



February 28, 2022

The Honorable Jennifer M. Granholm
Secretary
U.S. Department of Energy
1000 Independence Ave, SW
Washington, DC 20585

Re: Draft Environmental Impact Statement for Proposed Energy Conservation Standards for Manufactured Housing (EERE-2009-BT-BC-0021)

Dear Secretary Granholm,

The Manufactured Housing Institute (MHI) is pleased to provide comments to the Department of Energy (DOE) in response to the draft Environmental Impact Statement (EIS) associated with the proposed rulemaking about energy conservation standards for manufactured housing. We intend this letter to supplement our November 23, 2021, comment letter (Appendix II) on the proposed rule itself.

MHI is the only national trade association that represents every segment of the factory-built housing industry. As a result, our organization is uniquely qualified to provide detailed analysis of the proposed energy standards and to submit recommendations to fix problems in the proposed rule. Our members include home builders, suppliers, retail sellers, lenders, installers, community owners, community operators, and others who serve the industry, as well as 48 affiliated state organizations. In 2021, our industry produced more than 105,000 homes, accounting for approximately nine percent of new single-family home starts. These homes are produced by 33 U.S. corporations in 139 plants located across the country. MHI's members are responsible for close to 85 percent of the manufactured homes produced each year.

With regard to the narrow focus of this request for comment, the EIS, the proposed standards do not take into consideration current construction methods and transportation requirements or testing or compliance requirements. Therefore, the impact of the proposal on consumers and the industry is clearly and significantly underestimated in the EIS both with respect to the expected increase in costs and overall feasibility.

More broadly, we would point out that, to date, the rulemaking process implementing the underlying legislation has been plagued by legal issues, and the proposed rule raises a wide range of legal, policy, environmental, and implementation questions. In an effort to resolve those questions, MHI has attached to this letter specific technical recommendations (see Appendix I) that would address these concerns.

If adopted, these recommendations would result in a final rule that achieves the legislative goal of increased energy efficiency, without threatening low- and moderate-income families with losing the most affordable homeownership option in America, manufactured housing, as a result of excessive cost increases and feasibility challenges in the proposed standard.

Significant Problems with the Proposed Rule

Following is a short summary of the most significant legal, policy, environmental, and implementation questions regarding the proposed rule, which, if left unresolved, would undermine the adoption of a final rule:

1. **Court Injunction.** On February 11, 2022, in *Louisiana v. Biden*, the court adopted an injunction preventing the DOE, among other agencies, from “adopting, employing, treating, as binding, or relying upon” the findings of the Interagency Working Group, the calculations of Social Cost of Greenhouse Gas estimates based on global effects rather than national effects, or otherwise relying upon or

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implementing Executive Order 13990 in any manner. It would appear that this injunction applies to the proposed rule since it expressly references Executive Order 13990 and “interim estimates issued in February 2021” based thereon where it states: DOE calculates the value of the reduced emissions of CO₂, CH₄, and N₂O (collectively, greenhouse gases or GHGs) using a range of values per metric ton of pollutant, consistent with the interim estimates issued in February 2021 under Executive Order 13990. Thus, at a minimum, this injunction and the underlying legal issues cast a serious legal cloud on the proposed rule.

2. **Failure to Comply with the Statutory Requirement to be Cost Effective.** As noted in MHI’s November comment letter, “The proposed energy standards fail the Energy Independence and Security Act of 2007 (EISA) statutory requirement to use the International Energy Conservation Code (IECC) “**except in cases in which the code is not cost effective . . .**, based on the impact of the Code on the purchase price of manufactured housing and on total life-cycle construction and operation costs.” The result is manufactured housing will be less affordable, due to large increases in home sale prices and operating cost increases that exceed energy savings.”
3. **Failure to Comply with the Statutory Requirement to Adopt a More Stringent Standard when it would be Cost Effective.** As noted in MHI’s November comment letter, “The proposed energy standards fail the Energy Independence and Security Act of 2007 (EISA) statutory requirement to use the International Energy Conservation Code (IECC) “**except in cases in which . . . a more stringent standard would be more effective**, based on the impact of the code on the purchase price of manufactured housing and on total life-cycle construction and operation costs.” Per this statutory requirement, the rule should have – but was not – developed by incrementally adding more and more efficiency improvements, such as thicker insulation levels, until the next incremental improvement would not be cost-effective.
4. **Failure to Address Legal Issues Regarding Primacy of the HUD Code and the Manufactured Housing Consensus Committee’s role in establishing safety and construction standards.** As noted in MHI’s November comment letter, in its proposed rule, DOE completely avoided discussion of the primacy of the Manufactured Housing Consensus Committee (MHCC,) with regard to the establishment of manufactured housing safety and construction standards. The proposed rule would propose standards that are inconsistent with existing energy standards as promulgated by the MHCC. We assume the rule’s energy requirements would not take effect unless and until the MHCC adopts them, and further that the MHCC could make changes to the proposed requirements. However, these critical legal issues are not addressed in the proposed rule.
5. **Failure to Adequately Consult with HUD, as Required by the Statute.** As noted in MHI’s November comment letter, “The proposed energy standards were developed without complying in any meaningful way with the EISA statutory requirement to consult with HUD, resulting in proposed standards that ignore the construction aspects unique to manufactured housing or the negative impact on homebuyer affordability.” As a result, the proposal lacks the input of valuable expertise that HUD could have provided with respect to low- and moderate-income family housing affordability issues and the number of homebuyers that would no longer qualify for a mortgage loan because of cost increases and therefore would not achieve homeownership.
6. **Problems with the Environmental Impact Statement.** As noted in the introduction of this letter, the proposed standards do not take into consideration current construction methods and transportation requirements or testing or compliance requirements. Therefore, the impact of the proposal on consumers and the industry is clearly and significantly underestimated in the EIS both with respect to the expected increase in costs and overall feasibility.

Energy Efficiency and Manufactured Housing

MHI and its members have always supported energy conservation efforts and other reasonable environmental protection initiatives, and we will continue to do so. In fact, the vast majority of today's manufactured homes are constructed well above the required energy efficiency standards contained in the HUD Code. Not only are new factory-built homes as efficient as their site-built counterparts, but in 2020, more than 30 percent of new manufactured homes were built to meet or exceed Energy Star standards. Further, the industry is developing programming to engage all stakeholders, from manufacturers to retailers to consumers and energy providers to significantly grow the share of Energy Star.

Today's manufacturers understand the unique aspects associated with building manufactured homes and the downside the DOE's proposal will have in terms of hampering production in an industry that is operating at near capacity and driving up the costs of the only affordable housing solution in the country. The industry is continuously working on projects to improve energy efficiency and currently has four significant energy initiatives underway for manufactured housing. One with the state of California, two projects with the DOE, including one concentrating on developing a "Zero Energy Ready" manufactured home, and one with HUD to re-engineer the design and fabrication of the HVAC system in manufactured homes with all components installed in the plant under HUD's quality control regime.

Manufactured Housing as an Affordable Housing Solution

Any increase in construction costs, even modest increases in response to a new energy conservation standard, could jeopardize homeownership for hundreds of thousands of Americans at time when there is an affordable housing shortage in the country.

In the draft EIS, the DOE acknowledges this by stating that "manufactured home purchases and residents are disproportionately from lower-income and minority populations.... Increase purchase price and up-front costs might reduce access to affordable homeownership for some low-income consumers." The Energy Independence and Security Act (EISA) requires that "energy conservation standards established under this section shall be based on the most recent version of the International Energy Conservation Code (including supplements), except in cases in which the Secretary finds that the code is not cost effective...based on the impact of the code on the purchase price of manufactured housing and on total life-cycle construction and operating costs."

First, the higher home cost associated with the proposed standards will make manufactured housing far more expensive excluding potential buyers and reducing total manufactured housing sales, the latter hurting the industry and contributing to the lack of affordable housing. Second, if households are fortunate enough to qualify for a home that meets the new standards, the home they get will be more, not less, expensive to own.

As shown in DOE's proposal, using sample homes (single- and multi-section), DOE estimated energy savings by comparing homes, in select locations, built to the current HUD energy standards with homes meeting the IECC. As expected, there is a huge difference in energy use (and estimated energy costs) between these benchmarks. The large savings suggests that a whole lot of investment in energy measures can be justified, particularly if the savings are accumulated over 30 years which is an artificial construct. However, the EIS cites American Community Survey data that only "7 percent of manufactured home residents had lived in their home at least 30 years." This demonstrates that the proposal is not cost-effective for consumers and will raise the barrier for entry-level homeownership for millions of Americans at a time when there is an affordable housing shortage in the country.

Further, neither the draft EIS nor the proposed rule includes testing, compliance, or enforcement provisions which DOE says it will address at a later date. Estimating the costs of the proposed changes to consumers, without including these components is impossible, as these could significantly add to costs. Testing requirements for each of the systems being modified in the proposal must be addressed before any rule is

finalized, and the costs associated with these must be included in any analysis. Additionally, it is unnecessary for the DOE to develop a new enforcement mechanism with any proposed manufactured housing energy conservation standard because HUD already has an established enforcement mechanism that mandates a uniform standard for design, construction, and installation, including federal requirements for safety, durability, and energy efficiency. Failure to partner with HUD would result in complicated, overlapping requirements that will only increase manufacturing costs, hurting existing homeowners and prospective homebuyers.

Reliance on the International Energy Conservation Code

Utilizing the 2021 International Energy Conservation Code (IECC) – a standard that was designed for site-built homes and NOT manufactured homes – as recommended in the EIS is the wrong standard to utilize. Given that the IECC essentially ignores all the construction aspects unique to manufactured housing, it is an inappropriate code for attempted enforcement upon the manufactured housing industry and could potentially cause factory closures, the loss of thousands of jobs, and an immediate affordable housing crisis for one of the largest sectors in the housing market.

As just one example, the proposed requirements adapted from the IECC will require foam insulation throughout the walls in homes in thermal zone three, in addition to batt insulation which is currently used. Foam insulation is difficult to utilize in a factory setting, expensive and will slow down the production line. Further, adding foam insulation between the studs and siding of a home, could result in separation of the siding during transport and require more on-site labor work to address the issues. Additionally, by increasing the truss heel height, increasing floor joist depth, and adding insulation outside of the studs, as these proposed requirements will require, the overall shipping envelope will change which could prevent shipping a home into an area of the country with low bridges resulting in consumers having to settle for a different style of home, or more than likely, being forced out of the housing market due to a lack of affordable housing.

Implementation Period

In the draft EIS, the DOE proposes a one-year implementation period. However, when the DOE makes changes to appliance standards there is at least a five-year compliance period. For example, on January 6, 2017, the DOE published a final rule to establish energy conservation standards for residential central air conditioners and heat pumps with a compliance date of January 1, 2023 (Docket Number EERE-2014-BTSTD-0048-0200). Additionally, on April 16, 2010, the DOE published amendments to the existing energy conservation standards for residential water heaters, gas-fired direct heating equipment, and gas-fired pool heaters. While the effective date of the rule was June 15, 2010, compliance with the standards was not required until April 16, 2015 (Docket Number EE-2006-BT-STD-0129).

Given that the process for manufactured homes is at least as complex as appliances, a minimum of five years for compliance should apply. If the proposed rulemaking is finalized as written, implementing the changes would require manufacturing plants to completely overhaul their systems and processes. Further, every home design currently being utilized – of which there are thousands – would need to be redesigned and reapproved, further slowing down the production process. Using a one-year implementation will simply stop all manufactured housing production for a significant period of time, taking approximately nine percent of new housing out of the market, at a time when the demand for affordable housing is at its highest.

Conclusion

Efforts to improve energy efficiency should not have the unintended consequence of denying a hardworking family the opportunity to achieve the American Dream of homeownership. If the proposed standards are enacted, there is no question that it will have a negative impact on the ability of entry-level homebuyers to achieve homeownership through manufactured housing. MHI stands ready to work with DOE and HUD on the development of realistic and achievable energy standards, which the industry's proposal reflects, that not only encourages innovation and conservation but also eliminates regulatory barriers that impede consumer access to safe, affordable manufactured housing.

Sincerely,



Lesli Gooch, Ph.D.
Chief Executive Officer

APPENDIX I
Industry's Proposal for Energy Efficiency Standards for Manufactured Housing

MHI and the industry's goal in developing this alternative manufactured housing energy standard was to provide a concrete example showing how a judicious increase in energy requirements can result in substantially improved energy efficiency *and* greater affordability. In balancing these two considerations, the financial impact of increased efficiency is measured from the homebuyer's perspective. The technical recommendations were developed by incrementally adding more and more efficiency improvements, such as thicker insulation levels, until the next incremental improvement would not be cost effective. The result is a standard that can be implemented without requiring factories to retool or use unproven technologies yet would result in dramatic reductions in energy use that financially benefit buyers of new manufactured homes.

Authority: 42 U.S.C. 17071; 42 U.S.C. 7101 *et seq.*

Subpart A – General

§ 460.1 Scope.

This subpart establishes energy conservation standards for manufactured homes as manufactured at the factory, prior to distribution in commerce for sale or installation in the field. A manufactured home that is manufactured on or after the [DATE 4 YEAR AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER] must comply with all applicable requirements of this part.

§ 460.2 Definitions.

Adapted from Section R202 of the 2021 IECC and as used in this part—

Access (to) means that which enables a device, appliance or equipment to be reached by ready access or by a means that first requires the removal or movement of a panel or similar obstruction.

Air barrier means one or more materials joined together in a continuous manner to restrict or prevent the passage of air through the building thermal envelope and its assemblies.

Automatic means self-acting or operating by its own mechanism when actuated by some impersonal influence

Building thermal envelope means exterior walls, exterior floors, exterior ceiling, or roofs, and any other building element assemblies that enclose conditioned space or provide a boundary between conditioned space and unconditioned space.

