the agency, including whether the information will have practical utility;

(2) The accuracy of the agency's estimate of the burden of the proposed collection of information;

(3) Ways to enhance the quality, utility, and clarity of the information to be collected; and

(4) Ways to minimize the burden of the collection of information on those who are to respond; including through the use of appropriate automated collection techniques or other forms of information technology, e.g., permitting electronic submission of responses.

HUD encourages interested parties to submit comment in response to these questions.

Authority: Section 3507 of the Paperwork Reduction Act of 1995, 44 U.S.C. Chapter 35.

Dated: April 9, 2014.

Colette Pollard,

Department Reports Management Officer, Office of the Chief Information Officer.

[FR Doc. 2014–08540 Filed 4–14–14; 8:45 am]

BILLING CODE 4210–67–P

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT

DEPARTMENT OF AGRICULTURE

[HUD FR–5647–N–01; RIN 2501–ZA01; USDA RIN 0575–ZA00]

Preliminary Affordability Determination—Energy Efficiency Standards

AGENCIES: U.S. Department of Housing and Urban Development and U.S. Department of Agriculture.

ACTION: Notice of preliminary determination.

SUMMARY: The Energy Independence and Security Act of 2007 (EISA) establishes procedures for the U.S. Department of Housing and Urban Development (HUD) and the U.S. Department of Agriculture (USDA) to adopt revisions to the 2006 International Energy Conservation Code (IECC) and to the 2004 energy codes of the American Society of Heating, Refrigerating, and Air-conditioning Engineers (ASHRAE), referred to as ASHRAE 90.1–2004, subject to: (1) A determination that the revised codes do not negatively affect the availability or affordability of new construction of single and multifamily housing covered by EISA, and (2) a determination by the Secretary of Energy that the revised codes ''would improve energy efficiency.'' [1] This Notice announces the preliminary determination of HUD and USDA, as required under section 481(d) of EISA, that the 2009 IECC and (with the exception of the State of Hawaii) ASHRAE 90.1–2007 will not negatively affect the affordability and availability of housing covered by EISA. As of September 2013, 32 States plus the District of Columbia have already adopted the 2009 IECC, its equivalent, or a higher standard for single family homes. Thirty-eight States plus the District of Columbia have already adopted ASHRAE 90.1–2007, its equivalent, or a higher standard for multifamily buildings. For those States that have not yet adopted either of these standards, this Notice relies on several studies that show that these codes are cost effective, in that the incremental cost of the additional efficiency measures pays for itself with energy cost savings on a life-cycle basis.

DATES: *Comment Due Date:* May 30, 2014.

ADDRESSES: Interested persons are invited to submit comments regarding this Notice. There are two methods for submitting public comments. All submissions must refer to the above-referenced docket number (FR–5647–N–01) and title of this Notice.

1. *Electronic Submission of Comments.* Interested persons may submit comments electronically through the Federal eRulemaking Portal at *www.regulations.gov*. HUD and USDA strongly encourage commenter to submit comments electronically. Electronic submission of comments allows the commenter maximum time to prepare and submit a comment, ensures timely receipt, and enables HUD and USDA to make them immediately available to the public. Comments submitted electronically through the Web site can be viewed by other commenter and interested members of the public. Commenters should follow the instructions provided on that site to submit comments electronically.

Submission of Comments by Mail. HUD: Comments may be submitted by mail to the Regulations Division, Office of General Counsel, Department of Housing and Urban Development, 451 7th Street SW., Room 10276, Washington, DC 20410–0500. USDA: Comments may be submitted by mail to Rural Housing Service, Department of Agriculture, 1400 Independence Avenue SW., Room 5014–S, Washington, DC 20250.

Note: To receive consideration as public comments, comments must be submitted through one of the two methods specified above. Again, all submissions must refer to the docket number and title of this Notice.

No Facsimile Comments. Facsimile comments are not acceptable.

Public Inspection of Public Comments. All properly submitted comments and communications submitted to HUD will be available for public inspection and copying between 8 a.m. and 5 p.m., weekdays, at the above address. Due to security measures at the HUD Headquarters building, an appointment to review the public comments must be scheduled in advance by calling the Regulations Division at 202–708–3055 (this is not a toll-free number). Individuals with speech or hearing impairments may access this number via TTY by calling the toll-free Federal Relay Service at 800–877–8339. Copies of all comments submitted are available for inspection and downloading at *www.regulations.gov*.

FOR FURTHER INFORMATION CONTACT: HUD: Michael Freedberg, Office of Sustainable Housing and Communities, Department of Housing and Urban Development, 451 7th Street SW., Room 10180, Washington, DC 20410; telephone number 202–402–4366 (this is not a toll-free number). Persons with hearing or speech impairments may access this number through TTY by calling the toll-free Federal Relay Service at 800–877–8339. USDA: Meghan Walsh, Rural Housing Service, Department of Agriculture, 1400 Independence Avenue SW., Room 6900–S, Washington, DC 20250; telephone number 202–205–9590 (this is not a toll-free number).

SUPPLEMENTARY INFORMATION:

I. Introduction

A. Statutory Requirements

Section 481 of EISA (or the Act) amends section 109 of the Cranston-Gonzalez National Affordable Housing Act of 1990 (Cranston-Gonzalez) (42 U.S.C. 12709), which establishes procedures for setting minimum energy standards for the following housing that is assisted by HUD and USDA:

(A) New construction of public and assisted housing and single family and multifamily residential housing (other than manufactured homes) subject to mortgages insured under the National Housing Act; [2]

(B) New construction of single family housing (other than manufactured homes) subject to mortgages insured, guaranteed, or made by the Secretary of

[1] Energy Independence and Security Act of 2007, Section 481(d).

[2] This subsection of EISA refers only to HUD programs. See Appendix 1 for specific HUD programs covered by the Act.

Agriculture under title V of the Housing Act of 1949; [3] and,

(C) Rehabilitation and new construction of public and assisted housing funded by HOPE VI revitalization grants under section 24 of the United States Housing Act of 1937 (42 U.S.C. 1437v).

EISA references two standards: the IECC and the ASHRAE Standard 90.1. The IECC standard referenced in EISA applies to *single family homes and multifamily low-rise buildings (up to 3 stories),* while the ASHRAE 90.1 standard applies to *multifamily high-rise residential buildings (4 or more stories).*[4]

See Appendix 1 for the specific HUD and USDA programs covered by this Notice. Several exclusions are worth noting. EISA's application to the ''rehabilitation and new construction of public and assisted housing funded by HOPE VI revitalization grants'' is no longer applicable, since funding for HOPE VI has been discontinued. HUD's Housing Choice Voucher program (also known as Section 8 tenant-based assistance) is excluded since the agency does not have the authority to establish, a priori, housing standards for properties rented by tenant households under that program. Indian housing programs, including the Section 184 guaranteed loan program, are excluded because they are authorized under section 184 of the Housing and Community Development Act of 1992 (42 U.S.C. 1715z–13a), not the National Housing Act (12 U.S.C. 1701 *et seq.*) as specified in EISA. Similarly, housing financed with Community Development Block Grant (CDBG) funds is not included, since CDBG is separately authorized by the Housing and Community Development Act of 1974 (42 U.S.C. 5301 *et seq.*). Finally, only single family USDA programs are covered by EISA, whereas for HUD programs both single family and multifamily programs are covered.

Section 109(d) of Cranston-Gonzalez, as amended by EISA, establishes procedures for updating HUD and USDA energy standards following periodic revisions to the 2006 IECC and ASHRAE 90.1–2004 codes. Specifically, section 109(d) provides that revisions to the IECC or ASHRAE codes will apply to HUD and/or USDA's programs if: (1) Either agency ''make(s) a determination that the revised codes do not negatively affect the availability or affordability'' of new construction housing covered by the Act, and (2) the Secretary of Energy has made a determination under section 304 of the Energy Conservation and Production Act (42 U.S.C. 6833) that the revised codes would improve energy efficiency (see 42 U.S.C. 12709(d)). Otherwise, the 2006 IECC and ASHRAE 90.1–2004 will continue to apply.

B. Adoption of These Standards

Section 109(d) of Cranston-Gonzalez automatically applies to all covered programs upon completion of the specified affordability determinations by HUD and USDA, and the energy efficiency determinations by the U.S. Department of Energy (DOE). Accordingly, once a final affordability determination has been made by HUD and USDA under section 109(d), additional notice and comment rulemaking will not be required for the covered programs; the new codes, if found not to negatively affect the availability or affordability of covered housing, will automatically apply, subject to administrative actions such as mortgagee letters, notices, or amendments to handbooks. However, conforming rulemaking will be required for two HUD programs to update obsolete regulatory standards: The Federal Housing Administration's (FHA) single family minimum property standards, for which the HUD regulations are codified at 24 CFR 200.926d, and the energy standard of the HOME Investment Partnerships (HOME) program, for which the HUD regulations are codified at 24 CFR 92.251. In addition, USDA will update minimum energy requirements in the USDA regulations codified at 7 CFR 1924.

The adoption of the 2009 IECC or ASHRAE 90.1–2007 new construction standards described in this Notice will take effect as follows:

(1) For FHA-insured multifamily programs, to those properties for which mortgage insurance applications are received by HUD 90 days after the effective date of a Final Determination;

(2) For public housing competitive grant programs, to those properties for which grant applications are received by HUD 90 days after the effective date of a Final Determination;

(3) For public housing formula grant programs, to properties for which building permits are issued 180 days after the effective date of a Final Determination.

(4) For FHA-insured and USDA-guaranteed single family loan programs, to properties for which building permits are issued 180 days after the effective date of a Final Determination.

C. Current HUD–USDA Standards or Requirements

Pursuant to the energy alignment framework adopted by the interagency Rental Policy Working Group in December 2011, when funds are awarded by competition some of the programs covered by EISA (as well as other programs not covered by EISA) already require or incentivize grantees to comply with energy efficiency standards that exceed the prevailing IECC and ASHRAE 90.1 standards.[5] This standard is typically Energy Star Certified New Homes for single family properties or Energy Star for Multifamily High Rise for multifamily properties. Nothing in this Notice will preclude these competitive programs from maintaining these higher standards, or raising them further. A list of current program requirements or incentives is shown in Table 1, below.

[3] This subsection of EISA refers to USDA programs. See Appendix 1 for specific USDA programs covered by the Act.

[4] The IECC addresses both residential and commercial buildings. ASHRAE 90.1 covers commercial buildings only, including multifamily buildings four or more stories above grade. The IECC adopts, by reference, ASHRAE 90.1; that is, compliance with ASHRAE 90.1 qualifies as compliance with the IECC for commercial buildings.

