U.S. Environmental Protection Agency’s ENERGY STAR Program:

Executive Update for Energy Efficiency Program Sponsors

May 16, 2017
Agenda

• ENERGY STAR Awareness, Understanding & Influence
• Products Update
• Residential Update
• Commercial & Industrial Update
• Grid-Side Energy Efficiency Opportunities
ENERGY STAR Consumer Value

- More than **90%** consumer awareness
- **45%** of U.S. households report purchasing an ENERGY STAR certified product in the past year
- Nearly **75%** reported the label **as influential** in their purchasing decision
- **80%** of knowing purchasers reported that they are **likely to recommend** products that have earned the ENERGY STAR to friends
- Statistically, higher satisfaction with ENERGY STAR-certified light bulb
- Full report at [energystar.gov/awareness](http://energystar.gov/awareness)
Interesting Findings from Non-Federal Sources

Precourt Energy Efficiency Center, *Experiments with Appliance Choice*:

- **ENERGY STAR** label increases the activity in the *nucleus accumbens*, part of the brain’s “reward pathway” associated with positive emotions (as evaluated using Functional Magnetic Resonance Imaging or FMRI)

- Reward pathway activation while evaluating an appliance (e.g., CFL light bulb) *positively predicts purchasing* both with FMRI and in 1,550 person nationwide sample

Source: [https://peec.stanford.edu/research/experiments-appliance-choice](https://peec.stanford.edu/research/experiments-appliance-choice)
Interesting Findings from Non-Federal Sources

JD Powers 2016 Utility Products and Services Study as reported in AESP 2016 Magazine:

• Customers who participate in energy efficiency-oriented programs are much more satisfied with their utility.

• Overall Customer Satisfaction Index (CSI) for those who received a rebate for an ENERGY STAR-certified appliance was 750 compared to average CSI of 663

Products Updates
ENERGY STAR Consumer Products

- **Lighting & Fans**
  - Decorative Light Strings
  - Light Bulbs (Lamps)
  - Light Fixtures (Luminaires)

- **Electronics**
  - Audio/Video
  - Slates/Tablets
  - Set-top and Cable Boxes
  - Televisions

- **Building Products**
  - Residential Windows, Doors, and Skylights
  - Roof Products
  - Seal and Insulate

- **Heating & Cooling**
  - Central Air Conditioners
  - **Boilers**
  - Geothermal Heat Pumps
  - Vent Fans
  - Smart Thermostats
  - Furnaces
  - Dehumidifiers

- **Water Heaters**
  - Heat Pump
  - High Efficiency Electric Storage
  - **High Efficiency Gas Storage**
  - Solar
  - Whole Home Gas Tankless

[Blue indicates recent or upcoming spec change][Green indicates revision planned/underway 2017][Italic indicates with gas efficiency potential]
ENERGY STAR Consumer Products

• Appliances
  – Clothes Washers
  – Clothes Dryers
  – Air Purifiers (Cleaners)
  – Dehumidifiers
  – Dishwashers
  – Freezers
  – Refrigerators

• Office Equipment
  – Computers
  – Displays
  – Small Network Equipment
  – Printers, Multi-function Devices

• Other
  – Electric Vehicle Supply Equipment
  – Pool Pumps
  – Vending Machines
  – Water Coolers

New Products Under Development
  – Exterior & Interior Storm Panels
  – Home Energy Storage

Blue indicates recent or upcoming spec change
Green indicates revision planned/underway
Italic indicates with gas efficiency potential

www.energystar.gov/specifications
ENERGY STAR Commercial Products

• **Lighting**
  – Commercial Light Fixtures
  – Light Bulbs (Lamps)
  – Light Fixtures (Luminaires)

• **Office Equipment**
  – Signage Displays
  – VOIP Phones
  – Computers
  – Printers, Multi-function Devices

• **Heating & Cooling**
  – Light Commercial HVAC
  – Commercial Boilers

• **Water Heaters**
  – Commercial Gas Storage and Tankless

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[www.energystar.gov/specifications](http://www.energystar.gov/specifications)
ENERGY STAR Commercial Products

• Commercial Appliances
  – Commercial Clothes Washers
  – Vending Machines
  – Water Coolers
  – Commercial Ice
  – Commercial Refrigeration
  – Commercial Coffee
  – Commercial Dishwashers
  – Hot Food Holding Cabinets
  – Griddles
  – Fryers
  – Ovens

