



# **ENERGY STAR®**

## **Commercial Water Heaters**

### **Draft 1 Version 2.0**

## **Stakeholder Webinar and Discussion**

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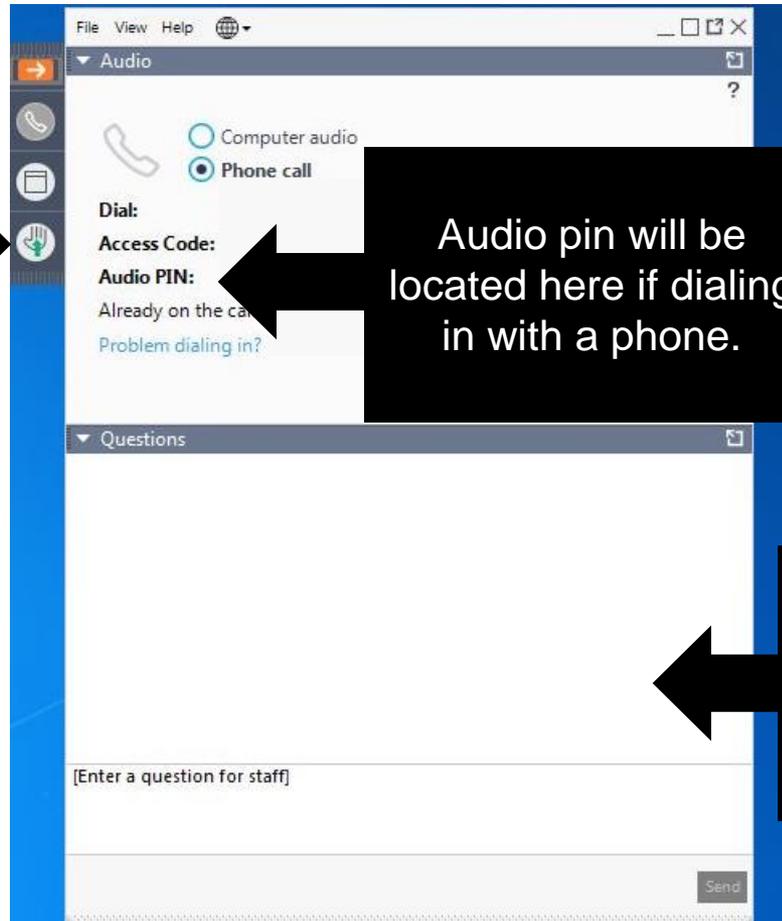
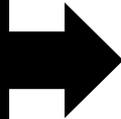
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# Agenda

- 1** Introduction
- 2** Definitions and Scope
- 3** Certification Criteria
- 4** Next Steps
- 5** Discussion



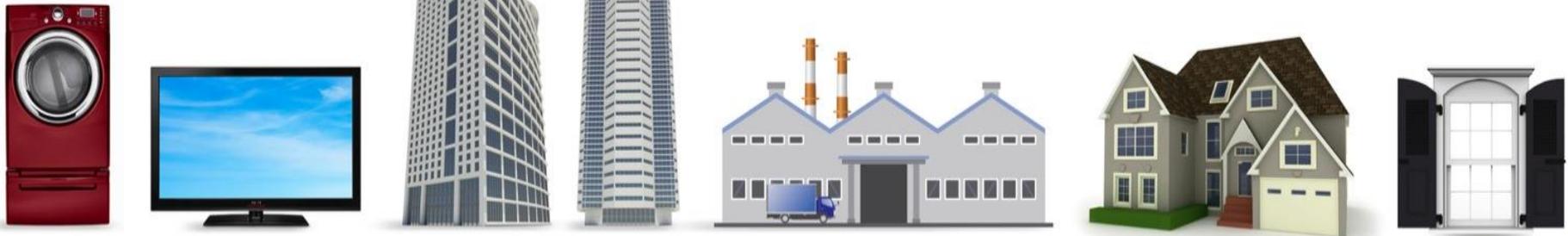
1	<b>Introduction</b>
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# EPA ENERGY STAR

EPA's ENERGY STAR identifies the most energy-efficient **products**, **buildings**, **plants**, and **new homes** – all based on the latest government-backed standards.

