



ENERGY STAR® for Windows, Doors, and Skylights

Industry Stakeholders Meeting

December 12, 2014

The Webinar will begin shortly.

- Please mute your lines
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- All lines will be muted for the duration of the webinar
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Welcome!

- **Thank you for participating**
- Please mute phones and laptops
- Please use microphones to ask questions or make comments
- Designated note takers will capture questions and issues raised
- Presentation will be posted on the www.energystar.gov/windows website



Introduction

Beth Craig

U.S. Environmental Protection Agency

Director

Climate Protection Partnerships Division

**Welcome Windows, Doors, and Skylights
Stakeholders**



Meeting Agenda

- I. Introduction
- II. ENERGY STAR Program Overview
- III. Review of Guiding Principles
- IV. Additional Discussion
- V. Next Steps



Goals for Future ENERGY STAR Specification Revisions

EPA seeks to:

- Encourage greater industry participation and collaboration
- Make the process clearer and more predictable
- Enhance the transparency of the analytical approaches used and the way criteria are proposed and developed



Stakeholder Participation

- Stakeholder participation is an essential part of the ENERGY STAR specification revision process
- This meeting is designed to give stakeholders more opportunity to collaborate and engage with EPA very early in the specification revision process before we develop a framework document
- The goal for this meeting is to begin the dialogue on how to make specification revisions as collaborative and transparent as possible
- EPA plans to take into account stakeholder insights prior to developing a framework document



Stakeholder Participation

Discussion framework:

- This presentation was developed to facilitate a structured discussion and includes opportunities for feedback
- EPA will present information on particular topics, providing background information, and proposing initial ideas
- Participants are encouraged to ask questions, present alternatives, and raise issues for discussion
 - Please approach microphones to comment
 - Webinar participants can submit written comments or questions via the “Chat” feature

Yellow boxes throughout the presentation call attention to important questions and other discussion topics

- After the meeting, stakeholders are encouraged to submit feedback on these topics in writing to assist EPA in drafting the Framework Document



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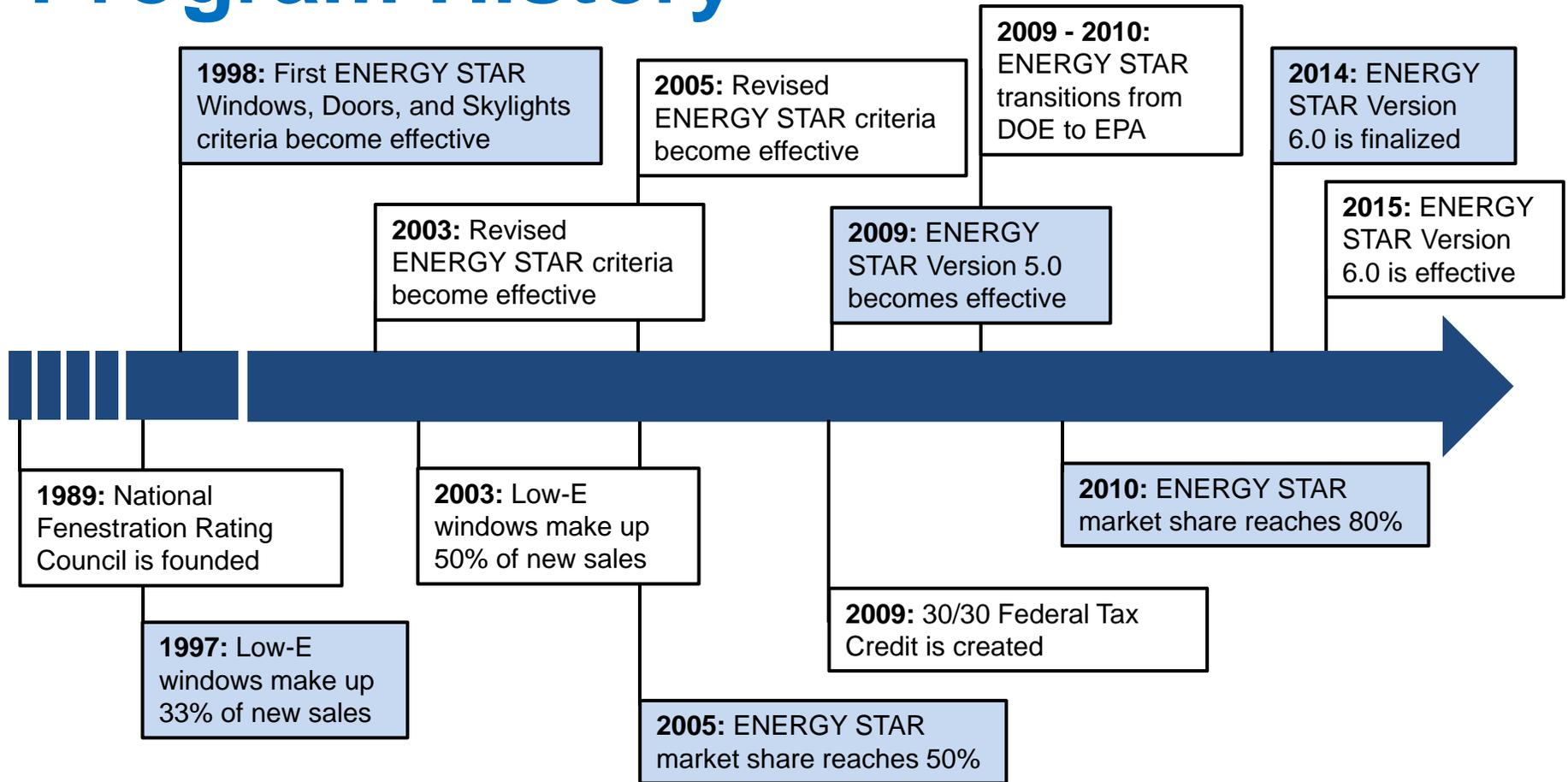
ENERGY STAR Program Overview

