ENERGY STAR®
Central Air Conditioners & Air-Source Heat Pumps

Framework Version 5.0 Stakeholder Meeting
July 22, 2013

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Agenda

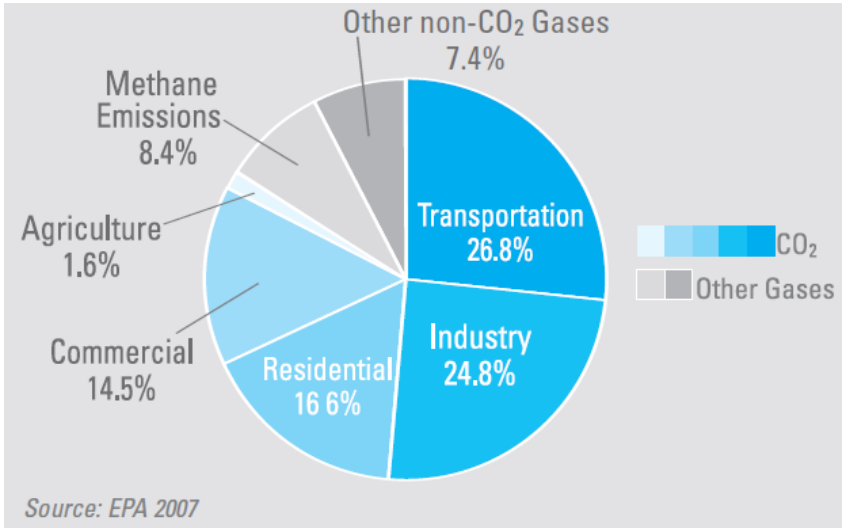
- Welcome and Introductions
- ENERGY STAR Program Overview
- Overview of Specification Revision Process
- Reasons Driving CAC/ASHP Specification Revision
- Framework Document Discussion
  - Regional specification
  - Additional performance metrics
  - System status and diagnostics
  - Supporting quality installation
  - Test method
- Timeline and Next Steps

What is ENERGY STAR

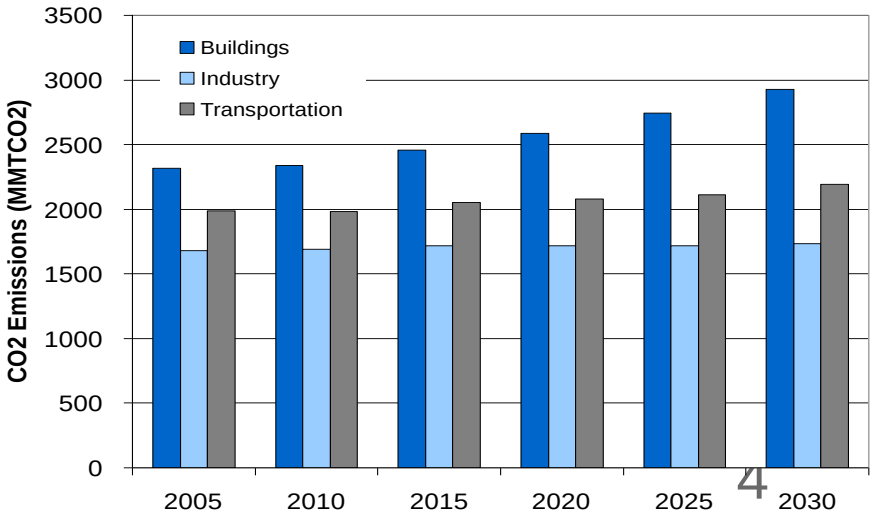
- **ENERGY STAR** is a voluntary government-backed program dedicated to helping individuals protect the environment through superior energy efficiency
- **ENERGY STAR** is the national symbol of energy efficiency, making it easy for consumers and businesses to identify high-quality, energy-efficient 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