Today, every ENERGY STAR label is verified by a rigorous third-party certification process.





## Brand Preference and Loyalty

### In American Households:



MORE THAN  
**90%**  
RECOGNIZE THE  
ENERGY STAR® LABEL



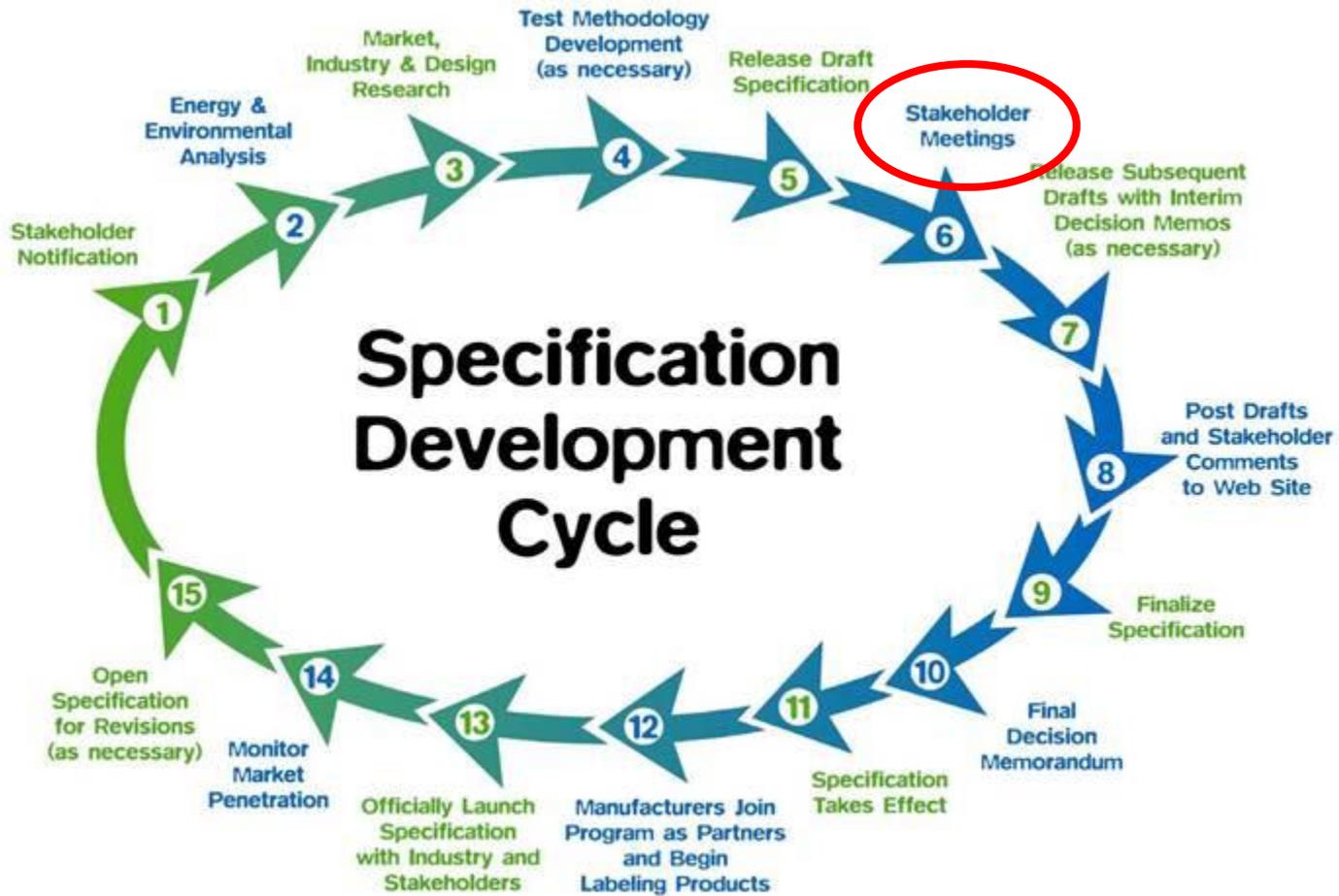
NEARLY  
**85%**  
UNDERSTAND  
WHAT IT MEANS



