



# RHEIA TECHNOLOGY HELPS BUILDERS QUALIFY FOR 45L TAX INCENTIVES

## Homebuilders using Rheia as an air distribution solution can benefit from the upgraded 45L federal tax credits

The Inflation Reduction Act revised and extended the 45L tax credit found in Section 13340 of the tax code with the intent to reward builders striving to deliver more energy-efficient homes. Properties acquired on or after January 1, 2023, are eligible to receive tax credits through 2032 with ENERGY STAR-certified or Zero Energy Ready-certified single-family, manufactured, and multifamily homes.

### Key provisions of the revised law

A new expiration date of December 31, 2032. Performance is measured and validated by a certified energy rater.

**\$2500** tax credit for homes that meet the provisions of ENERGY STAR 3.1 Single Family New Homes Program (increased to ENERGY STAR 3.2 beginning January 1, 2025).

**\$5,000** tax credit for homes that meet the provisions of the DOE Certified Zero Energy Ready Program Version 1 (increased to Version 2 for 2024 and 2025).



# How to comply

To qualify for the \$2,500 credit, homes must meet an Energy Rating Index (ERI) target as defined in Energy Star 3.1 (changing to 3.2 in 2025). Home Energy Rating System (HERS) is the most used ERI method. Each home will have a unique HERS score target based on specifics of the home including location, size, and floor plan layout. Although there are some state specific Energy Star programs, the 45L tax credit only applies to the National Energy Star program. Builders may use any energy efficient measures to meet the HERS target.

When the 45L program transitions to requiring Energy Star 3.2 on January 1, 2025, the HERS target will drop significantly for each home and a mandatory requirement is added that the envelope construction must meet or exceed IECC 2021 UA.

Energy Star models their Reference Design Home with ducts in the conditioned space. Builders who do not put ducts in the conditioned space have to find the HERS points elsewhere by other more costly means.

<b>Water Heater</b>
<ul style="list-style-type: none"> <li>DHW equipment modeled at the following applicable efficiency levels, dependent on fuel type: Gas: 0.90 UEF; Electric: 2.20 UEF</li> </ul>
<b>Thermostat &amp; Ductwork</b>
<ul style="list-style-type: none"> <li>Programmable thermostat modeled</li> <li>All ducts and air handlers modeled within conditioned space, uninsulated, with no leakage to the outside</li> </ul>
<b>Lighting &amp; Appliances</b>
<ul style="list-style-type: none"> <li>ENERGY STAR refrigerators, dishwashers, and ceiling fans modeled</li> <li>ENERGY STAR light bulbs modeled with Tier 2 efficiency in 100% of Qualifying Light Fixture Locations, as defined by ANSI / RESNET / ICC 301</li> </ul>

To qualify for the \$5,000 credit, homes must meet the DOE Zero Energy Ready Home National Program Requirements Version 1 (changing to Version 2 in 2024). One mandatory requirement of the Zero Energy Ready program is to have all ducts located within the building envelope.



## U.S. DOE Zero Energy Ready Home Single Family Homes National Program Requirements Version 2

New Homes Baseline	
<b>3. Envelope</b>	<input type="checkbox"/> Ceiling, wall, floor, & slab insulation meet or exceed 2021 IECC UA <sup>12,13,14</sup> <input type="checkbox"/> Windows meet high performance requirements based on climate zone <sup>15</sup> <i>Advisory:</i> DOE is monitoring the implementation of ENERGY STAR product specifications for residential windows (V7.0), and plans to adopt these in a future program version update <sup>16</sup>
<b>4. Duct System</b>	<input type="checkbox"/> All heating and cooling distribution ducts and heating and cooling air-handling equipment are located within the thermal and air barrier boundary <sup>17</sup>
<b>5. Water Heating Efficiency</b>	<input type="checkbox"/> Hot water delivery systems meet efficient design requirements <sup>18</sup> or <input type="checkbox"/> Water heater and fixtures meet efficiency criteria <sup>19</sup>
	<input type="checkbox"/> All builder-supplied and -installed refrigerators, dishwashers, clothes washers, and clothes

# Rheia benefits evaluation

Rheia partnered with PEG to evaluate the impact of bringing ductwork into conditioned space with Rheia as it relates to meeting Energy Star ERI target. Since the target is different for every home, several case studies were performed. 21 homes total across the country were evaluated including single family homes, town homes, single story and two story.

