

Appliance and Equipment Efficiency Standards

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Appliance Standards Awareness Project

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Outline

- What are appliance standards?
- What products are covered by standards?
- Savings from standards
- How standards are set
- Status of standards for major HVAC and water heating equipment
- Appliance standards and preemption
- Relationship between national standards and ASHRAE 90.1

What are appliance standards?

- Appliance and equipment standards specify minimum efficiency levels for specific products
- Apply to appliances and equipment manufactured or imported for sale into the U.S.

What products are covered by standards?

- Residential
- Commercial & Industrial
- Lighting
- Plumbing

Residential Products

- Boilers
- Ceiling Fans
- Central Air Conditioners and Heat Pumps
- Clothes Dryers
- Clothes Washers
- External Power Supplies
- Dehumidifiers
- Direct Heating Equipment
- Dishwashers
- Furnace Fans
- Furnaces
- Kitchen Ranges and Ovens
- Microwave Ovens
- Pool Heaters
- Refrigerators and Freezers
- Room Air Conditioners
- Water Heaters

Commercial & Industrial Products

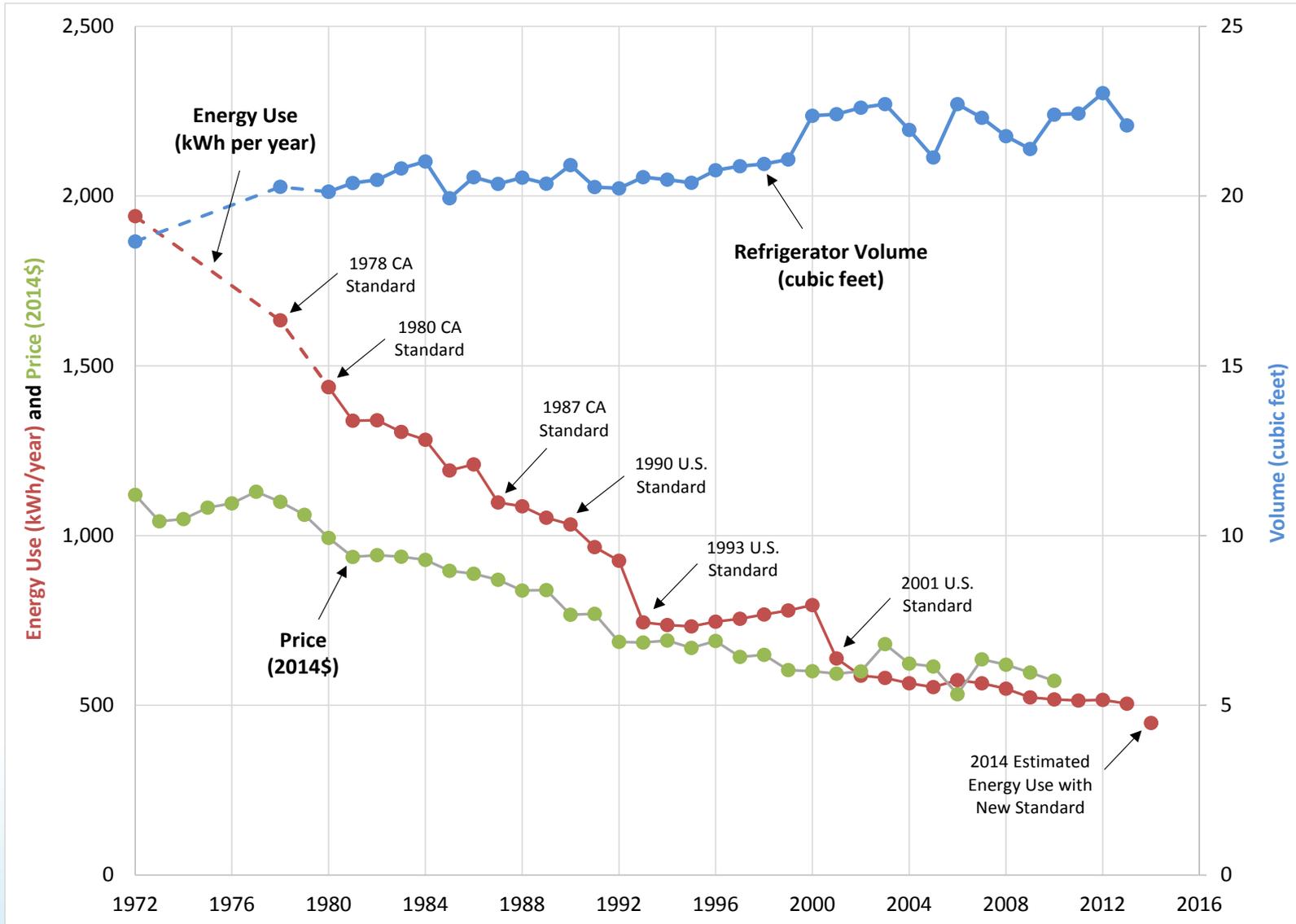
- Automatic Commercial Ice Makers
- Clothes Washers
- Commercial Package Air Conditioners and Heat Pumps
- Commercial Packaged Boilers
- Commercial Three-Phase Air Conditioners and Heat Pumps
- Computer Room Air Conditioners
- Distribution Transformers
- Electric Motors
- Packaged Terminal Air Conditioners and Heat Pumps
- Pumps
- Refrigerated Beverage Vending Machines
- Refrigeration Equipment
- Single Package Vertical Air Conditioners and Heat Pumps
- Small Electric Motors
- Unit Heaters
- Walk-In Coolers and Freezers
- Warm Air Furnaces
- Water Heaters
- Water-Source Heat Pumps