Topics:

- Program History
- Program Design
- Specification Revision Process
- Transparency and Confidentiality
- Guiding Principles for Specification Revisions
- When to Review a Specification
- How to Revise a Specification
- When to Sunset a Specification



Program History





Program Design

The ENERGY STAR Program is designed to

- “Identify and promote products that reduce greenhouse gas emissions by meeting highest energy conservation standards.”
- “Use a systematic framework built on a foundation of transparency and collaboration with stakeholders to... reassess performance specifications as market conditions change.”

Source: ENERGY STAR Products Program Strategic Vision and Guiding Principles, May 2012



Specification Revision Process

EPA's goal is to make the specification revision process collaborative and transparent

- As we explore the process in more detail, please consider the following questions:
 - How can EPA encourage greater industry participation and collaboration?
 - How can EPA make the process clearer and more predictable?
 - How can EPA enhance the transparency of the analytical approaches used and the way criteria are proposed and developed?

How can EPA improve the overall process of future specification revisions for windows, doors, and skylights?



Transparency and Confidentiality

EPA strives to present to the public all data and information used to make decisions

- Product manufacturers and other stakeholders have valuable market insights and data, and EPA wishes to encourage more stakeholder participation
- However, it is also critical that EPA protect the confidential cost data submitted by stakeholders

How can EPA strike the best balance between transparency and the confidentiality needed for proprietary data?



