Making the Transition to All-Electric Buildings

Considerations for Designers

Questions and Answers

- Ask questions in the chat box
- Use the “raise hand” function

We will answer questions as they come when there is a natural break

Agenda

- Introduction
- Module Goals
- Background
- Design Best Practices
- How to use the resource
- Questions

Introduction

About New Buildings Institute (NBI)

We push for **better buildings** that achieve **zero energy, zero carbon, and beyond**—through research, policy, guidance, and market transformation—to protect people and the planet.

NBI's work targets the aspects of the built environment that can make the greatest impact for the climate.

Research and guidance on "best-in-class" measures, practices and technologies

Advanced code and policy approaches

Training and education to build market capacity

Innovative, leading-edge program design and delivery approaches

Updates on issues critical to the utility energy efficiency business models

On-call subject matter experts

Since 1972, Steven Winter Associates, Inc. has been providing research, consulting, and advisory services to improve the built environment for private and public sector clients.

Our services include:

- Energy Conservation and Management
- Decarbonization
- Sustainability Consulting
- Green Building Certification
- Accessibility Consulting

Our teams are based across four office locations:
New York, NY | Washington, DC | Norwalk, CT | Boston, MA

For more information, visit
www.swinter.com

About BENEFIT

U.S. Department of Energy Funded Project

Started in October 2021 and ends March 2025

Key Partners: Nevada GOE, Northeast Energy Efficiency Partnerships (NEEP), Steven Winter Associates (SWA), and International Code Council (ICC)

Module Goals

Goals

What we hope you will get out of this presentation:

- Identify the drivers of all-electric design.
- Understand the steps needed to take when designing an all-electric multifamily building.
- Identify critical systems and possible pain points associated with building electrification.
- Understand the resource and share with others.

Background

Why Electrify?

Why Electrify?

- Decarbonize
- Futureproofing
- Simplify Construction Process
- Human Health
- Equipment Efficiency

Decarbonization

Futureproofing

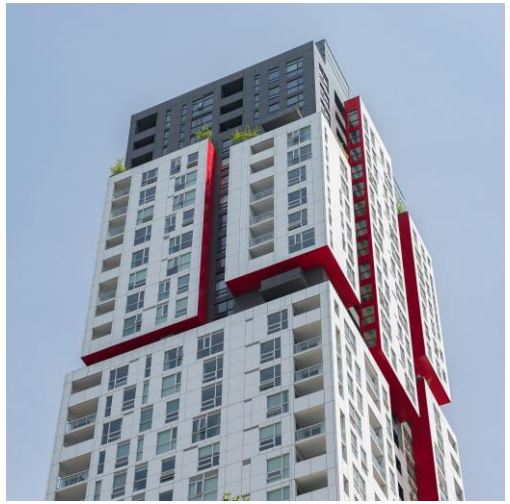
Human Health

Construction Impacts

Efficiency

Items to Consider

Building Size and Shape



Potential Impacts

- DHW distribution
- Space for rooftop units
- Solar/Renewable potential

Remember to Ask

- Is there enough space in the mechanical room for future electrification?

Size of Units

Impacts

- System sizing and availability
- Internal loads
- Space for unitized water heating

Remember to Ask

- Which systems are most appropriate for the units in the building?

Climate

Impacts

- System availability
- Efficiency
- Comfort

Remember to Ask

- How does the local climate impact where systems should be located?
- What special considerations do I need to make when selecting systems?