• Data Center Products
  – Data Center Storage
  – Enterprise Servers
  – Large Network Equipment
  – Uninterruptible Power Supply

• Other
  – Electric Vehicle Supply Equipment
  – Laboratory Grade Refrigerators and Freezers

New Products Under Development
  – Medical Imaging Equipment

Blue indicates recent or upcoming spec change
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Italic indicates with gas efficiency potential

www.energystar.gov/specifications
New ENERGY STAR Products in 2017

• **Lab Grade Refrigeration**: First product certified by Thermo Fisher. adding scope for ultra low temperature freezers

• **Commercial Coffee Makers**: Batch commercial coffee brewers offer as much as 35% in energy savings and about $100 per year compared to conventional models

• **Commercial Packaged Boilers**: offer end users as much as 15% in energy savings and about $1,150 in energy cost savings/yr. when compared to non-condensing baseline models

• **Connected (Smart) Thermostats**: first to rely on analysis and aggregation of field data, rather than a laboratory test, to demonstrate energy savings. Average consumer will save more than 8% of their HVAC energy, or approximately $50 annually
ENERGY STAR & Connectivity

- ENERGY STAR optional criteria leverage the national platform that utilities can rely on and consumers look for, bringing together interested partners and stakeholders.

- ENERGY STAR criteria provide consistent definitions and approaches, a consistent set of starter functionality, an emphasis on open standards, test methods for DR functionality.

- ENERGY STAR is a trusted resource that can help consumers find these connected products and identify the benefits they offer.
ENERGY STAR “Smart” Thermostats – A Different Approach

• Estimate of energy savings developed from analysis and aggregation of data from customers’ homes
  – Inherently includes user interaction with the product, a key lack in previous efforts to recognize thermostats
  – The product is understood as hardware and service combined
  – The service provider will be the ENERGY STAR partner, because they have the data to demonstrate savings
  – Data analysis and aggregation is done by service providers using EPA-provided software, thus protecting privacy; CBs and EPA receive aggregated data only
• Completed December 2016
• Seven certified models! Manufacturers to date:
  – Nest, Ecobee, EcoFactor, Bryant, and Carrier
# ENERGY STAR Connected Criteria

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<th>Electric Vehicle supply equipment</th>
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<th>Commercial Ice Makers (draft)</th>
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ENERGY STAR Most Efficient 2017 Categories

- Boilers
- Ceiling and Ventilating Fans
- CAC/ASHP
- Clothes Washers
- Computer Monitors
- Dishwashers
- **NEW: Dryers**
- Furnaces
- Geothermal Heat Pumps
- Refrigerator-Freezers
- Windows

**ENERGY STAR Most Efficient 2017** recognizes products that deliver cutting edge energy efficiency along with the latest in technological innovation.

[www.energystar.gov/mostefficient](http://www.energystar.gov/mostefficient)
ENERGY STAR Best Value Finder: A New Tool Leveraging Price & Location Functionality

- Goal: Make energy saving products and tips more accessible to low income or budget-constrained consumers
  - Highlight least cost, efficient options
  - Provide online and local options for researching and purchasing products
  - Provide buying tips and information about rebates
  - Offer simple ways to reduce energy consumption and save money
ENERGY STAR Best Value Finder – Refrigerators
Trend toward midstream program design for residential products

- More cost-effective compared to downstream rebates
- Utilities familiar with midstream approaches from lighting programs
- EPA talking with utility partners to understand and share best practices
- Candidate measures include HVAC, water heating, and windows

**ENERGY STAR Retail Products Platform**

- Nationally coordinated midstream rebate program aimed to transform the consumer product market
- Implemented at +600 Best Buy, Home Depot and Sears store locations
- Receiving on-going full category sales data with 12 months historic sales data
- Largest appliance and CE manufacturers collaborating with ESRPP
- Implementation through retailers—allows all sales and savings to be captured, and reduces spend on administrative budgets
- Creates a genuine Market Transformation program, whereby EEPS are influencing retail stocking decisions

Source: Northwest Energy Efficiency Alliance—"NEEA’s Definition of Market Transformation"
Homes, HVAC, and Other Residential Opportunities
ENERGY STAR Homes: ~ 650 New Partners in 2016!