IN THE PAST YEAR,  
**45%**  
PURCHASED ENERGY  
STAR-LABELED PRODUCTS



U.S. EPA 2017





## Guiding Principles for Specification Development

1. Significant energy savings can be realized on a national basis
2. Product performance can be maintained or enhanced with increased energy efficiency
3. Purchasers recover their investment in increased energy efficiency within a reasonable period of time
4. Energy-efficiency can be achieved through several technologies
5. Product energy consumption and performance can be measured and verified with testing
6. Labeling would effectively differentiate products and be visible for purchasers



# ENERGY STAR Commercial Water Heaters History

- Version 1.0 became effective on March 20, 2013
- Total number of certified products
  - 2014 → 336
  - 2015 → 407
  - 2016 → 408
- Intention was always to include commercial heat pump water heaters – DOE action now makes that possible.
- Also reviewing the specification to determine if revision is needed to maintain differentiation of ENERGY STAR commercial water heaters



## Driver for Revision

- DOE final rule test procedure mandatory for representation on November 6, 2017
  - New test procedure for measuring coefficient of performance (COP) for heat pump water heaters
  - Test procedure for measuring standby loss of instantaneous water heaters (some have significant storage volume)
  - DOE does not expect new test procedure to alter TE or Standby Loss outputs for gas products



## Summary of Draft 1 Proposals

- Maintain current thermal efficiency (TE) criteria for gas storage and gas instantaneous
- Standby loss criteria for instantaneous  $\geq 10$  gallons
- Add commercial-duty residential heat pump water heaters to scope
- Specify efficiency, warranty, and test method requirements for heat pump water heaters
- Propose reporting requirements to detail fault detection, performance reporting, energy savings reporting, and predictive maintenance alerts.



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## Definitions – New in Draft 1

- Commercial-duty residential heat pump water heater
  - Capable of 3-phase operation
  - Rated input less than or equal to 12 kW
- Uniform Energy Factor (UEF)
  - Efficiency metric for commercial-duty residential heat pumps
- Fault Detection and Display
  - Detect and report system faults in plain text
  - Store at least 5 faults in a history log



## Definitions – New in Draft 1

- Performance Reporting
  - Report at least three system performance metrics
  - E.g., fuel usage, hot water usage, run time
- Energy Savings Reporting
  - Analyze performance and report energy saving opportunities
  - Plain text or detailed visuals to relay opportunities for improvement
- Predictive Maintenance Alert
  - Track use and/or wear rates to alert when maintenance may be required



## Definitions – Minor Updates

- Minor updates to these definitions to better align with DOE definitions:
  - Electric Heat Pump Water Heater
  - Thermal Efficiency
  - Coefficient of Performance
- Updates do not impact the intent; they only clarify and provide alignment with DOE



## Scope – Updates in Draft 1

- Included Products:
  - Commercial Heat Pump Water Heaters (Electric)
    - These were included in scope of Version 1.0, but the efficiency criteria was TBD
  - Commercial-duty Residential Heat Pump Water Heaters
- Excluded Products
  - Heat pump water heaters with an integrated storage tank and rated electric power input less than 12 kW



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# Product Performance Requirements

