Introduction to the

Home Energy Rating System (HERS)

RESNET

Introduction

This Training Course Covers:

- Administrative Information
- RESNET Standards for Ratings
- Procedures for rating NEW proposed residential buildings from plans
- Important information for HERS core test
- Steps to becoming a full HERS Rater or Rating Field Inspector (RFI)
- Becoming a Rater for FSEC

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Lessons

- What is a HERS Rating?
- Why Do Homes Get Rated?
- How is a HERS Index Determined?
- Data Needed for HERS Ratings
- Mortgage Industry National HERS System
- Submitting a Rating and Rating Quality Assurance
- Becoming a HERS Rater or Rating Field Inspector (RFI)
- FSEC-Certified HERS Rater & RFI
- Using EnergyGauge for Ratings

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Lesson Quizzes

- At the end of each lesson, there will be one to five questions that you will need to answer correctly.
- If you answer incorrectly, go back and review the lesson and repeat the quiz.

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What is the RESNET Home Energy Rating System (HERS)?

What is the RESNET Home Energy Rating System (HERS)?

- A relative rating that allows you to compare the energy-efficiency of one house to another of the same size, occupancy and climate location
- Think of it as a “miles per gallon” MPG estimate of the home’s energy consumption and energy costs
- It gives detailed estimates of how much energy the home will consume in a year and how much it will cost to purchase that energy
- It applies to both new and existing buildings

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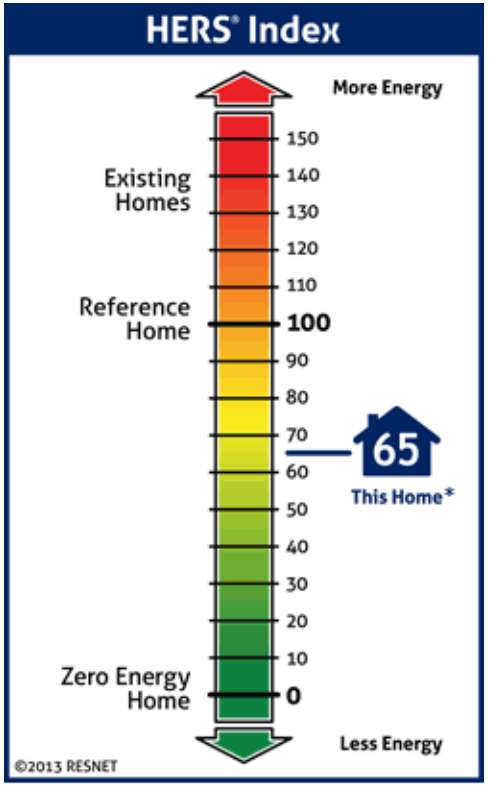
How Does the HERS work?

- The requirements and methodology are spelled out in RESNET standards
- Accredited software programs, including EnergyGauge®USA, compute the HERS Index based on these standards
- A building description from plans or site visit is created in the software — identifying all of its energy attributes (materials, components, and equipment)



*Sample rating representation.

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Why Do Homes Get Rated?

Why Do Homes Get Rated?

- Building code compliance
- ENERGY STAR® for Homes
- Green building certification
- Energy-efficient mortgages
- Increased home value

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Building Code Compliance

- Energy Rating Index (ERI) method of code compliance (R406 in the Energy Conservation Code) is similar to a HERS Rating and references the ANSI/RESNET/ICC Standard 301.
- Across the nation, some jurisdictions offer permit fee reductions for energy ratings with inspections.

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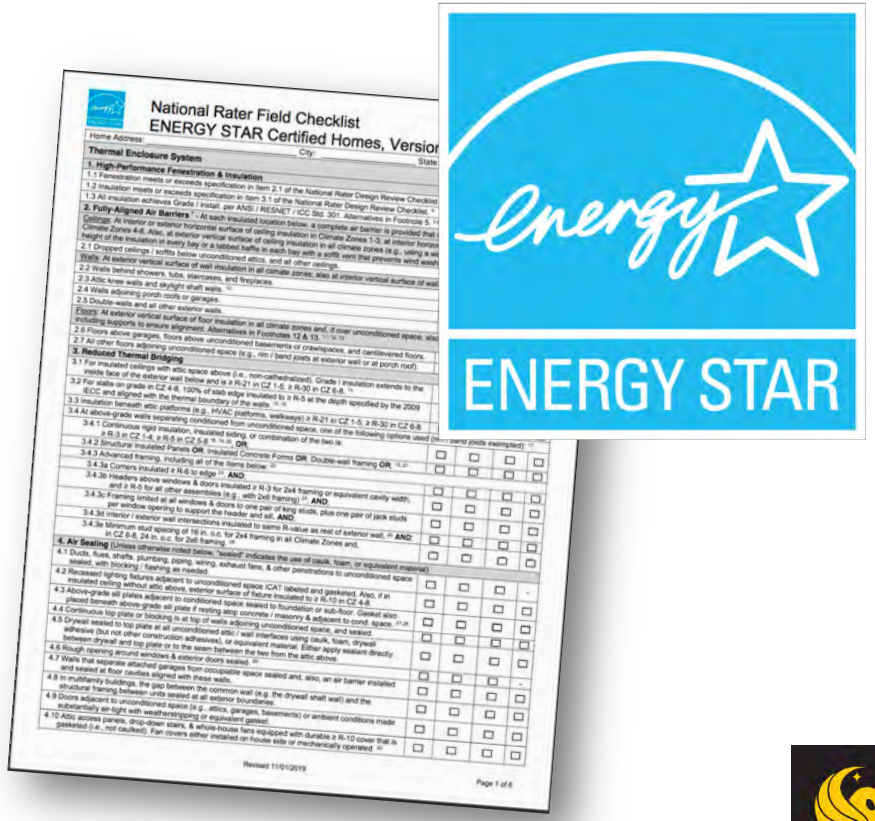
ENERGY STAR® for Homes

- ENERGY STAR® for Homes is a national voluntary program managed by the U.S. Environmental Protection Agency (EPA).
- The program uses both a home Index and a number of inspection checklists to qualify homes.
- Energy Raters must take additional training to rate homes for ENERGY STAR® certification.
- The program is designed to make buying simple – either the home is ENERGY STAR® or it isn't.



Green Building Certification Programs

- Green home programs provide “points” toward certification by incorporating a HERS rating
- Many offer higher points for lower Index scores
- Popular green building programs include:
  - United States Green Building Council LEED for Homes program
  - National Association of Home Builders National Green Building Standard
  - Florida Green Building Coalition Green Home Certification program

Energy-Efficient Mortgages

- Mortgages are designed to provide some benefit to purchasers or builders of energy efficient homes
- Energy-**efficient** mortgages:
  For financing homes that are already energy efficient
- Energy **improvement** mortgages:
  For financing energy improvements to existing homes

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Increased Home Value

A 2019 study by Freddie Mac evaluated a random sample of energy-efficient homes rated between 2013 and 2017 found:

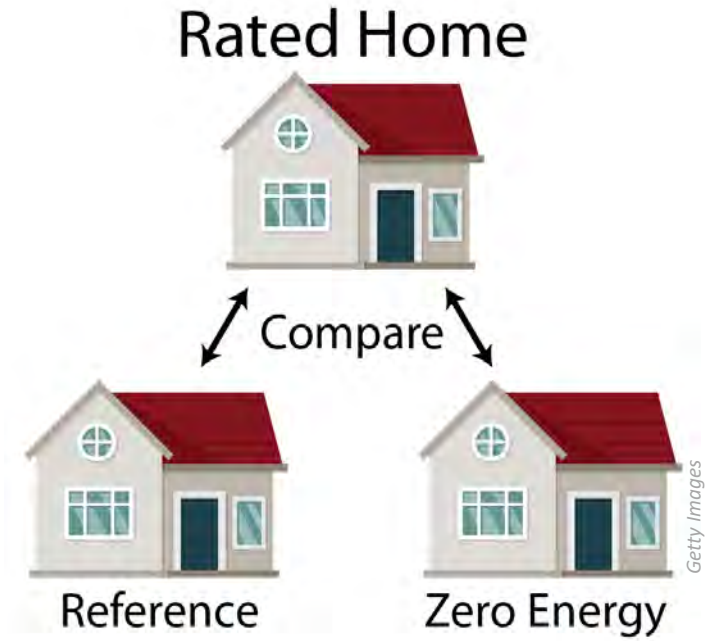
- Rated homes are sold for, on average, 2.7% more than comparable unrated homes
- Better-rated homes are sold for 3-5% more than lesser-rated homes

Source: https://sf.freddiemac.com/content/_assets/resources/pdf/fact-sheet/energy_efficiency_white_paper.pdf?utm_source=eloqua&utm_medium=email&utm_campaign=2019-10-22_AFFORD_DTS_REPORT_Energy_Efficiency_Whitepaper

How is a HERS Index Determined?

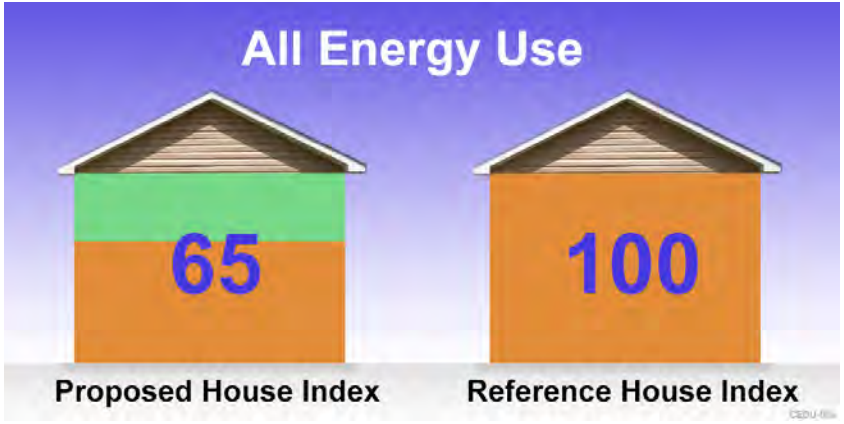
How is a RESNET HERS Index Determined?

- Identify the building's configuration – its layout, materials and equipment
- Evaluate the performance of the building and compare it to the Reference Home and a Zero Energy Home
- Isolate occupancy patterns and lifestyle choices from the building configuration



How is a RESNET HERS Index Determined?

- Energy ratings provide estimates of the annual energy use and energy cost for the whole house and major end-uses, enabling comparison of a house to other houses of similar size and occupancy.
- The rating software generates a Reference Home having the same gross area of walls, roof and floor as the Rated Home.



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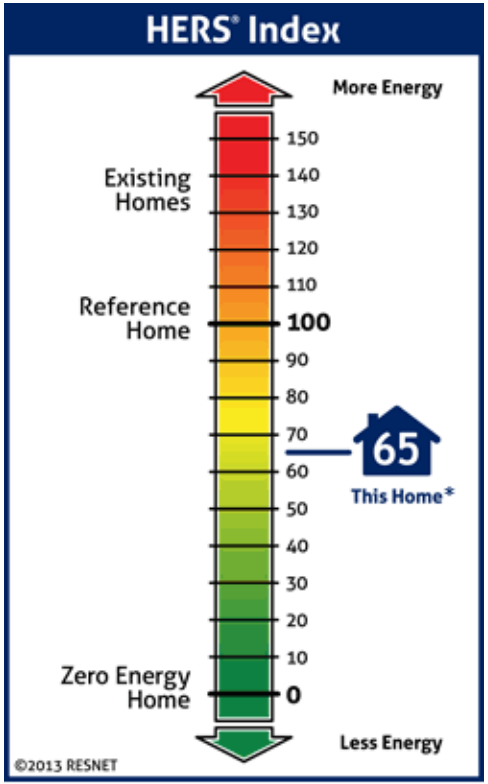
What Scale is Used for the HERS Index?

- The HERS Index is a scoring system in which a home built to the specifications of the HERS Reference Home scores a HERS Index of 100, while a net Zero Energy Home scores a HERS Index of 0.
- The lower a home's Index, the more energy efficient it is, in comparison to the HERS Reference Home.
- Since this example home has an Index of 65, it is considered more energy efficient than the reference home.



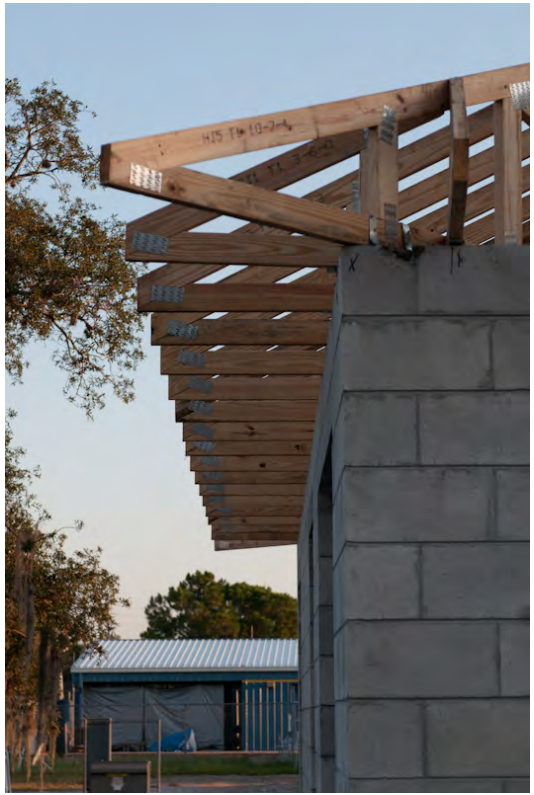
*Sample rating representation.

Who Makes the Rules and Where Can I Find Them?

- The Rules are spelled out in ANSI/RESNET/ICC 301-2019 and updated through continuous maintenance by RESNET
- These include rules regarding the HERS Reference Home used to compare against the built home, which is called the Rated Home
- These Reference Home rules are implemented by RESNET-approved software

Importance of Table 4.2.2(1) ANSI/RESNET/ICC 301-2019

- To fully understand the impacts of various home construction features, a rater must be familiar with Table 4.2.2(1)
- Questions regarding Table 4.2.2(1) may be on the RESNET core exam
- Find this table in the **Resources** section of this course.
- This table comes from Chapter 4 of the 2019 ANSI/RESNET/ICC 301, which can be found at the link below: https://codes.iccsafe.org/content/RESNETICC3012019/4-enery-rating-calculation-procedures



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Understanding Table 4.2.2(1)

- The basis of a Home Energy Rating is a comparison between the Rated Home and a HERS Reference Home
- For this comparison, rating software must generate a new Reference Home for every unique Rated Home
- Table 4.2.2(1) defines how the HERS Reference Home is generated for the comparison
- A clear understanding of this table assists the Rater in recognizing how construction and equipment choices will impact the Rated Home

Table 4.2.2(1) Features

- Table 4.2.2(1) has three columns with the first labeled “Building Component.” There are over 20 components in the table where Reference and Rated Home details are described
- The second column provides details on the “Energy Rating Reference Home.” These are fixed or calculated values that define the Reference Home. In some cases, the Reference Home is defined as “same as Rated Home” such as Gross area of walls, floors and ceilings
- The third column for the “Rated Home” is generally the same as the Rated Home with a few exceptions

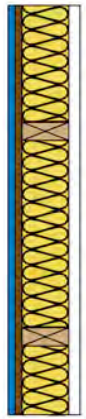
4.2.2. Residence Specifications. The Energy Rating Reference Home and Rated Home shall be configured and analyzed as specified by Table 4.2.2(1).

Table 4.2.2(1) Specifications for the Energy Rating Reference and Rated Homes

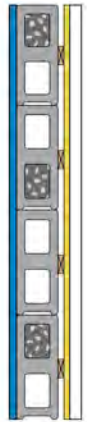
Building Component	Energy Rating Reference Home	Rated Home
Above-grade walls	Type: wood frame Gross Area: same as Rated Home U-Factor: from Table 4.2.2(2) Solar Absorptance = 0.75 Emittance = 0.90	Same as Rated Home Same as Rated Home Same as Rated Home Same as Rated Home Same as Rated Home
Conditioned basement walls	Type: same as Rated Home Gross Area: same as Rated Home U-Factor: from Table 4.2.2(2) with the insulation layer on the interior side of walls	Same as Rated Home Same as Rated Home Same as Rated Home
Floors over Unconditioned Space Volume, Non-Freezing Space or outdoor environment	Type: wood frame Gross Area: same as Rated Home U-Factor: from Table 4.2.2(2)	Same as Rated Home Same as Rated Home Same as Rated Home
Ceilings	Type: wood frame Gross Area: same as Rated Home U-Factor: from Table 4.2.2(2)	Same as Rated Home Same as Rated Home Same as Rated Home
Roofs	Type: composition shingle on wood sheathing	Same as Rated Home

Table 4.2.2(1) Above-Grade Wall Example

- Let's consider a home in Orlando, Florida built of concrete block with white exterior walls. The image below shows how the modeled Reference and Rated Home walls would differ.
- Reference Home "Above-grade wall" U-Factor will be taken from Table 4.2.2(2) shown later, whereas the Rated Home U-factor-and other parameters are whatever is built.
- Above-grade HERS Reference Home wall Gross Area is specified in Table 4.2.2(1) as "same as Rated Home," exactly matching values entered into the software for the Rated Home.



Reference Home Always:
Solar Absorptance 0.75
Wood frame material
U-factor for Orlando is 0.082
Gross wall area = rated home gross wall area



Sample Rated Home
White paint, tested solar absorptance 0.3,
U-factor with R6 combined insulation and air space = 0.116,
Gross wall area is whatever is measured for built house

Glazing Definitions as Used in Table 4.2.2(1)

- To understand the Reference Home window area formula and its importance, we need to go through a few definitions that RESNET uses
- What is glazing in the Rated Home? Glazing shall be defined as sunlight-transmitting fenestration, including the area of sash, curbing or other framing elements, that enclose Conditioned Space Volume
  - Glazing includes the area of sunlight-transmitting fenestration assemblies in walls bounding conditioned basements
  - For doors where the sunlight-transmitting opening is less than 50% of the door area, the Glazing area of the sunlight transmitting opening area shall be used
  - For all other doors, the Glazing area is the rough frame opening area, including door and frame

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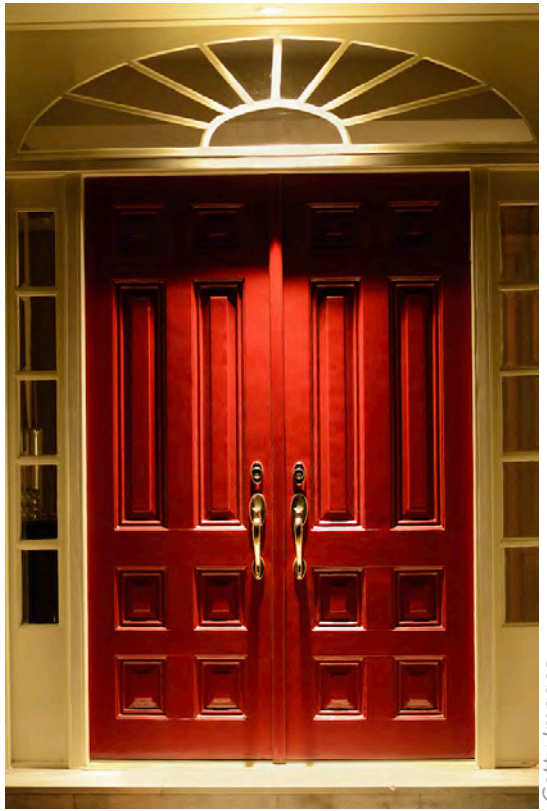
Table 4.2.2(1) Window and Door Area

- Most of the Reference Home component areas mimic the Rated Home. However, there are two components where the Reference Home component area will not mimic the Rated Home.
- Opaque door area for the Reference Home is set to 40 square feet regardless of the area of the Rated Home opaque door area.
- Glazing area is set in the Reference Home based on a formula that for many homes will be 18% of the conditioned floor area of the home. However, there are two times when it might be less:
  - When the house has a conditioned basement
  - When the home has common walls with another unit such as most townhomes, duplexes and flats.