[5] Rental Policy Working Group, Federal Rental Alignment: Administration Proposals, December 31, 2011, Available at *www.huduser.org/portal/aff_rental_hsg/rpwg_conceptual_proposals_fall_2011.pdf.*

TABLE 1—CURRENT ENERGY STANDARDS AND INCENTIVES FOR HUD AND USDA PROGRAMS

[New construction only]

Program	Type	Current energy efficiency requirements and incentives
HUD		
Choice Neighborhoods—Implementation.	Competitive Grant	Single family and low-rise multifamily: Energy Star Certified New Homes. Multifamily high-rise (4 or more stories): Energy Star for Multifamily High Rise. Additional 2 rating points for achieving Certified LEED–ND or similar standard; or 1 point if project complies with goal of achieving LEED–ND or similar standard.
Choice Neighborhoods—Planning.	Competitive Grant	Eligible for Stage 1 Conditional Approval of all or a portion of the neighborhood targeted in their Transformation Plan for LEED for Neighborhood Development from the U.S. Green Building Council.
HOPE VI	Competitive Grant	3 points if new units are certified to one of several recognized green building programs, including Enterprise Green Communities, National Green Building Standard, LEED for Homes, LEED New Construction, or local or regional standards such as Earthcraft; 2 points if new construction is certified to Energy Star for New Homes standard; 1 point if only Energy Star-certified products and appliances are used in new units.
Section 202 Supportive Housing for the Elderly.	Competitive Grant	Single family and low-rise multifamily: Energy Star Certified New Homes. Multifamily high rise (4 or more stories): Energy Star for Multifamily High Rise. Applicants earn additional points if they meet one of several recognized green building standards. *http://archives.hud.gov/funding/2010/202elderly.pdf*. (Note: capital advances for new construction last awarded in FY 2010.)
Section 811 for Persons with Disabilities Project Rental Assistance.	Competitive Grant	Energy Star Certified New Homes for single family homes, or Energy Star for Multifamily High Rise for multifamily buildings. *http://archives.hud.gov/funding/2012/sec811pranofa.pdf*. (Note that HUD is no longer awarding Section 811 grants for new units.)
Rental Assistance Demonstration (RAD).	Conversion of Existing Units.	Minimum 2006 IECC or ASHRAE 90.1–2004 for new construction or any successor code adopted by HUD; applicants encouraged to build to Energy Star Certified New Homes or Energy Star for Multifamily High Rise. Minimum WaterSense and Energy Star appliances required and the most cost-effective measures identified in the Physical Condition Assessment (PCA). (Note that most RAD units will be conversions of existing units, not new construction.)
FHA Multifamily Mortgage Insurance.	Mortgage Insurance	2006 IECC or ASHRAE 90.1–2004 (Multifamily Accelerated Processing Guide at *http://portal.hud.gov/hudportal/documents/huddoc?id=4430GHSGG.pdf*.)
FHA Single Family Mortgage Insurance.	Mortgage Insurance	2006 IECC (See Builder Certification Form at *http://portal.hud.gov/hudportal/documents/huddoc?id=92541.pdf*.)
HOME Investment Partnerships Program.	Formula Grant	''(C)urrent edition of the Model Energy Code published by the Council of American Building Officials'' (24 CFR part 92, September 16, 1996). Final Rule at *www.onecpd.info/home/home-final-rule/* reserves the energy standard for a separate rulemaking at 24 CFR 92.251. (July 24, 2013.)
Public Housing Capital Fund	Formula Grant	2009 IECC and ASHRAE 90.1–2010, or successor standards, Capital Final Rule October 24, 2013, at *http://www.gpo.gov/fdsys/pkg/FR-2013-10-24/pdf/2013-23230.pdf*. Energy Star appliances are also required unless not cost effective.
USDA		
Section 502 Guaranteed Housing Loans.	Loan Guarantee	2006 IECC at minimum.* Rural Energy Plus program requires compliance with most recent version of IECC, which is currently IECC 2012.
Section 502 Rural Housing Direct Loans.	Loan Guarantee	2006 IECC at minimum.* A pilot is being created that gives incentive points for participation in Energy Star Certified New Homes, Green Communities, Challenge Home, NAHB National Green Building Standard, and LEED for Homes.
Section 502 Direct Loans for Section 523 Mutual Self Help Loan program homeowner participants.	Loan Guarantee	2006 IECC at minimum.* A pilot is being created that gives incentive points for participation in Energy Star Certified New Homes, Green Communities, Challenge Home, NAHB National Green Building Standard, and LEED for Homes.

* USDA programs updated annually per Administrative Notice.

D. Additional Background

Section 109(a) of Cranston Gonzalez, as amended by EISA, allowed for HUD and USDA to collaborate and develop their own energy efficiency building standards if they met or exceeded the 2006 IECC or ASHRAE 90.1–2004, but if the two agencies did not act on this option, EISA specifies that the 2006 IECC and ASHRAE 90.1–2004 standards would apply.

The two agencies did not develop independent energy efficiency building standards, and therefore, the 2006 IECC or ASHRAE 90.1–2004 currently apply to covered HUD and USDA programs. HUD and USDA have not undertaken prior rulemaking to implement EISA because the statutory requirement to comply with the 2006 IECC and ASHRAE 90.1–2004 codes for covered HUD and USDA programs applied without rulemaking.[6]

[6] HUD will undertake conforming rulemaking to conform its existing regulations to the requirements of EISA for single family Minimum Property Standards at 24 CFR 200.926d(e) and for the HOME Investment Partnership Act at 24 CFR 92.251. HUD has also modified Builder Certification Form HUD–92451 to reflect the minimum 2006 IECC for FHA-insured single family housing. Similar conforming rulemaking will be required to update USDA's standard at 7 CFR 1924.

DOE reports that as of September 2013, 32 States plus the District of Columbia have already adopted codes that require equal or better energy efficiency than the 2009 IECC for residential buildings. Thirty-eight States plus the District of Columbia have also adopted ASHRAE 90.1–2007 or codes that require equal or better energy efficiency for commercial buildings. (See *www.energycodes.gov/adoption/states*). The International Code Council (ICC) also provides information, in the form of a chart, on States' adoption of building/energy efficient codes. The chart confirms that a significant number of States plus the District of Columbia have already adopted the more recent 2009 IECC, or its equivalent. (See *www.iccsafe.org/gr/Documents/stateadoptions.pdf*).

As required by the Energy Conservation and Production Act, as amended (ECPA) (42 U.S.C. 6801 *et seq.*), DOE has published Final Determinations that the 2009 IECC and ASHRAE 90.1–2007 standards would improve energy efficiency.[7] This Notice therefore announces the results of HUD and USDA's analysis of housing impacted by the 2009 IECC and ASHRAE 90.1–2007.

Note that this Notice does not address the more recent IECC and ASHRAE codes for which DOE has published efficiency determinations: i.e., the 2012 IECC and ASHRAE 90.1–2010. DOE has published Final Determinations of energy efficiency for both of these codes and, more recently (October 2012), completed a cost analysis of the 2012 IECC for 43 of the 50 States and the District of Columbia.[8] The impact of these more recent codes on the affordability and availability of HUD- and USDA-funded new construction is currently being assessed by the two agencies. Since HUD and USDA's affordability determination relies on DOE's affordability analysis, HUD and USDA will address the affordability of the 2012 IECC code and ASHRAE 90.1–2010 in a subsequent notice in the near future. It is HUD's and USDA's intention that adoption of future IECC and ASHRAE 90.1 standards can be implemented with a Preliminary Notice such as this one, followed by a Final Notice for all the covered programs. However, every program will need to update its handbooks, mortgagee letters, relevant forms, or other administrative documents each time HUD determines that the new standard will not negatively impact the affordability or availability of housing under the covered programs.

E. Market Failures in the Residential Energy Sector

Before focusing on the specific costs and benefits associated with adoption of the IECC and ASHRAE codes addressed in this Notice, the extent to which market failures or barriers exist in the residential sector that may prompt the need for these higher codes is discussed below. There is a wide body of literature on a range of market failures that have resulted in an ''energy efficiency gap'' between the actual level of investment in energy efficiency and the higher level of investment that would be cost-beneficial from the consumer's (i.e., the individual's or firm's) point of view.[9] Brown (2001) cites a range of market failures and barriers including, for example, the fact that energy is typically a small part of owning and operating a building and, as a result, the public places a low priority on energy issues and energy efficiency opportunities. More broadly, market *failures* include misplaced incentives or unpriced public goods. Market *barriers* include capital market barriers and incomplete markets for energy efficiency; i.e., the fact that energy efficiency is generally purchased as an attribute of another product (in this case shelter or a building).

Within this broader world of market disincentives, barriers to energy efficient investment in housing impose two primary costs: Increased energy expenditures for households and an increase in the negative externalities associated with energy consumption. In addition to complying with the EISA statute, HUD and USDA have two primary motivations in the promulgation of this Notice: (1) To reduce the total cost of operating and thereby increasing the affordability of housing by promoting the adoption of cost-effective energy technologies, and (2) to reduce the social costs (negative externalities) imposed by residential energy consumption.

The first justification (lowering housing costs) requires that there exist significant market failures or other barriers that deter builders from supplying the energy efficiency demanded by consumers of housing. Alternatively, there may be market barriers that limit consumer demand for energy efficiency, which builders might readily supply if such demand existed. While the gains from cost-effective investments in energy efficiency are potentially very large, the argument that the market will not provide energy efficient housing demanded by households is somewhat complex.

The second justification (reducing social costs) requires that the consumption of energy imposes external costs that are not internalized by the market. There is near universal agreement among scientists and economists that energy consumption leads to indirect costs. The challenge is to measure those costs.

Under Investment in Energy-Saving Technologies

The production of energy efficient housing may be substantial, but if there are market failures or barriers that are not reflected in the return on the investment, then the market penetration of energy efficient investments in housing will be less than optimal.

When analyzing energy efficiency standards, the generation of savings is typically the greatest of the different categories of benefits. Using potential private benefits to justify costly energy efficiency standards is often criticized (Allcott and Greenstone, 2012). A skeptic of this approach of measuring the benefits discussed in this Notice would indicate that if, indeed, there were net private benefits to energy efficient housing, then consumers would place a premium on that characteristic and builders would respond to market incentives and provide energy-efficient homes. The noninterventionist might argue that the analyst who finds net benefits of implementing a standard did not measure the benefits and costs correctly (for a detailed example see Allcott and Greenstone, 2012). The existence of unobserved costs (either upfront or periodic) is a potential explanation for low levels of investment in energy-saving technology. Finally, a proponent

[7] Since the publication of the 2006 IECC, the ICC has revised the IECC twice, in both 2009 and 2012. The ICC published the 2009 IECC on January 28, 2009. (Available at *http://shop.iccsafe.org/2009-international-energy-conservation-code.html*). On July 19, 2011, DOE determined that the 2009 IECC would achieve greater energy efficiency in low-rise residential buildings than the 2006 IECC (**Federal Register** Notice 76 FR 42688). On May 17, 2012, DOE published a Final Determination that the 2012 IECC would achieve greater energy efficiency than the 2009 IECC. (Available at *http://www.gpo.gov/fdsys/pkg/FR-2012-05-17/pdf/2012-12000.pdf*.) For multifamily properties, ASHRAE published ASHRAE 90.1–2007 on January 22, 2008. On July 20, 2011 (**Federal Register** Notice July 20,2011, 76 FR 43287), DOE determined that ASHRAE 90.1–2007 would achieve greater energy efficiency in commercial buildings (including high-rise residential buildings) than ASHRAE 90.1–2004. On October 19, 2011, DOE published a similar determination for ASHRAE 90.1–2010 (published October 27, 2010), FR 76 64904. (Available at *http://www.gpo.gov/fdsys/pkg/FR-2011-10-19/pdf/2011-27057.pdf*). ASHRAE 90.1–2013 was published on October 9, 2013; DOE has not yet determined the efficiency or published a cost-benefit analysis of this code.

[8] See *http://www.energycodes.gov/development/residential/iecc_analysis*.

[9] The existence of this gap has been documented in many cases (Brown, 2001).

of the market approach could argue that the very existence of energy efficient homes is ample proof that the market functions well. If developers build energy efficient housing, then the theoretical challenge is to explain why there is an undersupply.

