



ENERGY STAR Connected Thermostats Draft 3 Version 1.0

**Stakeholder Webinar and Discussion
Abigail Daken, U.S. EPA**

November 3, 2016



Agenda

- Welcome & Introduction
- What is ENERGY STAR?
- Version 1.0 Draft 3
 - Product families and software updates
 - Required field savings levels
 - Other changes
- Partner Commitments
 - Use of the ENERGY STAR mark
- Timeline and discussion



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ENERGY STAR

For more than 20 years, EPA's ENERGY STAR program has identified the most energy efficient **products, buildings, plants, and new homes** – all based on the latest government-backed standards and a rigorous third-party certification process.



ENERGY STAR Program Overview



ENERGY STAR® is the simple choice for energy efficiency. For more than 20 years, EPA's ENERGY STAR program has been America's resource for saving energy and protecting the environment.

From 1993 to 2013 Americans have purchased more than 300 million products that earned the ENERGY STAR across **more than 70 product categories**. That's more than 4.8 billion products, about 58 million vehicles off the road, and **\$30 billion saved!**

ENERGY STAR. The simple choice for energy efficiency.



Today,
this little blue label
does all the hard work
of certifying outstanding
energy efficiency in:

70

**Product
Categories**

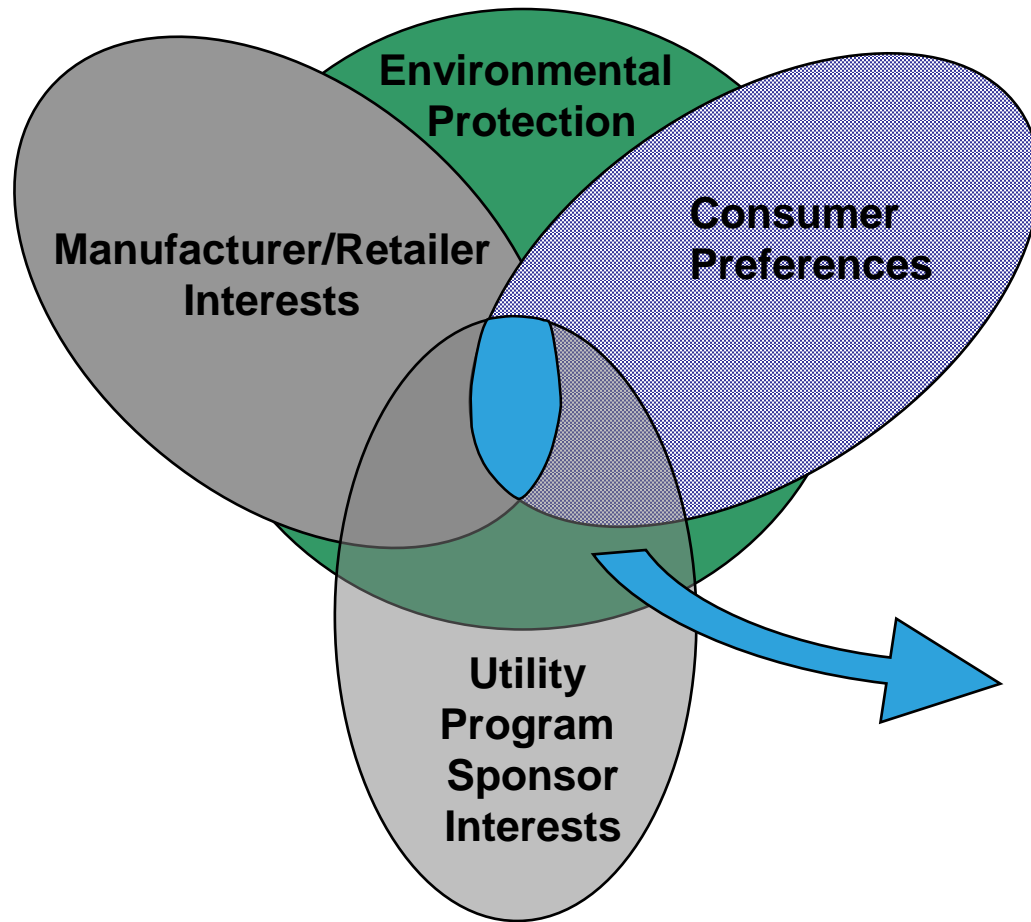


Every single day,
consumers choose
ENERGY STAR
products more than

800,000 times



ENERGY STAR's Focus



Cost-effective
No Sacrifice in
Performance
Government
backed

**Consumer
is Key**

Specification Development Cycle





Important Process Elements

- Consistency
- Transparency
- Inclusiveness
- Responsiveness
- Clarity



ENERGY STAR CTs - EPA Goals

- Recognize CT Products that save energy
- Include both hardware-centric and service-centric CT products
- Recognize CTs using varying energy saving strategies
- Robust participation by:
 - Hardware manufacturers
 - Service Providers
 - EEPS & Utilities
- Prominence of ENERGY STAR CTs in the marketplace



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Product families

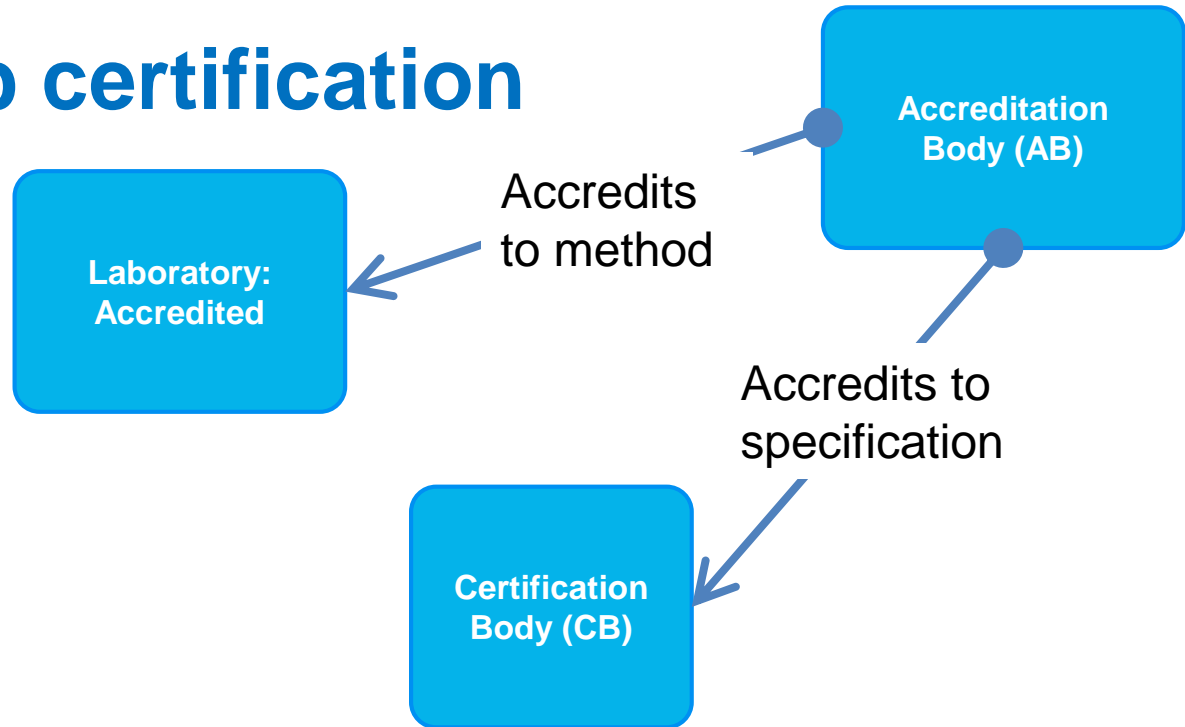
- Most providers offer several very similar products
 - Service providers' algorithms work with a variety of hardware
 - Service providers have several generations of CT devices in the field delivering similar savings
 - Algorithms may vary for different situations, but are fundamentally similar
- Product Family is a group of CT products from the same CT Service provider that use fundamentally similar savings strategies