- 90K Homes Certified last year; 1.7 million to-date
- ~10% of the nationwide single-family homes market share
Versions vs. Revisions

A New Version

- Is more stringent
- Is usually in response to more stringent code
- Current national Versions are v3 and v3.1

A New Revision

- Is generally not more stringent
- Is usually in response to partner feedback
- Current national Revision is Rev. 08
Version 3
Version 3.1
What you need to know about Version 3.1

- Efficiency Target
  - HERS Index Target
    - ~ 60-70

- Inspection Checklists
  - Revision 08 – Exact Same Checklists as v3
What you need to know about Version 3.1

• No new mandatory measures in v3.1!
• To hit the lower HERS index target, you’ll likely need to make incremental improvements to:
  – Infiltration,
  – Windows,
  – HVAC efficiency,
  – Lighting, and,
  – Either ducts in conditioned space or high-efficiency water heaters.
What you need to know about Version 3.1

- There are now 17 states, plus DC, with an implementation date for v3.1, plus regional v3.1 requirements in CA & FL:

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<th>State</th>
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<td><strong>DC, IL, MD, RI</strong></td>
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<td>On or after 06/01/2015</td>
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<td><strong>DE</strong></td>
<td>On or after 12/01/2015</td>
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<td><strong>MT, OR, WA</strong></td>
<td>On or After 01/01/2016</td>
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<td><strong>MN, VT</strong></td>
<td>On or after 04/01/2016</td>
</tr>
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<td><strong>NV</strong></td>
<td>On or after 10/01/2016</td>
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<tr>
<td><strong>MI, NJ</strong></td>
<td>On or after 04/01/2017</td>
</tr>
<tr>
<td><strong>CT, NY, TX</strong></td>
<td>On or after 10/01/2017</td>
</tr>
</tbody>
</table>
Updated Cost & Savings Analysis

• The updated analyses have been posted on our [website](#).
Ample evidence that HVAC systems are not properly installed

- Improper airflow:
  - Average airflow 14% below design (Proctor 1997)
  - Improper airflow in 44% of systems (Mowris et al. 2004)
  - Measured airflow ranging from 130 - 510 CFM / ton (Parker 1997)

- Incorrect refrigerant charge:
  - In 57% of systems (Downey/Proctor 2002)
  - In 62% of systems (Proctor 2004)
  - In 72% of systems (Mowris et al. 2004)
  - In 82% of systems (Proctor 1997)
Lessons Learned So Far on HVAC Commissioning

1. It deserves attention – it’s important and has been overlooked for too long.
2. Builders are starting to understand the rationale and value for it.
3. Commissioning requirements easily verified by Raters have taken hold.

But:
4. The industry, as a whole, still needs a lot of support to deliver it.
5. Lack of uniform, practical, standards leads to conflict and confusion.
6. No credit in the HERS index is a significant obstacle.
What’s Next?
HVAC Grading System Concept

- Follow the insulation quality-installation model:
  - **Grade III:**
    - The default. No verification is done.
    - No penalty and no credit.
  - **Grade II:**
    - Rater verifies key design and installation parameters.
    - Verification indicates that the system is good but not great.
    - Partial credit awarded.
  - **Grade I:**
    - Rater duplicates the tasks in Grade II.
    - But, the verification indicates that the system is great.
    - Full credit awarded.
ENERGY STAR Residential Branch – Key 2017 Plans

New Construction Programs:
- RaterPRO app
- Version 3/Revision 9
- Version 3.1 in new states as new codes are adopted (MI, NJ, CT, NY, TX)
- ENERGY STAR Homes Version 4 Framework Document
- New program requirements for Manufactured Housing
- “One Multifamily” specification for High-Rise/Low-Rise
- 2017 ES Homes Partner Meeting (October 23-25 Chicago, IL)

Existing Homes/Building Products Programs:
- Rule Your Attic! campaign
- Evaluate ENERGY STAR Verified Installation Pilot Programs
Commercial & Industrial Updates
Energy Management Guidance

“ENERGY STAR Guidelines for Energy Management”
Benchmarking with ENERGY STAR has Become the Industry Standard

- Over 6,400 C&I ENERGY STAR Partners
- Over 70,000 active portfolio manager accounts
- More than 500,000 buildings have been benchmarked in Portfolio Manager
- Over 30,300 properties are ENERGY STAR certified
- Almost 50% of U.S. commercial building space has benchmarked in Portfolio Manager
Eligible to Receive an ENERGY STAR Score

*All building types -- except for barracks, medical offices, residence halls, and wastewater treatment plants -- can apply for the ENERGY STAR if they earn a score of 75 or higher. Additional details on eligibility available [here](#).
Developing a 1 – 100 ENERGY STAR Score