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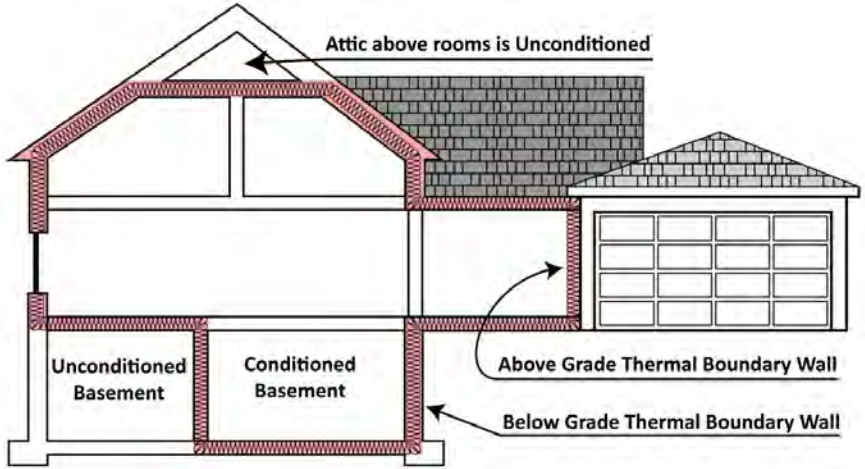
Glazing — Big Impact On HERS Index

- Window area has large impact on both cooling and heating
- Typically more window area in a **Rated** Home leads to a higher (worse) HERS Index
- More window area in the HERS **Reference** Home leads to a lower (better) HERS Index

Thermal Boundary Definition as Used in Table 4.2.2(1)

- Thermal boundary wall is any wall that separates Conditioned Space Volume from Unconditioned Space Volume, outdoor environment or the surrounding soil
- Above-grade thermal boundary wall is any portion of a thermal boundary wall not in contact with soil
- Below-grade thermal boundary wall is any portion of a thermal boundary wall in soil contact
- Common wall is the total wall area of walls adjacent to Unrated Conditioned Space, not including foundation walls



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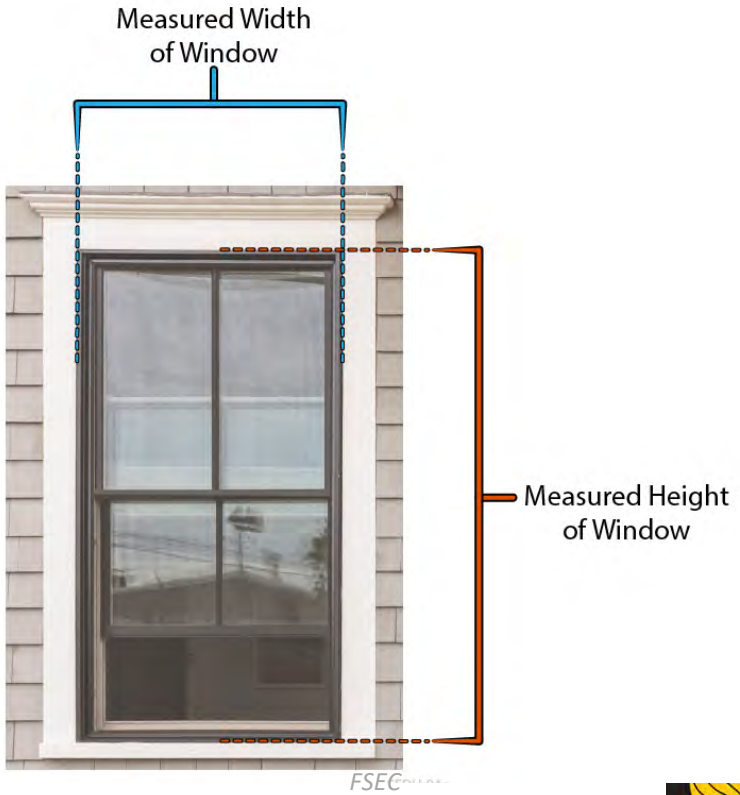
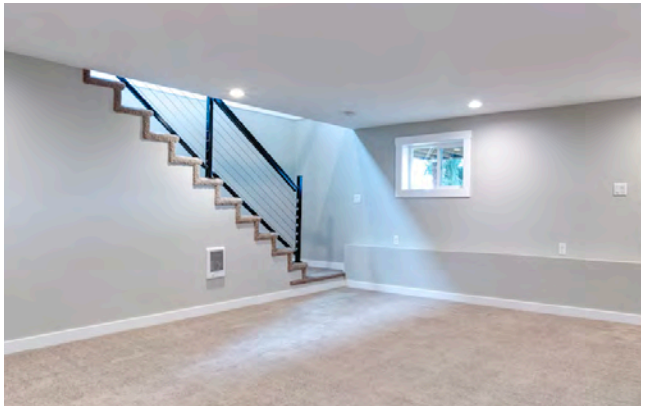
Reference Home Window Area Formula Table 4.2.2(1)

- Now here is the reference home window area formula:
  AG = 0.18 x CFA x FA x F
  where:
  - AG = Total Glazing area
  - CFA = Total Conditioned Floor Area
  - FA = (gross above-grade thermal boundary wall area)/ (gross above-grade thermal boundary wall area + 0.5*gross below-grade thermal boundary wall area)
  - F = 1- 0.44* (gross common wall area) / (gross above-grade thermal boundary wall area + gross common wall area)



Reference Home Window Area Factor – Basements

- Therefore, the window area formula mandates the Reference Home have total glazing area equal to 18% of conditioned floor area unless below-grade (e.g. conditioned basement) or common (e.g. shared or common) walls are present.
- The below-grade adjustment factor (FA) has no effect when conditioned basement walls are not present. That is:
  - FA = 1 when below-grade wall area is zero
  - FA will be less than 1 for homes with below-grade conditioned wall area
  - Result is less window area in the HERS Reference Home in order that homes with conditioned basements don't achieve low HERS Indexes without sufficient efficiency measures



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$$FA = \frac{\text{Above-grade wall area}}{\text{(Above-grade wall area + (0.5 * below-grade wall area))}}$$

Reference Home Window Factor – Common Walls

- Similarly, the common wall adjustment factor (F) has no effect when neighbor (or shared) walls are not present. That is:
  - F = 1 when common wall area is zero
  - F will be less than 1 for homes with common wall area
  - Result is less window area in the HERS Reference Home in order that homes with neighbor walls don't achieve low HERS Indexes without sufficient efficiency measures

$$F = 1 - 0.44 \times \frac{\text{Common wall area}}{\text{(Above-grade wall area + Common wall area)}}$$

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- Understanding the Window Area Formula provides insight of how two, otherwise similar, Rated Homes will produce different HERS Indexes as illustrated in the following examples.

Impact of Reference Home Windows: Case 1

- **Case 1:**
  Two 1000 ft^2 slab-on-grade homes:
  - One house with 200 ft^2 of high-efficiency windows
  - One house with 100 ft^2 with the same windows
  - The house with less window area achieves a better HERS Index

Footnote: HERS Indexes based on EnergyGauge runs for homes in Nashville with SEER 14, HSPF 8.2 heat pump, and a heat-pump water heater.

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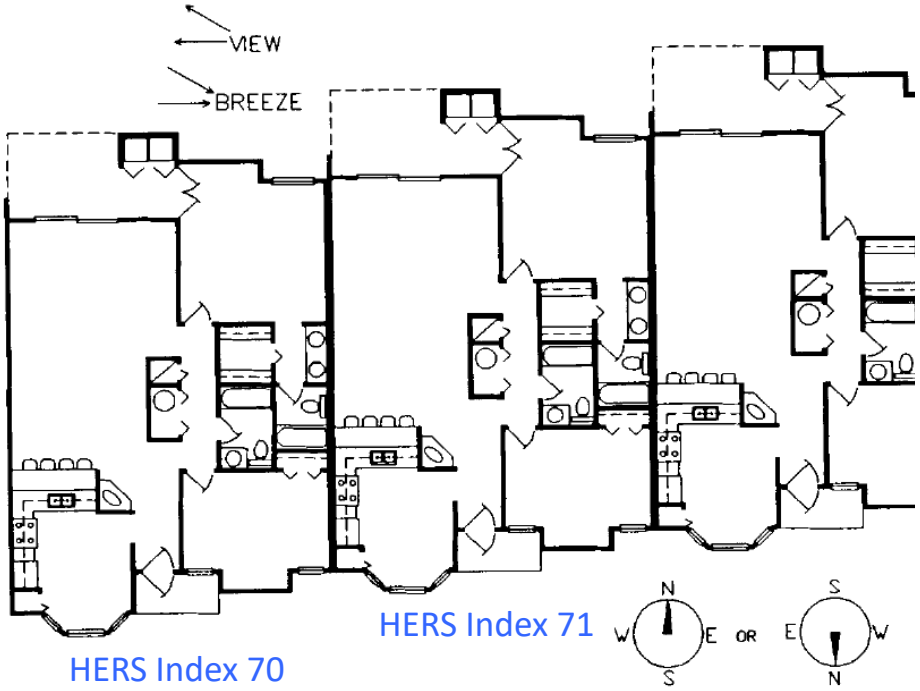
HERS Index = 72

HERS Index = 69

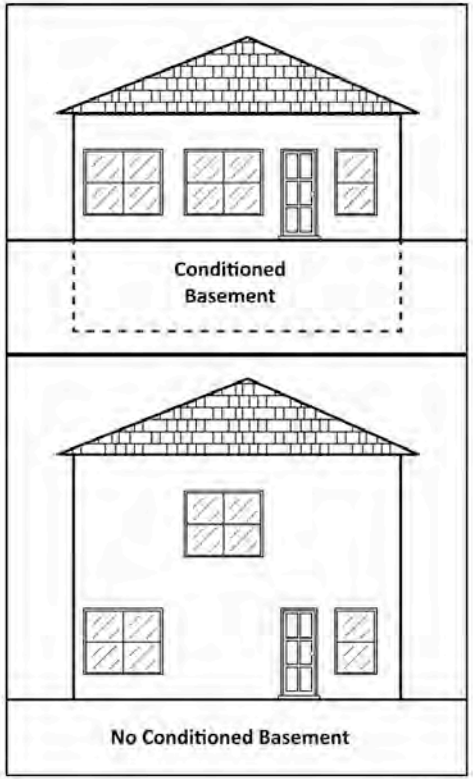
Impact of Reference Home Windows: Case 2

- **Case 2**:
  Identical “flat” units with same window area, however interior unit has more common wall area than end unit. For cases like that, the end unit might use more energy, but end unit may have a lower HERS index because of the HERS Reference Home window area.



Impact of Reference Home Windows: Case 3

- **Case 3**
  - One home with 1200 ft^2 conditioned basement and 1200 ft^2 above grade for a total of 2400 conditioned square feet.
  - One single-family home with two 1200 ft^2 above-grade stories for a total of 2400 conditioned square feet.
  - Each home has a total of 360 ft^2 of windows.



HERS Index = 75

HERS Index = 70

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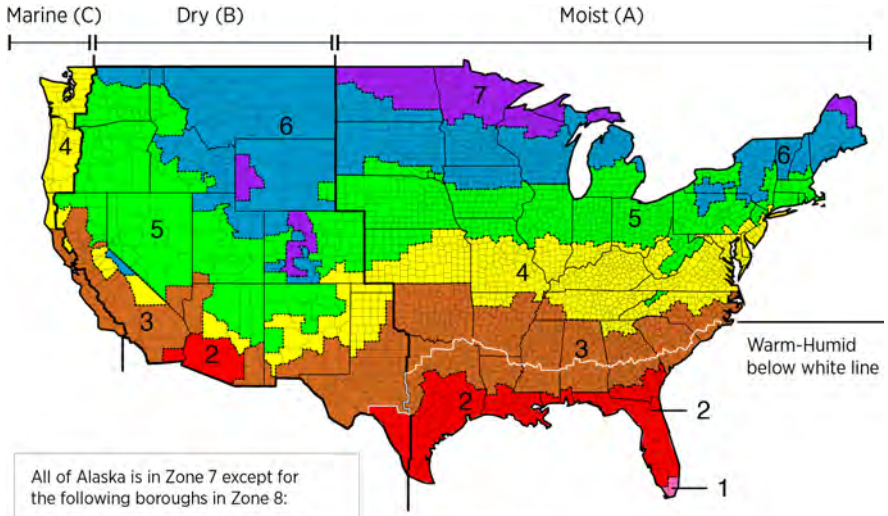
Supporting Tables for Table 4.2.2(1)

- A number of tables are referenced by Table 4.2.2(1) within and following the footnotes.
- For example Table 4.2.2(2) (see next slide) specifies heat transfer characteristics for various building components of the Reference Home, like walls, ceilings, floors, glazing, etc.
- These Reference Home building components will vary according to Climate Zone.
- Climate Zones are currently specified by the 2006 IECC.

IECC Climate Zone Map



U.S. Department of Energy

Table 4.2.2(2)

Component Heat Transfer Characteristics for Energy Rating Reference Home[a]

Climate Zone[b]	Fenestration and Opaque Door U-Factor	Glazed Fenestration Assembly SHGC	Ceiling U-Factor	Frame Wall U-Factor	Floor Over Unconditioned Space U-Factor	Basement Wall U-Factor[c]	Slab-on-Grade R-Value & Depth[d, e]
1	1.20	0.40	0.035	0.082	0.064	0.360	0
2	0.75	0.40	0.035	0.082	0.064	0.360	0
3	0.65	0.40	0.035	0.082	0.047	0.360	0
4 except Marine	0.40	0.40	0.030	0.082	0.047	0.059	10, 2ft.
5 & Marine 4	0.35	0.40	0.030	0.060	0.033	0.059	10, 2ft.
6	0.35	0.40	0.026	0.060	0.033	0.059	10, 4ft.
7 & 8	0.35	0.40	0.026	0.057	0.033	0.059	10, 4ft.

(a) Non-fenestration U-Factors shall be obtained from measurement, calculation, or an approved source.
(b) Climate zones shall be as specified by the 2006 IECC.
(c) For basements that are within the Conditioned Space Volume.
(d) R-5 shall be added to the required R-Value for slabs with embedded heating.
(e) Insulation shall extend downward from the top of the slab vertically to the depth indicated.

Data Needed for a HERS Rating

Minimum Rated Features

ANSI/RESNET/ICC 301-2019

The estimated annual Purchased Energy consumption for heating, cooling, water heating, lighting and appliances set forth in Section 4.2 shall be determined using the energy loss and gain associated with the Minimum Rated Features as set forth in Table 4.5.2(1).

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Minimum Rated Features Table 4.5.2(1)

- Minimum rated features must be collected by the rater and are subject to RESNET quality assurance
- Questions regarding Table 4.5.2(1) may be on the RESNET core exam
- This table can be found in the **Resources** section of this course
- This table comes from Chapter 4 of the 2019 ANSI/RESNET/ICC 301, which can also be found at the link below: https://codes.iccsafe.org/content/RESNETICC3012019/toc

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Insulation Grading

- Insulation installation quality is an important aspect of home efficiency and accurate energy ratings.
- The insulation grading discussion on the following frames provides a brief overview of ANSI/RESNET/ICC 301-2019 installation and grading requirements, but each student should review and be able to readily access the full requirements provided in the Standard (link provided below).
- RESNET insulation grading requirements are provided in Appendix A of ANSI/RESNET/ICC 301-2019:

http://www.resnet.us/wp-content/uploads/archive/resblog/2019/01/ANSIRESNETICC301-2019_vf1.23.19.pdf

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Minimum General Insulation Installation Requirements

- Installation per manufacturer's recommendations
- No airspaces allowed between different insulation types or systems (exception for enclosed, reflective airspaces)
- Installation to the required density and thickness necessary to achieve the labeled R-Value
- Must fill around obstructions such as framing, blocking, wiring, pipes, etc. without substantial gaps or voids
- Source and for additional requirements and exceptions see Appendix A of ANSI/RESNET/ICC 301-2019:

http://www.resnet.us/wp-content/uploads/archive/resblog/2019/01/ANSIRESNETICC301-2019_vf1.23.19.pdf.

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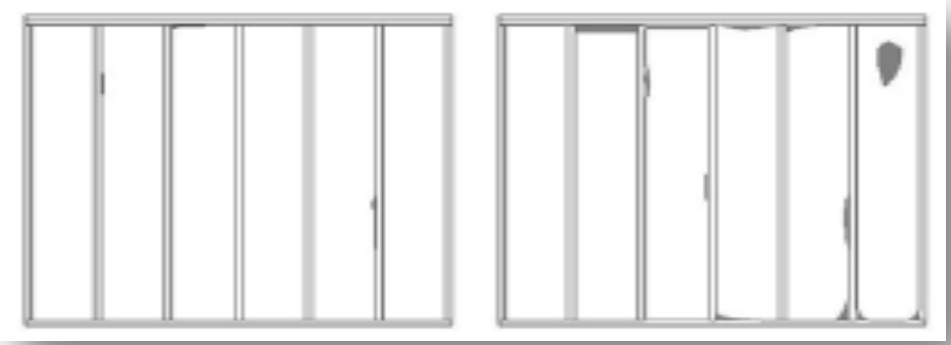
Insulation Grade I (Minor Defects)

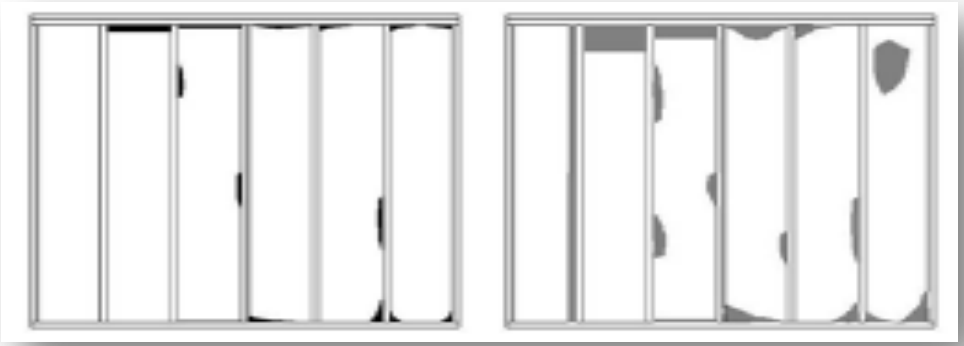
- Complies with minimum ASTM standard requirements
- Batts or loose fill: no more than 2% of total insulated area compressed or containing gaps or voids
- Spray foam depends on type (open or closed-cell), cavity fill and trimming
- Insulated sheathing: no interior to exterior voids exceeding 1/8”.



Example of Grade I insulated wall

Insulation Grade II (Moderate Defects)

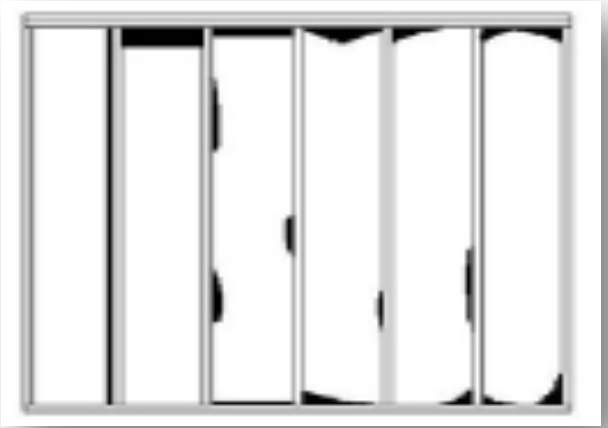
- Does not comply with minimum ASTM standard requirements and Grade I requirements
- Batts or loose fill: no more than 15% of total insulated area compressed or containing gaps or voids
- Spray foam depends on type (open or closed-cell), cavity fill and trimming



Example of Grade II insulated wall

Insulation Grade III (Substantial Defects)

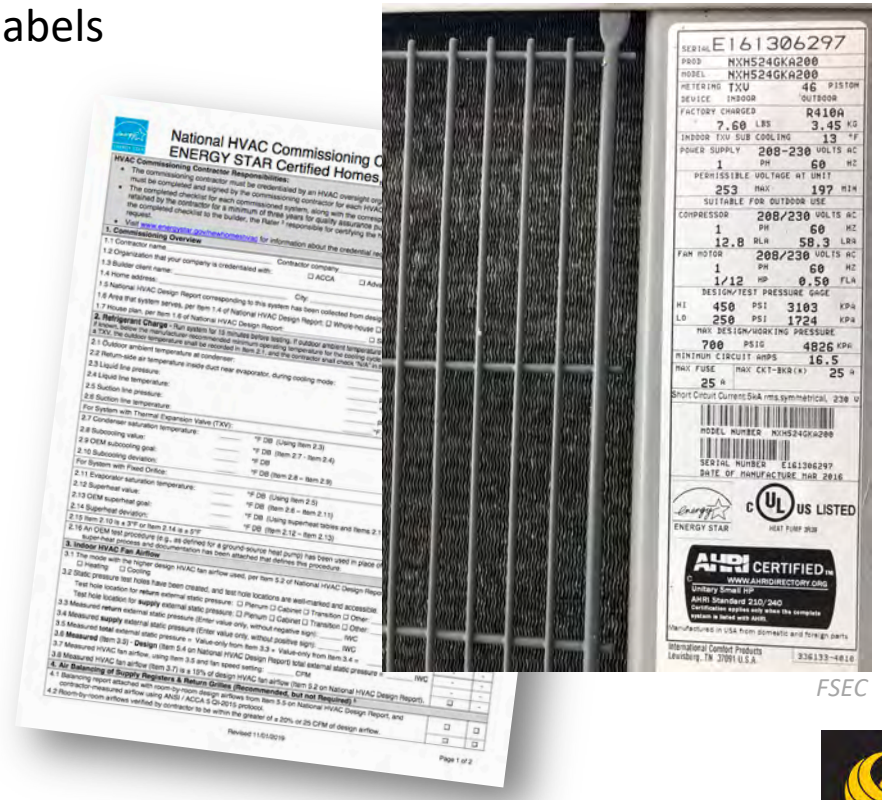
- Does not comply with minimum ASTM standard requirements and Grade I or Grade II requirements



Example of Grade III insulated wall

Registered Rating Documentation

- Pictures of all home elevations, equipment labels and meter test results
- Manufacturer specs/cut sheets
- Checklists (ENERGY STAR, etc.)
- Measurement notes



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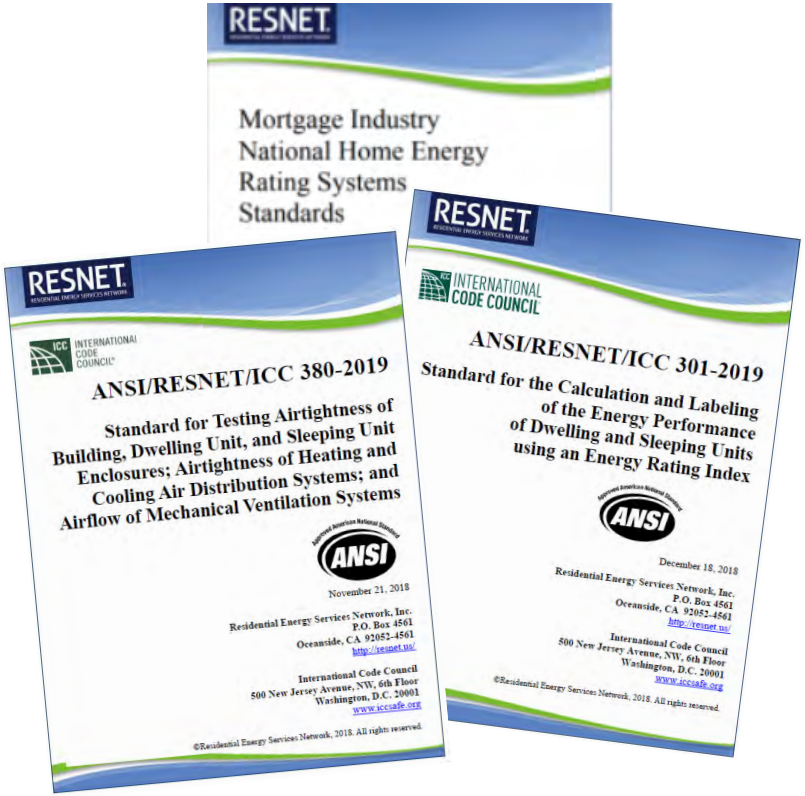
Mortgage Industry National HERS

Mortgage Industry National Home Energy Rating Systems (MINHERS)

- Now that we've learned about the HERS Index and how it's computed, we want to zoom out and show you the bigger picture.
- The RESNET Standards also govern the larger process of certifying Raters, software, and HERS Providers.