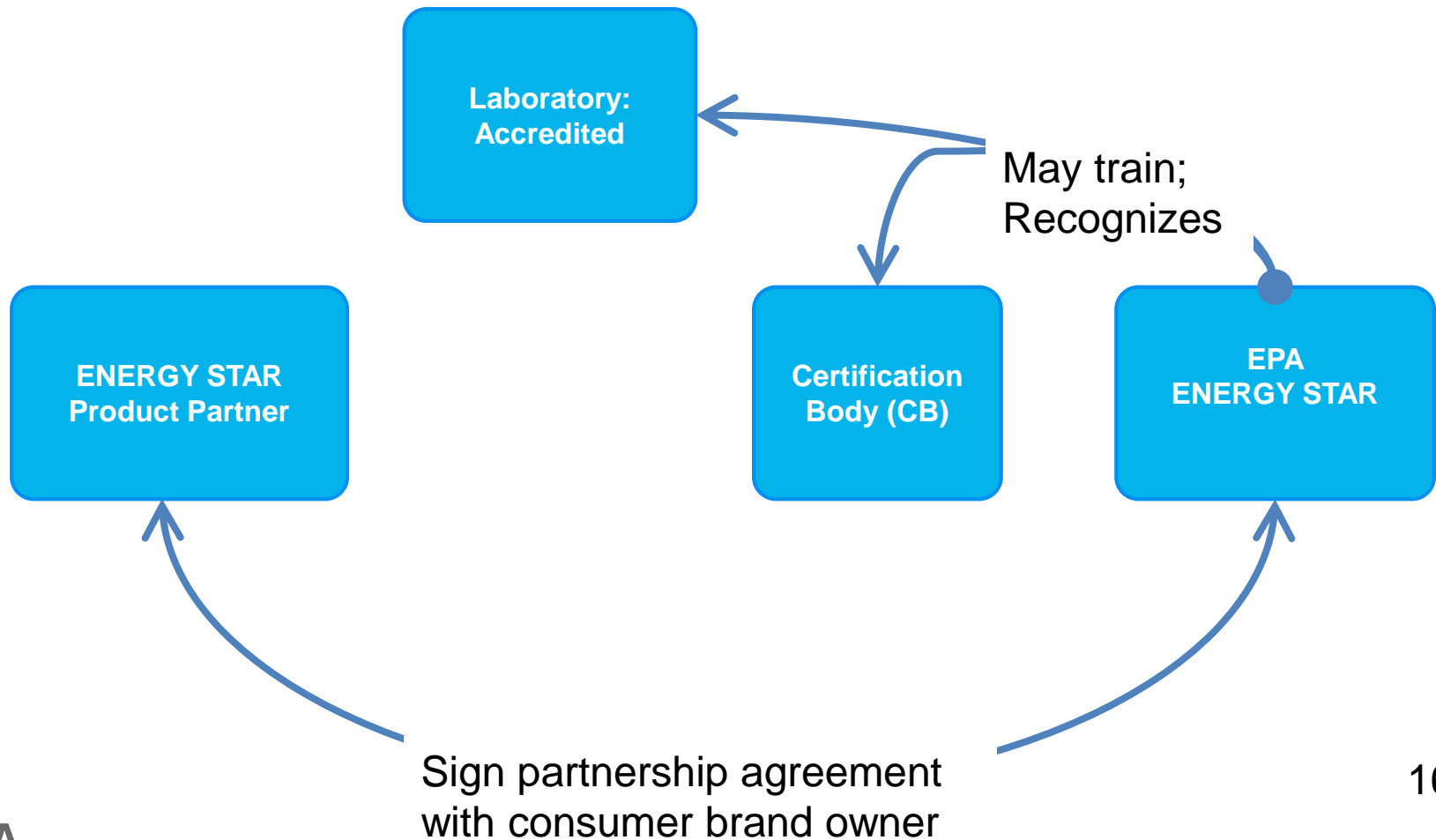
Product families (cont.)