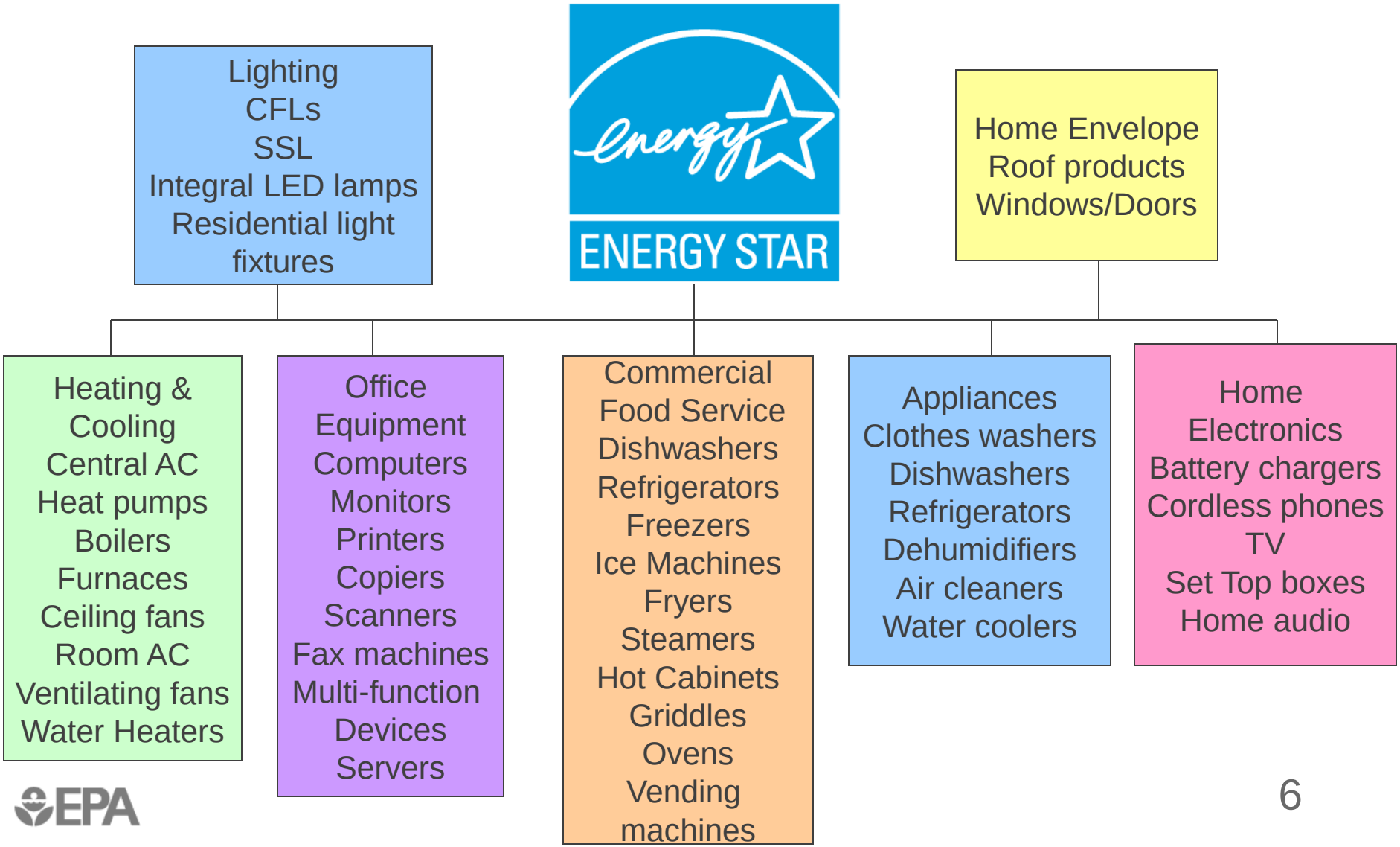


Source: AEO 2008

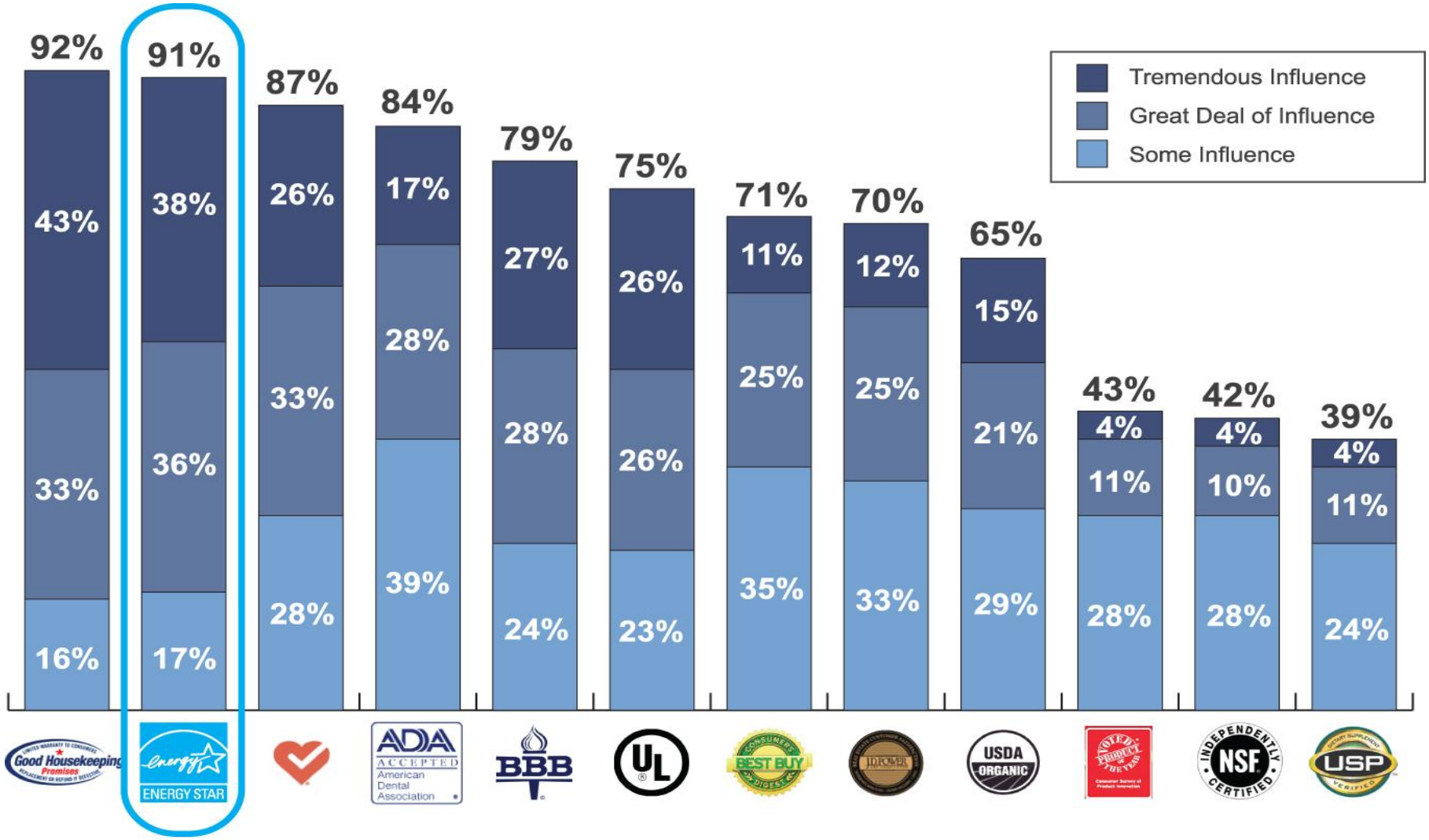
ENERGY STAR Portfolio

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

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

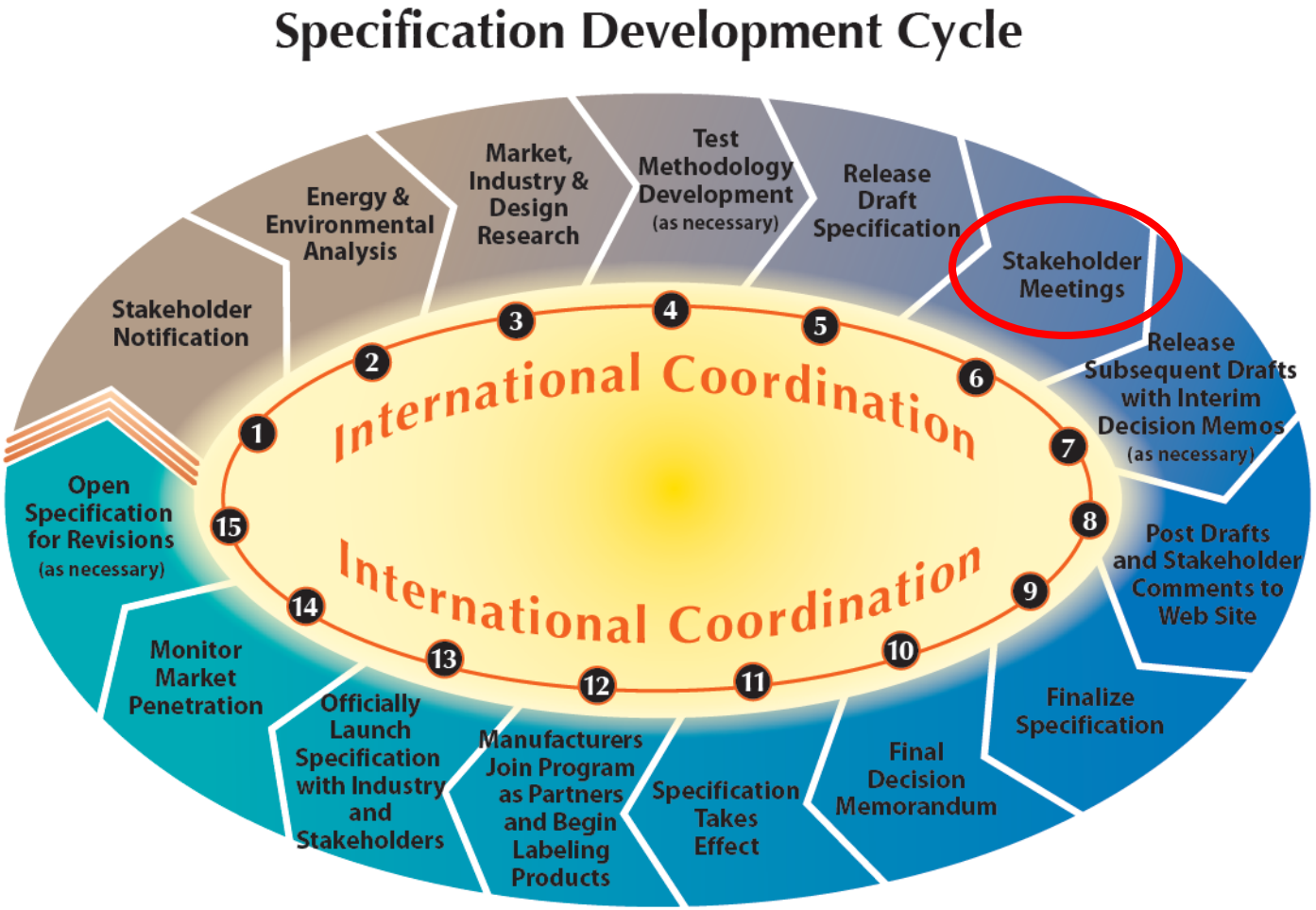


ENERGY STAR is one of the most influential labels in the marketplace



Source: Fairfield Research, July 2009

Development Process



Guiding Principles for When to Revise ENERGY STAR Specifications

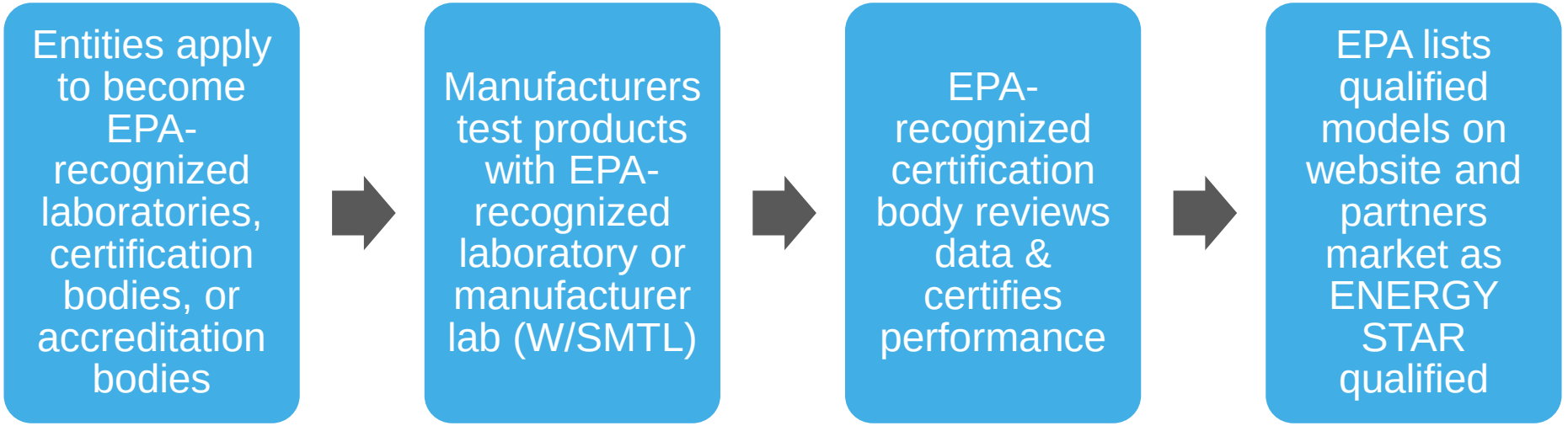
- Significant increase in market penetration of ENERGY STAR qualified models
- Change in the Federal minimum efficiency standards
- Technological advancements
- Product availability limitations
- Issues with consumers realizing expected energy savings
- Performance or quality issues
