ENERGY STAR® Overview & Program Updates

August 20, 2019

Agenda

- Introduction
- Products
  - Specification Development
    - *New!* Connected Criteria for Large Loads and Smart Home Energy Management Systems (SHEMS)
    - Proposed Heat Pump Specification Revisions
  - Joint Utility Manufacturer Procurement (JUMP)
    - Next Generation Refrigeration Technologies
  - Emerging Technologies Award
  - Resources and Tools
- Residential
  - Updated Multifamily Program
  - Updated Manufactured Homes Program
  - New Construction Programs: Resources and Tools

ENERGY STAR Overview

91% of households recognized the ENERGY STAR label when shown the label

75% of households had a high understanding of the ENERGY STAR label

5.5 billion products

28,500 buildings

130 industrial plants

1.6 million homes

Source: The Consortium for Energy Efficiency's report *National Awareness of ENERGY STAR for 2016*

ENERGY STAR Products

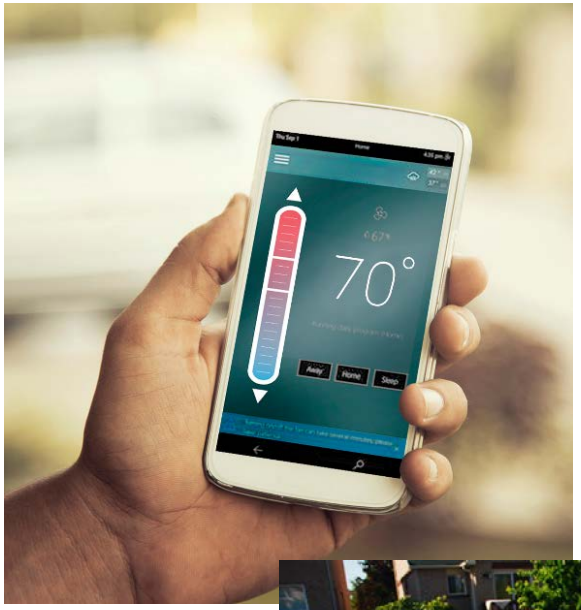
ENERGY STAR Residential Certified Products

- Appliances
- Building Products
- Electronics
- Heating & Cooling
- Lighting & Fans
- Office Equipment
- Pool Pumps
- Water Heaters

Key product updates to be discussed

- Smart thermostats
- Electric vehicle charging equipment
- Storm Windows
- Pool Pumps
- Connectivity
- Large Load
- Smart Home Energy Management Systems (SHEMS)
- Cold Climate Heat Pumps

Recent Specifications of Interest



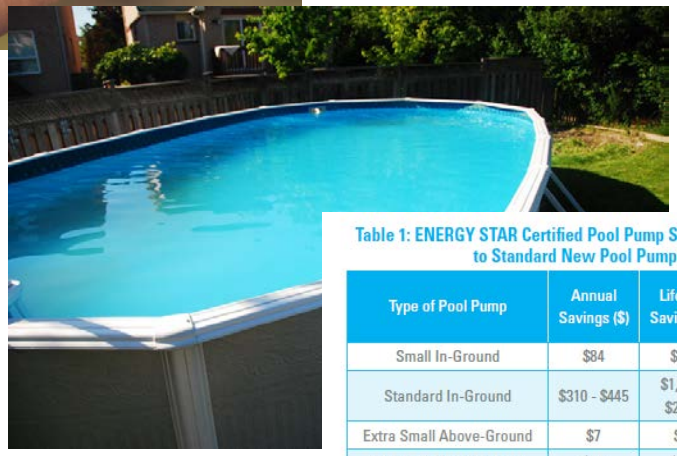


Table 1: ENERGY STAR Certified Pool Pump Savings Compared to Standard New Pool Pumps

Type of Pool Pump	Annual Savings ($)	Lifetime Savings ($)	Payback (years)
Small In-Ground	$84	$415	1.2
Standard In-Ground	$310 - $445	$1,500 - $2,200	1.2
Extra Small Above-Ground	$7	$30	2.7
Standard Above-Ground	$28	$120	1.0
Pressure Cleaner Booster	$13	$60	3.2

Specification Development

2019/2020 of New Product Specifications/Scoping

- Elevators
- Energy Battery Storage
- Microwaves
- Miscellaneous Refrigeration
- Portable AC
- Electronics:
  - Wireless Charging
  - Smart Home Energy Management Systems
  - Large Load Connected Criteria

2019 Planned Revised Specifications

- **Electronics:** Audio/Video, Computers (desktops), Displays, Small Network Equipment, Enterprise Storage, Set Top Boxes
- **Heating, Ventilating, and Cooling**: Central Air Conditioning/Air Source Heat Pumps (Cold Climate Heating), Furnaces (FERS)
- **Appliances:** Room Air Cleaners, Dehumidifiers, Dishwashers
- **Home Envelope:** Windows/Doors/Skylights
- **Other**: Vending Machines

Green denotes products with final update specifications released in 2019

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 Demand Response (DR) functionality
- ENERGY STAR is a trusted resource that can help consumers find these connected products and identify the benefits they offer

Grid Interest in Connected Technologies

- Energy efficiency continues to be a cost-effective component in the overall electricity supply market
- Effective distributed energy resources (DER) bundles need some loads that can be controlled automatically to
  - reduce energy consumption,
  - shift to another time period, or
  - accept electricity during a time of oversupply

ENERGY STAR Connected Criteria

	Smart Thermostats	Refrigerators & Freezers	Clothes Washers	Clothes Dryers	Room A/C	Dish-washers	Electric Vehicle Supply Equipment	Lighting	Pool Pumps	Commercial Ice Makers (draft)
Energy Consumption Reporting		✓	✓	✓	✓	✓		✓	✓	✓
Operational Status Reporting		✓	✓	✓	✓	✓		✓	✓	✓
Remote Management		✓	✓	✓	✓	✓		✓	✓	✓
Demand Response	✓	✓	✓	✓	✓	✓	✓		✓	✓
Open Access	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
DR override by Consumers	✓	✓	✓	✓	✓	✓	✓		✓	✓
Connected Capability Not Optional	✓									

Connected Criteria for Large Load Ongoing Discussions

- Landscape of home automation and the need for flexible loads has changed, placing increasing value on flexible and controllable loads and the tools needed to achieve them
- EPA is advancing our strategy on connected criteria to serve the evolving market and expanding coverage to linchpin products that have large potential in this space
  - Pool Pumps*
  - Water Heaters
  - Central A/C
  - Air Source Heat Pumps
  - Electric Vehicle Supply Equipment*
- EPA released a Connected Criteria Large Load Discussion Guide in February 2019 and responded on July 30, 2019.

