Two-Way AC

Single Family, Duplex and Townhome

Background, Policy Description, Resources, Discussion

www.bayareareachcodes.org

V2.1

Policy Overview

When **replacing or adding space cooling**, choose one to install:

1. A **heat pump** space conditioner (cooling + heating) and comply with State Code;

   OR

2. An **air-conditioner and other energy improvements** that go above State Code.

Policy Context

2025 Energy Code (Part 6) Nonresidential

- Prescriptively requires heat pumps for units up to 65 kBtu/h (5 tons)

2025 CALGreen (Part 11) Tier 1

- Offers AC-to-HP as voluntary model for local adoption
- Energy Commission, utility consultants, and volunteers have coordinated enhancements to the language, and an Energy Code version (Part 6)
- Requires cost-effectiveness determination

Air Quality Regulations

- Bay Area is in “non-attainment” for ozone and particulate matter (PM)
- Gas appliances generate NOx emissions, which create ozone and PM2.5
- Beginning in 2029 furnace sales will be restricted by California Air Resources Board and the Bay Area Air District

Why Heat Pumps?

- Heat pumps result in major greenhouse gas emission reductions
- Two to four times more efficient than gas furnaces
- Powered by electricity, which in California, is mostly from renewable energy sources
- Can be both an air conditioner and a space heater
- No on-site combustion of gas
- No risk of carbon monoxide poisoning

Policy Estimated Impacts

[Analyze building stock data to estimate]:

- # of existing nonresidential buildings
- # with central air conditioning and gas heating

[Analyze mechanical permit data to estimate]:

- # of annual permits for air conditioner installations or replacements
- % of projects affected annually by proposed requirements

Policy Requirements

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When does the Reach Code Apply?

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If replacing a furnace only

Reach code does not apply

State Code

If adding new or replacement space cooling

Path A

Install air conditioner

Option 1	Option 2	Option 3
No ducting	Reusing ducting	Installing new ducting
Follow State Code Minimum	Install **4** additional efficiency measures	Install **3** additional efficiency measures
State Code	Reach requirement	

Path B

Install a heat pump

No additional requirements

State Code

Additional Efficiency Measures for ACs

If the project reuses existing ducts:

1. Higher fan efficacy (0.45 W/cfm)
2. Refrigerant charge verification
3. R-49 attic insulation
4. Air sealing at the ceiling plane

If the project includes new ducts:

1. Higher fan efficacy (0.35 W/cfm)
2. Refrigerant charge verification
3. R-8 duct insulation

Image: Duct insulation installation

Exceptions allow for the following

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Lower efficiency levels

- Existing levels of ceiling insulation
- Small attics

Avoiding hazardous conditions

- Asbestos disturbances
- Atmospherically vented combustion appliances

Avoiding large electrical upgrades

- Knob and tube wiring disturbances
- Electrical service upgrades

Avoiding high costs

- Where the heating load is 12 kBtu/h greater than the cooling load

Policy Impacts

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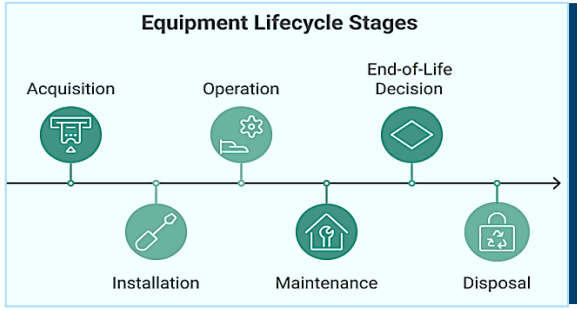
Heat Pump Costs

Up-Front Costs

- Heat pumps can cost $1,000 - $3,000 more than air conditioner units. Rebates often cover the gap.

Bill Savings

- Heat pumps save residents $200-$400 per year in bill costs compared to air conditioners.



Lifecycle Costs

- Heat pumps can both heat and cool a home, so only one piece of equipment needs to be maintained instead of two.

Sources: *Single Family Air Conditioner Replacements Cost-effectiveness Report, Climate Zone 3 & 4* & *Bill Impacts of Home Electrification Across the Bay Area*

Alternate Slides

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Trigger: Altered space-conditioning system serving existing single-family dwelling

1. Furnace-only replacement → no reach requirement
2. All CA Climate Zones except 15 (Palm Springs, Coachella)
3. Installing **new or replacement** air-conditioner
    - Install a heat pump. Supplemental heating from gas or electric resistance allowed. OR;
    - Install an AC
        1. Reuse **existing ductwork** + efficiency measures
        2. Replace or install new **ductwork and furnace** + efficiency measures

Energy equivalency test for **unducted** systems (e.g. wall furnaces) not yet performed.

