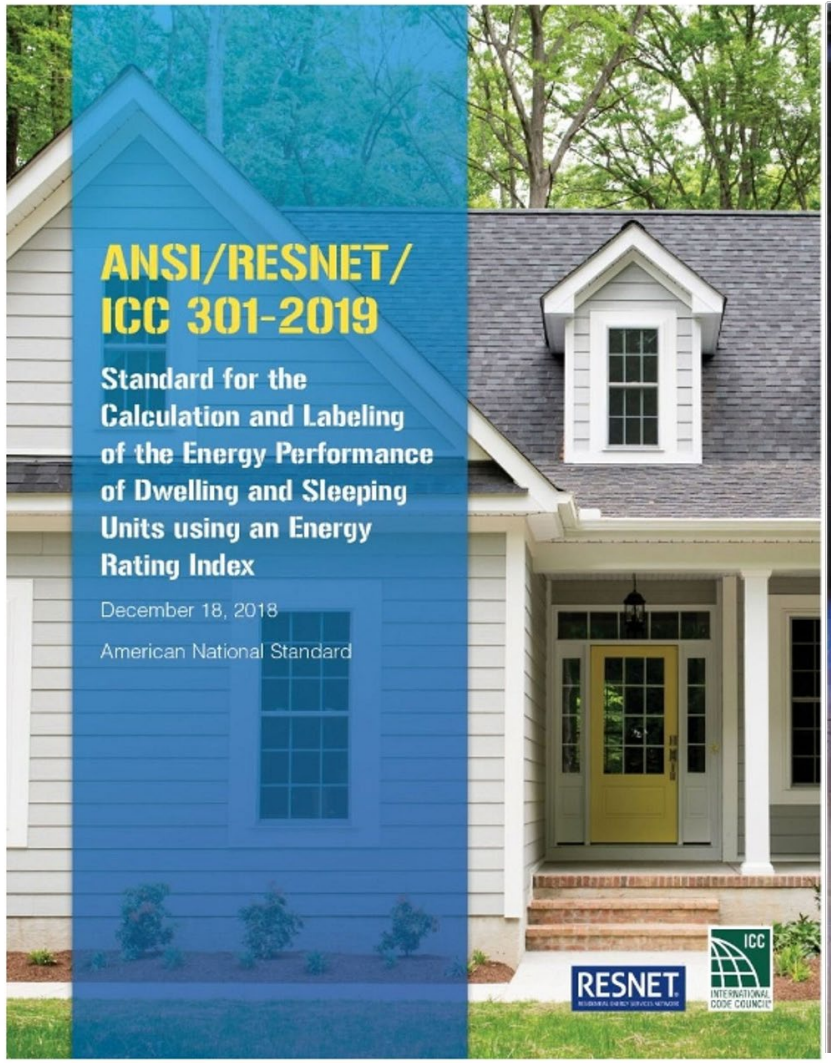
Updates Impacting RESNET HERS Index in 2025

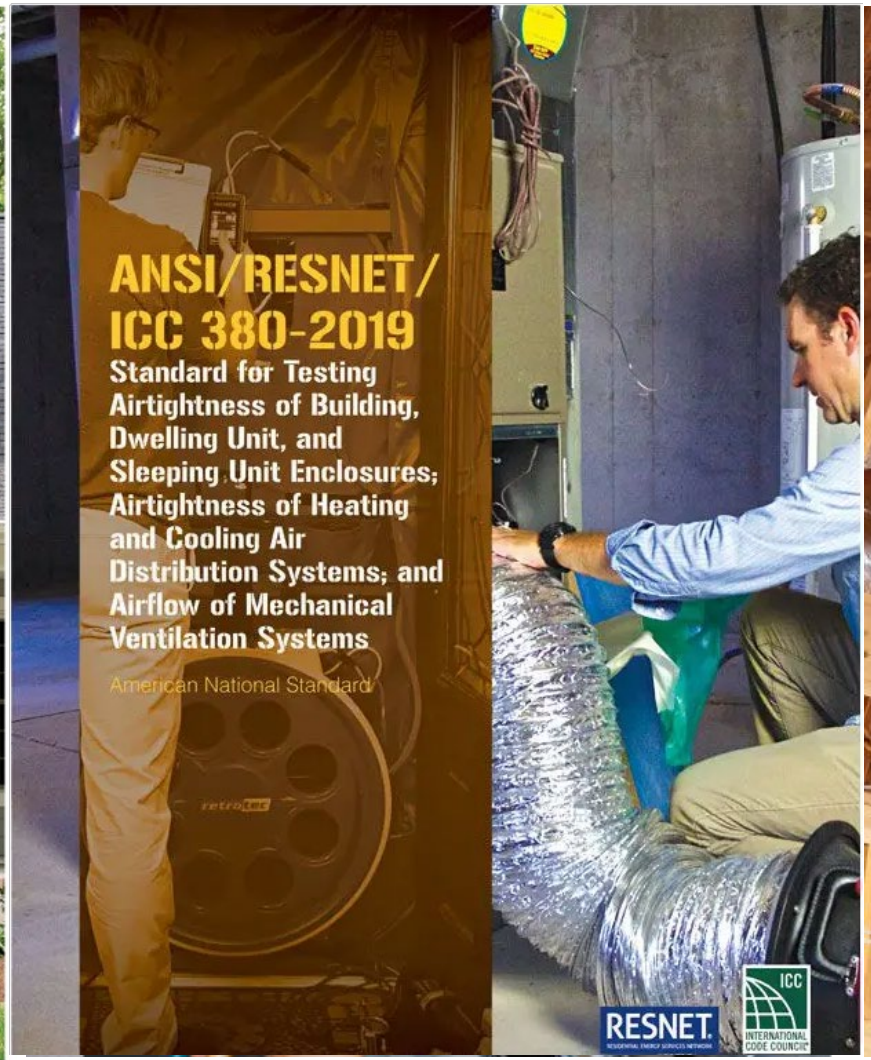
RESNET
RESIDENTIAL ENERGY SERVICES NETWORK
Leading the Path to Net Zero Energy Homes

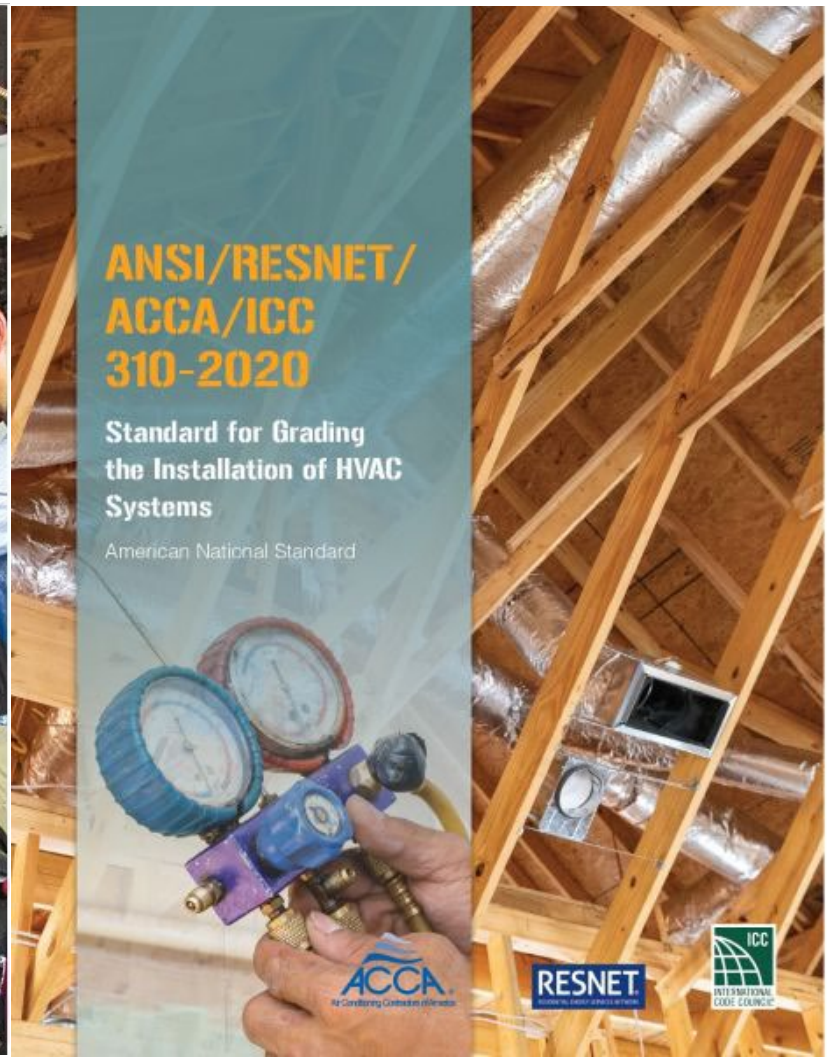
Gayathri Vijayakumar, Chair of SDC300

Steven Winter Associates, Principal Mechanical Engineer

Neal Kruis, RESNET Modeling Director and Chair of the Software Consistency Committee



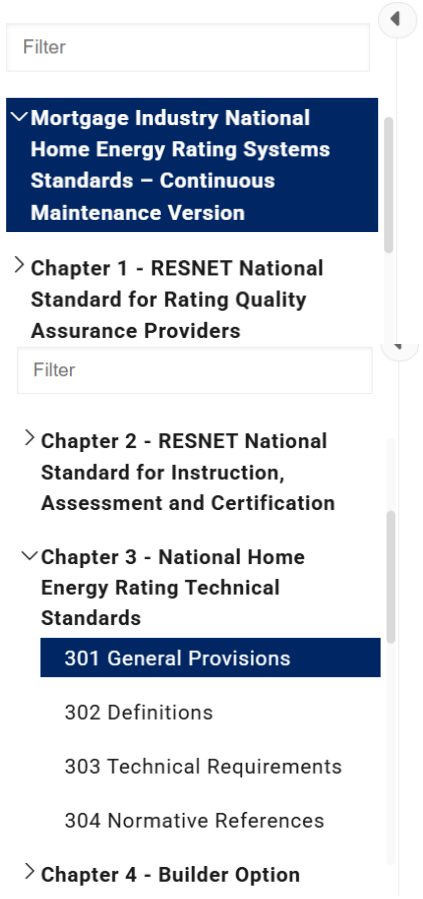




Applies to homes & buildings with Building Permit Dates* before July 1, 2025

*before July 1, 2025

https://standards.resnet.us/docs



Look in 303 for "Exceptions" which reflect MINHERS Addenda that have been approved and modify requirements that are in ANSI/RESNET/ICC 301-2019

Mortgage Industry National Home Energy Rating Systems Standards – Continuous Maintenance Version

Updated on 25 Jan 2024 Print Share

301 General Provisions

Updated on 04 Jun 2024 Print Share

NOTE:

HERS Update to Standard ANSI/RESNET/ICC 301-2019
MINHERS Addendum 42 adopted Standard ANSI/RESNET/ICC 301-2019 to replace Standard ANSI/RESNET/ICC 301-2014 as the basis for calculation of the HERS rating. Addendum 42 and has established a "Mandatory Compliance Date" of January 1, 2022. See Section 502.3.2 for the definition "Mandatory Compliance Date" and how it applies to your Rating.
Furthermore, for any Rating using Standard 301-2019, the RESNET Guidelines for Multifamily Energy Ratings may no longer be used except as allowed by Section 303.1 Exception 6 .
Dwelling Units in buildings issued a building permit prior to January 1, 2022 may continue to use the Guidelines pursuant to the requirements of Exception 4.

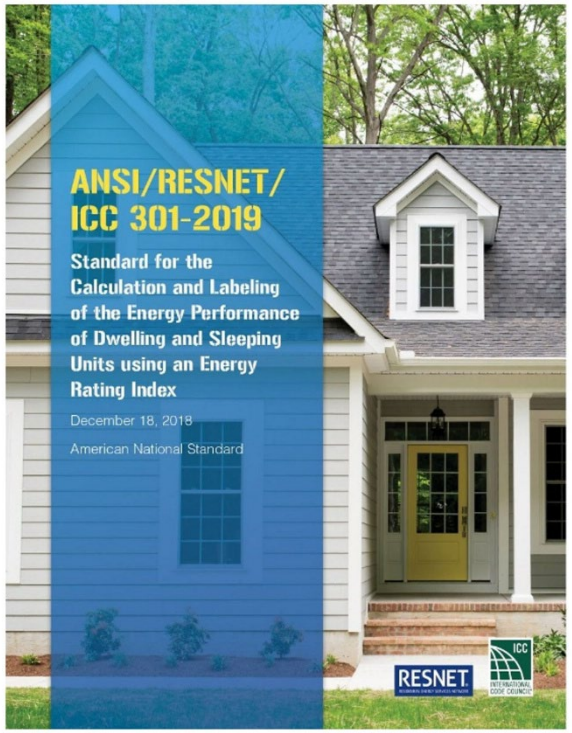
303 Technical Requirements

Updated on 14 Oct 2024 Print Share

HERS Update to Standard ANSI/RESNET/ICC 301-2019

MINHERS Addendum 42 adopted Standard ANSI/RESNET/ICC 301-2019 to replace Standard ANSI/RESNET/ICC 301-2014 as the basis for calculation of the HERS rating. Addendum 42 currently allows voluntary use of RESNET accredited software based on Standard 301-2019 and will require use of Standard 301-2019 on January 1, 2022. See the section 502.3.2 definition for Mandatory Compliance Date.

Developing ANSI 301-2022



Addendum A

Addendum B

Addendum C

Addendum D

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Interpretations

MINHERS Addenda

New changes

Public Comments

+

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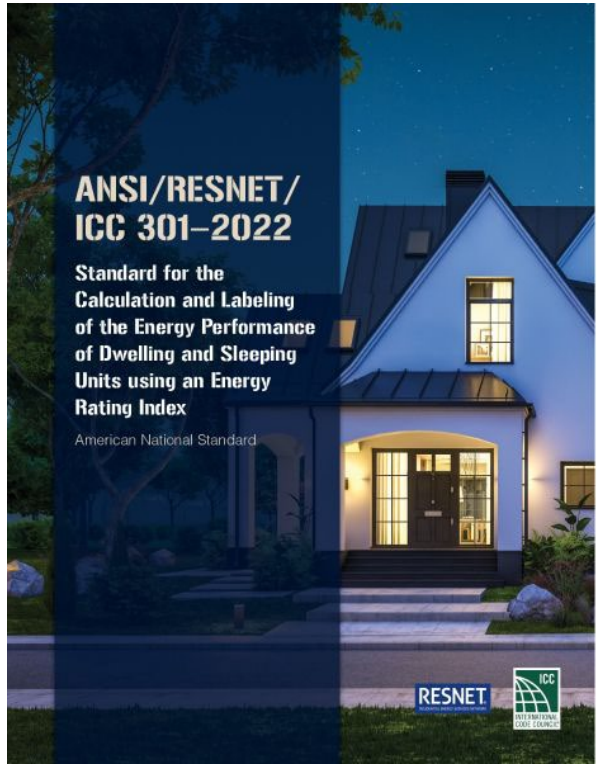
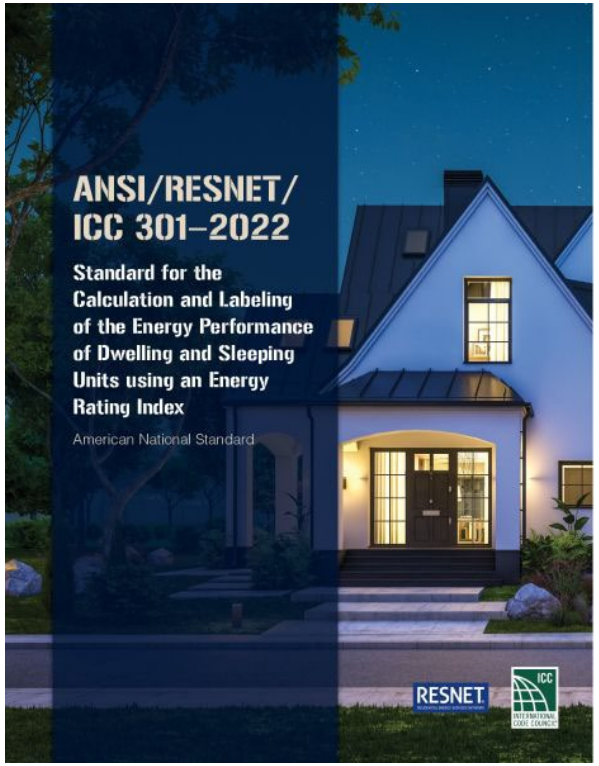


RESNET Adopts ANSI 301-2022 in July



Addendum A

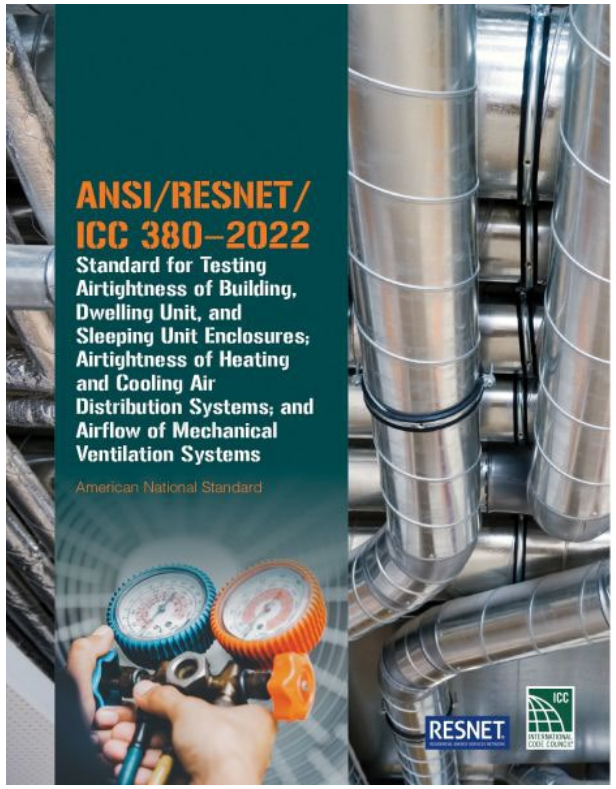
Addendum B

Addendum C

Addendum D ?