Lighting Products

- Candelabra Lamps
- Ceiling Fan Light Kits
- Compact Fluorescent Lamps
- Fluorescent Lamp Ballasts
- General Service Fluorescent Lamps
- General Service Incandescent Lamps
- Illuminated Exit Signs
- Incandescent Reflector Lamps
- Intermediate Base Lamps
- Metal Halide Lamp Fixtures
- Torchieres
- Traffic Signals

Plumbing Products

- Commercial Pre-Rinse Spray Valves
- Faucets
- Showerheads
- Toilets



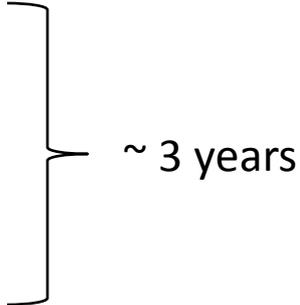
Savings from standards

- **7%** reduction in electricity use in 2010
 - Increasing to 14% by 2025
- Savings of **3.4 quads** of energy in 2010 (or about 3.5% of total U.S. energy consumption)
 - Increasing to 8 quads by 2025
- **\$1.1 trillion** in net present value savings from products sold through 2035

How standards are set

- National standards initially set either by Congress or by DOE
- Most products currently subject to national standards were first covered by state standards
- Historically, many standards have been negotiated by manufacturers and efficiency advocates
- DOE is required to review each standard at least once every 6 years

DOE standard-setting process

- Typical process
 - Framework document
 - Preliminary analysis
 - Proposed rule
 - Final rule

~ 3 years
- Recently, DOE has conducted a number of negotiated rulemakings
- DOE required to set standards at the highest levels that are “technologically feasible and economically justified”