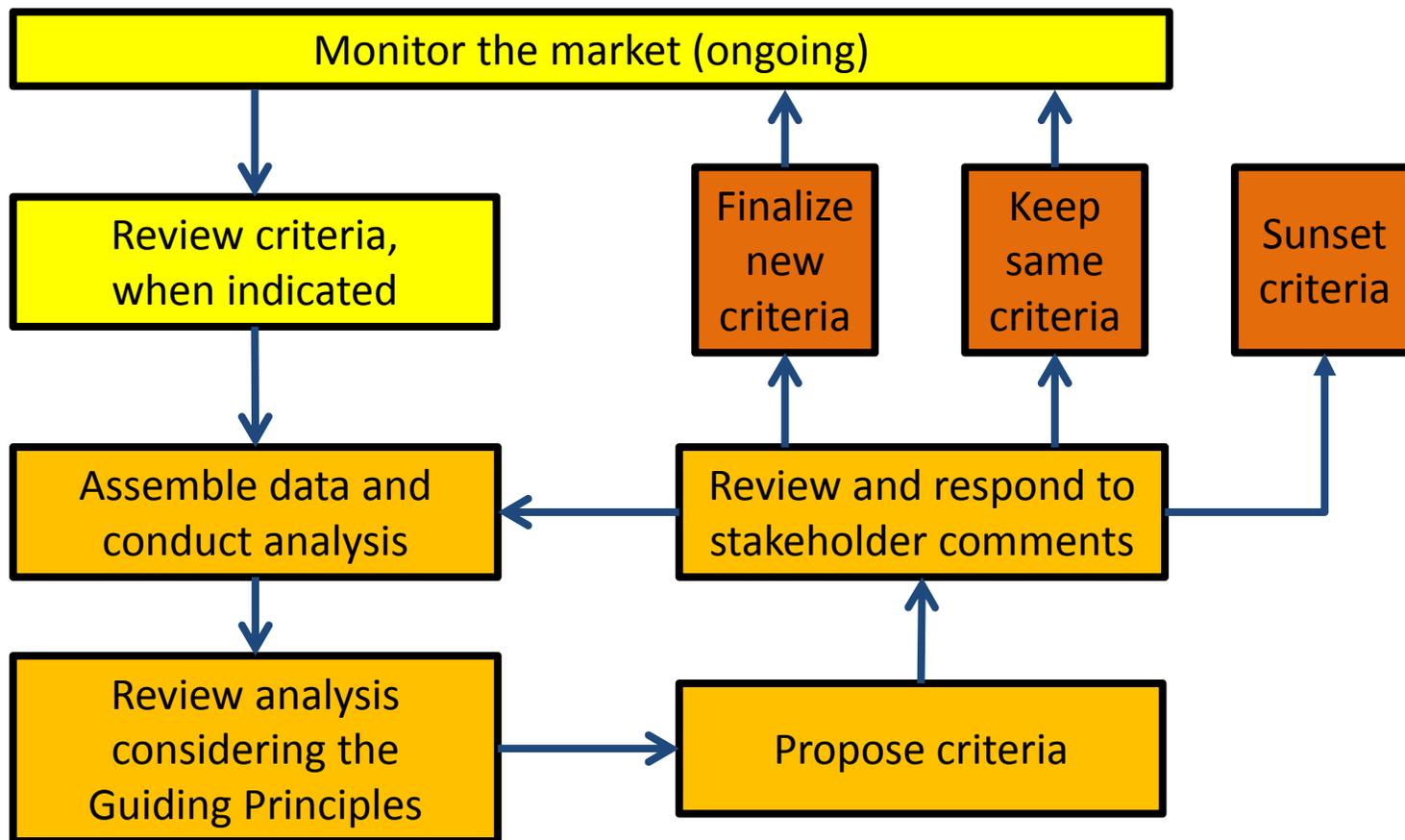
Guiding Principles for Specification Revisions

The *ENERGY STAR Product Program Strategic Vision and Guiding Principles* identifies three issues that EPA considers as market conditions change:

1. When to review a specification for possible revision
2. How to revise a specification
3. When to sunset a specification



Specification Revision Process For Fenestration Products





When to Review a Specification

Specifications are reviewed every 2-3 years, depending on the following factors:

- Market penetration of ENERGY STAR products (35% or more)
- Changes in minimum efficiency standards
- Technological advancements
- Product availability limitations
- Issues with consumers realizing expected energy savings
- Performance or quality issues
- Issues with test procedures

What are the best sources of information to monitor and understand the fenestration market?



How to Revise a Specification

When reviewing a specification and proposing revised criteria, EPA seeks to balance the following guiding principles:

- Significant energy savings can be realized on a national basis
- Product performance can be maintained or enhanced with increased energy efficiency
- Purchasers will recover their investment in increased energy efficiency within a reasonable amount of time
- Energy efficiency can be achieved through one or more technologies such that qualifying products are broadly available and offered by more than one manufacturer
- Product energy consumption and performance can be measured and verified with testing
- Labeling would effectively differentiate products and be visible for consumers



When to Sunset a Specification

The following conditions suggest that a product category should be sunset rather than revised:

- Additional cost-effective energy efficiency gains are not available or anticipated
- A federal standard [minimum efficiency standard] exists or is forthcoming at the current ENERGY STAR level that will serve as a backstop so efficiency gains are maintained
- The market has evolved such that the product type is being discontinued

Should EPA consider sunsetting the ENERGY STAR specifications for any window, door, or skylight categories?