Addendum E

MINHERS Addenda

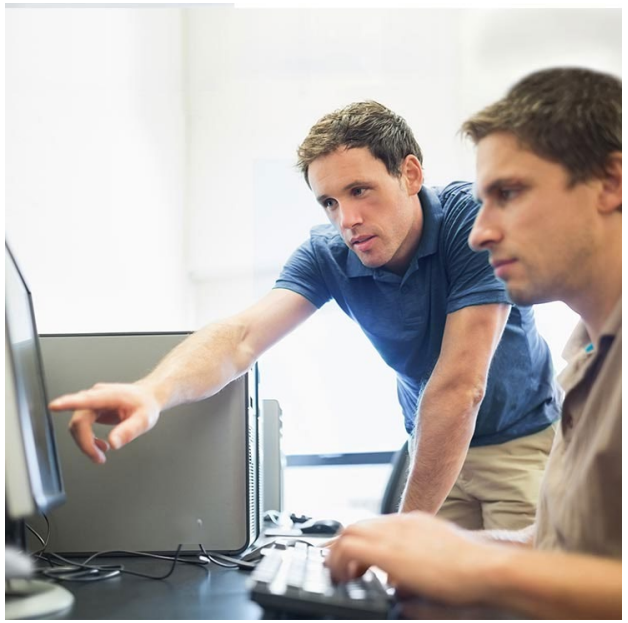


https://codes.iccsafe.org/content/RESNET3012022P1

https://codes.iccsafe.org/content/RESNET3802022P1

Changes in ANSI 301-2022

Blue Text = Changes that directly affect a Rater's energy modeling process, on-site inspections, or other procedures



Purple Text = Changes in standards language that do not directly affect the Rater, but may impact HERS index

Changes in ANSI 301-2022

If solar or other renewable energy on-site is being modeled in the rating:

Raters will need to document the status of the **Renewable Energy Certificate** (REC)

- Retired
- Retained
- Sold/transferred
- None associated
- Unknown

No impact on HERS index

BUILDING ELEMENTS: ON-SITE POWER PRODUCTION		
RATED FEATURE	**TASK**	**ON-SITE INSPECTION PROTOCOL**
Annual electricity generation for On- Site Power Production (OPP) systems	Data collection for On-Site Power Production systems	*On-Site Power Production systems* – Collect documentation that shows the annual kWh/y generated. For combined heat and power systems, the documentation shall include the annual gas use in addition to kWh/y generated. *Renewable Energy Systems* – Collect documentation or other information to determine whether Renewable Energy Certificates (RECs) are associated with the system, and document the RECs status as retired, retained ownership, sold/transferred, none associated with system, unknown. *Photovoltaic Systems* – In situations where the Approved Software Rating Tool calculates electricity generation from photovoltaic systems, determine and record the following: • the orientation of the photovoltaic `array to the nearest cardinal/ ordinal point, in the direction the array faces; • the tilt of the array. Use an angle finder instrument or geometric calculation; • the area of the array and the peak power using the information on the SRCC label or manufacturer's data sheet; and • the efficiency of the inverter using the manufacturer's data sheet.

Tracked changes in ANSI 301-2022 Appendix B

Changes in ANSI 301-2022

If solar or other renewable energy on-site is being modeled in the rating:

A Minimum Rated Feature has been added for **Onsite Battery Storage** which will affect the ERI calculation and will require Raters to determine and record the following:

- Storage type
- Maximum kW charging/discharging rates
- Usable kWh capacity
- Round-trip efficiency

Building Element: On-Site Battery Storage		
RATED FEATURE	TASK	ON-SITE INSPECTION PROTOCOL
On- Site Battery Storage Systems	Data collection for On-Site Battery Storage systems	*On-Site Battery Storage systems* – Collect documentation that shows the battery storage system type, its maximum kW charge and discharge rates, its usable kWh capacity, and its rated single charge-discharge cycle efficiency.

Tracked changes in ANSI 301-2022 Appendix B

Changes in ANSI 301-2022

When modeling the envelope of a home/building, Raters will now be required to:

Document the **color of exterior walls**

- White, yellow, light grey, silver, black, other

Document the **orientation of exterior walls**

For **through-wall AC or PTAC/PTHP units**, Raters shall model the area of the wall occupied by the system using R-2 (or less)

Document the **roof shape**

- Flat, sloped/shed, hip and gable

Document **roof eave** geometry

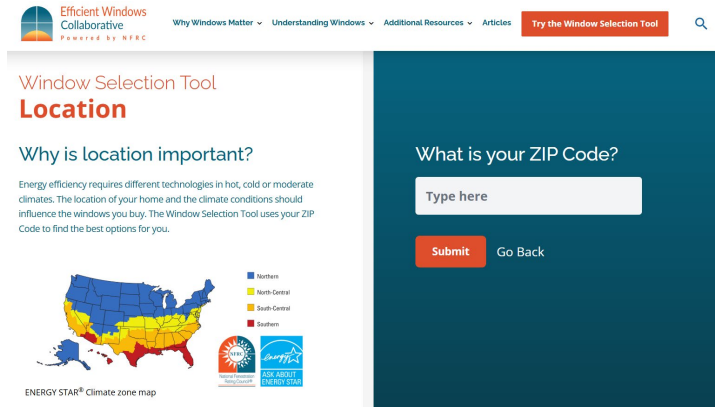
- If eave height is less than the roof/ceiling insulation thickness, the insulation may be derated

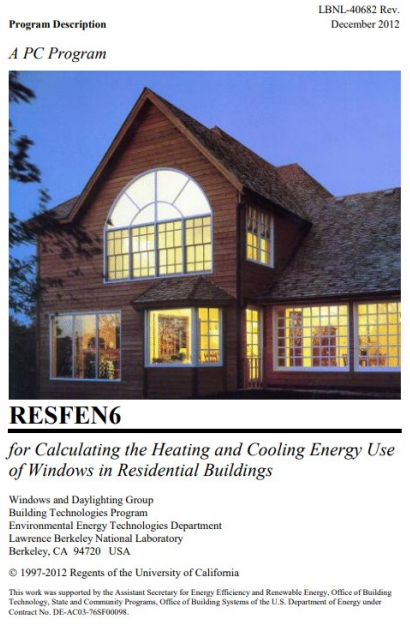
Changes in ANSI 301-2022

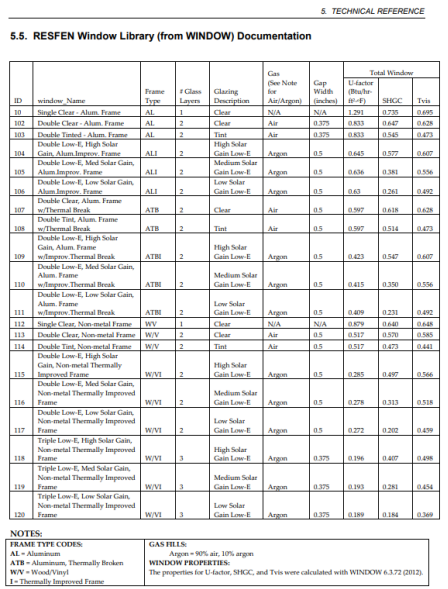
When modeling the window U-factor of a home/building, Raters can use additional resources:

- Through an interpretation request, windows without NFRC labels or listings on the NFRC Certified Products Directory, such as custom fabricated windows, can use **signed and dated documentation** provided by the manufacturer, listing the U-factor and SHGC, as documentation for the window unit's performance values

- In addition, these external resources for **data tables** and **selection tools** have also been listed in the Appendix B, to help determine window performance values
  - LBL RESFEN 6.0 User Manual
  - Efficient Window Collaborative window selection tool







Changes in ANSI 301-2022

When modeling ceiling fans and dryers, Raters will now be required to:

Enter the “Energy Use” Watts from the Energy Guide Label for **ceiling fans (instead of the LCFSW)**

Model the venting strategy for **clothes dryers**

- Vented or Ventless

Changes in ANSI 301-2022

When modeling a Central Fan Integrated Supply (CFIS) System, multiple changes were introduced in Addendum E

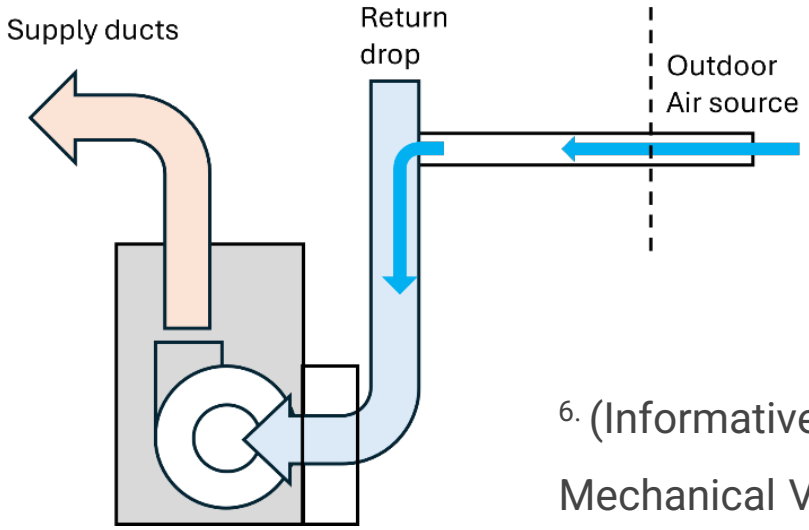


Diagram of typical CFIS System

Added CFIS definition and footnote:

Central Fan Integrated Supply System (CFIS System) – A Blower Fan of a Forced-Air HVAC System with a return-side outdoor air intake duct that supplies outdoor air to the Dwelling Unit.[6]

6. (Informative Note) A CFIS System does not automatically qualify as a Dwelling Unit Mechanical Ventilation System; see that definition for additional requirements. Additional criteria for characterizing and simulating a CFIS System can be found in Standard 380 in the Section on CFIS Systems, and in Standard 301 in the Section on Ventilation Systems, Table 4.5.2(1) Minimum Rated Features, and Normative Appendix B On-Site Inspection Protocols.

Changes in ANSI 301-2022

When modeling a Central Fan Integrated Supply (CFIS) System, multiple changes were introduced in Addendum E

Dwelling Unit Mechanical Ventilation System – A Ventilation system, operating continuously or through a programmed intermittent schedule, consisting of powered Ventilation equipment[16], related mechanical components[17], and automated control devices[18], that provides Dwelling Unit Ventilation at a known or measured airflow rate.

16. (Informative Note) Such as motor-driven fans and blowers.

17. (Informative Note) Such as ducts, inlets, dampers, or filters.

18. (Normative Note) A switch or thermostat setting, which enables the occupant to turn a system on and off, is not considered automated, continuous, nor programmed. The presence of a ventilation override control is permitted, if the override control is labeled with text or an icon that clearly indicate its function is to turn off the ventilation system.

Key Takeaway: If the CFIS does not qualify as Dwelling Unit Mechanical Ventilation, the Rated Home will still be modeled with CFIS, but the Energy Rating Reference Home will NOT.

Changes in ANSI 301-2022

When modeling a Central Fan Integrated Supply (CFIS) System in the Rated home:

Raters must document the following:

- How outdoor air is controlled
  - **Mechanical damper** or **other flow control** to block outdoor air when ventilation is not required
- Primary blower fan control strategy
  - Runs on a **fixed timer interval** or runs **during heating and cooling** operations
- Strategy for meeting any remainder of a ventilation target
  - **Supplemental** fan system or **blower fan** or **no strategy?**
  - If using a supplemental system, obtain its operating schedule, airflow measurements, and fan wattage
- Blower fan **model number**

Raters must test the following:

- The ventilation **airflows** of each fan for **each operational mode** used by the system

Changes in ANSI 301-2022

Other HVAC updates and changes:

For **forced air distribution systems**, Raters must now model the **duct area,** or use default:

$Area_{supply}$ = 0.27 x CFA

$Area_{return}$ = depends on CFA & # returns

For **untested** ducted systems, Raters can use **DLTO** default of 4 cfm /100 ft^2 of Conditioned Floor Area IF:

- Ducts & AHU are 100% inside Conditioned Space Volume, AND
- No building cavities are used as ducts, AND
- Ducts are not located in assemblies adjacent to exterior or adjacent to Unconditioned Space Volume (e.g., floor assembly above garage)

For **untested** ductless systems, Raters can use default **DSE** of 1.0 if:

- Supply-side length is less than 10ft, including both ductwork and building cavities used for distribution **AND** located **in CSV**.