*Connected criteria exist

Smart Home Energy Management System (SHEMS)

- SHEMS is a combination of devices and services that are designed to work together to deliver occupancy-based optimization of energy use and that meets all the device and service requirements outlined in the eligibility requirement (see next slide). A SHEMS package:
  - Must be marketed as a complete offering but individual devices may be sold separately.
  - May include devices with energy savings or grid services potential beyond what is required for ENERGY STAR certification.
  - May be a subset of a larger home automation platform that provides other services.

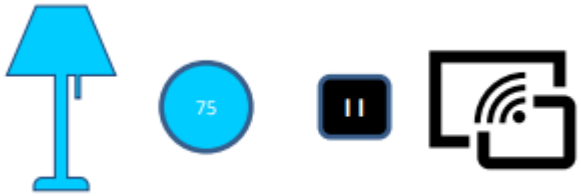
Visit the ENERGY STAR SHEMS website for the most up to date information on the specification.

SHEMS Eligibility Criteria

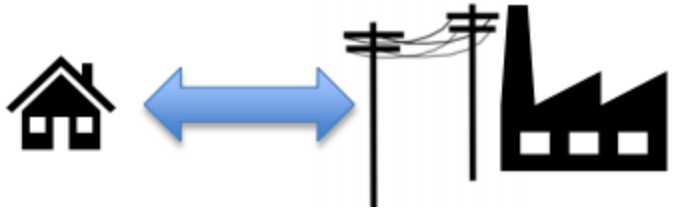
1. Required Base Services

2. Additional Platform Capabilities

3. Required Devices



4. Grid Services

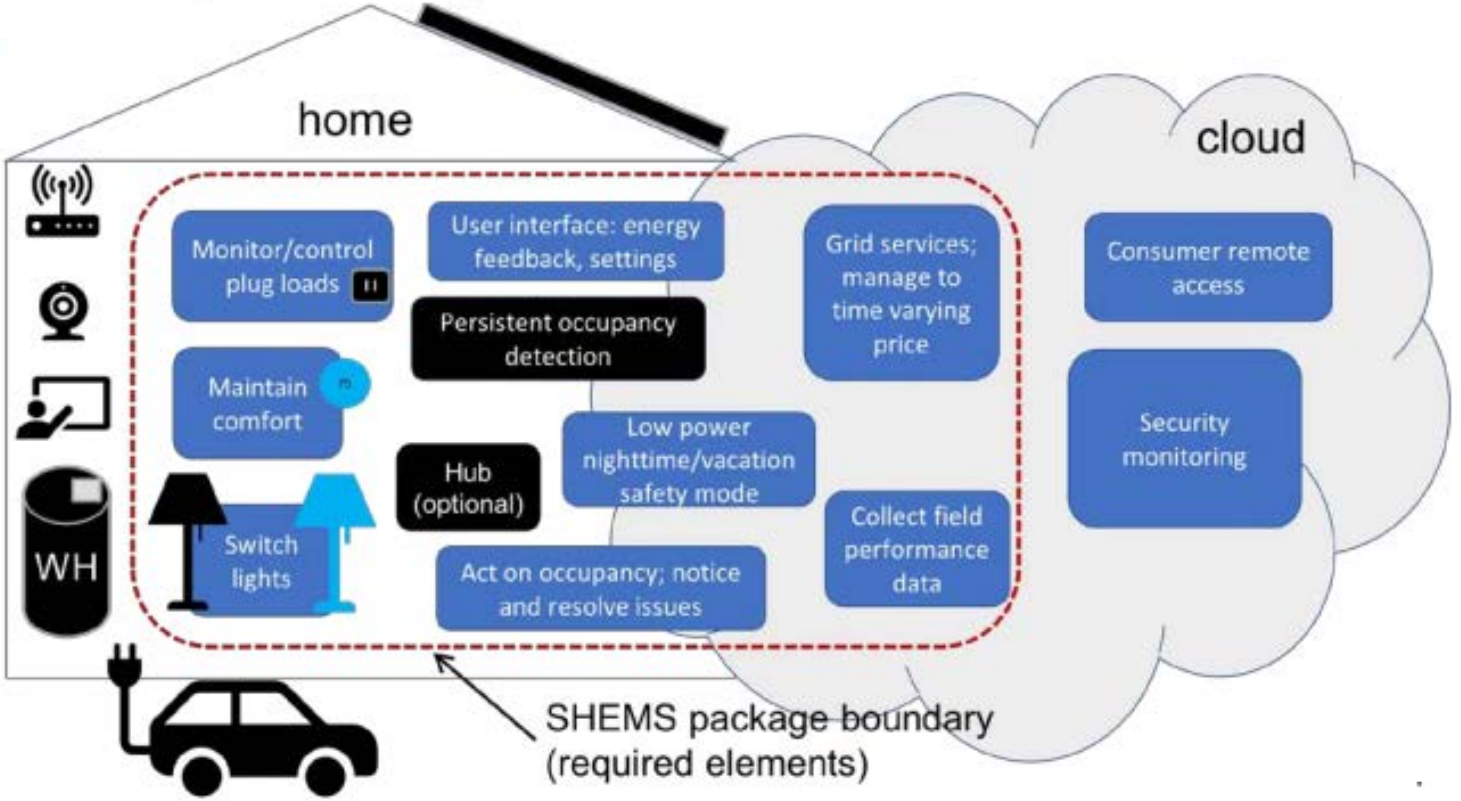


5. Field Data Reporting

ENERGY STAR SHEMS Scope

Figure 2: Illustration of SHEMS Package

Minimum device and function requirements are shown inside the red dotted boundary, including at least one ENERGY STAR certified thermostat and two lighting devices, one of which shall be ENERGY STAR certified. Refer to section 4 for detailed information. Persistent occupancy sensing may be a stand-alone additional device or integrated into another required device.



Connected Criteria: Specific to Central AC and Heat Pumps

- Optional Connected recognition has now been proposed for inclusion in the Version 6.0 specification currently under development

- Required functionality for grid services and consumer amenity:
  - Demand Response
  - Energy Reporting
  - Fault Reporting (based on Most Efficient criteria)

Connected Criteria: Specific to Central AC and Heat Pumps

- Communication requirements are intended to harmonize with AHRI 1380 Standard for Demand Response
- Communication allowable via CTA-2045-A or Open ADR protocols
- At least for variable capacity equipment, controllers can be included in product evaluated for connected

