



**ENERGY STAR®
Furnaces**

**Draft 1 Version 3.0
Stakeholder Meeting
September 21, 2010**

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Welcome to the webinar. Is anyone having trouble viewing the slides? Great. Rather than go through lengthy introductions, you should be able to see who is connected to the webinar in the webinar window.

I've spoken to many of you in the past, and am looking forward to working with you to update this Furnace specification. ENERGY STAR has been labeling furnaces for a long time (since 1995!) and the industry has made tremendous strides in that time. As I look forward, I see opportunities for even more progress.

Webinar Goals



1. Present the drivers and goals for this revision process.
2. Highlight key changes in the Version 3.0.
3. Solicit stakeholder feedback on proposal and outstanding issues.
4. Address stakeholder questions about process and/or changes.
5. Identify next steps and timeline.

Agenda



- ENERGY STAR Overview
- Drivers and goals for revised specification
- Review of Draft 1 Version 3.0 proposal
- Enhanced testing requirements
- Next steps and development schedule

Q 0: Throughout the presentation, questions on which EPA would particularly like stakeholder feedback will be highlighted in this format.



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We'll be pausing periodically for questions and comments, so except for clarifications, please try to hold your questions for the pauses. Our questions for you will be highlighted throughout the presentation.

We've kept the overview of the ENERGY STAR program very brief, with the assumption that most of you are quite familiar with it. If anyone would like to learn more, please give either myself or Sarah Medepalli at ICF International a call. Our contact information is at the end of the slide deck, and I am also easy to find through energystar.gov.

We'll spend quite a bit of time going over what's changed between the current furnace specification and this draft revision. As those of you who've had a chance to look at the draft know, there are some very substantial changes, and we'll discuss them in detail.

We will also talk about the new, program-wide testing and verification requirements. These are incorporated into the current draft, but will also be in effect for the current furnace standard (as for all ENERGY STAR standards) in 2011.

So let's get started!

ENERGY STAR Overview

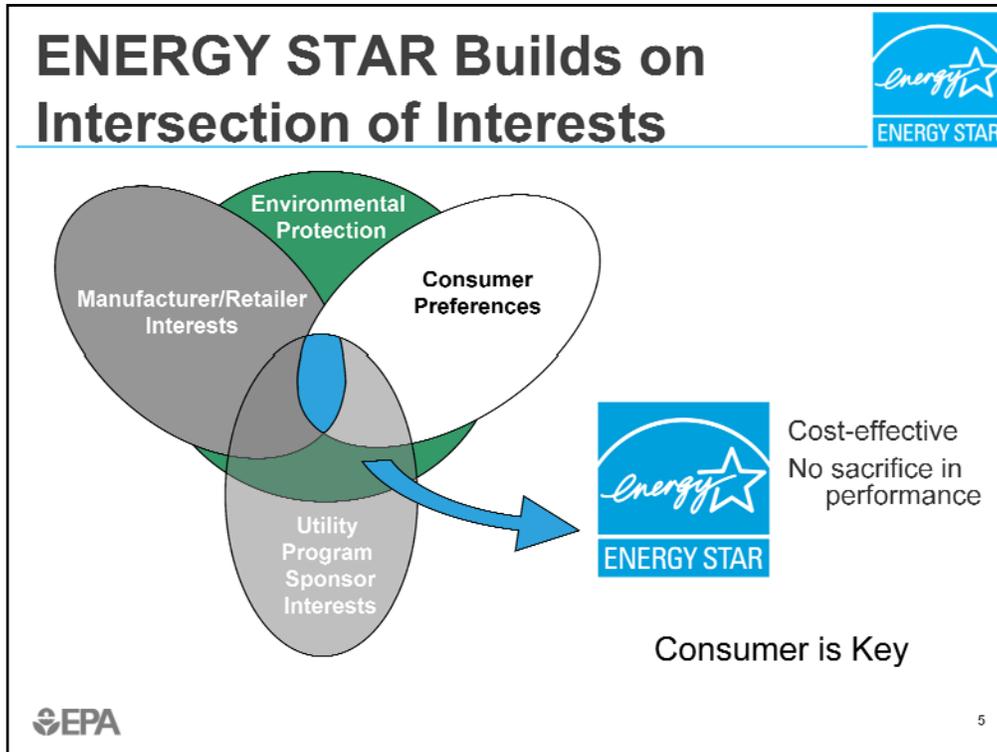


- What is ENERGY STAR?



A voluntary climate protection partnership
A strategic approach to energy management
Recognized by over 75% of Americans
An internationally recognized brand





In writing our specifications and administering the program, we're looking for situations where everyone can win – not just the environment, but also manufacturers, consumers, and utilities.