Changes in ANSI 301-2022

Other HVAC updates and changes:

Dwelling unit mechanical **ventilation** system **controls** must be documented by the Rater, along with photos of the system itself

- Continuous
- Programmed/intermittent

Formal inclusion of **SEER2 and HSPF2** ratings, including conversion factors

Table 4.4.4.1(1) SEER2 and HSPF2 Conversion Factors[84]

Equipment Type	SEER2/SEER	EER2/EER[85]	HSPF2/HSPF
Ductless Systems	1.00	1.00	0.90
Ducted Split System	0.95	0.95	0.85
Ducted Packaged System	0.95	0.95	0.84
Small Duct High Velocity System	1.00	Not Applicable	0.85
Ducted Space-Constrained Air Conditioner[86]	0.97	Not Applicable	Not Applicable
Ducted Space-Constrained Heat Pump[30]	0.99	Not Applicable	0.85

Chapter 4 added conversion factor table

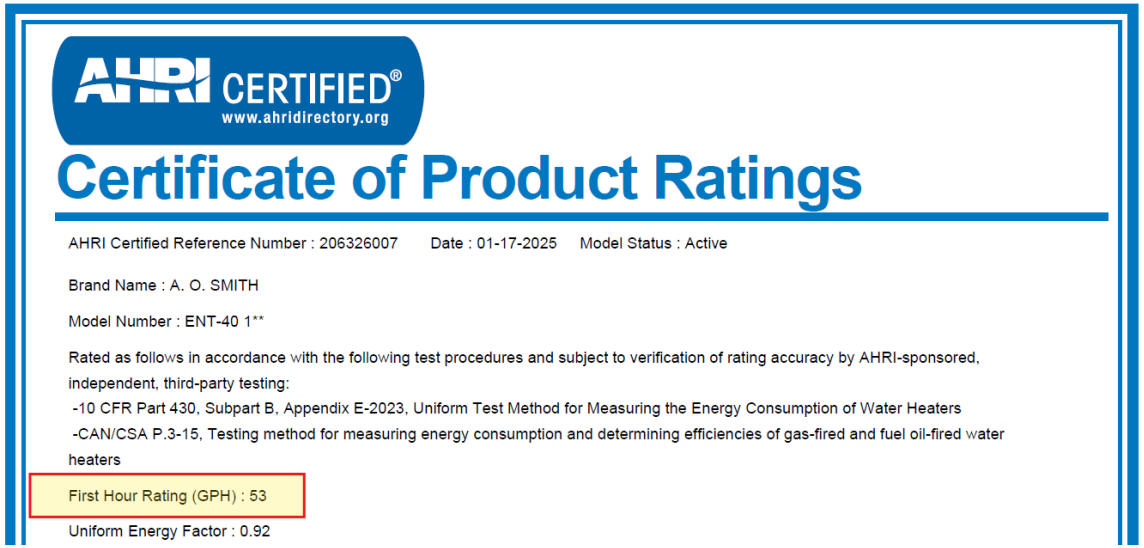
Changes in ANSI 301-2022

DHW updates and changes:

When using UEF for hot water equipment efficiency, Raters must also obtain first-hour rating (GPH)

Slight changes to on-site protocol when verifying hot water distribution systems

- Low-flow fixtures
- Pipe insulation
- Pipe length



AHRI CERTIFIED®
www.ahridirectory.org

Certificate of Product Ratings

AHRI Certified Reference Number : 206326007 Date : 01-17-2025 Model Status : Active

Brand Name : A. O. SMITH

Model Number : ENT-40 1**

Rated as follows in accordance with the following test procedures and subject to verification of rating accuracy by AHRI-sponsored, independent, third-party testing:
-10 CFR Part 430, Subpart B, Appendix E-2023, Uniform Test Method for Measuring the Energy Consumption of Water Heaters
-CAN/CSA P.3-15, Testing method for measuring energy consumption and determining efficiencies of gas-fired and fuel oil-fired water heaters

First Hour Rating (GPH) : 53

Uniform Energy Factor : 0.92

Changes in ANSI 301-2022

DHW updates and changes:

ANSI 301-2019 Standard:

Low-Flow Fixtures

- **Record the rated gpm printed on all showerheads and faucets**.
- When the gpm rate is not visible, collect documentation showing the model number of the plumbing fixtures and use manufacturer's data sheet to determine and record the rated gpm.

ANSI 301-2022 Standard:

Low-Flow Fixtures

- If **all** Bathroom sink faucets and showerheads in the Rated Home **are ≤ 2.0 gpm**, record that the Rated Home has **low-flow faucets and showerheads** and model it accordingly.
- If any or all Bathroom sink faucets and showerheads in the Rated Home **are > 2.0 gpm**, record that the Rated Home has **standard faucets and showerheads** and model it accordingly.
- A shower with multiple showerheads that operate simultaneously meets the low-flow criteria ONLY IF the sum of the flow rate of all showerheads is ≤ 2.0 gpm.

Changes in ANSI 301-2022

DHW updates and changes:

ANSI 301-2019 Standard:

Pipe Insulation

- Inspect the hot water piping for the presence of insulation and record the percentage of piping that is insulated. Measure the thickness of the insulation and identify material to determine its R-Value.

ANSI 301-2022 Standard:

Pipe Insulation

- Inspect the hot water piping to determine if the piping is insulated.
- Measure the thickness of the insulation and identify material to determine and **record if its R-Value is at least R-3**.
- If the pipe insulation is ≥ R-3, record that the Rated Home has at least R-3 pipe insulation and model it accordingly.
- If the pipe insulation is < R-3, record that the Rated Home does not have R-3 pipe insulation and model it accordingly.

Changes in ANSI 301-2022

DHW updates and changes:

ANSI 301-2019 Standard:

Hot Water Pipe Length

- The hot water distribution pipe length from the water heater to the farthest hot water fixture shall be measured horizontally and vertically along its length, assuming the hot water piping does not run diagonally.

ANSI 301-2022 Standard:

Hot Water Pipe Length

- The hot water distribution pipe length from the water heater to the farthest hot water fixture shall be measured longitudinally, assuming the hot water piping does not run diagonally, plus 10 feet of piping for each conditioned floor level, plus 5 feet of piping for unconditioned basements (if any).

PipeL = measured length of hot water piping from the hot water heater (or from a shared recirculation loop serving multiple[67] Dwelling Units) to the farthest hot water fixture, measured longitudinally from plans, assuming the hot water piping does not run diagonally, plus 10 feet of piping for each conditioned floor level[68] including conditioned basements (if any), plus 5 feet of piping for unconditioned basements (if any).[69]

Chapter 4, equation 4.2-41, specifies adding 10ft for “conditioned” levels

Changes in ANSI 301-2022

Added Definitions:

- Attic – A space volume directly below the roof assembly that is not included in the Conditioned Floor Area. Attics may be either vented or air sealed.[4]
  - [4]. (Normative Note) Conditioned Space Volume that is intended for human activities, including but not limited to those for living, sleeping, dining, or cooking as well as toilets, closets, halls, utility areas and above the main Dwelling Unit, (for example a 'Cape Cod' home), is not considered attic space and shall be included in the Conditioned Floor Area.
- Bathroom – A room with at least one sink and at least one toilet.
- Battery Storage Losses – Charging and discharging energy losses calculated as total annual energy based on the rated single charge-discharge cycle efficiency for the On-Site Battery Storage system.
- Carbon Dioxide Equivalent Rating Index (CO2e Rating Index) – A numerical integer value that represents the relative Carbon Dioxide equivalent (CO2e) emissions of a Rated Home as compared with the CO2e emissions of the CO2e Reference Home where an Index value of 100 represents the CO2e performance of the CO2e Reference Home and an Index value of 0 (zero) represents a home that emits zero net CO2e annually.
- Cooling Load, Sensible – The quantity of sensible heat that must be removed from the Dwelling Unit or building to keep the space temperature at a specified thermostat setting. The sensible cooling load is independent of the distribution system(s) used to remove heat from the spaces.
- Deviation - shall mean the measured fractional change from a design condition whereby the measured value minus the design value is divided by the design value to yield the fractional change.
- First Hour Rating (FHR) – The volume of hot water in gallons that a storage water heater can supply within an hour beginning with the water heater fully heated.

Changes in ANSI 301-2022

Added Definitions:

- Heating Load – The quantity of sensible heat that must be added to the Dwelling Unit or building to keep the space temperature at a specified thermostat setting. The heating load is independent of the distribution system(s) used to add heat to the spaces.
- Hot Water Load – The quantity of heat that must be added to mains water to supply a given quantity of hot water at a given temperature. The hot water load includes the distribution system losses, but is independent of any hot water tank heat losses.
- Load, Sensible – The quantity of heat added to or removed from a Dwelling Unit or building to satisfy specific levels of service.[23]
    - [23] .(Informative Note) Examples are: heat added or removed to keep a space temperature at a specified thermostat setting; heat added to supply a given quantity of hot water at a given temperature, and; heat added to a space by miscellaneous appliances.
- On-Site Battery Storage – Electrical energy storage system on the site of the Rated Home accepting electrical energy from On-Site Power Production, storing that electric energy, and then dispatching the stored electric energy to power building loads in accordance with a defined battery energy storage system power dispatch protocol.
- Renewable Energy Certificate (REC) – A market-based instrument that represents and conveys the environmental, social, and other non-power attributes of one megawatt-hour of renewable electricity generation.

Changes in ANSI 301-2022

Summaries of Updates to Existing Definitions:

- Conditioned Floor Area (CFA) – added that "if the subject Dwelling Unit shares a wall assembly with another Dwelling Unit, then the CFA of the subject Dwelling Unit shall extend to the midpoint of that shared wall assembly" in order to be consistent with the existing CSV definition

- Dwelling Unit Mechanical Ventilation System – added footnote 18, relating to automated control devices
  - [18]. (Normative Note) A switch or thermostat setting, which enables the occupant to turn a system on and off, is not considered automated, continuous, nor programmed. The presence of a ventilation override control is permitted, if the override control is labeled with text or an icon that clearly indicate its function is to turn off the ventilation system.

- Multifamily Buffer Boundary – added that "for modeling purposes, the temperature of this space shall be the average of conditioned space and outside temperatures but shall be no lower than 50°F."

- Purchased Energy – added that it is "excluding electricity produced on-site that is purchased from a supplier."

- Unrated Heated Space – added that "for modeling purposes, the temperature of this space shall be the average of conditioned space and outside temperatures but shall be no lower than 68°F."

Changes in ANSI 301-2022

Software Updates to Energy Rating Calculation Procedure

Multiple **End Use Loads**

- When the Rated Home has multiple equipment serving the same end use load, text added to clarify how the normalized modified end use load shall be determined & creates multiple systems in Reference Home

Tank losses for **shared storage water heaters** (and **recirc pump energy**):

- Prorated to a Dwelling Unit based on its number of bedrooms relative to the total number of bedrooms served by shared storage water heater (rather than prorated by dwelling units in the building)

Rated Homes **without proposed water heater**:

- Fuel type determined based on weighted space heating loads served by each fuel
- Where space heating loads served by different fuel types are equal, fossil fuel shall be used

Rated Homes with **multiple proposed water heaters**:

- Shall be modeled as one 40-gallon storage type water heater
- Fuel type determined based on weighted water heating loads served by each fuel
- Where water heating loads served by different fuel types are equal, fossil fuel shall be used

MINHERS Addenda

Addendum 83i

- As an Interim Addendum, this became effective Dec 20, 2024 to provide immediate access to a Grade I inspection protocol for **concrete masonry unit (CMU)** assemblies insulated by foam insulation filled core
  - Can be used now but only if modeling the R-values in accordance with the Normative Appendix C, C1.2
  - MINHERS Addendum 83f will follow & will require the use of those R-values, regardless of whether Grade I is sought.

Addendum 46 & 76

- RESNET guidelines for multifamily ratings are not permitted for ratings as of July 1, 2025 (currently, those Guidelines are only allowed for Sampling protocols)

C1.2 For concrete masonry units (CMU), the R-value of the CMU component shall be as provided by Tables C.1(2) for 3-web CMU and from Table C.1(3) for 2-web CMU.

Table C.1(2) 3-Web CMU Blocks

R-Values[1] for 8" x 16" Concrete Masonry Units (CMU)[2]					
CMU	Foamed-in-place cores at R-4.6/in[3]			Without core insulation	
concrete density[4]	core pours[5] at 96" o.c.	core pours at 48" o.c.	all cores poured	core pours at 96" o.c.	core pours at 48" o.c.
85	5.75	4.92	1.39	1.77	1.73
95	5.06	4.37	1.27	1.63	1.59
105	4.44	3.88	1.16	1.50	1.47
115	3.89	3.43	1.06	1.39	1.36
125	3.39	3.02	0.98	1.29	1.26
135	2.95	2.66	0.91	1.19	1.17

Changes in ANSI 380-2022

Clarifications and Refinement of existing practice:

- Definitions to better align with RESNET 301 and 310
- Infiltration Volume definition, set-up, and test method with respect to Attics, Crawlspaces, Basements and Mechanical Rooms
- Infiltration, Duct Leakage, and Ventilation test set-ups with respect to mechanical openings
- Dwelling unit infiltration test set-up with respect to adjacent conditioned spaces including dwelling units (which shall be opened for the test unless access is not permitted)

Changes in ANSI 380-2022

Expansions to existing practice:

- **Passive resistance devices** can now be used for ventilation systems with multiple inlet terminals provided there is a passive resistance device simultaneously measuring every inlet
- Ventilation test equipment now includes **sections for vane anemometers, hot wire anemometers, and non-averaging velocity pressure probes**
    - Inlet and outlet airflows may now be measured using a vane anemometer
    - Hot wire anemometers, and non-averaging velocity pressure probes may be used for mid-stream ventilation air flow measurements

Software Update Timeline

- Beta Versions: October 2024
- Impact Analysis: November 2024
- Voluntary Compliance: January 1, 2025
- Mandatory Compliance: July 1, 2025

Summary of Software Change Impacts

- **301-2022**
  - Eave insulation (0 to +1)
  - Default framing fractions (0)
- **Addendum C**
  - Material properties, infiltration metrics, hourly schedules, interior shading (-1 to +1)
- **Addendum E**
  - CFIS duct losses (+ 1 to + 7)
- **Publication 002 (software testing procedures)**
  - Updated acceptance criteria (-4 to +3 in Ekotrope)
- **Bug Fixes**

Software Accreditation Status

- Ekotrope:
  - v5.0 Approved (301-2022 + A + B, Pub 002)
  - v5.1 Under review (+ C + E)
- REM/Rate:
  - 2025 Under review
- EnergyGauge:
  - v8.1.08 Approved
- APEX
  - v1.9 Under review

Standard 301-2022: Eave Insulation

Raised-Heel Truss

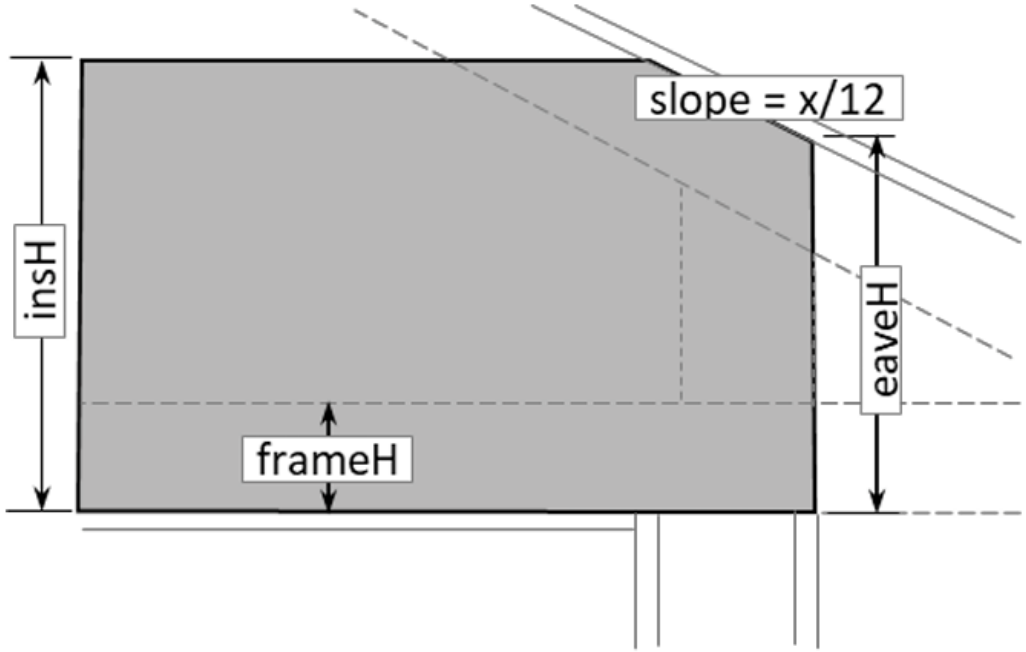


Figure 4.2.2-1b. Illustration of critical inputs for raised heel truss eave assembly