- Issues with test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

Important Process Elements

- Consistency
- Transparency
- Inclusiveness
- Responsiveness
- Clarity

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

Reasons for Specification Revision

- Current specification, Version 4.1, has been in place since April 1, 2006. EPA considers specifications for revision at least every three years.

- New federal minimum efficiency standards will take effect in January 1, 2015. Some levels will meet or be close to the current ENERGY STAR levels.

Themes and Issues

- Regional Specification
- Additional performance metrics
- Supporting quality installation and maintenance
- Test Method

Regional Specification

- 2015 federal standards divide nation into three regions: Hot Dry (Southwest), Hot Humid (South) and Rest of the Country (North)
- EPA considering similar regional approach for ENERGY STAR
- If regional approach adopted, EPA would harmonize ENERGY STAR regions with DOE regions

Regional Labeling

- Regional approach presents labeling complexities
- One possible solution – requiring ENERGY STAR regional logo on a rating certificate available for download from the manufacturer (or their Certification Body)
  - Links model numbers of the combination system to performance ratings
  - For example, AHRI Directory Certificate

Regional Specification Questions

1. What do non-AHRI manufacturers use as proof of performance to utilities or consumers for rebates?
2. Any alternative suggestions for simplified, reliable labeling of ENERGY STAR certified models under a regional specification?
3. Are there any issues with providing a performance rating certificate for download?

Additional Performance Metrics for Northern Regions

Additional Metrics	Reason for Consideration
Coefficient of Performance (COP) at 35°F or 17°F	Similar to EER, may be valuable to track peak load performance
Capacity de-rating at 17°F	Determine when a unit will provide the heat needed without supplemental heat

Additional Performance Metric Questions

4. What performance indicators do utilities use in their rebate programs? Are there any additional ones used to identify ASHPs that are well suited for use in cooler climates?
5. Do manufacturers capture COP data during the testing currently conducted for DOE regulatory metrics?
6. For northern region, can the HSPF be raised independently of SEER?