Ceiling means an assembly that supports and forms the overhead interior surface of a building or room that covers its upper limit and is horizontal or tilted at an angle less than 60 degrees (1.05 rad) from horizontal.

Climate zone means a geographical region identified in §460.101.

Conditioned space means an area, room, or space that is enclosed within the building thermal envelope and that is directly or indirectly heated or cooled. Spaces are indirectly heated or cooled where they communicate through openings with conditioned space, where they are separated from conditioned spaces by uninsulated walls, floors or ceilings, or where they contain uninsulated ducts, piping, or other sources of heating or cooling.

Continuous air barrier means a combination of materials and assemblies that restrict or prevent the passage of air from conditioned space to unconditioned space.

Door means an operable barrier used to block or allow access to an entrance of a manufactured home.

Dropped ceiling means a secondary nonstructural ceiling, hung below the exterior ceiling.

Dropped soffit means a secondary nonstructural ceiling that is hung below the exterior ceiling and that covers only a portion of the ceiling.

Duct means a tube or conduit, except an air passage within a self-contained system, utilized for conveying air to or from heating, cooling, or ventilating equipment.

Duct system means a continuous passageway for the transmission of air that, in addition to ducts, includes duct fittings, dampers, plenums, fans, and accessory air-handling equipment and appliances.

Eave means the edge of the roof that overhangs the face of an exterior wall and normally projects beyond the side of the manufactured home.

Equipment includes material, devices, fixtures, fittings, or accessories both in the construction of, and in the plumbing, heating, cooling, and electrical systems of a manufactured home.

Exterior ceiling means a ceiling that separates conditioned space from unconditioned space.

Exterior floor means a floor that separates conditioned space from unconditioned space.

Exterior wall means a wall, including a skylight well, that separates conditioned space from unconditioned space.

Fenestration means vertical fenestration and skylights.

Floor means a horizontal assembly that supports and forms the lower interior surface of a building or room upon which occupants can walk.

Glazed or glazing means an infill material, including glass, plastic, or other transparent or translucent material used in fenestration.

Heated water circulation system means a water distribution system in which one or more pumps are operated in the service hot water piping to circulate heated water from the water heating equipment to fixtures and back to the water heating equipment.

2021 IECC means the 2021 version of the International Energy Conservation Code, issued by the International Code Council.

Insulation means material deemed to be insulation under 16 CFR 460.2.

Manufactured home means a structure, transportable in one or more sections, which in the traveling mode is 8 body feet or more in width or 40 body feet or more in length or which when erected onsite is 320 or more square feet, and which is built on a permanent chassis and designed to be used as a dwelling with or without a permanent foundation when connected to the required utilities, and includes the plumbing, heating, air conditioning, and electrical systems contained in the structure. This term includes all structures that meet the above requirements except the size requirements and with respect to which the manufacturer voluntarily files a certification pursuant to 24 CFR 3282.13 and complies with the construction and safety standards set forth in 24 CFR part 3280. The term does not include any self-propelled recreational vehicle. Calculations used to determine the number of square feet in a structure will be based on the structure's exterior dimensions, measured at the largest horizontal projections when erected on site. These dimensions will include all expandable rooms, cabinets, and other projections containing interior space, but do not include bay windows. Nothing in this definition should be interpreted to mean that a manufactured home necessarily meets the requirements of the U.S. Department of Housing and Urban Development Minimum Property Standards (HUD Handbook 4900.1) or that it is automatically eligible for financing under 12 U.S.C. 1709(b).

Manufacturer means any person engaged in the factory construction or assembly of a manufactured home, including any person engaged in importing manufactured homes for resale.

Manual means capable of being operated by personal intervention.

Opaque door means a door that is not less than 50 percent opaque in surface area.

R-value (thermal resistance) means the inverse of the time rate of heat flow through a body from one of its bounding surfaces to the other surface for a unit temperature difference between the two surfaces, under steady state conditions, per unit area ($\text{h} \times \text{ft}^2 \times$ °F/Btu).

Rough opening means an opening in the exterior wall or roof, sized for installation of fenestration.

Service hot water means supply of hot water for purposes other than comfort heating.

Skylight means glass or other transparent or translucent glazing material, including framing materials, installed at an angle less than 60 degrees (1.05 rad) from horizontal, including unit skylights, tubular daylighting devices, and glazing materials in solariums, sunrooms, roofs and sloped walls.

Skylight well means the exterior walls underneath a skylight that extend from the interior finished surface of the exterior ceiling to the exterior surface of the location to which the skylight is attached.

Solar heat gain coefficient (SHGC) means the ratio of the solar heat gain entering a space through a fenestration assembly to the incident solar radiation. Solar heat gain includes directly transmitted solar heat and absorbed solar radiation that is then reradiated, conducted, or convected into the space.

State means each of the 50 states, the District of Columbia, the Commonwealth of Puerto Rico, Guam, the U.S. Virgin Islands, and American Samoa.

Thermostat means an automatic control device used to maintain temperature at a fixed or adjustable set point.

U-factor (thermal transmittance) means the coefficient of heat transmission (air to air) through a building component or assembly, equal to the time rate of heat flow per unit area and unit temperature difference between the warm side and cold side air films (Btu/h \times ft² \times °F).

U_o (overall thermal transmittance) means the coefficient of heat transmission (air to air) through the building thermal envelope, equal to the time rate of heat flow per unit area and unit temperature difference between the warm side and cold side air films (Btu/h \times ft² \times °F).

Ventilation means the natural or mechanical process of supplying conditioned or unconditioned air to, or removing such air from, any space.

Vertical fenestration means windows (fixed or moveable), opaque doors, glazed doors, glazed block and combination opaque and glazed doors composed of glass or other transparent or translucent glazing materials and installed at a slope of greater than or equal to 60 degrees (1.05 rad) from horizontal.

Wall means an assembly that is vertical or tilted at an angle equal to greater than 60 degrees (1.05 rad) from horizontal that encloses or divides an area of a building or room.

Whole-house mechanical ventilation system means an exhaust system, supply system, or combination thereof that is designed to mechanically exchange indoor air with outdoor air when operating continuously or through a programmed intermittent schedule to satisfy the whole house ventilation rates.

Window means glass or other transparent or translucent glazing material, including framing materials, installed at an angle greater than 60 degrees (1.05 rad) from horizontal.

Zone means a space or group of spaces within a manufactured home with heating or cooling requirements that are sufficiently similar so that desired conditions can be maintained using a single controlling device.

§ 460.3 Materials incorporated by reference.

(a) Certain material is incorporated by reference into this subpart with the approval of the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. To enforce any edition other than that specified in this section, DOE must publish a document in the Federal Register and the material must be available to the public. All approved material is available for inspection at the U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, Building Technologies Program, Sixth Floor, 950 L'Enfant Plaza SW., Washington, DC 20024, (202) 586–2945, <https://www.energy.gov/eere/buildings/appliance-and-equipment-standards-program>, and may be obtained from the other sources in this section. It is also available for inspection at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, email: fedreg.legal@nara.gov, or go to: www.archives.gov/federal-register/cfr/ibr-locations.html.

(b) ACCA. Air Conditioning Contractors of America, Inc., 2800 S. Shirlington Road, Suite 300, Arlington, VA 22206, 703-575-4477, www.acca.org/.

~~(1) ANSI/ACCA 2 Manual J 2016 (“ACCA Manual J”), *Manual J—Residential Load Calculation (8th edition)*, Copyright 2016. IBR approved for §460.205.~~

~~(2) ANSI/ACCA 3 Manual S 2014 (“ACCA Manual S”), *Manual S—Residential Equipment Selection (2nd Edition)*, Copyright 2014. IBR approved for § 460.205.~~

(c) PNL. Pacific Northwest Laboratory, Richland, WA 99352, 800-245-2691, www.buduser.org/portal/publications/manufbsg/uvalue.html.

(1) PNL–8006, (“Overall U-values and Heating/Cooling Loads–Manufactured Homes”), *Overall U-Values and Heating/Cooling Loads–Manufactured Homes*, C. C. Conner and Z. T. Taylor, February 1, 1992. IBR approved for §460.102(e)(1).

(2) ~~{Reserved}~~.

~~§ 460.4 Energy conservation standards.~~

~~(a) General. Energy conservation standard tier thresholds presented in paragraphs~~

~~(b) and (c) of this section must be adjusted to the most recently available Annual Energy Outlook (AEO) gross domestic product (GDP) time series.~~

~~(b) Tier 1. A manufactured home for which the manufacturer's retail list price is~~

~~\$55,000 or less in real 2019\$ (i.e., a Tier 1 manufactured home) must comply with all applicable requirements in subparts B and C of this part.~~

~~(c) Tier 2. A manufactured home for which the manufacturer retail list price is greater than \$55,000 in real 2019\$ (i.e., a Tier 2 manufactured home) must comply with all applicable requirements in subparts B and C of this part.~~

Subpart B – Building Thermal Envelope

§ 460.101 Climate zones.

Manufactured homes subject to the requirements of this subpart must comply with the requirements applicable to one or more of the climate zones set forth in Figure 460.101 and Table 460.101 of this section.

Figure 460.101 Climate Zones

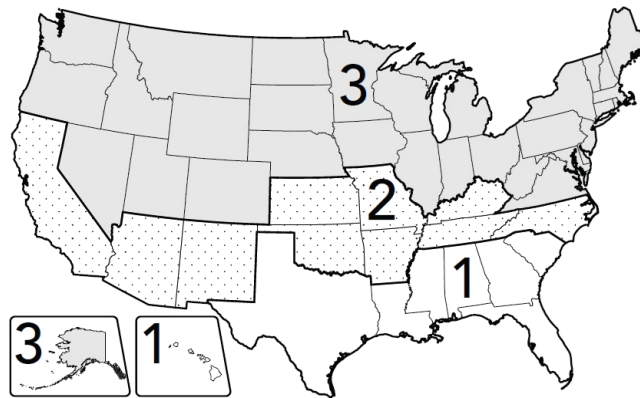


Table 460.101 U.S. States and Territories per Climate Zone

ZONE 1	ZONE 2	ZONE 3
Alabama	Arkansas	Alaska
American Samoa	Arizona	Colorado
Florida	California	Connecticut
Georgia	Kansas	Delaware
Guam	Kentucky	District of Columbia
Hawaii	Missouri	Idaho
Louisiana	New Mexico	Illinois
Mississippi	North Carolina	Indiana
South Carolina	Oklahoma	Iowa
Texas	Tennessee	Maine
The Commonwealth of Puerto Rico		Maryland
U.S. Virgin Islands		Massachusetts
		Michigan
		Minnesota
		Montana
		Nebraska
		Nevada
		New Hampshire
		New Jersey
		New York
		North Dakota
		Ohio
		Oregon
		Pennsylvania
		Rhode Island

		South Dakota
		Utah
		Vermont
		Virginia
		Washington
		West Virginia
		Wisconsin
		Wyoming

§ 460.102 Building thermal envelope requirements.

(a) *Compliance options.* The building thermal envelope must meet either the prescriptive requirements of paragraph (b) of this section or the performance requirements of paragraph (c) of this section.

(b) *Prescriptive requirements.* (1) The building thermal envelope must meet the applicable minimum R-value (nominal value of insulation), and the glazing maximum Ufactor and SHGC, ~~requirements set~~requirements set forth in Tables 460.102-1 ~~and~~ or component U-value set forth in Table 406.102-2, 460.102-2 of this section.

Table 460.102-1 Tier 1 Building Thermal Envelope Prescriptive Requirements

Climate Zone	Exterior Wall Insulation R-value	Exterior Ceiling Insulation R-value	Exterior Floor Insulation R-value	Window U-factor	Skylight U-factor	Door U-factor	Glazed Fenestration SHGC
1	11 3	25 2	22	1.08	0.7 5	0.40	0.7
2	11 3	25 2	19	0.5	0.5 5	0.40	0.6
3	19	22	22	0.35	0.5 5	0.40	Not applicable

Table 460.102-21 Tier 2 Building Thermal Envelope Prescriptive Requirements

Climate Zone	Exterior Wall Insulation R-value	Exterior Ceiling Insulation R-value	Exterior Floor Insulation R-value	Window U-factor	Skylight U-factor	Door U-factor	Glazed Fenestration SHGC
1	13	30	13	0.3 <u>0.25</u>	0.7 5	0.40	0.33
2	21 or 13+ <u>5</u> <u>20</u> <u>+5</u> <u>13</u>	30	19	0.3 <u>0.35</u>	0.5 5	0.40	0.25
3	21 or 13+ <u>5</u> <u>20+</u> <u>5</u> <u>15</u>	38	30 <u>5</u>	0.3 <u>0.32</u>	0.5 5	0.40	Not applicable

(2) For the purpose of compliance with the exterior ceiling insulation R-value requirement of paragraph (b)(1) of this section, the truss heel height must be a ~~minimum~~ of minimum of 5.5 inches at the outside face of each exterior wall.

(3) A combination of R-21 batt insulation and R-14 blanket insulation may be used for the purpose of compliance with the floor insulation R-value requirement of Table 460.102-~~21~~, climate zone 3.

