ENERGY STAR®
Commercial Water Heaters

Draft 1 Version 1.0
Stakeholder Meeting
September 10, 2012

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Agenda

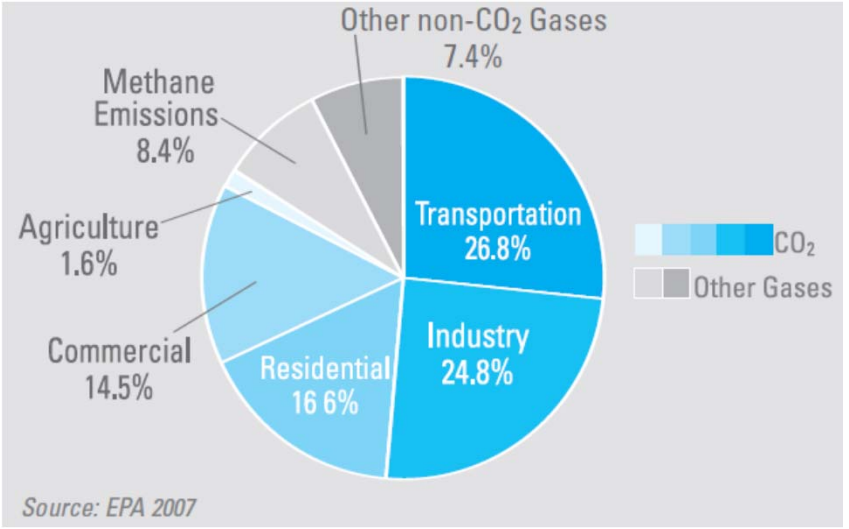
- Welcome and Introductions
- ENERGY STAR Program Overview
- Overview of Specification Development Process
- ENERGY STAR Opportunity
- Draft 1 Document Discussion
  - Definitions
  - Scope
  - Qualification Criteria
  - Test Methods
- Timeline and Next Steps

What is ENERGY STAR

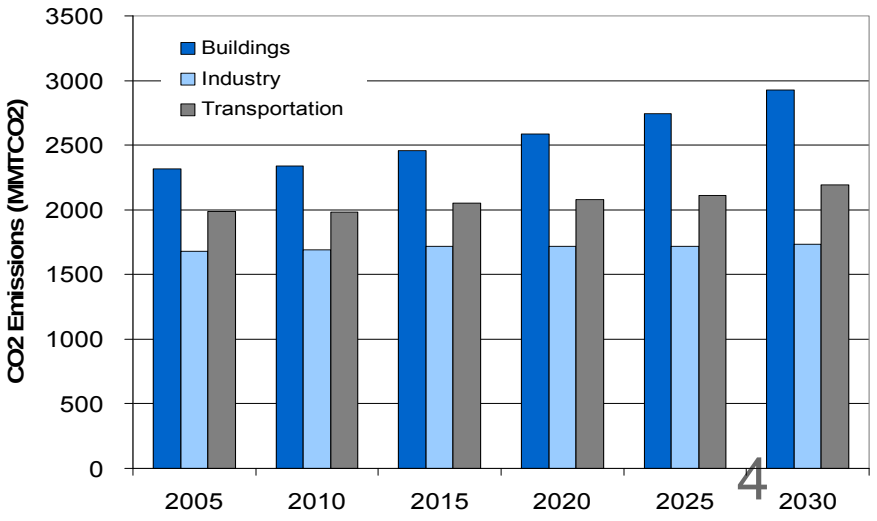
- **ENERGY STAR** is a voluntary government-backed program dedicated to helping individuals protect the environment through superior energy efficiency
- **ENERGY STAR** is the national symbol of energy efficiency, making it easy for consumers and businesses to identify high-quality, energy-efficient products
- **ENERGY STAR** distinguishes what is efficient/better for the environment without sacrificing features or performance
- Products that earn the **ENERGY STAR** meet strict energy performance criteria set by EPA

ENERGY STAR

- Started in 1992; voluntary program
- GOAL: Reduce greenhouse gas (GHG) emissions through large win-win-win opportunities with today's energy efficient technologies and practices.
- Provide credible information to buyers
- Work with the marketplace to capitalize on motivations of individuals