The MINHERS Standards Focus on Four Areas:

1. **Rating Program Administration** (Ch 1)
2. **Rater Training & Certification** (Ch 2)
3. **Technical Requirements for Ratings** (Ch 3 & 8)
4. **Quality Assurance of Ratings** (Ch 9)

Contents of RESNET MINHERS Standards

Chapter	Topic	
1	National Standard for Quality Assurance Providers	
2	National Standard for Instruction, Assessment and Certification	
3	National Home Energy Rating Technical Standards	(ANSI/RESNET/ICC 301 and 380)
4	Builder Option Packages	(removed January 1, 2012)
5	Revision of Standards	(Continuous Maintenance)
6	National Standard for Sampled Ratings	
7	National Standards for Home Energy Audits	
8	Standard for Performance Testing and Work Scope	(Combustion Safety)
9	National Standard for Quality Assurance	
10	RESNET Standard for EnergySmart Projects and EnergySmart Contractors	

MINHERS Standards are Recognized for:

- Accreditation of Rating Providers, Rater Training Providers, and Rating software tools
- Quality Assurance oversight of Home Energy Ratings
- Verification of energy savings and performance for energy efficient mortgages (EEMs) and ENERGY STAR® homes
- Code compliance by the International Energy Conservation Code (IECC)
- Performance option for compliance with energy codes adopted
- Verification of energy performance in state utility benefit-funded residential energy efficiency programs

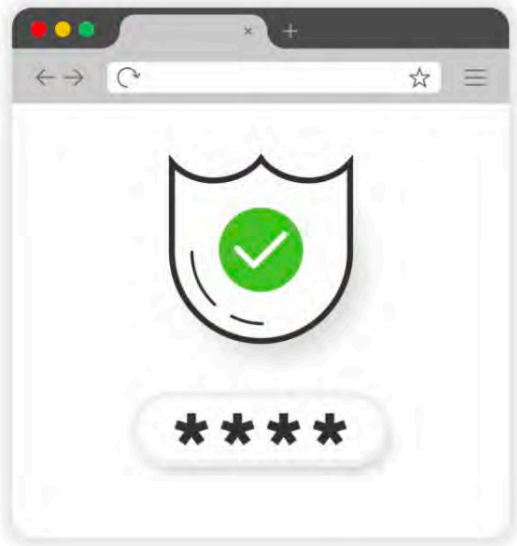
Minimum Standards for Rating Quality Assurance (QA) Provider Accreditation

- Sets the Criteria for QA Providers
- Rater and Rating Field Inspector Certification Standards
- Professional Development and Recertification for Raters and Rating Field Inspectors
- Rater Agreements (a written agreement with the QA Provider)
- Comply with the RESNET Code of Ethics
- Home Energy Rating Standard Disclosure
- Rater Registry
- Rating Software
- Ratings Provided for Third-party Energy Efficiency Programs

RESNET

Minimum Standards for Rating Software Accreditation

- Sets the criteria for software use
- Defines the time for transition from one version to another



Getty Images

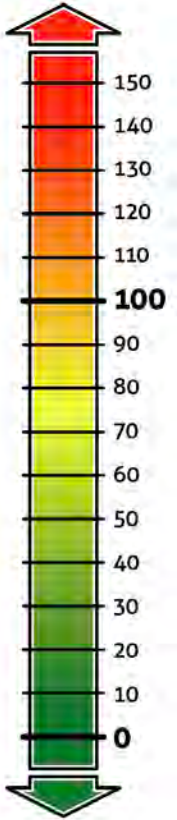
Minimum Standards for Training Provider Accreditation

- Training and Education Committee (Standards Development Committee, SDC 200)
- Maintain all up-to-date changes
- Maintain certified trainers
- Hold the core exam in the strictest of confidence

Getty Images

Technical Standards

- These standards apply to existing or proposed, site-constructed or manufactured, single- and multi-family residential buildings except hotels and motels
- The Rating Index shall be a numerical integer value that is based on a linear scale constructed such that the HERS Reference Home has an Index value of 100 and a home that uses no net purchased energy has an Index value of 0 (zero).



Standards Updates

Effort is made to keep the HERS course materials up-to-date, but be aware that the RESNET Standards are under continuous changes and maintenance, so Raters must check for updates on a regular basis.

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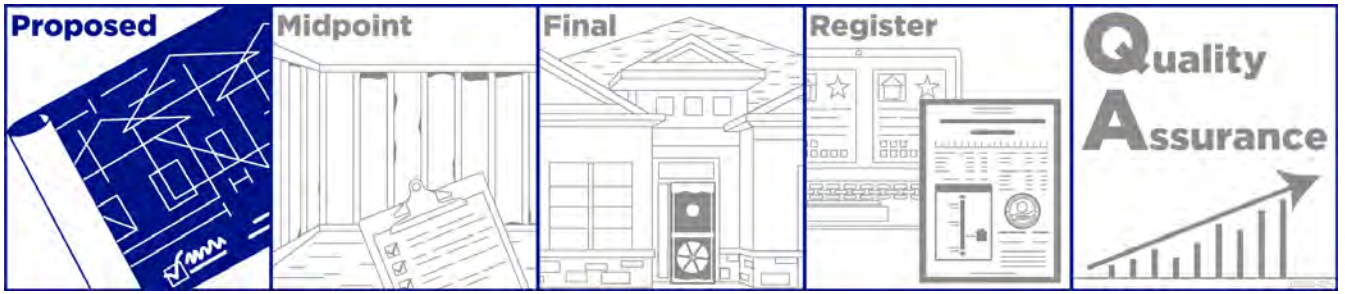
The Rating Process

The Rating Process (5 basic steps)

1. **Proposed** Rating for client (from plans, recommended)
2. **Midpoint** inspection: On-site construction (optional)
3. **Final** Inspection: On-site testing
   - Be aware of possible modifications to original plan, modify rating file accordingly (as-built condition)
4. **Register** Rating
5. **Quality Assurance**: Follow procedures per provider requirements

Proposed Rating for Client



- Often clients will want to market their homes with a specific score or program achievement such as:
  - ENERGY STAR® for Homes
  - Zero Energy Ready Home
- To plan accordingly, a proposed rating can be conducted from plans
- This step requires proposed values for:
  Insulation grade, Air infiltration, Duct testing

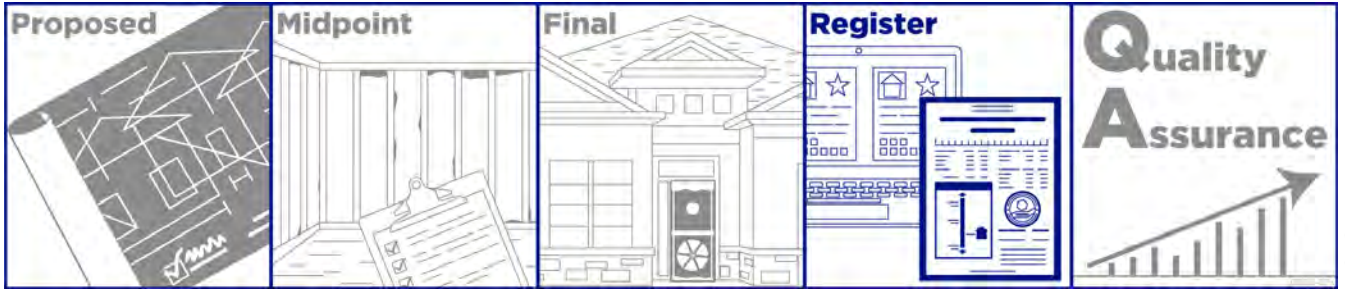
Construction Midpoint Inspection

- Follow ANSI/RESNET/ICC 301-2019
- Insulation quality assessment
- Window labels – photograph each label; they will be removed
- Quality of duct installation
- Optional duct rough-in test (will need to submit final duct test)
- Roof material – verify solar absorptance
- Radiant barrier installation
- Sealing of penetrations

Testing and Final Inspection

- Picture documentation of home elevations and installed equipment
- Follow combustion safety testing protocols (ANSI/ACCA 12 QH, Appendix A)
- Document building airtightness
- Document duct airtightness
- Document mechanical ventilation
- Building/duct airtightness and mechanical ventilation testing procedures are described in ANSI/RESNET/ICC 380-2019

Registering a Rating



- After final inspection, complete software entry with as-found and as-tested condition
- Verify rating index
- Send in building file according to your HERS Provider methodology
- Deliver copy of rating and disclosure form to client (**mandatory**)
  - Located in the software
  - Rater/consumer protection

Rating Quality Assurance

- QA procedures include random auditing of submitted ratings
- The two types of audits include:
  - **File** audits performed on 10% of submitted ratings
  - **Field** audits performed on 1% of submitted ratings

Rating Quality Assurance – File Audit

Once notified of a file audit, the Rater is required to provide:

- Floor plans and elevations
- Picture documentation of home elevations, equipment manufacturer labels and envelope/duct test meter results
- Notes or other information pertaining to the specific address
- QA compares uploaded information with the associated file
- A successful audit is uploaded to the RESNET Registry
- A failed audit requires submission of an accurately revised file

Rating Quality Assurance – Field Audit

- Field audits involve an on-site visit by the QA Designee to rated homes already registered in the RESNET Registry
- The QAD calculates a HERS Index based on data collected during the field audit
- The Rater uploads the same documentation of the Rated Home as in a file audit for review and comparison with the associated rating file
- A successful audit will allow acceptance to the RESNET Registry
- Failed audits must follow corrective actions

Becoming a Rater

Minimum Testing Requirements for HERS Raters

- All rater candidates must pass the national core competency tests including:
  - RESNET National Rater Exam
  - RESNET Combustion Appliance Simulation Test
  - RESNET Rater Simulation Practical Test
- Other classes and testing may be required by your chosen training organization or QA Provider

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RESNET National Rater Exam Specifics

- 55 multiple-choice questions
- 72% to pass (40 of 55 correct)
- Online exam
- This is a national test that is not climate or location specific
- $125 payable by credit card to RESNET

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National Rater Exam Retake Waiting Period

- **First failure:**
  - User will be blocked for **7 days** before able to try again
- **Second failure**:
  - User will be blocked for **30 days** before able to try again
- **Third failure**:
  - User will be blocked for **6 months** before able to try again

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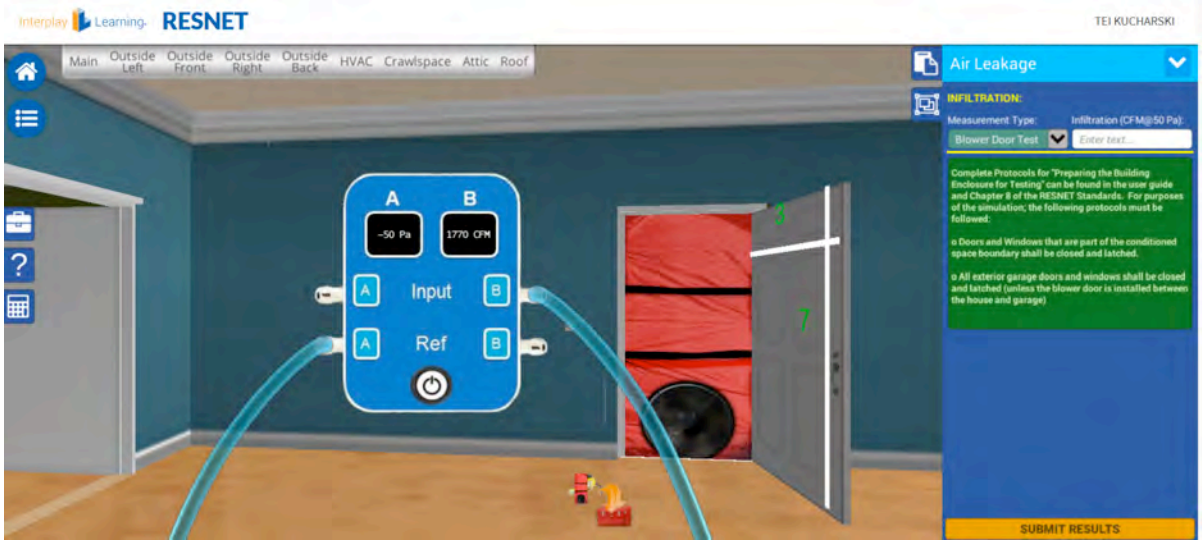
RESNET Combustion Appliance Simulation Test

- 85% to pass
- Online exam
- 2 hours
- Combustion safety simulation exam based on the RESNET Combustion Standard
- RESNET fee of $200 includes the student tutorials and multiple scenarios from basic to advanced as well as the exam

RESNET

RESNET Rater Simulation Practical Test

- 80% to pass
- Online exam
- 4 hours in 2 segments of 2 hours each
- Tests a candidate's ability to conduct a rating in a simulated fashion
- $200 payable to RESNET



RESNET

Probationary Ratings Overseen by Rating Provider

- Rater certification is completed by signing an agreement with a RESNET-accredited Rating Provider and carrying out 5 probationary ratings
- The first probationary rating can be completed upon taking the exam following this course
- All required exams and probationary ratings must be completed within 15 months

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HERS Rater PDUs (Professional Development Units)

18 PDUs are required **every three years** for a HERS Rater

These can be obtained by:

- Attend RESNET Conference(s) or other tracks at approved conferences and attain 18 contact hours

or

- Take RESNET-approved classes
- Document your compliance with certificates
- Submit documentation to your HERS Provider

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Inactive Raters

- If no registered Ratings during a three-year period, you must take a RESNET-certified assessment.
- Also requires field-demonstration of rating skills to a certified assessor (fee required).

Quality Assurance (QA) HERS Providers

QA HERS Providers are:

- RESNET-accredited organizations for registering Rated Homes and conducting quality assurance
- Responsible for keeping accurate records of individual Rater's and Rating Field Inspector's certification and equipment calibrations and maintaining their professional development units (PDUs) and any disciplinary actions
- Every certified rater **must** choose a RESNET QA HERS Provider

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Costs to Become a HERS Rater

- Cost of training and exams
- Annual certification fee
  - ($50 if FSEC is provider)
- Annual software license fee
- Equipment costs, typically:
  - Manometer
  - Blower door
  - Duct tester
  - CAZ testing equipment
- Marketing your skills or business

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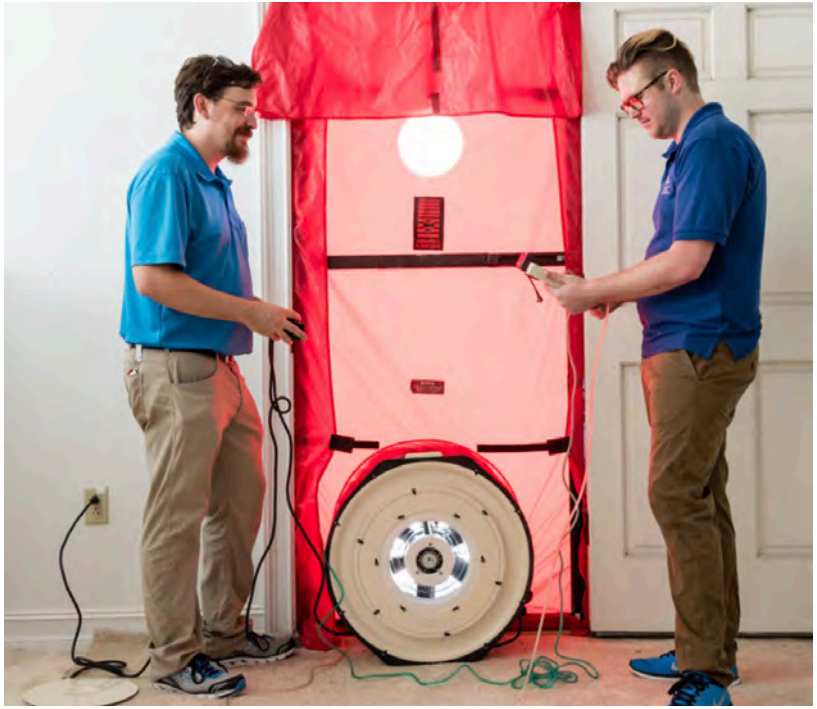
Rating Field Inspector (RFI)

- Must have a Rater and a QA HERS Provider
- Certified by Rating QA Provider to conduct field inspections for home energy ratings
- Conducts inspections and performance tests (air tightness and duct leakage) for home energy ratings under mentorship of a certified Home Energy Rater
- Requires the ability to identify and quantify building components and systems
- Is not certified to register ratings



FSEC

Steps to Become a Rating Field Inspector

Using the RESNET RFI Field Evaluation Form:

- Form available in course Resources as well as at: https://www.resnet.us/wp-content/uploads/RFI-Field-Evaluation-Form.pdf

1. Complete a minimum of three (3) mentored inspections
   - Mentors are Certified Energy Raters or Certified Field Assessors
2. Pass the final graded field evaluation
   - 100% satisfactory on all applicable features
   - Conducted by a Certified Field Assessor,
3. Pass the Combustion Appliance simulation test (85%)
4. Pay $50 processing fee to RESNET
5. Candidate should follow up with their Rating QA Provider for certification status and eligibility to perform ratings

- **RFIs must have an RFIIN (identification number) to be able to conduct any inspections for home energy ratings**

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Rating Field Inspector (RFI) Recertification

- Required every three years
- Must pass the RESNET-graded field evaluation, overseen by a RESNET-certified Candidate Field Assessor
- Must have a Rater and a QA HERS Provider

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FSEC-Certified Raters

FSEC Rater Training

- Each HERS Provider may require specific training
- FSEC, which is both a RESNET-accredited HERS provider and an accredited RESNET training organization, provides recommended training and additional Rater testing
- FSEC only uses EnergyGauge® software
- FSEC also requires:
  - Recertification (every three years)
  - Documentation of equipment calibration

FSEC

Courses to Take for FSEC-Certified Residential Energy Modeler

All courses and tests are offered Online:

1. Building Geometry for Energy Modeling (**Free**)
2. Building Science for Energy Modeling and Field Inspection
3. Introduction to HERS (this course)
4. From Blueprints to Energy Code and Ratings
5. EnergyGauge Pro Hands-On

After completing the five courses listed above:

- Energy Modeling Test

FSEC Full Rater Training Path

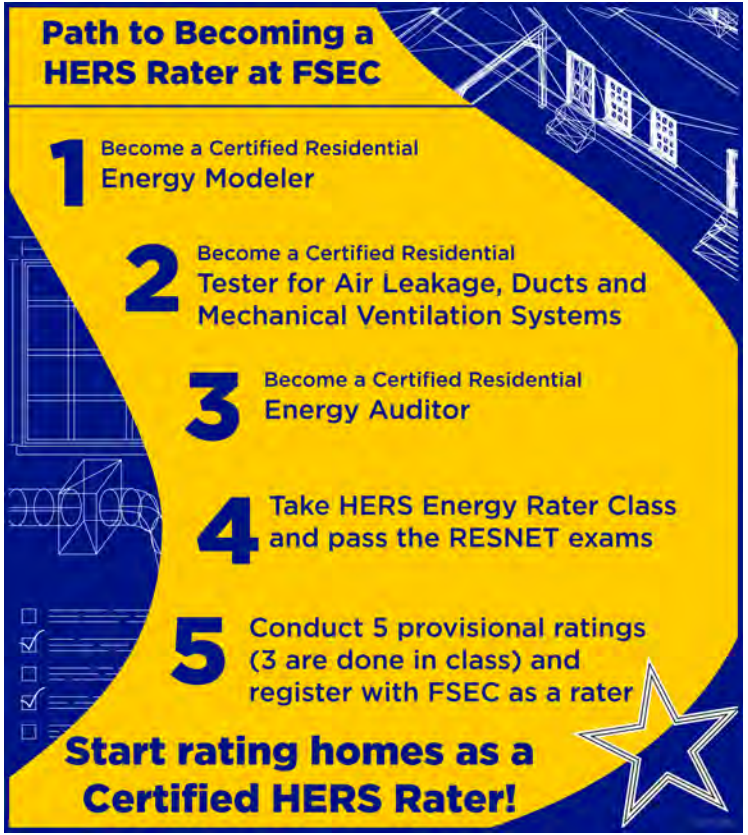
Prerequisites:

- Certified Residential Energy Modeler (five course online series including this course, and one online test)
- Residential Energy Auditor (two day in-person class)

Certified tester classes:

- Air leakage
- Duct tester
- Mechanical ventilation

HERS Energy Rater course (includes test preparation, exams and 2 provisional ratings)



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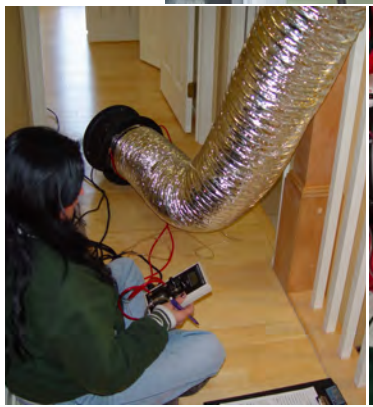
FSEC-Required Testing

- RESNET national core competency tests:
  - RESNET National Rater Exam
  - RESNET Combustion Appliance Simulation Test
  - RESNET Rater Simulation Practical Test
- FSEC Hands-on Practical Exam for Performance and CAZ
- Rater must have also passed each of the certified tester class exams
  - Air leakage
  - Duct tester
  - Mechanical ventilation



FSEC

FSEC Rating System Requirements

- Ratings are voluntary
- Florida Statue 553.990 insists that an information brochure regarding ratings is given to homebuyers
  - Brochure available in Resources, and at

  https://energyresearch.ucf.edu/wp-content/uploads/2019/11/EG-30-2019_Thinking-About-Buying-A-Home.pdf
- Fees charged for a rating are negotiated between the rater and the party contracting for the rating
- Anyone can become certified


Thinking About Buying a Home?
Get An EnergyGauge® Rating!

Consider the Benefits:
- More Home for Less Money
- Tested Quality Construction
- Enhanced Indoor Comfort
- Superior Energy Efficiency
- More Environmental Sustainability
- Improved Mortgage Options
- Greater Resale Value

Congratulations on your decision to purchase a home.

As you know, there are a lot of factors to consider before signing on the dotted line. By now you've probably checked out the location of the home you like the best. You know how much the seller wants, how many bedrooms there are, whether your dining room table will fit, where you'll park your car and lots of other important things.

But wait, there's still one more important thing you really ought to do.

You wouldn't buy a car without asking how many miles-per-gallon it gets, would you? So why would you even think of buying a house without knowing how much the power bills will be? That's why now is the perfect time to get an EnergyGauge® rating on the house.

Since 1994, there has been a voluntary, statewide energy-efficiency rating system for homes in Florida. Prospective homebuyers just like you, all around the state, are getting their homes rated before they make their purchase.

There are several very important reasons why:

▲ Energy ratings give homebuyers a marker-place yardstick that measures the benefits of energy-efficiency. You get detailed estimates of how much your energy use will cost.

▲ Energy ratings give you clear and specific information that lets you compare similar homes on their energy use. Two homes might look similar, but one may be efficient and comfortable, and the other an energy-guzzler with a very uncomfortable interior.

▲ Maybe most important of all, the national Home Energy Rating System (HERS) Index on the energy rating can qualify you for a number of special mortgage programs that offer lower interest rates, lower closing costs, and other benefits. Some lenders may offer special financing.

Before buying your next home, hire a Certified Energy Rater to do a rating.

Your builder or Realtor can help you find a Certified Rater in your area. After the rating, you'll get an easy-to-understand Energy Guide that estimates how much it will cost to pay for energy used in that home.

For many years, buyers have had home inspectors look over a home before making their purchase. This is a great way to find out about potential house problems before you make your purchase. Smart homebuyers around the country are now also asking for a home energy rating to look specifically at the energy use in a home and determine efficiency. Because energy costs can equal house payments, the relatively small cost of a home energy rating can easily be offset by many years of lower energy payments.

You're already familiar with the miles-per-gallon stickers on new automobiles and the yellow Energy Guide labels on home appliances. Shoppers use this information to figure out how much that car or appliance is really going to cost them. This information gives the buyer a good estimate of what it will cost to operate that car or use that appliance, over and above the purchase price. A car or product that is cheaper to buy can often be more expensive to operate, so this information can be very important to assure that you make the best purchase decision.

Here's how the EnergyGauge® program works.

After the rating, you'll get an easy-to read form like the one on the next page. The Rating Guide has a scale that allows you to compare the specific home you're looking at with the most efficient and the least efficient homes of the same size, with the same number of bedrooms available in your part of the state today.

One of the keys to the success of this program is the uniformity of ratings, made possible by the use of the EnergyGauge® software developed by the Florida Solar Energy Center®. It has been specially designed to let Raters input the key data on the home and obtain accurate information for comparison purposes.

HERS® Index
New Energy
Existing Home
Reference Home
65
This Home
Zero Energy Home
Less Energy

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Home Energy Ratings Student Page

- Account created upon first Building Science class taken at FSEC
- Allows the student to change contact information
- Documents the status of exams
- Documents the PDU's earned

https://securedb.fsec.ucf.edu/estudent/login

FSEC Rater Page

- Upload rating files and see file status
- Pay rating registration and annual renewal fees
- Access archived ratings and reports

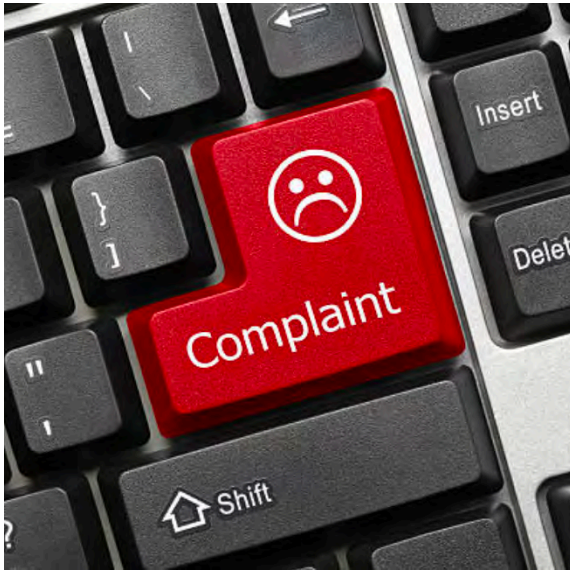
https://securedb.fsec.ucf.edu/engauge/engauge_login_form

Show 200 entries Search:

Work Log	RESNET ID	Address	City	State	Builder	ENERGY STAR	Tax Credit	RGU File	USA Version	Rater	Company	Receive Date	Status	Reports/Documents	View Error
115383		14392 Bartram Creek Boulevard						Kb Homes Jacksonville Lot 451 Bartram Creek.Rgu	6.1.04	Edward Naessens	Alpha EMC	04/06/20 07:52 am	AUDIT RANDOM	All Supporting Documents Supporting Documents Pending QA Upload	
115382		21858 Butterfly Kiss Drive						21858 Butterfly Kiss Drive.Rgu	6.1.04	Jeffrey T Wenzel	Infinite Energy Solutions	04/06/20 07:43 am	AUDIT WITH CAUSE	All Supporting Documents Supporting Documents Accept Reject	View Errors
115381	2753338742	2014 Manor Stone Way	Indian Trail	NC	Eastwood Homes		N	Eastwood Charlotte Lot 262 Heritage.Rgu	6.1.04	Edward Naessens	Alpha EMC	04/06/20 06:45 am	COMPLETE	Download All Download	
115380	8865969905	149 Fremont Ave	St. Augustine	FL	Providence Homes	3.1 Florida	Y	Mi060 Monroe 3485 Co.Rgu Confirmed.Rgu	6.1.04	Michael O'Donoughue	Jacksonville Building Science LLC	04/05/20 02:30 pm	COMPLETE	Download All Download	
115379		436 Union Hill Drive						Pv024 Hernando 2204 FF.Rgu Confirmed.Rgu	6.1.04	Michael O'Donoughue	Jacksonville Building Science LLC	04/05/20 02:09 pm	AUDIT RANDOM	All Supporting Documents Supporting Documents Pending QA Upload	

FSEC Complaint Resolution

- The consumer makes a complaint in writing to the Energy Gauge Office
- Arbitration – try to get the rater and complainant to resolve the issue
- Site visit by Provider
- Costs will be incurred by party found at fault
- If you disagree with the Provider, then you would need to seek a Resolution from RESNET



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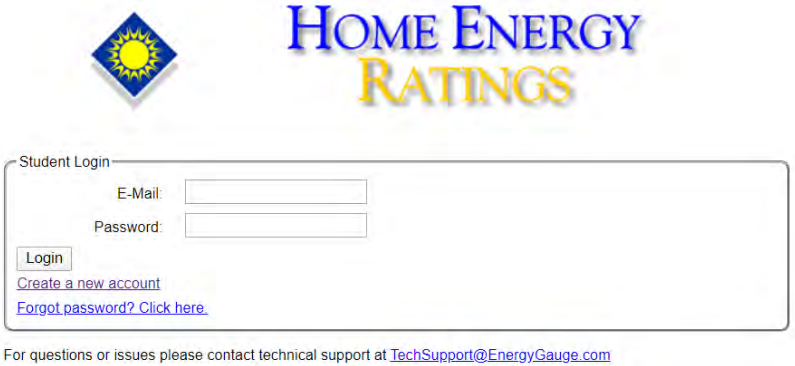
Certify as an Energy Rater or RFI with FSEC

- Fill out application form for certification and submit to FSEC along with application fee of $50 at the Home Energy Ratings Student Page

https://securedb.fsec.ucf.edu/estudent/login



Must certify within 15 months of passing first RESNET test (CAZ, 3D simulator, RESNET core) Note: RFI only need Combustion Appliance Zone (CAZ).

Rater and RFI Certification Renewal (every 3 years)

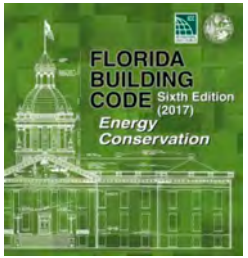
- Certification is good for 3 years
- Must pay annual $50.00 Renewal Fee to keep in good standing
- To extend Certification for another 3 years, you must take a Recertification Course (Free for FSEC raters) before the end of the third year and continue paying the annual Renewal Fee
- Raters without a HERS home registration in three years must pass the RESNET Rater Field Assessment Test
- RFIs must pass the RESNET Rater Field Assessment Test

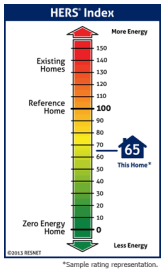
Using EnergyGauge for Ratings

Energy Gauge USA Software

- Calculates the HERS rating to compare to other houses of the same size and number of bedrooms
- Calculates HERS Index for an Energy Efficient Mortgage
- Florida's Energy Code Compliance
- Calculates IECC 2006/2009/2012/2015/2018
- Includes mandatory provisions checklist for all 3 versions
- Calculates ENERGY STAR Version 3.0 and 3.1 Florida and Multifamily New Construction (MFNC 1.0 & 1.1)
- Calculates DOE Zero Energy Ready
- Calculates Energy Rating Index (ERI)
- Calculates Improvement Analysis
- ACCA Manual J, S and D (SizePro Versions)
- 3D Duct Design (SizePro Versions)

EnergyGauge®
Energy and Economic Analysis Software



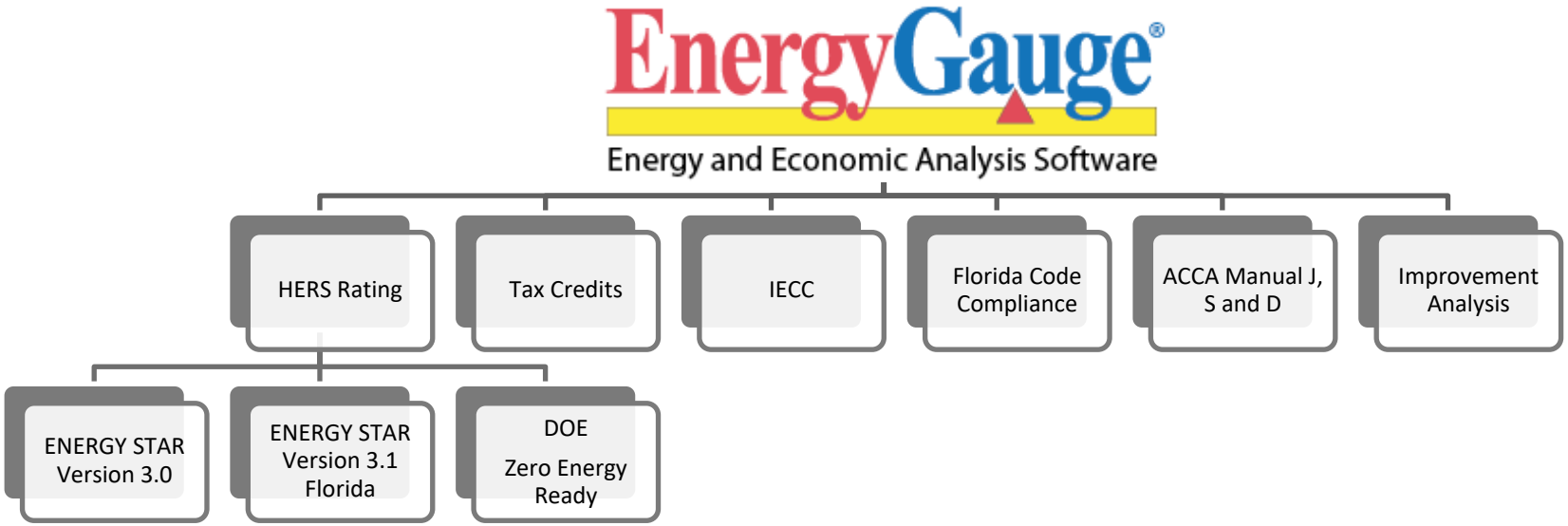


IECC
INTERNATIONAL ENERGY CONSERVATION CODE

ZERO
ENERGY READY HOME

Powered by ACCA
MANUAL J®

EnergyGauge Code Calculations



Projected Rating from Plans

- From code compliance, just a few additional inputs
- Can assist builders to build more efficiently
- Models homes for Energy Efficiency Programs
- RESNET Minimum Rated Features

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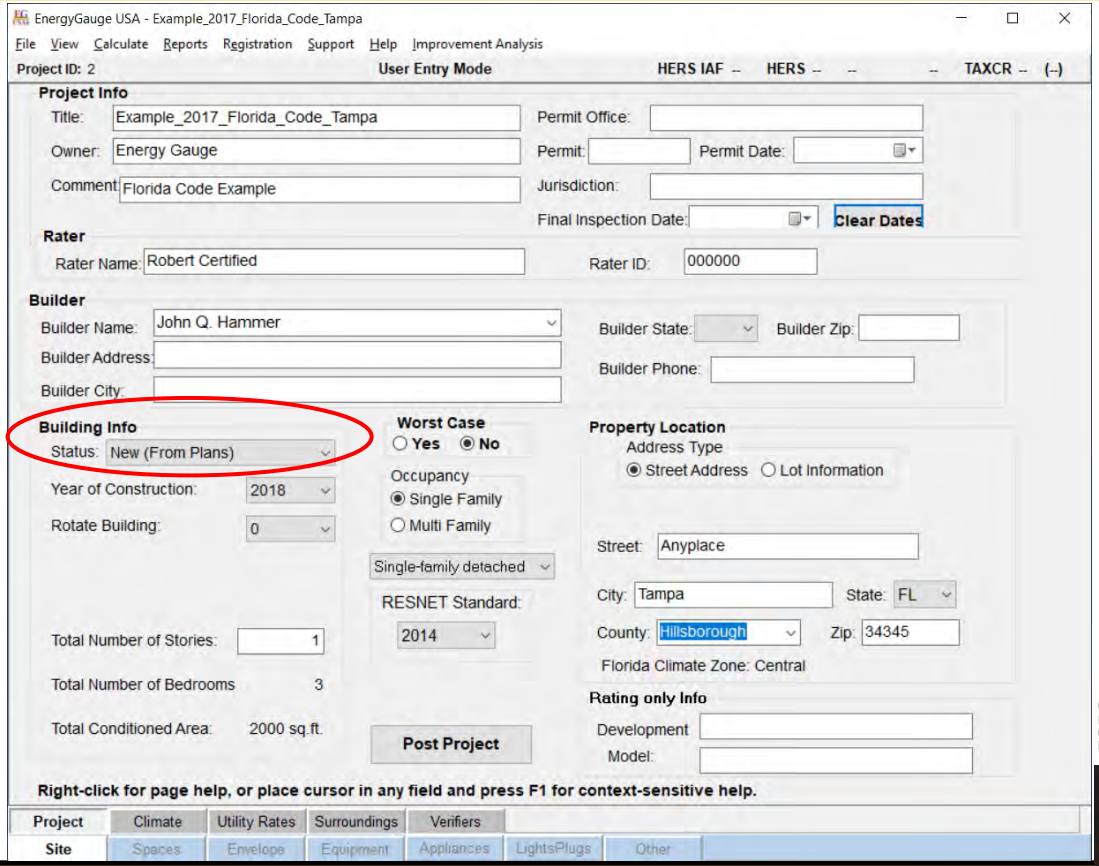
Project Screen

- Project Screens holds basic information about the building and property
- As a “projected rating,” the status of this file will be “New (From Plans)”



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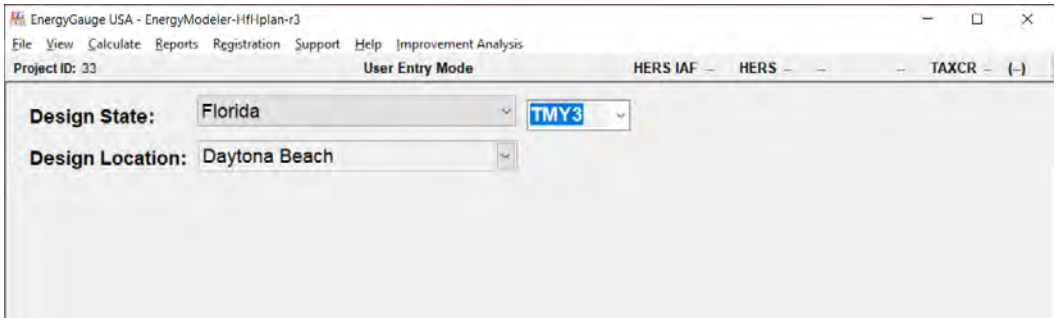
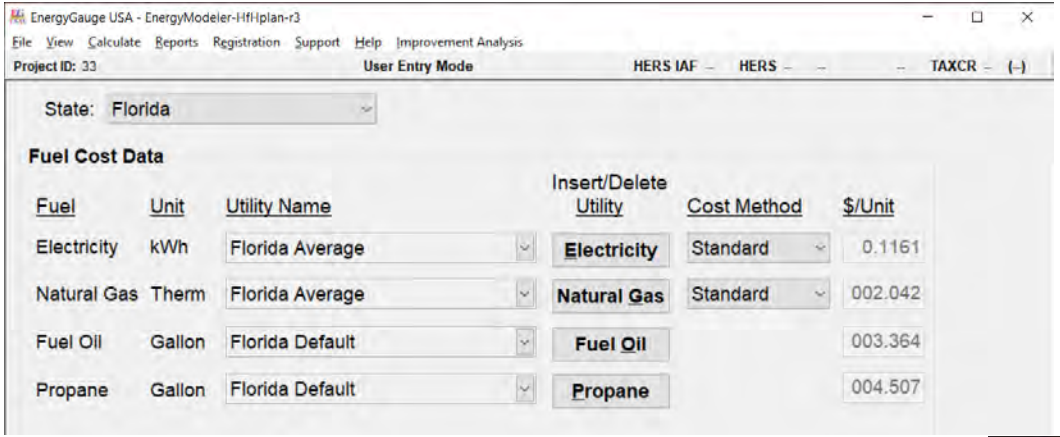
Climate Screen & Utility Rates Screen