(4) An individual skylight that has an SHGC that is less than or equal to 0.30 is not subject to the glazed fenestration SHGC requirements established in paragraph (b)(1) of this section. ~~Adapted from section R402 of the 2021 IECC.~~

(5) U-factor alternatives to R-value requirements. Compliance with the applicable requirements in paragraph (b)(1) of this section may be determined using the maximum component U-factor values set forth in Tables 460.102-~~3-2~~ and ~~460.102-4~~, which reflect the

thermal transmittance of the component, excluding fenestration, and not just the insulation of that component, as an alternative to the minimum nominal R-value requirements set forth in Tables 460.102-1 ~~and 460.102-2, respectively.~~

- ~~R402.3.3~~ Glazed fenestration exemption. Not greater than 15 square feet (1.4 m2) of glazed fenestration per dwelling unit shall be exempt from the Ufactor and SHGC requirements- (Table 460.120-1)in Section R402.1.2. This exemption shall not apply to the Total UA-value alternative in Section R402.1.5(Table 460.120-2).
- ~~R402.3.4~~ Opaque door exemption. One side-hinged opaque door assembly not greater than 24 square feet (2.22 m2) in area shall be exempt from the Ufactor requirement (Table 460.120-1). This exemption shall not apply to the Total U-value alternative (Table 460.120-2).in Section R402.1.2. This exemption shall not apply to the Total UA alternative in Section R402.1.5.

Table 460.102-3 U-factor Alternatives to Tier 1 R-value Requirements

Climate Zone	Exterior Ceiling U-factor		Exterior Wall U-factor	Exterior Floor U-factor
	Single-section	Multi-section		
1	0.06 4	0.05 7	0.09 4	0.04 9
2	0.06 4	0.05 7	0.09 4	0.05 6
3	0.06 4	0.05 7	0.06 8	0.04 9

Table 460.102-4 2 U-factor value Alternatives to Tier 2 R-value Requirements

Climate Zone	Exterior Ceiling U-factor value		Exterior Wall U-factor value	Exterior Floor U-factor value
	Single-section	Multi-section		
1	0.04 5	0.04 3	0.09 4	0.07 8

2	0.04 5	0.04 3	0.09 447	0.05 6
3	0.03 8	0.03 7	0.07 647	0.03 2036

(c) *Performance requirements.* (1) The building thermal envelope must have a Uo-
value that is less than or equal to the applicable value specified in Tables 460.102-~~5-3~~ and
 460.102-6 of this section.

**Table 460.102-~~35~~ Tier 1 Building Thermal & Multi-Thermal Envelope
 Performance Requirements**

Climate Zone	Single-Section Uo- value	Multi-Section Uo- value
		Section Uo
1	0.0930.110	0.0900.096
2	0.0810.094	0.0760.079
3	0.0650.074	0.0610.073

Table 460.102-6 Tier 2 Building Thermal Envelope Performance Requirements

Climate Zone	Single-Section Uo	Multi-Section Uo
1	0.086	0.082
2	0.0760.062	0.0730.063
3	0.0670.053	0.0640.052

- (1) Area-weighted average vertical fenestration U-factor value must not exceed 0.48 in climate zone 2 or 0.40 in climate zone 3. ~~Adapted from section R402 of the 2021 IECC.~~
- (2) Area-weighted average skylight U-factor must not exceed 0.75 in climate zone 2 and climate zone 3. ~~Adapted from section R402 of the 2021 IECC.~~

(3) Windows, skylights and doors containing more than 50 percent glazing by area must satisfy the SHGC requirements established in paragraph (b)(1) of this section on the basis of an area-weighted average. ~~Adapted from section R402 of the 2021 IECC.~~

(d)) *Determination of compliance with paragraph (c) of this section.* (1) U_o ~~must value~~ must be determined in accordance with Overall U-Values and Heating/Cooling Loads – Manufactured Homes (incorporated by reference; see §460.3)

~~(2) [Reserved]~~

§ 460.103 Installation of insulation.

Insulating materials must be installed according to the insulation manufacturer’s installation instructions and the requirements set forth in Table 460.103 of this section, ~~which is adapted from section R402 of the 2021 IECC.~~

Table 460.103 Installation of Insulation

COMPONENT	INSTALLATION REQUIREMENTS
General	Air-permeable insulation must not be used as a material to establish the air barrier.
Access hatches, panels, and doors	Access hatches, panels, and doors between conditioned space and unconditioned space must be insulated to a level equivalent to the insulation of the surrounding surface, must provide access to all equipment that prevents damaging or compressing the insulation, and must provide a wood-framed or equivalent baffle or retainer when loose fill insulation is installed within an exterior ceiling assembly to retain the insulation both on the access hatch, panel, or door and within the building thermal envelope.
Baffles	Baffles must be constructed using a solid material, maintain an opening equal or greater than the size of the vents, and extend over the top of the attic insulation <u>where insulation is restrained from full depth in order to maintain 1’ minimum air space between insulation and roof decking.</u>
Ceiling or attic	The insulation in any dropped ceiling or dropped soffit must be a lined with the air <u>the air</u> barrier.
<u>Eave vents</u>	Air permeable insulations in vented attics within the building Thermal envelope must be installed adjacent to eave vents.

Narrow cavities	Batts to be installed in narrow cavities must be cut to fit or narrow cavities must be filled with insulation that upon installation readily conforms to the available cavity space.
Rim joists	Rim joists must be insulated such that the insulation maintain permanent contact with the exterior rim board.
Shower or tub adjacent to exterior wall	Exterior walls adjacent to showers and tubs must be insulated.
Walls	Air permeable exterior building thermal envelope insulation for framed exterior walls must completely fill the cavity, including within stud bays caused by blocking lay flats or headers.

§ 460.104 Building thermal envelope air leakage.

Manufactured homes must be sealed against air leakage at all joints, seams, and penetrations associated with the building thermal envelope in accordance with the component manufacturer’s installation instructions and the requirements set forth in Table 460.104 of this section. Sealing methods between dissimilar materials must allow for differential expansion, contraction and mechanical vibration, and must establish a continuous air barrier upon installation of all opaque components of the building thermal envelope. All gaps and penetrations in the exterior ceiling, exterior floor, and exterior walls, including ducts, flue shafts, plumbing, piping, electrical wiring, utility penetrations, bathroom and kitchen exhaust fans, recessed lighting fixtures adjacent to unconditioned space, and light tubes adjacent to unconditioned space, must be sealed with caulk, foam, gasket or other suitable material. ~~The air barrier installation criteria is adapted from section R402 of the 2021 IECC.~~

Table 460.104 Air Barrier Installation Criteria

COMPONENT	AIR BARRIER CRITERIA
Ceiling or attic	The air barrier in any dropped ceiling or dropped soffit must be aligned with the insulation and any gaps in the air barrier must be sealed with caulk, foam, gasket, or other suitable material.

	Access hatches, panels, and doors, drop-down stairs, or knee wall doors to unconditioned attic spaces must be weather-stripped or equipped with a gasket to produce a continuous air barrier.
Duct system register boots	Duct system register boots that penetrate the building thermal envelope or the air barrier must be sealed to the subfloor, wall covering or ceiling penetrated by the boot, air barrier, or the interior finish materials with caulk, foam, gasket, or other suitable material.
Electrical box or phone box on exterior walls	The air barrier must be installed behind electrical and communication boxes or the air barrier must be sealed around the box penetration with caulk, foam, gasket, or other suitable material.
Floors	The air barrier must be installed at any exposed edge of insulation. The bottom board may serve as the air barrier.
Mating line surfaces	Mating line surfaces must be equipped with a continuous and durable gasket.
Recessed lighting	Recessed light fixtures installed in the building thermal envelope must be sealed to the drywall with caulk, foam, gasket, or other suitable material.
Rim joists	The air barrier must enclose the rim joists. The junctions of the rim board to the sill plate and the rim board and the subfloor must be air sealed.
Shower or tub adjacent to exterior wall	The air barrier must separate showers and tubs from exterior Walls <u>when interior wall surface is used as an air barrier-</u>
Walls	The junction of the top plate and the exterior ceiling, and the junction of the bottom plate and the exterior floor, along exterior walls must be sealed with caulk, foam, gasket, or other suitable material.
Windows, skylights, and exterior doors	The rough openings around windows, exterior doors, and skylights must be sealed with caulk or foam.
COMPONENT	AIR BARRIER CRITERIA
doors	

Subpart C – HVAC, Service Hot Water, and Equipment Sizing

§460.201 Duct system.

Each manufactured home equipped with a duct system, which may include air handlers and filter boxes, must have supply ducts and be sealed to limit total air leakage to less than or equal to four (4) cubic feet per minute per 100 square feet of conditioned floor area.

Building framing cavities must not be used as ducts or plenums when directly connected to mechanical systems. ~~The duct total air leakage requirements are adapted from section R403 of the 2021 IECC.~~

Duct systems must be sealed against air leakage in accordance with the duct manufacturer's installation instructions and the following provisions:

- All metal ducts and fittings shall be sealed. For glass fiberboard ducts, the manufacturer's sealing instructions shall be followed. Sealants are in addition to mechanical fastening (if used).
- Connections and routing of manufacturer installed ductwork completed without kinks or sharp bends that would significantly impede air flow.
- Flexible ducts in unconditioned space not installed in cavities smaller than outer duct diameter; in conditioned space not installed in cavities smaller than inner duct diameter

§460.202 Thermostats and controls.

(a) At least one thermostat must be provided for each separate heating and cooling system installed by the manufacturer. The thermostat and controls requirements are adapted from section R403 of the 2021 IECC.

(b) Programmable thermostat. Any thermostat installed by the manufacturer that controls the heating or cooling system must–

(1) Be capable of controlling the heating and cooling system on a daily schedule to maintain different temperature set points at different times of the day and different days of the week;

(2) Include the capability to set back or temporarily operate the system to maintain zone temperatures down to 55 °F (13 °C) or up to 85 °F (29 °C); and

(3) ~~Initially be programmed with a heating temperature set point no higher than 70 °F (21 °C) and a cooling temperature set point no lower than 78 °F (26 °C).~~
Homeowner manuals should include recommendation that homeowners program thermostat with a heating temperature set point no higher than 70 °F (21 °C) and a cooling temperature set point no lower than 78 °F (26 °C).

(c) Heat pumps with supplementary electric-resistance heat must be provided with controls that, except during defrost, prevent supplemental heat operation when the heat pump compressor can meet the heating load.

§ 460.203 Service hot water.

(a) Service hot water systems installed by the manufacturer must be installed according to the service hot water manufacturer's installation instructions. ~~Where service hot water systems are installed by the manufacturer, the manufacturer must ensure that any maintenance instructions received from the service hot water system manufacturer are provided with the manufactured home~~ ~~The service hot water requirements are adapted from section R403 of the 2021 IECC.~~

(b) Any automatic and manual controls, temperature sensors, pumps associated with service hot water systems must provide access.

(c) Heated water circulation systems must—

(1) Be provided with a circulation pump;

(2) Ensure that the system return pipe is a dedicated return pipe or a cold water supply pipe;

(3) Not include any gravity or thermosyphon circulation systems;

(4) Ensure that controls for circulating heated water circulation pumps start the pump based on the identification of a demand for hot water within the occupancy; and

(5) Ensure that the controls automatically turn off the pump when the water in the circulation loop is at the desired temperature and when there is no demand for hot water.

(d) All hot water pipes—

~~(1)~~ Outside conditioned space must be insulated to a minimum R-value of R-3; ~~(2)~~ and

~~(3)~~ From a service hot water system to a distribution manifold must be insulated to a minimum R-value of R-3.

~~(4)~~

~~§460.205 Equipment sizing.~~

~~Sizing of heating and cooling equipment installed by the manufacturer must be determined in accordance with ACCA Manual S (incorporated by reference; see §460.3) based on building loads calculated in accordance with ACCA Manual J (incorporated by reference; see §460.3). The equipment sizing criteria are adapted from section R403 of the 2021 IECC.~~

APPENDIX II



November 23, 2021

The Honorable Jennifer M. Granholm
Secretary
U.S. Department of Energy
1000 Independence Ave. SW
Washington, DC 20585

Re: Energy Conservation Program: Energy Conservation Standards for Manufactured Housing (EERE-2009-BT-BC-0021)

Dear Secretary Granholm,

The Manufactured Housing Institute (MHI) is pleased to provide comments to the Department of Energy (DOE) in response to the supplemental notice of proposed rulemaking titled “Energy Conservation Program: Energy Conservation Standards for Manufactured Housing.” While we appreciate DOE listening to the feedback it has received and providing updated data and analysis, as well as extending the comment deadline, the proposed rule is still not workable for the manufactured housing industry and homebuyers seeking affordable homeownership.

MHI is the only national trade association that represents every segment of the factory-built housing industry. Our members include home builders, suppliers, retail sellers, lenders, installers, community owners, community operators, and others who serve the industry, as well as 48 affiliated state organizations. In 2020, our industry produced nearly 95,000 homes, accounting for approximately nine percent of new single-family home starts. These homes are produced by 33 U.S. corporations in 138 plants located across the country. MHI’s members are responsible for close to 85 percent of the manufactured homes produced each year.

To be clear, MHI and its members have always supported energy conservation efforts and other reasonable environmental protection initiatives, and we will continue to do so. Not only are new factory-built homes as efficient as their site-built counterparts, but in 2020, more than 30 percent of new manufactured homes were built to meet or exceed Energy Star standards. Further, today’s manufactured homes already offer many energy efficient options. Just like site-built homes, manufactured homes are constructed and fitted with energy efficient features that are tailored to the climate demands of the region in which each home will be sited.

Today’s manufactured homes already consume significantly less energy than site-built homes. According to the U.S. Energy Information Administration, “most energy end-uses are correlated with the size of the home. As square footage increases, the burden on heating and cooling equipment rises, lighting requirements increase, and the likelihood that the household uses more than one refrigerator increases. Square footage typically stays fixed over the life of a home and it is a characteristic that is expensive, even impractical to alter to reduce energy consumption.”¹ According to the U.S. Census Bureau, the median size of a completed single-family house in 2020 was 2,261 square feet, while the median size of a manufactured home was 1,338 square feet. The significant difference in size correlates with a significant reduction in energy usage. A study of residential energy consumption showed that manufactured homes consume the least energy of all types of homes, at 59.8 million BTUs per household, compared to 94.6 million BTUs for single-family detached homes and 70 million BTUs for townhomes.²

¹ <https://www.eia.gov/consumption/residential/reports/2009/square-footage.php>

² [ce1.1.xlsx](#) (eia.gov)

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Further, the controlled environment of the factory-built process not only offers consumers unmatched quality and affordability due to technological advancements and other advantages, but the industry is a pioneer in the development of processes that value efficiency and reduce waste. Our in-factory home builder members are constantly developing new initiatives and technologies, such as comprehensive recycling programs, to reduce waste. The factory-built process utilizes exact dimensions and measurements for most building materials, eliminating waste. Today's modern manufacturing plants are so efficient that nearly everything is reused or recycled such as cardboard, plastic, carpet padding, vinyl siding, scrap wood and much more.