More Insulation
Along Attic Perimeter

Standard-Heel Truss

ΔHERS Index: 0 to +1

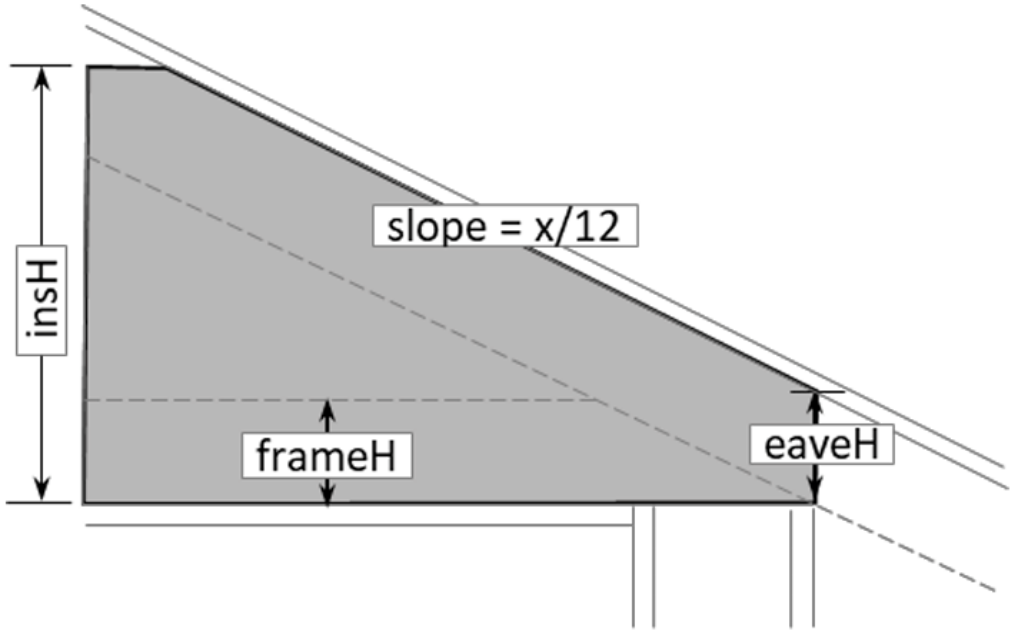
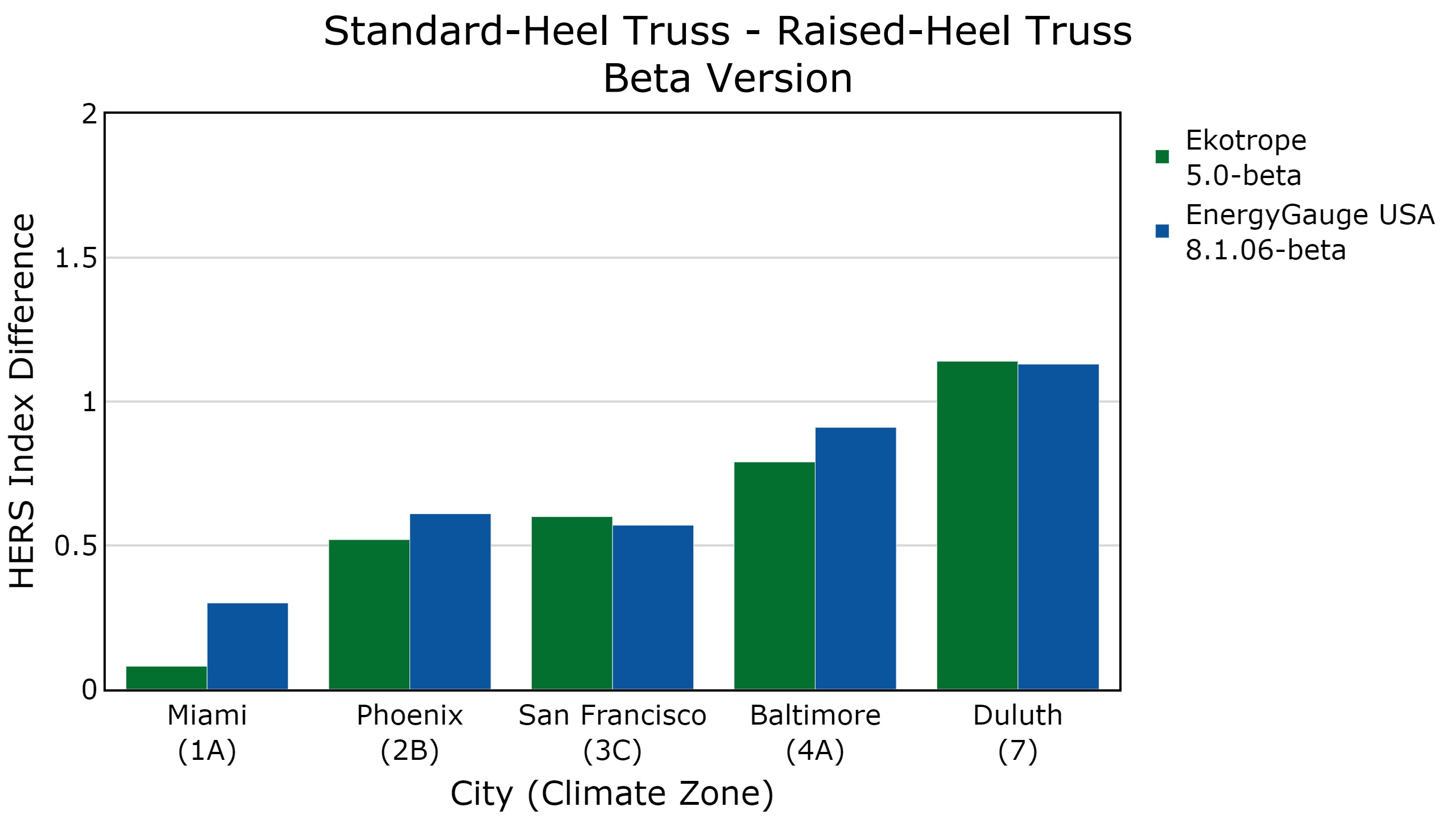


Figure 4.2.2-1a. Illustration of critical inputs for standard eave assembly

Less Insulation
Along Attic Perimeter


Standard-Heel Truss - Raised-Heel Truss
Beta Version
HERS Index Difference
2
1.5
1
0.5
0
Miami
(1A)
Phoenix
(2B)
San Francisco
(3C)
Baltimore
(4A)
Duluth
(7)
City (Climate Zone)
Ekotrope
5.0-beta
EnergyGauge USA
8.1.06-beta

Standard 301-2022: Framing Fractions

ΔHERS Index: 0

Table 4.2.2(5) Default Framing Fractions for Enclosure Elements

Enclosure Element	Frame Spacing (in o.c.)	Default Frame Fraction (% area)
Walls (standard):		
@16" o.c.	16	23%
@24" o.c.	24	20%
Walls (advanced):		
@16" o.c.	16	19%
@24" o.c.	24	16%
Structural Insulated Panels	48	10%
Floors (standard):		
@16" o.c.	16	13%
@24" o.c.	24	10%
Floors (advanced):		
@16" o.c.	16	11%
@24" o.c.	24	8%
Ceilings (standard trusses):		
@16" o.c.	16	14%
@24" o.c.	24	11%
Ceilings (advanced trusses – "raised heel"):		
@16" o.c.	16	10%
@24" o.c.	24	7%
Ceilings (conventional framing):		
@16" o.c.	16	13%
@24" o.c.	24	9%

Table 4.2.2(5) Default Framing Fractions for Wood-Framed Assembly Components

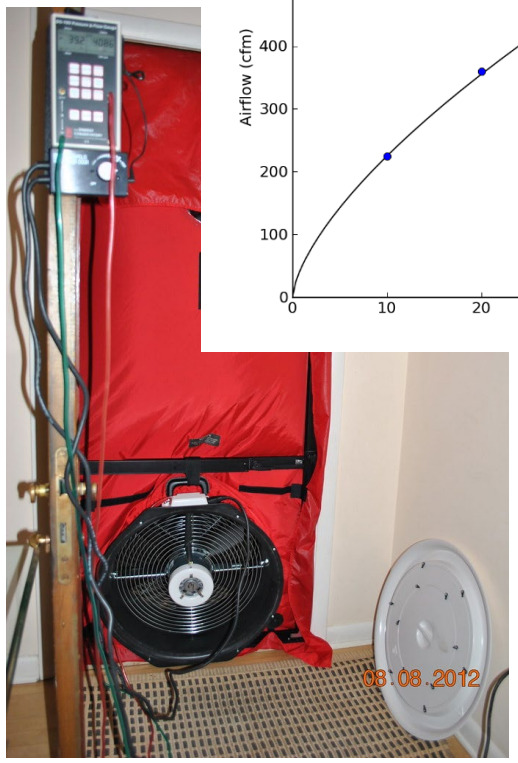
Assembly Component	Framing Spacing (Inches On-Center)	Framing Type	Default Framing Fraction (% Area)
Wall	16	Standard	25%
	16	Advanced	19%
	24	Standard	22%
	24	Advanced	16%
	n/a	Structural Insulated Panel	10%
Floor	16	n/a	13%
	24	n/a	10%
Ceiling	16	n/a	10%
	24	n/a	7%

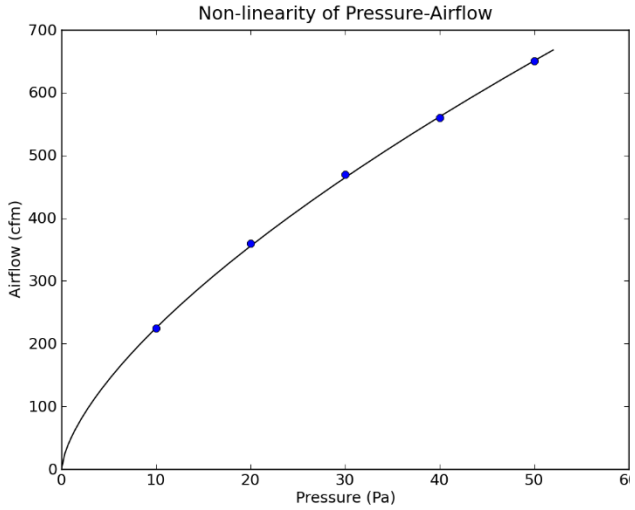
Addendum C: Material Properties

Table C.1(1) Material Thermal Properties

Material	Conductivity (Btu/hr-F-ft)
Soil (adjacent to the home's foundation)	1.000
Wood	0.067
Drywall	0.092

Addendum C: Infiltration Metrics





C2.2 Conversion Equations

$NL = 1000 * SLA * (H/Hr)^{0.4}$ [*ASHRAE Standard 62.2*] (Eq. 1)

$SLA = NL / (1000 * (H/Hr)^{0.4})$ (Eq. 2)

$SLA = ELA / (CFA*144)$ (Eq. 3)

$ELA = (CFA*144) * SLA$ (Eq. 4)

$SLA = ach_4 * (Hf/Hr) / (1000 * wsf * (H/Hr)^{0.4})$ (Eq. 5)

$ach_4 = SLA * 1000 * wsf * (H/Hr)^{0.4} * Hr/Hf$ (Eq. 6)

$ELA = 0.283316 * C * 4^n$ *['C' input in IP units]* (Eq. 7)

$EqLA = 0.2937 * C * 10^n$ *['C' input in IP units]* (Eq. 8)

$C = ELA / (0.283316 * 4^n)$ *['C' returned in IP units]* (Eq. 9)

$C = EqLA / (0.2932 * 10^n)$ *['C' returned in IP units]* (Eq. 10)

$cfm_{50} = C * 50^n$ *['C' input in IP units]* (Eq. 11)

$cfm_{25} = C * 25^n$ *['C' input in IP units]* (Eq. 12)

$ach_{50} = (cfm_{50} * 60) / (CFA * Hf)$ (Eq. 13)

$cfm_{50} = CFA * Hf * ach_{50} / 60$ (Eq. 14)

$ach_{50} = SLA / (0.283316 * 4^n) * (50^n * 60 * 144 / Hf)$ (Eq. 15)

$SLA = ach_{50} * (0.283316 * 4^n) / (50^n * 60 * 144 / Hf)$ (Eq. 16)

$ach_{50} = SLA * 19200$ *[for Hf =Hr and n = 0.65]* (Eq. 17)

$SLA = ach_{50} / 19200$ *[for Hf =Hr and n = 0.65]* (Eq. 18)

$ELA = 0.054863 * cfm_{50}$ *[for n = 0.65]* (Eq. 19)

$ach_{50} = 19.2 * ach_4 / (wsf * (H/Hr)^{0.4})$ *[for n = 0.65]* (Eq. 20)

$NL = ach_4 * (Hf/Hr) / wsf$ *[for n = 0.65]* (Eq. 21)

Addendum C: Hourly Schedules

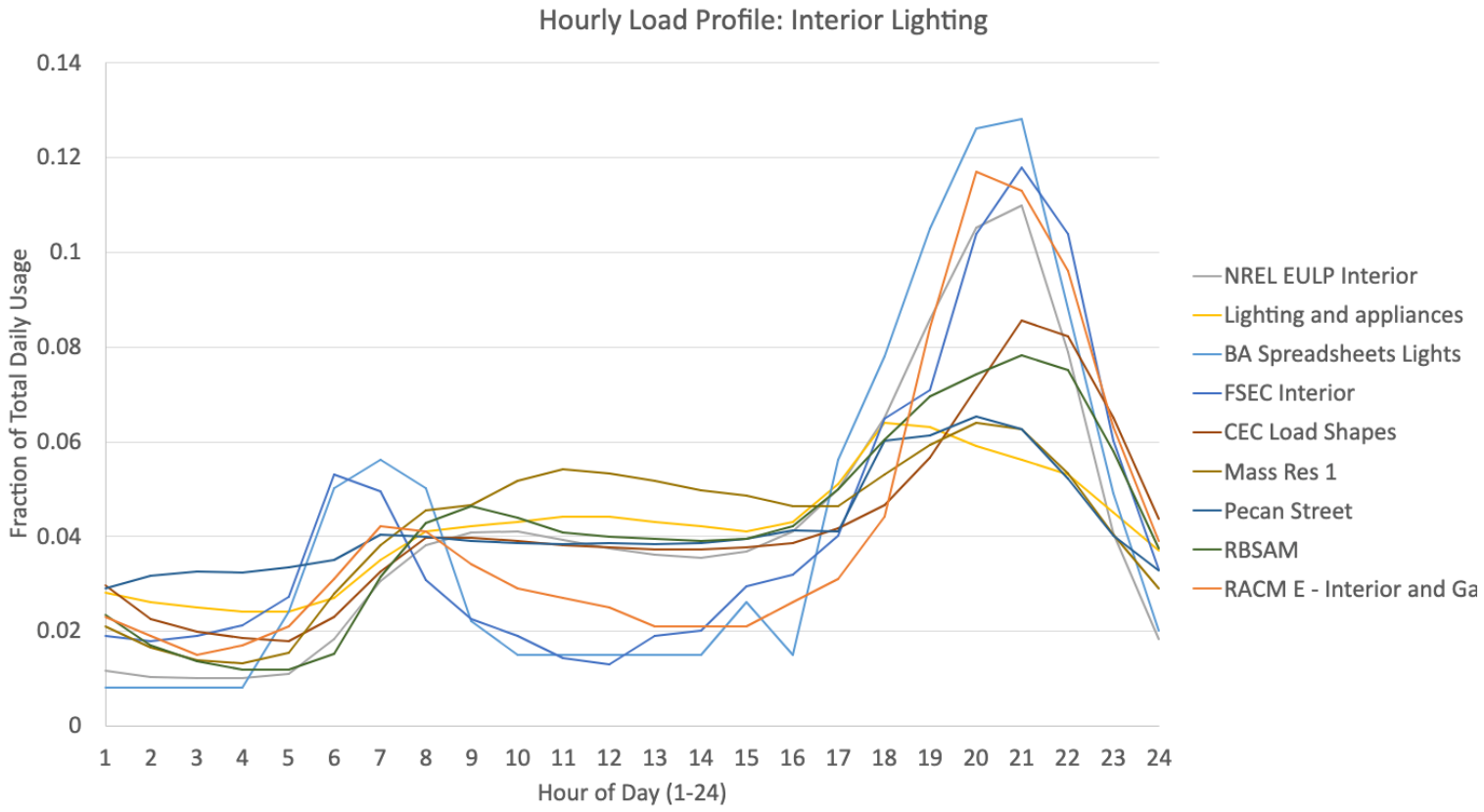


Table C.3(3) Daily End Use Profile Schedules for Lighting

Hour of Day	Interior	Exterior	Garage
0-1	0.012	0.040	0.023
1-2	0.010	0.037	0.019
2-3	0.010	0.037	0.015
3-4	0.010	0.035	0.017
4-5	0.011	0.035	0.021
5-6	0.018	0.039	0.031
6-7	0.030	0.044	0.042
7-8	0.038	0.041	0.041
8-9	0.041	0.031	0.034
9-10	0.041	0.025	0.029
10-11	0.039	0.024	0.027
11-12	0.037	0.024	0.025
12-13	0.036	0.025	0.021
13-14	0.035	0.028	0.021
14-15	0.037	0.030	0.021
15-16	0.041	0.035	0.026
16-17	0.050	0.044	0.031
17-18	0.065	0.056	0.044
18-19	0.086	0.064	0.084
19-20	0.106	0.068	0.117
20-21	0.110	0.070	0.113
21-22	0.079	0.065	0.096
22-23	0.040	0.056	0.063
23-24	0.018	0.047	0.039