- It is important to chose the correct location for climate as this will determine the weather used for the rating
- Utility rates must also be chosen correctly for each rating to reflect local costs
- At a minimum, average rates for the state should be selected rather than the nation average

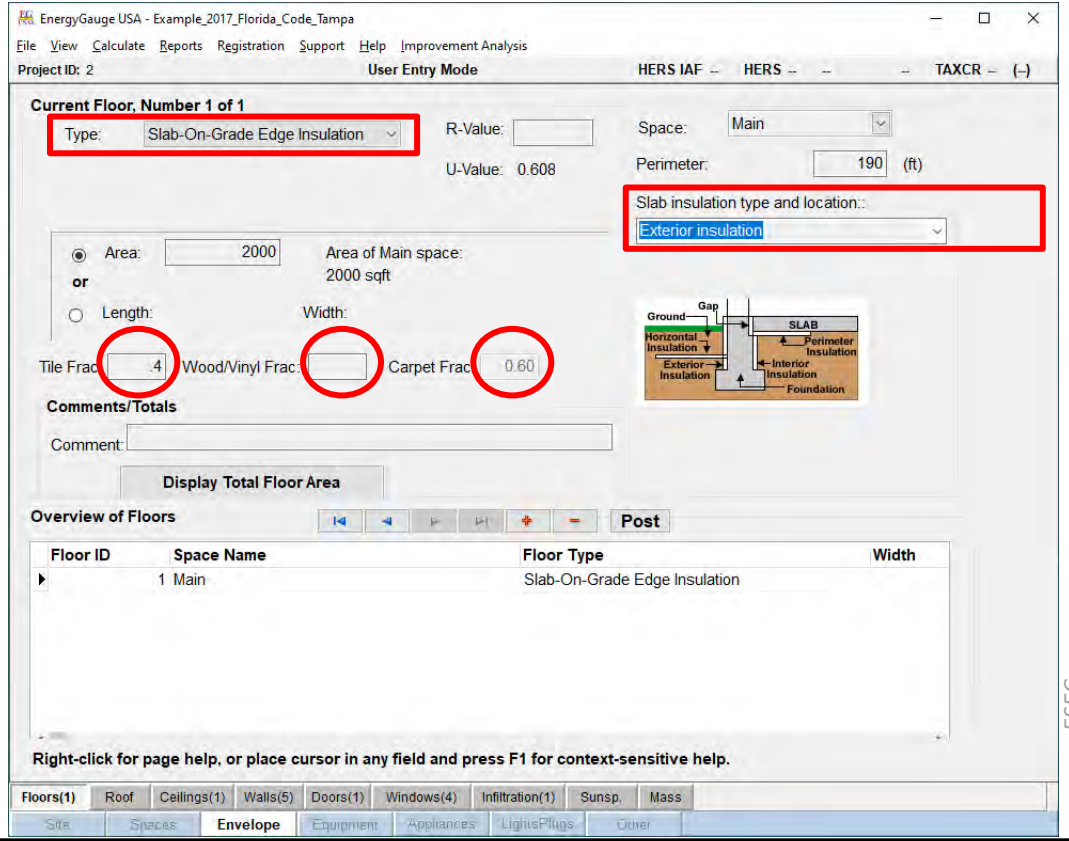




Floors

Enter the estimated percentage of tile, wood-vinyl or carpet

A higher fraction of tile and wood/vinyl can lower HERS Index in hot climates



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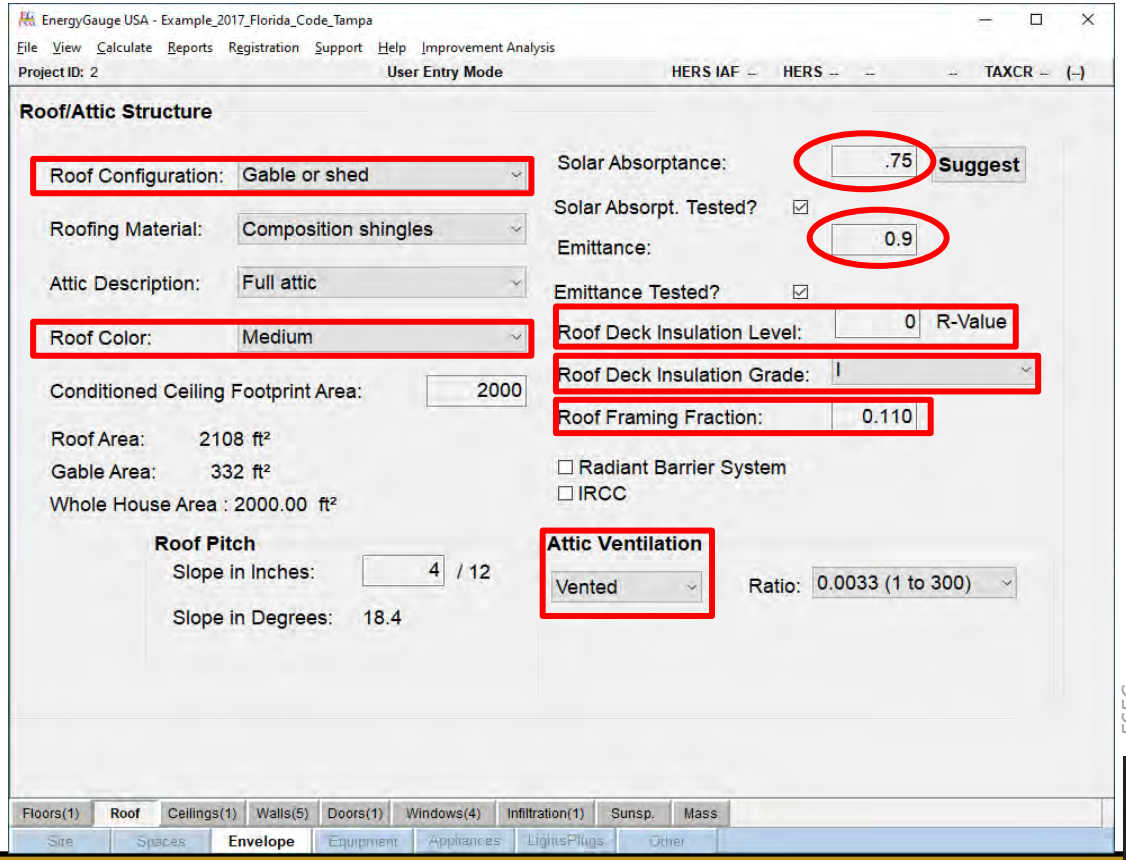
Roof

- Enter roof configuration, area and pitch, as well as material properties
- Tested results for solar absorptance and emittance can lower HERS Index score



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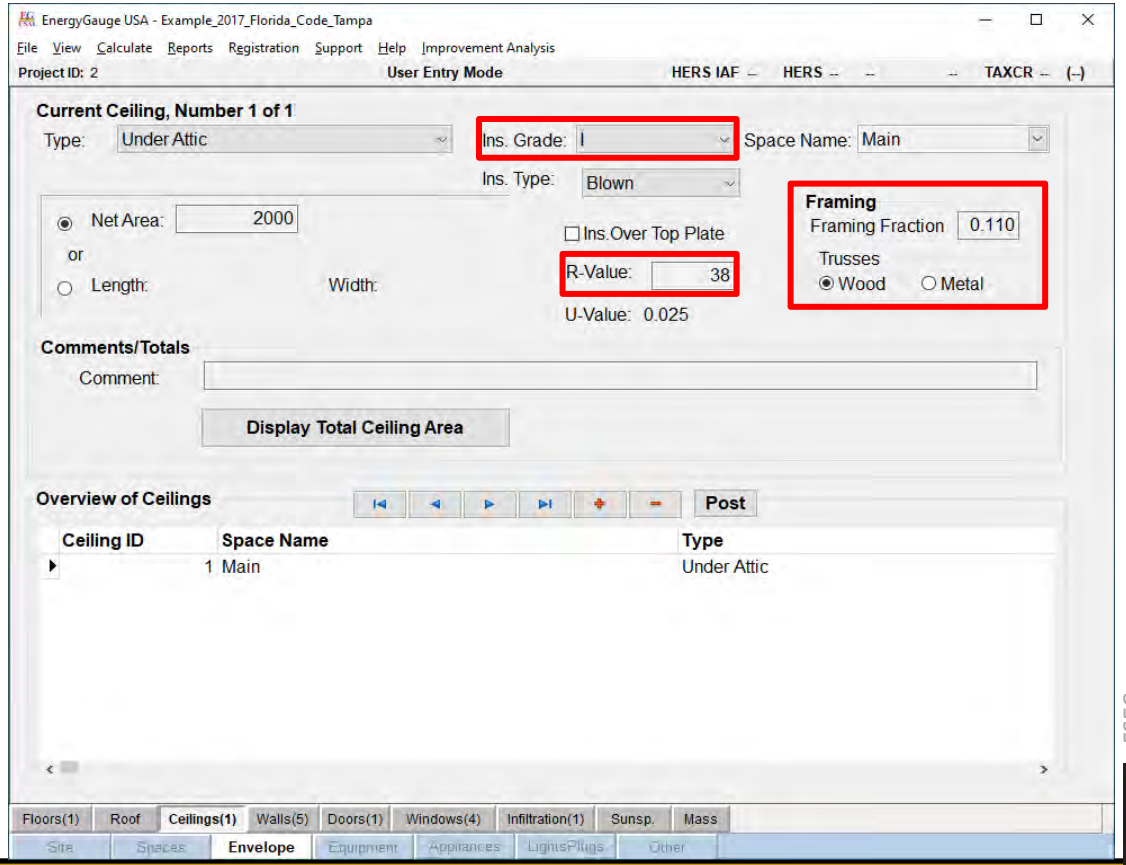
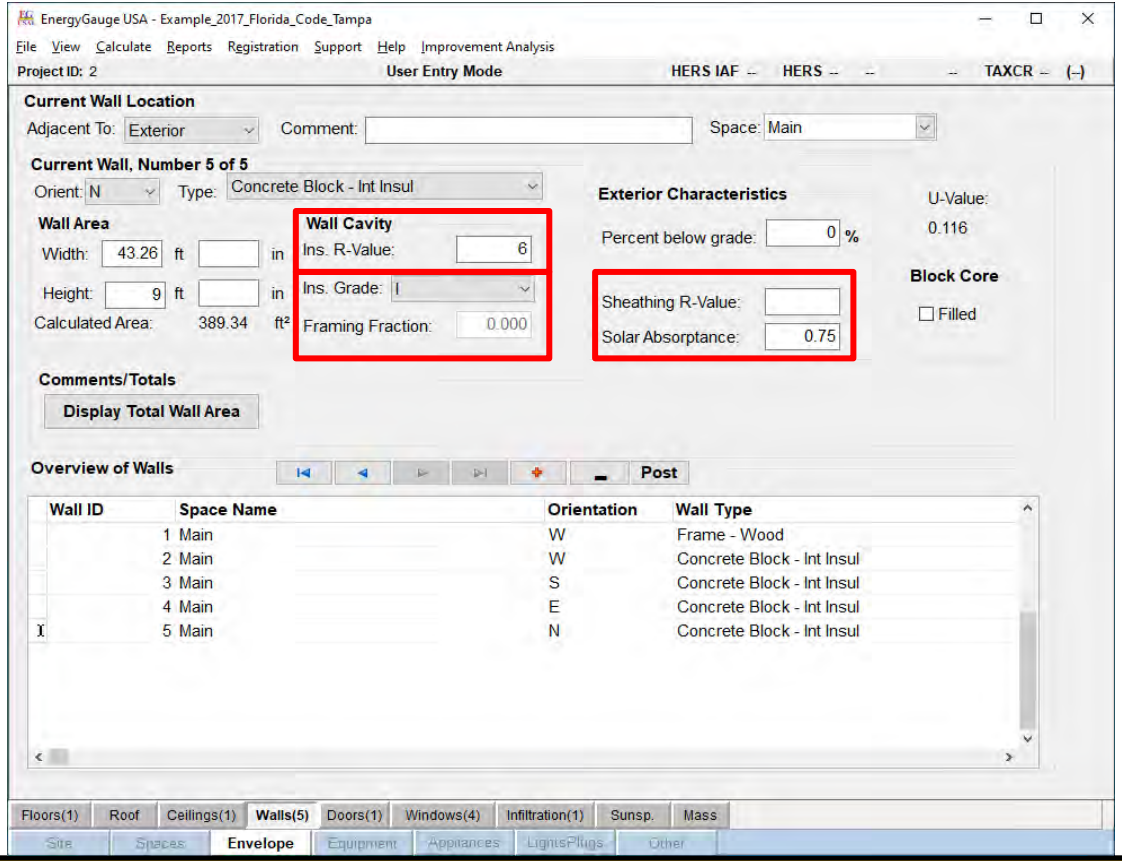
Ceiling

- Select ceiling type, as well as insulation grade, type and R-Value
- A suggested framing fraction is provided but can be modified (see help for suggestions)
- Knee Walls (if any) can be added on this page



Walls

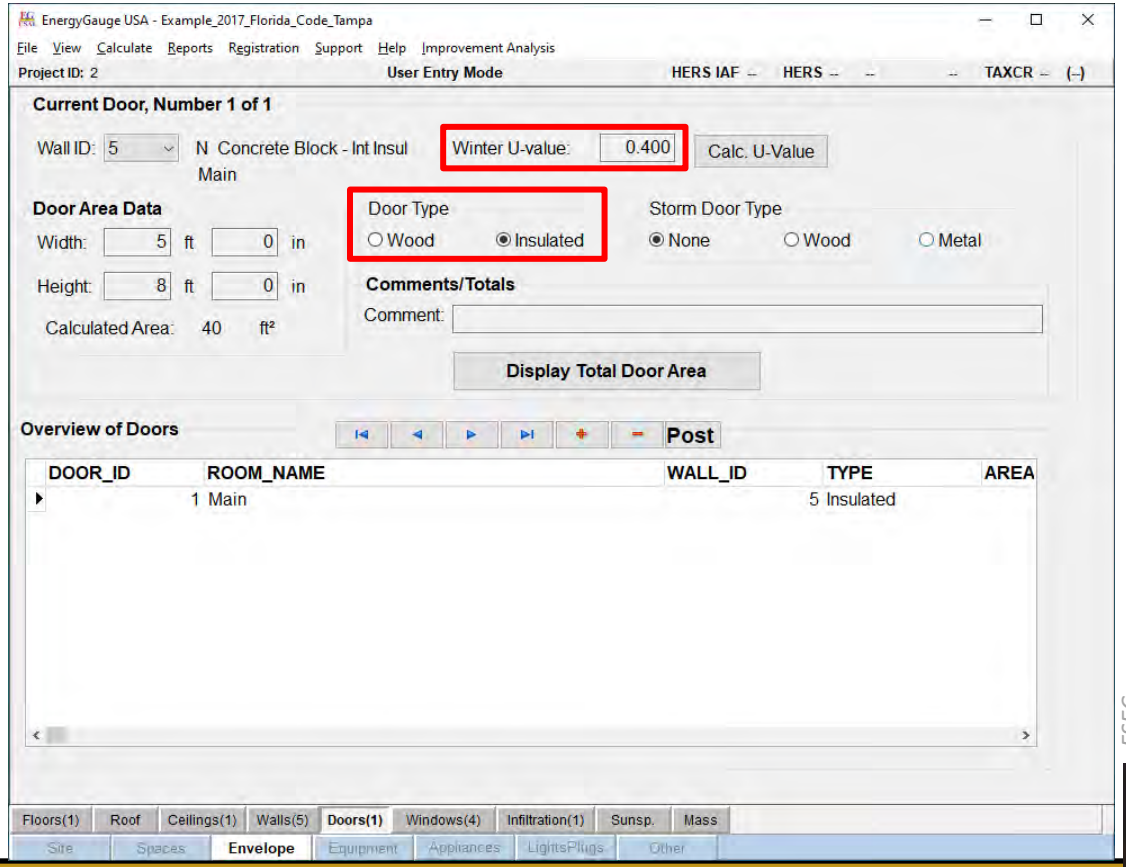
- Specifications of all exterior walls are included on this page
- Walls adjacent to an attached garage will also be entered here



FSEC

Doors

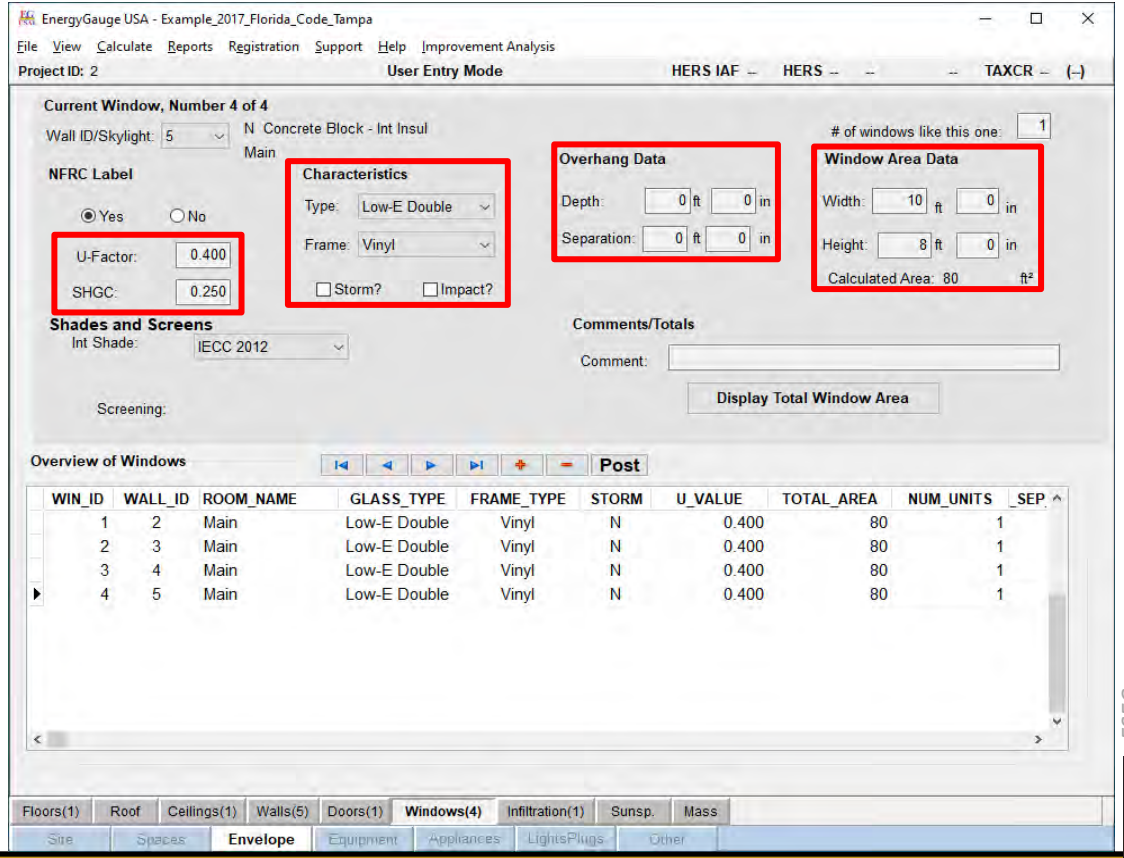
- Exterior door specifications are entered here
- Door location is determined by Wall ID as designated on the Walls page (including doors to an attached garage)
- Doors with glass area greater than 1/3 of total door area will require special entry as described in “help”