Source: ENERGY STAR Products Program Strategic Vision and Guiding Principles, May 2012



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Review of Guiding Principles

The following section will review each Guiding Principle in detail and highlight key issues to discuss, including:

- How can each Principle be assessed for the Windows, Doors, and Skylights program?
- What inputs and data sources should EPA use for its analyses?
- What other issues should EPA and stakeholders consider?



Review of Guiding Principles

Topics:

- National Energy Savings
- Maintaining Product Performance
- Cost-Effectiveness
- Product Availability
- Measurement and Verification
- Market Differentiation



National Energy Savings

“Significant energy savings can be realized on a national basis”

Key Issues

- Possible Energy Improvements
- Emerging Technologies
- Methodology and Modeling
- Data and Assumptions



National Energy Savings

Possible Energy Improvements

- EPA has not developed target criteria for Version 7 at this time
- When reviewing a specification, EPA considers different ways to improve energy efficiency
- EPA may consider changes to:
 - U-factor criteria
 - SHGC criteria
 - Equivalent energy tradeoffs
 - Air leakage criteria
 - Climate zone boundaries
 - Other product attributes or program requirements

What changes to the specification should EPA consider in the future to realize significant national energy savings?



National Energy Savings

Emerging Technologies

- Are new technologies emerging or available today that EPA should consider?
 - Improved frames
 - Improved glass and spacer combinations
 - Gas fill technologies
- Are there new product types that EPA should consider?
 - Low-e storm windows
 - Dynamic windows
 - Fenestration attachments

Are there additional emerging technologies or products that EPA should consider in the future?



National Energy Savings

Methodology and Modeling

- National energy savings can be calculated using standard modeling software and publicly available market data
- Lawrence Berkeley National Labs (LBNL) is working to update the national savings model used for Version 6.0 with the latest software, including EnergyPlus and RESFEN 6
- The fenestration market is complex and varied across the country, requiring certain assumptions to simplify energy savings calculations
- The assumptions used for Version 6.0 are published online: <http://windows.lbl.gov/energystar/version6/>
- EPA is seeking input on data sources and assumptions and will propose the methodology in the Framework Document



National Energy Savings

Data and Assumptions

Potential Market Data Sources

- Ducker Research
- Hanley Wood & Virginia Tech
- Residential Energy Consumption Survey (RECS)

What are the best sources for market data, including shipments and market penetration?

Baseline Product Performance

- IECC building codes?
- Best-selling products?
- Worst-case products? (single/double clear?)

What baseline should EPA use to calculate energy savings?

Household Characteristics

- Representative climates?
- Home efficiency?
- Number of windows per home?

What assumptions should EPA make about household characteristics?



Maintaining Product Performance

“Product performance can be maintained or enhanced with increased energy efficiency”

Key Issues

- Potential Non-Energy Attributes
- Measuring Non-Energy Performance
- Product Subcategories



Maintaining Product Performance

Potential Non-Energy Attributes

- Specifications can include non-energy attributes in the interest of ensuring that ENERGY STAR products perform as well as (or better than) non-ENERGY STAR products
- In past specification revisions, stakeholders have asked EPA to evaluate non-energy attributes such as the following:
 - Visual transmittance (VT)
 - Condensation resistance (CR)
 - Operability
 - Structural integrity

What non-energy attributes are important to consumers?
Are any of these attributes compromised by increased energy efficiency?
Should additional attributes be considered?



Maintaining Product Performance

Measuring Non-Energy Performance

- The National Fenestration Rating Council (NFRC) Certified Products Directory (CPD) contains limited data on non-energy attributes
- Research papers have been published on the effects of certain components
- Manufacturers have experience with the performance of different product features and may have access to additional product data

How should EPA evaluate the non-energy performance of products?