Despite the economic argument for nonintervention, there are many compelling economic arguments for the existence of an energy efficiency gap. Thaler and Sunstein (2008) attribute the energy efficiency gap to incentive problems that are exaggerated because upfront costs are borne by the builder, whereas the benefits are enjoyed over the long term by tenants. Four justifications deserve special consideration: (1) Imperfect information concerning energy efficiency, (2) inattention to energy efficiency, (3) disincentives to energy efficient investments in the housing market, and (4) lack of financing for energy efficient retrofits (Allcott and Greenstone, 2012).

(1) Lack of adequate information. Assuming information concerning energy efficiency affects investment, one can imagine two scenarios in which imperfect information would lead to an underinvestment in energy efficiency. First, consumers may be unaware of the potential gains from energy efficiency or even of the existence of a particular energy-saving investment. Second, imperfect information may inhibit energy efficient investments. A consumer may be perfectly capable of evaluating energy efficiency and making rational economic decisions but researching the options is costly. Establishing standards reduces search costs: Consumers will know that newer housing possesses a minimal level of efficiency. Similarly, because it may be costly for consumers to identify energy efficient housing, the real estate industry may hesitate to invest in energy efficiency.

(2) Consumer inattention to energy efficiency. Consumers may be inattentive to long-run operating costs (energy bills) when purchasing durable energy-using goods (p. 21, Allcott and Greenstone, 2012). Procrastination and self-control also may affect the rationality of long-run decisions (Ariely, 2009). These behavioral phenomena may deter energy efficiency choices. Establishing minimal standards that do not impose excessive costs but generate economic gains will benefit consumers who, when making housing choices, concentrate on other characteristics of the property.

(3) Market disincentives. For owner-occupied homes, the prospect of ownership transfer may create a barrier to energy efficient investment (McKinsey, 2009). If owners, builders, or buyers do not believe that they will be able to recapture the value of the investment upon selling their home, then they will be deterred from investing in energy efficiency. As indicated by McKinsey (2009), the length of the payback period and lifetime of the stream of benefits is longer than a large proportion of households' tenure. This concern may lead to the exclusive pursuit of investments for which there is an immediate payback.

For rental housing, split incentives exist that lead to sub-optimal housing (Gillingham *et al,* 2011). There is an agency problem when the landlord pays the energy bill and cannot observe tenant behavior or when the tenant pays the energy bill and cannot observe the landlord's investment behavior.[10]

(4) Lack of financing. Energy efficient investment may require a significant investment that cannot be equity financed. Capital constraints are a formidable barrier to energy efficiency for low-income households (McKinsey, 2009). While there is a wide variety of financing alternatives for home purchases, there are not many financing alternatives specifically for undertaking energy retrofits of for-sale housing (McFarlane, 2011). Building energy efficiency into housing at the time of construction allows homeowners and landlords to finance the energy-saving improvement with a lower mortgage interest rate, as opposed to a less affordable home improvement loan specifically for energy retrofits.[11]

Non-Energy Benefits

Even if there were no investment inefficiencies and individual consumers who were able to satisfy their need for energy efficiency, non-energy consumption externalities could justify energy conservation policy. The primary non-energy co-benefits of reducing energy consumption are the reduction of emissions and health benefits. The emission of pollutants (such as particulate matter) cause health and property damage. Greenhouse gases (such as carbon dioxide) cause global warming, which imposes a cost on health, agriculture, and other sectors. Greater energy efficiency allows households to afford energy for heating during severe cold or cooling during intense heat, which could have positive health effects for vulnerable populations. For example, studies have found a strong link between health outcomes and indoor environmental quality, of which temperature, lighting, and ventilation are important determinants (Fisk, 2002). Clinch and Healy (2001) discuss how to value the effect on mortality and morbidity in a benefit-cost analysis of energy efficiency. In addition to the direct health benefits of residents of energy efficient housing, there will be indirect public health benefits. First, the local population will gain from reducing emissions of particulate matter that have harmful health effects. Second, Schweitzer (2002) indicates there may be a positive safety effect from reducing the probability of fires by eliminating the need for supplemental heating sources.

II. 2009 IECC Affordability Determination

The IECC is a model energy code developed by the ICC through a public hearing process involving national experts for single family residential and commercial buildings.[12] The code contains minimum energy efficiency provisions for residential buildings, defined as single family homes and low-rise residential buildings up to three stories, offering both prescriptive- and performance-based approaches. Key elements of the code are building envelope requirements for thermal performance and air leakage control.

The IECC is typically published every 3 years, though there are some exceptions. In the last 2 decades, full editions of its predecessor, the Model Energy Code, came out in 1989, 1992, 1993, and 1995, and full editions of the IECC came out in 1998, 2000, 2003, 2006, 2009, and 2012. Though there were changes in each edition of the IECC from the previous one, the IECC can be categorized into two general eras:

[10] Such agency problems are not unique to energy. A landlord does not know in advance of extending a lease to what extent a tenant will inflict damage, make an effort to take care of the property, or report urgent problems (Henderson and Ioannides, 1983). The response is to raise rent and lower quality.

[11] With the exception of a few small programs serving specific markets and a Federal Housing Administration (FHA) pilot program (*PowerSaver*), affordable financing for home energy improvements that reflects sound lending principles is limited. Unsecured consumer loans or credit card products for home improvements typically charge high interest rates. Home equity lines of credit require owners to be willing to borrow against the value of their homes during a period when home values are flat or declining in many markets. Utility ''on bill'' financing (in which a home energy retrofit loan is amortized through an incremental change on a utility bill) serves only a handful of markets on a small scale. Property Assessed Clean Energy (PACE) financing programs have encountered resistance because of their general requirement to have priority over existing liens on a property.

[12] The IECC also covers commercial buildings. States may choose to adopt the IECC for residential buildings only, or may extend the code to commercial buildings (which include multifamily residential buildings of four or more stories).

2003 and before, and 2004 and after. The residential portion of the IECC was heavily revised in 2004. The climate zones were completely revised (reduced from 17 zones to 8 primary zones) and the building envelope requirements were restructured into a different format.[13] The post-2004 code became much more concise and simpler to use, but these changes complicate comparisons of State codes based on pre-2004 versions of the IECC to the 2009 IECC.

The 2009 IECC substantially revised the 2006 code as follows: [14]

- The duct system has to be tested and the air leakage out of ducts must be kept to an acceptable maximum level. Testing is not required if all ducts are inside the building envelope (for example in heated basements), though the ducts still have to be sealed.
- 50 percent of the lighting (bulbs, tubes, etc.) in a building has to be energy efficient. Compact fluorescents qualify; standard incandescent bulbs do not.
- Trade-off credit can no longer be obtained for high-efficiency heating, ventilation, and air conditioning (HVAC) equipment. For example, if a high-efficiency furnace is used, no reduction in wall insulation is allowed.
- Vertical fenestration U-factor requirements are reduced from 0.75 to 0.65 in Climate Zone 2, 0.65 to 0.5 in Climate Zone 3, and 0.4 to 0.35 in Climate Zone 4.
- The maximum allowable solar heat gain coefficient for glazed fenestration (windows) is reduced from 0.40 to 0.30 in Climate Zones 1, 2, and 3.
- R–20 walls in climate zones 5 and 6 (increased from R–19).
- Modest basement wall and floor insulation improvements.
- R–3 pipe insulation on hydronic distribution systems (increased from R–2).
- Limitation on opaque door exemption both size and style (side hinged).
- Improved air-sealing language.
- Controls for driveway/sidewalk snow melting systems.
- Pool covers are required for heated pools.

Current Adoption of the 2009 IECC

As of September 2013, 32 States and the District of Columbia have voluntarily adopted the 2009 IECC, its equivalent, or a more recent energy code (Table 2).[15] The remaining 18 States have not yet adopted the 2009 IECC.[16] (In certain cases, cities or counties within a State have a different code from the rest of the State. For example, the cities of Austin and Houston, Texas, have adopted energy codes that exceed the minimum Texas statewide code).[17] [18] HUD and USDA are primarily interested in the States that have not yet adopted the 2009 IECC, since it is in these States that any affordability impacts will be felt relative to the cost of housing built to current State codes. As noted, in instances where a local entity has a more stringent standard, the affordability impacts within a State will differ.

An increasing number of States have in recent years adopted, or plan to adopt, the 2009 IECC, in part due to section 410 of the American Recovery and Reinvestment Act of 2009 (ARRA) (Pub. L. 111–5, approved February 17, 2009), which established as a condition of receiving State energy grants the adoption of an energy code that meets or exceeds the 2009 IECC (and ASHRAE 90.1–2007), and achievement of 90 percent compliance by 2017. All 50 State governors subsequently submitted letters notifying DOE that the provisions of section 410 would be met.[19]

TABLE 2—CURRENT STATUS OF IECC ADOPTION BY THE STATES [20]

[As of September 2013]

2009 IECC or equivalent or higher (32 States and DC)	Prior Codes (18 States)
Alabama	2006 IECC or Equivalent (8 States)
California (2012 IECC)	Hawaii
Connecticut	Kentucky
Delaware	Louisiana
District of Columbia	Minnesota
Florida	Oklahoma
Georgia	Tennessee
Idaho	Utah
Illinois (2012 IECC)	Wisconsin
Indiana	2003 IECC or Equivalent (2 States)
Iowa	Arkansas
Maryland (2012 IECC)	Colorado
Massachusetts (2012 IECC)	No Statewide Code (8 States)
Michigan	Alaska
Montana	Arizona
Nebraska	Kansas
Nevada	Maine
New Hampshire	Mississippi
New Jersey	Missouri
New Mexico	South Dakota
New York	Wyoming
North Carolina	
North Dakota	
Ohio	
Oregon	
Pennsylvania	
Rhode Island (2012 IECC)	
South Carolina	
TexasVermont	
Virginia	
Washington (2012 IECC)	
West Virginia	

2009 IECC Affordability Analysis

In this Notice, HUD and USDA address two aspects of housing affordability in assessing the impact that the revised code will have on housing affordability. As described further below, the primary affordability test is a life-cycle cost savings (LCC) test, the extent to which the additional, or incremental, investments required to

[13] In the early 2000s, researchers at the U.S. Department of Energy's Pacific Northwest National Laboratory prepared a simplified map of U.S. climate zones. The map was based on analysis of the 4,775 U.S. weather sites identified by the National Oceanic and Atmospheric Administration, as well as widely accepted classifications of world climates that have been applied in a variety of different disciplines. This PNNL-developed map divided the United States into eight temperature-oriented climate zones. See *http://apps1.eere.energy.gov/buildings/publications/pdfs/building_america/4_3a_ba_innov_buildingscienceclimatemaps_011713.pdf.*

[14] Pacific Northwest National Laboratory for the U.S. Department of Energy, *Impacts of the 2009 IECC for Residential Buildings at State Level,* September 2009. Available at *https://www.energycodes.gov/impacts-2009-iecc-residential-buildings-state-level-0.*

[15] Not shown in Table 2 are the U.S. Territories. The status of IECC code adoption in these jurisdictions is as follows: Guam, Puerto Rico, and the U.S. Virgin Islands have adopted the 2009 IECC for residential buildings. The Northern Mariana Islands have adopted the Tropical Model Energy Code, which is equivalent to the 2003 IECC. American Samoa does not have a building energy code. These territories are all covered by the Act, for any covered HUD and USDA program that operates in these localities.

[16] In addition, there are two territories that have not yet adopted the 2009 IECC: the Northern Mariana Islands and American Samoa. Accordingly, they will be covered by the affordability and availability determinations of this Notice.