Connected Criteria: Specific to Central AC and Heat Pumps

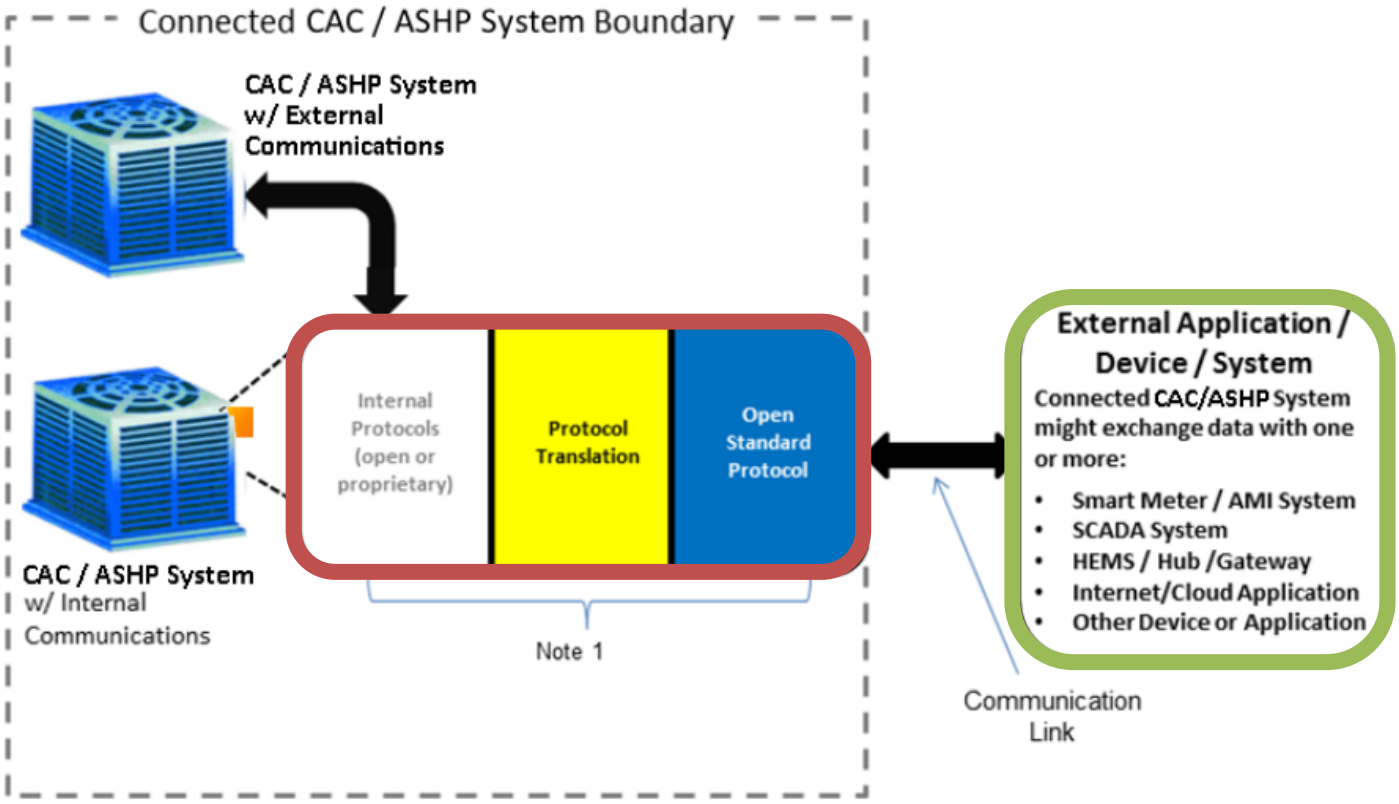


Figure 1. Connected CAC/ASHP System (CCS)

Proposed Climate Differentiated ASHP Labeling

- For Version 6.0, we have proposed ASHP certification marks with the words “Cold Climate” or “Moderate and Hot Climate”
- Manufacturers ensure the correct label is on the correct product, but can sell product anywhere
- Very flexible: programs, contractors, and consumers decide which climate is most appropriate

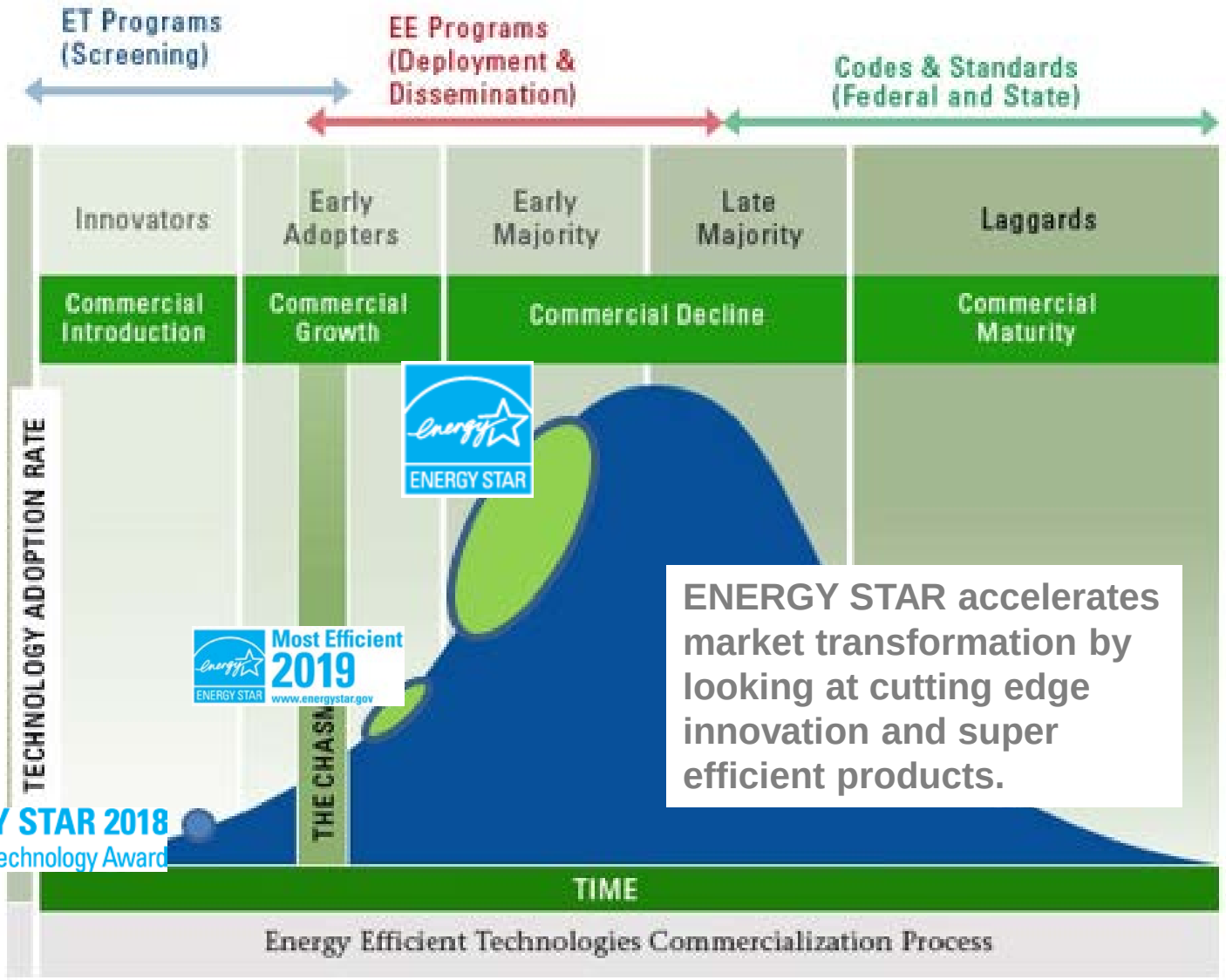
Moderate and Hot Climate	Cold Climate
SEER, EER, HSPF Criteria	Additional Criteria based on M1 test at 5°F
Higher EER, lower HSPF	Higher HSPF, lower EER