Status of standards for major HVAC and water heating products- residential

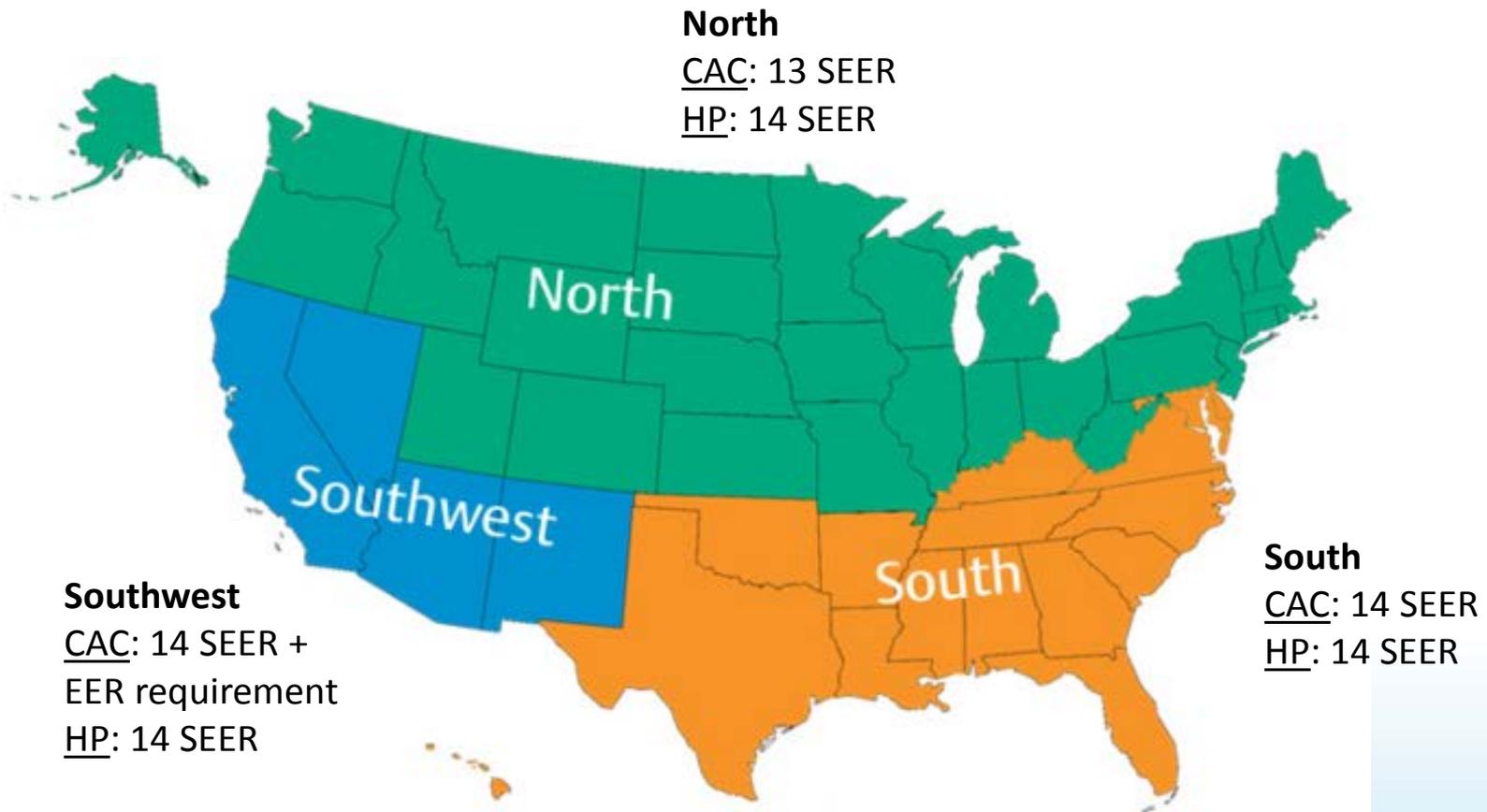
- Furnaces

- Current standard (80% AFUE) essentially unchanged since 1992
- DOE proposed rule issued in 2015 would raise the minimum standard to 92% AFUE (i.e. condensing levels)
- Waiting on final rule

- Boilers

- Current standards: 82% AFUE for gas-fired hot water, 84% for oil-fired hot water + outdoor reset
- New standards effective in 2021: 84% for gas-fired hot water, 86% for oil-fired hot water

Central air conditioners and heat pumps: current standards



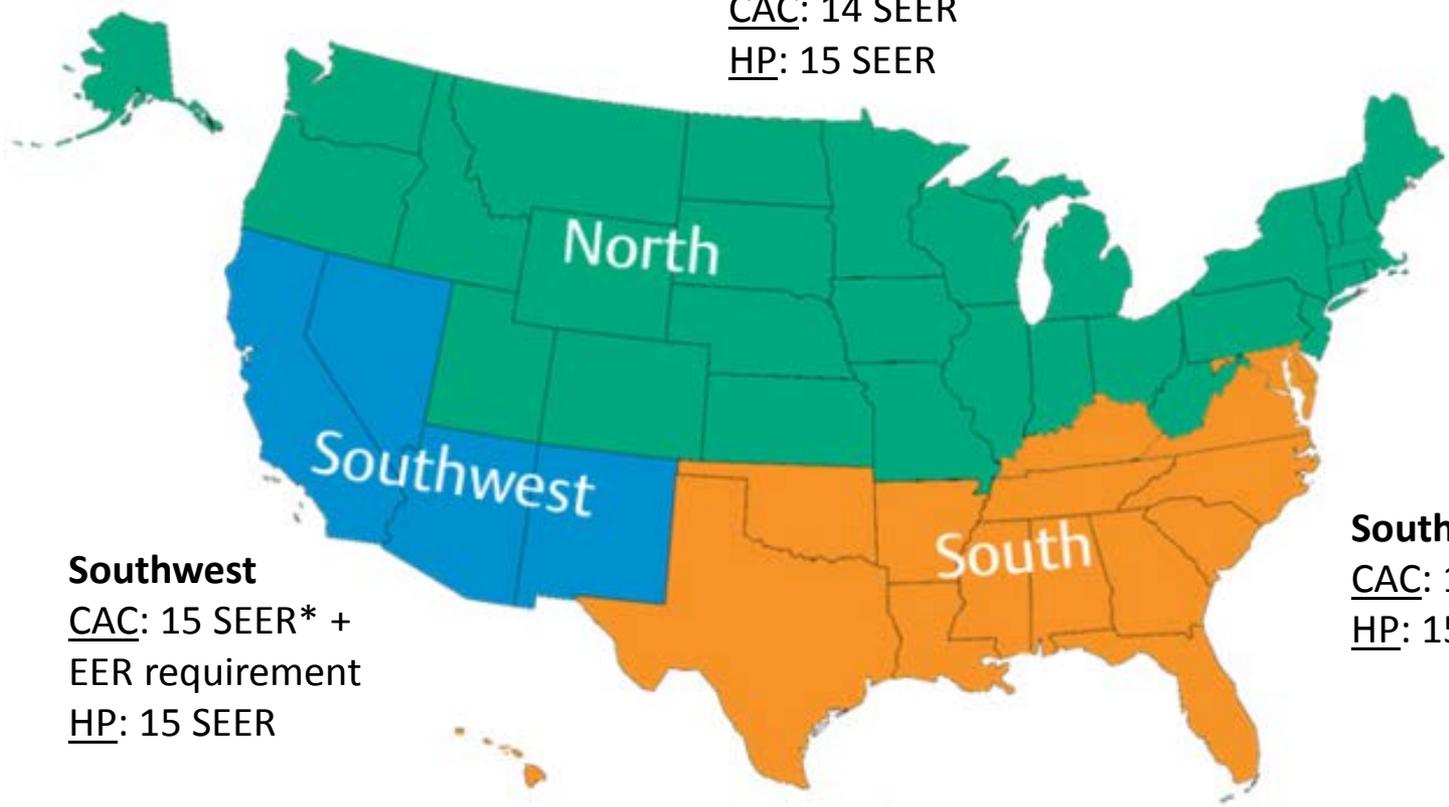
Note: The standards shown are for split-system CACs and both split-system and single-package HPs. The standard for single-package CACs is 14 SEER nationally.