FSEC

Windows

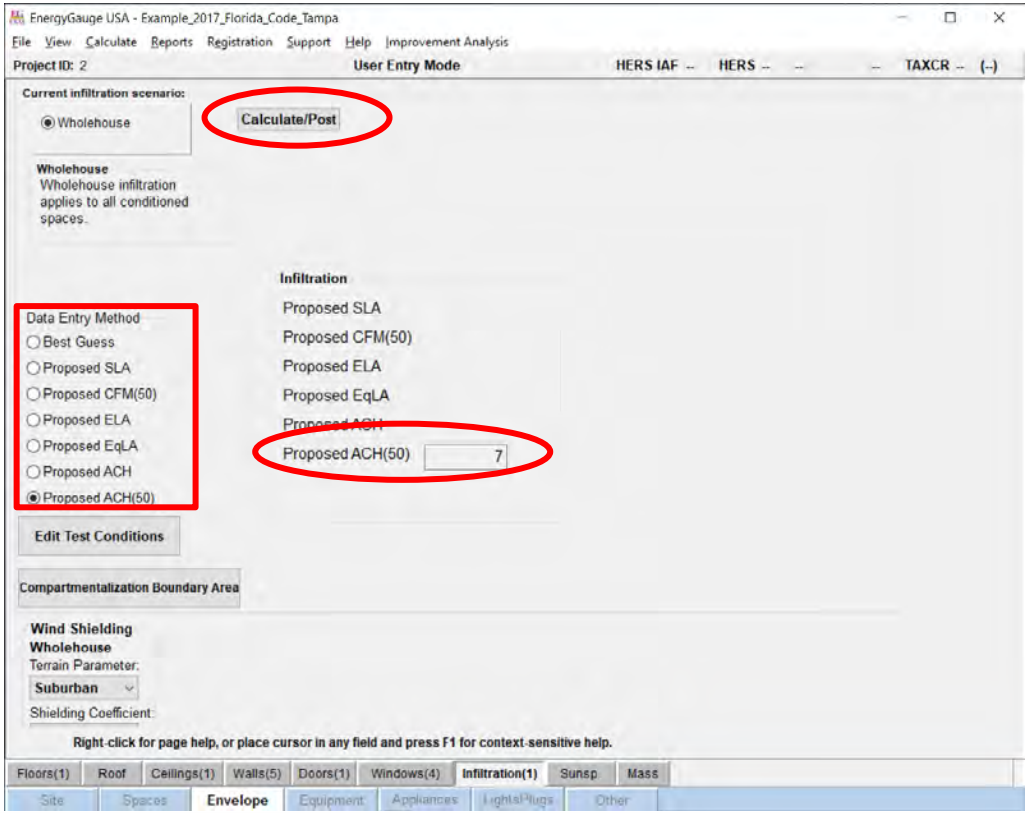
- Windows location is also determined by Wall ID
- NFRC label information will provide best accuracy, otherwise enter general characteristics
- Window overhangs can improve the HERS index
- See help file for details on overhang entry



FSEC

Air Leakage

- Infiltration (or envelope air leakage) will be entered as a proposed value
- Typical entry method is “Proposed ACH(50)” as specified by the builder
- Lower infiltration numbers may yield a better HERS Index, but must be confirmed later with on-site Blower Door testing

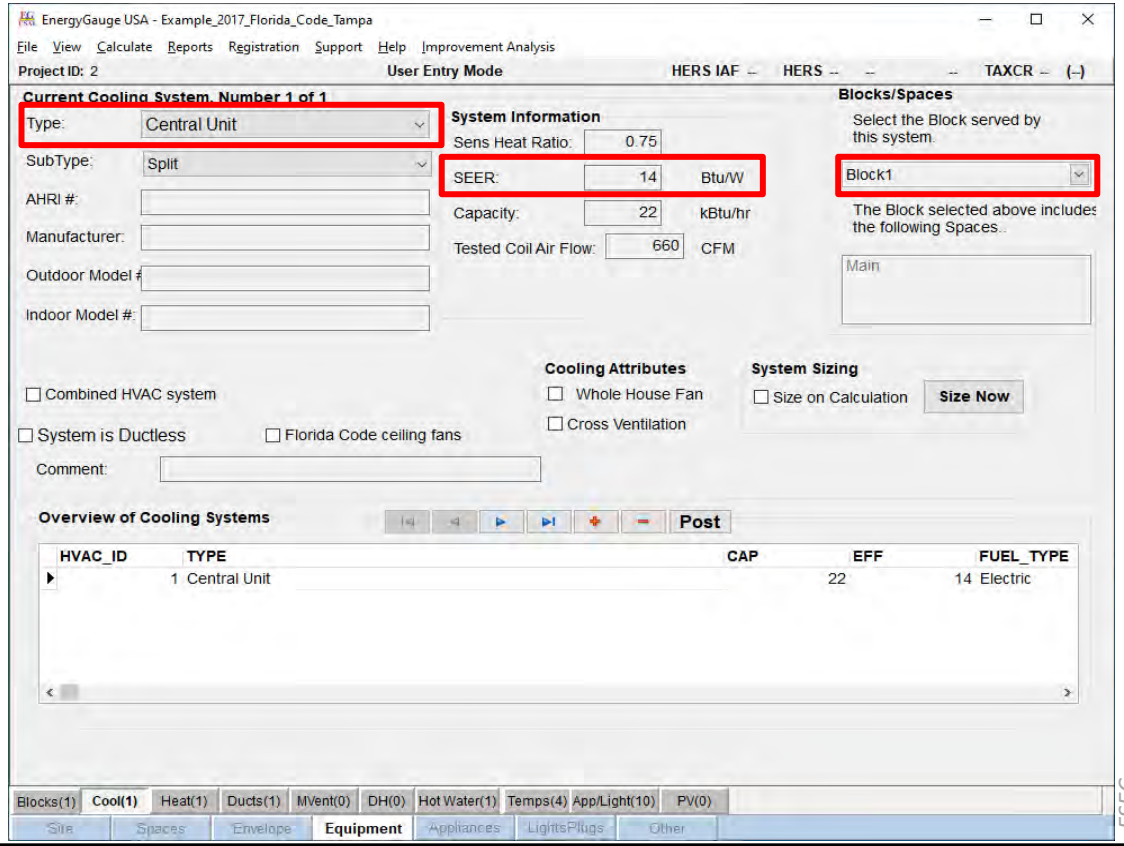


FSEC

UCF

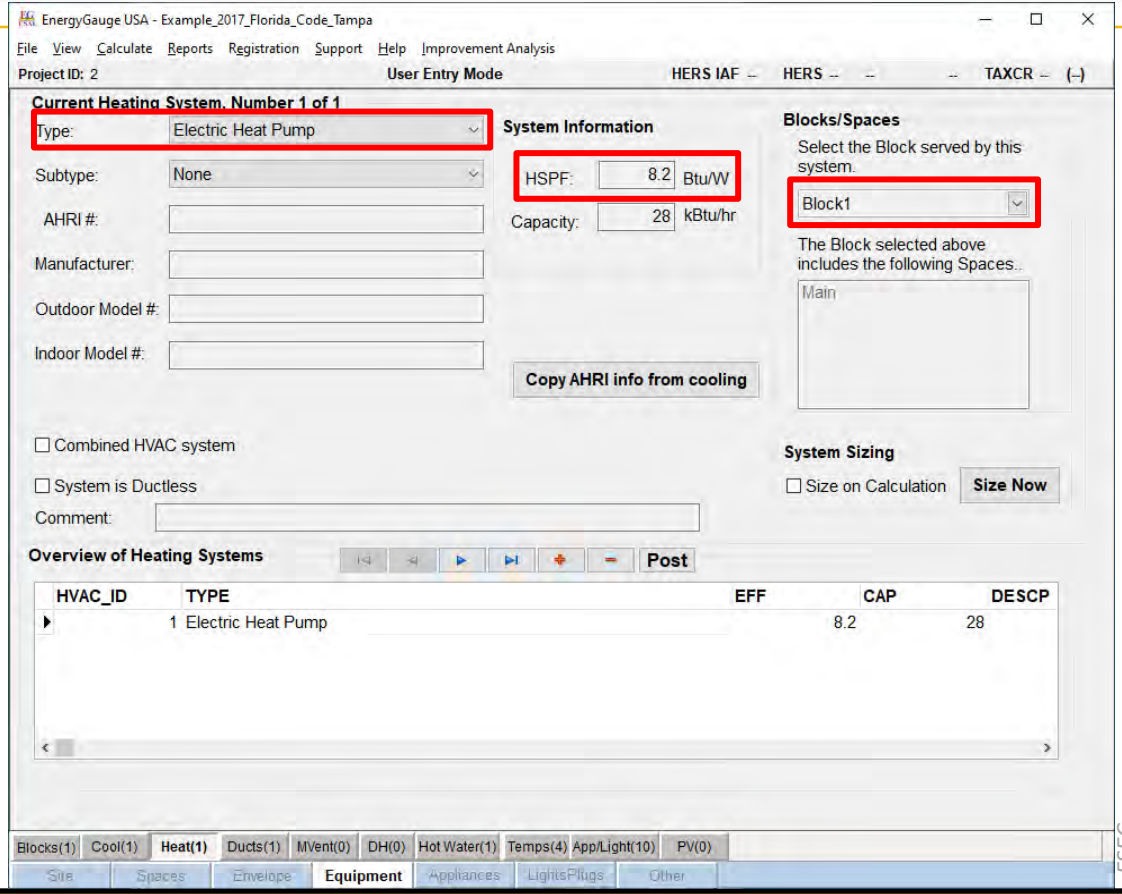
Cooling

- Cooling equipment type and specifications are entered here
- Each system must be associated with a previously entered Block and Space



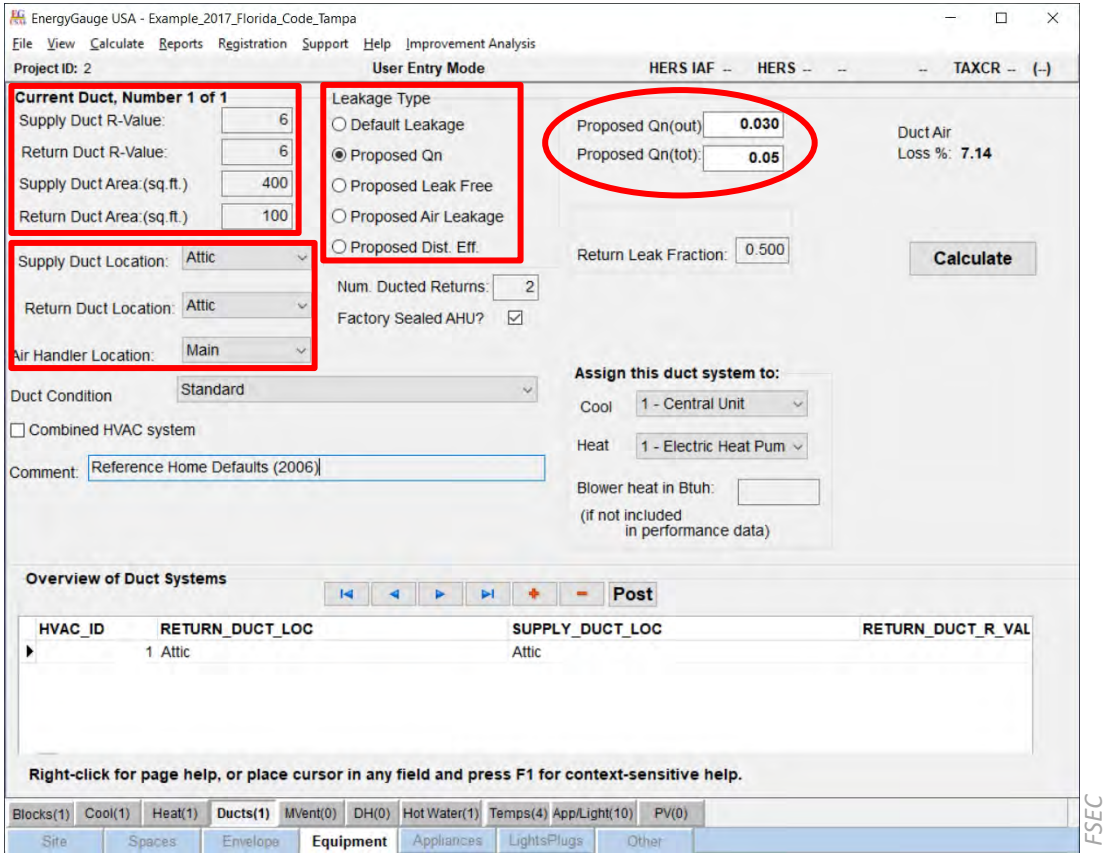
Heating

- Heating equipment type and specifications are entered here
- Each system must be associated with a previously entered Block and Space



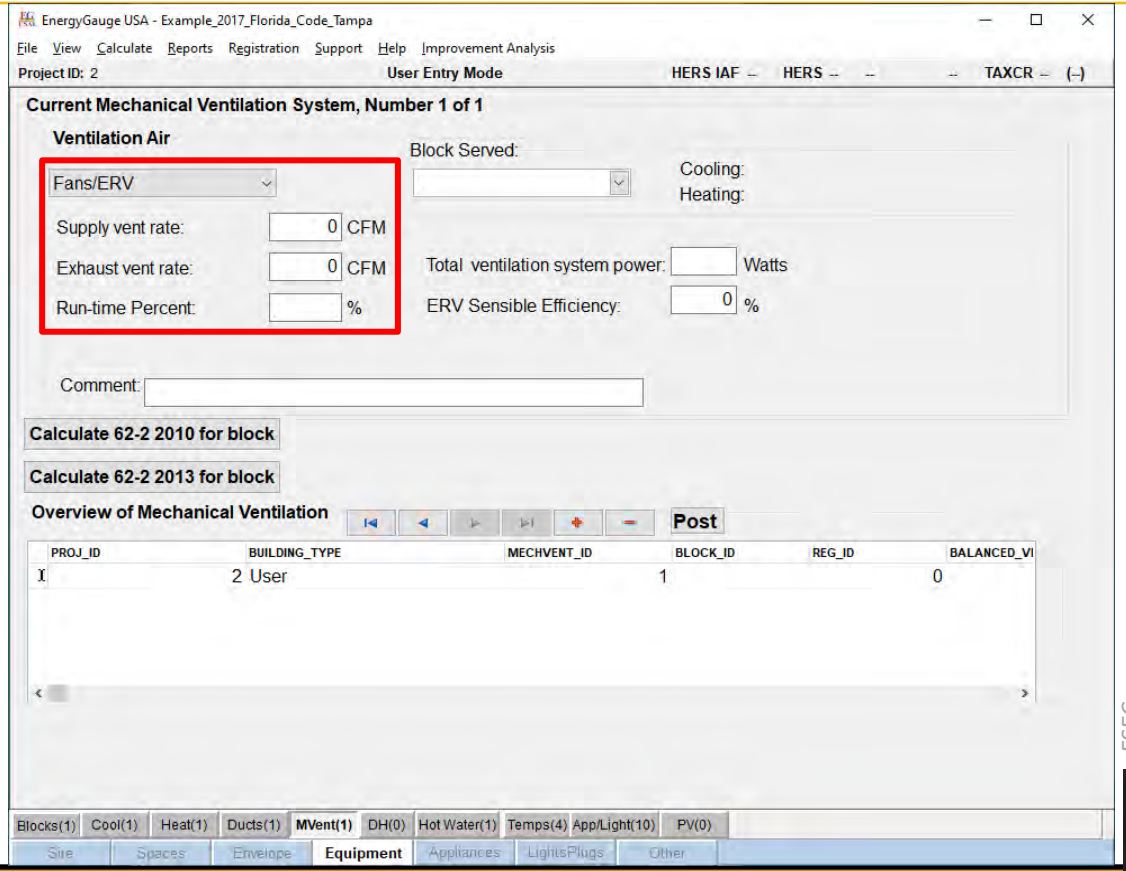
Air Distribution

- Duct specifications are entered here, including:
  - Supply and return areas
  - R-Value
  - Location
  - Proposed leakage (Qn)
- Lower duct leakage will yield a better HERS Index but must be confirmed later with on-site duct testing



Mechanical Ventilation

- Several methods of providing ventilation air are available from the pull-down menu
- The method chosen will determine required inputs
- Several factors, including building codes, builder preference, and infiltration levels will determine whether ventilation is required and how much it should be

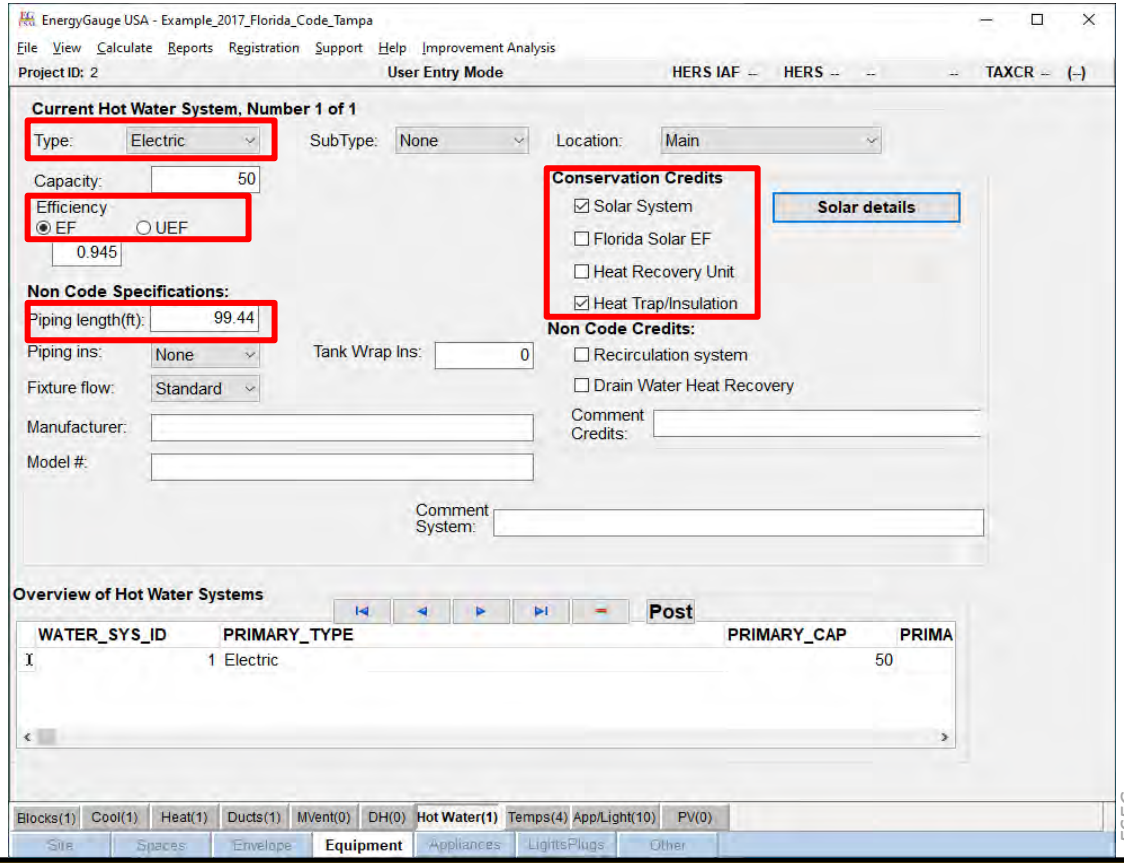


FSEC

Water Heater

Enter proposed water heater specifications here including:

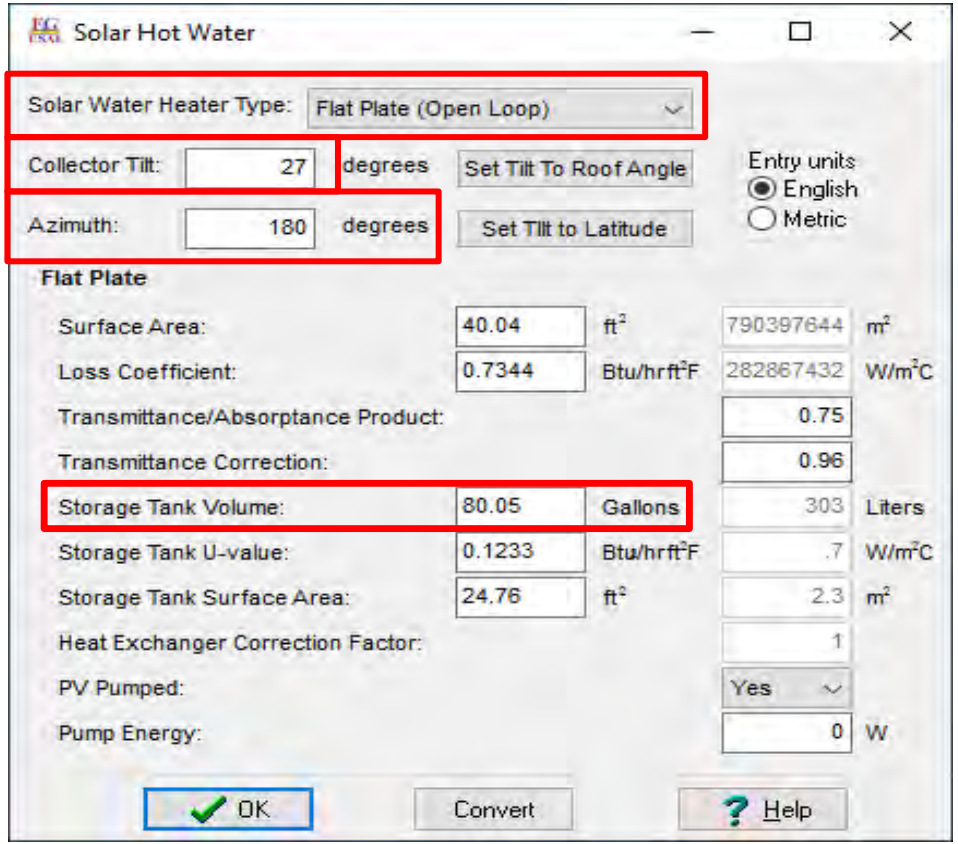
- Type
- Location
- Capacity
- Efficiency
- Estimated pipe length
- Pipe insulation
- Fixture type (standard or low-flow)
- Any conservation credits