Supporting high quality installation and maintenance

- Improper installation and maintenance have major effects on CAC/ASHP efficiency, 20 - 30% total energy loss
- EPA continues to be interested in technical capabilities that facilitate this
- In preparing for the revision, EPA discussed several types of requirements with a wide variety of stakeholders
  - Communications and diagnostics
  - Airflow/static pressure test points
  - Expanded performance data for designers

Communications and Diagnostics

- Auto-diagnostics can allow maintenance alerts to homeowners for either homeowner action (e.g. filter change) or a service call (such as refrigerant charge or airflow issues)
- EPA may consider requiring alerts such as low refrigerant charge, high head pressure, or other faults to consumer and technician
- Internal system communication can automate setup by sending information about capacity, stages and required air flow

Airflow/static pressure test ports

- Equipment shipped with pre-drilled holes to measure airflow or pressure
  - ENERGY STAR Homes V 3.0 spec requires measurement of air flow and/or static pressure at specific points in the air path
  - Testing holes in cabinets are currently made by installers at the time of installation
  - Manufacturer-made test ports would standardize installer airflow measurement locations

Expanded Performance Data

- Helps designer determine the capacity of the system at the indoor and outdoor design conditions
- Data not always publically available or in consistent format
- EPA recommends Expanded Performance Data be published in a consistent format, and provided for all rated combinations

System status and Diagnostics Questions

7. How prevalent are these technologies in the market today? What is the near term market evolution in this area?
8. What approximate percentage of models available have two way communication with a system controller?
9. In regard to maintaining energy efficiency, what information is most important to communicate back to the system controller? Are there any studies available?

System status and Diagnostics Questions (contd.,)

10. Are there any studies or data available on the savings attained by effective system status communications?
11. NIST is working on a Fault Detection and Diagnostics (FDD) program, a standalone software tool that uses a rule-based chart to detect and diagnose common faults. How do manufacturers foresee system designs incorporating FDD? How do utilities plan to use FDD?

Other Quality Installation Questions

12. Are there concerns about or difficulties in publishing expanded performance data?
13. What other data points or information could be helpful during the design or installation of a system?
14. Will pre-made testing holes in CAC/ASHPs standardize airflow measurements?

Test Methods

- Current specification, Version 4.1, refers to ANSI/AHRI 210/240-2008 for SEER and HSPF, and AHRI 210/240-1994 for EER

- Version 5.0 references will be updated to refer directly to the DOE test method, 10 CFR, Part 430, Subpart B Appendix M

Specification Development Timeline

- Jul 1, 2013 — Framework published
- Jul 22, 2013 — Stakeholder Webinar
- Aug 2, 2013 — Framework comment period ends
- Sep 2013 — Draft 1 published
- Nov 2013 — Draft 2 published
- Jan 2014 — Final Draft published
- Feb 2014 — Final published

Contact Information

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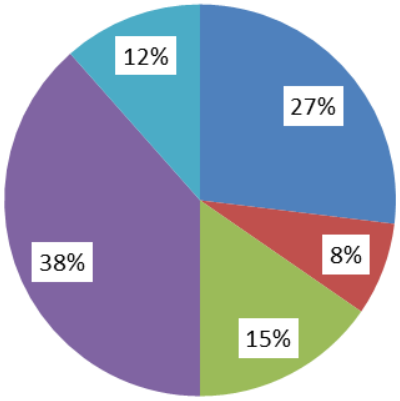
Questions?

Poll Results

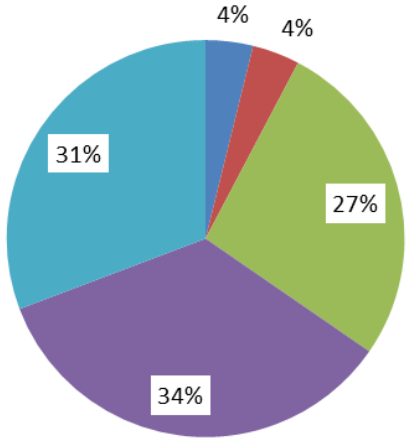
Which of these diagnostic and communication features do you see as most important for energy efficiency?

- Automatic monitoring of subcool/superheat
- Fault code history, in text, available to technicians
- Blower signal for estimating static pressure/airflow
- Letting residents know about a need for service
- Communicating system information at commissioning



Which of these diagnostic and communication features do you see as the second most important for energy efficiency?