The proposal provided by the DOE will add significant costs to manufactured homes, which are currently the most affordable, unsubsidized homeownership option for American families. Any increase in construction costs, even modest increases in response to a new energy conservation standard, could jeopardize homeownership for hundreds of thousands of Americans at time when there is an affordable housing shortage in the country. As currently drafted, the proposed rule would:

- Contradict the objectives of the Administration's January Executive Order on "Advancing Racial Equity and Support for Underserved Communities" and undermine the Administration's September initiative to "Increase Affordable Housing Supply."
- Significantly raise the cost of new manufactured homes by an average of \$3,914 to \$5,200 for most new manufactured homes with an estimated cost increase of over \$7,000 for a multi-section home located in climate zone 3 – without including the costs of energy testing or compliance (Tier 2 Standard) – thereby exacerbating homeownership affordability challenges in the wake of the recent escalation of home prices.
- Fail the statutory requirement of being cost effective, by increasing the cost of owning a new manufactured home by more than claimed energy savings.

Thus, MHI makes the following comments and recommendations regarding the proposed rule:

1. The proposed energy standards fail the Energy Independence and Security Act of 2007 (EISA) statutory requirement to use the International Energy Conservation Code (IECC) "except in cases in which the code is not cost effective or a more stringent standard would be more effective, based on the impact of the code on the purchase price of manufactured housing and on total life-cycle construction and operation costs." The result is manufactured housing will be less affordable, due to large increases in home sale prices and operating cost increases that exceed energy savings.
2. The \$55,000 or \$63,000 low-income price cap threshold for streamlined energy efficiency requirements should be eliminated or significantly increased to at least \$110,260. Further, if the DOE proceeds with a tiered approach, the Department must seriously consider, as it did in its updated data and analysis, an alternative approach such as square footage or sections. Not doing this would result in DOE failing to accomplish its stated goal of protecting low-income homebuyers from steep price increases resulting from the new standards.
3. The proposed energy standards are inappropriate for the manufactured housing industry as they do not take into consideration the current construction methods, transportation demands and short on-site completion duration unique to manufactured housing. Further, they do not include testing requirements or compliance and enforcement provisions.

4. The proposed energy standards were developed without complying in any meaningful way with the EISA statutory requirement to consult with HUD, resulting in proposed standards that ignore the construction aspects unique to manufactured housing or the negative impact on homebuyer affordability. Further, DOE ignored the primacy of manufactured housing construction standards established under the Manufactured Housing Improvement Act of 2000.
5. The proposed energy standards ignore the large number of homebuyers that will no longer be able to buy a manufactured home, because they no longer qualify for an FHA, GSE, or non-agency mortgage loan, due to the impact of increased mortgage payments on debt-to-income ratios.

Detailed below is a summary of MHI's recommendations, along with several Appendices that explain in more detail our concerns as follows:

- Appendix I – MHI's Cost Benefit Analysis
- Appendix II – MHI's Comments on the DOE Rule's Proposed Changes by Section
- Appendix III – MHI's Responses to Issues on Which the DOE Requests Comment

SUMMARY OF MHI'S RECOMMENDATIONS

1) The DOE Proposed Rule Fails Statutory Requirement Not to Use IECC When Not Cost Effective

One of the tenets of the National Manufactured Home Construction and Safety Standards Act (NMHCSS Act) is the importance of ensuring that manufactured housing remains an affordable housing option for all consumers considering homeownership. It also states that energy conservation standards for manufactured homes must “ensure the lowest total construction and operating costs” and be cost-effective. Echoing that language, EISA requires that “energy conservation standards established under this section shall be based on the most recent version of the International Energy Conservation Code (including supplements), except in cases in which the Secretary finds that the code is not cost effective, or a more stringent standard would be more cost effective, based on the impact of the code on the purchase price of manufactured housing and on total life-cycle construction and operating costs.”

Increasing the costs of manufactured homes could jeopardize homeownership for millions of Americans at a time when there is an affordable housing shortage. This increase will have a disproportionate impact on minority communities, who face the most significant burden in obtaining affordable homeownership. This would be in direct contrast to the Administration's goal of achieving racial equity in homeownership.

Use of the IECC is Not Appropriate

While the IECC is respected in the construction industry, it was developed over many years for utilization in both site-built residential homes and commercial buildings. Although EISA directs the DOE to establish energy conservation standards for manufactured housing based on the most recent version of the IECC unless it is found to be not cost effective, to date no state has adopted the 2021 IECC standards and the vast majority of states are using amended versions of the 2009, 2012 or 2015 IECC.

The IECC was never intended nor designed to be implemented in the manufactured housing sector. Given that the IECC essentially ignores all the construction aspects unique to manufactured housing, it is an inappropriate code for attempted enforcement upon the manufactured housing industry and could potentially cause factory closures, the loss of thousands of jobs, and an immediate affordable housing crisis for one of the largest sectors in the housing market. Because the IECC was not designed for manufactured housing, it is NOT a cost-effective standard, which is why its use does not result in a cost-effective change to energy standards.

First, the higher home cost associated with the proposed standards will make manufactured housing far more expensive excluding potential buyers and reducing total manufactured housing sales, the latter hurting the industry and contributing to the lack of affordable housing. Second, if households are fortunate enough to qualify for a home that meets the new standards, the home they get will be more, not less, expensive to own. This is all but guaranteed by the method DOE used in conducting the Life Cycle Cost analysis which demonstrates why the IECC is not an appropriate building code for manufactured homes.

DOE Proposal Uses Incorrect Calculations and Methodologies

DOE's own analysis shows the proposal will increase costs for homebuyers without reciprocal energy savings, and many households will simply be priced out of homeownership due to this proposal. One of the major inputs to a Life Cycle Cost analysis is estimated cost savings. As noted in DOE's Technical Support Document, using sample homes (single- and multi-section), DOE estimated energy savings by comparing homes, in select locations, built to the current, relatively easy to meet HUD energy standards with homes meeting the IECC. As expected, there is a huge difference in energy use (and estimated energy costs) between these benchmarks. The large savings suggests that a whole lot of investment in energy measures can be justified, particularly if the savings are accumulated over 30 years which is an artificial construct. If, conversely, DOE had started with a baseline less than the current HUD standards (e.g., zero insulation, leaky building, etc.) a 30-year Life Cycle Cost would show enough savings to justify building such an energy efficient home. But that is because energy improvements have diminishing returns and today's manufactured homes are already energy efficient.

Every step in making homes more energy efficient costs more and saves less. Most of the savings comes from the first few measures to improve performance. For example, adding R-5 insulation to a wall that is R-10 saves more energy than adding the same amount of insulation to a wall that is already R-20, but costs the same. If you are aiming to optimize investment (i.e., find the lowest combination of construction and operating costs) the proper way to do the analysis is by examining each incremental improvement in efficiency, individually. Each improvement in performance must be cost justified and stand on its own. Once an energy measure begins to result in negative returns, you stop adding any additional measures. DOE did not do this in its analysis, even though the Department developed and promotes a Building Energy Optimization Tool that uses this incremental approach to find the optimum investment. By combining all the energy measures together into a single figure, the slim benefits of adding the last, least cost-efficient measures, is subsumed in and masked by the benefits of adding the first, most cost-effective measures. Even based on a 30-year perspective, the optimum investment, representing the minimum total of construction and operating cost, is less stringent than the 2021 IECC.

Further, the DOE's proposal is based on improper calculations and methodologies including underestimating the current costs of homes and the costs of the new materials to construct them, and not considering the cost of testing procedures and compliance. The DOE also significantly underestimates the fact that the first buyer of an energy efficient manufactured home would likely never reap the economic benefit. Based on MHI's industry data, buyers usually sell their homes within seven to ten years of purchase, and it is unlikely that a manufactured homebuyer financing the purchase of a new manufactured home would even recover these upfront costs at a future sale. Consequently, as result of the DOE's proposal, homeowners will not realize incremental value for energy features that increase a home's purchase or sale price.

At the efficiency levels proposed by the DOE in its recent rulemaking, MHI's survey of manufacturers found that it is unlikely that a buyer purchasing a new home and financing 90 percent of the purchase price would even recover these upfront costs at a future sale. Instead, the DOE's proposal would likely yield a negative return over the ownership period. While several reasons contribute to this, including purchase price and availability of financing options, the fact that homebuyers usually sell their homes within the first seven to ten years of purchase is the most relevant.

Using the DOE's assumptions of cost and location as outlined in the Technical Support Document, which assumes a 30-year mortgage which is not the norm for manufactured housing, MHI conducted a

cost-benefit analysis using more realistic financing options that are being utilized in the market today. Assuming a downpayment of 10 percent, an interest rate of nine percent – which is at the high end of today’s mortgage rates – a loan term of 20 years, and a tenancy period of 10 years, MHI’s cost-benefit analysis found that the DOE’s proposal would result in a net loss of between \$890 to \$5,500 for a single-section home and \$1,300 to \$6,800 for a multi-section home depending on location (See Appendix I). This would be financially devastating for homebuyers looking to finance the purchase of a manufactured home.

It is important to note that the only place that MHI’s analysis shows a savings is in Fairbanks, Alaska, where the savings is only \$369 after ten years. In 2020, Alaska had only 64 homes shipped to the state and as of September 2021 only six homes have been shipped there. Further, many of the locations selected by the DOE for its analysis are not locations where manufactured housing is prevalent.

Given these facts, any new energy conservation standard must avoid creating a scenario where the upfront increase to the purchase price of a home prices many consumers out of the market, even if those upfront costs could be amortized over the duration of the homeowner’s tenancy and recouped over time.

2) The DOE Proposal Fails to Accomplish its Stated Goal of Protecting Low-Income Homebuyers from Steep Price Increases

Using a tiered system based on price shows a fundamental lack of understanding of the factory-built process. There is no manufacturer’s suggested retail price for manufactured homes. Home price is determined by the retailer based on the home features selected by the consumer. The approval for floor design and layout with respect to HUD Code requirements are made regardless of those selections, and long before the consumer has made them. Requiring approval of every floorplan AFTER consumer choices are made determining the price, would mean each and every individual house would have to be approved separately – adding astronomical costs to the process and slowing down the production line so as to remove all efficiencies. If a tiered system based on price is used, the price point in Tier 1 must be significantly increased to better reflect the costs of today’s manufactured homes.

According to the National Association of Homebuilders’ data, new homebuyers have an average income of \$101,811. In contrast, the median annual household income of a manufactured home buyer is only \$33,000. Manufactured homes are clearly more affordable, serving homebuyers with much lower incomes.

The proposed rule creates two tiers, based on whether the manufacturer’s retail list price is below \$55,000/\$63,000 or above. The rule estimates that the new energy requirements will raise prices in Tier 1 by an average of \$663 for a single-section unit and \$839 for a multi-section unit. The rule estimates that the average price increases for homes in Tier 2 are more than six times higher - \$3,914 for a single-section unit and \$5,289 for a multi-section unit.

In the section “Development of the Current Proposal,” the rule states that Tier 1 was established to protect “low-income buyers.” However, the \$55,000/\$63,000 threshold is arbitrary, and it excludes significant numbers of low income manufactured homebuyers, using HUD metrics. The result is that DOE completely failed in their stated goal of shielding low-income homebuyers from price increases.

The HUD national median income for a four-person family is \$79,900. HUD defines a “low-income” family as a family making 80 percent or less of median income which would be \$63,920. Further, HUD defines a “very low-income family” as a family making 50 percent or less of median income which would be \$39,950.

Additionally, HUD defines housing for lower income families as “affordable” when the family pays no more than 30 percent of their income for housing. However, in practice, that ratio is much higher for most families. Nevertheless, consider a new home at \$110,260 – more than twice DOE’s proposed Tier 1 threshold. Assuming an eight percent mortgage rate on a typical 15-year manufactured home, the monthly cost for mortgage, property tax, and rent would be \$1,236. Thus, a low-income family could buy a \$110,260

manufactured home and only pay 23.6 percent of their income for housing – well below the HUD standard for being “affordable.”

Second, consider a “very low-income family” at the top of that income range. On a \$110,260 home, a very low-income family would pay 34 percent of their income for rent. This is only slightly above HUD’s ideal benchmark of 30 percent. Moreover, it is well below FHA’s 43 percent Debt to Income (DTI) requirement for a mortgage.

Thus, DOE’s arbitrary \$55,000/\$63,000 cutoff – whose stated purpose is to protect low-income families – does not protect significant numbers of low-income families – or even significant numbers of very low-income families.

MHI’s analysis for using \$110,260 as the cutoff price for Tier 1 is based on an extensive rulemaking conducted by the Consumer Financial Protection Bureau (CFPB) on its Qualified Mortgage (QM) rule. The CFPB selected this \$110,260 threshold to give loans below this level more protections including more flexibility on permissible points and fees. While this is not a perfect analogy, MHI is using this metric to illustrate how arbitrary and unreasonably low the \$55,000/\$63,000 Tier 1 level is.