[17] Pacific Northwest National Laboratory for the U.S. Department of Energy, *Impacts of the 2009 IECC for Residential Buildings at State Level,* September 2009. Available at *https://www.energycodes.gov/impacts-2009-iecc-residential-buildings-state-level-0.*

[18] HUD and USDA do not currently maintain a list of local communities that may have adopted a different code than their state code. There are cities and counties that have adopted the 2009 or even the 2012 IECC in states that have not adopted the 2009 IECC or equivalent/better. For example, most major cities or counties in Arizona have adopted the 2009 IECC or better. And Maine has adopted the 2009 IECC but allows towns under 4,000 people to be exempt. The code requirements can also vary; Kentucky, for example, adopted the 2009 IECC for all homes except those that have a basement. The following Web site notes locations that have adopted the 2012 (but not the 2009) IECC: *http://energycodesocean.org/2012-iecc-and-igcc-local-adoptions.*

[19] American Recovery and Reinvestment Act, P.L. 111–5, Division A, Section 410(a)(2).

[20] Department of Energy, Office of Efficiency and Renewable Energy, Building Energy Codes Program, *Status of Codes.* May 2013. Available at: *http://www.energycodes.gov/adoption/states.*

comply with the revised code are cost effective; i.e., the additional measures pay for themselves with energy cost savings over a typical 30-year mortgage period. A second test is whether the incremental cost of complying with the code as a share of total construction costs—regardless of the energy savings associated with the investment—is affordable to the borrower or renter of the home.

In determining the impact that the 2009 IECC will have on HUD- and USDA-assisted or insured new homes, the agencies have relied on a cost-benefit analysis of the 2009 IECC completed by the Pacific Northwest National Laboratory (PNNL) for DOE.[21] This study provides an assessment of both the initial costs and the long-term estimated savings and cost-benefits associated with complying with the 2009 IECC. It offers evidence that the 2009 IECC may not negatively impact the affordability of housing covered by the Act.

Note that there may be other benefits associated with energy efficient homes. A March 2013 study by the University of North Carolina (UNC) Center for Community Capital and the Institute for Market Transformation (IMT) shows a correlation between greater energy efficiency and lower mortgage default risk for new homes. The UNC study surveyed 71,000 Energy Star-rated homes and found that mortgage default risks are 32 percent lower for these more energy efficient homes than homes without Energy Star ratings.[22]

Cost Effectiveness Analysis and Results

The DOE study, *National Energy and Cost Savings for New Single and Multifamily Homes: A Comparison of the 2006, 2009, and 2012 Editions of the IECC,* published in April 2012 (2012 DOE study), shows positive results for the cost effectiveness of the 2009 IECC for new homes. This national study projects energy and cost savings, as well as life-cycle cost (LCC) savings that assume that the initial costs are mortgaged over 30 years. The LCC method is a ''robust cost-benefit metric that sums the costs and benefits of a code change over a specified time frame. LCC is a well-known approach to assessing cost-effectiveness.'' [23] In September 2011, DOE solicited input via **Federal Register** Notice on their proposed cost benefit methodology [24] and this input was incorporated into the final methodology posted on DOE's Web site in April 2012.[25] A further Technical Support Document was published in April 2013.[26]

In summary, DOE calculates energy use for new homes using EnergyPlus™ energy modeling software, Version 5.0. Two buildings are simulated: a 2,400 square foot single family home and an apartment building (a three-story multifamily prototype having six dwelling units per floor) with 1,200 square foot dwelling units. DOE combines the results into a composite average dwelling unit based on 2010 Census building permit data for each State and eight climate zones. Single family home construction is more common than low-rise multifamily construction; the results are weighted accordingly to reflect this. Census data also is used to determine climate zone and national averages weighted for construction activity.

Four heating systems are considered: Natural gas furnaces, oil furnaces, electric heat pumps, and electric resistance furnaces. The market share of heating system types are obtained from the U.S. Department of Energy Residential Energy Consumption Survey (2009). Domestic water heating systems are assumed to use the same fuel as the space heating system.

For all 50 States, DOE estimates that the 2009 IECC saves 10.8 percent of energy costs for heating, cooling, water heating, and lighting over the 2006 IECC. LCC savings over a 30-year period are significant in all climate zones: Average consumer savings range from $1,944 in Climate Zone 3, to $9,147 in Climate Zone 8 when comparing the 2009 IECC to the 2006 IECC.[27]

The published cost and savings data for all 50 States provides weighted average costs and savings for both single family and low-rise multifamily buildings. For the 18 States impacted by this Notice, disaggregated data for single family homes only was provided to HUD and USDA by DOE. These disaggregated data are shown in Table 3. Front-end construction costs range from $550 (Kansas) to $1,950 (Hawaii) for the 2009 IECC over the 2006 IECC. On the savings side, average LCC savings over a 30-year period of ownership range from $1,633 in Utah to $6,187 in Alaska when comparing the 2009 IECC to the 2006 IECC.[28]

In addition to LCC savings, the 2012 DOE study also provides simple paybacks and ''net positive cash flows'' for these investments. These are additional measures of cost effectiveness. Simple payback is a measure, expressed in years, of how long it will take for the owner to repay the initial investment with the estimated annual savings associated with that investment. Positive cash flow assumes that the measure will be financed with a 30-year mortgage, and reflects the break-even point—equivalent to the number of months or years after loan closing—at which the cost savings from the incremental energy investment exceeds the combined cost of: (1) The additional downpayment requirement and (2) the additional monthly debt service resulting from the added investment.

For example, the average LCC for Minnesota's adoption of the 2009 IECC over its current standard (the 2006 IECC) is estimated at $3,904, with a simple payback of 4.3 years, and a net positive cash flow (mortgage payback) of just one year. Missouri homeowners will save $2,674 over 30 years under the 2009 IECC, with a simple payback of 3.8 years, and a positive cash flow of one year on the initial investment. As shown in Table 3, below, similar results were obtained for the remaining States analyzed, with simple paybacks ranging from a high of 8.3 years (Louisiana) to a low of 2.6 years (Alaska). The positive cash flow for all 18 impacted States is always one or 2 years, while the simple

[21] Department of Energy, *National Energy and Cost Savings for new Single- and Multifamily Homes: A Comparison of the 2006, 2009 and 2012 Editions of the IECC.* April 2012. Available at: *http://www.energycodes.gov/sites/default/files/documents/NationalResidentialCostEffectiveness.pdf.*

[22] Available at: *http://www.imt.org/uploads/resources/files/IMT_UNC_HomeEEMortgageRisksfinal.pdf.*

[23] Department of Energy, *National Energy and Cost Savings for new Single- and Multifamily Homes: A Comparison of the 2006, 2009 and 2012 Editions of the IECC.* April 2012. p. A–1 Available at: *http://www.energycodes.gov/sites/default/files/documents/NationalResidentialCostEffectiveness.pdf.*

[24] **Federal Register** Notice September 13, 2011, 76 FR 56413.

[25] Pacific Northwest National Laboratory for the Department of Energy (Z. Taylor, R. Lucas, N. Fernandez) *Methodology for Evaluating Cost-Effectiveness of Residential Energy Code Changes.* April 2012. Available at: *http://www.energycodes.gov/methodology-evaluating-cost-effectiveness-residential-energy-code-changes.*

[26] Pacific Northwest National Laboratory for the Department of Energy (V. Mendon, R. Lucas, S. Goel), *Cost-Effectiveness Analysis of the 2009 and 2012 IECC Residential Provisions—Technical Support Document. April 2013,* Available at *http://www.energycodes.gov/sites/default/files/documents/State_CostEffectiveness_TSD_Final.pdf.*

[27] Department of Energy, *National Energy and Cost Savings for new Single- and Multifamily Homes: A Comparison of the 2006, 2009 and 2012 Editions of the IECC.* April 2012, p. 3.

[28] Disaggregated single family data provided by DOE to HUD and USDA. Data shows LCC savings disaggregated for single family homes only (subset of LCC savings for both single family and low-rise multifamily shown in an April 2012 DOE study. Data available at *www.hud.gov/sustainability.*

payback averages 5.1 years, and is always less than 10 years (the longest payback is 8.3 years in Louisiana).

As noted, the costs and savings estimates for the 18 States presented here do not use the composite single family/low-rise multifamily data presented in the 2012 DOE study. Rather, DOE provided HUD and USDA with the underlying disaggregated data for single family housing only, to more accurately reflect the housing type receiving FHA single family insurance or USDA loan guarantees. These disaggregated data for single family homes are available at *www.hud.gov/sustainability.*

TABLE 3—LIFE-CYCLE COST (LCC) SAVINGS, NET POSITIVE CASH FLOW, AND SIMPLE PAYBACK FOR THE 2009 IECC [29]

State	Weighted average incremental cost ($ per unit)	Weighted average cost savings per year	Life-cycle cost (LCC) savings ($ per unit)	Net positive cash flow (years)	Simple payback (years)
Alaska	$940	$357	$6,187	1	2.6
Arizona	1,090	173	3,411	1	5.6
Arkansas	1,364	242	2,320	2	6.3
Colorado	902	902	1,782	2	6.7
Hawaii	1,950	393	5,861	1	5.0
Kansas	550	176	2,934	1	3.1
Kentucky	584	163	2,629	1	3.6
Louisiana	1,291	155	1,733	2	8.3
Maine	910	305	5,261	1	3.0
Mississippi	1,043	245	2,174	2	7.2
Minnesota	643	168	3,904	1	4.3
Missouri	1,275	176	2,674	1	3.8
Oklahoma	1,293	202	2,680	2	6.4
South Dakota	869	196	3,070	1	4.4
Tennessee	643	143	2,158	1	4.5
Utah	925	128	1,633	2	7.2
Wisconsin	1,027	239	3,788	1	4.3
Wyoming	885	155	2,215	1	5.7
Avge of U.S.	980	203	3,069	1.4	5.1
Avge of 18 States	1,010	208	3,134	1.3	5.1

Note that only the 18 States that have not yet adopted the 2009 IECC are included in this table.

Limitations

HUD and USDA are aware of studies that discuss limitations associated with cost-savings models such as these developed by PNNL for DOE. For example, Alcott and Greenstone (2012) suggest that ''it is difficult to take at face value the quantitative conclusions of the engineering analyses'' associated with these models, as they suffer from several empirical problems. They cite two problems in particular. First, engineering costs typically incorporate upfront capital costs only and omit opportunity costs or other unobserved factors. For example, one study found that nearly half of the investments that engineering assessments showed in energy audits for medium-size businesses would have short payback periods were not adopted due to unaccounted physical costs, risks, or opportunity costs. Second, engineering estimates of energy savings can overstate true field returns, sometimes by a large amount, and that some engineering simulation models have still not been fully calibrated to approximate actual returns.[30] HUD and USDA nevertheless believe that the PNNL–DOE model used to estimate the savings shown in this Notice represents the current state-of-the art for such modeling, is the product of significant public comment and input, and is now the standard for all of DOE's energy code simulations and models.