Maintaining Product Performance

Product Subcategories

- ENERGY STAR specifications generally take a technology neutral approach to helping consumers identify the most efficient products within the category
- In rare cases, certain product subcategories can have separate ENERGY STAR specifications to accommodate their unique features/functionalities and to benefit consumers
- Subcategories are generally not created on the basis of component materials

Are there subcategories of products that have special features that make it more difficult to meet higher efficiency levels?



Cost-Effectiveness

“Purchasers will recover their investment in increased energy efficiency within a reasonable amount of time”

Key Issues

- Estimating Fenestration Product Costs
 - Voluntary Manufacturer Cost Data
 - Component Cost Analysis
 - Retail and Distributor Data
- Reasonable Payback Periods



Cost-Effectiveness

Estimating Fenestration Product Costs

- EPA recognizes that product prices can vary and are a function of a range of different product features and consumer circumstances
- EPA attempts to isolate the incremental cost of improving efficiency from other factors that may impact costs
- Potential sources for product cost estimates include:
 - Voluntary data from manufacturers
 - Component “Bill of Materials” analysis
 - Retailer and distributor product prices



Cost-Effectiveness

Voluntary Manufacturer Cost Data

- Stakeholder participation can help EPA develop more accurate cost estimates because fenestration product cost data is difficult to assemble
- It is important for EPA to understand the basis for cost estimates to compare costs
- During the Version 6.0 process, manufacturers voluntarily submitted data using a template provided by EPA
 - The template asked for estimates of the incremental costs of improving efficiency to different levels over best selling models
 - Confidential data was protected through non-disclosure agreements

How can EPA encourage more manufacturers to submit data?



Cost-Effectiveness

	Performance		Primary Components								Size
	U-Factor	SHGC	Foam-Filled?	IG Type	IG Size	Glass Type 1	Glass Type 2	Glass Type 3	Gas Fill	Spacer	
Best-Selling ENERGY STAR Qualified Window											
Improvements in U-Factor	U-Factor	SHGC	Change cells below as necessary								Added cost over best-selling
Window A1	-0.01										
Window A2	-0.02										
Window A3	-0.03										
Window A4	-0.04										
Window A5	-0.05										
Window A6	-0.06										
Window A7	-0.07										
Window A8	-0.08										
Window A9	-0.09										
Window A10	-0.10										
Improvements in SHGC	U-Factor	SHGC	Change cells below as necessary								Added cost over best-selling
Window B1		0.27									
Window B2		0.26									
Window B3		0.25									
Window B4		0.24									
Window B5		0.23									
Window B6		0.22									
Window B7		0.21									
Window B8		0.20									
Window B9		0.19									
Window B10		0.18									
Window B11		0.17									
IECC 2012 Zone 2 Criteria	U-Factor	SHGC	Change cells below as necessary								
Window C1	0.40	0.25									

Version 6.0 Template

Would data be easier to provide in a different format (e.g., cost per ft² or cost for specific product configurations)?



Cost-Effectiveness

Window Selection Tool: Existing Construction Windows www.efficientwindows.org

Equal Small Typical **LOCATION:** Washington, District of Columbia
 North Moderate None **HOUSE TYPE:** 1 Story
 East Large Interior **WINDOW TYPE:** Windows
 South Overhangs
 West Maximum

Modify Search

Window System							Standards		Performance					
ID	Panes	Glass	Frame	U-factor	SHGC	VT	ENERGY STAR	2012 IECC	Heating	Energy Cooling	Comfort Total	Winter	Summer	Condt.
20	3	LSG Low-E	Non-metal, Improved	≤0.22	≤0.25	≤0.40	Yes	Yes	●	●	●	●	●	●
19	3	MSG Low-E	Non-metal, Improved	≤0.22	0.28-0.40	0.41-0.50	Maybe	Yes	●	●	●	●	●	●
18	3	HSG Low-E	Non-metal, Improved	≤0.22	0.41-0.60	0.41-0.50	No	Maybe	●	●	●	●	●	●
17	2	LSG Low-E	Non-metal, Improved	0.23-0.30	≤0.25	0.41-0.50	Yes	Yes	●	●	●	●	●	●
16	2	MSG Low-E	Non-metal, Improved	0.23-0.30	0.28-0.40	0.51-0.60	Maybe	Yes	●	●	●	●	●	●
15	2	HSG Low-E	Non-metal, Improved	0.23-0.30	0.41-0.60	0.41-0.50	Maybe	Yes	●	●	●	●	●	●
14	2	Tint	Non-metal	0.41-0.55	0.41-0.60	0.41-0.50	Maybe	Yes	●	●	●	●	●	●
13	2	Clear	Non-metal	0.41-0.55	0.41-0.60	0.41-0.50	Maybe	Yes	●	●	●	●	●	●
12	1	Clear	Non-metal	0.71-0.99	>0.60	0.41-0.50	No	No	●	●	●	●	●	●

