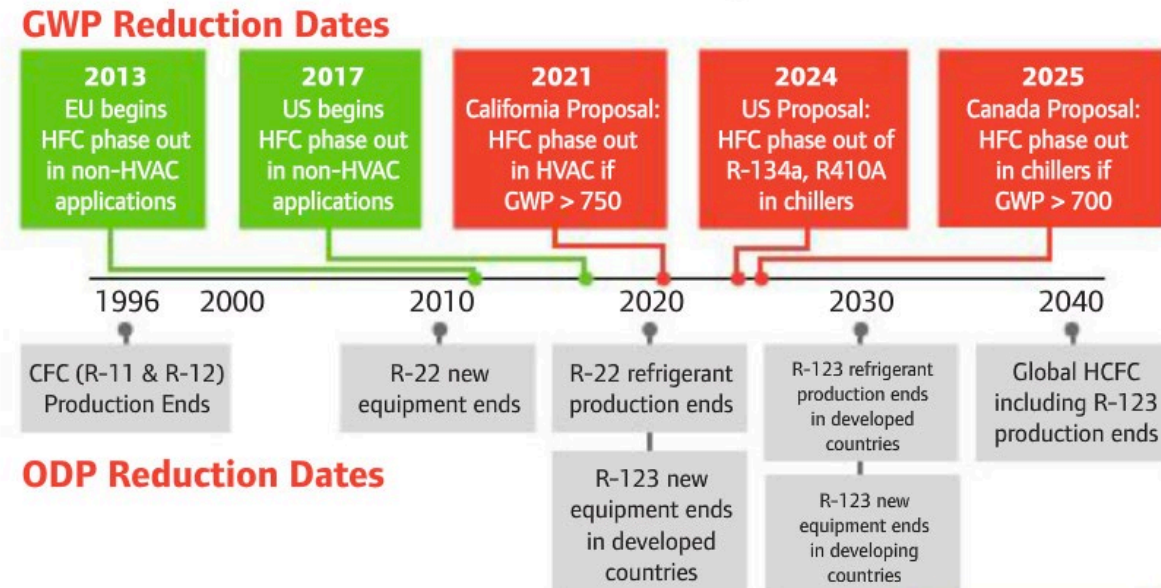
# WSHP SYSTEM HEAT RECOVERY OPERATION

- Building core zones will require cooling due to internal heat gains. These WSHPs will be in **cooling mode**.
- Perimeter building zones will require heating. These WSHPs will be in **heating mode**.
- Heat is being simultaneously rejected into and extracted from the water loop.

**Energy Recovery within the water loop minimizes boiler and heat rejector operation and provides maximum efficiency.**

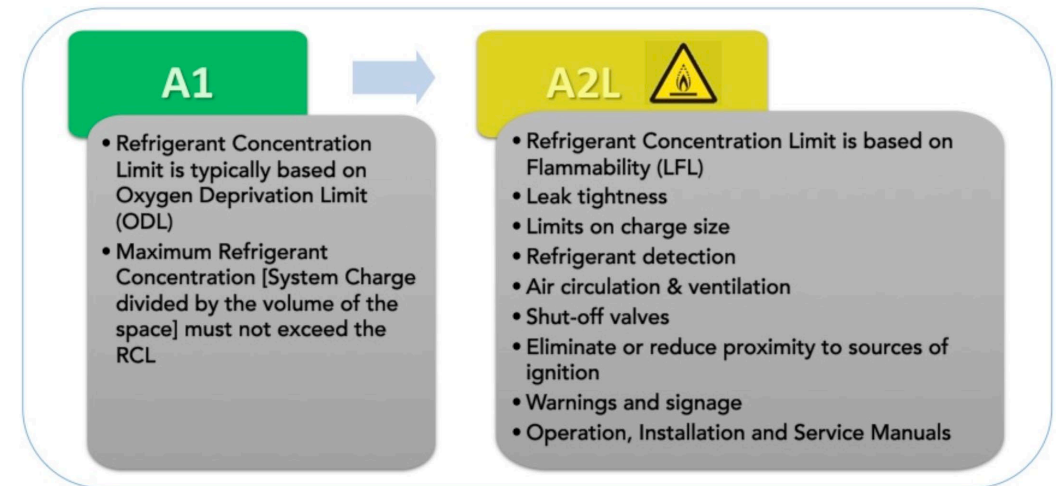


# CHANGES IN REFRIGERANT



A2L Refrigerants will require different risk mitigation methods for refrigerant leaks.

Future refrigerant options will most likely be Flammability Class 2L which will result in lower maximum charge limitations and changes in equipment internal components.