To find the multiple wins, we have some guidelines in writing specifications. They are:

- Cost-effective efficiency
- Performance maintained or enhanced
- Significant energy savings potential
- Efficiency improvements are achievable with non-proprietary technology
- Product differentiation and testing are feasible
- Labeling can be effective in the market

ENERGY STAR Successes



In 2009 alone, Americans:

- Saved **\$17 billion dollars** off energy bills with **ENERGY STAR**
- Saved **45 MMTCe**, equivalent to the annual emissions of 30 million cars
- Purchased over **300 million ENERGY STAR** qualified products



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For a program with a relatively small budget, ENERGY STAR has delivered a lot.

What Drives Specification Revisions?



- High or low market share of ENERGY STAR products
- Federal or state minimum efficiency standards
- Introduction of new technologies or changes in product design
- Performance or quality issues
- Availability of new (or changes to existing) test procedures



When we have a product type that's already labeled, how do we know it's time to consider revising?

Furnace Revision: Drivers



- 2008 ENERGY STAR Gas Furnace market penetration– 43%
- DOE minimum standards
 - Proposed regional approach.
 - Proposed minimum AFUE for gas furnaces in U.S. North equal to current ENERGY STAR level.
- Canadian minimum efficiency standard for gas furnaces equal to the current ENERGY STAR specification



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As you know, many of these drivers apply to furnaces.

Furnace Revision: Goals



- Represent the most efficient products in marketplace
- Align with DOE regional approach for AFUE levels
- Make modest increases in AFUE in areas of the U.S. where more cost effective
- Introduce furnace fan efficiency and air leakage requirements
- Identify areas for further research and additional savings opportunities (e.g., emergence of digital communication within HVAC systems)



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As we develop this revision together, these are the goals that EPA will have in mind.

Next, we'll talk in detail about the energy efficiency requirements we've proposed for the revision. First, let's take a minute and pause for questions and comments.

Draft 1 V3.0 Specification



- Key Areas for Discussion
 - Regional Approach
 - AFUE
 - Furnace Fan Efficiency
 - Air Leakage



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Great, so here are the key changes to the requirements. We are moving to a regional approach, which will allow us to raise AFUE in some regions. We are also adding requirements for furnace fan efficiency and furnace cabinet air leakage. Both are opportunities based on newly available test procedures.

Regional Approach



- U.S. North - States with population-weighted Heating Degree Days (HDD) equal to or greater than 5000.
- U.S. South - States with population-weighted Heating Degree Days (HDD) less than 5000.
- Canada - All provinces and territories.
- Proposed regions for the U.S. are similar to the DOE proposed regions for minimum standards.



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I feel confident saying that there is broad recognition that it is not cost effective in some climates to raise furnace requirements from very efficient to super-efficient. However, in some climates there are still opportunities for cost-effective efficiency. Therefore, we propose using climate regions similar to those proposed in the recent DOE rulemaking. Since the ENERGY STAR program operates in Canada as well, we will also have a region for Canada.

Regional Approach cont.



U.S. Regions	U.S. States Per Region
U.S. North	Alaska, Colorado, Connecticut, Idaho, Illinois, Indiana, Iowa, Kansas, Maine, Massachusetts, Michigan, Minnesota, Missouri, Montana, Nebraska, New Hampshire, New Jersey, New York, North Dakota, Ohio, Oregon, Pennsylvania, Rhode Island, South Dakota, Utah, Vermont, Washington, West Virginia, Wisconsin and Wyoming.
U.S. South	Alabama, American Samoa, Arizona, Arkansas, California, Delaware, District of Columbia, Florida, Georgia, Guam, Hawaii, Kentucky, Louisiana, Maryland, Mississippi, Nevada, New Mexico, North Carolina, Oklahoma, Puerto Rico, South Carolina, Tennessee, Texas and Virginia.



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Here are the actual states and territories in each of the US regions.

Moving to regional approach will require regional versions of the ENERGY STAR label. We've been doing this for years for windows, which have much more complex regions, though a simpler distribution chain. We anticipate the label will include a small map and a text listing of states by postal abbreviation. Keep in mind that these labels will only be relevant to furnaces between 90 and 94% AFUE, since the most efficient furnaces will qualify everywhere. The labeling requirements, when we finish developing them, will be in the identity guidelines.

AFUE Levels



Furnace	Regions	Proposed AFUE	Current AFUE
Gas Furnace	U.S. North	≥92%	≥90%
	U.S. South	≥90%	≥90%
	Canada	≥94%	≥90%
Oil Furnace	U.S. All	≥85%	≥85%
	Canada	≥85%	≥85%



We propose the following AFUE levels. As you see, we have a modest AFUE increase for gas furnaces in the U.S. North, and a more substantial one in Canada.