Design Best Practices

Reduce Loads

Insulation & Air Tightness

Why it Matters

- Comfort
- System efficiency
- Accurate load sizing

Best Practices

- Grade 1 insulation
- “Tight” construction
- Test units

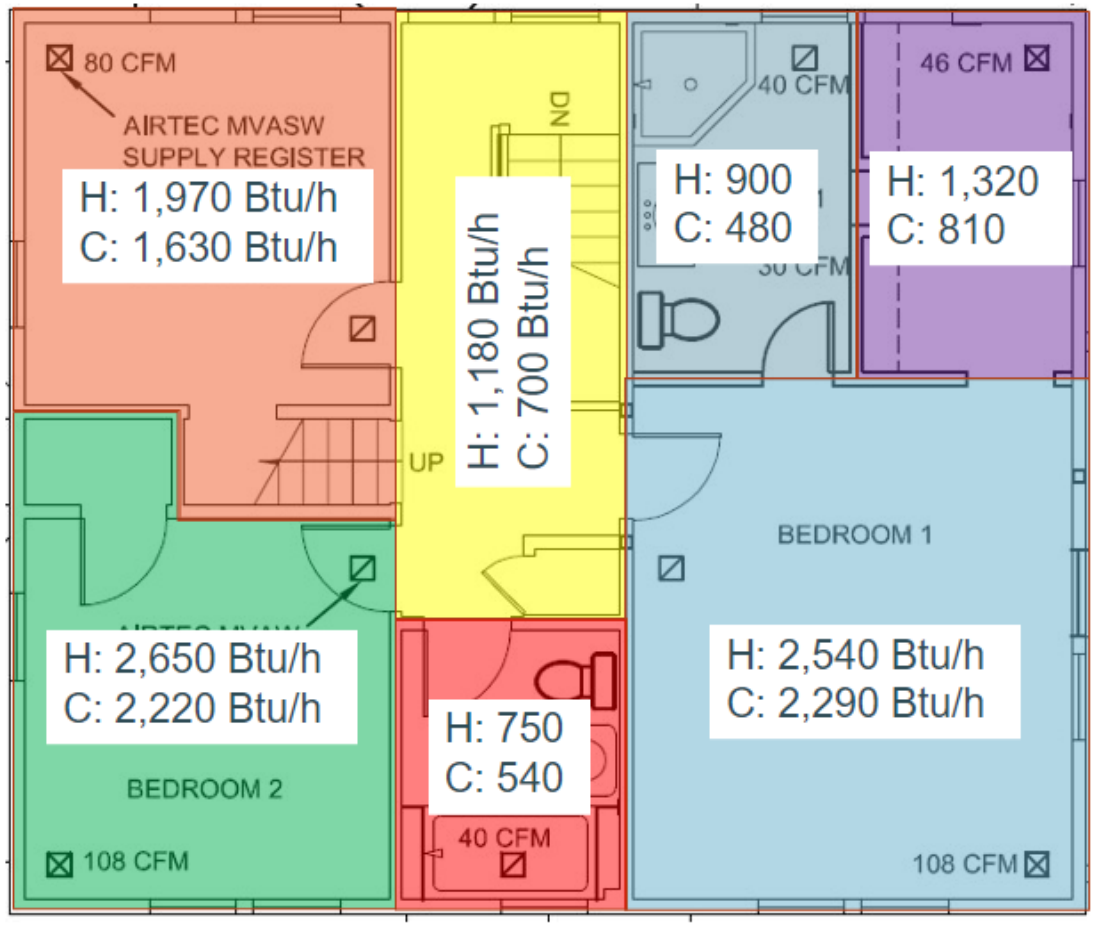
Perform Accurate Load Calculations

Why it Matters

- Oversizing leads to short-cycling
- Creates comfort issues
- Reduces system efficiency