Addendum C: Interior Shading

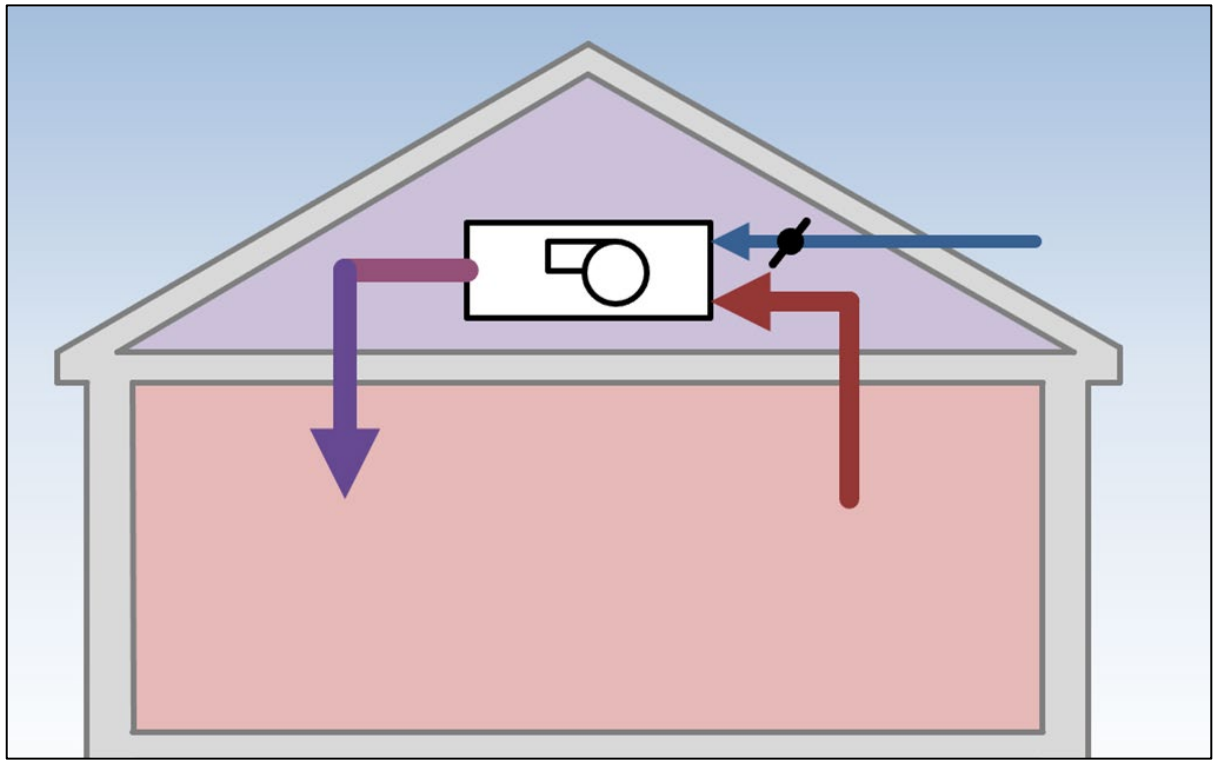
Glazing[b]	Total area[c] =18% of CFA	Same as Rated Home
	Orientation: equally distributed to four (4) cardinal compass orientations (N, E, S, & W)	Same as Rated Home
	U-Factor: from Table 4.2.2(2)	Same as Rated Home
	SHGC: from Table 4.2.2(2)	Same as Rated Home
	Interior shade coefficient: 0.92-(0.21*SHGC ~~for of~~ the ~~standard reference design~~ Energy Rating Reference Home)~~Summer = 0.70 Winter = 0.85~~	0.92-(0.21*SHGC ~~as~~ ~~proposed~~of the Rated Home)~~Same as Energy Rating Reference Home~~[d]
	External shading: none	Same as Rated Home[e]

ΔHERS Index: -1 to +1

Addendum E: CFIS System

4.2.2.7.2.13.2. Software shall simulate all CFIS Systems as follows:

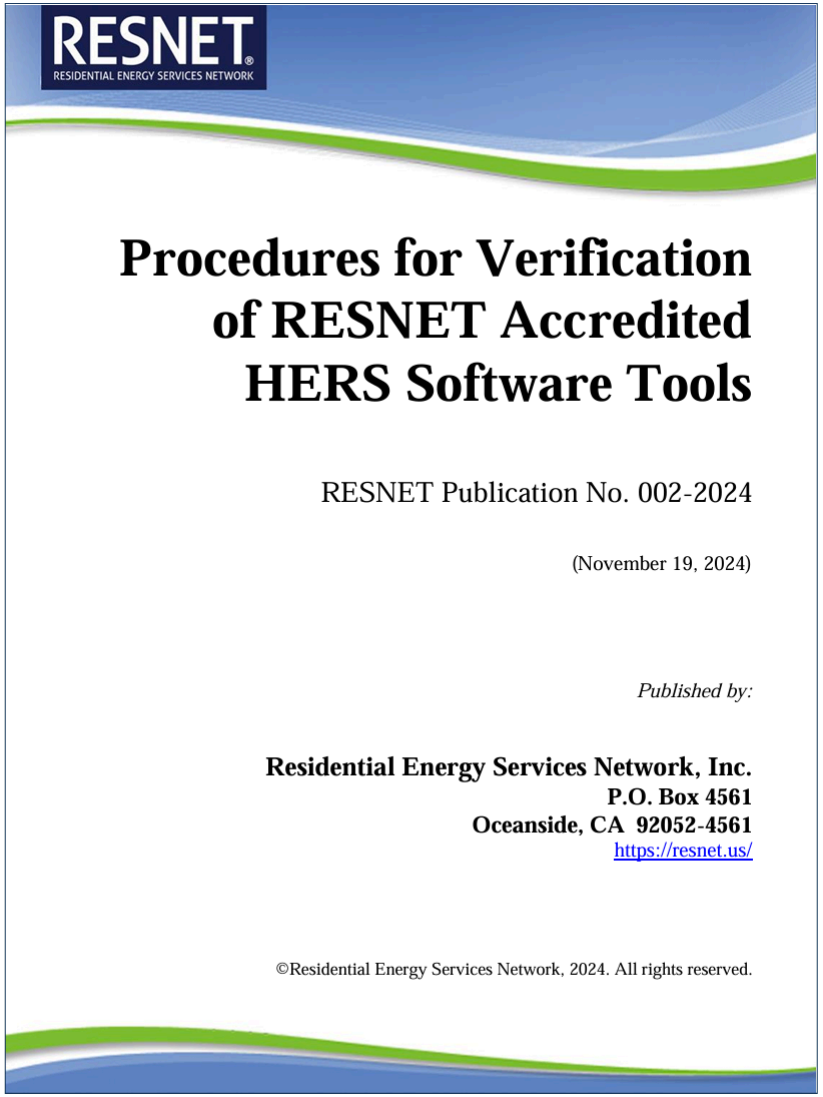
4.2.2.7.2.13.2.1 Where a Rated Home has a CFIS System, duct losses for all non-heating and non-cooling Blower Fan run-time shall be included in the simulation.



Ventilation Mode

ΔHERS Index: +1 to +7

Publication 002: Acceptance Criteria


RESNET
RESIDENTIAL ENERGY SERVICES NETWORK

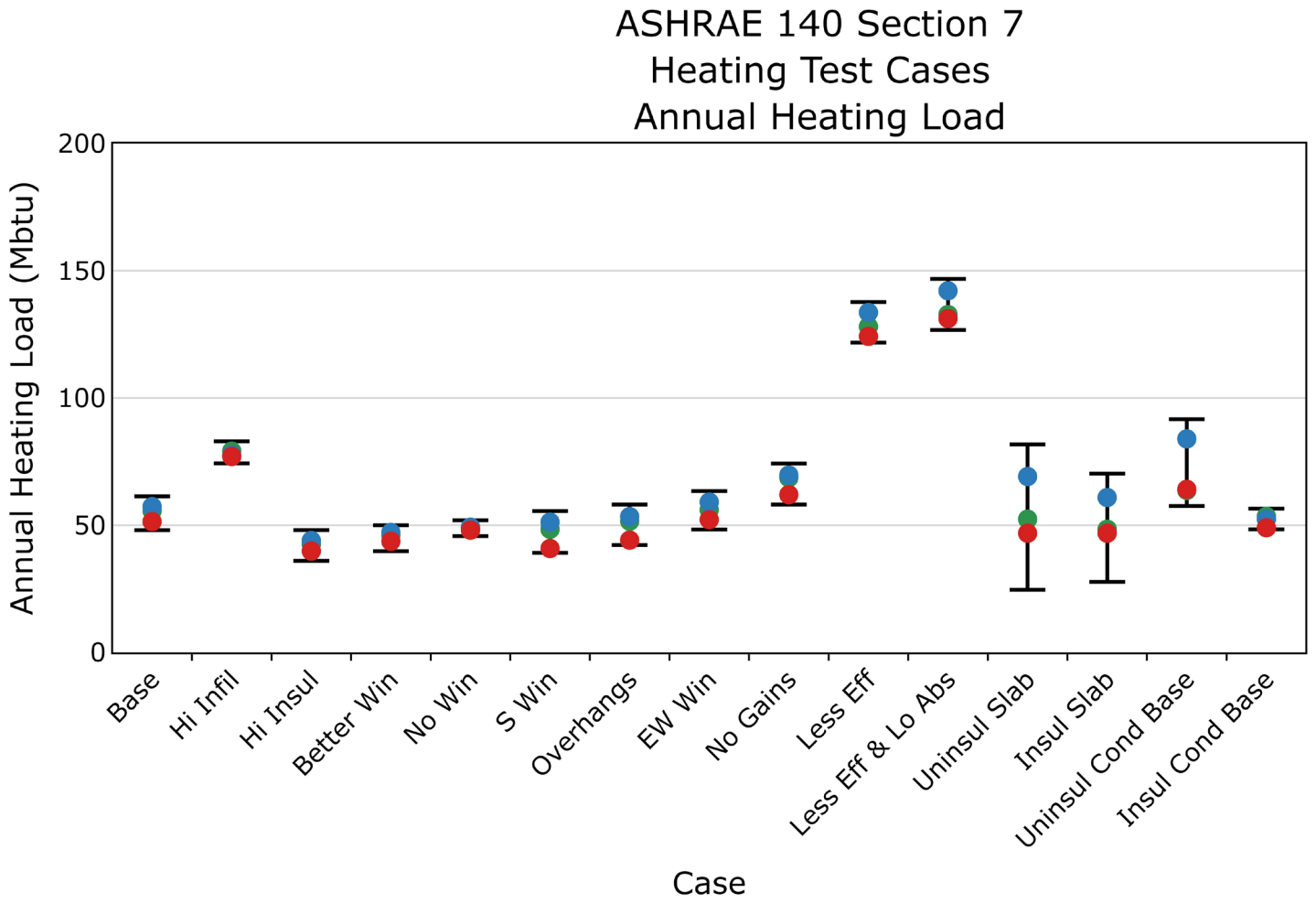
Procedures for Verification of RESNET Accredited HERS Software Tools

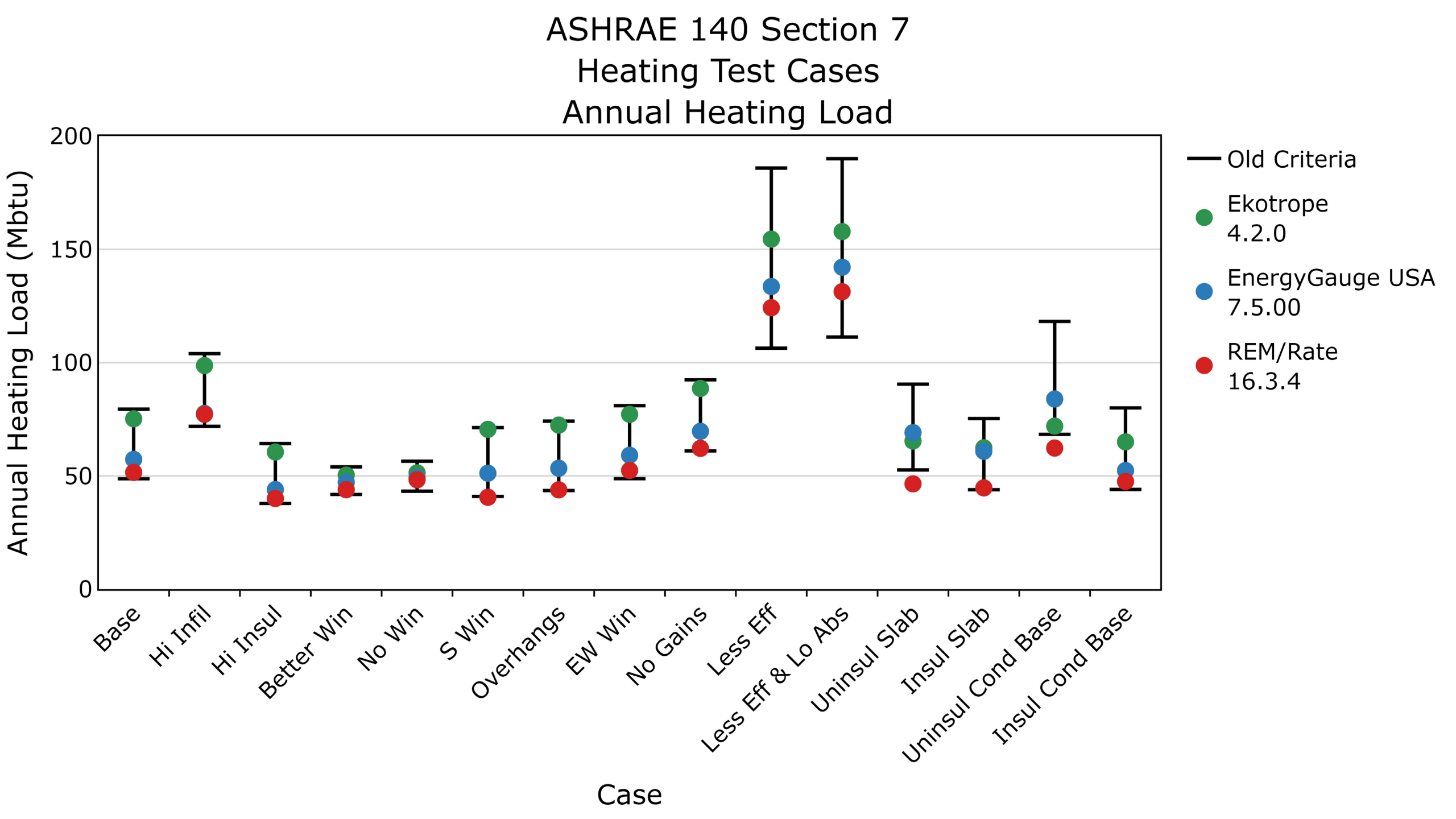
RESNET Publication No. 002-2024

(November 19, 2024)

Published by:

Residential Energy Services Network, Inc.
P.O. Box 4561
Oceanside, CA 92052-4561
https://resnet.us/