Proposed Climate Differentiated ASHP Labeling

- As we work toward finalizing the specification, we have been seeking feedback from stakeholders on the value of an ENERGY STAR climate-based label
- We want to harmonize with the NEEP requirements, but have an opportunity to add testing rigor to a Cold Climate label
- A new federal test method for CACs and ASHPs will be going into affect in 2023, which includes a 5°F optional test point

- We are looking to:
  - Ensure COP at low temperatures
  - Ensure capacity can be maintained at low temperatures (with minimal electric resistance backup)

ENERGY STAR & Innovation



ENERGY STAR 2018
Emerging Technology Award

ENERGY STAR Emerging Technologies Award

- Award Winning Technologies for 2019:
  - Air-to-water heat pumps
    - Transfer heat from outside air into a fluid to provide in home heating
  - Room Air Conditioners with Efficient Variable Output
    - Continuously control temperature
- EPA is looking for 2020 nominations over the next year
  - Commercially available, not widely adopted
  - Likely to reduce greenhouse gases

Joint Utility Manufacturer Procurement (JUMP)

- Due to the success of ENERGY STAR and utility consumer rebates, refrigerator energy savings have dwindled to the point where:
  - Rebates, in terms of dollars, have decreased and are not as effective
  - Utilities have trouble claiming enough energy savings and some are looking for other ways to incentivize replacement programs
- Market transformation (MT) is evolving as viable program model to advance energy efficiency However, MT programs typically require long-term investments to achieve significant savings.
- To invigorate the ENERGY STAR brand, JUMP is the short-term energy savings opportunities that fit both Resource Acquisition (RA) and MT program designs
  - Focus on next-generation refrigerator models with significant per unit incremental energy savings – ***JUMP START***

JUMP Start

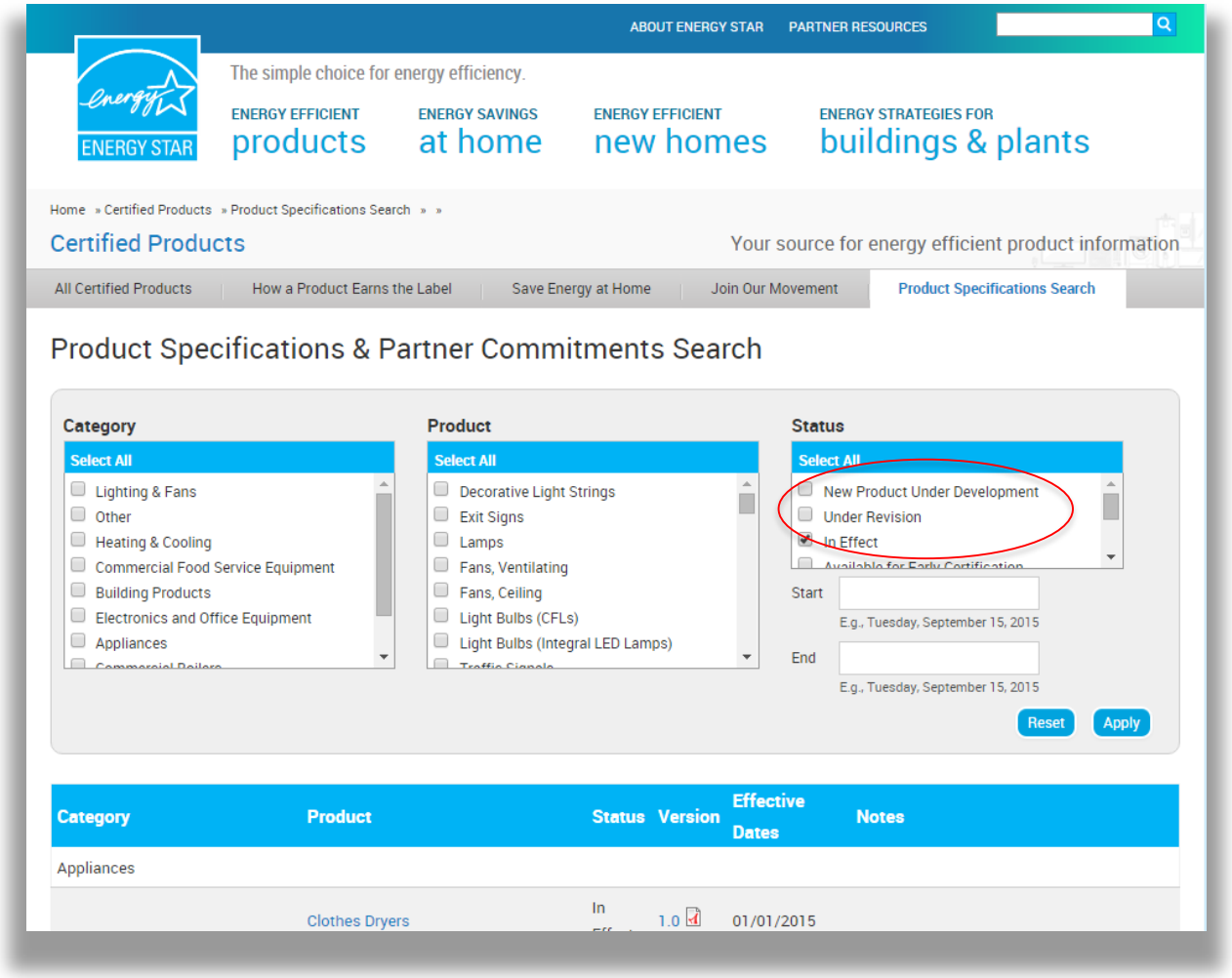
- Identify appliance manufacturers that have "next-generation" refrigerators that use 40% less energy than the US DOE Standard by Fall 2019
  - Support the manufacturer(s) with market entry (e.g. match-making, market intelligence, etc.)—value proposition
- Recruit utilities
  - Exploring low-income
  - Traditional consumer rebates
  - Online Marketplaces
- Timeline
  - Summer 2019: Inform program sponsors of available technologies
  - Fall 2019/ENERGY STAR Products Partner Meeting: Connect manufacturers with product in market to interested utilities