Projected GHG Emissions from Key Sectors through 2030



Source: AEO 2008

ENERGY STAR Portfolio

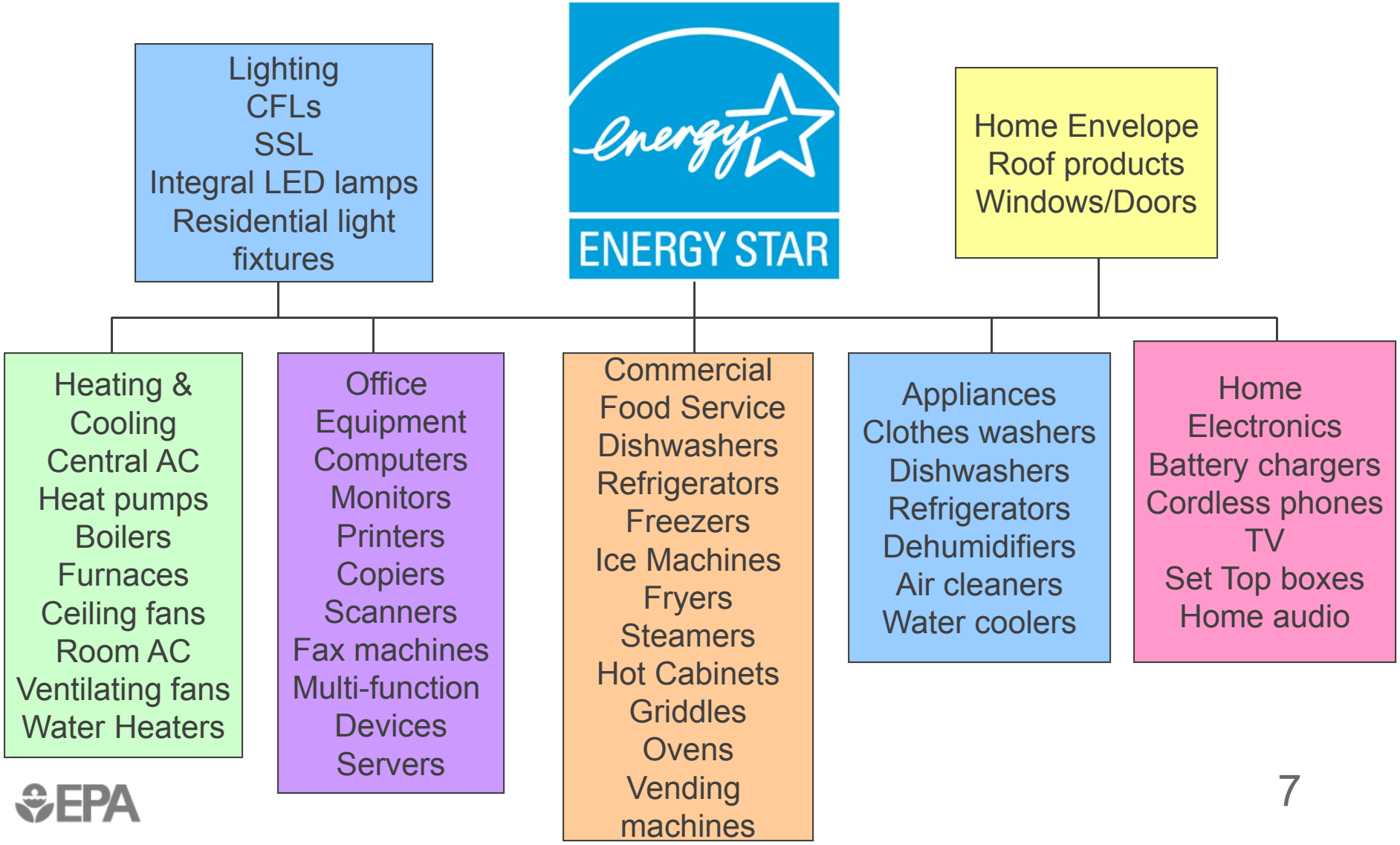
- Define and educate on energy/environmental performance through a single designation: ENERGY STAR
  - Product Efficiency
  - New/Existing Home Efficiency
  - Commercial Building Efficiency

Success: 2011 Accomplishments

- Americans, with the help of ENERGY STAR, prevented about 210 million metric tons of greenhouse gas emissions in 2011 alone—equivalent to the annual emissions from 41 million vehicles—and saved $23 billion on their utility bills.

- Americans purchased more than 200 million products that have earned the ENERGY STAR in 2011 across more than 60 product categories for a cumulative total of more than 5 billion products.