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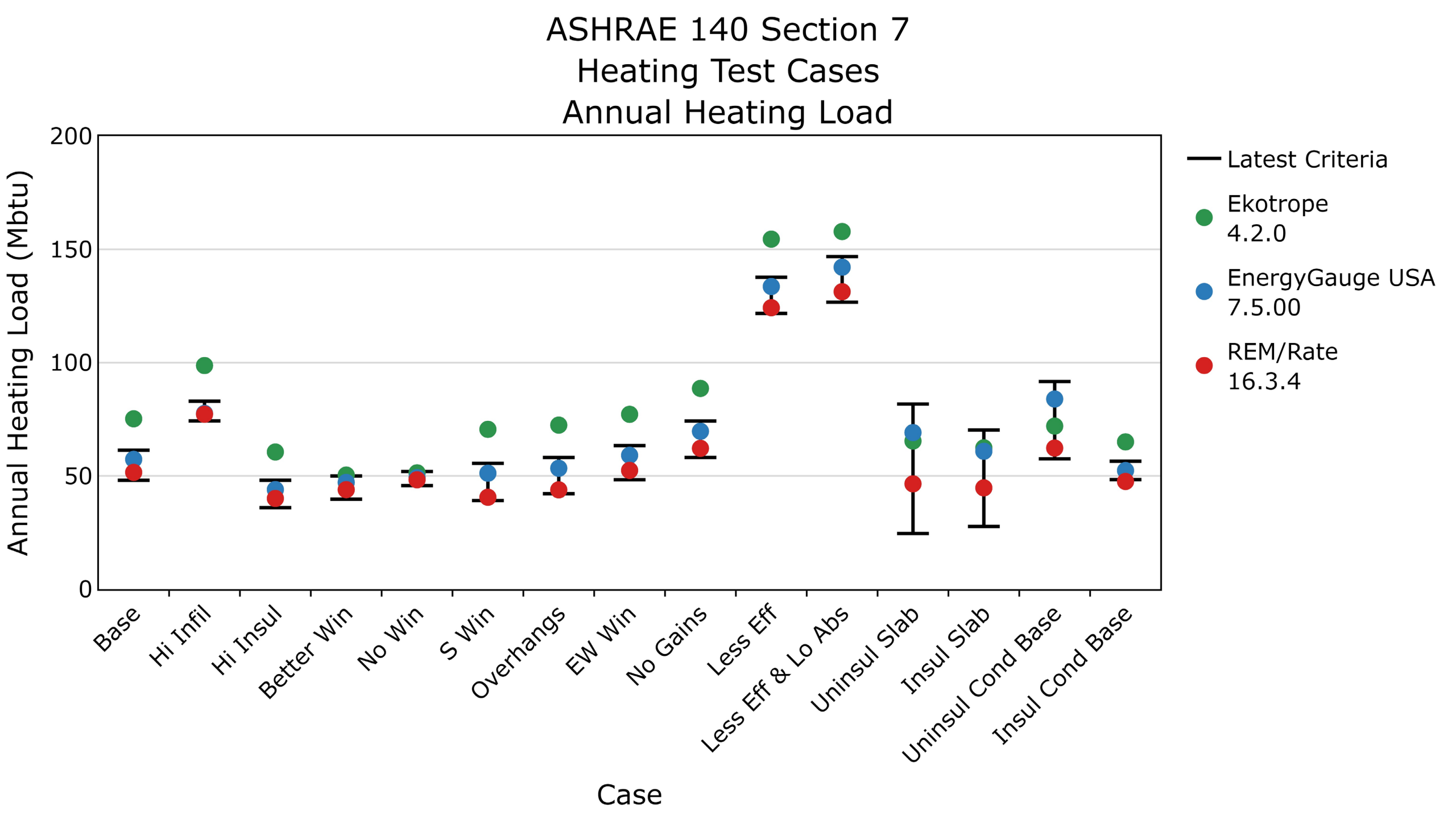
Annual Heating Load (Mbtu)
200
150
100
50
0
Base
Hi Infil
Hi Insul
Better Win
No Win
S Win
Overhangs
EW Win
No Gains
Less Eff
Less Eff & Lo Abs
Uninsul Slab
Insul Slab
Uninsul Cond Base
Insul Cond Base
Case
Old Criteria
Ekotrope
4.2.0
EnergyGauge USA
7.5.00
REM/Rate
16.3.4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Annual Heating Load
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150
100
50
0
Base
Hi Infil
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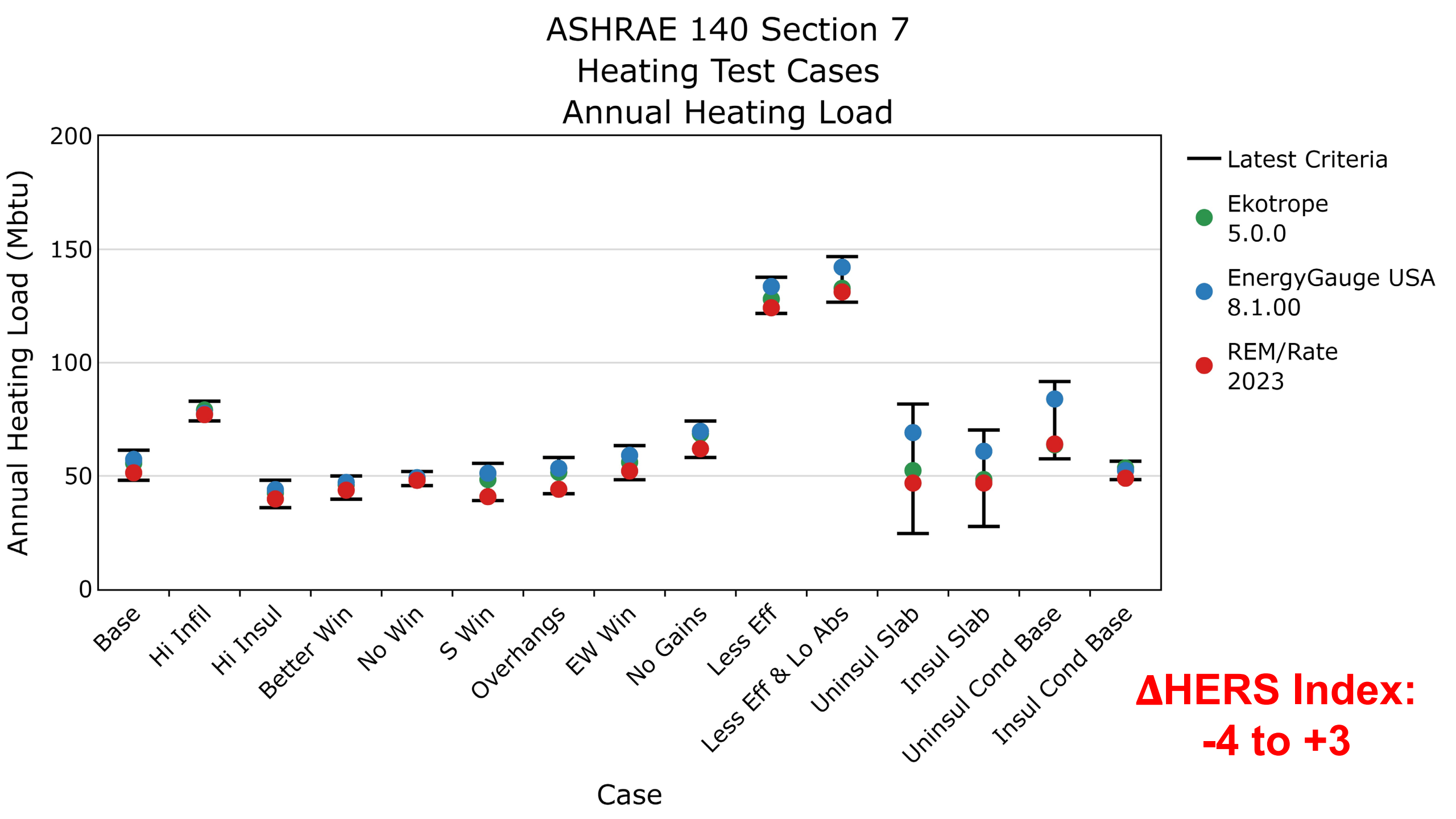
Better Win
No Win
S Win
Overhangs
EW Win
No Gains
Less Eff
Less Eff & Lo Abs
Uninsul Slab
Insul Slab
Uninsul Cond Base
Insul Cond Base
Case
Latest Criteria
Ekotrope
4.2.0
EnergyGauge USA
7.5.00
REM/Rate
16.3.4


ASHRAE 140 Section 7
Heating Test Cases
Annual Heating Load
Annual Heating Load (Mbtu)
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150
100
50
0
Base
Hi Infil
Hi Insul
Better Win
No Win
S Win
Overhangs
EW Win
No Gains
Less Eff
Less Eff & Lo Abs
Uninsul Slab
Insul Slab
Uninsul Cond Base
Insul Cond Base
Case
Latest Criteria
Ekotrope
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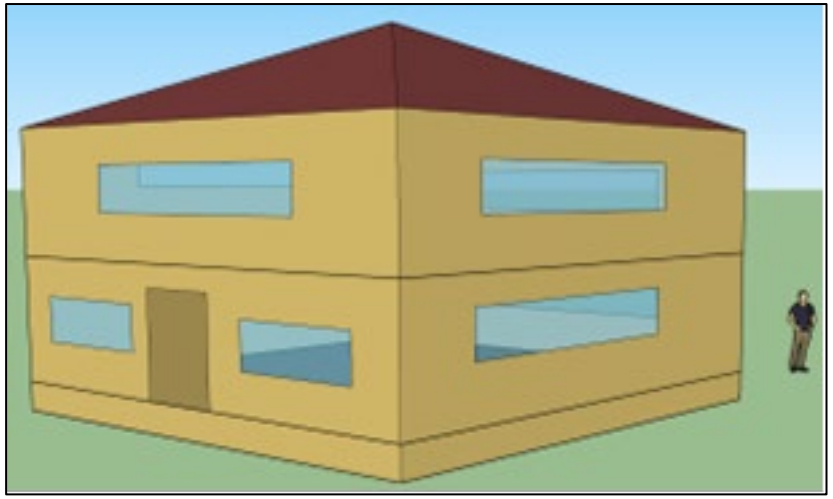
EnergyGauge USA
8.1.00
REM/Rate
2023
ΔHERS Index:
-4 to +3

Multi-Climate Test Suite



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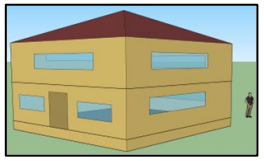

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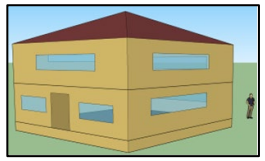

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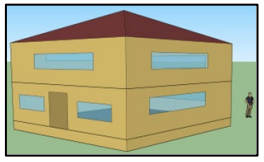
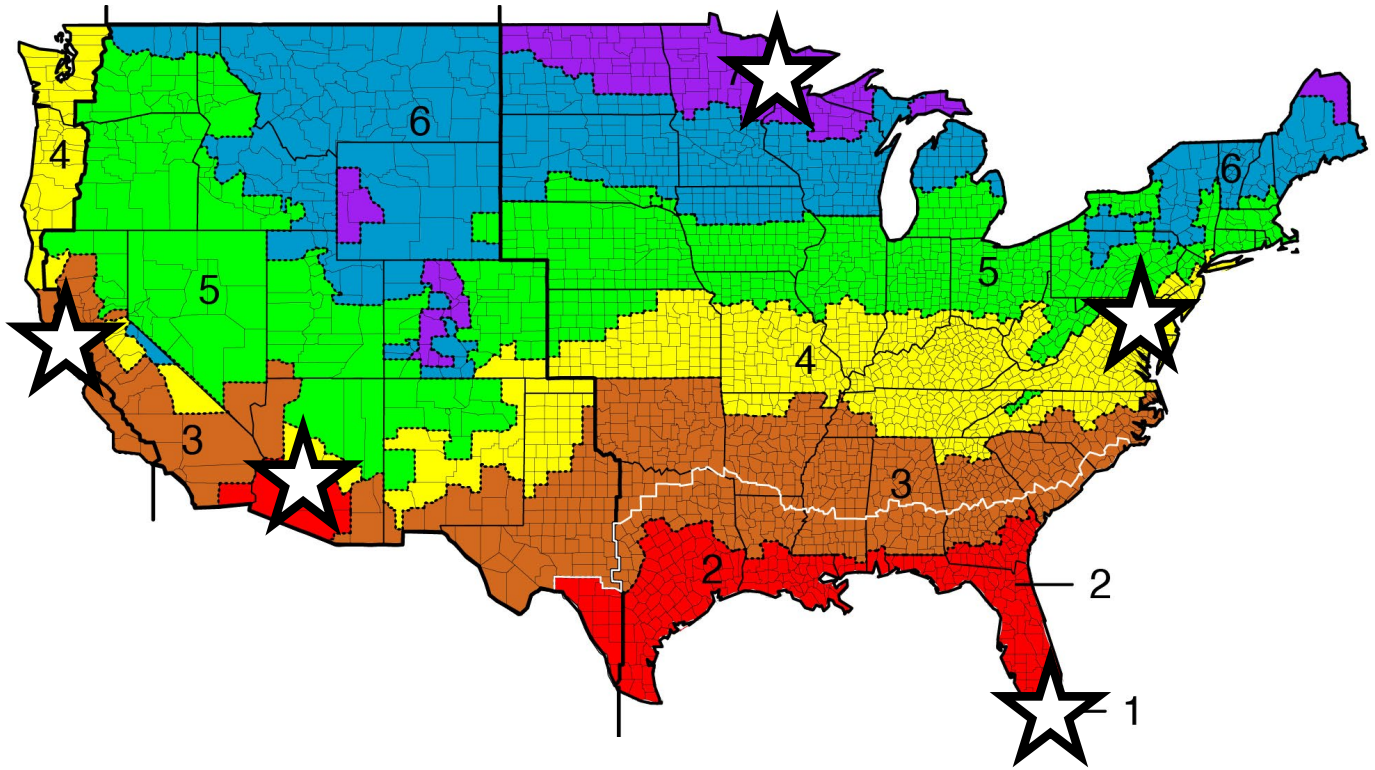
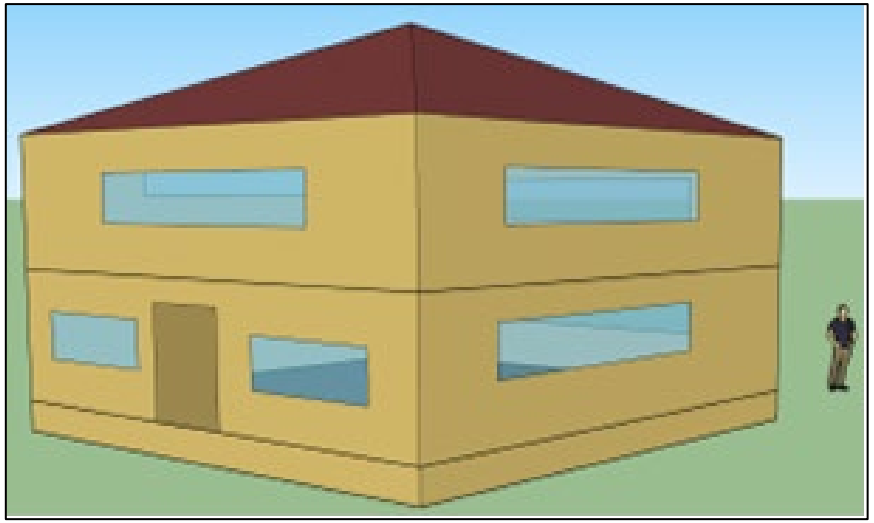