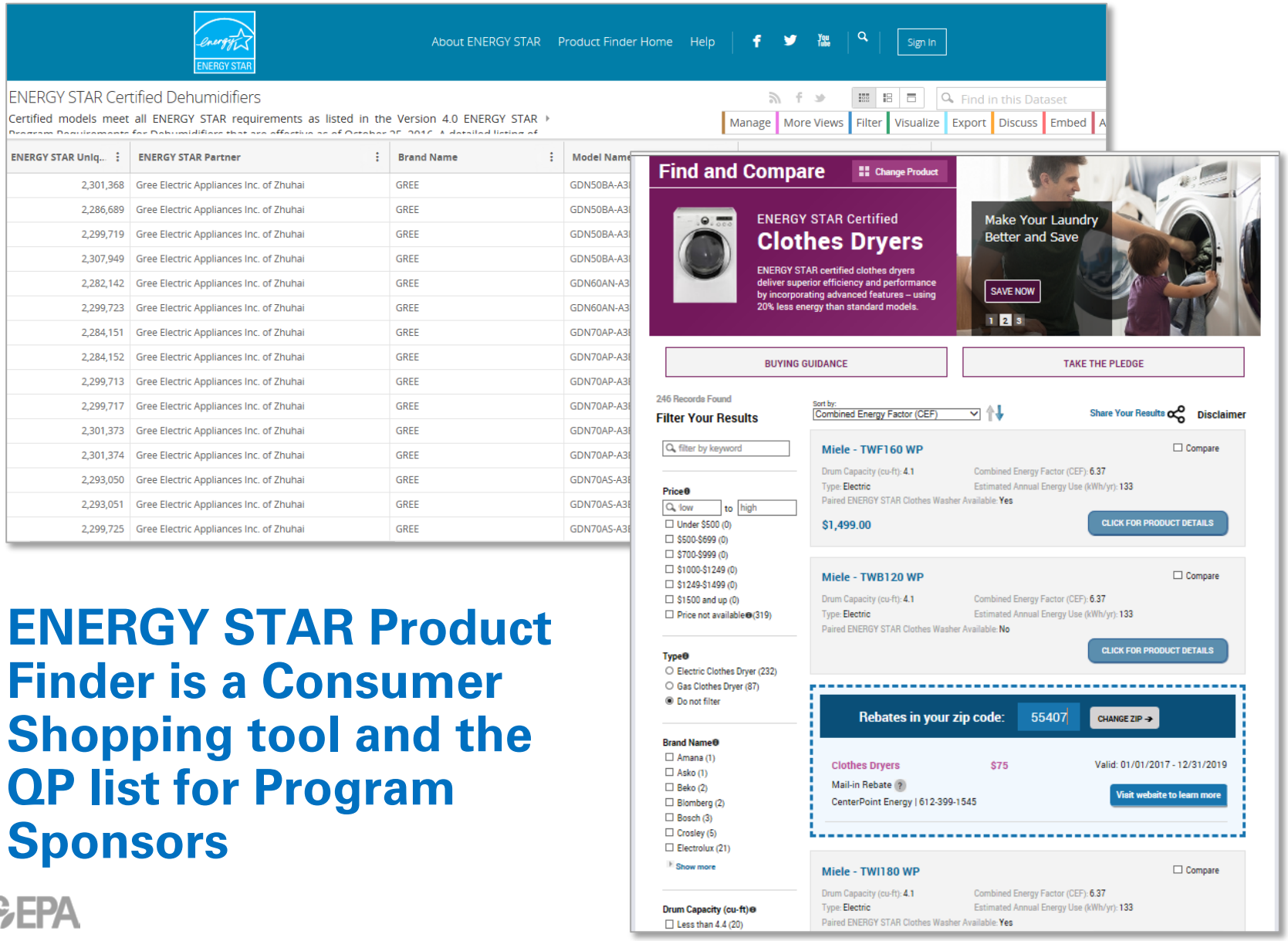
Current Status and Activities

- Reaching out to utilities to determine interest and best opportunities
- Initial interest from several manufacturers
- Beko is farthest along, with new designs using:
  - R600A refrigerant (a refrigerant with low global warming potential)
  - Electronics with mechanical valve technology for cold air distribution in up to three separate cooling zones, single compressor
  - Electromechanical valve technology coupled with sensors to move air at any compartment at any desired time and velocity thanks to the use of high capacity inverter compressors
  - Utilizing sensor technology to adopt household habits and using machine learning sensor electronics to direct the cold air at any time to wherever is needed
  - Current Models (Spring 2019):
    - 24" bottom mount, meets ENERGY STAR Most Efficient 2019 criteria. Most efficient in its class in the US, 294 kWh/yr for 10.3 cu-ft, R600A refrigerant
  - Coming Fall 2019 (Beko claims):
    - 28" top mount, meets ENERGY STAR Most Efficient 2019 criteria. Most efficient top mount in the US, 320KWh/yr for 13.8 cu-ft. (no icemaker)
    - Beko will share more at the ENERGY STAR Products Partner Meeting

ENERGY STAR Specification Search Tool

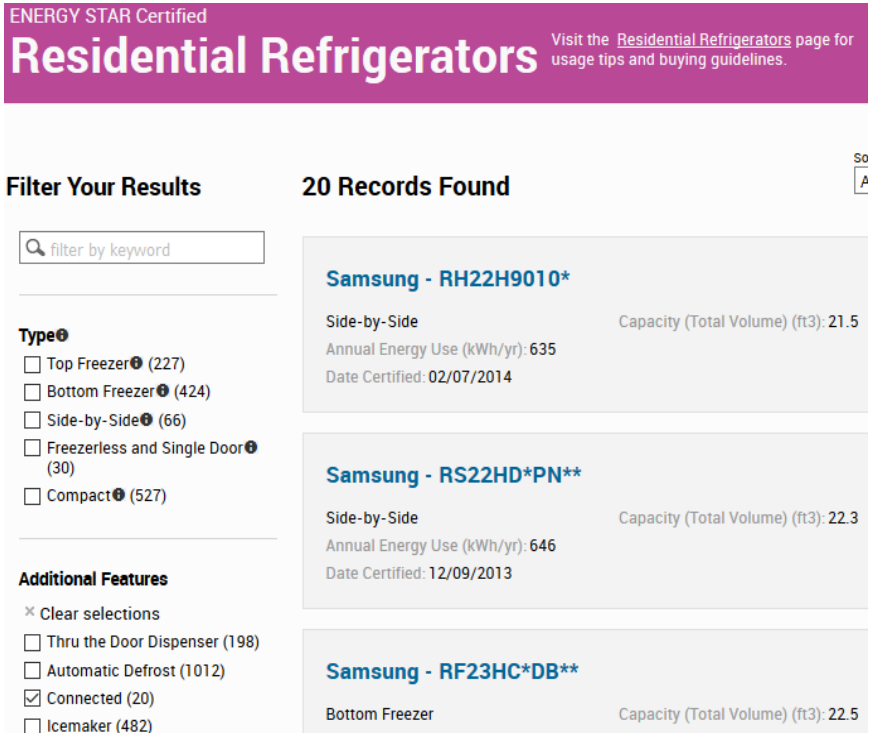
- Search for product specification requirements
- Find information on the specification version and effective date
- Identify new specifications under development