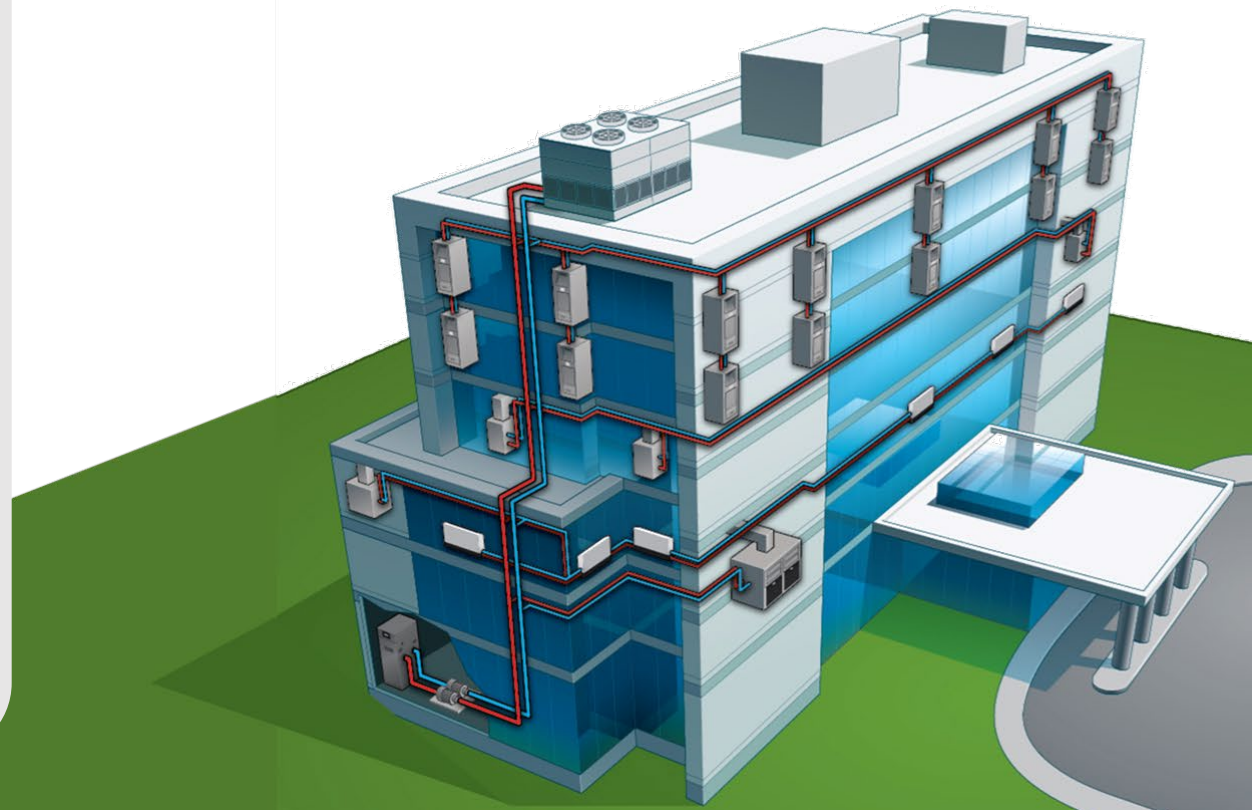


# WATER: A FUTURE-FRIENDLY SOLUTION

As refrigerant regulations change in the future it may become more difficult to service or replace systems with large distributed refrigerant piping in walls and ceilings.