Distributional Impacts on Low-Income Consumers or Low Energy Users

For reasons discussed below, HUD and USDA project that affordability will not decrease for many low-income consumers of HUD- or USDA-funded units as a result of the determination in this Notice. The purpose of the regulatory action is to lower gross housing costs. For rental housing, the gross housing cost equals the contract rent plus utilities (unless the contract rent includes utilities, in which case gross housing costs equal the contract rent). For homeowners, housing cost equals mortgage payments, property taxes, insurance, utilities, and other maintenance expenditures. Reducing periodic utility payments is achieved through an upfront investment in energy efficiency. The cost of building energy efficient housing will be passed on to residents (either renters or homeowners) through the price of the unit (either rent or sales price). Households will gain so long as the net present value of energy savings to the consumer is greater than the cost to the builder of providing energy efficiency. The DOE study cited in this Notice provides compelling evidence that this is the case for the energy standards in question; i.e., that they would have a positive impact on affordability. In the 18 States impacted by the 2009 IECC, one of two codes addressed in the Notice, the average incremental cost of going to the higher standard is just $1,010 per unit, with average annual savings of $208, for a 5.1 year simple payback, and a 1.3 year net positive cash flow (Department of Energy 2012).

Households that would gain the most from this regulatory action would be those that consume energy the most intensively. However, it is possible, although unlikely, that a minority of households could experience a net increase in housing costs as a result of the regulatory action. Households that

[29] Data provided by DOE to HUD and USDA showing disaggregated LCC savings for single family homes only (subset of LCC savings for both single family and low-rise multifamily published in April 2012 DOE study).

[30] Hunt Alcott and Michael Greenstone, ''Is there an energy efficiency gap?'' Journal of Economic Perspectives, Volume 26, Number 1, Winter 2012, pp. 3–28.

consume significantly less energy than the average household could experience a net gain in housing costs if their energy expenditures do not justify paying the cost of providing energy efficient housing.

There are a few reasons why a significant number of these households is not expected to be inconvenienced. First, in the rare case that a household does not value the benefits of energy efficient housing, much of the pre-existing housing stock is available at a lower standard. Those that would lose from the capitalization of energy savings in more efficient housing could choose alternative housing from the large stock of existing and less energy efficient housing.

Second, to the extent that the majority of users of HUD/USDA programs are likely to be lower-income households, these households may suffer more from the ''energy efficiency gap'' than higher income households. Low-income households pay a larger portion of their income on utilities and so are not likely to be adversely affected by requiring energy efficiency rules. According to data from the 2012 Consumer Expenditure Survey, utilities represent almost 10 percent of total expenditures for the lowest-income households, as opposed to just 5 percent for the highest income. A declining expenditure share indicates that utilities are a necessary good. One study of earlier data from the Consumer Expenditure Survey (Branch, 1993) found a short-run income elasticity of demand of 0.23 (indicating that energy is a normal and necessary good). Given these caveats, the expectation is that the overwhelming majority of low-income households will gain from this regulatory action.

TABLE 4—QUINTILES OF INCOME BEFORE TAXES AND SHARES OF AVERAGE ANNUAL EXPENDITURES

[Figures represent percent.]

Item	Lowest 20 percent	Second 20 percent	Third 20 percent	Fourth 20 percent	Highest 20 percent	All consumer units
Total Housing *	40	38	34	31	30	33
Shelter	25	22	20	18	18	19
Utilities, fuels, and public services	9.8	9.1	8.3	7.0	5.4	7.1
Natural gas	0.9	0.8	0.8	0.7	0.6	0.7
Electricity	4.3	3.7	3.2	2.5	1.9	2.7
Fuel oil and other fuels	0.3	0.3	0.3	0.2	0.2	0.3
Telephone services	3.0	3.0	2.9	2.5	1.8	2.4
Water and other public services	1.3	1.3	1.2	1.0	0.8	1.0

* Housing expenditures are composed of shelter, utilities, household operations, housekeeping expenses, furniture, and appliances.
Source: Consumer Expenditure Survey, 2012, shares calculated by HUD.

Third, as noted above, the standards under consideration in this Notice are not overly restrictive and are expected to yield a high benefit-cost return.

Conclusion

For the 32 States and the District of Columbia that have already adopted the 2009 IECC or a stricter code, there will be little or no impact of HUD and USDA's adoption of this standard for the programs covered under EISA, since all housing in these States is already required to meet this standard as a result of State legislation. For the remaining 18 States that have not yet adopted the 2009 IECC, HUD and USDA expect no negative affordability impacts from adoption of the code as a result of the low incremental first costs, the rapid simple payback times, and the life-cycle cost savings documented above.

For the States that have not yet adopted the 2009 IECC the evidence shows, however, that the 2009 IECC is cost effective in all climate zones and on a national basis. Cost effectiveness is based on LCC cost savings estimated by DOE for energy-savings equipment financed over a 30-year period. In addition, simple paybacks on these investments are typically less than 10 years, and positive cash flows are in the one- to 2-year range. HUD and USDA therefore determine that the adoption of the 2009 IECC code for HUD- and USDA-assisted and insured new single family home construction does not negatively impact the affordability of those homes.

III. ASHRAE 90.1–2007 Affordability Determination

EISA requires HUD to consider the adoption of ASHRAE 90.1 for HUD-assisted multifamily programs (USDA multifamily programs are not covered). ASHRAE 90.1 is an energy code published by the American Society of Heating, Refrigerating, and Air-conditioning Engineers for commercial buildings, which, by definition, includes multifamily residential buildings of more than three stories. The standard provides minimum requirements for the energy efficient design of commercial buildings, including high-rise residential buildings (four or more stories). By design of the standard revision process, ASHRAE 90.1 sets requirements for the cost-effective use of energy in commercial buildings.

Beginning with ASHRAE 90.1–2001, the standard moved to a 3-year publication cycle. Substantial revisions to the standard have occurred since 1989. Significant requirements in ASHRAE 90.1–2007 over the previous (2004) code included stronger building insulation, simplified fenestration requirements, demand control ventilation requirements for higher density occupancy, and separate simple and complex mechanical requirements.

ASHRAE 90.1–2007 included 44 changes, or addenda, to ASHRAE 90.1–2004.[31] In an analysis of the code, DOE preliminarily determined that 30 of the 44 would have a neutral impact on overall building efficiency; these included editorial changes, changes to reference standards, changes to alternative compliance paths, and other changes to the text of the standard that may improve the usability of the standard, but do not generally improve or degrade the energy efficiency of the building. Eleven changes were determined to have a positive impact on energy efficiency and two changes to have a negative impact.[32]

The 11 addenda with positive impacts on energy efficiency include: Increased requirement for building vestibules, removal of data processing centers from

[31] Department of Energy, *Impacts of Standard 90.1–2007 for Commercial Buildings at State Level,* September 2009. Available at *https://www.energycodes.gov/impacts-standard-901-2007-commercial-buildings-state-level.*

[32] The two negative impacts on energy efficiency are: (1) Expanded lighting power exceptions for use with the visually impaired, and (2) allowance for louvered overhangs.

exceptions to HVAC requirements, removal of hotel room exceptions to HVAC requirements, modification of demand-controlled ventilation requirements, modification of fan power limitations, modification of retail display lighting requirements, modification of cooling tower testing requirements, modification of commercial boiler requirements, modification of part load fan requirements, modification of opaque envelope requirements, and modification of fenestration envelope requirements.

Current Adoption of ASHRAE 90.1–2007

Thirty-eight States and the District of Columbia have adopted ASHRAE 90.1–2007, its equivalent, or a stronger commercial energy standard (Table 5).[33] In many cases, that standard is adopted by reference through adoption of the commercial buildings section of the 2009 IECC, while in other cases ASHRAE 90.1 is adopted separately. Twelve States either have previous ASHRAE codes in place or no statewide codes. ASHRAE 90.1–2007 was also the baseline energy standard established under ARRA for commercial buildings (including multifamily properties), to be adopted by all 50 States and for achieving a 90 percent compliance rate by 2017.

TABLE 5—CURRENT STATUS OF ASHRAE CODE ADOPTION BY STATE [34]

[as of August 2012]

ASHRAE 90.1–2007 or higher (38 states and District of Columbia)	Prior or no statewide codes (12 states)
Alabama	ASHRAE 90.1–2004 or Equivalent (4 States)
Arkansas	Hawaii
California	Minnesota
Connecticut	Oklahoma
Delaware	Tennessee
District of Columbia	
Florida	
Georgia	
Idaho	ASHRAE 90.1–2001 or Equivalent (1 State)
Indiana	Colorado
Illinois	
Iowa	
Kentucky	
Louisiana	
Maryland	No Statewide Code (7 States)
Massachusetts	Alaska
Michigan	Arizona
Mississippi (Effective July 1, 2013)	Kansas
Montana	Maine
Nebraska	Missouri
Nevada	South Dakota
New Hampshire	Wyoming
New Jersey	
New Mexico	
New York	
North Carolina	
North Dakota	
Ohio	
Oregon	
Pennsylvania	
Rhode Island	
South Carolina	
Texas	
Utah	
Vermont	
Virginia	
Washington	
West Virginia	
Wisconsin	

[33] Not shown in Table 5 are the U.S. Territories. Guam, Puerto Rico, and the U.S. Virgin Islands have adopted ASHRAE 90.1–2007 for multifamily buildings. The Northern Mariana Islands have adopted the Tropical Model Energy Code, equivalent to ASHRAE 90.1–2001. American Samoa does not have a building energy code

[34] Department of Energy, Office of Efficiency and Renewable Energy, Building Energy Codes Program, *Status of Codes.* August, 2012. Available at: *https://www.energycodes.gov/adoption/states.*

ASHRAE 90.1–2007 Affordability Analysis

Section 304(b) of ECPA requires the Secretary of DOE to determine whether a revision to the most recent ASHRAE standard for energy efficiency in commercial buildings will improve energy efficiency in those buildings.[35] In its determination of improved energy efficiency for commercial buildings, DOE developed both a ''qualitative'' analysis and a ''quantitative'' analysis to assess increased efficiency of ASHRAE Standard 90.1.[36] The qualitative analysis evaluates the changes from one version of Standard 90.1 to the next and assesses if each individual change saves energy overall. The quantitative analysis estimates the energy savings associated with the change, and is developed from whole building simulations of a standard set of buildings built to the standard over a range of U.S. climates.

Energy Savings Analysis

DOE's quantitative analysis for ASHRAE 90.1–2007 concluded that on average for mid-rise apartment buildings nationwide, electric energy use intensity would decrease by 2.1 percent and natural gas energy use intensity would decrease by 11.5 percent, for a total site decrease in energy use intensity of 4.3 percent under ASHRAE 90.1–2007.[37] The energy cost index for this building type was also calculated to decrease by 3 percent.

DOE also completed a state-by-state assessment of the impacts of ASHRAE 90.1–2007 on residential (mid-rise apartments), nonresidential, and semi-heated buildings subject to commercial building codes.[38] This analysis included energy and cost savings over current commercial building codes by State and climate zone, by comparing each State's base code at the time of the study to Standard 90.1–2007. Results of this savings analysis for the 12 States that have not yet adopted Standard 90.1–2007 can be found in Appendix 2. Results are shown for the percent reduction estimated by DOE in both overall site energy use and energy cost resulting from adoption of Standard 90.1–2007 over the base case.[39] ASHRAE 90.1–2007 was projected to generate both energy and cost savings in all States in all climate zones over existing codes.

The highest energy and cost savings projected by DOE for residential buildings, for example, was in Topeka, Kansas (Climate Zone 4A), where adoption of ASHRAE 90.1–2007 would provide 10.3 percent energy savings and 6.8 percent cost savings over the current energy code of the State of Kansas. The lowest energy and cost savings estimated by DOE for residential buildings were in Honolulu, Hawaii (Climate Zone 1A), at 0.8 percent in reduced electricity consumption and costs. (Differentials between energy savings and cost savings reflect price differences and varying shares of the total for different fuel sources.)