AFUE Levels cont.



- Gas Furnaces
 - Higher AFUE combined with furnace fan efficiency and air leakage requirements is cost effective in U.S. North and Canada.
 - Increase in AFUE is not cost effective in U.S. South, so no AFUE increase proposed.
- Oil Furnaces
 - U.S. and Canada oil furnace market is small and shrinking compared to gas furnace market.
 - U.S. market penetration continues to be low (2008 market penetration is 12%).
 - Proposal to maintain the current AFUE levels for both U.S. and Canada.



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So let's take a minute here and pause for comments and questions.

Furnace Fan Efficiency



- EPA recognizes potential energy savings in furnace fans
 - Blowers account for roughly 80% of total furnace electricity consumption.
- Proposed test standard - CSA C823 "*Performance standard for air handlers in residential space conditioning system*".
- Proposed metric - Annual Electrical Energy Consumption Rating (AECR).
- AECR Definition - The standardized Integrated Mechanical System (IMS) electrical energy consumption rating. AECR accounts for the annual electrical energy used by an IMS to provide standardized space heating, water heating, and ventilation loads.



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This draft went out with a reference to C823. We are aware that DOE is also planning to release a fan efficiency test metric, and will continue to follow that process. Our goal is to avoid unneeded test burdens, but we also would like to capture energy saving opportunities as soon as possible.

Furnace Fan Efficiency



- As the annual cooling and heating hours for U.S. and Canada are similar, EPA proposes to use standard C823 as is for U.S.

Region	Annual Heating Hours	Annual Cooling Hours
Canada	2000	400
U.S. National Average	1970	399
U.S. North	2400	310
U.S. South	1700	460



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We had originally anticipated altering the heating and cooling hours used in calculating AECR, and asked Jim Lutz at LBL to come up with an initial proposal of reasonable numbers to get the discussion started. However, the average hours in the US are not very different from in Canada, and even a breakdown by region doesn't change the picture a lot. (We are guessing this is because in colder climates, folks have larger capacity heating equipment, but don't particularly run it more.) So, for simplicity, we propose using AECR as calculated in C823.

Furnace Fan Efficiency cont.



We intend to propose a level for the fan efficiency requirement in the next draft, based on any data stakeholders share with us by September 30, 2010.

- Q 1:** Are there any concerns with standard C823 with regards to the test procedure or calculation?
- Q 2:** Are there any concerns using the same standard and conditions for US?
- Q 3:** If so, what approaches might be better for the U.S. regions?



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Let's pause again for discussion.

Air Leakage



- Air leakage increases space conditioning load, reduces energy efficiency and contributes to air quality issues
- Proposed air leakage level is $\leq 2\%$ for both gas and oil furnaces sold in the U.S. and Canada
- Florida building code gives a credit for $\leq 2\%$ air leakage.
- International Energy Conservation Code (IECC) and California Energy Commission: proposals to include the 2% requirement.



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While there had never been a DOE or EPA requirement for air leakage, the Florida residential building code did give a credit for furnaces with 2% or less leakage. Several manufacturers sent letters to Florida listing a substantial number of furnace models with low leakage. Furthermore, in recent research, some furnaces were found to leak very little, while others leaked much more. There did not seem to be a strong correlation with between cabinet tightness and furnace cost, though it's difficult to say since only a few models were tested.

Air Leakage cont.



- Proposed test standard - ANSI/ASHRAE Standard 193-2010 “Method of Test for Determining the Airtightness of HVAC Equipment”
- Air Leakage (Q_{leak}) Definition - The airflow rate required to maintain the applied pressures is the air leakage rate of the equipment under test, Q_{leak} . The percent of the rated flow of the fan that leaves or enters through cracks, joints and penetrations in the furnace cabinet rather than through supply and return ducts installed in accordance with manufacturer’s instructions.



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ASHRAE recently released a standard test method for determining furnace cabinet tightness. It assumes that the furnace is installed according to the manufacturer’s instructions.

Air Leakage cont.



- Q 4:** Are there any concerns with the proposed level?
- Q 5:** Are there any concerns with using the ASHRAE standard 193 test method to determine air leakage?
- Q 6:** What are the typical air leakage levels observed in the field?
- Q 7:** What is the consumer cost premium for a tighter furnace cabinet?



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Let's pause here for discussion again. Are there any questions or comments from folks on the phone?

This concludes our discussion of the efficiency requirements in this draft revision. Now let's talk a little about enhanced testing and verification.