Best Practices

- Be honest
- Calculate each condition
- Use appropriate software and guides



Panel Sizing

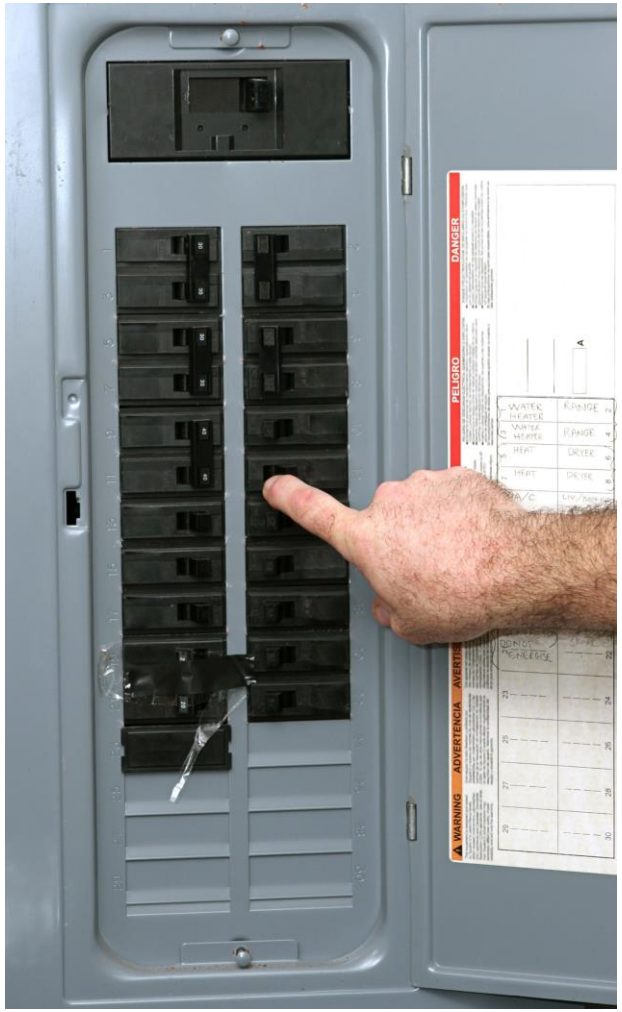
Panel Sizing

Why it Matters

- Ensures adequate service
- Can determine if electrification is possible

Best Practices

- Consider future electrical needs



Select Appropriate Systems

Select Appropriate Systems

Why it Matters

- Comfort
- Operating costs
- Replacement is expensive

Best Practices

- Understand available options
- Iterate with design team
- Maintain flexibility

Space Heating

Centralized Systems

Variable Refrigerant Flow

Advantages

- Energy efficient
- Flexibility
- Space saving
- Quiet
- Simultaneous heating and cooling

