

The Virginia Energy Code Field Study is one of a series of research studies the U.S. Department of Energy (DOE) Building Energy Codes Program<sup>1</sup> launched in 2014 to investigate typical energy efficiency practices in residential buildings and identify opportunities to reduce household utility bills. A primary goal of the study was to document baseline practices in new single-family construction, target areas for improvement, and quantify related savings potential.

In Virginia, 135 new construction single-family detached homes were visited in 2017-2018. Homes were located in 29 jurisdictions around the state. The study was administered by SEEA and implemented by Viridiant. Support from the Home Builders Association of Virginia, the Virginia Department of Housing and Community Development, and the Virginia Department of Mines, Minerals and Energy were critical to the success of the study. Data analysis is currently underway by the Pacific Northwest National Laboratory and findings below are preliminary.

### Energy Code Compliance

8 key areas were evaluated for compliance with the Virginia Energy Code: foundation insulation, wall insulation, ceiling insulation, window U-factor, window SHGC, envelope tightness (ACH50), duct leakage, and high efficacy lighting.

### Preliminary Findings

#### Duct leakage

Of the duct systems tested, 74% were over the 2012 code requirement of total duct leakage of 6 cfm or less per 100 square feet. If the exemption for systems with all air handlers and duct work being within conditioned space is applied, the failure rate drops to 63%. Under the 2015 IECC, which took effect September 4, 2018 and becomes mandatory a year later, 94% of the tested duct systems would have exceeded the 4 cfm/100 square feet requirement. The exemption would bring that down to 84%. Duct systems are currently evaluated for code compliance through visual inspection. The 2015 IECC will require that duct leakage testing is performed to demonstrate compliance.

#### Envelope Tightness

In both the 2012 and 2015 IECC versions of the Virginia Construction Code, envelope tightness is assessed through visual inspection. Both codes require 5 ACH50 or less. 78% of tested homes met the requirement when assessed with blower door testing.

#### Insulation

During the study, slab insulation was only observed in one geographic area, though slab construction is typical throughout Virginia. Where observable, all instances failed to meet the R-10 code requirement. Instead, slabs were insulated with R-4 polystyrene insulation.

Wall and ceiling insulation R-values were code compliant in terms of the rated R-value of the installed materials. However, 63% of wall insulation installations and 31% of ceiling insulation installations were not installed per manufacturer's specifications, which results in a decreased R-value.

### **High-Efficacy Lighting**

The 2012 code requires 50% of installed lamps (lights) be high-efficacy. 83% of homes were in compliance.

### **Windows**

The average U value for installed windows was .31. The average SHGC was .25. With the exception of one home with non-code compliant windows, the highest U value was .35 and the highest SHGC was .33, reflecting values significantly better than code requires.

### **Southeast Energy Efficiency Alliance (SEEA)**

*SEEA is a nonprofit founded in 2007 and is one of six regional energy efficiency organizations dedicated to leveraging energy efficiency for the benefit of all citizens. SEEA supports smarter energy policies, stronger local energy codes, resources to upgrade the existing building stock, and opportunities to provide equal access to affordable energy for all communities. SEEA works collaboratively with many different stakeholder groups to service utilities, businesses and communities in 11 southeastern states, including Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee and Virginia. More information is available at <http://seealliance.org/>.*

### **Viridiant**

*Viridiant, formerly EarthCraft Virginia, is a 501(c)(3) nonprofit, providing education, consultation, and certification to advance economic, environmental, and economic sustainability throughout the construction industry. Founded in 2006, the organization relies on successful partnerships with the Home Builders Association of Virginia, Virginia Housing Development Authority, Virginia Department of Housing and Community Development, Habitat for Humanity of Virginia, and Southface to educate thousands of professionals and homeowners on the EarthCraft family of programs and building science best practices. Viridiant has certified over 21,000 EarthCraft homes in the region. The organization also provides value to affordable housing networks as demonstrated in *The Impact of Energy Efficient Design and Construction of LIHTC in Virginia*,<sup>ii</sup> published by Virginia Center for Housing Research at Virginia Tech. See more at <http://www.viridiant.org/>.*

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<sup>i</sup> <https://www.energycodes.gov/compliance/energy-code-field-studies>

<sup>ii</sup> <https://www.vchr.vt.edu/wp-content/uploads/2015/02/Housing-VA-LIHTC-Study-Full-Report.pdf>