Would it be possible to report cost estimates for different product types, similar to those defined by the Efficient Windows Collaborative?



Cost-Effectiveness

Component Bill of Materials

- EPA is evaluating whether it is possible to estimate complete product costs by analyzing the costs of product components (e.g., the glass package, gas fill, spacer, frame)
- This is a common approach in the rulemaking process for Federal standards
- Ideally, this approach would provide a common basis for all cost estimates and allow for a clearer comparison between different efficiency levels



Cost-Effectiveness

Component Bill of Materials – Potential analytical framework

Step 1 – Identify Component Configurations

- There are a variety of technical pathways and component configurations at different performance levels
- EPA would primarily be interested in component variations that affect energy efficiency
- The CPD is a potential source for component configurations and product performance

Step 2 – Estimate Component Cost

- There are a variety of suppliers for each type of component and other market factors that affect cost
- EPA could ask component suppliers and product manufacturers for component cost ranges at different performance levels

Step 3 – Estimate Manufacturing Costs and Mark-Ups

- EPA recognizes that manufacturers bear additional manufacturing costs to improve efficiency, and some costs are passed on to consumers
- Manufacturers could volunteer manufacturing cost estimates and average mark-ups
- EPA could also compare bill of material estimates to other cost estimates

Is a component analysis a good way to identify incremental product costs? What factors should EPA consider? What sources should EPA use to identify components and costs?



Cost-Effectiveness

Retailer and Distributor Data

- This approach would involve collecting product prices through online and in-store research of retailers

Pros	Cons
Prices are publicly available	Small number of manufacturers represented in retail
Product configurations can be clearly identified	Product prices vary based on product size
Distributors offer a wide variety of products	Distributors are diverse and data may be inconsistent among markets
High confidence that the product is available to consumers	Distributors may not be willing to provide data

What should EPA consider when collecting data from retailers and distributors?



Cost-Effectiveness

Reasonable Payback Periods

- The payback period analysis involves calculating how much money consumers will save on energy costs by purchasing more efficient products, and how long it will take them to recoup the incremental cost
- Energy prices and climates vary across the country, so for fenestration products there are typically a range of payback periods for the same criteria

What is a reasonable payback period for fenestration products? What sources can be used to determine an objective basis for each estimate?

- Average product lifetime?
- Typical warranty period?
- Average number of years consumers stay in their homes?
- Consumer preferences?
- Consideration of cost versus resale value?



Product Availability

“Energy-efficiency can be achieved through one or more technologies such that qualifying products are broadly available and offered by more than one manufacturer”

Key Issues

- Assessing Availability
- Filtered CPD
- Comparing Potential Data Sources



Product Availability

Assessing Availability

- “Experience has shown that it is typically possible to achieve the necessary balance among principles by selecting efficiency levels reflective of the top 25% of models available on the market when the specification goes into effect” – *Guiding Principles*
- Assessing availability in the fenestration market is complex because there is no complete list of product models that manufacturers offer their customers (i.e., products available for sale)

How can EPA develop a reasonable proxy of products available for sale?

- Potential data sources:
 - Products advertised online
 - Manufacturer reporting
 - Filtered Certified Products Directory (CPD)



Product Availability

Filtered CPD

- Filter A: Identify options from product lines designated as ENERGY STAR for the Independent Verification Program (IVP)
 - Approximately 8 million options in 2013
- Filter B: Identify the variations within a product line that affect product performance and filter out non-performance variations
 - Examples include aesthetic variations and similar components from different suppliers
- Filter C: Manufacturers voluntarily provide input on what product options they sell or do not sell

Would filtering the CPD using one or more of these options provide a reasonable proxy for availability?