Mod C



Base Case



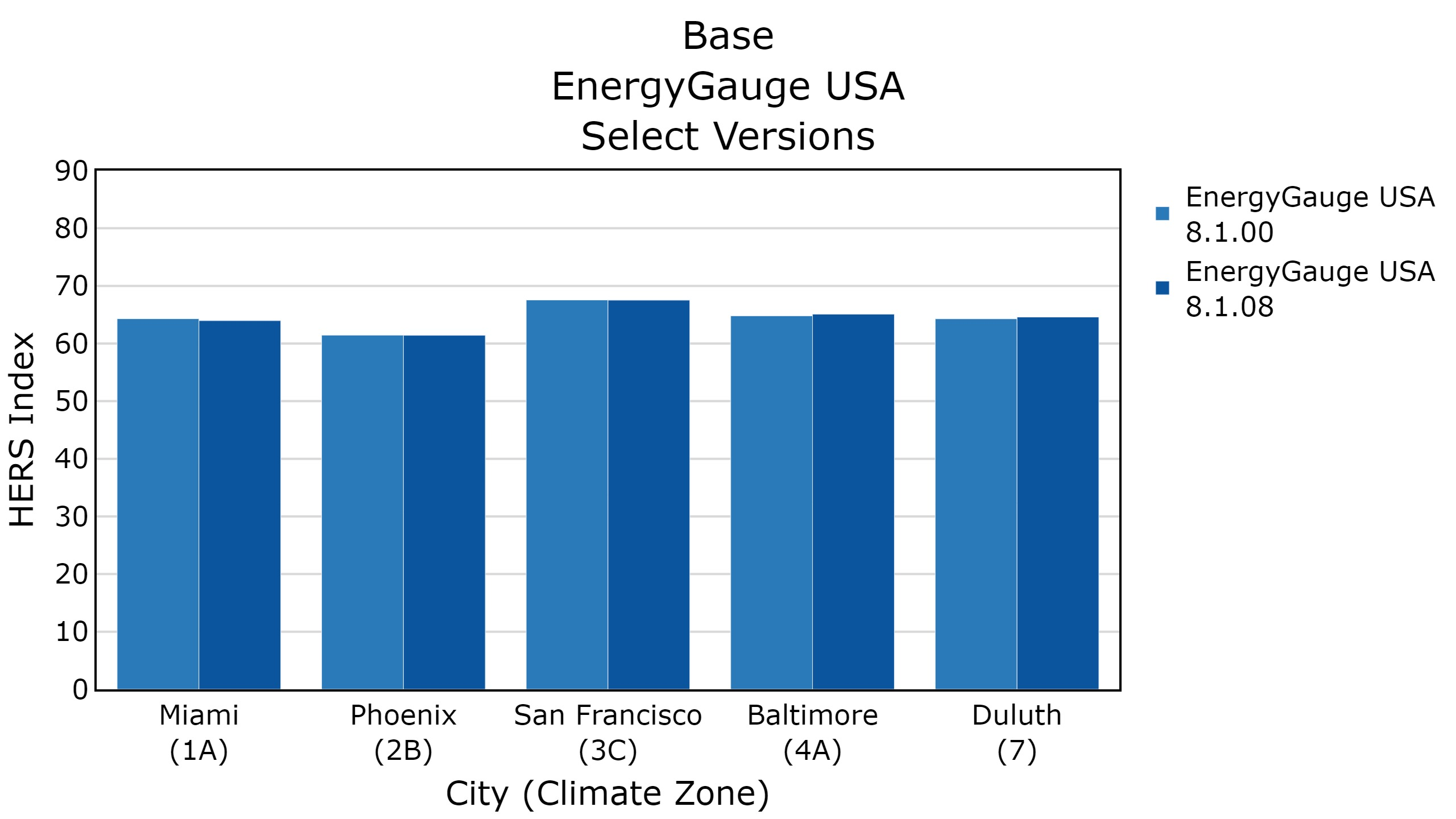
Index Adjustment Design (IAD)

Number of Stories (NS): Two (2)
Number of Bedrooms (Nbr): Three (3)
Conditioned Floor Area (CFA): 2400 ft^2
Number of conditioned zones: One (1)
No attached garage
Wall height: 17 feet (including band joist)
Wall width: 34.64 feet facing N, S, E and W
All heating, cooling, and hot water equipment shall be located in Conditioned Space Volume.

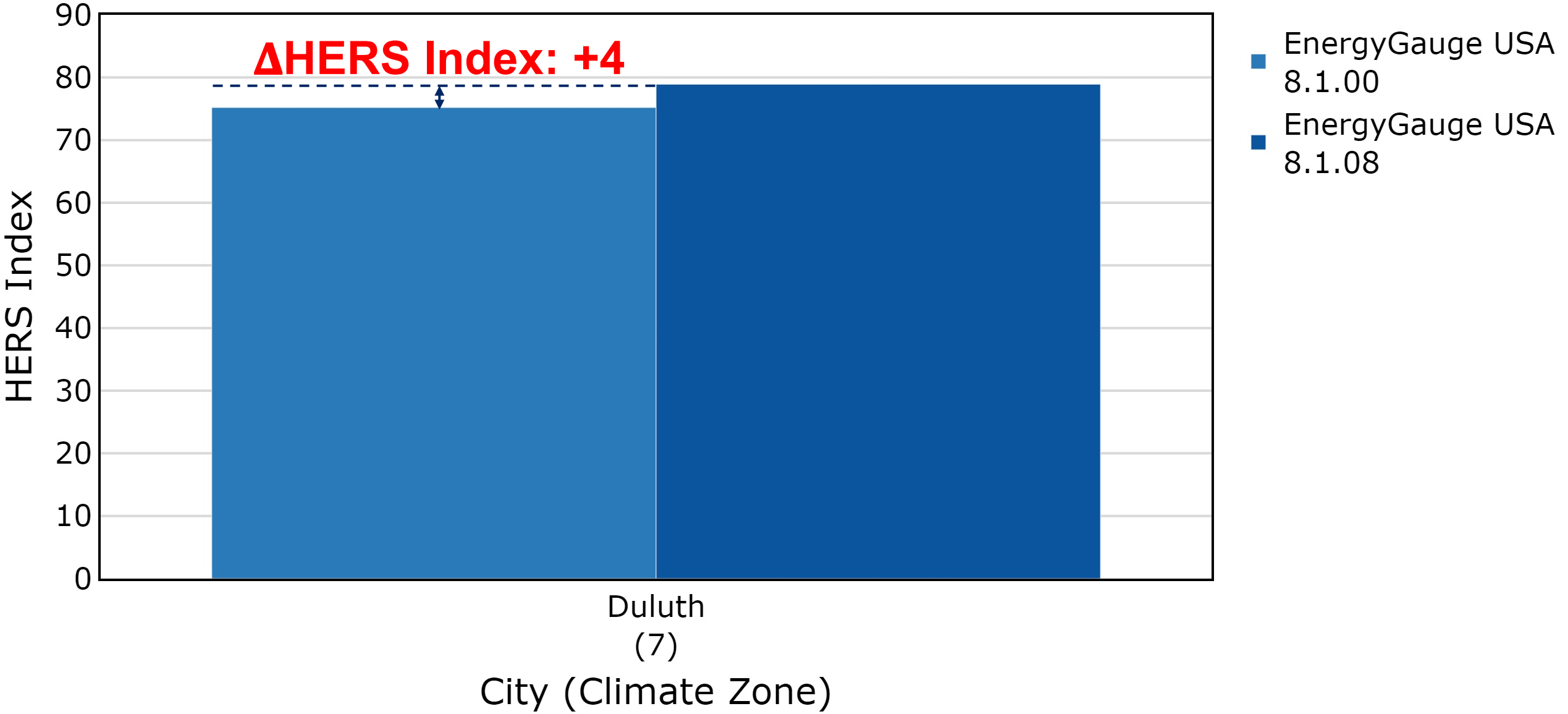
- Raised-Heel Truss
- 2022 Default Framing Fractions
- Balanced Mechanical Ventilation
- Ducts in Conditioned Space
- Vented Crawlspace Foundation

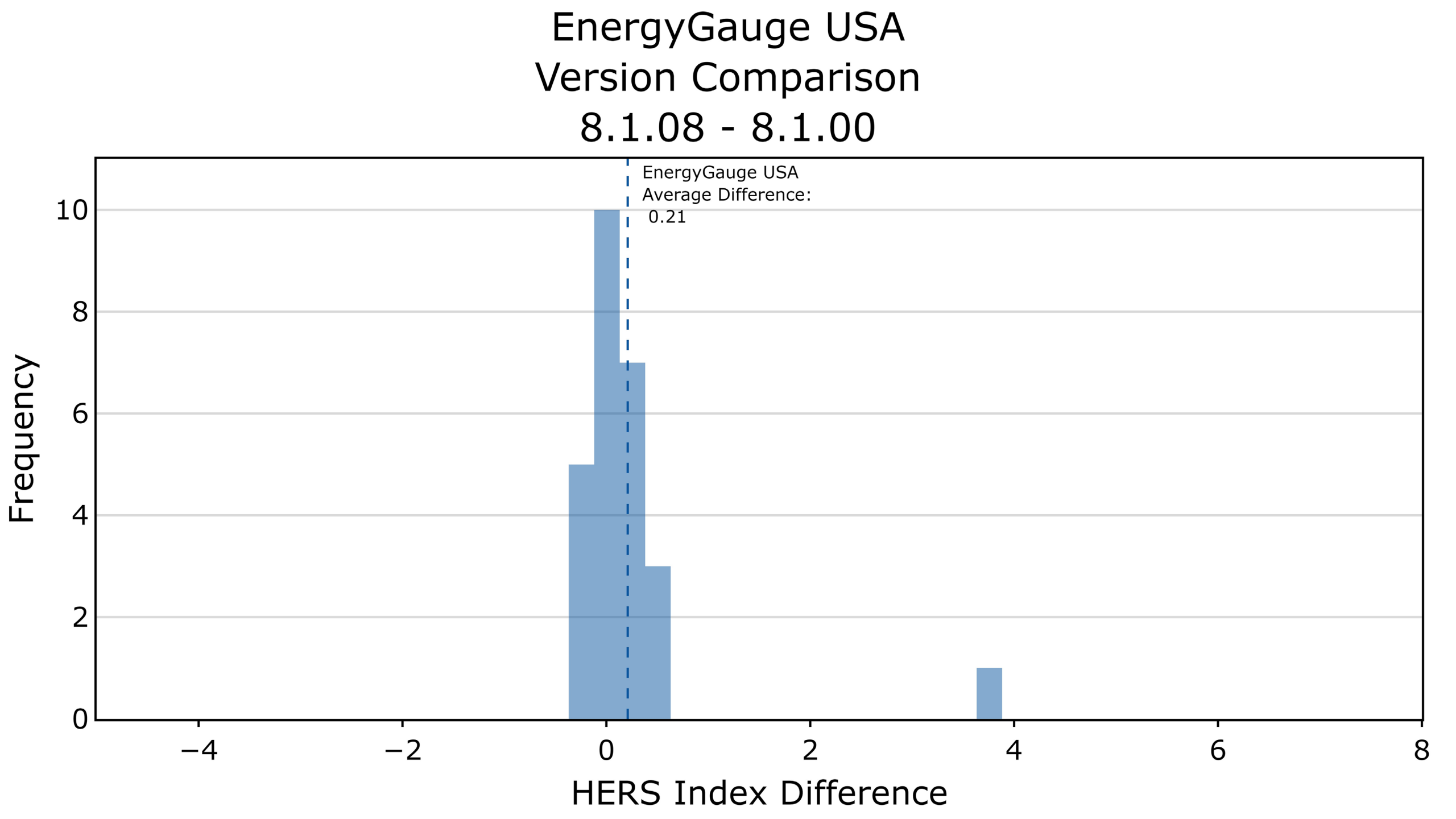
List of Multi-Climate Test Cases

Miami (1A)	Phoenix (2B)	San Francisco (3C)	Baltimore (4A)	Duluth (7)
1. Base 2. Adiabatic Raised Floor 3. Slab on Grade 4. Reference Windows	1. Base 2. Adiabatic Raised Floor 3. Conditioned Basement 4. Slab on Grade 5. Reference Windows	1. Base 2. Adiabatic Raised Floor 3. Slab on Grade 4. Reference Windows	1. Base 2. Adiabatic Raised Floor 3. Conditioned Basement 4. Slab on Grade 5. Reference Windows	1. Base 2. Adiabatic Raised Floor 3. Conditioned Basement 4. CFIS 5. CFIS Ducts in Attic 6. No Mech. Vent. 7. No Mech. Vent. Ducts in Attic 8. Reference Windows


Base
EnergyGauge USA
Select Versions
HERS Index
90
80
70
60
50
40
30
20
10
0
Miami
(1A)
Phoenix
(2B)
San Francisco
(3C)
Baltimore
(4A)
Duluth
(7)
City (Climate Zone)
EnergyGauge USA
8.1.00
EnergyGauge USA
8.1.08