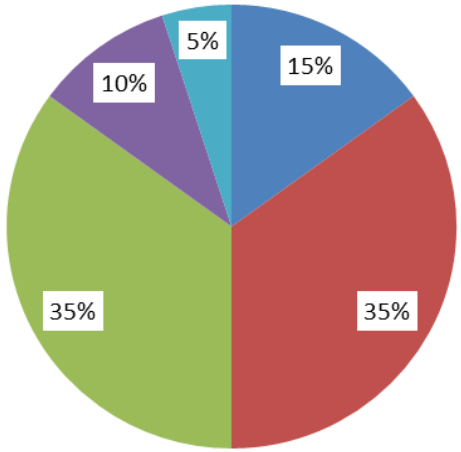
- Automatic monitoring of subcool/superheat
- Fault code history, in text, available to technicians
- Blower signal for estimating static pressure/airflow
- Letting residents know about a need for service
- Communicating system information at commissioning



Poll Results

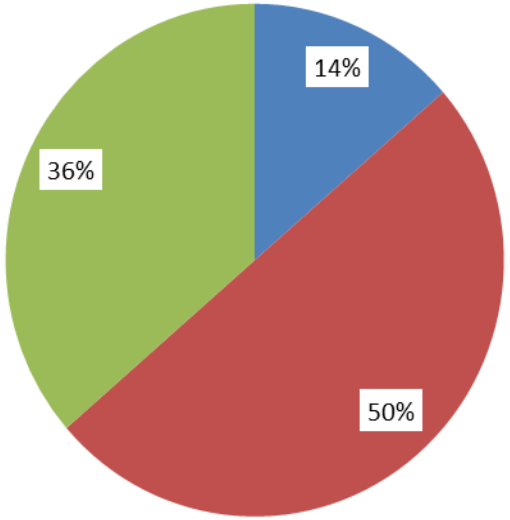
Which of these diagnostic and communication features do you see as the easiest to implement?

- Automatic monitoring of subcool/superheat
- Fault code history, in text, available to technicians
- Letting residents know about a need for service
- Blower signal for estimating static pressure/airflow
- Communicating system information at commissioning



Which of these additional capabilities is most important to energy efficiency?

- Easier access to expanded performance data
- Enabling actual static pressure drop/airflow measurements
- Other manufacturer action or product capability



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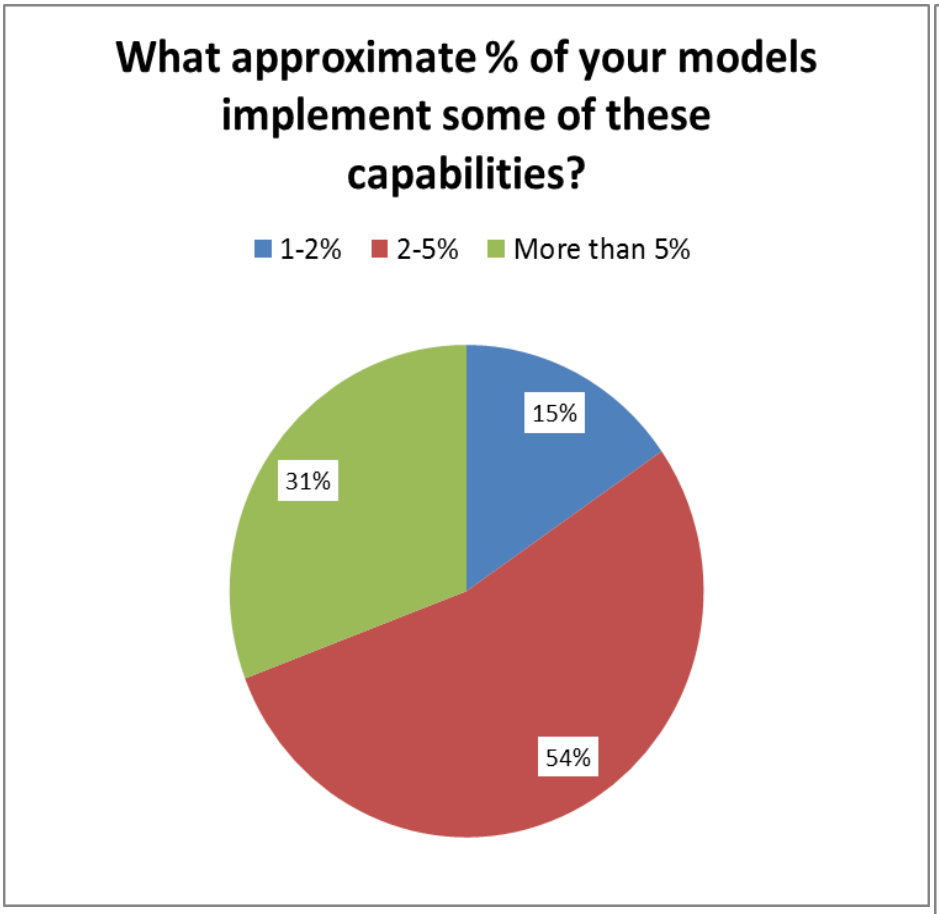