60+ Product Categories Are Covered by ENERGY STAR in the US



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Loyalty is the goal

85+% of households recognize the label.

57% think that the ENERGY STAR label means the product helps reduce global warming.

92+% think the ENERGY STAR label means the product uses energy more efficiently than comparable products.

84% think the ENERGY STAR label means the product will save the purchaser money over its lifetime.

80+% of knowing purchasers would likely recommend ENERGY STAR to a friend.

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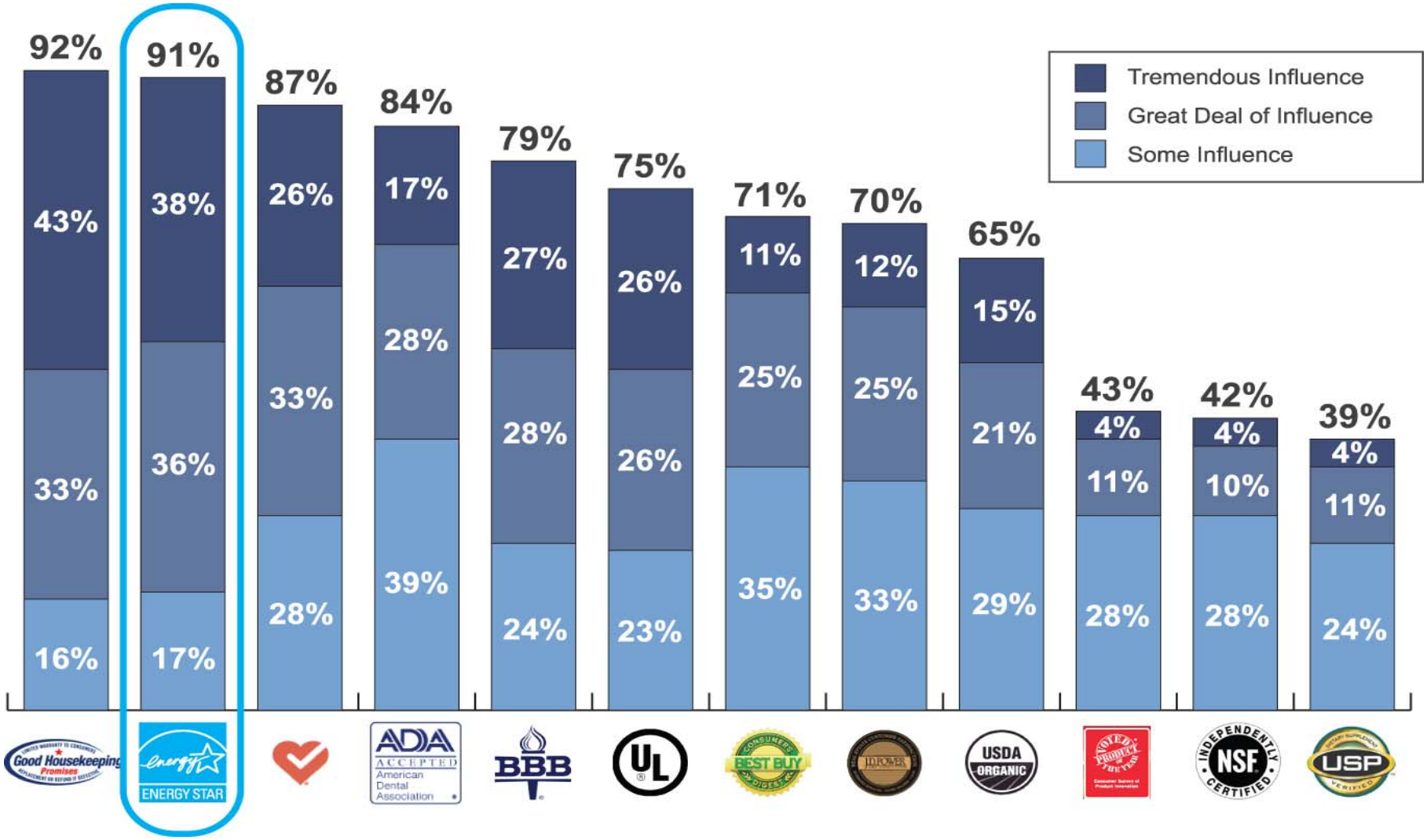
ENERGY STAR is one of the most influential labels in the marketplace