CFIS Ducts In Attic
EnergyGauge USA
Select Versions

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EnergyGauge USA
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−2
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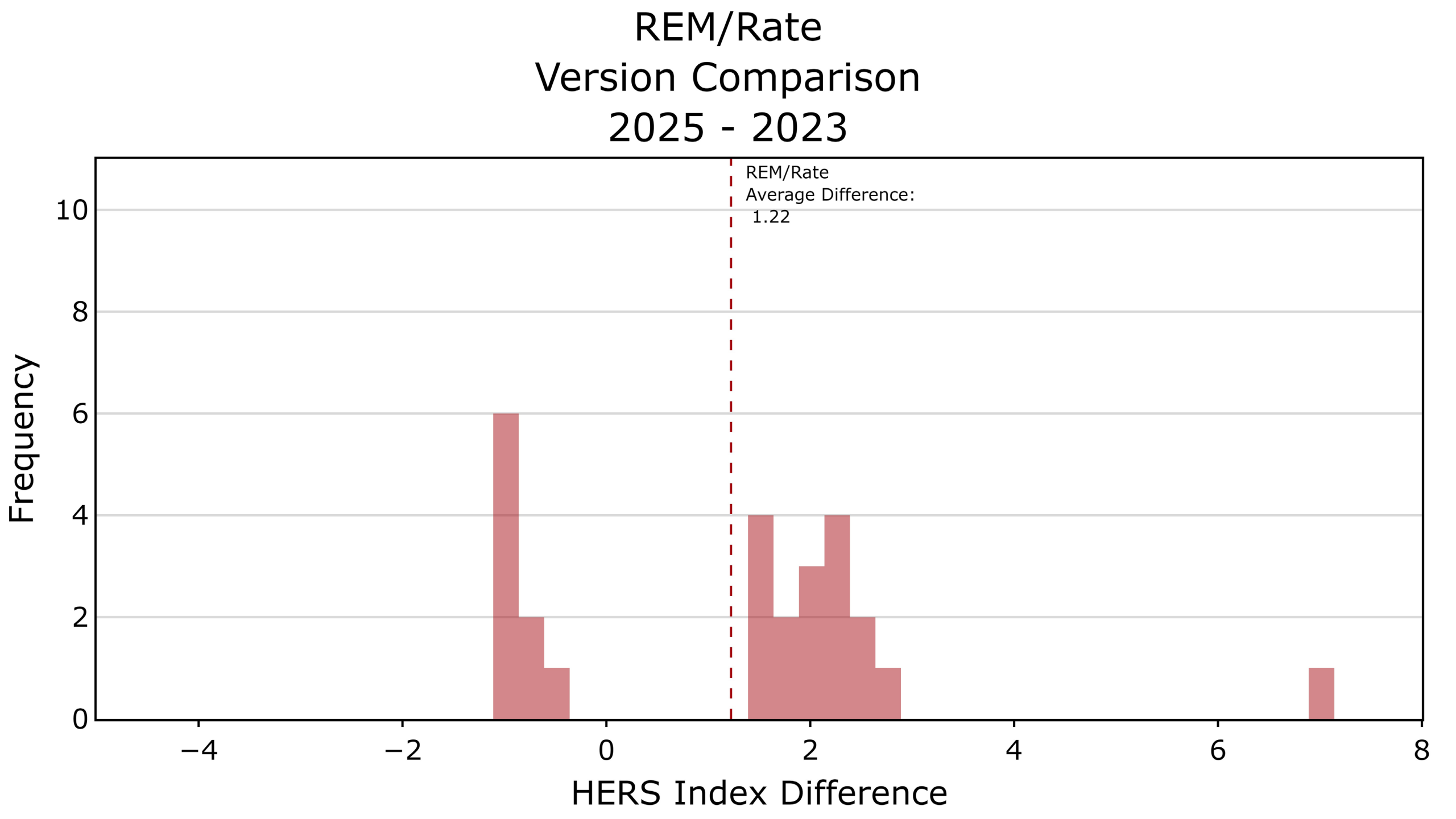
HERS Index Difference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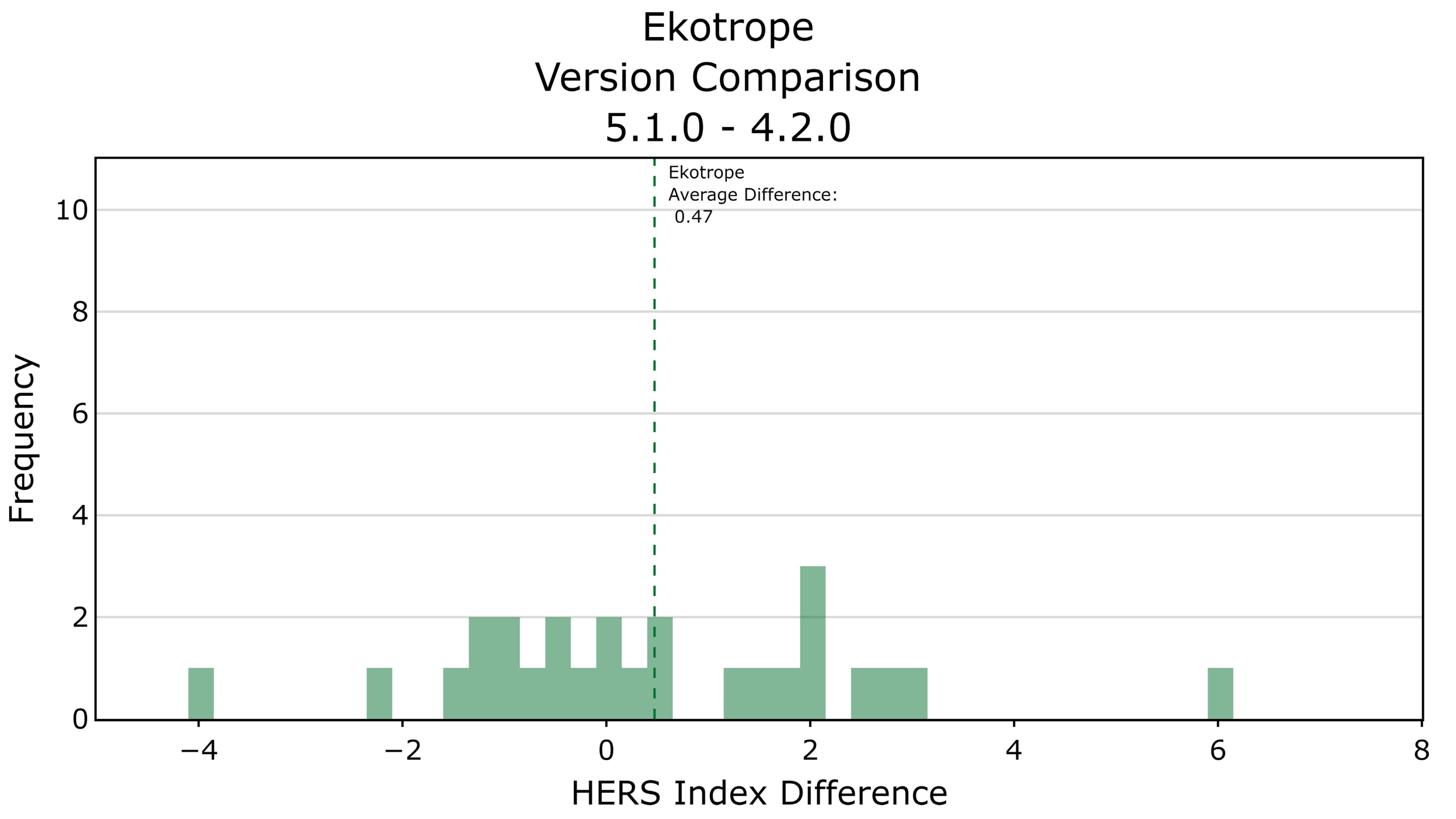
HERS Index Difference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Ekotrope
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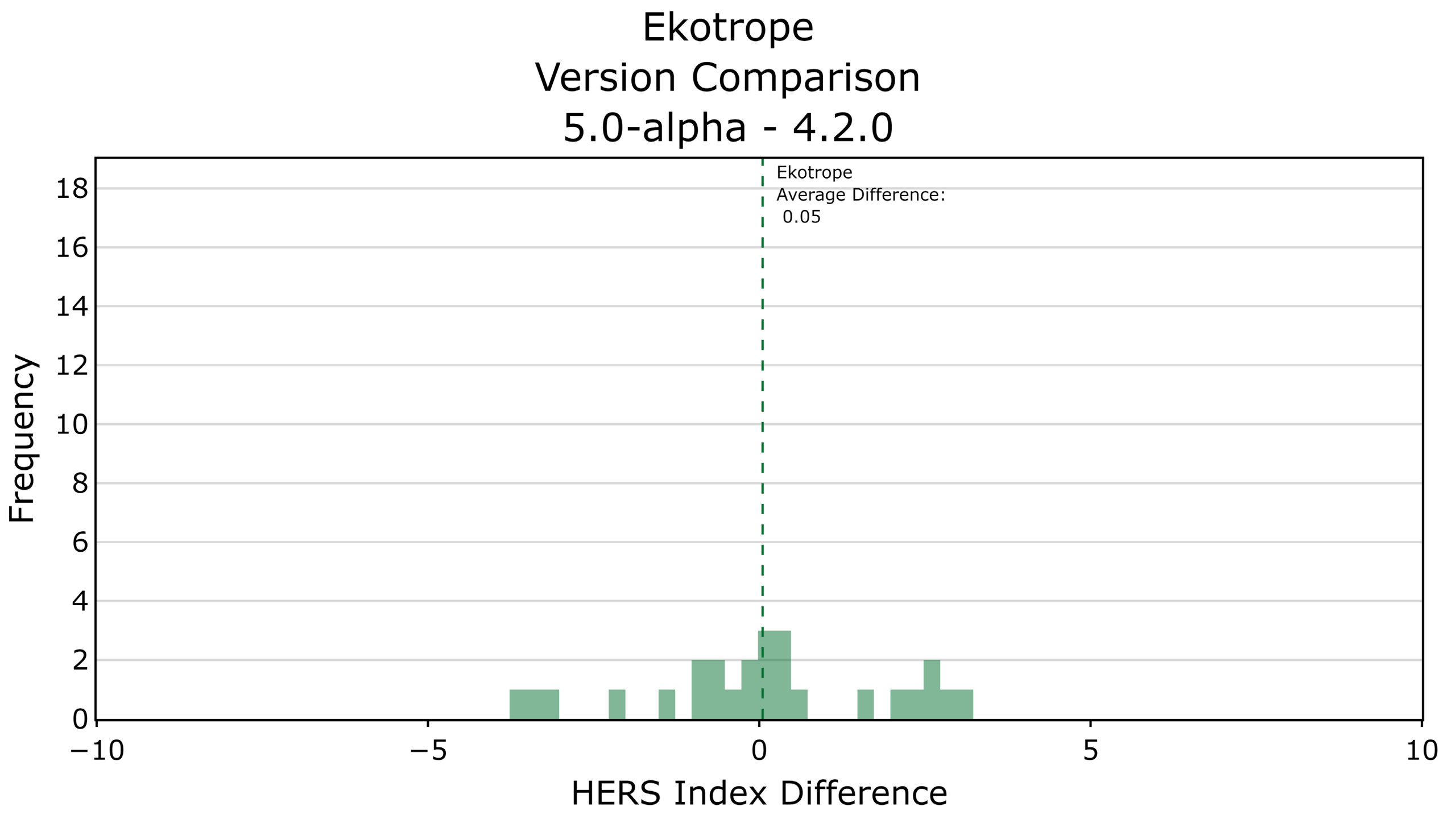
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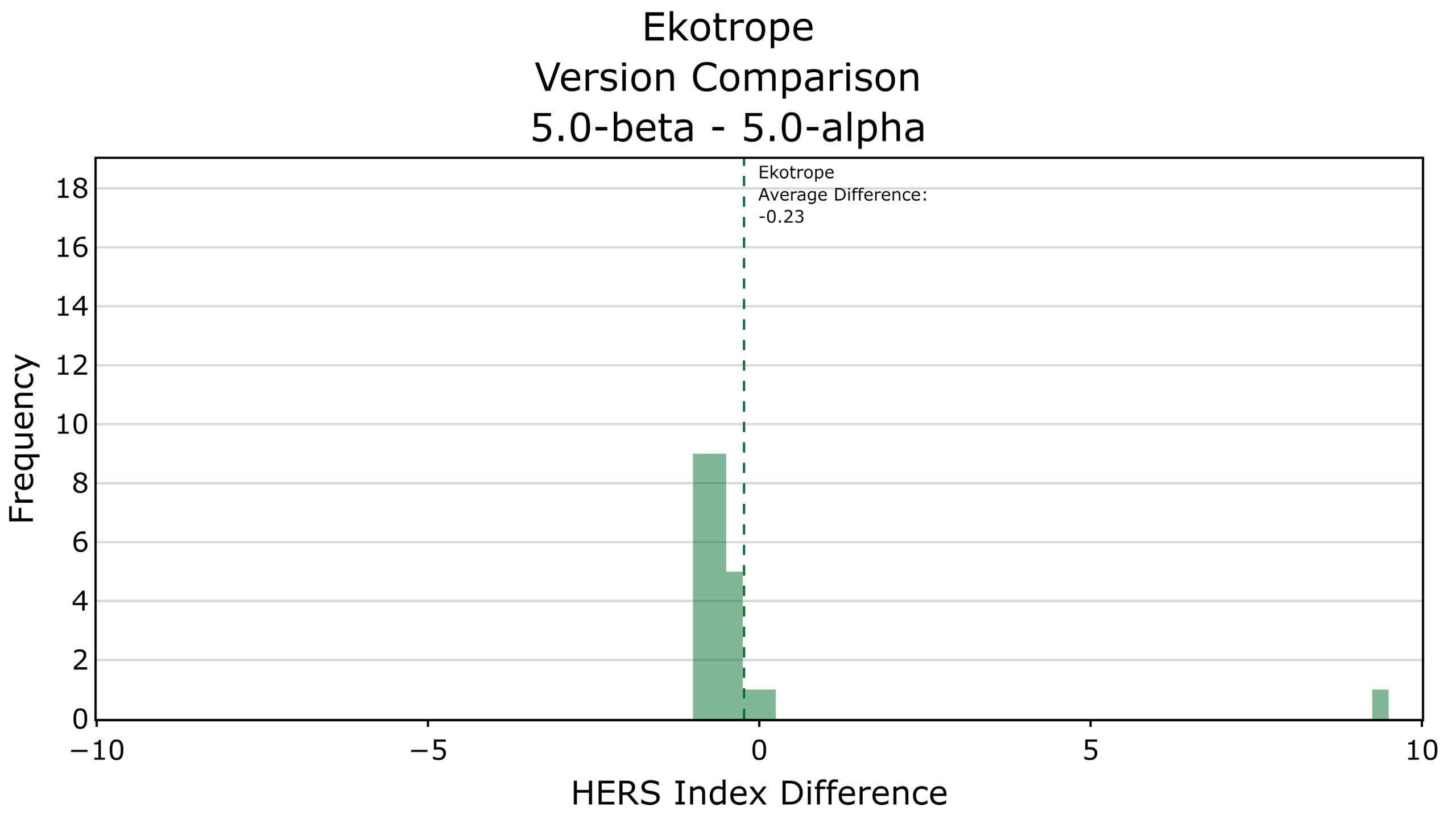
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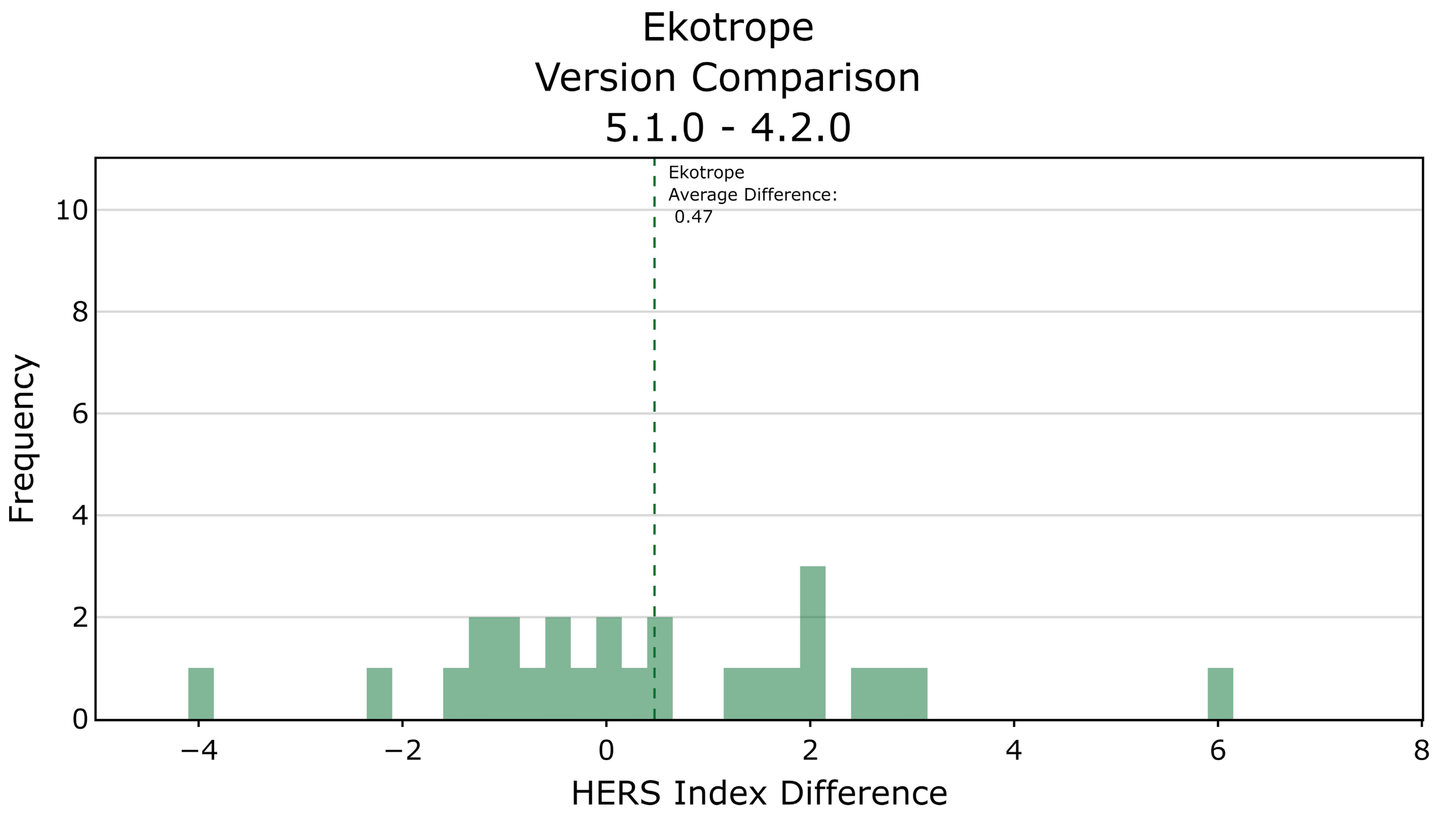
HERS Index Difference


Ekotrope
Version Comparison
5.1.0 - 4.2.0
Ekotrope
Average Difference:
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Frequency
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4
6
8
10
−4
−2
0
2
4
6
8
HERS Index Difference

Conclusions

- Updates to RESNET Standards make **more accurate ratings**
- Will impact HERS Index in some cases
- New software available now (more coming soon)
- Test the software and understand impacts before the July 1, 2025 Mandatory Compliance Date

THANK YOU