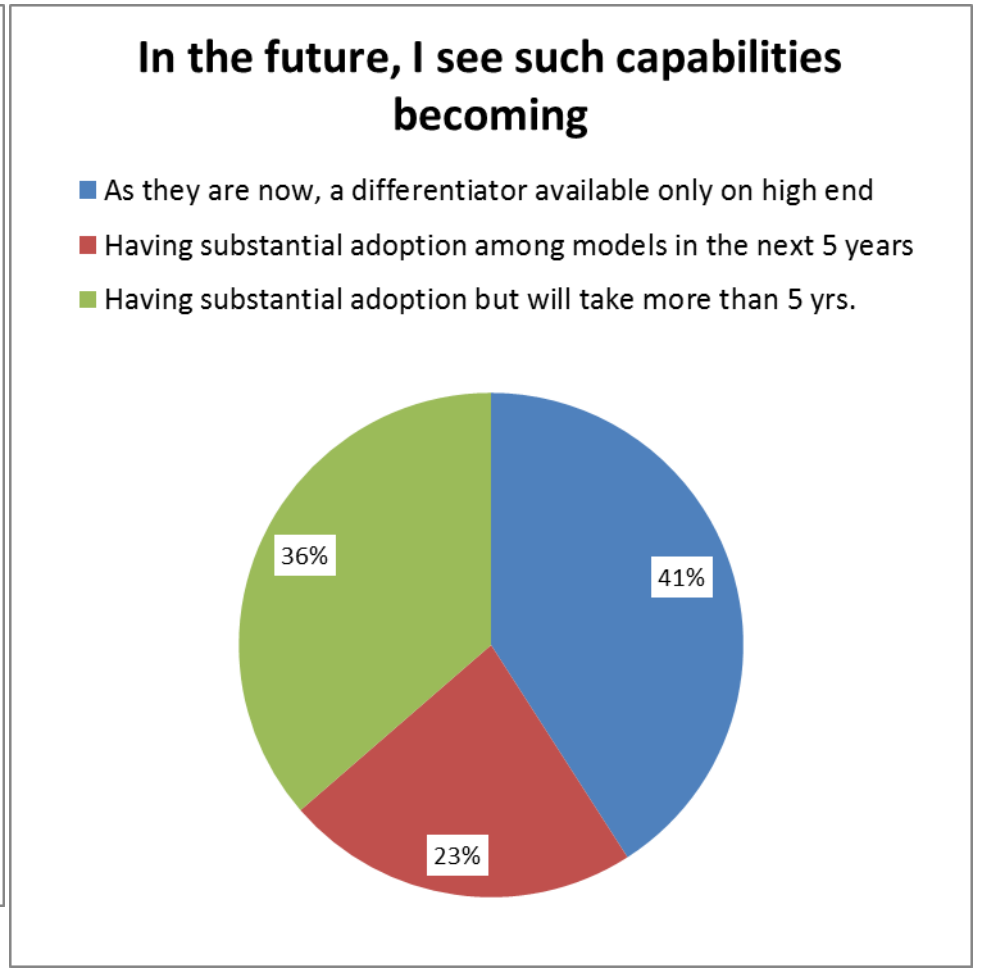

Thank You