Source: Fairfield Research, July 2009

Specification Development Cycle

Important Process Elements

- Consistency
- Transparency
- Inclusiveness
- Responsiveness
- Clarity

Guiding Principles for Specification Development

- Significant energy savings can be realized on a national basis
  - ENERGY STAR specifications are created only when the energy savings potential translates into tangible energy savings
  - Ensures ENERGY STAR qualified products deliver promised savings
- Product performance can be maintained or enhanced with increased energy efficiency
  - Label is not only a credible symbol for energy efficiency, but it is also found on products with the features and performance that consumers demand

Guiding Principles, *cont.*

- Purchasers recover their investment in increased energy efficiency within a reasonable period of time
  - Some energy-efficient products may have a price premium while others do not. Typical maximum ROI is around 5 years
  - Every product has *two* price tags:
    - 1) initial product installed cost, and
    - 2) cost of energy to operate over product's lifetime
- Energy-efficiency can be achieved through several technologies
  - Specifications take a technology neutral approach
  - Do not favor one manufacturer over all others by designating a proprietary technology or unique design approach when establishing or revising the performance attributes of an ENERGY STAR product specification

Guiding Principles, *cont.*

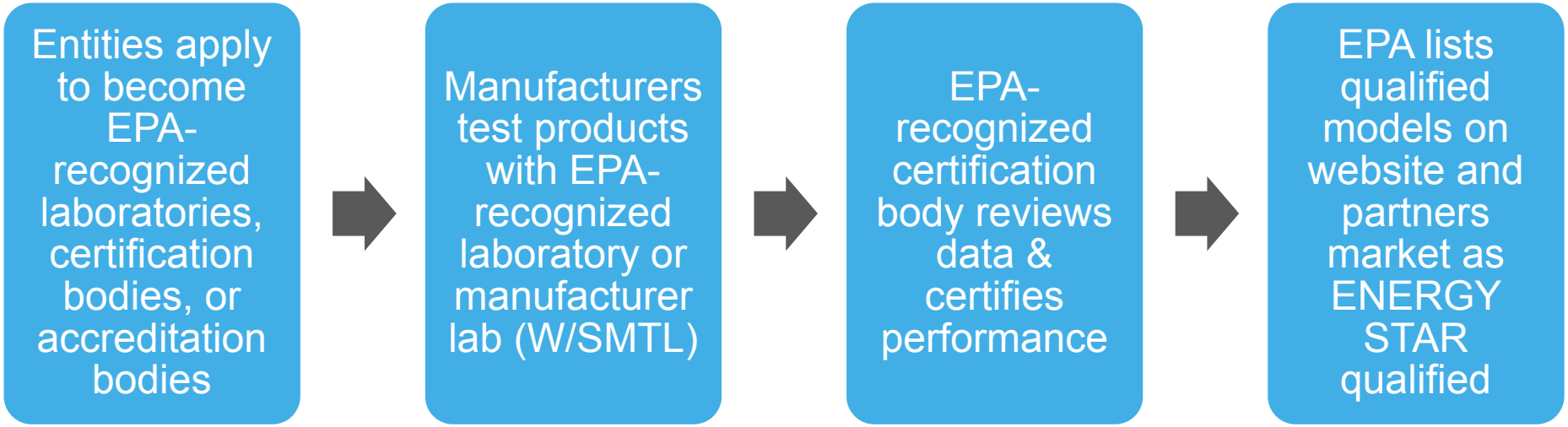
- Product energy consumption and performance can be measured and verified with testing
  - Available, industry accepted test procedure
  - Several manufacturers and products represented
  - Target top 25% in terms of energy efficiency
- Labeling would effectively differentiate products and be visible for purchasers
  - ENERGY STAR's goal is to provide value to purchasers by enabling them to easily identify energy-efficient products that have earned the label
  - EPA develops and revises specifications so they reflect the performance of products meeting the highest conservation standards

Guiding Principles for When to Revise ENERGY STAR Specifications

- Significant increase in market penetration of ENERGY STAR qualified models
- Change in the Federal minimum efficiency standards
- Technological advancements
- Product availability limitations
- Issues with consumers realizing expected energy savings
- Performance or quality issues
- Issues with test procedures

ENERGY STAR's Third-Party Certification Process

January 2011: ENERGY STAR Labeled Products Program moved from self certification to third party certification.



