

Memorandum



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TO: Idaho Energy Code Collaborative

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SUBJECT: DOE Residential Energy Code Field Study – Idaho Memo

Utilizing Northwest Energy Efficiency Alliance (NEEA) dollars for field work, and U.S. Department of Energy (DOE) dollars for analysis and reporting, an Idaho residential energy code field study was undertaken during calendar year 2018. The purpose of the study was to assess potential statewide compliance issues with the Idaho Energy Conservation Code (effective from January 1, 2015), so that NEEA funded energy code training and technical assistance can be customized to help contractors and trades construct more energy efficient and cost-effective new homes for Idaho home buyers.

The protocol for the field work is a statistically valid sampling method developed by Pacific Northwest National Laboratory(PNNL) under DOE. This protocol has already been utilized and tested in multiple states over the past five years. The study looked at the key measure requirements of the code that have direct energy impact, such as how much insulation would be required in a wall cavity, and at the modeled energy use of homes in comparison to a prescriptive or baseline code home.

Idaho has two recognized climate zones based on a range of heating degree days. More moderate climates, such as the Treasure and Magic Valley’s and much of central Idaho are climate zone 5. The more mountainous regions and eastern Idaho are in the colder climate zone 6. This is important to note because the energy code can have a higher requirement for insulation in zone 6. Both zones were studied.

The 127 homes visited and tested (envelope and duct air leakage testing) were built under the Idaho Energy Conservation Code. The envelope, lighting and air leakage provisions of the Idaho Energy Conservation Code are based on the 2009 International Energy Conservation Code (IECC), while other requirements of the Idaho Energy Conservation Code, such as heating, ventilation and air-conditioning sizing and selection requirements, duct leakage thresholds, attic ventilation configuration and whole-house (occupant) ventilation, are based on 2012 IECC requirements.

So, how did new homes in Idaho fare?

In terms of overall energy consumption, the analysis shows that new homes in Idaho use less energy than would be expected relative to homes built to the minimum Idaho Energy Conservation Code requirements. The collected data indicates an average energy use intensity of 34.62 thousand Btu's are used per square foot whereas, the code would allow 40.51 thousand Btu's of energy per square foot. This is a whopping 15% difference! If looked at like a mpg standard for cars and the minimum standard was 20 mpg, the Idaho car would be averaging about 24 mpg. The study also showed that new residential buildings have a 97% energy code compliance rate, up from the 90% rate documented in a 2013 study funded by NEEA.

So, with this really good news, is there room for improvement? The answer is yes, there are some areas that could be improved.

First, the work force needs education on insulation installation. The quality of wall insulation installation (including basement walls) and floor insulation, across the state were at a Grade II level in over 60% of homes. A Grade I level of installation would provide greater home owner comfort and energy savings.

Second, duct leakage in climate zone 5 is higher than allowed by the Idaho Energy Conservation Code. This makes a big difference in homeowner comfort as ducts deliver the air that heats and cools occupants. If conditioned air is leaking into building cavities like roof and floor assemblies, it's not doing as thorough a job of making the home comfortable. And, it ends up costing the home owner more for heating and cooling.

Third, many homes did not meet the prescriptive Idaho Energy Conservation Code even as they delivered savings greater than minimum code. For example, not all insulation met 2009 levels, but overall, buildings performed better than code in the models because some code requirements such as the air tightness were surpassed. It should be noted that either a performance (energy modeling) or U-factor (REScheck) analysis are acceptable compliance approaches and both are deemed as alternatives to the prescriptive methodology.

Fourth, although Idaho homes are beating the current Idaho Energy Conservation Code by 15%, it is important to note that current code uses 2009 IECC values for insulation. Products, insulation standards, and codes have not remained static in the past nine years. The current 2018 IECC has cost-effective requirements that would increase comfort and efficiency over the current Idaho code.

All-in-all, Idaho residential contactors and trades are doing very well, more than is required by the current Idaho Energy Conservation Code. Improvements could be made in some areas, but Idaho homeowners can feel assured that they are receiving what they are paying for, plus some.

The full study can be found on the DOE website energycodes.gov
Look under Highlights and Energy Code Field Studies on the front page of the site.