Disadvantages

- First cost
- Maintenance
- Complexity
- Refrigerant

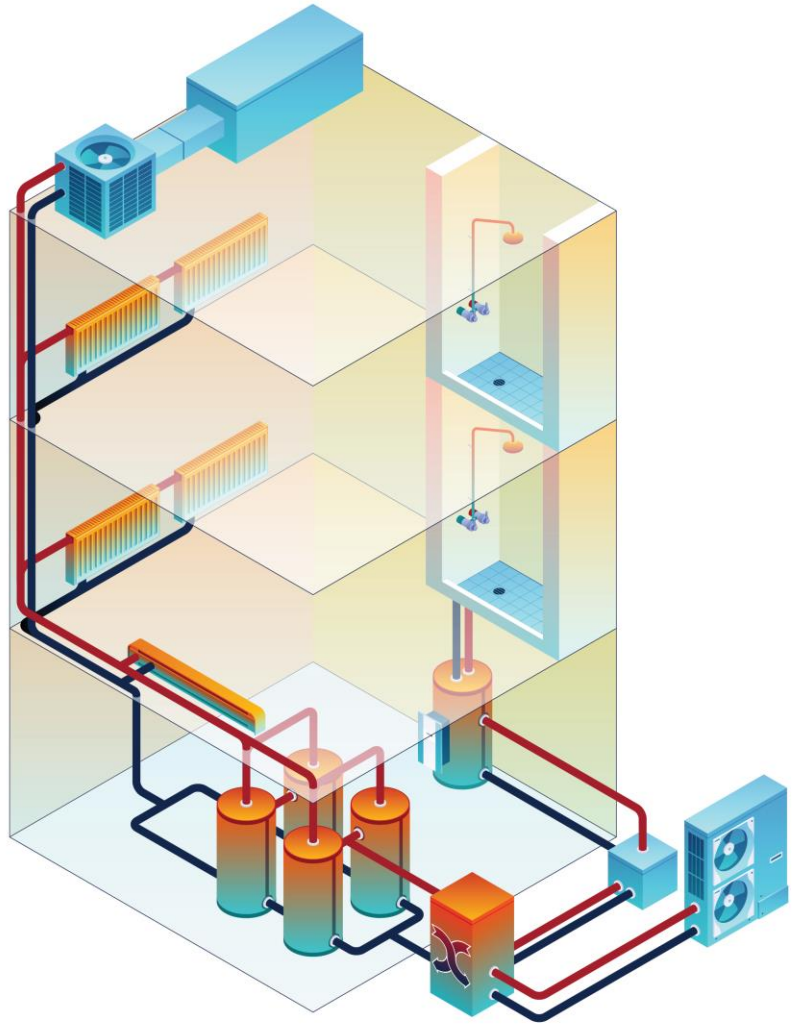
Water Source Heat Pump

Advantages

- Energy efficient
- Durable
- Flexible
- Lower refrigerant

Disadvantages

- First cost
- Noise
- Emerging



Unitary Systems

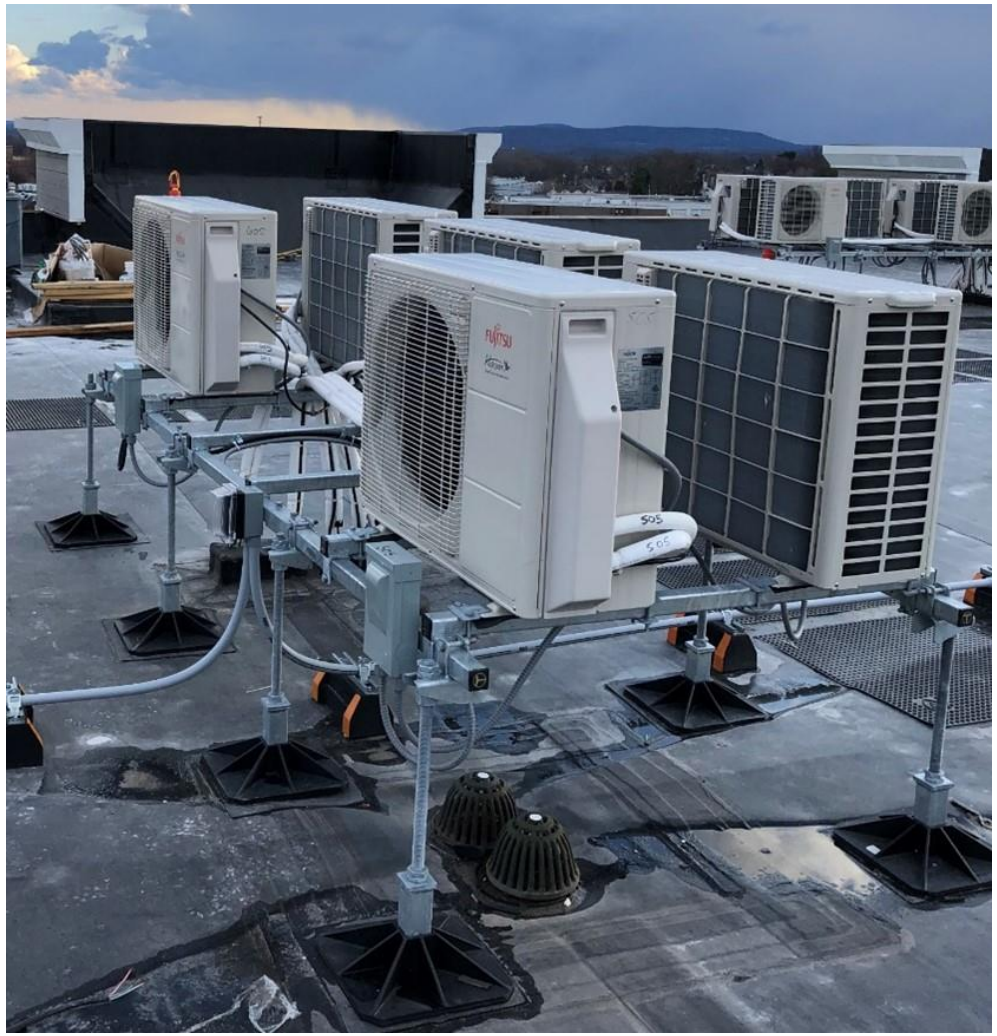
Air Source Heat Pump

Advantages

- » Energy efficient
- » Versatile
- » Maintenance
- » Flexibility

Disadvantages

- » Weather-dependent
- » Need space



Mini-Splits

Advantages

- Energy efficient
- Zoned heating and cooling
- Easy installation
- Quiet operation