Details available at www.energystar.gov/3rdpartycert

EPA Interest in Commercial WH

- Completed a market research and scoping analysis in Fall 2011
  - Sufficient availability of energy efficient products
  - Opportunity for product differentiation
  - Cost effective high efficiency models
  - Significant national energy savings potential
  - Annual energy savings estimated per facility in each segment by upgrading to high-efficiency heaters.
  - Estimated hot water use, temperature rise, operating efficiency of standard and high-efficiency gas and electric water heaters in all segments

Commercial Segments Examined

- Deli + Sandwich
- Bar + Tavern
- Coffee + Specialty
- Quick Service Restaurant
- Full Service Restaurant
- Personal Care Services
- Office Building
- Multi-Family Housing
- Nursing + Residential Care
- Laundry Facility
- K-12 School
- Supermarket
- Work Cafeteria
- Hotel
- Hotel with Food Service or Casino
- Hospital
- College + University
- Correctional Facility

Annual Savings and Payback

- Installed base: more than 1 million commercial heaters
- Per facility weighted annual energy savings
  - Air-to-water heat pump-- 54,000 kWh
  - High-efficiency gas--1,100 therms
- Weighted simple payback
  - Air-to-water heat pump--4.3 years
  - High-efficiency gas--1.6 years

Draft 1: Definitions

- Definitions proposed in the Draft 1 specification provided by
  - U.S. Department of Energy (DOE) regulations, 10 CFR Part 431 Subpart G
  - Other ENERGY STAR specifications
- Preliminary list includes:
  - Product types
    - Storage (Gas and Electric) and Gas Instantaneous
  - Performance metrics
    - Thermal Efficiency, Standby Loss
  - General definitions
    - Basic Model, Warranty

Draft 1: Scope – Included Products

- Intended for sale in the commercial market

- Product types included:
  - Gas Storage Water Heaters > 75 kBtu/h, < 4,000 Btu/h per gal
  - Gas Instantaneous Water Heaters ≥ 200 kBtu/h, ≥ 4,000 Btu/h per gal
  - Electric Heat Pump Water Heaters ≥ 1.6 kW input rate

Draft 1: Scope – Excluded Products

- Products that are covered under other ENERGY STAR product specifications

- Commercial Solar Water Heaters
  - Custom designed and engineered depending on application
  - Lack of test method and metrics

- Electric resistance water heaters
  - Energy consumption does not offer meaningful differentiation
  - Point-Of-Use Water Heaters
    - Complex calculations and savings dependent on application
    - Lack of test method and metrics

Draft 1: Qualification Criteria – Proposed Performance

- Gas Water Heaters
  - Thermal Efficiency ≥ 0.94
  - Standby loss (for storage)

$$\leq 0.84 \cdot \left[\frac{\text{Input Rate}}{800} + 110 \cdot (\text{Volume})^{1/2} \right] \left(\frac{\text{Btu}}{\text{h}} \right)$$

- Electric (Heat Pump) Water Heaters
  - TBD

Q 1: Which metrics should be considered for electric heat pump water heaters? Are there metrics missing?