MHI requests that if a tiered system by price is used, the Tier 1 threshold be raised to at least \$110,260, and potentially higher, based on a more detailed analysis along the lines of what we presented. Further, it must be updated annually to reflect actual costs, which can change dramatically. For example, according to the Census Bureau’s Manufactured Housing Survey the average price of a new manufactured home in June was \$106,800 up from \$95,000 in January.

3) The DOE Proposal Fails to Consider the Design and Construction Standards of Today’s Manufactured Homes and Does Not Include Testing and Compliance Requirements

Manufactured housing is the only form of housing regulated by a federal building code. Unlike sitebuilt homes, which are subject to different state and local regulations, manufactured homes are built to one uniform federal code, the Manufactured Home Construction and Safety Standards Act of 1974 (i.e., the HUD Code). The HUD Code’s single regulatory framework for home design and construction includes standards for health, safety, energy efficiency, and durability.

DOE’s proposed rule seeks to use the IECC to make changes related to the building thermal envelope; air sealing; installation of insulation; duct sealing; heating, ventilation, and air conditioning (HVAC); service hot water systems; mechanical ventilation fan efficacy; and heating and cooling equipment sizing for manufactured homes. As proposed, many of these changes conflict with current HUD Code requirements and no direction is given as to how the two differing standards should be integrated which will result in complicated, overlapping requirements that will only increase manufacturing costs, hurting existing homeowners and prospective homebuyers.

The proposed changes to the manufactured housing energy conservation standards contain requirements that raise potential issues with certain components and materials currently being used in the production of today’s manufactured homes. Below are a few examples of how the proposed changes conflict with current manufacturing processes.

Insulation

Manufacturers are currently using R-11 for most of the insulation which is predominantly used in the walls and floors for Zones 1 and 2. Further, manufacturers typically prefer to use two layers of R-11 if they need more insulation in the floors. However, the current proposed changes do not use R-11, but rather the lowest insulation value used is R-13. Therefore, this may cause a supply issue for the manufacturers that have ramped up to supply large quantities of R-11. The same supply issue will be present for R-20 and R-19, which is currently not used in large quantities. Further, it will be difficult to source a material to use as the R5 continuous exterior insulation that will meet the requirements of the proposed changes as well as the current

HUD Code. Section 3280.504 has requirements for the perm rating of the exterior wall assemblies. The perm ratings of the rigid foam may also lead to redundant vapor barriers and stud cavities that may not breathe properly. This is a potential area where the proposed changes and the current HUD Code may have a conflict.

Duct Systems

Section 460.104 of the proposed changes states that duct system register boots that penetrate the thermal envelope of the air barrier must be sealed to the subfloor. However, in manufactured homes with the heat ducts installed in the belly of the home, there is no need to seal the duct registers and boots to the subfloor because they are installed within the thermal envelope. Table 406.103 states that access hatches, panels, and doors between conditioned space and unconditioned space must be insulated to a level equivalent to the insulation of the surrounding surface. However, this requirement does not seem to be consistent with the discussion around exterior doors in the earlier section of the proposed standards.

Section 460.201 also states that total duct leakage must be limited to four cubic feet per minute. However, with homes where the duct system is installed in the belly, any duct leakage that may occur is still within the thermal envelope of the home. Further, the required testing for the duct leakage limitation is also unknown at this time and therefore has not been included in the DOE cost analysis.

Thermostats

Section 460.202 states that any thermostat installed by the manufacturer must be programmable. It has been the observation, that many of the current homeowners do not use these thermostats correctly or have them replaced with a simpler version. Based on current observations, the programmable thermostat is not perceived as “providing value” to the current consumer and should not be mandated.

ACCA Manual S and ACCA Manual J

Section 460.205 states that heating and cooling equipment shall be sized using the ACCA Manual S and the ACCA Manual J. ACCA Manual J analysis requires knowledge of the orientation of the home with respect to the sun for cooling load analysis. Because the orientation of the home is often unknown until installed, the proposed rule must establish a default orientation. ACCA Manual S establishes sizing limits for heating and cooling equipment and these limits presume that thermal loads are established for a specific location and specific building orientation. The variation in design parameters within a single thermal zone exceeds the sizing limits of ACCA Manual S. The proposed rule must establish alternate criteria for using ACCA Manual S where the design parameters vary within a thermal zone.

Transportation challenges

Several of the proposed changes in the rule focus on changes to the building thermal systems which will affect the overall shipping height and width of a home. By increasing the truss heel height, increasing floor joist depth, and adding insulation outside of the studs, the overall shipping envelope will change. In some cases, this change could be significant. For example, the additional height could prevent shipping a home into an area of the country with low bridges resulting in consumers having to settle for a different style of home, or more than likely, being forced out of the housing market due to a lack of affordable housing. Further, an additional escort or pole car may be required to accompany the home that goes beyond maximum width or height, which could add thousands of dollars to the price of the home for the consumer.

Current Construction Requirements and Climate Zones

As described in DOE’s rulemaking, the proposed climate zones are consistent with the climate zones currently used in the HUD Code. Because the new and existing climate zones remained consistent, MHI was able to compare the current construction requirements and future construction requirements. While performing the thermal analysis of the prototypical homes that were presented in the Technical Support Document, MHI observed several issues in the four different categories as outlined below:

- **Tier I Prescriptive Requirements**

Based on the calculations that MHI performed, it appears that the Tier I prescriptive requirements represent a modest upgrade to the current HUD Code requirements and would require only minor changes from homes currently being constructed today.

- **Tier 2 (Untiered) Prescriptive Requirements**

The Tier II requirements represent significant changes over the current HUD Code and will be more of a challenge to implement in a cost-effective manner.

Tier 2, Zone 1

Table III.8 lists the exterior ceiling insulation as R-30. Due to the thicker insulation in the ceiling, the proposed code states that a 5.5-inch truss heel height would be required. This change in the truss profile will affect the overall shipping height of the home unless other conciliatory changes are made.

Tier 2, Zone 2

Table III.8 lists the exterior ceiling insulation as R-30, which is the same issue as Zone 1. Further, Table III.8 lists the exterior wall insulation as R-20+5, which represents R-20 in the walls and a continuous R-5 on the exterior of the studs. The requirement of R-20 in the exterior wall will force the sidewall to 2x6 construction resulting in the following:

- The installation of the exterior insulation will be more costly for manufacturers to install. The overall cost of the home will be higher from the increased material costs, but also the increased labor costs.
- The exterior insulation will also require most plants to re-work their production stations to allow time for this installation.
- The exterior insulation will also create an additional problem for fastening the exterior finish siding. The siding would now have to be fastened thru the exterior insulation, and currently there are no approved fasteners to penetrate thru the 1-inch exterior insulation. These fasteners would also have to support the siding during transportation.
- Windows and doors will need to be installed on framed extensions to pack out nailing surfaces to the thickness of the continuous R-5 insulation.
- Continuous flashing may be required at the bottom edge of the rigid insulation layer to protect from exposure to weather and infestation.
- The extra thickness of insulation on the exterior wall would either increase the shipping width or decrease the habitable space on the interior. For houses currently designed to maximize the legal shipping width, there is no additional width available on the exterior. Therefore, the space for the exterior insulation on these homes would have to be taken from the interior of the home.

Table III.8 also lists the exterior floor insulation as R-19. Currently, most manufacturers use a blanket insulation for the floors. However, the lack of availability of R-19 in the blanket style could cause issues for this requirement or force further production changes to accommodate other styles of insulation.

Tier 2, Zone 3

Table III.8 lists the exterior ceiling insulation as R-38. This depth of insulation will be difficult to achieve on lower sloped roofs and cathedral style truss profiles. This insulation requirement could cause some home options to become unavailable for the consumer.

Further, Table III.8 lists the exterior wall insulation as R-20+5 which is the same issue we expressed concerns about in Tier 2, Zone 2.

Table III.8 also lists the exterior floor insulation to be R-30. According to the Technical Support Document, the floor joist will need to be 2x8 when any insulation equal to or over R-30 is used. This change will be more costly than just the insulation if the entire floor system must go to 2x8. This increased joist depth would also further impact the transportation of the home by making it 2 inches taller. Further, the availability of R-30 insulation in a blanket style may be an issue in meeting this requirement or force further production changes to accommodate other styles of insulation.

- **Tier 1 Performance Requirements**

Based on the calculations that MHI performed, it appears that the Tier 1 performance requirements represent a modest upgrade to the current HUD Code requirements and would require only minor changes from homes currently being constructed today.

- **Tier 2 (Untiered) Performance Requirements**

The Tier 2 requirements represent significant changes over the current HUD Code and will be more of a challenge to implement in a cost-effective manner. These values will require many changes to the current home construction methodologies. Because this part of the changes is listed as “performance,” there are multiple pathways to try and achieve the listed overall U-factor.

Tier 2, Zone 1

The overall U-factor listed in Table III.12 is 0.086 for single- and 0.082 for multi-section homes. Based on the calculations MHI performed on prototypical homes, the proposed Zone 1 requirements should be able to be met with upgraded insulation and upgraded windows.

Tier 2, Zone 2

The overall U-factor listed in Table III.12 is 0.062 for single- and 0.063 for multi-section homes. Based on the calculations MHI performed on the prototypical homes, the proposed Zone 2 requirements would require many changes such as upgraded insulation, 2x6 wall construction, upgraded windows, and taller truss heel. MHI also found that this overall U-factor requirement was more difficult to meet as the homes became smaller.

Tier 2, Zone 3

The overall U-factor listed in Table III.12 is 0.053 for singles and 0.052 for multi-section. Based on the calculations MHI performed on the proto-typical homes, we were not able to satisfy the overall Ufactor requirements using common options that are available to most manufacturers. Further, MHI found this became even more difficult to achieve as the homes became smaller. Upgrading insulation, 2x6 exterior walls, deeper trusses, deeper floor joists, and upgraded windows did not lower the overall U-factor enough to meet the value in the Table III.12. For the calculations that MHI performed, we did not evaluate the addition of continuous exterior insulation due to the installation and transportation issues involved with this product.

Compliance, Enforcement and Testing

Testing requirements for each of the systems being modified in the proposal are not included and must be addressed before any rule is published. Determining the impact of a system change without knowing the testing parameters is impossible, especially in response to specific metrics like “§460.201 Duct system.” For example, the proposed rule requires testing of air handlers and filter boxes. However, manufactured homes often utilize uncased evaporator coils (a-coils) that prevent the air handler from being readily tested. Oftentimes, it is necessary to temporarily remove the air handler in order to test the duct system for leakage due to the difficulty sealing the air handler.

For multi-sectional units where ductwork is installed on-site, the rule does not establish enforcement procedures for testing. More specifically, what qualifications are required for those performing the testing? Can installers certify their own work? What training is required for installer personnel performing this work? How are the test results documented? Is the installer responsible for any remedial work that may be required after the testing is performed? These questions must be answered in order to determine the additional costs which may be attached to such.

If testing is required to be performed by a third-party or in cases where the installer is not capable of performing the testing, the additional cost of testing could be \$600 or more. For Tier 1 homes this nearly doubles the cost increase for single-section construction and increases the installed cost by more than 50percent for multi-section homes. This cost was not considered in the DOE purchase price increase analysis performed. DOE must not propose a rule without including the required testing requirements, so any analysis can include the true cost impact.

Further, the proposed rule does not include compliance and enforcement provisions which DOE says it will address at a later date. MHI believes it is unnecessary for the DOE to develop a new enforcement mechanism with any proposed manufactured housing energy conservation standard because the HUD Code is an already-established enforcement mechanism that mandates a uniform standard for design, construction, and installation, including federal requirements for safety, durability, and energy efficiency. Failure to partner with HUD would result in complicated, overlapping requirements that will only increase manufacturing costs, hurting existing homeowners and prospective homebuyers.

4) The DOE Proposal Fails to Comply with the Statutory Requirement to Consult with HUD

Because the DOE has no real expertise, knowledge, or understanding of housing and home financing, EISA required the Department to consult with HUD in developing these new energy requirements. However, to our knowledge, DOE has made no discernible effort to consult with HUD, and by extension FHA and the Manufactured Housing Consensus Committee (MHCC), in any meaningful way. While DOE provided detailed justifications for the new energy requirements in the narrative for the proposed rule, the Department offered no evidence that it utilized any of HUD's housing expertise that could have led to a more informed rulemaking.

This is not an insignificant failure. This lack of consultation with HUD shows up in several critical areas that reflect a complete failure to consider the realities of buying and owning a manufactured home. First, the establishment of an artificially low \$55,000/\$63,000 Tier 1 price point for low-income families completely ignores the reality that much higher home prices are affordable to "low-income families" (as defined by HUD) – and even HUD-defined "very low-income families" qualify for a loan twice as large. The use of a three percent discount rate is wildly inappropriate for chattel manufactured home loans, which lack access to federal agency mortgage loans, and is measurably lower than actual mortgage and other price-related increased costs of real property manufactured home loans. This fatally undermines DOE's contention that the new requirements result in net savings to homeowners and results in a real-world impact that punctures any DOE contention that it complied with EISA's statutory cost effectiveness requirement. Further, failure to consult with FHA completely ignores the meaningful percentage of homebuyers that will no longer qualify for an FHA, Fannie Mae, Freddie Mac, or non-agency mortgage loan because of significantly increased home prices that even DOE acknowledges in the proposed rule will price consumers out of the housing market. Additionally, DOE's failure to consult with HUD also ignores the primacy of the HUD Code with respect to safety and construction standards.

The NMHCSS Act states "the Federal manufactured home construction and safety standards established by HUD shall include preemptive energy conservation standards."³ Further, EISA mandates that the DOE must consult with HUD, which may seek further counsel from the MHCC, when it comes to

¹ U.S.C. § 5403(g)(1).

developing energy conservation standards for manufactured housing.¹ Additionally, any updated energy conservation standard that the DOE proposes should take into consideration the unique design and factory construction techniques specific to manufactured housing.²

Because of these mandates, the DOE must first consult with HUD and the MHCC to assess the economic impact that a new energy conservation standard will have on manufactured housing homeownership. The DOE and HUD should then work together to develop the standard, as well as an efficient and practical implementation strategy that HUD will enforce.