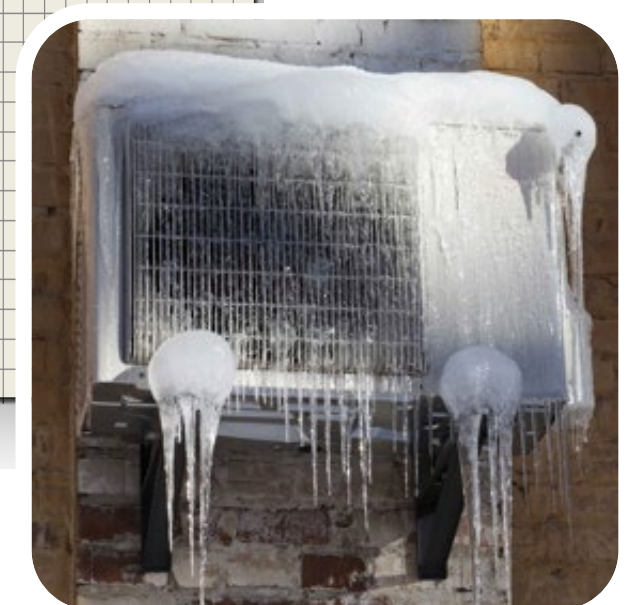
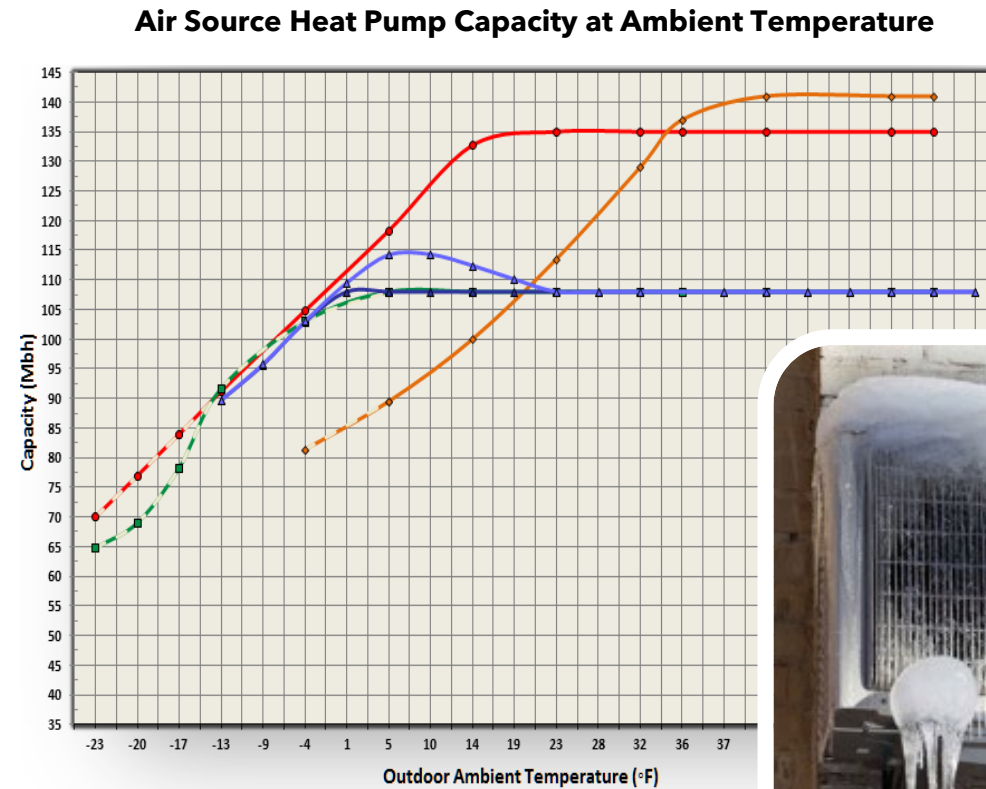
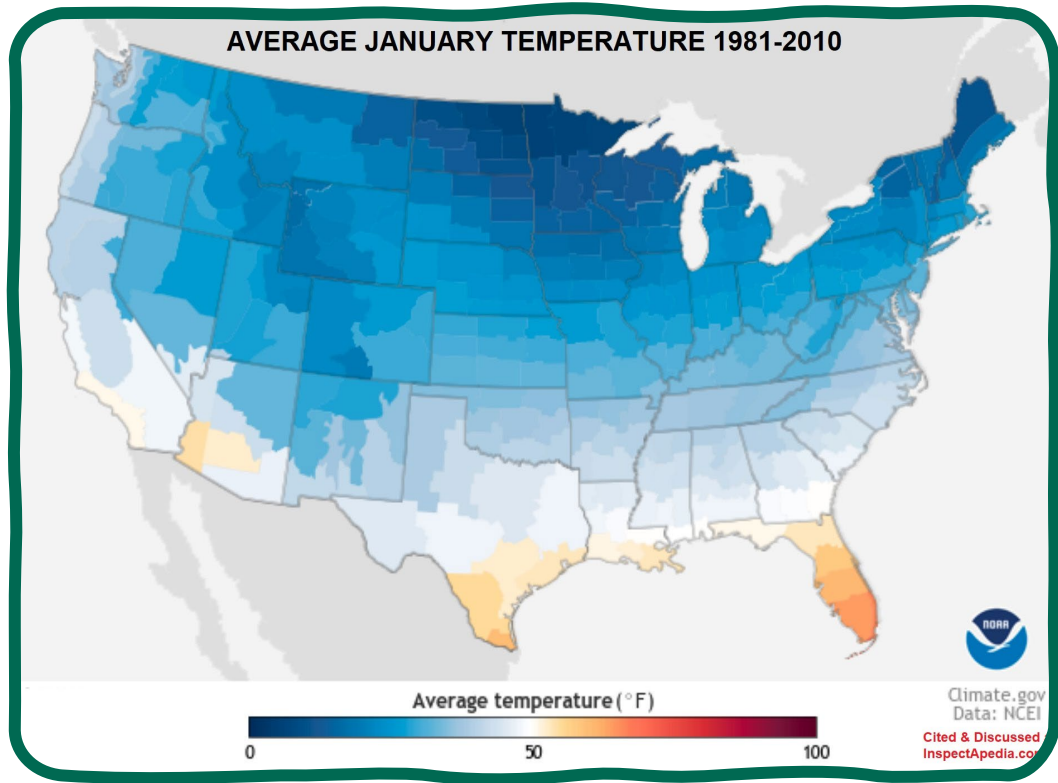