ENERGY STAR Product Finder is a Consumer Shopping tool and the QP list for Program Sponsors

Highlighting Connected Functionality for Consumers



- Qualified product list
  - (3) additional fields, on QPL advanced view
    - ***Connects Using:*** Wired Ethernet, Wi-Fi, Zigbee, HomePlug Green PHY
    - ***Communication Standard Application Layer :*** SEP 1.x, SEP2.x, OpenADR
    - ***Direct on-premises Open-standard Based Interconnection*** – Yes/No
- Product finder
  - Product finder would indicate connected Y/N
  - Results of a product finder search include “connects using” (e.g., Wi-Fi)

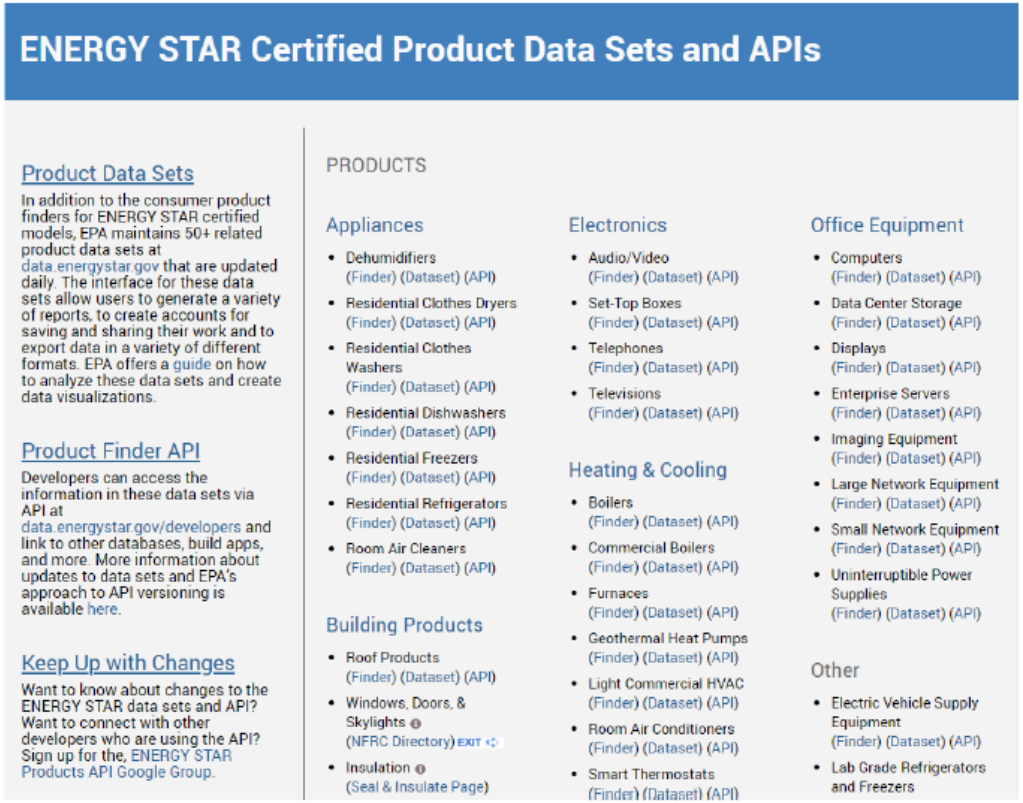
Application Programming Interface (API) Features of Product Finder

APIs allow program sponsors to develop customized product lists that fit the criteria of their incentive for internal use or to help customers shop for the products eligible for an incentive.

Certified Product Datasets are:

- Updated daily
- Provide filter and export options

data.energystar.gov



ENERGY STAR Certified Product Data Sets and APIs

Product Data Sets

In addition to the consumer product finders for ENERGY STAR certified models, EPA maintains 50+ related product data sets at data.energystar.gov that are updated daily. The interface for these data sets allow users to generate a variety of reports, to create accounts for saving and sharing their work and to export data in a variety of different formats. EPA offers a guide on how to analyze these data sets and create data visualizations.

Product Finder API

Developers can access the information in these data sets via API at data.energystar.gov/developers and link to other databases, build apps, and more. More information about updates to data sets and EPA's approach to API versioning is available here.

Keep Up with Changes

Want to know about changes to the ENERGY STAR data sets and API? Want to connect with other developers who are using the API? Sign up for the, ENERGY STAR Products API Google Group.

PRODUCTS

Appliances

- Dehumidifiers (Finder) (Dataset) (API)
- Residential Clothes Dryers (Finder) (Dataset) (API)
- Residential Clothes Washers (Finder) (Dataset) (API)
- Residential Dishwashers (Finder) (Dataset) (API)
- Residential Freezers (Finder) (Dataset) (API)
- Residential Refrigerators (Finder) (Dataset) (API)
- Room Air Cleaners (Finder) (Dataset) (API)

Building Products

- Roof Products (Finder) (Dataset) (API)
- Windows, Doors, & Skylights (NFRC Directory)
- Insulation (Seal & Insulate Page)

Electronics

- Audio/Video (Finder) (Dataset) (API)
- Set-Top Boxes (Finder) (Dataset) (API)
- Telephones (Finder) (Dataset) (API)
- Televisions (Finder) (Dataset) (API)

Heating & Cooling

- Boilers (Finder) (Dataset) (API)
- Commercial Boilers (Finder) (Dataset) (API)
- Furnaces (Finder) (Dataset) (API)
- Geothermal Heat Pumps (Finder) (Dataset) (API)
- Light Commercial HVAC (Finder) (Dataset) (API)
- Room Air Conditioners (Finder) (Dataset) (API)
- Smart Thermostats (Finder) (Dataset) (API)

Office Equipment

- Computers (Finder) (Dataset) (API)
- Data Center Storage (Finder) (Dataset) (API)
- Displays (Finder) (Dataset) (API)
- Enterprise Servers (Finder) (Dataset) (API)
- Imaging Equipment (Finder) (Dataset) (API)
- Large Network Equipment (Finder) (Dataset) (API)
- Small Network Equipment (Finder) (Dataset) (API)
- Uninterruptible Power Supplies (Finder) (Dataset) (API)

Other

- Electric Vehicle Supply Equipment (Finder) (Dataset) (API)
- Lab Grade Refrigerators and Freezers

ENERGY STAR Products Partner Meeting September 10-12, 2019 in Charlotte, NC

- Partners and industry gather to discuss new program initiatives, product specifications or other outreach activities.
- Opportunity to network with others to develop relationships and collaborations to promote ENERGY STAR.
- Register until August 21 at www.energystar.gov/partnermeeting

ENERGY STAR
Residential

Residential Sector Opportunities for Energy Efficiency Program Sponsors

ENERGY STAR offers opportunities to enable and accelerate the deployment and integration of energy efficiency across the residential sector through:

- New Construction Programs
  - ENERGY STAR Certified New Homes
    - Single-family
    - Low- and high-rise multifamily
    - Manufactured

What is an ENERGY STAR Certified Home or Apartment?