Cost Effectiveness Analysis and Results

As discussed above, while DOE has completed an analysis of projected *savings* that will result from ASHRAE 90.1–2007, an equivalent to the *cost* studies conducted by DOE of the 2009 IECC does not exist for ASHRAE 90.1–2007. However, PNNL completed an analysis for DOE of the incremental costs and associated cost benefits of complying with the new standard for

[35] 42 U.S.C. 6833(b)(2)(A).

[36] 76 FR 43287, July 20, 2011.

[37] Pacific Northwest National Laboratory for Department of Energy, *Impacts of Standard 90.1–2007 for Commercial Buildings at State Level,* September 2009. Available at *http://www.energycodes.gov/impacts-standard-901-2007-commercial-buildings-state-level.*

[38] Id.

[39] Energy cost savings were estimated using national average energy costs of $0.0939 per kWh for electricity and $1.2201 per therm for natural gas.

the State of New York, and this analysis was used as the basis for determining the overall affordability impacts of the new standard.[40] Note that PNNL compared ASHRAE 90.1–2007 to the prevailing code in New York at the time, the 2003 IECC, whereas the current standard for HUD-assisted multifamily buildings is ASHRAE 90.1–2007 or the 2006 IECC.

In its New York analysis, PNNL found that adoption of ASHRAE 90.1–2007 would be cost effective for all commercial building types, including multifamily buildings, in all climate zones in the State. The incremental first cost of adopting the revised standard for a hypothetical 31-unit mid-rise residential prototype building in New York was projected to be $21,083, $10,423, and $9,525 per building for each of three climate zones in New York (climate zones 4A, 5A, and 6A, respectively), for an average across all climate zones of $13,677 per building, or $441 per dwelling unit. (Costs in climate zone 4A were high because the sample location chosen for construction costs was New York City.)

Annual cost savings in New York were projected to be $2,050, $1,234, and $1,185 for climate zones 4A, 5A, and 6A per building, respectively, for an average building, yielding cost savings of $1,489 per building for all climate zones, and average savings of $45 per unit. The average simple payback period for this investment in New York is 9.8 years, with a range of approximately 8 to 10 years.

Using New York as a baseline, HUD and USDA used Total Development Cost (TDC) adjustment factors developed by HUD in order to determine an estimate of the incremental costs associated with ASHRAE 90.1–2007 in the 12 States that have not yet adopted this code. HUD develops annual TDC limits for multifamily units for major metropolitan areas in each State. The average TDC for each State was derived by averaging TDCs for walkup- and elevator-style building types in each of several metropolitan areas in that State. (Note that since TDC costs include soft costs, site improvement costs, and management costs, the TDC differentials may not always correspond directly with ASHRAE-related cost differentials.) For the State of New York, TDCs were averaged for all of the State's metro areas, and arrived at an average New York TDC of $221,607 per unit.[41] HUD and USDA then developed a TDC adjustment factor, which consists of the ratio of the average New York TDC of $221,607 for a two-bedroom unit against the average TDC for a similar unit in other States (Appendix 3). This TDC adjustment factor was then applied to the average cost per unit of $441.19 for complying with ASHRAE 90.1–2007 in New York, to arrive at an incremental cost per unit for the remaining 12 States that have not yet adopted ASHRAE 90.1–2007 (Appendix 4).

HUD and USDA then averaged DOE's estimated energy savings across climate zones in each State to generate statewide energy savings estimates and for calculating simple payback periods for the ASHRAE 90.1–2007 investments. For example, as shown in Appendices 2 and 4, the average cost savings resulting from adopting ASHRAE 90.1–2007 in the State of Arizona was estimated by DOE to be 4.9 percent of $1,107 per unit per year, or $54.22. For an estimated average incremental cost of $341 per unit, the simple payback in Arizona was determined to be 6.3 years.[42] Note that the same baseline code used for the New York analysis (the IECC 2003) is assumed for these States; the actual codes in these States may vary from the New York baseline.

Conclusion

USDA's multifamily programs are not covered by EISA, and therefore will not be impacted by ASHRAE 90.1. For impacted HUD programs, in the 38 States and the District of Columbia that have adopted ASHRAE 90.1–2007 or a higher standard, there will, by default, be no adverse affordability impacts of adopting this standard. For the remaining 12 States that have not yet adopted ASHRAE 90.1–2007, in all cases, HUD and USDA estimate the incremental cost of ASHRAE 90.1–2007 compliance at under $500 per dwelling unit, with the highest incremental cost at $489.52 per dwelling unit (Alaska), and the lowest cost at $309.64 per dwelling unit (Oklahoma). This estimate compares favorably to the cost of complying with the 2009 IECC for single family homes, which showed an average incremental cost of $840 per dwelling unit. These incremental costs are a very small percent of initial construction costs—less than 0.2 percent of the average TDC of $221,000 for the State of New York, for example. With one exception (Hawaii), simple payback times are well under 15 years.

Given the low incremental cost of compliance with the new standard and the generally favorable simple payback times, HUD and USDA have determined that, with one exception, adoption of ASHRAE 90.1–2007 by the covered HUD programs will not negatively impact the affordability of multifamily buildings built to the revised standard in the 12 States that have not yet adopted this standard.[43] The exception is Hawaii. Since energy and cost savings are estimated by PNNL for Hawaii at less than one percent (.08%), and PNNL estimates the payback on the initial investment at 58.8 years, HUD and USDA determine that adoption of ASHRAE 90.1–2007 in Hawaii may negatively impact the affordability of housing in that State. Note that PNNL uses a national average kWh cost of .0939/kWh to estimate energy savings; using the current Hawaii energy price of .3204/kWh, the simple payback improves dramatically, to 17 years, but not sufficiently to justify adoption of the ASHRAE 90.1–2007 standard.

Given the differential between the payback at the average national electricity price compared to the payback at the current State energy price, this Notice specifically seeks comment on whether this exclusion of Hawaii is appropriate based on the available data.

IV. Impact on Availability of Housing

EISA requires that HUD and USDA assess both the affordability *and* availability of housing covered by the Act. This section of this Notice addresses the impact that the EISA requirements would have on the ''availability'' of housing covered by the Act. ''Affordability'' is assumed to be a measure of whether a home built to the updated energy code is affordable to potential homebuyers or renters, while ''availability'' of housing is a measure associated with whether builders will make such housing available to consumers at the higher code level; i.e., whether the higher cost per unit as a result of complying with the revised code will impact whether that unit is likely to be built or not. A key aspect of determining the impact on availability is the proportion of affected units in

[40] Krishan Gowri *et al, Cost Effectiveness and Impact Analysis of Adoption of ASHRAE 90.1–2007 for New York State,* June 2009. Available at *http://www.pnl.gov/main/publications/external/technical_reports/PNNL-16770.pdf.*

[41] Department of Housing and Urban Development, *2011 Unit Total Development Cost (TDC) Limits,* 2011. Available at *http://portal.hud.gov/huddoc/2011tdcreport.pdf.*

[42] While the 13 States that have not yet adopted ASHRAE 90.1–2007 have a variety of different energy codes, for the purposes of these estimates, the current codes in those States are assumed to be roughly equivalent to those in New York (ASHRAE 90.1–2004) at the time of the DOE study. States that have pre-2004 codes in place are likely to yield greater savings.

[43] Alaska, Arizona, Colorado, Kansas, Maine, Minnesota, Missouri, North Dakota, Oklahoma, South Dakota, Tennessee, and Wyoming.

relation to total units funded by HUD and USDA or total for sale units. These issues are discussed below.

Impact of Increases in Housing Prices and Hedonic Effects

At the margins, HUD and USDA do not project that the projected increase in housing prices, as a result of higher construction costs and hedonic effects, would decrease the quantity of housing. More efficient energy standards are expected to reduce operating costs for reasons explained in the above discussion of market failures. Thus, while there will theoretically be a negative impact on the supply of housing as a result of an increase in construction cost, there will also be a positive increase in demand for housing if it is more energy efficient. The capitalization of energy efficiency into housing prices may be hindered by difficulties in identifying and assessing energy efficiency. However, so long as the regulatory action leads to investments with positive net present value, the quantity of housing will increase.

Measuring the hedonic value (demand effect) of energy efficiency improvements is fraught with difficulty and there is little consensus in the empirical literature concerning the degree of capitalization (Laquatra *et al,* 2002). However, whatever their methodology, studies do suggest a significant and positive influence of energy efficiency on real estate values. One of the most complete studies on the hedonic effects of energy efficiency is on commercial buildings (Eicholtz *et al,* 2010). The results indicate that a commercial building with an Energy Star certification will rent for about 3 percent more per square foot, increase effective rents by 7 percent, and sell for as much as 16 percent more. The authors skillfully disentangle the energy savings required to obtain a label from the unobserved effects of the label itself. Energy savings are important: A 10 percent decrease in energy consumption leads to an increase in value of about 1 percent, over and above the rent and value premium for a labeled building. According to the authors of the study, the ''intangible effects of the label itself'' seem to play a role in determining the value of green buildings.

Impact of 2009 IECC on Housing Availability

For the 32 States and the District of Columbia that have already adopted the 2009 IECC, there will be few negative effects on the availability of housing covered by the Act as a result of HUD and USDA establishing the 2009 IECC as a minimum standard.

For those 18 States that have not yet adopted the revised codes, HUD and USDA have estimated the number of new construction units built under the affected programs in FY 2011. As detailed in Table 6, in FY 2011 a total of 23,262 units of HUD- and USDA-assisted new single family homes were built in these States, including 17,098 that were FHA-insured new homes, 1,170 that received USDA Section 502 direct loans, and 4,563 that received Section 502 guaranteed loans. Overall, this represented 7.0 percent of all new single family home sales in the United States, and 0.4 percent of all U.S. single family home sales in FY 2011.[44]

Assuming similar levels of production as in 2011, the share of units estimated as likely to be impacted by the IECC in the 18 States that have not yet adopted this code is likely to be similar; i.e., approximately 7.0 percent of all new single family home sales in those 18 States, and 0.4 percent of all single family home sales in those 18 States.

TABLE 6—FY 2011 ESTIMATED NUMBER OF HUD- AND USDA-SUPPORTED UNITS IMPACTED BY ADOPTION OF 2009 IECC

States not yet adopted 2009 IECC	HOME	FHA Single family	USDA Sec 502 direct	USDA Sec 502 guaranteed	Total
AK	16	207	25	53	301
AR	10	672	127	412	1,221
AZ	46	2,885	94	384	3,409
CO	46	1,946	46	79	2,117
HI	10	109	35	165	319
KS	5	686	28	52	771
KY	86	888	110	254	1,338
LA	93	906	103	1,105	2,207
ME	0	175	50	95	320
MN	14	1,659	20	72	1,765
MO	13	1,456	48	284	1,801
MS	10	506	114	361	991
OK	15	1,074	100	275	1,464
SD	6	182	30	80	298
TN	28	1,609	57	349	2,043
UT	14	1,224	156	314	1,708
WI	19	743	15	66	843
WY	0	171	12	163	346
Total	431	17,098	1,170	4,563	23,262

Adoption of the 2009 IECC for affected HUD and USDA programs represents an estimated one-time incremental cost increase for new construction single family units of $23.6 million nationwide, and an estimated annual benefit of $4.4 million, for an estimated simple payback of 5.4 years, as shown in Appendix 5.