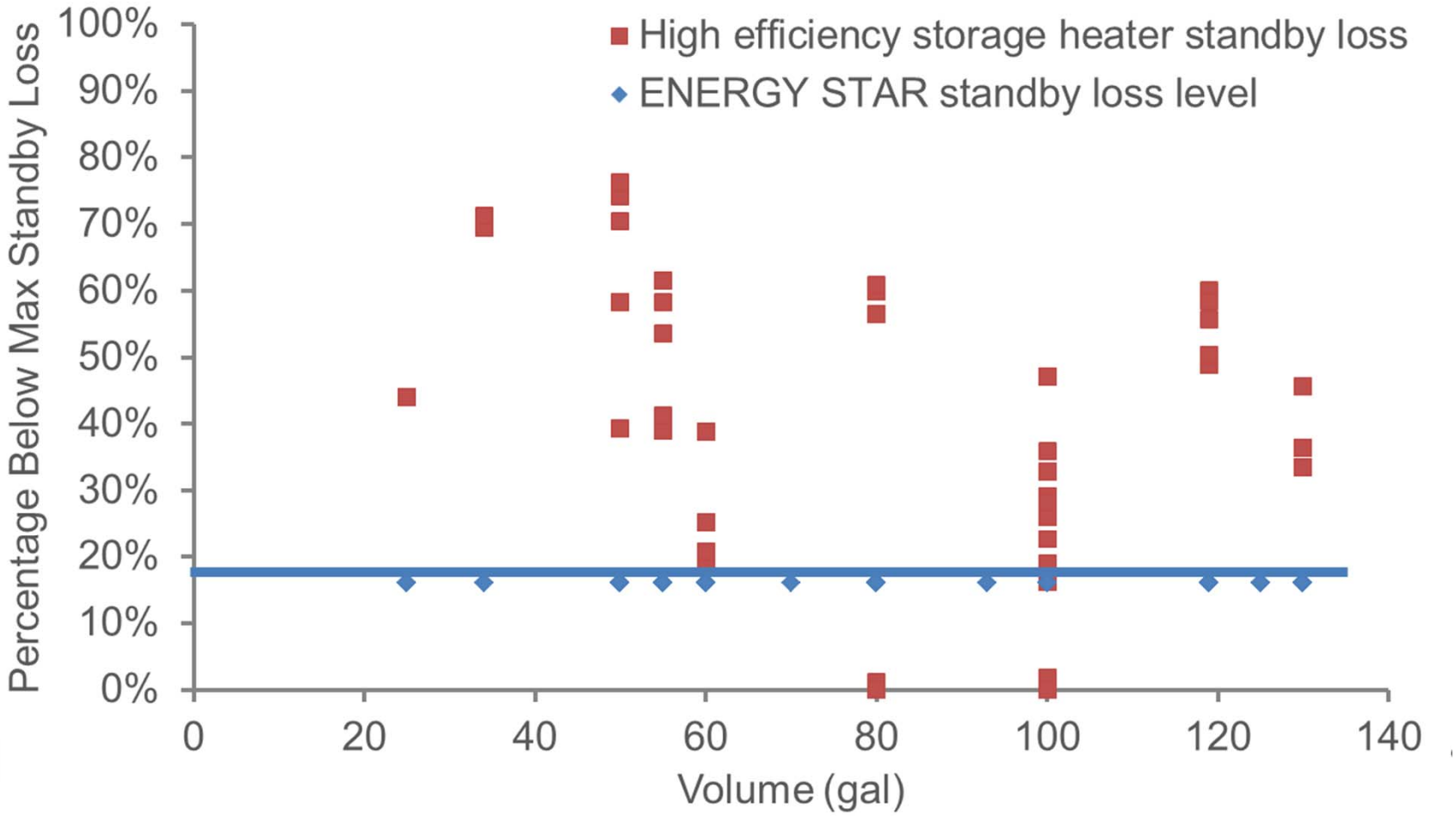
Draft 1: Qualification Criteria – Thermal Efficiency

- Thermal Efficiency ≥ 0.94
  - Harmonizes with other energy efficiency initiatives such as the Federal Energy Management Program (FEMP) and Consortium for Energy Efficiency (CEE) Tier 2
  - Estimated 26% of the current market meets the proposed Thermal Efficiency

Q 2: Are there other specification levels outside of CEE and FEMP that we should be aware of and attempt to harmonize with? Any overseas?

Draft 1: Qualification Criteria – Standby Loss

- Proposed Standby Loss is 16% more stringent than the federal requirement



Draft 1: Qualification Criteria - Warranty

- Manufacturer Limited Warranty Proposed
  - Gas Water Heaters
    - 3 years on tank and/or heat exchanger and 1 year on parts
  - Heat Pump Water Heaters
    - TBD (considering 5 years on the compressor and 2 years on other parts)

Draft 1: Qualification Criteria – Proposed Safety Requirements

- Gas
  - ANSI Z21.10.3/CSA 4.3
- Heat Pump Water Heaters
  - TBD (considering UL 1995, titled "*Heating and Cooling Equipment*")

Q 3: Are there other safety standards or requirements for commercial water heaters to be considered?

Draft 1: Test Methods Proposed

- Gas Commercial Water Heaters
  - Thermal Efficiency and Standby Loss - 10 CFR 431.106
- Electric Commercial (Heat Pump) Water Heaters
  - TBD (considering ANSI/ASHRAE 118.1)

    Note: Different test methods for units without tanks and those with tanks

Q 4: Which other existing test methods should DOE look at for heat pump water heaters?

Specification Development Timeline

- Aug. 28, 2012 Draft 1 released
- Sept. 10, 2012 Stakeholder Webinar
- Sept. 21, 2012 Draft 1 comment period closes
- Oct. 2012 Draft Final published
- Oct. 2012 Draft Final comment period
- Nov. 2012 Final published and effective
- If a second draft is needed before the draft final, the process is expected to finish in December instead.

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Questions?

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Learn more at **energystar.gov**

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