Similar, to the 2016 proposed rule, the DOE did not work with HUD or the MHCC before it drafted its proposed rule. Further, the MHCC was only given a preview of a small portion of the proposed rule

approximately two months before it was published, which raised many concerns amongst its members and the public to both the affordability and feasibility of what was presented. Because DOE did not work with HUD on these proposed changes, the proposed rulemaking is resulting in complicated, overlapping requirements that will increase manufacturing costs, hurting existing homeowners and prospective homebuyers. Moreover, it demonstrates a fundamental lack of understanding of the factory-built process.

5) The DOE Proposal Does Not Consider How These Changes Will Make Homebuyers Unable to Obtain Financing

EISA requires that the energy standards be based on the most recent version of the IECC "except in cases in which the code is not cost effective or a more stringent standard would be more effective, based on the impact of the code on the purchase price of manufactured housing and on total life-cycle construction and operation costs."

Thus, the statute explicitly requires that the cost effectiveness standard be based on the impact on the purchase price. Yet, there is no consideration in the entire narrative of the proposed rule that any consideration was given to the impact of home price increases, which the rule acknowledges range from \$3,914 to \$5,289 for most homes in Tier 2, on a potential homebuyer's ability to buy a home in the first place. Put simply, all the pages and pages of theoretical savings in the rule are meaningless if the price increase causes the homebuyer to no longer qualify for a mortgage loan, because they no longer meet Debt to Income (DTI) underwriting requirements.

An increased home purchase price will result in a proportionate increase in the debt burden. FHA's customary DTI requirement is 43 percent. Therefore, any homebuyer at the edge of this 43 percent DTI requirement will no longer qualify for an FHA loan because of the higher price caused by the new energy standards. And, for example, a homebuyer at a 41 percent DTI ratio that would have more easily qualified for a loan, will now be just over the permitted DTI.

Additionally, the proposed rule includes no real consideration of the impact of the increased down payment that will result from the new energy requirements. Based on the average home price increases ranging from \$3,914 to \$5,289 that the rule projects for Tier 2 homes, and based on an assumption that a homebuyer must make a down payment of 10%, the energy requirements will raise down payment requirements on new manufactured homes by an average of \$391 to \$529. For the low- and moderate-income homebuyers that makes up the bulk of the manufactured home purchase market, with an average income of \$33,000, this is a not insignificant amount.

¹ *Id.* at 17071(a)(2)(B).

² *Id.* at 17071(b)(2)(A).

Further, the analysis on the impact of the rule is fundamentally marred by a discount rate ranging of three percent to seven percent for computation of future projected energy savings. The impact of significantly understating the discount rate is that it significantly overstates the net savings to the manufactured homebuyer. Higher home prices (e.g., ranging on average from \$3,914 to \$5,200) for most manufactured homes that are in Tier 2 directly translates into higher mortgage amounts and higher property taxes related to the increased home purchase price.

Mortgage rates on personal property loans (i.e., chattel loans), where the manufactured home is not permanently attached to land, comprise 78 percent of new manufactured home purchases. These loans are currently in the nine percent range, and mortgage rates on real estate loans, where the manufactured home is attached to the land, are in the range of four percent. Assuming a one percent property tax rate on the higher cost, DOE should have used a much higher discount rate of around ten percent for personal property/chattel loans. This resulted in the DOE significantly overestimating the homebuyer benefits from the new energy requirements.

While it is difficult to quantify the percentage of individuals that will no longer qualify for a mortgage loan because of the higher purchase price resulting from the new energy standards, it will clearly result in some percentage of previously eligible homebuyers that will no longer be able to buy a home. It is disturbing that the DOE narrative on the rule did not even consider this factor in assessing compliance with the requirement to deviate from using the IECC based on whether standards are cost effective with respect to impact on purchase price.

Conclusion

While MHI and its members will always support sensible energy conservation efforts, the overly burdensome regulations proposed by DOE will price many consumers out of homeownership. This increase will have a disproportionate impact on minority communities, who face the most significant burden in obtaining affordable homeownership and would be in direct contrast to the Administration's goal of achieving racial equity in homeownership. It also contradicts the Administration's goal of increasing manufactured housing development in order to address the lack of affordable housing supply.

Further, the proposed rule demonstrates a profound lack of understanding of the factory-built process for constructing manufactured homes and a lack of knowledge about the existing HUD Code standards. It also lacks information about testing and enforcement, which makes any true cost analysis challenging and incomplete. All costs imposed by the proposed rule must be factored, and enforcement and testing are factors that must be included in the cost. Finally, the proposal has a fundamental misunderstanding of housing affordability and the fact that most manufactured homes are currently affordable for even low-income individuals.

MHI stands ready to work with DOE and HUD on the development of realistic and achievable energy standards that not only encourages innovation and conservation, but also eliminates regulatory barriers that impede consumer access to safe, affordable manufactured housing.

Sincerely,



Lesli Gooch, Ph.D.
Chief Executive Officer

Appendix I – Cost Benefit Analysis

The tables below provides MHI’s Life Cycle Cost results for the DOE proposed rule. The figures offer a glimpse of the benefits and costs for a homebuyer purchasing either a single- or multi-section home. The inputs for location selection, average home cost, increase in home cost related to the energy investment and resultant monthly energy savings match DOE’s assumptions contained in the Technical Support Document (TSD). The table sums the major costs and benefits as experienced by the buyer over a ten-year, average occupancy period to yield a net benefit (cost) including incremental mortgage payment, added down payment and monthly energy savings. A negative value indicates that the buyer can expect to lose money on the energy investment making the home less affordable. For example, a purchaser of a single section home in Phoenix, AZ, can on average expect to experience a net cost of nearly \$4,900 over the 10-year period of occupancy. Other assumptions made in generating the tables are provided below. Note: all figures are expressed in current dollars. Further, it is assumed that the buyer does not realize an incremental price increase associated with the energy measures at the time of sale, an assumption that is based on a lack of evidence that energy features can demand a higher home price.

Assumptions

Down payment	10%
Principal	90%
Mort. interest rate	9%
Loan term (yrs)	20
Occupancy term (yrs)	10
Principal recapture rate	0%

Single-Section Home											
HUD Standards Climate Zone	Sample Locations	Average home cost (DOE)	Increase in home cost (DOE)	Percent increase in cost	Down payment	Inc. in mortgage	Inc. monthly mort. pay.	Energy savings (\$/mth) (DOE)	Net Mthly. Savings/ Cost	Principal repayment	Net benefit (cost)
1	Miami	\$57,300	\$2,574	4.5%	\$257	\$2,317	\$21	\$20	(\$1)	\$1,646	(\$2,010)
1	Houston	\$57,300	\$2,574	4.5%	\$257	\$2,317	\$21	\$24	\$3	\$1,646	(\$1,493)

1	Atlanta	\$57,300	\$2,574	4.5%	\$257	\$2,317	\$21	\$29	\$8	\$1,646	(\$891)
1	Charleston	\$57,300	\$2,574	4.5%	\$257	\$2,317	\$21	\$26	\$5	\$1,646	(\$1,340)
1	Jackson	\$57,300	\$2,574	4.5%	\$257	\$2,317	\$21	\$28	\$7	\$1,646	(\$1,048)
1	Birmingham	\$57,300	\$2,574	4.5%	\$257	\$2,317	\$21	\$27	\$7	\$1,646	(\$1,106)
2	Phoenix	\$57,300	\$4,820	8.4%	\$482	\$4,338	\$39	\$28	(\$11)	\$3,081	(\$4,897)
2	Memphis	\$57,300	\$4,820	8.4%	\$482	\$4,338	\$39	\$32	(\$7)	\$3,081	(\$4,432)
2	El Paso	\$57,300	\$4,820	8.4%	\$482	\$4,338	\$39	\$30	(\$9)	\$3,081	(\$4,658)
2	San Francisco	\$57,300	\$4,820	8.4%	\$482	\$4,338	\$39	\$23	(\$17)	\$3,081	(\$5,543)
2	Albuquerque	\$57,300	\$4,820	8.4%	\$482	\$4,338	\$39	\$30	(\$9)	\$3,081	(\$4,666)
3	Baltimore	\$57,300	\$4,659	8.1%	\$466	\$4,193	\$38	\$33	(\$4)	\$2,978	(\$3,967)
3	Salem	\$57,300	\$4,659	8.1%	\$466	\$4,193	\$38	\$26	(\$12)	\$2,978	(\$4,892)
3	Chicago	\$57,300	\$4,659	8.1%	\$466	\$4,193	\$38	\$34	(\$4)	\$2,978	(\$3,930)
3	Boise	\$57,300	\$4,659	8.1%	\$466	\$4,193	\$38	\$28	(\$10)	\$2,978	(\$4,605)
3	Burlington	\$57,300	\$4,659	8.1%	\$466	\$4,193	\$38	\$35	(\$3)	\$2,978	(\$3,812)
3	Helena	\$57,300	\$4,659	8.1%	\$466	\$4,193	\$38	\$36	(\$2)	\$2,978	(\$3,686)
3	Duluth	\$57,300	\$4,659	8.1%	\$466	\$4,193	\$38	\$49	\$11	\$2,978	(\$2,144)
3	Fairbanks	\$57,300	\$4,659	8.1%	\$466	\$4,193	\$38	\$69	\$32	\$2,978	\$369

Multi-Section Home

HUD Standards Climate Zone	Sample Locations	Average home cost (DOE)	Increase in home cost (DOE)	Percent increase in cost	Down payment	Inc. in mortgage	Inc. monthly mort. pay.	Energy savings (\$/mth) (DOE)	Net Mthly. Savings/ Cost	Principal repayment	Net benefit (cost)
1	Miami	\$108,500	\$4,143	3.8%	\$414	\$3,729	\$34	\$33	(\$1)	\$2,648	(\$3,134)
1	Houston	\$108,500	\$4,143	3.8%	\$414	\$3,729	\$34	\$40	\$6	\$2,648	(\$2,313)
1	Atlanta	\$108,500	\$4,143	3.8%	\$414	\$3,729	\$34	\$48	\$15	\$2,648	(\$1,306)
1	Charleston	\$108,500	\$4,143	3.8%	\$414	\$3,729	\$34	\$42	\$8	\$2,648	(\$2,065)
1	Jackson	\$108,500	\$4,143	3.8%	\$414	\$3,729	\$34	\$46	\$12	\$2,648	(\$1,597)
1	Birmingham	\$108,500	\$4,143	3.8%	\$414	\$3,729	\$34	\$45	\$11	\$2,648	(\$1,696)
2	Phoenix	\$108,500	\$6,167	5.7%	\$617	\$5,550	\$50	\$40	(\$10)	\$3,942	(\$5,714)
2	Memphis	\$108,500	\$6,167	5.7%	\$617	\$5,550	\$50	\$45	(\$5)	\$3,942	(\$5,170)
2	El Paso	\$108,500	\$6,167	5.7%	\$617	\$5,550	\$50	\$42	(\$8)	\$3,942	(\$5,496)
2	San Francisco	\$108,500	\$6,167	5.7%	\$617	\$5,550	\$50	\$31	(\$19)	\$3,942	(\$6,835)
2	Albuquerque	\$108,500	\$6,167	5.7%	\$617	\$5,550	\$50	\$42	(\$8)	\$3,942	(\$5,535)
3	Baltimore	\$108,500	\$5,839	5.4%	\$584	\$5,255	\$47	\$45	(\$2)	\$3,732	(\$4,584)
3	Salem	\$108,500	\$5,839	5.4%	\$584	\$5,255	\$47	\$34	(\$14)	\$3,732	(\$5,949)
3	Chicago	\$108,500	\$5,839	5.4%	\$584	\$5,255	\$47	\$46	(\$2)	\$3,732	(\$4,502)
3	Boise	\$108,500	\$5,839	5.4%	\$584	\$5,255	\$47	\$37	(\$10)	\$3,732	(\$5,508)
3	Burlington	\$108,500	\$5,839	5.4%	\$584	\$5,255	\$47	\$47	(\$0)	\$3,732	(\$4,364)
3	Helena	\$108,500	\$5,839	5.4%	\$584	\$5,255	\$47	\$48	\$0	\$3,732	(\$4,271)
3	Duluth	\$108,500	\$5,839	5.4%	\$584	\$5,255	\$47	\$66	\$18	\$3,732	(\$2,105)
3	Fairbanks	\$108,500	\$5,839	5.4%	\$584	\$5,255	\$47	\$94	\$47	\$3,732	\$1,292

Appendix II – MHI’s Comments on the DOE Rule’s Proposed Changes by Section

Subpart A – General

§ 460.1 Scope.

MHI Comments:

MHI has no comments to this section.

§ 460.2 Definitions.

MHI Comments:

Revise the following definition to include the addition of the underlined text to read as follows:

“Whole-house mechanical ventilation system” – Exhaust system, supply system, or combination thereof that is designed to mechanically exchange indoor air with outdoor air when operating continuously or through a programmed intermittent schedule to satisfy the whole house ventilation rates.

As currently proposed in the rule, this definition would include all exhaust fans, including bath fans and range hoods, which are systems MHI does not believe should be included. The suggested underlined change has been copied from the 2021 IECC.

§ 460.3 Materials incorporated by reference.

MHI Comments:

Incorporation of ACCA Manual J and ACCA Manual S are examples of trying to use a site-built code for manufactured housing that just does not work. See “§460.205 Equipment sizing” for more detailed information.

§ 460.4(a) Energy conservation standards.