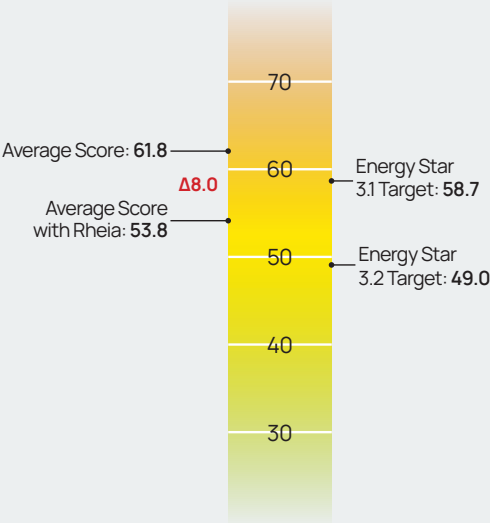


[www.pegenv.com](http://www.pegenv.com)

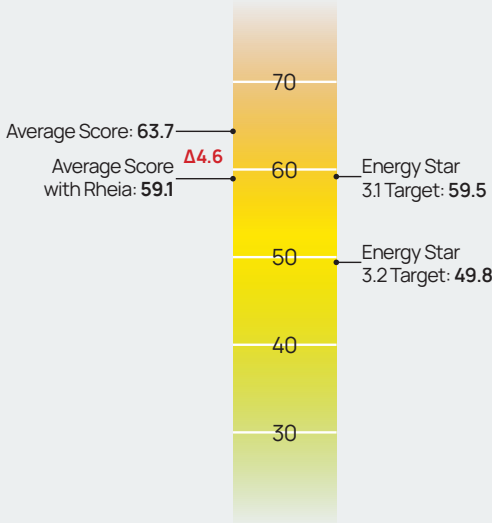
The results found on average, bringing ductwork into conditioned space with Rheia provided a 5.48 HERS score improvement. The charts below shows a breakdown of the results. In many cases, Rheia alone was enough to meet the Energy Star 3.1 or 3.2 targets. In others, additional energy efficient measures were needed beyond Rheia to meet the targets.

## Rheia HERS rating gains

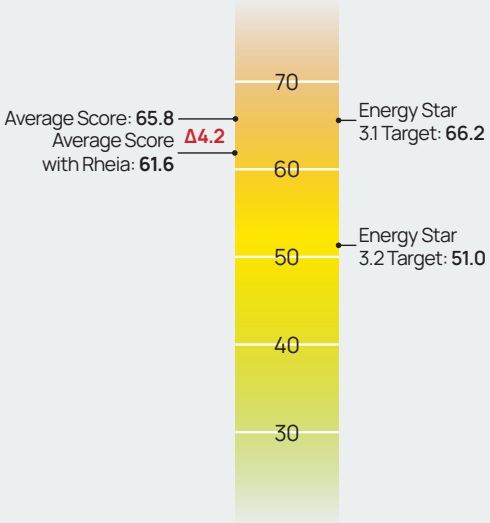
Single-Family One Story Home



Single-Family Two Story Home



Two Story Town Home



The charts above show the average HERS improvements Rheia provides by home type. Rheia has the biggest impact on single family slab-on-grade homes because conventionally 100% of the ductwork is in the vented attic, outside conditioned space. In the other home types, a portion of the ductwork is conventionally already in conditioned space, so the improvements are not as significant.

The charts below show the impact Rheia had on each individual case study. Of the 21 homes evaluated, 7 already qualified for Energy Star 3.1 without Rheia. 7 more homes (1/3 of the homes in the study) qualified for Energy Star 3.1 when Rheia was added to their base spec. None of the homes qualified for Energy Star 3.2 without Rheia. Adding Rheia, two of the homes qualified for Energy Star 3.2 without additional improvements.