- Gas-fired Water Heaters

Criteria	Type	ENERGY STAR Requirements
Thermal Efficiency	Storage; Instantaneous	$TE \geq 0.94$
Maximum Standby Loss	Storage Instantaneous $\geq 10$ gallons	$\leq 0.84 * [(Input\ Rate / 800) + 110(Volume_r)^{1/2}]$ (expressed in Btu/hr)
Minimum Manufacturer Limited Warranty	Storage; Instantaneous	3 years on tank and/or heat exchanger and 1 year on parts



## Product Performance Requirements

- Electric Heat Pump and Commercial-duty Residential Heat Pump Water Heaters

Criteria	Type	ENERGY STAR Requirements
Coefficient of Performance ( $COP_h$ )	Heat Pump	$COP_h \geq 3.0$
Uniform Energy Factor (UEF)	Commercial-duty Residential Heat Pump	$UEF \geq 2.20$
Minimum Manufacturer Limited Warranty	Heat Pump; Commercial-duty Residential Heat Pump	5 years on the compressor and 2 years on parts



## Reporting Requirements

- Products shall report whether they meet the requirements, and also any ancillary equipment needed to use the functions, such as a Wi-Fi router or proprietary hub.
  - Fault Detection and Display
  - Performance Reporting
  - Energy Savings Reporting
  - Predictive Maintenance Alerts
- Products do not need to provide any of these functions to be certified



## Significant Digits and Rounding

- Updated to match the language that is common to recently revised ENERGY STAR specifications
- Requirements are the same as in Version 1.0



# Test Procedures

ENERGY STAR Requirement	Test Method Reference	Applicable Products
Thermal Energy	10 CFR Part 431.106	Gas-fired Storage and Gas-fired Instantaneous Water Heaters
Standby Loss		
Coefficient of Performance	10 CFR Part 431.106, Subpart G, Appendix E	Heat Pump Water Heaters
Uniform Energy Factor	10 CFR Part 430, Subpart B, Appendix E	Commercial-duty Residential Heat Pump Water Heaters



## Summary of Differentiation for Draft 1 Criteria

- EPA estimates that around 25% of all gas-fired storage and instantaneous models in the AHRI Directory are certified as ENERGY STAR
- The market penetration is higher than this, however, and EPA would like to understand why
  - Simply more customers choosing high efficiency heaters? What influence has labeling had in this?
  - Do installations that use high efficiency heaters tend to have a larger number of smaller units?
- 3.0 COP and 2.20 UEF are expected to be relatively inclusive, but will still offer savings compared to electric resistance water heaters



## Payback for Draft 1 Heat Pump Criteria

Application	Electricity Savings (kWh/yr)	Cost Savings (\$/yr)	Simple Payback (yr)
Deli/Sandwich Shop	5,280	544	24.9
Bar/Tavern	10,560	1,088	12.5
Multi-family Housing	49,900	5,140	2.6
Supermarket	90,990	9,372	1.4
Hotel	99,510	10,250	1.3
Full-service Restaurant	160,630	16,545	0.8
College Dormitory	969,170	99,825	0.2
<b>Weighted Average</b>			<b>3.6</b>



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## Next Steps / Timeline

- Written comments are due **November 10, 2017**
- EPA hopes to finalize the Version 2.0 in December 2017
  - EPA expects the next specification draft to be a Final Draft, barring any substantial changes from Draft 1
- Once finalized, products may be certified to Version 2.0 immediately
- Approximately 9 months from finalization, the product finder will **only** include products certified to Version 2.0



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## Discussion

- Open to comments and questions
- Please raise your hand in the webinar control panel or write in a question
- The slides will be posted online
  - Slides, draft specifications, and all other related materials can be found on EPA's Commercial Water Heater Version 2.0 [product development webpage](#)



## Written Comments

- In addition to making verbal comments during today's meeting, stakeholders are strongly encouraged to submit written comments and data
  - *Comments will be displayed for public viewing unless otherwise specified by the commenter*
- Please send all comments to:  
[CommercialWaterHeaters@energystar.gov](mailto:CommercialWaterHeaters@energystar.gov)

**Comment Deadline**

**November 10, 2017**



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