Example 1

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Homeowner replaces an old furnace, or installs a heat pump.

Reach Code Requirements:

None.

The homeowner may install new ducts, maintain old ducts, or replace old ducts.

They may also have supplemental gas or electric heating for a heat pump.

Image: Heat Pump

Homeowner installs an AC unit and reuses existing ducts.

Reach Code Requirements:

4 efficiency measures:

1. Higher fan efficacy (0.45 W/cfm)
2. Refrigerant charge verification
3. R-49 attic insulation
4. Air sealing at the ceiling plane

Image: Attic insulation

Example 3

Homeowner installs an AC unit and new ducts.

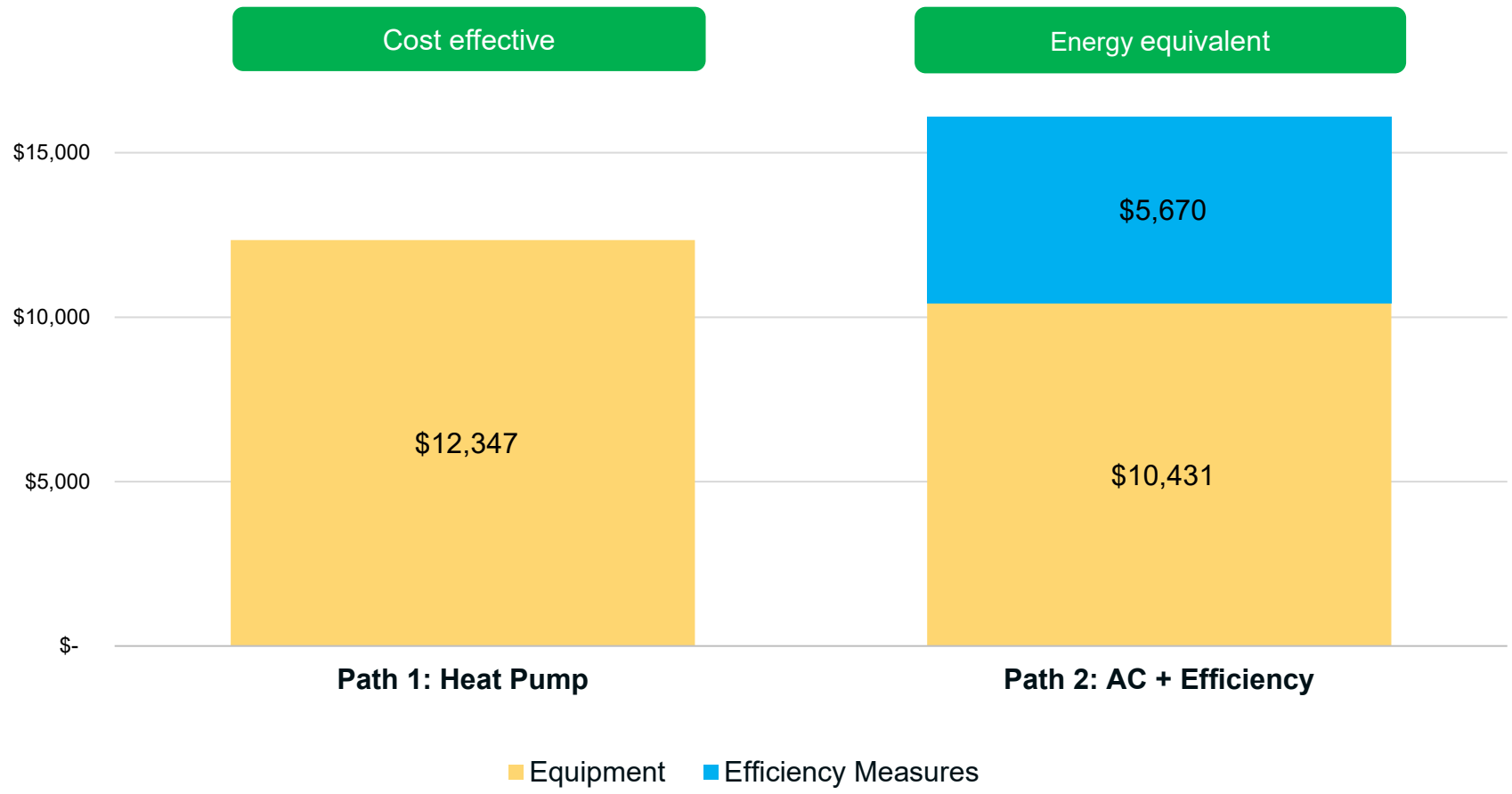
Reach Code Requirements:

3 efficiency measures:

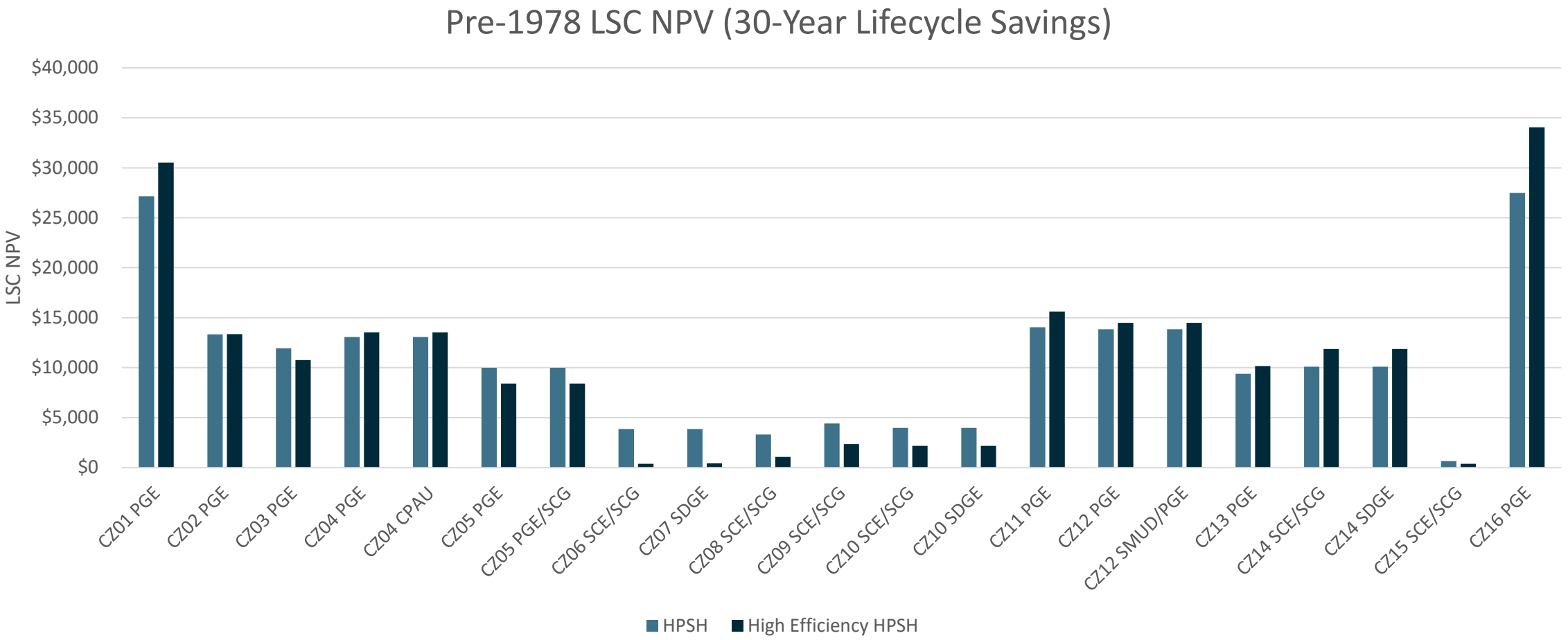
1. Higher fan efficacy (0.35 W/cfm)
2. Refrigerant charge verification
3. R-8 duct insulation