Enhanced Testing and Verification (ET&V) Requirements



- Certification of test data prior to qualification and labeling, beginning January 2011
 - EPA will recognize certification bodies (CBs), laboratories, and accreditation bodies (ABs)
 - All new products seeking qualification will have to be tested in an EPA-recognized lab (not necessarily third-party), and test reports will have to be reviewed and certified by an EPA-recognized CB
- Verification testing after qualification
 - CBs will test samplings of qualified models for all product categories, to ensure compliance with the reported values
 - Products must meet the ENERGY STAR requirements as reported



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Just a note here, that we expect to have at least one CB for furnaces up and running when the requirement takes effect. We hope and expect that AHRI will be the main CB for furnaces, though there may well be others.

ET&V changes to furnace specification



- Key ET & V changes to the specification include –
 - Product family definition
 - Significant digits and rounding requirements
 - Clear definition of included and excluded products
- Product Family Definition - A group of models which have identical ratings for heating input, output heating capacity, electric power (PE), auxiliary electrical energy consumption (EAE), fossil fuel energy consumption (EF), and annual fuel utilization efficiency (AFUE).
- The product family definition has been adopted from AHRI Furnace Certification Program.



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Like all the specifications, the furnace specification changed a bit to support the ET&V program. These changes are made to this draft revision. Mostly, we needed to be more clear in order for CBs to have clear guidance.

ET&V Timeline



- September 14, 2010 – An announcement sent to all stakeholders on ET&V requirements and timeline.
- October 1, 2010 – Comments due on revised Partner Commitments and Product Specifications.
- Mid October 2010 - Final Partner Commitments and Product Specifications.
- End of December 2010 – Implementation of the ET&V requirements.
- EPA is currently accepting applications from accreditation bodies (ABs), test laboratories, and certification bodies (CBs) that wish to participate in the ENERGY STAR program



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This is how we expect the program-wide ET&V requirements to unfold.

Keep in mind that the performance requirements are NOT changing – just how the program is administered.

By the time the Version 3 furnace specification comes into effect, this will all be old hat to you!

Are there any questions about this?

Looking into future



- Technical features to address installations and maintenance? → Diagnostics and Communications
 - Monitor operating state, diagnose efficiency loss and other problems, notify homeowners or contractors
 - Digital communication enhances the utility of diagnostics.
 - EPA looking at including self diagnostics as part of Tier 2 requirements, or in the future.

Q 8: How are energy savings provided by self diagnostics captured?

Q 9: Are there any industry standards on diagnostics?



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It was clear to us in thinking about revising the furnace specification that straight efficiency requirements will be of limited utility in guaranteeing energy savings. That's partly because, as I mentioned earlier, the payback from changing from a very efficient furnace to a super-efficient one just isn't very high, either in dollars or in energy use.

One area that does provide opportunity for improvement is maintaining that efficiency through installation and over time. The ENERGY STAR homes team has worked with ACCA to release a Quality Installation specification, and is building the capacity in the installer base to do a great job with high efficiency equipment. I know that many of our manufacturing partners have put a lot of effort into that as well.

Meanwhile, though, as product folks, we are looking for technical features that can help make quality installation and appropriate maintenance easier and more likely to occur. We've identified two areas that may aid this: self-diagnostics, and communications. I know that the large manufacturers have high-end product lines that can detect problems and communicate them to a thermostat, for instance. Also, they can automatically configure the thermostat properly for the equipment its connected to. We think these kinds of features are likely the future backbone of the most energy efficient systems. We are building this kind of capability into the ongoing Climate Controls specification development, and expect to include it in future furnace specifications.

So, we are interested in what kinds of diagnostics and advanced control features you see as garnering the largest energy savings, and how that energy savings can be quantified.

Furnace spec revision Schedule



- 8-30-2010 Draft 1 Version 3.0 Furnace specification released
- 9-21-2010 Draft 1 Stakeholder webinar
- 9-30-2010 Deadline for comments/data
- Mid Oct 2010 Draft 2 specification released
- Early Nov 2010 Draft 2 Stakeholder webinar
- Mid Nov 2010 Deadline for comments/data
- Early Dec 2010 Final draft specification
- Mid Dec 2010 Deadline for comments/data
- Early Jan 2011 Final specification released
- Sept 2011 Version 3.0 takes effect



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This is our anticipated schedule for the rest of the furnace specification revision. As you can see, we expect to finish early in the new year.

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Visit the ENERGY STAR Furnace Web page at

www.energystar.gov/revisedspecs





Thank you



Learn more at energystar.gov

This concludes our presentation, and it looks like we have some additional time for discussion, so the floor is open.

Thanks for your time and attention, and I look forward to working with you on this revision.