Central air conditioners and heat pumps: standards effective in 2023 (pending final rule)

North

CAC: 14 SEER

HP: 15 SEER



Southwest

CAC: 15 SEER* +
EER requirement
HP: 15 SEER

South

CAC: 15 SEER*
HP: 15 SEER

*14.5 SEER for
≥45,000 Btu/h

Note: The standards shown are for split-system CACs and HPs. The standards for single-package CACs and HPs will be 14 SEER nationally.

Residential water heaters

- New standards took effect in April 2015
 - Modest increases in efficiency for most water heaters
 - Significant jump in efficiency for >55 gallon products
 - Electric storage water heaters >55 gallons: heat pump technology (~50% savings)
 - Gas storage water heaters >55 gallons: condensing gas technology (~25% savings)



Status of standards for major HVAC and water heating products- commercial

- Commercial rooftop air conditioners

- Current standards based on **EER** (measure of full-load efficiency)
- Recently finalized new standards negotiated by manufacturers and efficiency advocates
 - Based on **IEER**: better reflection of annual energy use and weighted heavily towards part-load efficiency
 - Two-tier standard:
 - ~10% savings effective in 2019 (90.1-2013 levels)
 - 25-30% savings effective in 2023
 - *Will save more energy than any standard ever issued by DOE: ~15 quads over 30 years of sales*



Status of standards for major HVAC and water heating products- commercial (cont'd)

- Commercial boilers
 - Current standards took effect in 2012 (efficiency levels of 77-84%)
 - DOE just issued a proposed rule that would raise efficiency levels to 81-88% effective in 2019
- Commercial water heaters
 - Standards essentially unchanged since 2003
 - Small increase for oil-fired storage took effect in 2015
 - Expect to see a DOE proposed rule soon

Appliance standards and preemption

- In general, national standards preempt state standards
- No state standard has ever been preempted by a weaker federal standard
- For products subject to national standards, states cannot adopt standards that are different than the national standard
- States cannot prescriptively require efficiency levels for products in building codes that are different than the national standard
 - However, higher equipment efficiency levels can be part of an option for compliance, as long as other options are also available

Relationship between national standards and ASHRAE 90.1

- For equipment where standards are included in 90.1, building codes can require higher efficiency levels than the minimum national standards *if*:
 - The requirement is not higher than the standard in 90.1
 - The requirement does not take effect prior to the effective date of the 90.1 standard

Relationship between national standards and ASHRAE 90.1 (cont'd)

- The statute is written such that ASHRAE “takes the lead” on establishing standards for the “ASHRAE products” (e.g. comm. air conditioners, comm. furnaces, comm. boilers, comm. water heaters)
 - If a standard in 90.1 is amended, DOE must either adopt that level as the national standard, or may adopt higher levels if there is “clear and convincing evidence” that higher levels would result in significant additional energy savings and would be “technologically feasible and economically justified”
- But, DOE is now also required to review each standard at least once every 6 years, including standards for the “ASHRAE products”

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