Solar Thermal System

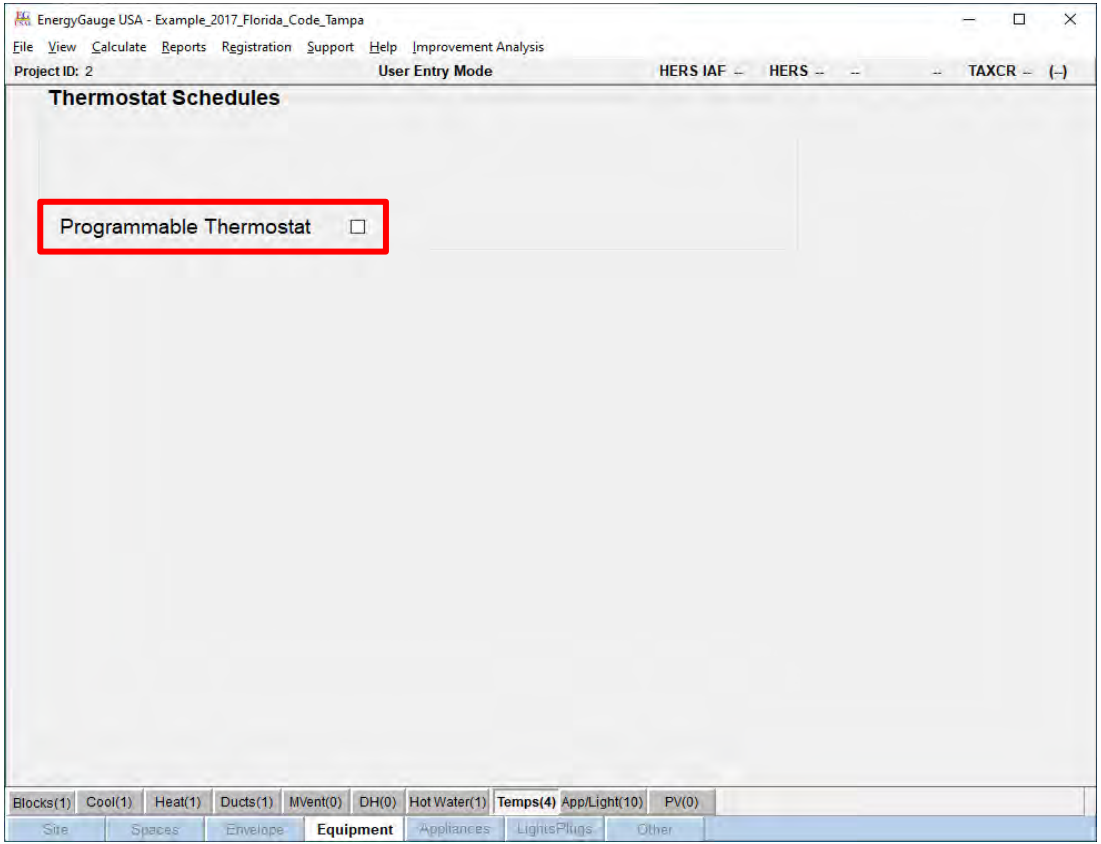
Choosing the “Solar System” credit on water heater page and clicking “Solar details” will produce another screen for entry of:

- Solar water heater type
- Collector tilt & azimuth
- Other specifications associated with the collector type



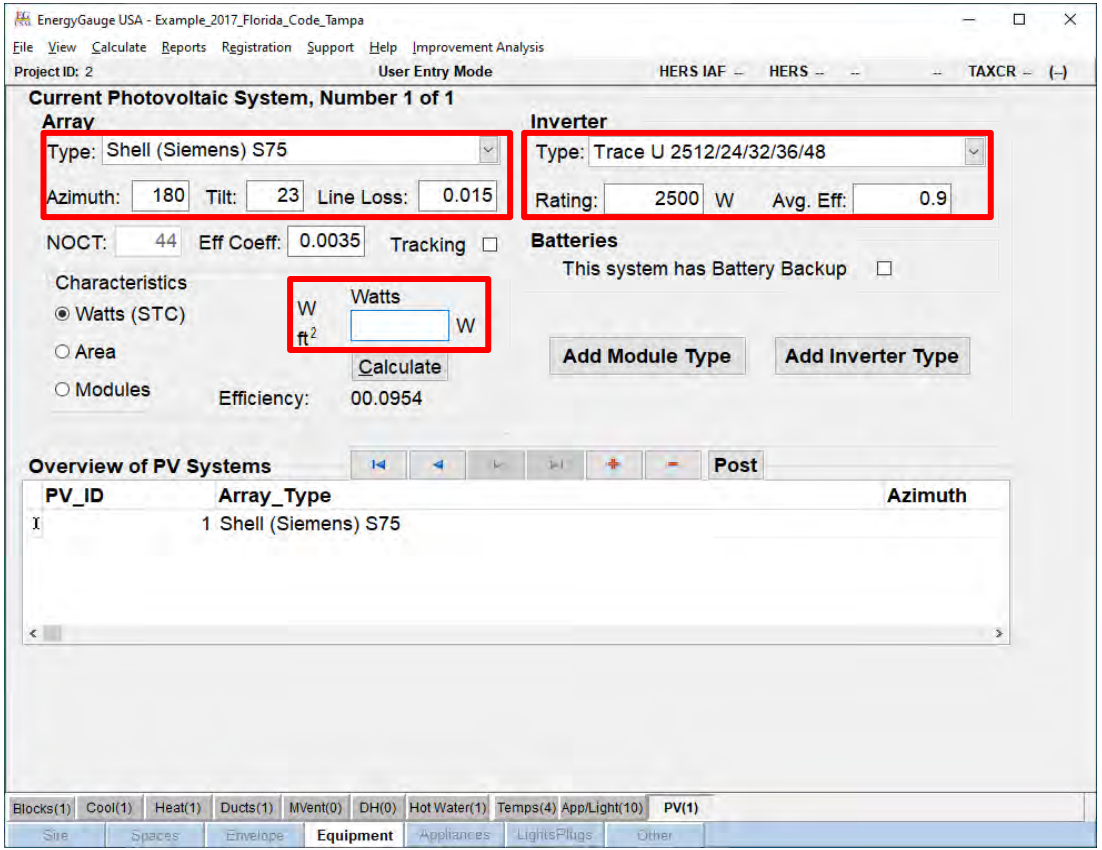
System Control

- The “Temps” page allows for selection of a programmable thermostat (if present), which can improve the HERS Index



On-Site Power Generation

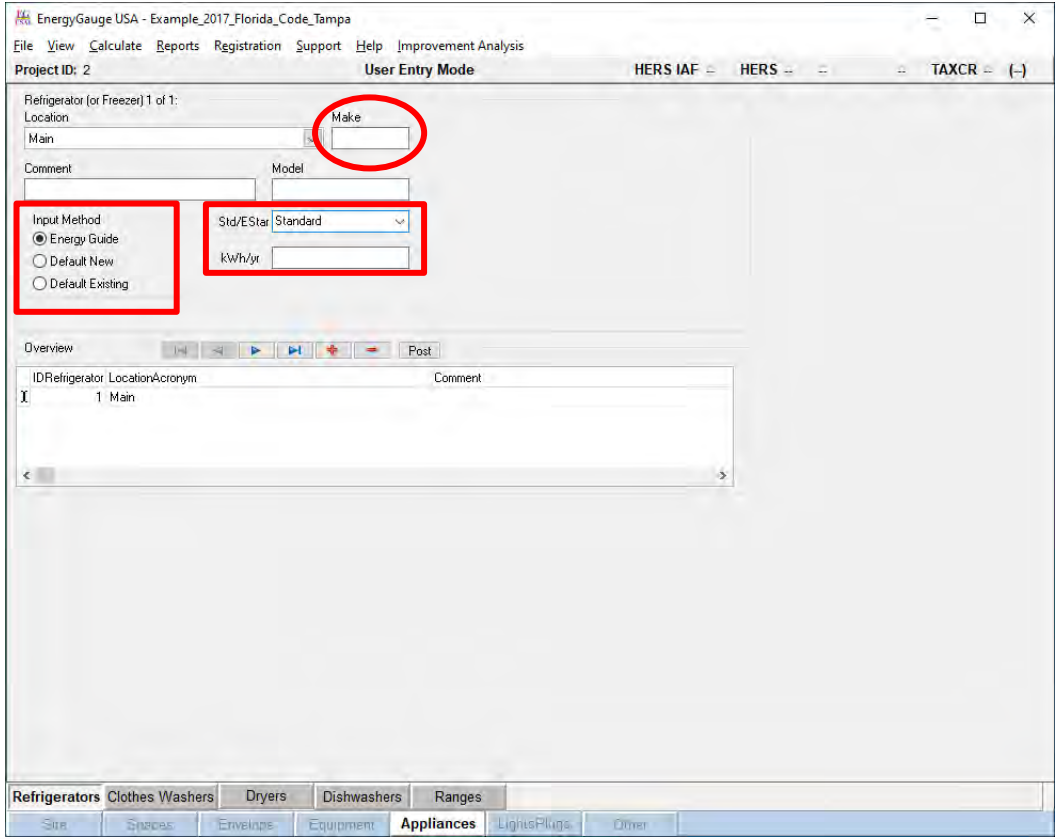
- Photovoltaic (PV) power generation specifications can be added on this page, including module type, inverter type, and batteries if present



Appliances

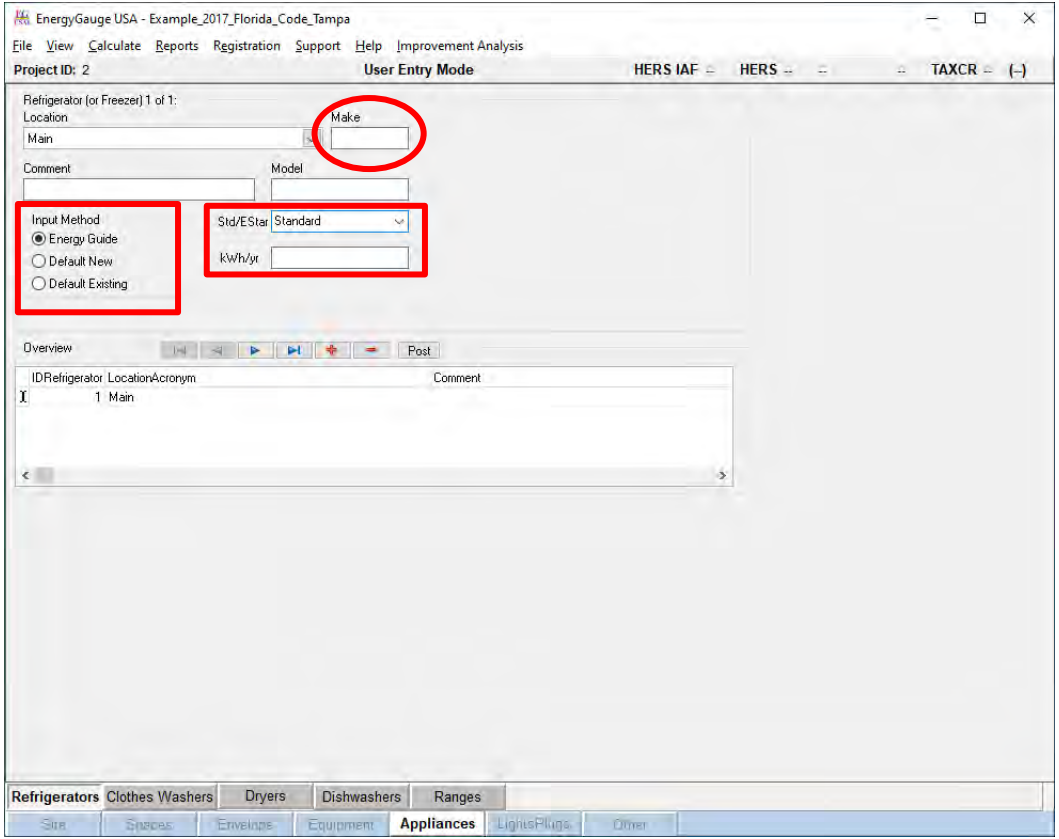
For all appliances:

- Using the Energy Guide input method can result in a lower HERS Index
- If an appliance will be a new model of unknown type, select “default new”
- If builder is NOT including an appliance, then do not enter one
    - EnergyGauge will use RESNET rules to enter one during calculations)



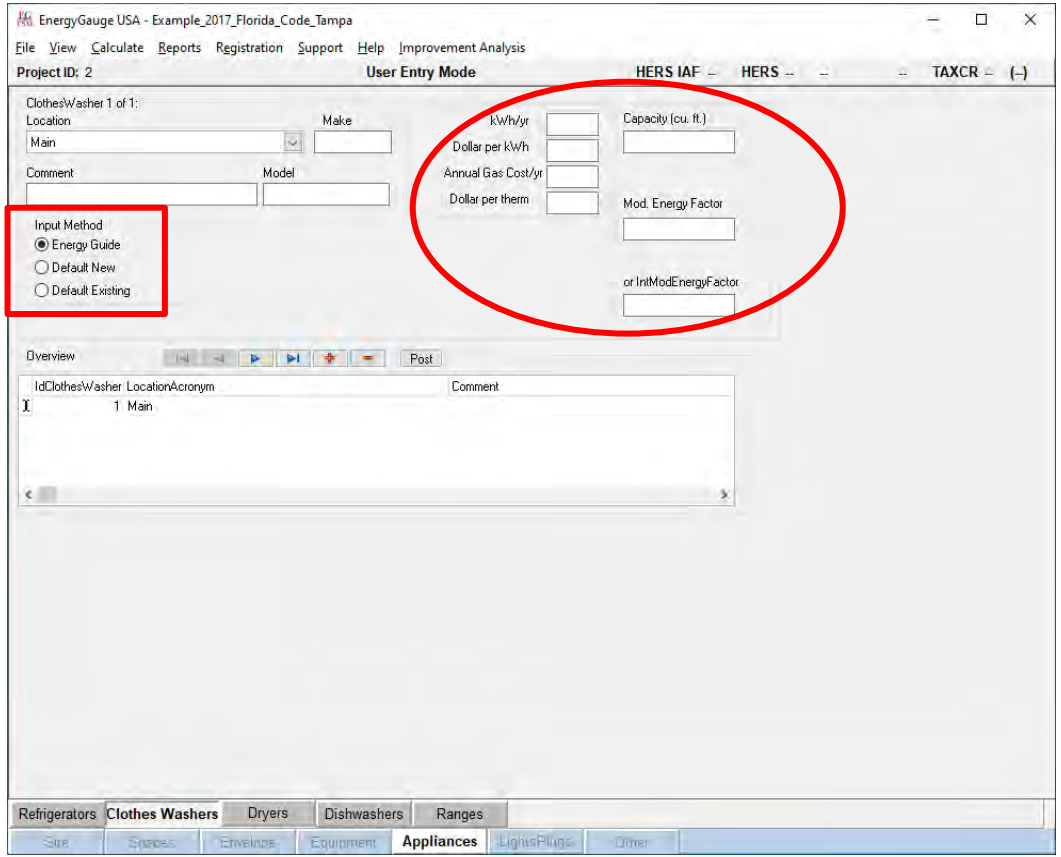
Refrigerator

- If the refrigerator will be a new model, but is unknown at time of projected rating, select default new
- If the builder is not including a refrigerator, then do not enter one.
    - EnergyGauge will use RESNET rules to enter a refrigerator during calculations



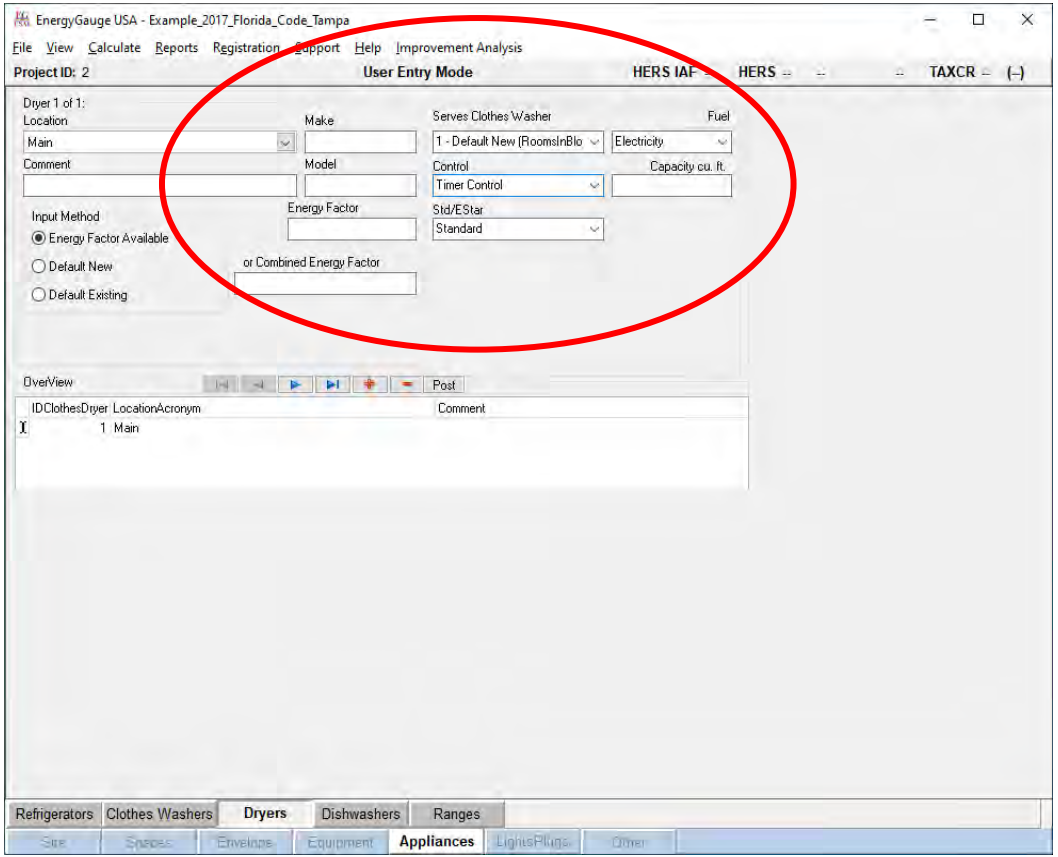
Clothes Washer

- The same guidelines that apply to a refrigerator are true for a clothes washer
- Do not enter one if the builder will not be providing one



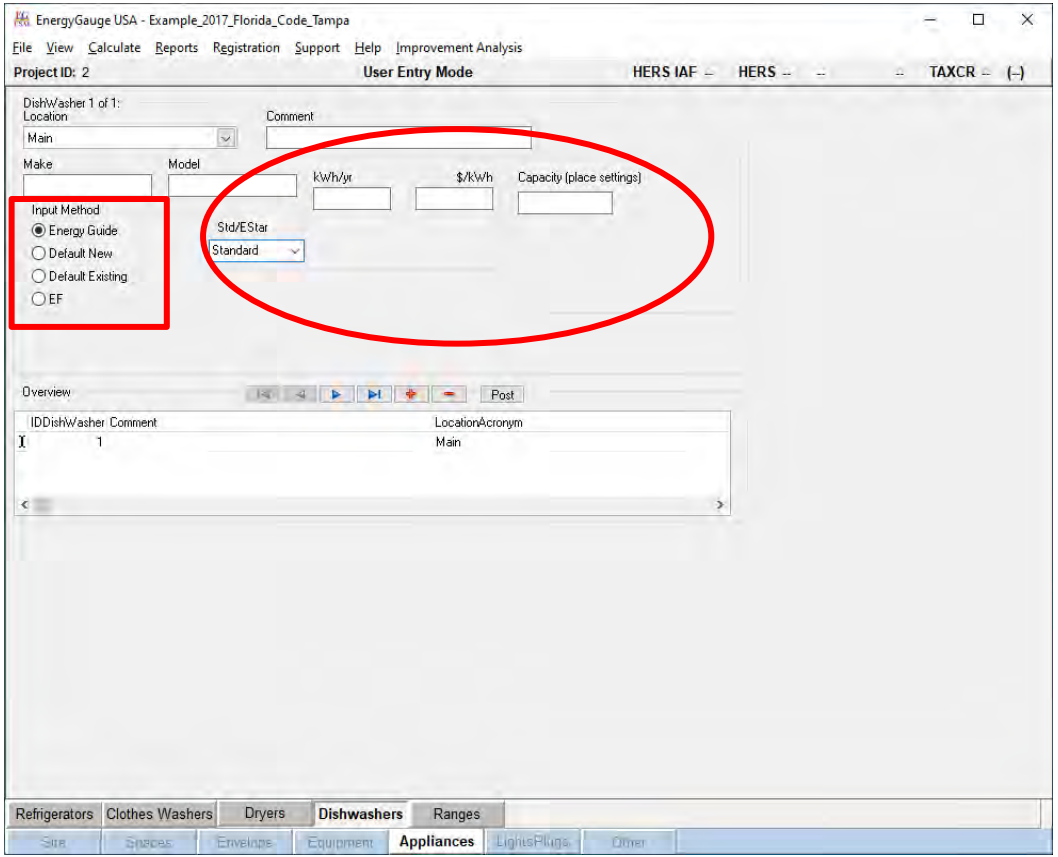
Dryer

- The same guidelines that apply to a refrigerator and clothes washer are also true for a dryer. Do not enter one if the builder will not be providing one