MHI Comments:

The application of the Annual Energy Outlook (AEO) to the adjustment of home price needs to be standardized and established in the rule for the purposes of enforcement. The proposed rule must establish trigger points for reevaluating the “price” of a home. For example, would Tier 1 models need to be “limited approvals” that expire after a period of time? Or would it be based on a percentage increase in price? Further, the proposed rule must establish the monitoring mechanisms to be used by production inspection primary inspection agencies (IPIAS) and design approval primary inspection agencies (DAPIAS) for the purposes of prompting manufacturers to resubmit updated information for Tier 1 homes.

§ 460.4(b) and (c) Energy conservation standards.

MHI Comments:

Using a tiered system based on price shows a fundamental lack of understanding of the factory-built process and should be eliminated. There is no manufacturer’s suggested retail price for manufactured homes. The use of “price” is unworkable from an enforcement standpoint as a standardized method for pricing does not exist and it would not be possible for a DAPIA to evaluate whether a price is “reasonable” or “correct.” The methods used by manufactures to establish pricing constitute trade “secrets” and dissemination of pricing information in the form of Tier 1 and/or Tier 2 model plans would potentially lead to inappropriate price-fixing or price manipulation among manufacturers in violation of federal (including Sherman Act, Clayton Act, Federal Trade Commission Act, and Robinson-Patman Act) and state antitrust/competition laws.

Further, the use of price as a threshold is overly simplistic and fails to account for regional variations in average housing cost and construction methods. For example, an “affordable” home in the southeastern U.S. is much less expensive and constructed differently than a home of relative affordability in the northeast and/or west. At a minimum, a distinct Tier 1 price point should be established for each thermal zone. Moreover, manufacturers do not set a “retail list price” so that measure is not applicable.

From an enforcement standpoint the regulation does not establish how the “price” would be conveyed to the enforcement bodies, such as the IPIA and/or DAPIA. Because the price of a home depends on options, such as interior finishes (e.g., board and batten verses finished drywall), each Tier 1 model plan submission would need to specifically define the finish attributes required to meet the Tier 1 price limit. Moreover, models that exist in both tiers, due to available options, would need to be submitted for review and approval in both “Tier 1” and “Tier 2.”

If a tiered system based on price is used, the price point in Tier 1 must be significantly increased to at least \$110,260 to better reflect the costs of today’s manufactured homes.

Subpart B – Building Thermal Envelope

§ 460.101 Climate zones.

MHI Comments:

MHI appreciates DOE’s use of the HUD Code zones to match manufacturing practices more appropriately. However, as written the proposed rule would require a home in southern Virginia, which would be in climate zone 3 under the IECC, to meet the same requirements as a home located in Fairbanks, Alaska, which would be located in climate zone 8 using the IECC. MHI encourages the DOE to lower proposed thermal envelopment requirements within zone 3 to align with IECC climate zone 3 requirements more closely.

§ 460.102 Building thermal envelope requirements.

MHI Comments:

MHI recommends deleting the following sentence and reference wherever it appears in this section: “Adapted from section R402 of the 2021 IECC.”

Additionally, the R-20 wall insulation listed in Tier 2 for Zones 2 and 3 may not be readily available in roll form, as typically used in production. Having a continuous insulation on the outside of the studs may become problematic for siding installation due to transportation. The siding fasteners would have to penetrate through the continuous insulation which would pose an issue, especially for siding applications with more weight. MHI recommends revising exterior wall insulation to R-11 and increasing ceiling insulation to R-25 in Tier 1 for Zones 1 and 2. Allowing for R-11 would provide valuable flexibility in the current restricted fiberglass insulation market.

MHI also recommends revising 20+5 wall R values to 21 or 13+5. This is consistent with the 2015 IECC and would provide manufacturing options to avoid continuous insulation sheathing which would reduce home rigidity which could cause transportation issues.

In addition, MHI recommends adding the following language to this section:

- [R402.3.3] Glazed fenestration exemption. Not greater than 15 square feet (1.4 m²) of glazed fenestration per dwelling unit shall be exempt from the U-factor and SHGC requirements in

Section R402.1.2. This exemption shall not apply to the Total UA alternative in Section R402.1.5.

- [R402.3.4] Opaque door exemption. One side-hinged opaque door assembly not greater than 24 square feet (2.22 m²) in area shall be exempt from the U-factor requirement in Section R402.1.2. This exemption shall not apply to the Total UA alternative in Section R402.1.5.

For “Table 460.102-5 – Tier I Building Thermal Envelope Performance Requirements,” MHI recommends the following changes:

Change Zone 1 total U_o to 0.098 for single and 0.096 for multi-sectional, Zone 2 total U_o to 0.081 for single and 0.079 for multi-sectional, and the Zone 3 total U_o to 0.076 for singles and 0.073 for multi-sectional.

For “Table 460.102-6 – Tier 2 Building Thermal Envelope Performance Requirements,” MHI recommends the following changes:

Change Zone 2 total U_o to 0.076 for single and 0.073 for multi-sectional and the Zone 3 total U_o to 0.067 for single and 0.064 for multi-sectional.

These energy levels better align with current Energy Star requirements and provide an aggressive first step in enhancing energy conservation in manufactured homes. Further, these changes will reduce the pay off period and provide better value to homeowners.

§ 460.103 Installation of Insulation

MHI Comments:

The following strikethrough text should be deleted from this section:

“Insulating materials must be installed according to the insulation manufacturer’s installation instructions and the requirements set forth in Table 460.103 of this section, ~~which is adapted from section R402 of the 2021 IECC.~~”

In Table 460.103 the instructions should clarify the location where baffles are required by adding the following underlined text:

Component	Installation Requirements
<p style="text-align: center;">Baffles </p>	<p>Baffles must be constructed using a solid material, maintain an opening equal or greater than the size of the vents, and extend over the top of the attic insulation <u>where insulation is restrained from full depth in order to maintain 1-inch minimum air space between insulation and roof decking.</u></p>

In Table 460.103 instructions for “eave vents” should be deleted. This requirement is not within the 2021 IECC nor does it provide insulation installation instructions. Furthermore, it should be acceptable to use nonpermeable insulation adjacent to ventilated soffits as long as required free air path is maintained.

§ 460.104 Building thermal envelope air leakage.

MHI Comments:

The following strikethrough text should be deleted from this section:

“Manufactured homes must be sealed against air leakage at all joints, seams, and penetrations associated with the building thermal envelope in accordance with the component manufacturer's installation instructions and the requirements set forth in Table 460.104 of this section. Sealing methods between dissimilar materials must allow for differential expansion, contraction and mechanical vibration, and must establish a continuous air barrier upon installation of all opaque components of the building thermal envelope. All gaps and penetrations in the exterior ceiling, exterior floor, and exterior walls, including ducts, flue shafts, plumbing, piping, electrical wiring, utility penetrations, bathroom and kitchen exhaust fans, recessed lighting fixtures adjacent to unconditioned space, and light tubes adjacent to unconditioned space, must be sealed with caulk, foam, gasket or other suitable material. ~~The air barrier installation criteria is adapted from section R402 of the 2021 IECC.”~~

Table 460.104 should revise the “rim joists criteria” by deleting the following strikethrough text. Mud sill plates are not typically used in manufactured housing and, if used, would be installed on-site by others outside the scope of this rule.

Component	Air Barrier Criteria
Rim joists	The air barrier must enclose the rim joists. The junctions of the rim board to the sill plate and the rim board and the subfloor must be air sealed.

In Table 460.104 the component “Shower or tub adjacent to exterior wall” should be deleted or clarified to apply only when interior wall surface is used as an air barrier. Exterior sheathing or house wrap products are often used as home air barrier and these products are not installed between shower walls.

Subpart C – HVAC, Service Hot Water, and Equipment Sizing

§460.201 Duct systems.

MHI Comments:

The following underlined text and strikethrough text changes must be made to the following section:

“Each manufactured home equipped with a duct system, which may include air handlers and filter boxes, must have supply ducts be sealed to limit total air leakage to less than or equal to four (4) cubic feet per minute per 100 square feet of conditioned floor area. Building framing cavities must not be used as ducts or plenums when directly connected to mechanical systems. Multi-section homes may have each home section isolated and tested separately. ~~The duct total air leakage requirements are adapted from section R403 of the 2021 IECC.”~~

MHI also recommends revising this section based on R403.3.6 of the 2021 IECC as follows:

- Rough-in test: The total leakage shall be less than or equal to 4.0 cubic feet per minute (113.3 L/min) per 100 square feet (9.29 m²) of conditioned floor area where the air handler is installed at the time of the test. Where the air handler is not installed at the time of the test, the total leakage shall be less than or equal to 3.0 cubic feet per minute (85 L/min) per 100 square feet (9.29 m²) of conditioned floor area.
- Postconstruction test: Total leakage shall be less than or equal to 4.0 cubic feet per minute (113.3 L/min) per 100 square feet (9.29 m²) of conditioned floor area.
- Test for ducts within thermal envelope: Where all ducts and air handlers are located entirely within the building thermal envelope, total leakage shall be less than or equal to 8.0 cubic feet per minute (226.6 L/min) per 100 square feet (9.29 m²) of conditioned floor area.

MHI also has significant concerns that testing was not included in this proposal and these concerns are demonstrated in this section which requires testing of air handlers and filter boxes. However, manufactured homes often utilize uncased evaporator coils (a-coils) that prevent the air handler from being readily tested. Oftentimes, it is necessary to temporarily remove the air handler in order to test the duct system for leakage due to the difficulty sealing the air handler.

For multi-sectional units where ductwork is installed on-site, the rule does not establish enforcement procedures for testing. More specifically, what qualifications are required for those performing the testing? Can installers certify their own work? What training is required for installer personnel performing this work? How are the test results documented? Is the installer responsible for any remedial work that may be required after the testing is performed?

If testing is required to be performed by a third-party or in cases where the installer is not capable of performing the testing, the additional cost of testing could be \$600 or more. For Tier 1 homes this nearly doubles the cost increase for single-section homes and increases the installed cost by more than 50 percent for multi-section homes. This cost was not considered in the DOE purchase price increase analysis performed. DOE must not propose a rule without including the required testing requirements, so any analysis can include the true impact.

§460.202 Thermostats and controls.

MHI Comments:

MHI recommends deleting the following sentence and reference wherever it appears in this section: “Adapted from section R403 of the 2021 IECC.”

MHI also recommends revising §460.202 (b)(3) to the following:

“Homeowner manuals should include recommendation that homeowners program thermostat with a heating temperature set point no higher than 70 °F (21 °C) and a cooling temperature set point no lower than 78 °F (26 °C).”

§ 460.203 Service hot water.

MHI Comments:

MHI recommends deleting the strikethrough text from “section (a)” as typical water heater instructions do not include maintenance instructions and such when available are readily available on-line. Further, this information is already accommodated in 24 CFR Part 3280.

“(a) Service hot water systems installed by the manufacturer must be installed according to the service hot water manufacturer’s installation instructions. ~~Where service hot water systems are installed by the~~

~~manufacturer, the manufacturer must ensure that any maintenance instructions received from the service hot water system manufacturer are provided with the manufactured home. The service hot water requirements are adapted from section R403 of the 2021 IECC.”~~

§460.204 Mechanical ventilation fan efficacy.

MHI Comments:

MHI recommends deleting the following sentence and reference wherever it appears in this section: “Adapted from section R403 of the 2021 IECC.”

As referenced in § 460.2 Definitions, the definition of “whole-house mechanical ventilation system” must be revised to include the addition of the underlined text as shown below. Further, this section must clarify it does not apply to bath fans and range hoods.

“Whole-house mechanical ventilation system” – Exhaust system, supply system, or combination thereof that is designed to mechanically exchange indoor air with outdoor air when operating continuously or through a programmed intermittent schedule to satisfy the whole house ventilation rates.

§460.205 Equipment sizing.

MHI Comments:

Incorporation of these manuals is an example of trying to use a site-built code for manufactured housing that just does not work as outlined below.

The design parameters provided in ACCA Manual J are location specific rather than based on zones in the proposed rule. The proposed rule must provide the required design parameters to perform an ACCA Manual J analysis within the context of the three thermal zones in the proposed rule.

ACCA Manual J analysis requires knowledge of the orientation of the home with respect to the sun for cooling load analysis. Because the orientation of the home is often unknown until installed, the proposed rule must establish a default orientation, such as the front door is assumed to face south.

ACCA Manual S establishes sizing limits for heating and cooling equipment, these limits presume that thermal loads are established for a specific location and specific building orientation. The variation in design parameters within a single thermal zone exceeds the sizing limits of ACCA Manual S. The proposed rule must establish alternate criteria for using ACCA Manual S where the design parameters vary within a thermal zone.

Current equipment sizing methods are not based on Manual J or Manual S. The use of this software, as proposed, will add additional time and cost for each model plan submission.

The rule must establish a threshold for requiring a revised Manual J or Manual S analysis. For example, where a home model has options that affect the glazing area or insulation value, are distinct Manual J and Manual S analysis required for each possible option?

If equipment sizing is limited by Manual S, homes can only be placed in their respective thermal zones under the proposed rule because placing a home in a zone for which it was not designed would violate the sizing limits of Manual S. For example, under the current standard a Zone II home can be placed

in Zone I, as Zone II is considered more restrictive. However, under the new standard, this common practice would not be permitted because equipment sized for Zone II would be oversized for Zone I and would violate the proposed rule. This would restrict current sales practices in the industry especially for retailers located near the Zone boundaries.

Appendix III – MHI’s Responses to Issues on Which the DOE Requests Comment

1. DOE invites comment on whether (1) the manufacturer’s retail list price threshold for Tier 1 under the tiered proposal is appropriate, (2) the untiered proposal in this SNOBR is cost-effective, generally, and (3) the untiered proposal is cost-effective for low-income consumers.