- CT Hardware devices: even in the same product family, may have more than cosmetic differences
- CT Hardware devices must be separately tested for standby power and static temperature accuracy
- Field savings: All products in family share heating savings and cooling savings scores; all are in population sampled for analysis
- Look for changes in the Definitions and Testing Requirements sections

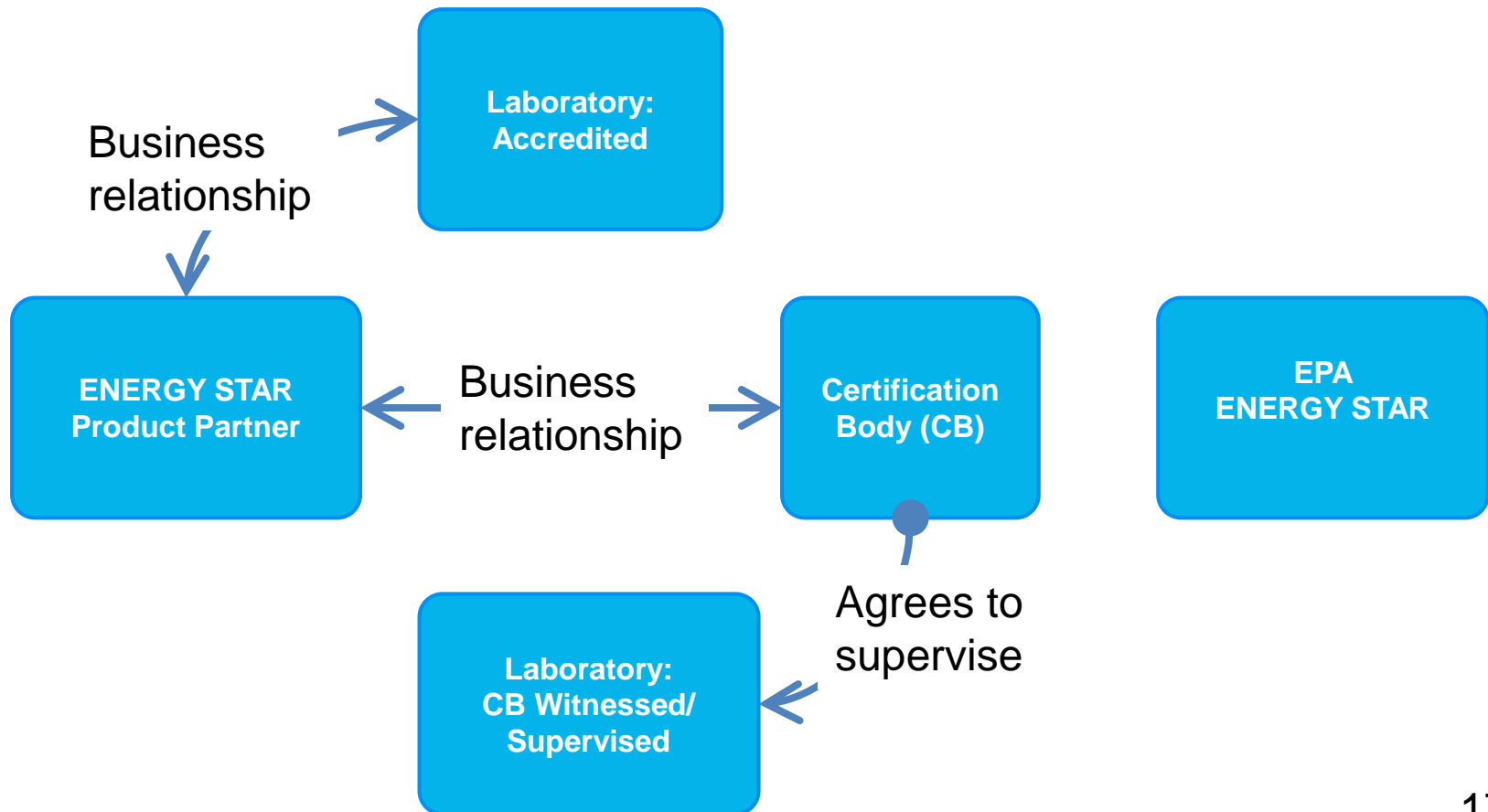
Setting up certification



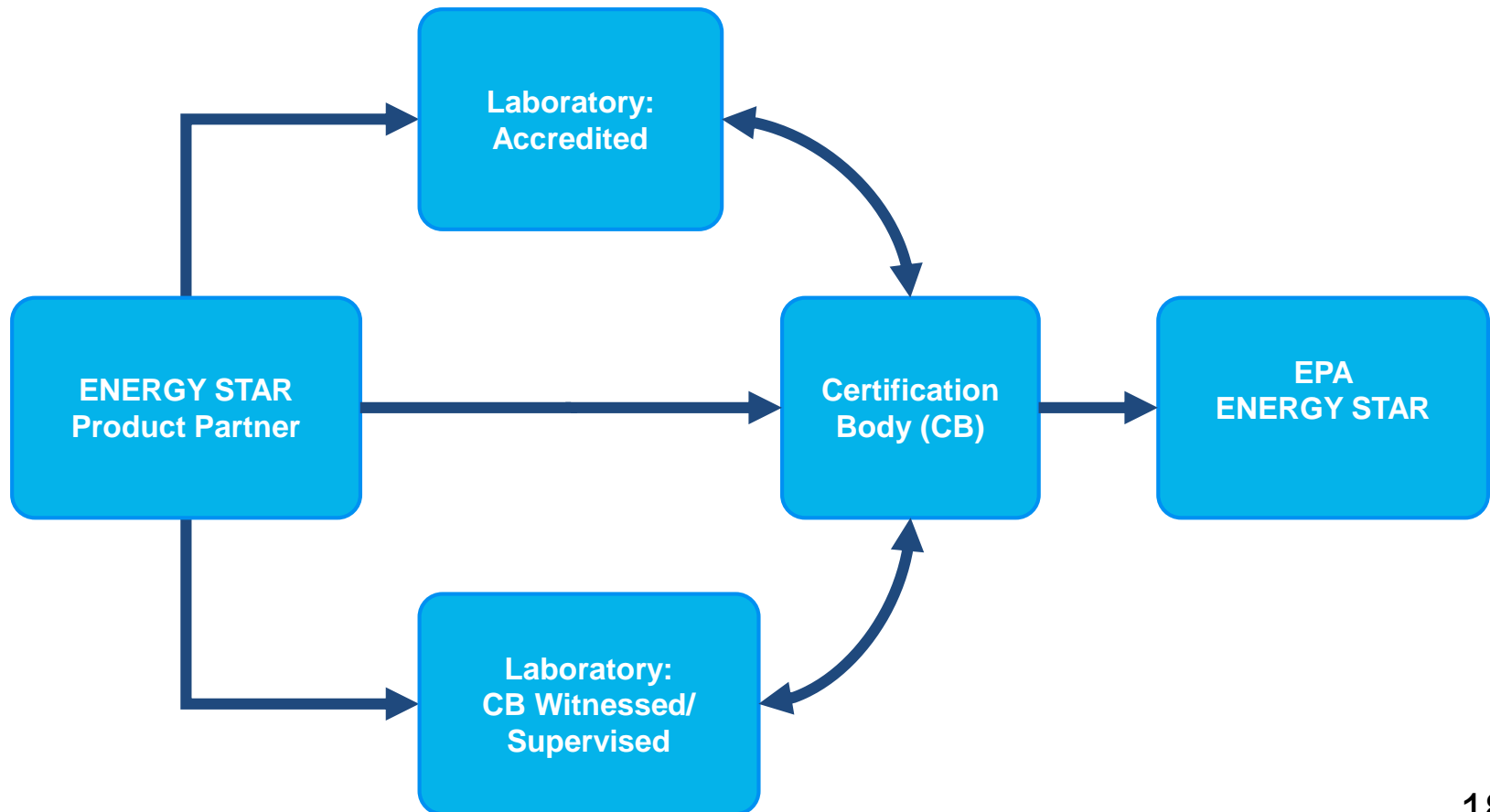
Setting up certification



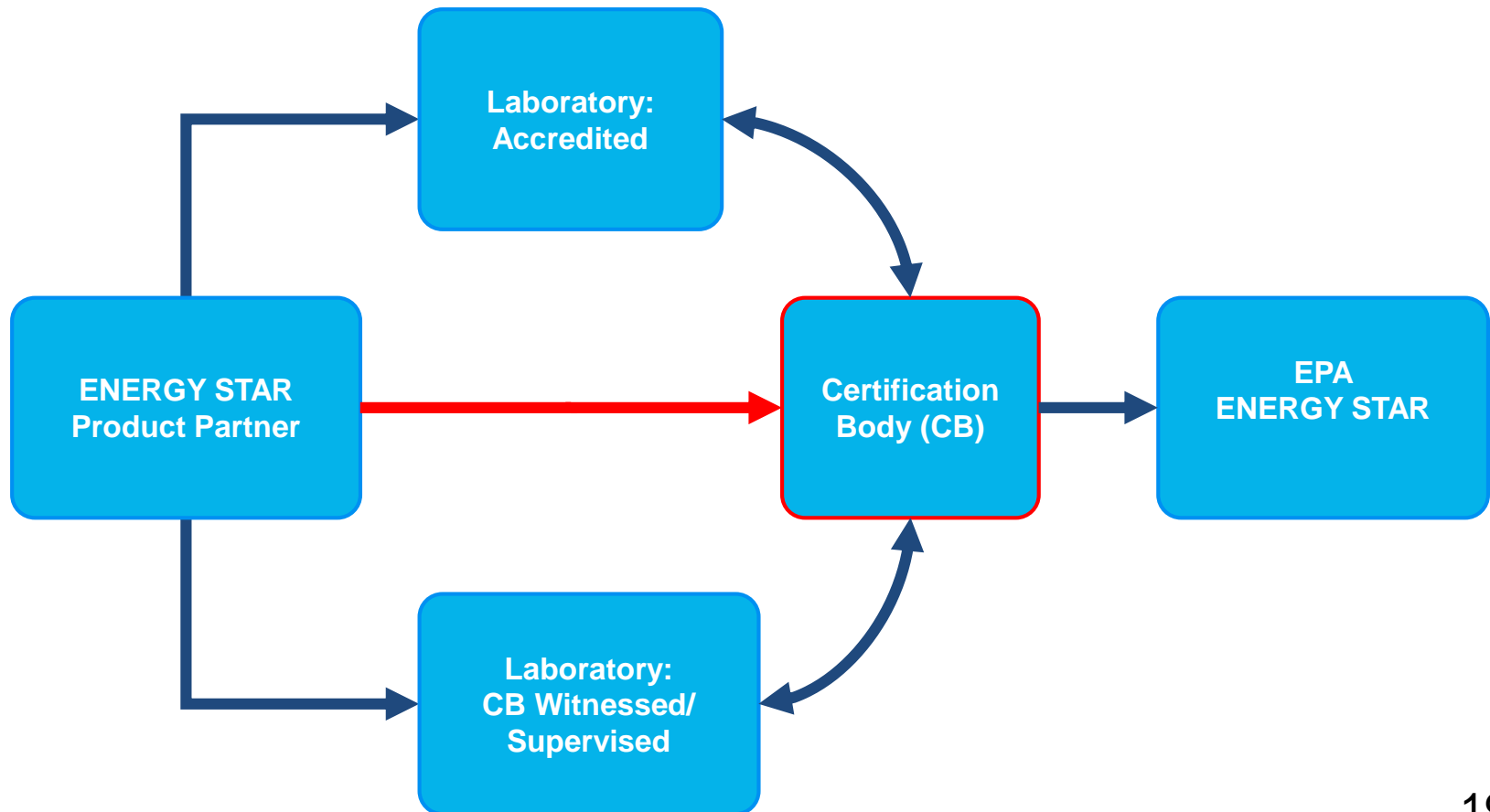
Setting up certification



Certification Process



Certification process - **product families**





Software updates

- Software updates are common
 - Bug fixes
 - Add capabilities, may provide additional savings
 - Provide amenity, at the possible cost of savings
- Recertification process would look very much like periodic data submission
 - EPA proposes software updates do not require recertification (as long as product stay w/in family)
- Look for changes in the Testing Requirements section



Software updates

Q1: For CT service providers, how do you evaluate whether an update is likely to erode savings, and by how much?