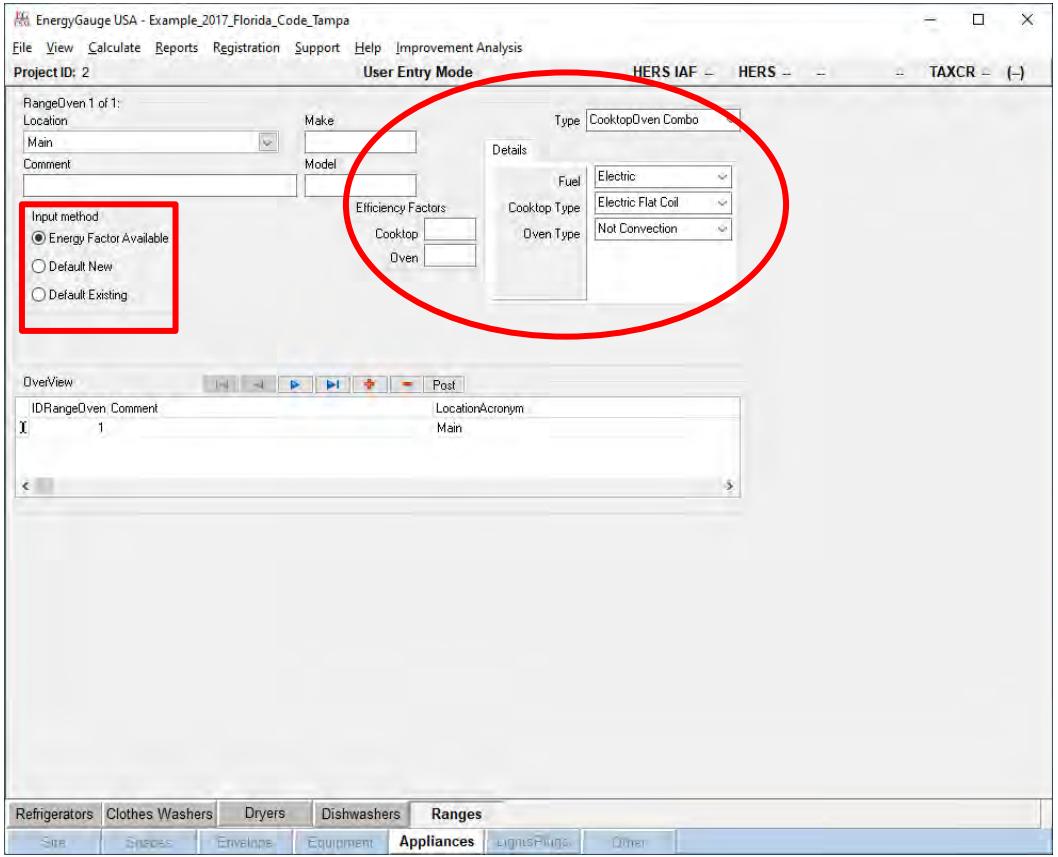
Dishwasher

- The same appliance guidelines apply to dishwashers as well



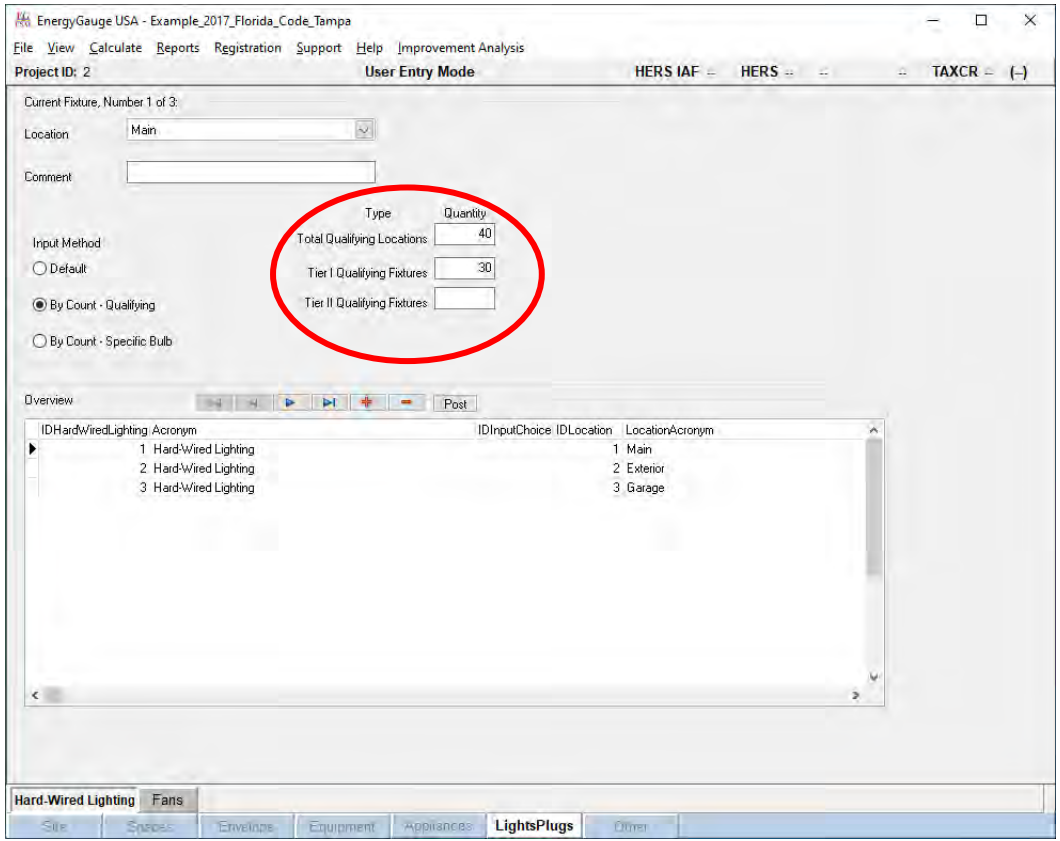
Range

- The same appliance guidelines apply to ranges as well



Hard-Wired Lighting

- Lighting is most easily entered by qualifying location
- Qualifying locations include all rooms and outdoor lights, but exclude plug-in lamps, closets, landscape lighting and unfinished basements
- Tier I fixtures include fluorescent lamps and CFLs.
- Tier II fixtures include LEDs (also indoor fixture controlled by motion sensor and outdoor fixture controlled by photocell)

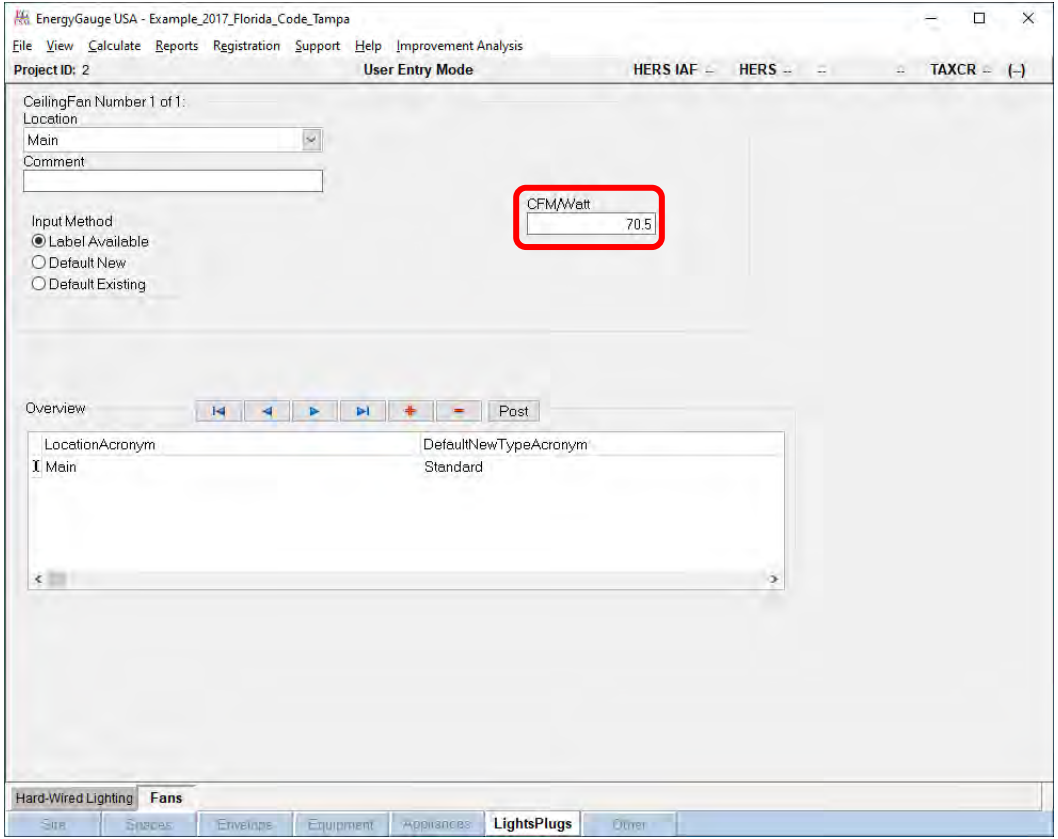


FSEC

UCF

Fans

- The cfm/watt for a ceiling fan can usually be found on the product's box



FSEC

UCF

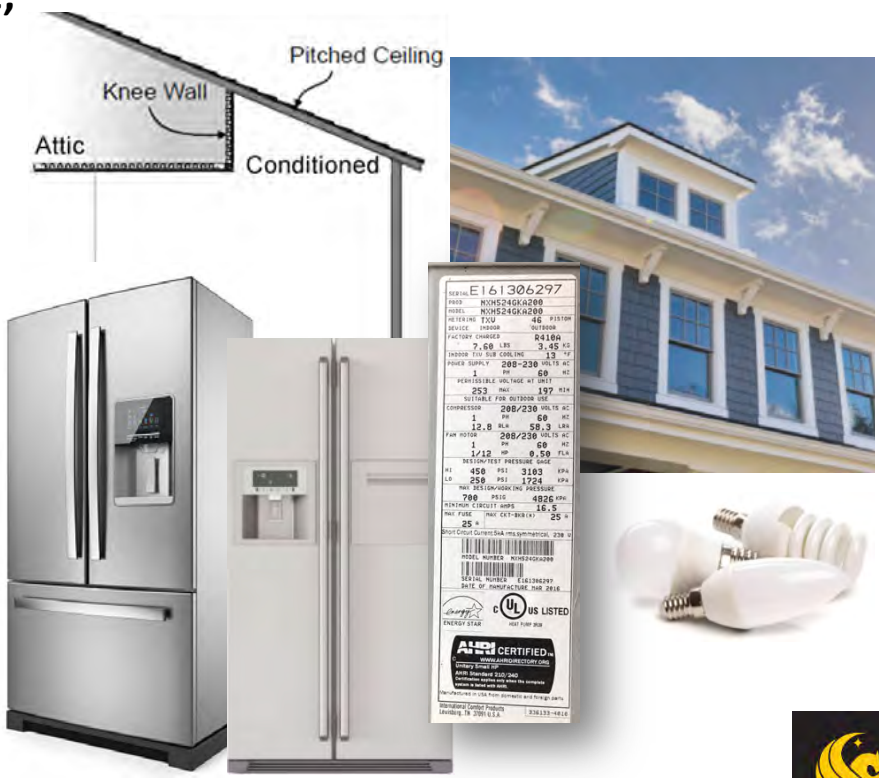
Revising for Confirmed Rating

Field verification must be reflected in the software, this includes:

- Building geometry
- Window areas and quantities as they strongly impact HERS and are often missed
- Knee walls separating conditioned space from attics (enter on the ceiling screen)
- Equipment make, model, efficiency and capacity
- Appliance and lighting inputs, including multiple refrigerators

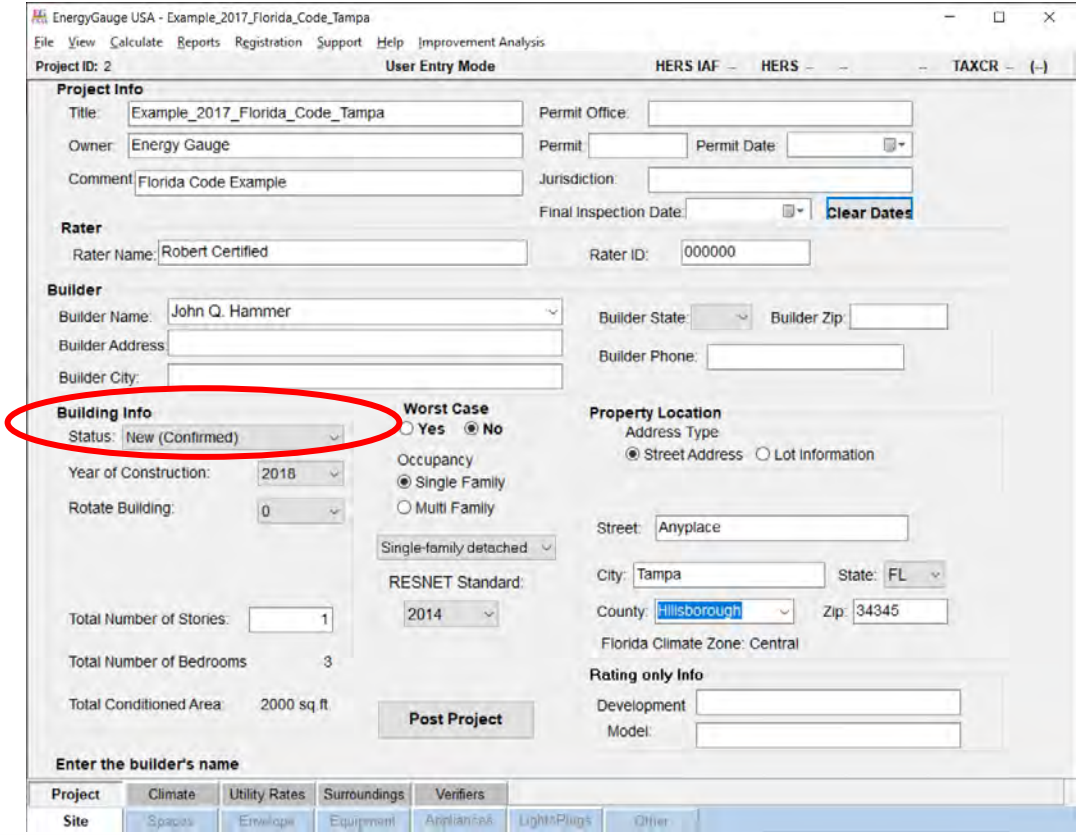
Test Results

- Air Leakage of Home
- Duct Air Leakage
- Mechanical Ventilation System Inputs



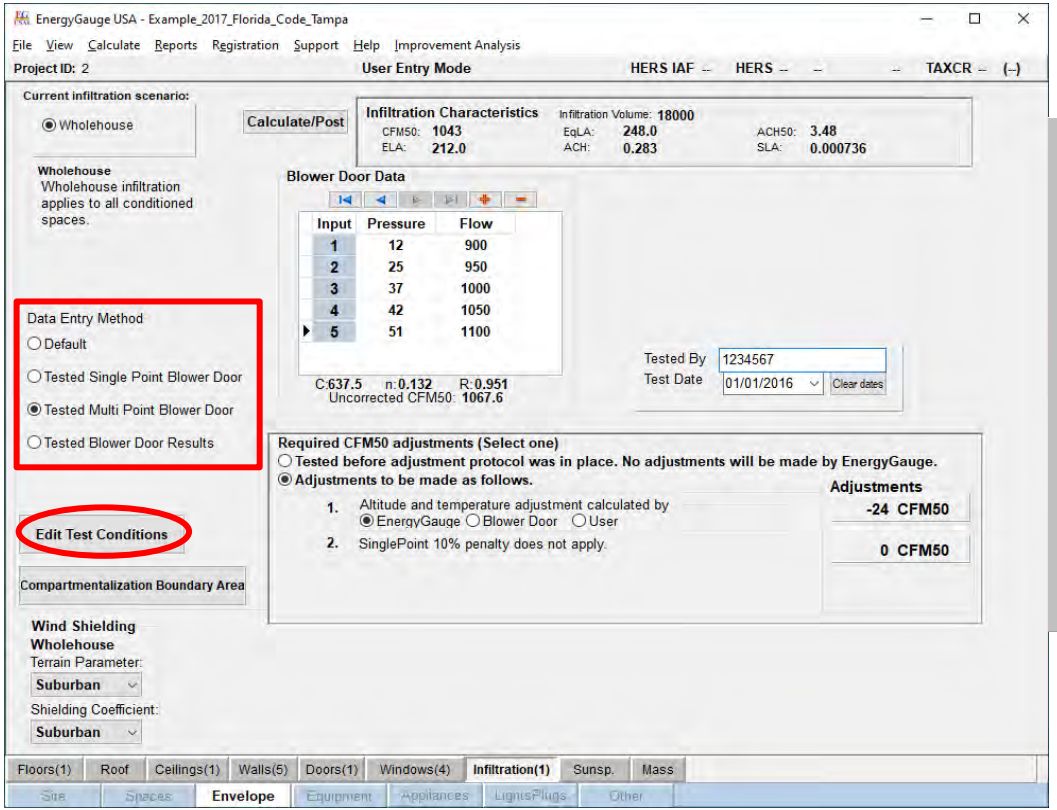
First, select “Confirmed” on Project Screen

- Selecting “Confirmed” will enable several pages in the software for the input of test results



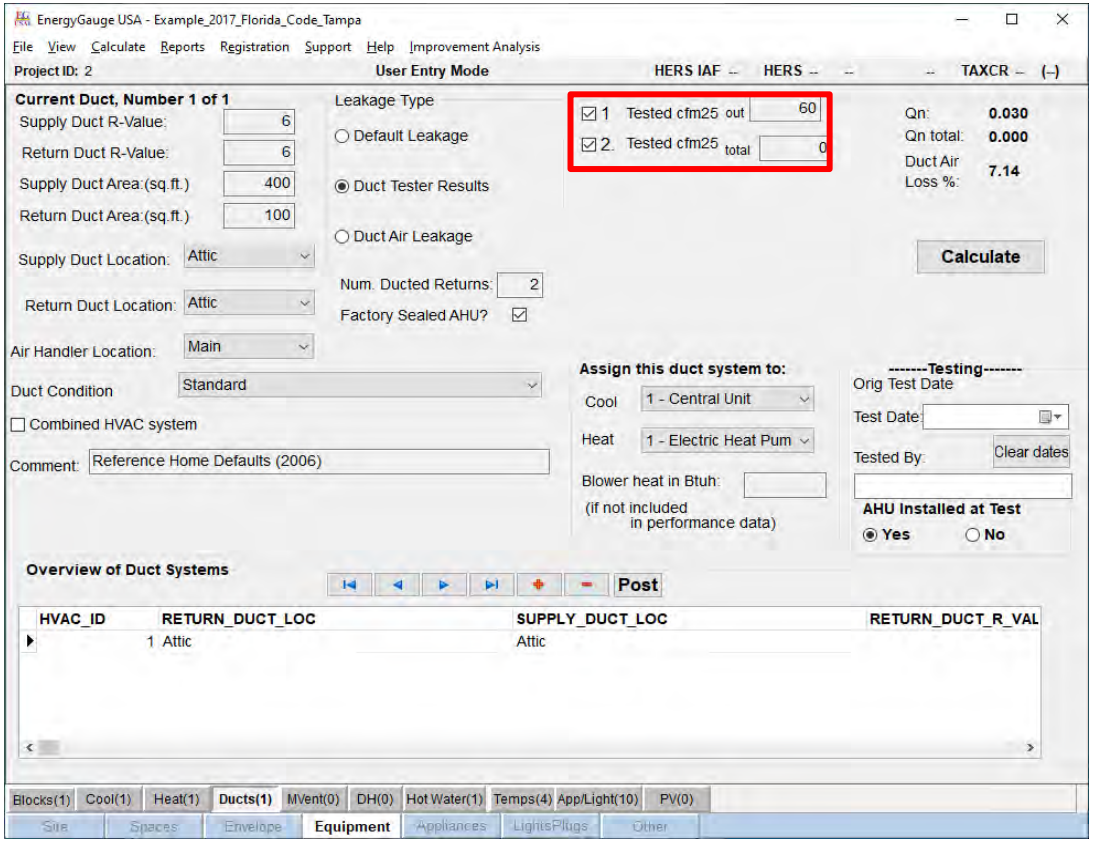
Air Leakage – Enter Test Results

- Select a data entry method on the Infiltration page based on your type of Blower Door test
- Select “Edit Test Conditions” to complete inputs



Air Distribution – Enter Test Results

- Duct leakage test results will be enabled on the Ducts page where test results can be entered



Confirm Ventilation System Type and Flows

- Ventilation system type must reflect what's actually installed and flows must be replaced with measurements made on-site