Performance Target + Mandatory Features + Testing, Inspections, & Oversight = ENERGY STAR

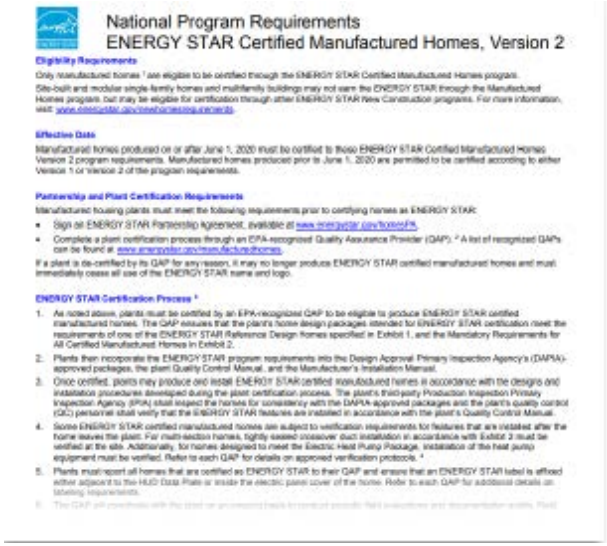
How Can Program Sponsors Participate?

In 2018, 72 utilities nationwide offered incentives for ENERGY STAR home certification:

- Financial
  - Through these utilities offering incentives, there were 15,752 builder companies that participated in the programs in 2018
  - For homebuyers: rebate or utility bill discount
- Non-monetary
  - Technical assistance
  - Marketing support

ENERGY STAR Certified Manufactured Homes Program Update

- The updated Version 2 specification simplifies the program requirements:
  - Removes the performance path option, only the prescriptive path remains
  - Thermal zones are aligned with HUD's zones, previously EPA had its own defined zones
  - Three packages partners can choose from (significant reduction in package options):
    - Electric heat pump package (8.2 HSPF / 14 SEER)
    - High-efficiency furnace package (90-15 AFUE)
    - Envelope-only package (Windows and envelope)
- Available to use now, mandatory starting June 1, 2020



National Program Requirements
ENERGY STAR Certified Manufactured Homes, Version 2

Eligibility Requirements

Only manufactured homes [1] are eligible to be certified through the ENERGY STAR Certified Manufactured Homes program. Site-built and modular single-family homes and multifamily buildings may not earn the ENERGY STAR through the Manufactured Homes program, but may be eligible for certification through other ENERGY STAR New Construction programs. For more information, visit www.energystar.gov/newhomesprogramrequirements.

Effective Date

Manufactured homes produced on or after June 1, 2020 must be certified to these ENERGY STAR Certified Manufactured Homes Version 2 program requirements. Manufactured homes produced prior to June 1, 2020 are permitted to be certified according to either Version 1 or Version 2 of the program requirements.

Partnership and Plant Certification Requirements

Manufactured housing plants must meet the following requirements prior to certifying homes as ENERGY STAR:

- Sign an ENERGY STAR Partnership Agreement, available at www.energystar.gov/homesPA.
- Complete a plant certification process through an EPA-recognized Quality Assurance Provider (QAP). [2] A list of recognized QAPs can be found at www.energystar.gov/manufacturedhomes.

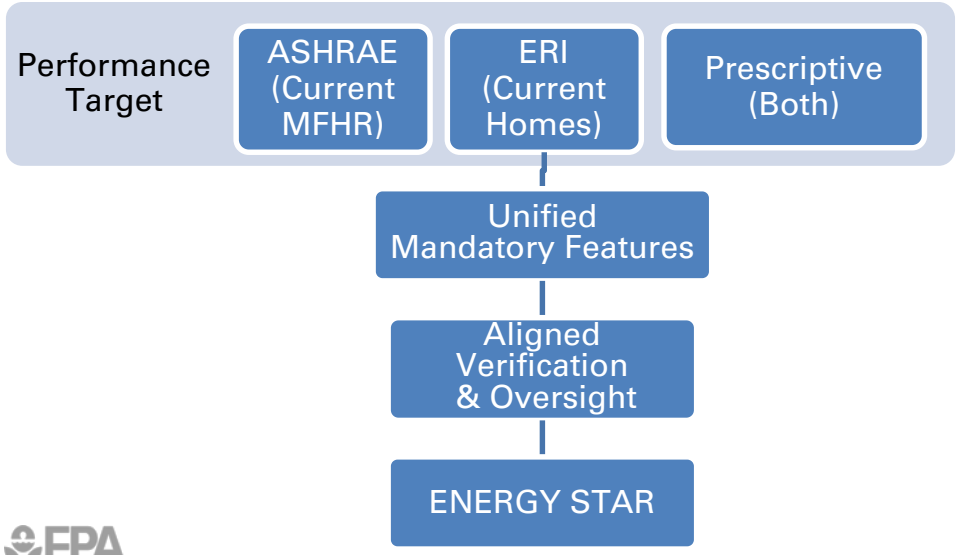
If a plant is de-certified by its QAP for any reason, it may no longer produce ENERGY STAR certified manufactured homes and must immediately cease all use of the ENERGY STAR name and logo.