Data analysis

Nationally representative survey

Statistical modeling

Comparison between actual energy data and the modeled estimate
Industrial Focuses, Energy Performance Indicators, and the Challenge for Industry

- **Industrial Focus Areas**: Cooperation between EPA and manufactures to create sector-specific industrial energy management tools

- **Energy Performance Indicators (EPIs)**: Measures relative energy intensity of manufacturing facilities 1-100 scale; 75 required to earn ENERGY STAR

- **ENERGY STAR Challenge for Industry**: A global call to action to reduce plant-level energy intensity by 10% within 5 years
Industrial Plants with Benchmarks

- Aluminum Casting
- Automobile Assembly
- Cement Plants
- Commercial Roll & Bread Bakery
- Cookie & Cracker Bakeries
- Container Glass Plants
- Flat Glass Plants
- Frozen Fried Potato Processing
- Integrated Paper and Paperboard
- Integrated Steel
- Iron Casting
- Juice Plants
- Petroleum Refineries
- Pharmaceuticals
- Pulp & Paper Mills
- Wet Corn Mills
Customers Can Find Utilities that Provide Energy Data for Benchmarking

For additional information visit www.energystar.gov/utilitydata
Governments Leveraging ENERGY STAR
A Comprehensive Approach for Key Customers

- Building Performance with ENERGY STAR can provide portfolio-wide savings opportunities with an efficient investment of time and incentive dollars.

- Embodies the strategic approach of the EPA ENERGY STAR Guidelines for Energy Management.

- Provides a framework for integrating strategic energy management; benchmarking; operations, behavioral and capital investment programs.

- Supports strengthening relationships with commercial customers.
ENERGY STAR Tenant Spaces

- Tenants control energy use
- Recognition motivates change
- Capitalize on ENERGY STAR brand and certification

*Pilot launching in September, applications due July 15, 2017!*
Grid-Side Energy Efficiency Opportunities
Grid-Side Energy Efficiency Opportunities:

Conservation Voltage Reduction/Volt Var Optimization

What it is: Delivering voltage to customers at the lower end of acceptable range to save energy in homes and buildings

- Savings ≈1-4% depending on circuit (and customer end uses); ≈90% on customer-side of meter
- Potential to target/prioritize low income communities for CVR/VVO operations (assuming other favorable conditions)

What we offer: New EM&V guide covering energy efficiency potential, data tracking considerations, impact analysis (including methods for estimating potential and impacts to low-income communities)

ENERGY STAR Buying Guide to Energy Efficient Distribution Transformers… *coming soon*

- Defines meaningful efficiency above DOE standard
- Can reduce transformer losses ≈11-29%
- Identifies circuit characteristics where cost effective
ENERGY STAR Certified Electric Vehicle Charging Stations

- Covers 120 V and 208 to 240 V chargers
- Use ≈40% less energy in standby mode (typically in standby for 85% of product lifetime)
- Potential savings could grow to $17 million per year
- Currently three certified models from Chargepoint
Links for Additional Information

- Product specification criteria and updates: [www.energystar.gov/specifications](http://www.energystar.gov/specifications)
- ENERGY STAR Most Efficient: [www.energystar.gov/mostefficient](http://www.energystar.gov/mostefficient)
- ENERGY STAR Best Value Finder: [https://www.energystar.gov/best-value-finder](https://www.energystar.gov/best-value-finder)
- ENERGY STAR new homes partnership: [www.energystar.gov/newhomespartners](http://www.energystar.gov/newhomespartners)
- ENERGY STAR certified homes technical requirements:
  - Current: [www.energystar.gov/newhomesguidelines](http://www.energystar.gov/newhomesguidelines)
  - Version 3.1: [www.energystar.gov/index.cfm?c=bldrs_lenders_raters.nh_v3_1](http://www.energystar.gov/index.cfm?c=bldrs_lenders_raters.nh_v3_1)
  - HVAC design and commissioning: [www.energystar.gov/newhomesHVAC](http://www.energystar.gov/newhomesHVAC)
- ENERGY STAR certified homes training: [www.energystar.gov/newhomestraining](http://www.energystar.gov/newhomestraining)
- Utility-offered benchmarking services through Portfolio Manager: [www.energystar.gov/utilitydata](http://www.energystar.gov/utilitydata)
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* - Carly will be maintaining chief account management responsibility for MD and DE partners in 2017.

** - Madeline will be maintaining chief account management responsibility for NJ and NY partners in 2017.
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