**Low refrigerant charge, packaged systems using water as a distribution system can switch refrigerants more easily with fewer changes to building structure.**



# AIR SOURCE HEAT PUMP CHALLENGES

Cold temperature heating design days can strain the capacity of most air source heat pumps and reduce capacity and efficiency when they are needed most.

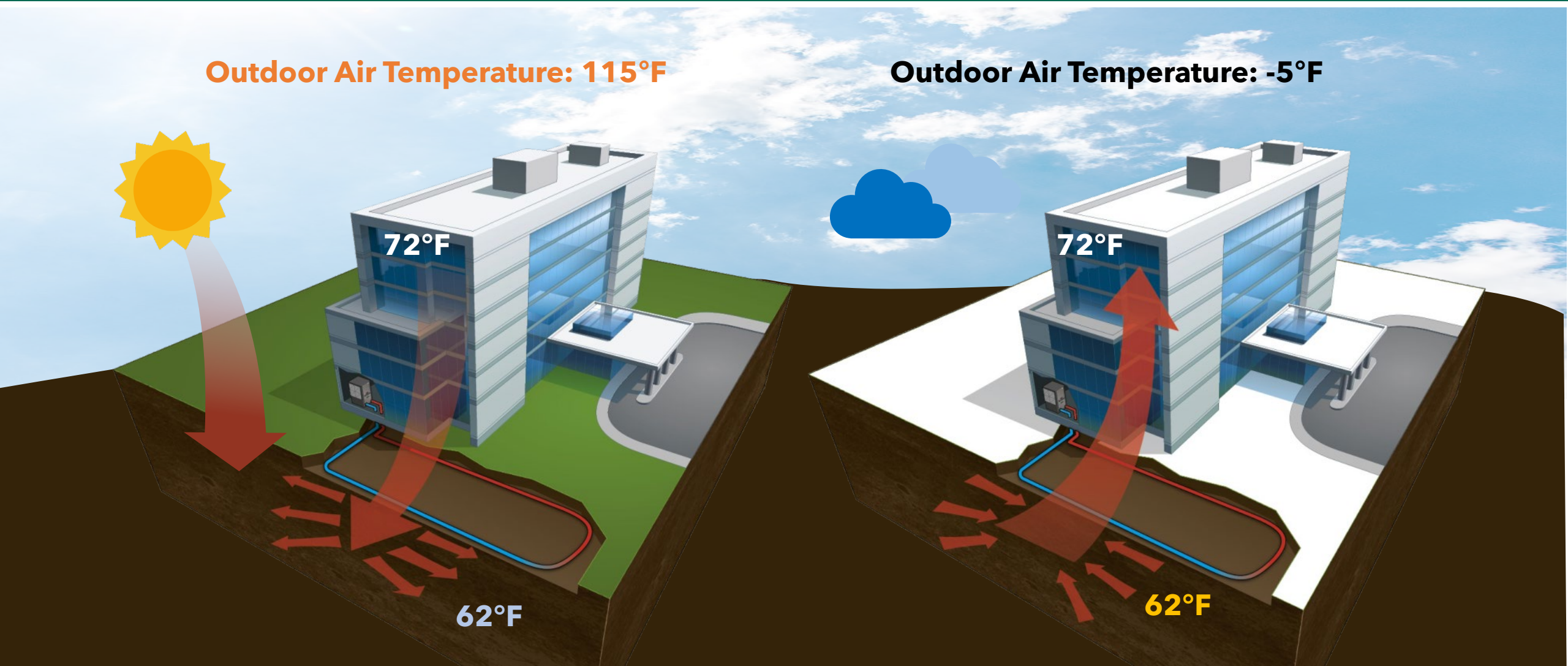




# WSHP COMFORT YEAR-ROUND!

Outdoor Air Temperature: 115°F

Outdoor Air Temperature: -5°F







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YES. We would love to follow up with you.

We know you couldn't make it to all of our presentations, it's a busy week! We hope you enjoyed your time. Let us know which content you'd like us to send you and we will reach out to you next week!



# Let's Talk

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CLIMATE CONTROL GROUP A NIBE GROUP MEMBER

POWER OF 4 BRANDS  
DELIVERING THE EXCELLENCE

PARTNERING WITH THE BEST

COMING TOGETHER FOR A BETTER TOMORROW