#### 21 homes evaluated



Because ducts and air handlers are frequently located in attics and crawlspaces, their efficiency is compromised. About 30% of the energy used by HVAC systems is wasted and does not condition the home.

The Rheia air distribution system design locates the ducts and equipment within the home's conditioned space. With compact, uninsulated ducts and components that easily fit into wall and floor cavities, Rheia is the only cost-effective way to achieve the goal.

Achieving this goal using conventional ductwork is almost impossible. Traditional ductwork is insulated and bulky, requiring the construction of large bulkheads and chases to route the ducts throughout the home. This approach is expensive and time-consuming due to the additional framing, air sealing, and drywall work needed to construct the bulkheads and chases. In addition, it creates an aesthetically awkward interior that negatively impacts homeowner satisfaction.

While the application of Rheia alone will not necessarily grant compliance with Energy Star 3.1 or 3.2, it is a cost-effective way to move towards compliance versus other energy efficient building practices.



**For an Energy Star evaluation of your homes reach out to your Energy Rater. Get started at [rheiacomfort.com/45L](https://rheiacomfort.com/45L)**

# How to certify your homes

Builders are required to sign an ENERGY STAR Partnership Agreement and complete the on line Version 3 Builder Orientation, and identify their residential verification organization (energy rater).

HVAC installing contractors are required to be credentialed by an EPA-recognized HVAC Quality Installation Training and Oversight Organization. Contractors who hold EPA-recognized credentials, or Energy Raters accredited to perform ACCA Standard 310 HVAC Grading can complete parts of the ENERGY STAR certified homes HVAC requirements.

Raters and Field Inspectors are required to complete Version 3 training.

The certification process provides flexibility to select a custom combination of measures for each home that is equivalent in performance to the minimum requirements of the ENERGY STAR Reference Design Home, as assessed through energy modeling. An EPA-recognized HCO's Approved Software Rating Tool shall automatically determine the ENERGY STAR ERI Target, which is the highest ERI value that each rated home may achieve to earn the ENERGY STAR.

## In basic terms, the process is:

- 1** Configure the preferred set of efficiency measures for the home to be certified and verify that the modeled ERI meets or exceeds the ENERGY STAR ERI Target.
- 2** Meet mandatory requirements as referenced in Exhibit 2: Mandatory Requirements for All Certified Homes are also required and impose certain constraints on the efficiency measures selected (e.g., insulation levels, insulation installation quality, window performance).
- 3** Construct the home using the measures selected in Step 1 and the Mandatory Requirements for All Certified Homes.
- 4** Work with an expert energy rater such as PEG to verify that all requirements have been met in accordance with the Mandatory Requirements for All Certified Homes and with the inspection procedures for minimum rated features.

# References

Energy Star Version 3.1 Program Requirements:

[https://www.energystar.gov/sites/default/files/asset/document/National%20Program%20Requirements%20Version%203.1\\_Rev%2012.pdf](https://www.energystar.gov/sites/default/files/asset/document/National%20Program%20Requirements%20Version%203.1_Rev%2012.pdf)

Energy Star Version 3.2 Program Requirements:

[https://www.energystar.gov/sites/default/files/asset/document/National%20Program%20Requirements%20Version%203.2\\_Rev%2012.pdf](https://www.energystar.gov/sites/default/files/asset/document/National%20Program%20Requirements%20Version%203.2_Rev%2012.pdf)

DOE Zero Energy Ready Home Program Requirements Version 1:

<https://www.energy.gov/sites/default/files/2022-10/DOE%20ZERH%20V1%20Rev08%20-%2010-20-2022.pdf>

DOE Zero Energy Ready Home Program Requirements Version 2:

<https://www.energy.gov/sites/default/files/2022-12/DOE%20ZERH%20V2%20National%20Program%20Requirements%20-%20DEC%202022.pdf>

DOE Zero Energy Ready Home PV-Ready Checklist Version 2:

<https://www.energy.gov/sites/default/files/2022-12/DOE%20ZERH%20PV-Ready%20Checklist%20Version%202%20-%20DEC%202022%20%282%29.pdf>