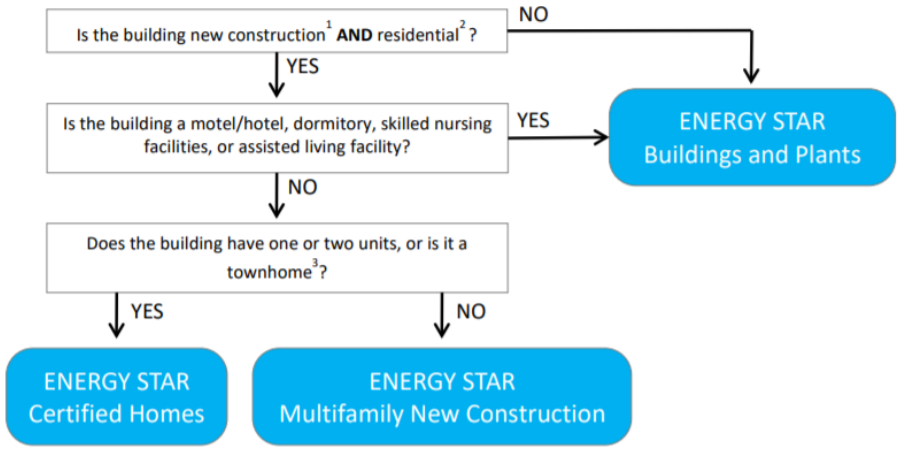
ENERGY STAR Certification Process [3]

1. As noted above, plants must be certified by an EPA-recognized QAP to be eligible to produce ENERGY STAR certified manufactured homes. The QAP ensures that the plant's home design packages intended for ENERGY STAR certification meet the requirements of one of the ENERGY STAR Reference Design Homes specified in Exhibit 1, and the Mandatory Requirements for All Certified Manufactured Homes in Exhibit 2.
2. Plants then incorporate the ENERGY STAR program requirements into the Design Approval Primary Inspection Agency's (DAPIA)-approved packages, the plant Quality Control Manual, and the Manufacturer's Installation Manual.
3. Once certified, plants may produce and install ENERGY STAR certified manufactured homes in accordance with the designs and installation procedures developed during the plant certification process. The plant's third-party Production Inspection Primary Inspection Agency (IPIA) shall inspect the homes for consistency with the DAPIA-approved packages and the plant's quality control (QC) personnel shall verify that the ENERGY STAR features are installed in accordance with the plant's Quality Control Manual.
4. Some ENERGY STAR certified manufactured homes are subject to verification requirements for features that are installed after the home leaves the plant. For multi-section homes, tightly sealed crossover duct installation in accordance with Exhibit 2 must be verified at the site. Additionally, for homes designed to meet the Electric Heat Pump Package, installation of the heat pump equipment must be verified. Refer to each QAP for details on approved verification protocols. [4]
5. Plants must report all homes that are certified as ENERGY STAR to their QAP and ensure that an ENERGY STAR label is affixed either adjacent to the HUD Data Plate or inside the electric panel cover of the home. Refer to each QAP for additional details on labeling requirements.
6. The QAP will coordinate with the plant on an inspection basis to conduct periodic field inspections and documentation audits. Plant

ENERGY STAR Multifamily New Construction Program

- The Certified Homes program and the Multifamily High-Rise program have been combined under the ENERGY STAR Multifamily New Construction (MFNC) program
- Three options to achieving the Performance Target (ERI, ASHRAE 90.1, Prescriptive)
  - projects must meet the national requirement of 15% over ASHRAE 90.1- 2007 (with exceptions)
- Adopted the Certified Homes checklist-style for its program documents.



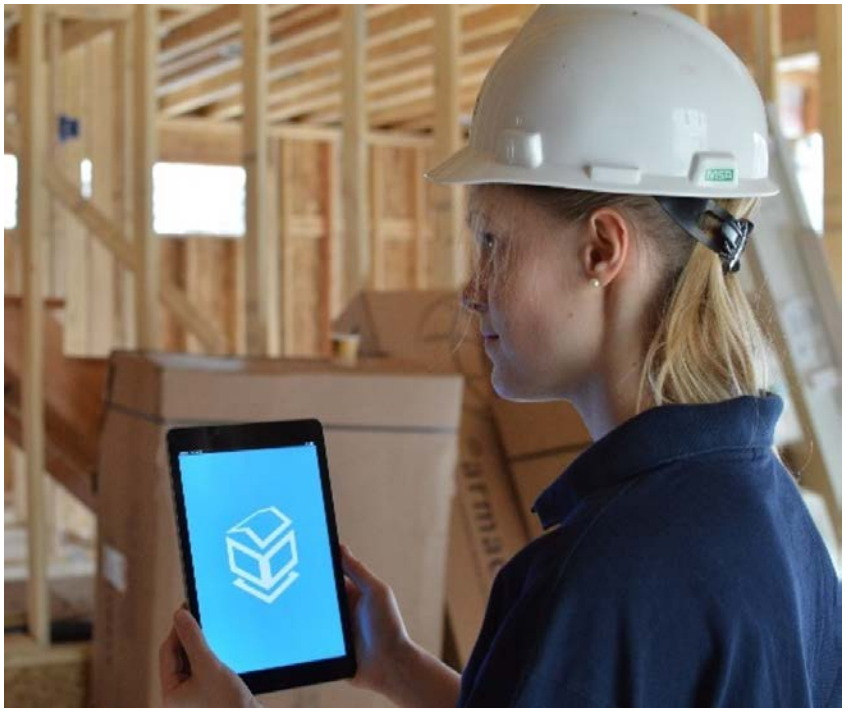


ENERGY STAR New Construction Programs: Tools & Resources

- Marketing Tools
  - Consumer brochures, fact sheets, online content
  - Promotional opportunities (Website listing, awards)
  - Sales training
- Technical and Educational Resources
  - Comprehensive program requirements and documentation
  - Verification guidance
  - Best practices for program design and implementation
  - Webinars and training videos on a variety of technical topics
- Partner Support
  - Technical assistance for builders and Raters
  - Enhanced support for Market Leader Award recipients
  - Networking opportunities (annual stakeholder meeting for partners)

ENERGY STAR® RaterPRO™

- RaterPRO is a free mobile app that helps home energy raters complete on-site inspections for Energy Rating Index ratings and ENERGY STAR certifications
- Paperwork is complete before a rater leaves the inspections
  - ENERGY STAR field checklist is filled out
  - Updates to construction specs are synced to the office
  - Action report sent to building
  - Photos/notes automatically included in job file



ENERGY STAR Tools and Resources for Manufactured Homes

- ENERGY STAR Certified Manufactured Homes Brochure
  - 1-page, quad-fold consumer brochure highlights the features and benefits of an ENERGY STAR certified manufactured home
  - Spanish language version also available
  - Copies of the Brochure can be ordered from the New Homes section of ENERGY STAR's publications web page at www.energystar.gov/publications
- Fact Sheet for Affordable Housing
  - Two-page fact sheet that highlights ENERGY STAR's tools and resources that can be used by affordable housing stakeholders to improve energy efficiency. Greater energy efficiency helps improve resident comfort, reduce operating costs, and decrease greenhouse gas emissions
  - Audience: Architects & Designers, Builders, Community Developers, Home Energy Providers/Raters, Local Governments, Utilities/Program Sponsors

ENERGY STAR Residential New Construction Partner Meeting
September 11-12, 2019 in Charlotte, NC

- Partners and industry gather to discuss new program initiatives, program updates or other outreach activities.
- Opportunity to network with others to develop relationships and collaborations to promote ENERGY STAR.
- Register until August 21 at www.energystar.gov/partnermeeting

Questions?

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THANK YOU