Field savings: data call results

- Produced with the beta release software, and data from 2015.
- All of the results received meet the proposed requirements
- The lower 95% confidence limits on the national heating and cooling scores (CS and HS) were all within 1 percentage point of each other, for the choices of method and filtering proposed in Draft 3
- All results received are for products which have demonstrated significant metered energy savings in field trials

Field savings requirements

| Metric | Statistical measure | Performance Requirement |
|---|---|-------------------------|
| Annual % run time reduction, heating (HS) | Lower 95% confidence limit of weighted national average | $\geq 8\%$ |
| | Weighted national average of 20 th percentiles | $\geq 4\%$ |
| Annual % run time reduction, cooling (CS) | Lower 95% confidence limit of weighted national average | $\geq 10\%$ |
| | Weighted national average of 20 th percentiles | $\geq 5\%$ |
| Average resistance heat utilization (heat pump installations) (RHU) | In 5° F outdoor temperature bins from 0° to 60° F | Report results |

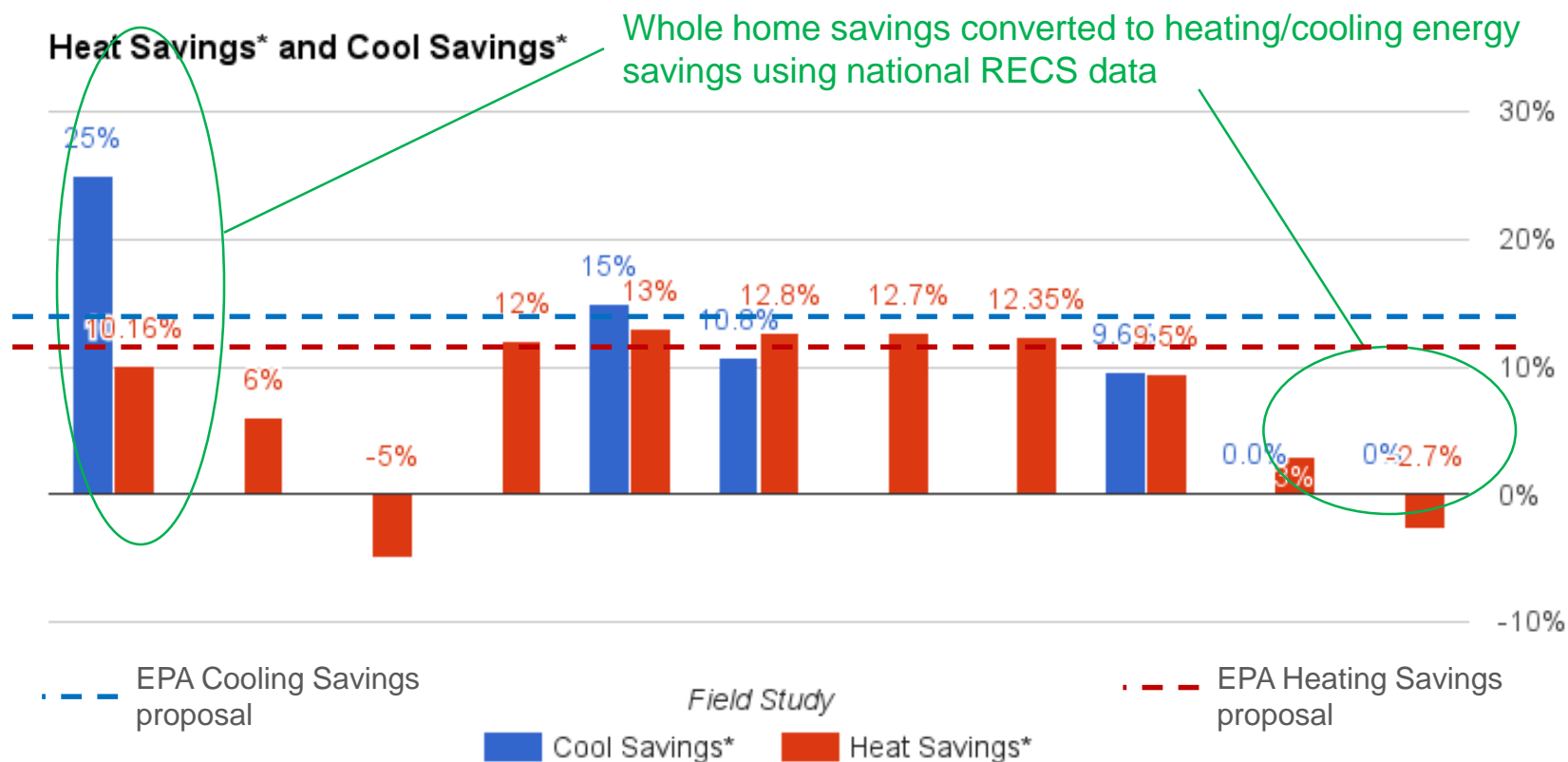


Field savings: interpreting savings %

- The method **may overestimate** savings...
 - The baseline of constant comfort temperature is not realistic; some setback behavior will occur with any t-stat
- Or it **may underestimate** savings...
 - Only setback behavior is awarded; measures to reduce the temp when people are home and awake will *reduce* metric results
 - Metric not sensitive to better control of heat pump resistance back up heat, or of stages
- At the moment, it seems to even out: metered savings similar to metric scores (see next slide)

Compare to metered field savings results

- Data from 7 CT field studies by utilities and state efficiency agencies, 2013-2015, with a variety of study designs
- 8 different CT products in all – each bar is one product in one study
- [More information can be found here.](#)





Other specification changes

- Added definitions:
 - Open Standard
 - Interface Specification
 - Product Family
 - Core Heating Day/Core Cooling Day
- Excluded line voltage thermostats
- Higher 3w standby power limit
- Modified A/B study option to be more parallel to metric performance
- Static temperature accuracy test slightly more specific



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Partner Commitments

- Agreement between EPA and ENERGY STAR CT Service Provider
- PCs are standard across ENERGY STAR product categories; labeling varies somewhat per category