[44] New single family home sales totaled 333,000 in 2011; all single family home sales totaled 5,236,000. Federal Housing Administration, *FHA Single Family Activity in the Home-Purchase Market Through November 2011,* February 2012. Available at *http://portal.hud.gov/hudportal/documents/huddoc?id=fhamkt1111.pdf.*

Impact of ASHRAE 90.1–2007 on Housing Availability

ASHRAE 90.1–2007 has been adopted by 38 States and the District of Columbia; the availability of HUD-assisted housing will therefore not be negatively impacted in these States with the adoption of this standard by the two agencies. As shown in Table 7, in the 12 States that have not yet adopted this code, 7,489 new multifamily units were funded or insured through HUD programs in FY 2011. HUD and USDA project that of the units produced in the programs shown in Table 7, only future units under the HOME Investment Partnerships (HOME) program and FHA multifamily units will be affected by this Notice. Using FY 2011 unit production as the baseline, HUD and USDA project this to be approximately 5,438 units annually. Although covered under EISA, HUD's Public Housing Capital Fund, the Sections 202 and 811 Supportive Housing, and HOPE VI programs are not projected to be covered by the codes addressed in this Notice, due to the fact that the Public Housing Capital Fund currently already requires a more recent building energy code for new construction (ASHRAE 90.1–2010); the Sections 202 and 811 Supportive Housing programs no longer fund new construction and in any case have established higher standards for new construction in recent notices of funding availability (NOFAs) (Energy Star Certified New Homes and Energy Star Certified Multifamily High Rise buildings), and HOPE VI is no longer active.

TABLE 7—FY 2011 ESTIMATED NUMBER OF UNITS POTENTIALLY IMPACTED BY ADOPTION OF ASHRAE 90.1–2007

States not yet adopted ASHRAE 90.1–2007	Public housing capital fund	Section 202/811	HOME	HOPE VI	FHA-Multifamily	Total
AK		16	53		0	69
AZ		0	584		274	858
CO		14	146		1,654	1,814
HI		0	[138]		0	[138]
KS		24	35		0	59
ME		0	0		0	0
MN		204	80		180	464
MO		134	532		144	810
OK		10	215		1,086	1,311
SD		0	79		60	139
TN		33	91		144	268
WY		0	9		72	81
Unallocated	1,155			323		
Total Units Produced in FY2011	1,155	435	1,962	323	3,614	7,489
Total Units Projected to be Covered Under this Notice			1,824		3,614	[45] 5,438

Twenty-four projects with 3,614 new multifamily units were endorsed by FHA in 2011. Two States, Colorado and Oklahoma, accounted for nearly half of this total, with five States accounting for less than 200 units each. The 3,614 multifamily units endorsed by FHA in FY 2011 in States that have not yet adopted ASHRAE 90.1–2007 represented 2 percent of a total of 180,367 units receiving FHA multifamily endorsements in FY 2011. The 24 projects with affected units represented a mortgage value of $396 million, or 3.4 percent of a total FHA-insured mortgage amount of $11.68 billion in FY 2011. Assuming a similar share of impacted units as in FY 2011 in future years, HUD and USDA assume that less than 2 percent of FHA multifamily endorsements will be impacted by ASHRAE 90.1–2007, and approximately 3 percent of total loan volume.

Adoption of ASHRAE 90.1–2007 by the covered HUD and USDA programs represents an estimated one-time incremental cost increase for new multifamily residential units of $1.87 million nationwide, and an estimated annual benefit of $177,800 nationwide, resulting in an estimated simple payback time of under 11 years, as shown in Appendix 6.

Combined Energy Costs and Savings

For both the single family units complying with the 2009 IECC and the multifamily units complying with ASHRAE 90.1–2007, the combined cost of implementing the updated date is estimated at $25.5 million, with an estimated annual energy cost savings of $4.6 million. Annualized costs for this initial investment over 10 years are $2.9 million. Over 10 years, the present value of these cost savings, using a discount rate of 3 percent, is $40.1 million, for a net present value savings of $14.4 million over 10 years.

Social Benefits of Energy Standards: Reducing CO_2 Emissions

In addition to energy savings, additional cost benefits will be achieved from the resulting reductions in carbon emissions. The effect of a decline on energy consumption is to reduce emissions of pollutants (such as particulate matter) that cause health and property damage and greenhouse gases (such as carbon dioxide) that cause global warming. To calculate the social cost of carbon dioxide in any given year, the Interagency Working Group on Social Cost of Carbon estimated the future damages to agriculture, human health, and other market and nonmarket sectors from an additional unit of carbon dioxide emitted in a particular year in terms of reduced consumption due to the impacts of elevated temperatures.[46] The interagency group provides estimates of the damage for every year of the analysis from a future value of $39 in 2013 to $96 in 2027 (a

[45] Although 138 HOME units would be projected to be affected in Hawaii, Hawaii has been excluded from coverage under ASHRAE 90.1–2007 due to insufficient cost savings and relatively long paybacks, projected from the adoption of ASHRAE 90.1–2007. These units are therefore excluded from the affected unit count.

[46] Interagency Working Group on Social Cost of Carbon, *Technical Support Document: Social Cost of Carbon for Regulatory Impact Analysis Under Executive Order 12866,* United States Government, 2010.

25-year stream of benefits). A worst-case scenario was presented by the Interagency Working Group with costs starting at $110 in 2013 and rising to $196 by 2037.

The emission rate of metric tons of carbon dioxide (CO_2) per British thermal unit (BTU) consumed varies by power source. The primary source for these data is the U.S. Energy Information Administration's Voluntary Reporting of Greenhouse Gases Program. HUD uses a range for its emission factor of 0.107 to 0.137 metric tons of CO_2 per million BTUs. Based on studies by DOE, HUD estimates energy savings of 2.06 million BTUs per housing unit per year from the ASHRAE 90.1–2007 standard and a reduction of 7.06 million BTUs per housing unit per year from the 2009 IECC. The expected aggregate energy savings (technical efficiency) is approximately 175,000 million BTUs annually.[47]

Whatever the predicted energy savings (technical efficiencies) of an energy efficiency upgrade, the actual energy savings by a household are likely to be smaller due to a behavioral response known as the ''rebound effect.'' A rebound effect has been observed when an energy efficient investment effectively lowers the price of the outputs of energy (heat, cooling, and lighting), which may lead to both income and substitution effects by raising the demand for energy. Increasing energy efficiency reduces the expense of physical comfort and may thus increase the demand for comfort. To account for the wide range of estimates for the scale of the rebound effect and the uncertainty surrounding these estimates, HUD assumes a range of between 10 and 30 percent (Sorrel 2007). The size of the rebound effect does not reduce the benefit to a consumer of energy efficiency but indicates how those benefits are allocated between reduced energy costs and increased comfort. Taking account of the rebound effect, the technical efficiencies provided by the energy standards discussed in this Notice produce an estimated energy savings of from 122,500 million to 157,500 million BTUs.

The table below summarizes the aggregate social benefits realized from reducing carbon emissions for different marginal social cost scenarios (average and worst case), lifecycles, and scenario assumptions. The highest benefits will be for a high marginal social cost of carbon, long lifecycle, low rebound factor, and high emissions factor.

TABLE 8—ANNUALIZED VALUE OF REDUCTION IN CO_2 EMISSIONS OVER 305,000 UNITS

[$2,012 million]

Lifecycle	Emission factor of 0.107				Emission factor of 0.137			
	Rebound 30%		Rebound 10%		Rebound of 30%		Rebound of 10%	
	Median MSC*	High MSC	Median MSC	High MSC	Median MSC	High MSC	Median MSC	High MSC
10 years	0.58	1.68	0.73	2.15	0.73	2.14	0.94	2.75
15 years	0.60	1.77	0.77	2.29	0.77	2.28	0.99	2.97
20 years	0.63	1.87	0.81	2.40	0.81	2.39	1.03	3.12
25 years	0.65	1.97	0.84	2.52	0.85	2.51	1.07	3.22

* MSC = marginal social cost.

The annualized value of the social benefits of reducing carbon emissions, discounted at 3 percent, ranges from $580,000 to $3.22 million.[48] The corresponding present values range from $5 million to $24.2 million over 10 years, to $58 million over 25 years.

Conclusion

Given the extremely low incremental costs associated with adopting both the 2009 IECC and ASHRAE 90.1–2007 described above, and that the estimated number of new construction units built under the affected programs in FY 2011 in States that have not yet adopted the revised codes is a small percentage of the total number of new construction units in those programs nationwide, HUD and USDA have determined that adoption of the codes will not adversely impact the availability of the affected units.

V. Impact on HUD and USDA Programs

Implementation

Based on DOE findings on improvements in energy efficiency and energy savings, and HUD and USDA determinations on housing affordability and availability outlined in this Notice, HUD and USDA programs specified under EISA will implement procedures to ensure that recipients of HUD funding, assistance, or insurance comply with the 2009 IECC and (except in Hawaii) ASHRAE 90.1–2007 code requirements, commencing no later than 30 days after the date of publication of a Notice of Final Determination.

Environmental Impact

A Finding of No Significant Impact with respect to the environment has been made in accordance with HUD regulations at 24 CFR part 50, which implement section 102(2)(C) of the National Environmental Policy Act of 1969 (42 U.S.C. 4332(2)(C)). That finding is posted at *www.regulations.gov* and *www.hud.gov/sustainability* and is available for public inspection between the hours of 8 a.m. and 5 p.m. weekdays in the Regulations Division, Office of General Counsel, Department of Housing and Urban Development, 451 7th Street SW., Room 10276, Washington, DC 20410–0500. Due to security measures at the HUD Headquarters building, please schedule an appointment to review the finding by calling the Regulations Division at 202–402–3055 (this is not a toll-free number).

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[47] 2.06 MMBTU × 5,438 multifamily units + 7.06 MMBTU × 23,262 single family units.

[48] Because the Interagency Group used a 3 percent rate to calculate the present value of damage, HUD uses the same rate in order to be consistent with the federally approved estimates of damage.

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Dated: April 9, 2014.

Shaun Donovan,

Secretary, U.S. Department of Housing and Urban Development.

Thomas J. Vilsack,

Secretary, U.S. Department of Agriculture.

APPENDIX 1—COVERED HUD AND USDA PROGRAMS

	Legal Authority	Regulations
HUD Programs:		
Public Housing Capital Fund ...	Section 9(d) and Section 30 of the U.S. Housing Act of 1937 (42 U.S.C. 1437g(d) and 1437z–2).	24 CFR parts 905, 941, and 968.
HOPE VI Revitalization of Severely Distressed Public Housing.	Section 24 of the U.S. Housing Act of 1937 (42 U.S.C. 1437v)	24 CFR part 971.
Choice Neighborhoods Implementation Grants.	Section 24 of the U.S. Housing Act of 1937 (42 U.S.C. 1437v)	24 CFR part 971.
Choice Neighborhoods Planning Grants.	Section 24 of the U.S. Housing Act of 1937 (42 U.S.C. 1437v)	24 CFR part 971.
Section 202 Supportive Housing for the Elderly.	Section 202 of the Housing Act of 1959 (12 U.S.C. 1701q), as amended.	24 CFR part 891.
Section 811 Supportive Housing for Persons with Disabilities.	Section 811 of the Housing Act of 1959 (12 U.S.C. 1701q), as amended..	24 CFR part 891.
HOME Investment Partnerships (HOME).	Title II of the Cranston-Gonzalez National Affordable Housing Act (42 U.S.C. 12701 *et seq.*).	24 CFR part 92.
FHA Single Family Mortgage Insurance Programs.	National Housing Act Sections 203(b) (12 U.S.C. 1709(b)), Section 251 (12 U.S.C. 1715z–16), Section 247 (12 U.S.C. 1715z–12), Section 203(h) (12 U.S.C. 1709(h)), Housing and Economic Recovery Act of 2008 (Public Law 110–289), Section 248 of the National Housing Act (12 U.S.C. 1715z–13).	24 CFR parts 203, Subpart A; 203.18(i); 203.43i; 203; 203.49; 203.43h.
FHA Multifamily Mortgage Insurance Programs.	Sections 213, 220, 221, 231, and 232 of the National Housing Act (12 U.S.C. 1715e, 12 U.S.C. 1715v, 12 U.S.C. 1715k, 12 U.S.C. 17151, 12 U.S.C. 1715w)..	24 CFR parts 200, subpart A, 213; 231; 220; 221, subparts C and D; and 232.
USDA Programs:		
Section 502 Guaranteed Housing Loans.	Section 502 of Housing Act (42 U.S.C. 1472)	7 CFR part 1980.
Section 502 Rural Housing Direct Loans.	Section 502 of Housing Act (42 U.S.C. 1472)	7 CFR part 3550.
Section 502 Mutual Self Help Loan program, homeowner participants.	Section 502 of Housing Act (42 U.S.C. 1472)	7 CFR part 3550.