Image: Duct insulation

1-Way AC Costs More for The Same Efficiency

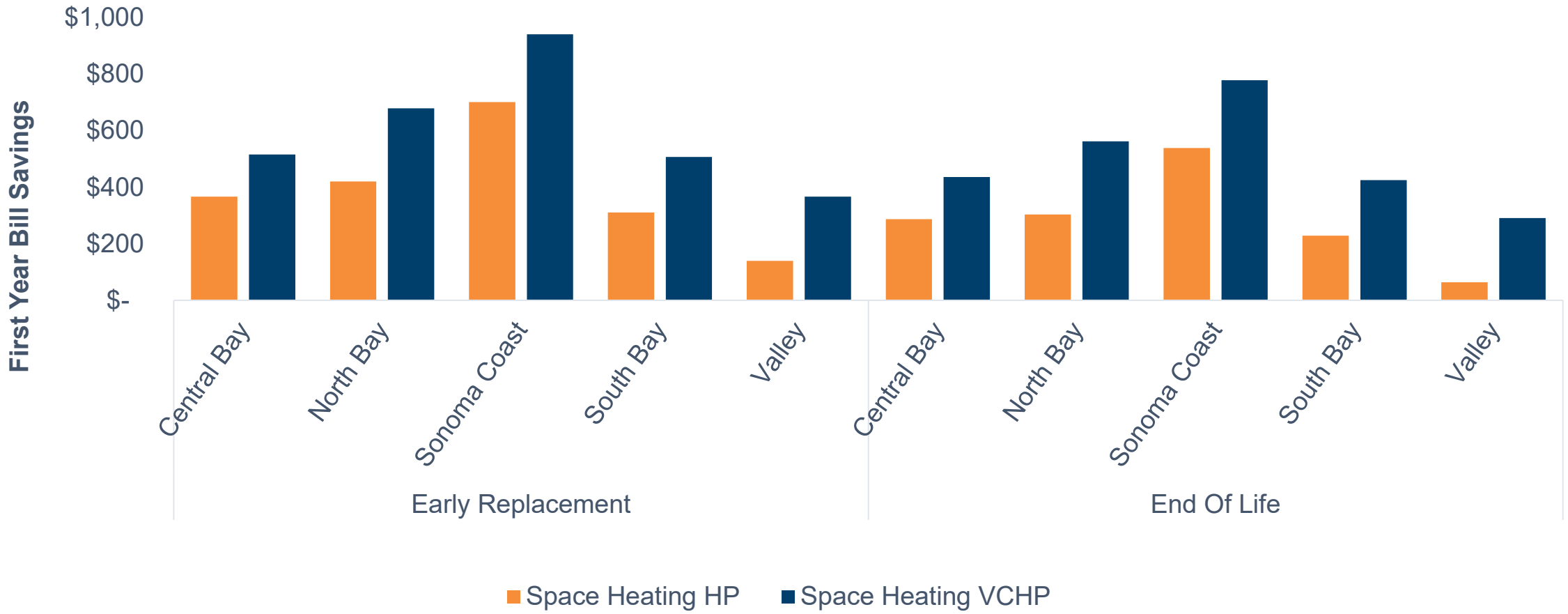


Heat Pumps Save $ Over Time



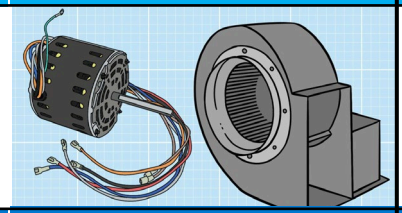
Source: Statewide IOUs C&S: Single Family Air Conditioner Replacements (AC to HP)

Heat Pumps Save $ Today



Source: Peninsula Clean Energy / Silicon Valley Clean Energy On-Bill Analysis for CZs 1, 2, 3, 4, 12

Lifetime Costs

	PATH 1		PATH 2	
	Scenario	Cost (Present Value)	Scenario	Cost (Present Value)
2026	1. AC fails 2. Install new HP	$12,300	1. AC fails 2. Install new AC	$10,400
				
10 years				
2036	1. Furnace fails 2. Replace fan motor	$900	1. Furnace fails 2. Install new 95AFUE furnace	$5,900
				
5 years				
2041	1. HP fails 2. Install new HP and air handler	$9,300	1. AC fails 2. Install new AC	$6,700
	TOTAL	**$22,500**		**$23,000**

New Heat Pump Only

- Duct Insulation: No Requirement
- Duct Sealing: 10% or RA Path
- Airflow: 300 CFM/ton or RA Path
- Fan Efficacy: No requirement
- Ref Charge

Solid blue: Reach over state code

Gradient: Reach in some CZ

No fill: Same as state code

RA: Reference Appendix

New AC Only

- Duct Insulation: No Requirement
- Duct Sealing: 10% or RA Path
- Airflow: 300 CFM/ton or RA Path
- Fan Efficacy: 0.45 W/CFM or RA Path
- Ref Charge
- Attic Insulation: R-49 Exception: Exist R-38
- Air Sealing: Ceiling Exception: Exist R-38

New Heat Pump and New Ducts

- Duct Insulation: R-6 in CZ 3, 5-7 R-8 in CZ 1, 2, 4, 8-16
- Duct Sealing: 5%
- Airflow: 350 CFM/ton
- Fan Efficacy: 0.58 W/CFM
- Ref Charge
- Attic Insulation: R-49 CZ 1-4, 6, 8-16 Only. Exc. R-19 in CZ 1, 3, 6
- Air Sealing: Ceiling CZ 2, 4, 8-16 Only. Exception - Exist R-19

New AC/Furnace and New Ducts

- Duct Insulation: R-8
- Duct Sealing: 5%
- Airflow: 350 CFM/ton
- Fan Efficacy: 0.35 W/CFM
- Ref Charge
- Attic Insulation: R-49 CZ 1-4, 6, 8-16 Only. Exc. R-19 in CZ 1, 3, 6
- Air Sealing: Ceiling CZ 2, 4, 8-16 Only. Exception - Exist R-19