- Use of the certification mark is granted to ENERGY STAR partners (in this case, CT service providers)
- CT device brand owners, that do not also brand a compliant CT service, may not be partners
- Overall goal of labeling is to influence purchasing (and in this case, service subscription) behavior



Changes to labeling – electronic

- Primary labeling is on mobile apps and web portals, as these are under control of the CT service provider
- Simplified to make clear that the certification mark shall appear to users occasionally in routine use
 - Home screen and main menu locations are examples that meet these requirements
 - Other strategies are likely to work, depending on the user architecture of the interface
- Requirement to include certification mark in product literature is standard to all ENERGY STAR products



Influencing purchases at retail

- To influence purchasing behavior at retail, EPA generally relies on use of the cert mark on product packaging
- CTs require a different approach
 - Item sold at retail (CT device) not an ENERGY STAR product
 - manufacturer may not be ENERGY STAR partner
- Creative ideas welcome!



Influencing purchases at retail

Q2: For all CT service providers, do you have a relationship with retail outlets, either on line or brick and mortar?

Q3: How does a CT device become linked with a service, such that they become the certified CT product?



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Estimated Timeline

| | |
|--------------|--|
| Sep 30, 2016 | Released Draft 2 Method to Demonstrate CT Field Savings |
| Oct 18, 2016 | Released Draft 3 CT Specification |
| Oct 26, 2016 | Draft 2 Savings Method comments due |
| Nov 3, 2016 | Draft 3 Specification Webinar |
| Nov 14, 2016 | Draft 3 Spec comments due |
| Nov 2016 | Final Draft Savings Method |
| Dec 2016 | Final Draft Specification |
| Dec 2016 | Finalize Savings Method and Specification |
| January 2017 | Set up certification infrastructure, start certifying products |



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Field savings: software decisions

- Core heating and cooling days defined by 30 minutes of run time
- Filtering will include model shows physically reasonable level of “free heat”, that the linear fit is reasonably good, and throwing out top and bottom 1% of savings
- Propose using the linear ΔT method of fitting data to calculate the metric
- All regions will be used in the weighted average for the national heating score, and all except Marine for the cooling score