Product Availability – Comparing Potential Sources

	Products Advertised Online	Filtered CPD	Manufacturer Reporting
Description	Collect products found on consumer-facing websites of the top 20 manufacturers, and/or retail surveys	Filter the CPD to include only ENERGY STAR product lines and/or remove duplicate and non-available options	Manufacturers would report all ENERGY STAR products that they offer
EPA Level of Effort	Very High – EPA would perform extensive research	High – EPA would perform data analysis and research to distinguish duplicate and non-available options	Medium – EPA would design a reporting template
Partner Level of Effort	None	Medium –Partners could specify which product options or general configurations they offer (or alternatively, that they do not offer)	Very High – Partners would review all available products and report the list to EPA annually
Data Quality	<ul style="list-style-type: none"> •EPA cannot confirm product attributes •Only limited data is available for some products •Top 20 manufacturers account for 80% of the market, but only a fraction of available models 	<ul style="list-style-type: none"> •All products are certified •All partners and ENERGY STAR product lines are accounted for •Analysis can be repeated annually to track trends •May capture some products that are not available for sale 	<ul style="list-style-type: none"> •All products are certified •All partners and all products are accounted for •Analysis can be repeated annually to track trends



Measurement and Verification

“Product energy consumption can be measured and verified with testing”

Key Issues

- Verification Testing
- Dynamic Products



Measurement and Verification

Verification Testing

- Verification testing is now part of the ENERGY STAR program across all product categories, and this ensures that the ENERGY STAR name and trademarks are applied properly and consistently in the marketplace
- Beginning in 2012, EPA instituted a verification testing program for fenestration products that is administered by NFRC
- To date, more than 300 products have been tested, and EPA seeks to test 10% of ENERGY STAR product lines annually
- EPA reviews verification testing results to ensure products are performing as certified, meet all program requirements and are correctly labeled

How can EPA improve verification testing for fenestration products?



Measurement and Verification

Dynamic Products

- As EPA considers new technologies, it is important that product performance can be measured and verified
- Products with dynamic glazing and automated attachments have variable performance
- EPA is monitoring certification and research efforts to determine how these products could be considered for ENERGY STAR and Most Efficient

How should the performance of dynamic products be measured and verified?



Market Differentiation

“Labeling would effectively differentiate products and be visible for purchasers”

- ENERGY STAR strives to differentiate the highest performing products on the market
- Market differentiation is typically assessed by analyzing market share and performance distribution
- Continuing high market share suggests that additional improvements could be possible

Is ENERGY STAR effectively differentiating the top performers in the market?



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Additional Discussion

- Are there any issues to discuss that were not addressed in the presentation?
- Is additional discussion of previously identified issues or questions needed?



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Next Steps

Topics:

- How to Provide Feedback
- Framework Document
- Possible Version 7.0 Timing



Next Steps

How to Provide Feedback

- Thank you to all attendees for your participation!
- Please provide written feedback on the questions found in the “Issues for Discussion Handout” and any other issues
- EPA will consider all questions and comments raised during the meeting when developing the Framework Document
- Please let EPA know if you may be interested in providing data on product performance, cost, and availability



Next Steps

Framework Document

- EPA does not expect to publish a Framework Document until after mid-2015 at the earliest
 - Present initial proposals for analytical framework, data sources, and methodologies in detail
 - Communicate possible timelines for future proposals
 - The Framework Document will not contain proposed criteria levels
- Stakeholders will have an opportunity to submit formal comments on the Framework Document



Next Steps

Possible Version 7.0 Timing

- Before beginning a new specification revision process, EPA needs to evaluate how the market responds to Version 6.0
- Version 6.0 will be fully implemented January 1, 2016, which means that data on market share and availability would likely be released in 2017
- EPA will review this data and consider whether and when to begin a Version 7.0 Specification Revision process



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General ENERGY STAR Fenestration Questions

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