APPENDIX 2—ESTIMATED ENERGY AND COST SAVINGS FROM ADOPTION OF ASHRAE 90.1–2007 [49]

State	Location	Climate zone	Energy savings (%)	Baseline energy cost ($/unit/year)	Cost savings (%)
AK ...	Anchorage	7	6.5	1,281	4.7
	Fairbanks	8	4.7	1,475	3.7
	Average	.....	*5.6*	*1,378*	*4.2*
AZ ...	Phoenix	2B	6.6	1,070	5.8
	Sierra Vista	3B	6.1	1,037	5.4
	Prescott	4B	8.7	1,	5.6
	Flagstaff	5B	5.7	1,059	3.0

APPENDIX 2—ESTIMATED ENERGY AND COST SAVINGS FROM ADOPTION OF ASHRAE 90.1–2007 [49]—Continued

State	Location	Climate zone	Energy savings (%)	Baseline energy cost ($/unit/year)	Cost savings (%)
	Average		*6.8*	*1,106*	*4.9*
CO ..	La Junta	4B	7.4	1,092	4.5
	Boulder	5B	7.5	1,101	4.6
	Eagle	6B	1.7	1,102	0.9
	Alamosa	7B	2.7	1,118	1.6
	Average		*4.8*	*1,103*	*2.9*
HI	Honolulu	1A	0.8	1,013	0.8
	Average		*0.8*	*1,013*	*0.8*
KS ...	Topeka	4A	10.3	1,192	6.8
	Goodland	5A	5.2	1,177	3.2
	Average		*7.8*	*1,185*	*5.0*
ME ..	Portland	6A	4.5	1,175	2.8
	Caribou	7	5.4	1,311	4.0
	Average		*5.0*	*1,243*	*3.4*
MN ..	St. Paul	6A	2.2	1,245	1.3
	Duluth	7	5.2	1,342	3.9
	Average		*3.7*	*1,294*	*2.6*
MO ..	St. Louis	4A	3.5	1,147	2.2
	St. Joseph	5A	3.6	1,161	2.3
	Average		*3.6*	*1,154*	*2.3*
OK ..	Oklahoma City	3A	1.5	1,074	1.7
	Guymon	4A	3.6	1,098	2.2
	Average		*2.6*	*1,086*	*2.0*
SD ...	Yankton	5A	4.1	1,264	2.7
	Pierre	6A	4.2	1,258	2.8
	Average		*4.2*	*1,261*	*2.8*
TN ...	Memphis	3A	3.4	1,047	3.0
	Nashville	4A	3.2	1,083	1.9
	Average		*3.3*	*1,065*	*2.4*
WY ..	Torrington	5B	4.2	1,145	2.6
	Cheyenne	6B	4.5	1,179	2.8
	Rock Springs	7B	4.7	1,205	3.0
	Average		*4.5*	*1,176*	*2.8*

APPENDIX 3—AVERAGE 2011 TWO-BEDROOM TOTAL DEVELOPMENT COST LIMITS FOR 13 STATES THAT HAVE NOT ADOPTED ASHRAE 90.1–2007 AND TDC ADJUSTMENT FACTORS

State	TDC Limit ($)	TDC Adjustment Factor
NY	221,607	1.00
AK	245,882	1.11
AZ	171,058	0.77

APPENDIX 3—AVERAGE 2011 TWO-BEDROOM TOTAL DEVELOPMENT COST LIMITS FOR 13 STATES THAT HAVE NOT ADOPTED ASHRAE 90.1–2007 AND TDC ADJUSTMENT FACTORS—Continued

State	TDC Limit ($)	TDC Adjustment Factor
CO	178,241	0.80
HI	239,412	1.08
KS	170,213	0.77
ME	187,802	0.85
MN	207,475	0.94

APPENDIX 3—AVERAGE 2011 TWO-BEDROOM TOTAL DEVELOPMENT COST LIMITS FOR 13 STATES THAT HAVE NOT ADOPTED ASHRAE 90.1–2007 AND TDC ADJUSTMENT FACTORS—Continued

State	TDC Limit ($)	TDC Adjustment Factor
MO	184,221	0.83
OK	155,578	0.70
SD	159,576	0.72
TN	160,222	0.72
WY	160,431	0.72

APPENDIX 4—ESTIMATED COSTS AND BENEFITS PER DWELLING UNIT FROM ADOPTION OF ASHRAE 90.1–2007 [50]

State	Incremental Cost/Unit ($)	Energy cost savings/unit ($/year) *	simple pay-back/unit (years)
AK	489	57.90	8.5
AZ	340	54.22	6.3

[49] Source: Pacific Northwest National Laboratory, Department of Energy, *Impacts of Standard 90.1–2007 for Commercial Buildings at State Level,* September 2009. States for which figures are provided are states that have not yet adopted ASHRAE 90.1–2007. Those States for which cost and savings are shown as zero percent had adopted ASHRAE 90.1–2007 as of August 2012. Available at *http://www.energycodes.gov/impacts-standard-901-2007-commercial-buildings-state-level.*

[50] *Sources:* HUD Estimate of Incremental Costs and Dollar Savings associated with ASHRAE 90.1–2007. Incremental Cost/Unit was estimated by adjusting the New York incremental cost of $441.19 by Total Development Cost (TDC) adjustment factors in Appendix 2B. Energy Cost Savings/Unit is derived from PNNL estimates of energy saved, using national average of .0939/kWh for electricity and $1.2201/therm. Simple Payback/Unit is derived by dividing Incremental Cost/Unit by Energy Cost Savings/Unit.

APPENDIX 4—ESTIMATED COSTS AND BENEFITS PER DWELLING UNIT FROM ADOPTION OF ASHRAE 90.1–2007 [50]—Continued

State	Incremental Cost/Unit ($)	Energy cost savings/unit ($/year) *	simple payback/unit (years)
CO	354	32.01	11.1
HI	476	8.11	58.8
KS	338	59.26	5.7
ME	373	42.27	8.8
MN	413	33.65	12.3
MO	366	26.55	13.8
NY	441	45.07	9.8
OK	309	21.73	14.3
SD	317	35.32	9.0
TN	318	25.57	12.5
WY	319	32.95	9.7

* Note on Energy Cost Savings: This table uses PNNL methodology of national average cost of electricity of .0939/kWh and $1.2201/therm for natural gas.

APPENDIX 5—ESTIMATED TOTAL COSTS AND BENEFITS FROM ADOPTION OF 2009 IECC OVER EXISTING STATE CODE

State	Total incremental cost per state ($)	Total energy cost savings per state ($ per year)
AK	282,940	107,457
AR	1,330,890	211,233
AZ	4,649,876	824,978
CO	1,909,534	283,678
HI	622,050	125,367
KS	424,050	135,696
KY	781,392	218,094
LA	2,849,237	342,085
ME	291,200	97,600
MN	1,840,895	432,425
MO	1,158,043	302,568
MS	1,263,525	174,416
OK	1,892,952	295,728
SD	258,962	58,408
TN	1,313,649	292,149
UT	1,579,900	218,624
WI	865,761	201,477
WY	306,210	53,630
Total	23,621,066	4,375,613

APPENDIX 6—ESTIMATED TOTAL COSTS AND BENEFITS FROM ADOPTION OF ASHRAE 90.1–2007

State	Total incremental cost/ state ($)	Total energy cost savings/ state ($/year)
AK	25,945	3,069
AZ	292,192	46,521
CO	638,730	57,618
HI [51]	0	0
KS	11,860	2,074
ME [52]	0	0
MN	107,396	8,749
MO	247,930	17,948
OK	402,972	28,271
SD	44,159	4,909
TN	74,960	6,009
WY	25,871	2,669

APPENDIX 6—ESTIMATED TOTAL COSTS AND BENEFITS FROM ADOPTION OF ASHRAE 90.1–2007—Continued

State	Total incremental cost/ state ($)	Total energy cost savings/ state ($/year)
Total	1,872,015	177,837

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BILLING CODE 4210–67–P

[51] Hawaii has been excluded from this notice due to insufficient cost savings and a resulting long simple payback projected from the adoption of ASHRAE 90.1–2007. These costs and savings are therefore excluded from this table.

[52] No units were produced under affected programs in Maine in FY 2011: therefore, no costs or savings are shown.

DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

[FWS–R8–ES–2014–N060; FXES11120800000–145–FF08EVEN00]

Low-Effect Habitat Conservation Plan for the Endangered Mount Hermon June Beetle, Bonny Doon, Santa Cruz County, California

AGENCY: U.S. Fish and Wildlife Service, Interior.

ACTION: Notice of availability; request for comment.

SUMMARY: We, the U.S. Fish and Wildlife Service, have received an application from Steven C. Sohl for a 5-year incidental take permit under the Endangered Species Act of 1973, as amended (Act). The application addresses the potential for ''take'' of the federally endangered Mount Hermon June beetle likely to occur incidental to the construction of a single-family residence, garage, and associated landscaping/infrastructure on an existing legal parcel in Bonny Doon, Santa Cruz County, California. We invite comments from the public on the application package includes the Sohl Low-Effect Habitat Conservation Plan for the Endangered Mount Hermon June Beetle.

DATES: To ensure consideration, please send your written comments by May 15, 2014.

ADDRESSES: You may download a copy of the Habitat Conservation Plan, draft Environmental Action Statement and Low-Effect Screening Form, and related documents on the Internet at *http://www.fws.gov/ventura/,* or you may request copies of the documents by U.S. mail or phone (see below). Please address written comments to Stephen P. Henry, Acting Field Supervisor, Ventura Fish and Wildlife Office, U.S. Fish and Wildlife Service, 2493 Portola Road, Suite B, Ventura, CA 93003. You may alternatively send comments by facsimile to (805) 644–3958.

FOR FURTHER INFORMATION CONTACT: Chad Mitcham, Fish and Wildlife Biologist, by U.S. mail at the above address, or by telephone (805) 644–1766.

SUPPLEMENTARY INFORMATION: We have received an application from Steven C. Sohl for a 5-year incidental take permit under the Endangered Species Act of 1973, as amended. The application addresses the potential for ''take'' of the federally endangered Mount Hermon June beetle (*Polyphylla barbata*) likely to occur incidental to the construction of a single-family residence, garage, and associated landscaping/infrastructure on an existing legal parcel in Bonny Doon, Santa Cruz County, California. The applicant would implement a conservation program to minimize and