Disadvantages

- Aesthetics
- Load capacity

Packaged Terminal Heat Pumps

Advantages

- Individual controls
- Low initial cost
- Space saving
- Maintenance

Disadvantages

- Noise
- Load capacity
- Wall penetrations

Water Heating

Centralized Systems

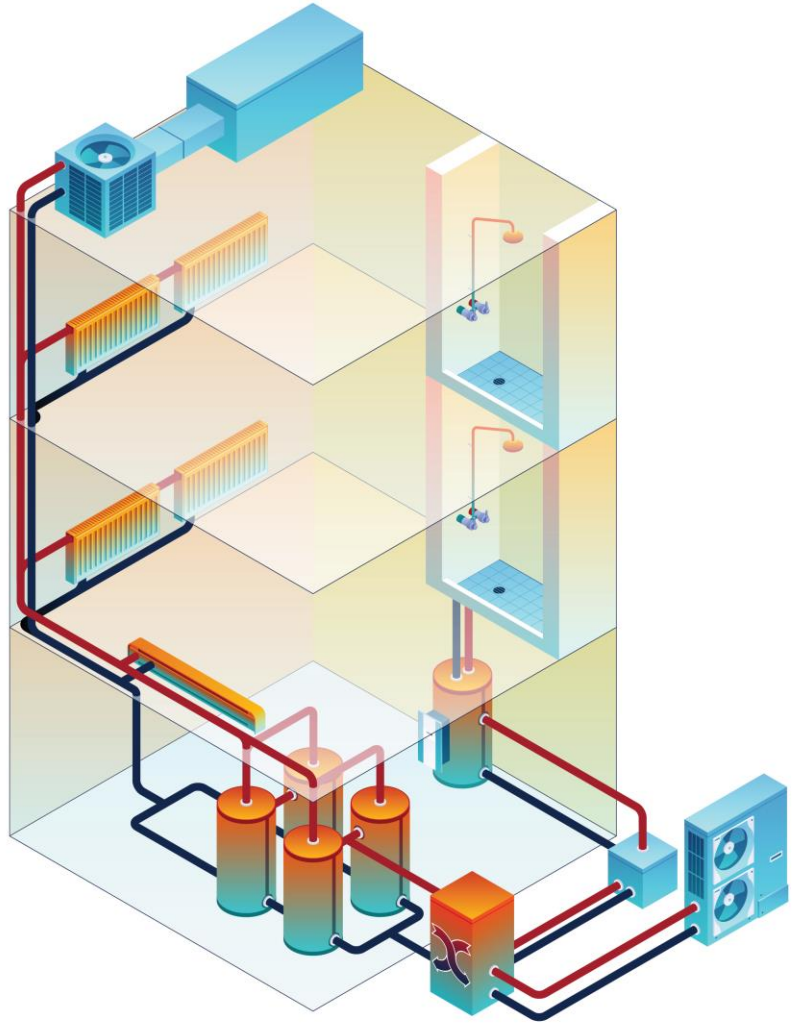
Air to Water Heat Pump + Storage

Advantages

- Energy efficient
- Low GHG emissions
- Save space in units
- Can be distributed

Disadvantages

- Sizing is complicated
- Need space in mechanical room
- Climate-dependent
- Emerging technology



Unitary Systems

Heat Pump Water Heater

Advantages

- Energy efficient
- Low GHG emissions
- Can provide dehumidification
- Cools ambient air

Disadvantages

- Need space
- Noise
- Condensate management
- Cools ambient air

Electric Resistance Water Heater

Advantages

- Proven
- Save space in units
- Easy swap

Disadvantages

- Less efficient
- May require more electrical service

Installation and Commissioning

Installation

Use Qualified Contractors

- More experience with systems
- Warranty protection
- Improved system performance

Commissioning

Why Do Commissioning?

- Catch costly errors
- Maximize efficiency
- Meet performance requirements
- Save money

How to Use This Resource

Making the Transition to All-Electric Buildings: A Design Guide

Questions?