Using a tiered system based on price shows a fundamental lack of understanding of the factory-built process. There is no manufacturer’s suggested retail price for manufactured homes. Home price is determined by the retailer based on the home features selected by the consumer. The approval for floor design and layout with respect to HUD Code requirements are made regardless of those selections, and long before the consumer has made them. Requiring approval of every floorplan AFTER consumer choices are made determining the price, would mean each and every individual house would have to be approved separately – adding astronomical costs to the process and slowing down the line so as to remove all efficiencies.

Moreover, the setting of either \$55,000/\$63,000 as the threshold for Tier 1 is arbitrary and relates affordable housing ONLY to the manufactured housing market. To determine if a home is affordable, it is necessary to consider the entire housing market. Manufactured homes at any price point provide a significant source of affordable housing – with the average price of a new manufactured home being \$87,000 compared to \$308,597 for a new site-built home not including land.⁶ Furthermore, recent labor and supply shortages have increased those prices significantly (as they have also done in the site-built home industry). According to the Census Bureau's Manufactured Housing Survey the average price of a new manufactured home in June was \$106,800 up from \$95,000 in January.

2. DOE welcomes comment on approaches for testing, compliance and enforcement provisions for the proposed standards and alternative proposal. DOE also welcomes comments and information related to potential testing, compliance and enforcement under the current HUD inspection and enforcement process, and potential costs of testing, compliance and enforcement of the proposed standards and alternative proposal in this document.

MHI has significant concerns that testing was not included in this proposal, and finds it challenging to consider the costs and impacts of a number of the proposed changes without knowing what the testing protocols will be. All costs imposed by the proposed rule must be factored, and enforcement and testing are parts of that cost. For example, will the duct testing require every unit to be tested thus requiring each manufacturer to hire one individual to test the ducts in line? Additionally, each multi-section home will need to be tested on-site which will cost around \$1,000 per unit, assuming the duct system passes the first time. If a duct system fails the testing on-site, additional costs will be incurred with bringing the duct system into compliance and then another site test will be required.

Furthermore, it is unnecessary for the DOE to develop a new enforcement mechanism because the HUD Code is an already-established enforcement mechanism that mandates a uniform standard for design, construction, and installation, including federal requirements for safety, durability, and energy efficiency. While MHI recognizes that the DOE has the authority to develop an energy conservation standard for manufactured housing, it should be developed in coordination with HUD to ensure that any proposed rules are integrated into the HUD Code for enforcement.

3. DOE requests comment on the use of a tiered approach to address affordability and PBP concerns from HUD, other stakeholders, and the policies outlined in Executive Order 13985. DOE also requests comment regarding whether the price point boundary between the proposed tiers is appropriate, and if not, at what price point should it be set and the basis for any alternative price points. DOE also requests comment on its assumptions regarding the use of high-priced loans (e.g., chattel loans) by low-income purchasers, or other purchasers, of manufactured housing.

⁶ 2020 U.S. Census Bureau's Manufactured Housing Survey.

Manufactured housing is a critical component of the success of Executive Order 13985, officially titled "Advancing Racial Equity and Support for Underserved Communities." According to the Urban Institute, "the gap in the homeownership rate between black and white families in the U.S. is bigger today than it was when it was legal to refuse to sell someone a home because of the color of their skin." Addressing systemic barriers to minority homeownership is imperative and increasing the supply of quality affordable housing must be an integral part of the effort. This is where manufactured housing comes in. With the average cost of a new manufactured home itself being around \$87,000, it is common for the purchase of a manufactured home to be a less expensive option than renting.⁷ Unlike other affordable homeownership options, which are often aging housing stock in need of extensive improvements and rehabilitation, a family can attain homeownership in a brand-new home that has the latest innovations, energy efficient features, and modern floor plans and amenities. Any federal regulations that impact the affordability of housing could make it even harder for minority homeowners to access homeownership.

4. DOE also requests comment on alternate thresholds (besides price point) to consider for the tiered approach, including a size-based threshold (e.g., square footage or whether a home is single- or multisection). DOE requests comment on the square footage and region versus sales price data provided in the notice (from MHS PUF 2019) and how that data (or more recent versions of that data) could be used to create either a size-based or region-based threshold instead. DOE further requests input on whether there should be single national threshold as proposed, or whether it should vary based on geography or other factors, and if so, what factors should be considered.

The Department must seriously consider, as it did in its updated data and analysis, an alternative approach such as square footage or sections. Thresholds must be established differently for different regions of the country because the features and amenities in an "affordable" home vary geographically. Further, the pricing for a manufactured home can differ greatly depending on the location of where the home will be sited. For example, below are the 2020 average prices of a manufactured home in several states across the country⁸:

- Arizona - \$106,800
- California - \$118,700
- Colorado - \$88,200
- Florida - \$89,200
- Texas - \$88,200

Further, from an approval and enforcement standpoint, it is not clear how designs of varying levels of affordability would be distinguished by production inspection primary inspection agencies (IPIAS) and design approval primary inspection agencies (DAPIAS).

5. DOE requests comment on using the AEO GDP deflator series to adjust the manufacturer's retail list price threshold for inflation. DOE requests comment on whether other time series, including those that account for regional variability, should be used to adjust manufacturer's retail list price.

While MHI does not believe a price threshold is at all appropriate, if used there absolutely needs to be an index to increase the price over time if a price tier is used. The proposed rule should establish the Federal agency

tasked with providing the annually adjusted threshold values. Whether it is HUD or the DOE, a single adjusted value must be provided to ensure consistency across the industry.

6. DOE requests comment on whether a one-year lead time would be sufficient given potential constraints that compliance with the DOE standards may initially place on the HUD certification process, and whether a longer lead time (e.g., a three-year lead time) or some other alternative lead-

⁷ 2020 U.S. Census Bureau's Manufactured Housing Survey.

⁸ *Id.*

time for this first set of standards (e.g., phased-in over three years, with one-year lead-times thereafter) should be provided.

When DOE makes changes to appliance standards there is generally a five-year compliance period. Given that the process for manufacturing homes is at least as complex as appliances, the same time period should apply. If the proposed rulemaking is finalized as written, implementing the changes would require manufacturing plants to completely overhaul their systems and processes. Further, every home design currently being utilized – of which there are thousands – would need to be redesigned and reapproved, further slowing down the process.

7. DOE requests comment on its understanding of the definitional changes in the 2018 IECC and the 2021 IECC. DOE also requests comments on its changes to the proposed definitions as compared to those proposed in the June 2016 NOPR.

MHI recommends revising the definition of whole-house mechanical ventilation system to: “Exhaust system, supply system, or combination thereof that is designed to mechanically exchange indoor air with outdoor air when operating continuously or through a programmed intermittent schedule to satisfy the whole house ventilation rates.” As currently proposed, the definition would include all exhaust fans including bath and range hoods – systems we do not believe are intended to be included.

8. DOE requests comment on incorporating by reference ACCA Manual J, ACCA Manual S, and “Overall U-Values and Heating/Cooling Loads–Manufactured Homes” by Conner and Taylor.

Incorporation of these manuals is an example of trying to use a site-built code for manufactured housing that just does not work as outlined below.

ACCA Manual J analysis requires knowledge of the orientation of the home with respect to the sun for cooling load analysis. Because the orientation of the home is often unknown until installed, the proposed rule must establish a default orientation, such as the front door is assumed to face south.

ACCA Manual S establishes sizing limits for heating and cooling equipment, these limits presume that thermal loads are established for a specific location and specific building orientation. The variation in design parameters within a single thermal zone exceeds the sizing limits of ACCA Manual S. The proposed rule must establish alternate criteria for using ACCA Manual S where the design parameters vary within a thermal zone.

Current equipment sizing methods are not based on Manual J or Manual S. The use of this software, as proposed, will add additional time and cost for each model plan submission.

The rule must establish a threshold for requiring a revised Manual J or Manual S analysis. For example, where a home model has options that affect the glazing area or insulation value, are distinct Manual J and Manual S analysis required for each possible option?

If equipment sizing is limited by Manual S, under the proposed rule homes can only be placed in their respective thermal zones because placing a home in a zone for which it was not designed would violate the sizing limits of Manual S. For example, under the current standard a Zone II home can be placed in Zone I, as Zone II is considered more restrictive. However, under the new standard, this common practice would not be permitted because equipment sized for Zone II would be oversized for Zone I and violate the proposed rule. This would restrict current sales practices in the industry especially for retailers located near the Zone boundaries.

9. DOE requests comment on basing the climate zones on the three HUD zones instead of the June 2016 NOPR-proposed four climate zones, or other configuration of climate zones. DOE further requests input on whether energy efficiency requirements should be based on smaller geographic areas than provided with the 3 or 4 zone model.

MHI supports utilizing the current HUD climate zones for the purpose of this rulemaking. However, as written the proposed rule would require a home in southern Virginia, which would be in climate zone 3 under the IECC, to meet the same requirements as a home located in Fairbanks, Alaska, which would be located in climate zone 8 using the IECC. MHI encourages the DOE to lower proposed thermal envelopment requirements within zone 3 to align with IECC climate zone 3 requirements more closely

10. DOE requests comment on the Tier 1 energy conservation standards, which would be applicable to manufactured homes with a manufacturer's retail list price of \$55,000 or less. DOE also requests comment on the proposed energy conservation standards based on the most recent version of the IECC for the Tier 2 and untiered standards and the consideration of R-21 sensitivity for exterior wall insulation for climate zones 2 and 3.

Per our response to Question 1, MHI does not support a tiered approach based on retail price.

11. DOE requests comment on the additional energy efficiency requirements from the 2021 IECC and whether they should apply to manufactured homes, including those that DOE has initially considered as not applicable to manufactured homes. If so, DOE requests comment on how these requirements would apply and the costs and savings associated with these requirements.

While the IECC is respected in the construction industry, it was introduced as a standard specific to commercial and site-built residential housing with no input from the manufactured housing industry. Given that the IECC essentially ignores all the construction aspects unique to manufactured housing, requiring the industry to comply with a building code that was developed without the benefit of our industry's knowledge or participation is not an appropriate solution. Thus, an integration process of individual evaluation and strategic merging of any increased energy standards would be a much more prudent approach rather than attempting a "broad scale, one size fits all" approach as is currently being suggested. For that to work, the most appropriate code to utilize to update energy standards for manufactured homes is the HUD Code.

12. DOE requests comment on the proposal to not require that exterior ceiling insulation must have uniform thickness or a uniform density.

MHI agrees that manufactured homes should NOT have to require uniform thickness of installation. Installing insulation with a nonuniform thickness is required to construct most manufactured homes due to shipping height restrictions and the need to minimize truss heel height. Below is further supporting information as to why MHI supports not requiring uniform thickness based on the DOE proposal.

- The loose fill spray applied ceiling insulation was assumed to be R-31 per inch in the DOE analysis. Therefore, as the required R-value for the ceiling insulation is increased the required depth will also increase.

- Due to shipping restrictions across the U.S., most manufacturers limit the truss heel height to allow the most conservative shipping heights.
- When the heel height is less than the depth of insulation required, a compressed area of insulation occurs at the eave areas. The deeper the required insulation, the further the compressed area extends toward the center of the home.
- Because of the compressed area at the eave, the manufacturers typically increase the depth toward the center of the home to provide an average depth that meets the requirements.
- Approximately 30 percent of homes produced have a “vaulted” ceiling instead of “flat” ceiling as assumed in the DOE proposal. The insulation depths that are being proposed for Tier 2 prescriptive requirements would eliminate the production of homes with vaulted ceilings unless the trusses are redesigned with higher heel heights or steeper exterior roof slopes. These changes will then increase the shipping height and require truss re-designs.
- The DOE proposal includes assumptions that heel heights will increase as the required depth of insulation increases to minimize the compressed area. The DOE document states that the truss heel height is assumed to be 2.5 inches for ceilings using less than or equal to R-22, 5.5 inches for insulation between R-22 and R-30, and 7.5 inches for over R-38. This increased heel height assumption will require the trusses to be re-designed and will increase shipping heights. Homes with increased shipping heights will be more costly to ship based on state-by-state restrictions.

13. DOE requests comment on the proposal not to limit the total area of glazed fenestration.

MHI agrees that the DOE should not limit the amount of glazed fenestration. The 2021 IECC already includes exemptions that must also be included in this proposed rule. Further, MHI recommends adding the following language to this section of the proposal:

“(6) [R402.3.3] Glazed fenestration exemption. Not greater than 15 square feet (1.4 m²) of glazed fenestration per dwelling unit shall be exempt from the U-factor and SHGC requirements in Section R402.1.2. This exemption shall not apply to the Total UA alternative in Section R402.1.5.”

14. DOE requests comment on removing the proposed requirement that exterior floor insulation installed must maintain permanent contact with the underside of the rough floor decking.

MHI supports exempting manufactured housing from this requirement. In manufactured home construction, the floor insulation between the I-beams is inherently not in contact with the underside of the floor decking. This must be exempted to permit standard construction practices as outlined below.

The typical insulation used in the production environment is blanket style insulation that is installed between the bottom of the floor and the chassis frame which keeps the HVAC supply duct system inside the thermal boundary of the building. Changing this method of installation would effectively remove the HVAC supply duct system from inside the thermal boundary of the building and would cause an increased heat gain and heat loss, effectively decreasing energy efficiency. This would be contradictory to the purpose and scope of the IECC. For this reason, most manufacturers do not currently install floor insulation between the floor joists that would be in contact with the underside of the floor decking. Therefore, production facilities are not set-up to efficiently install insulation that is contact with the underside of the floor decking. However, interior perimeter rim joist insulation is a common practice.

Installing insulation between the floor joists will also increase the production labor to install the insulation. This additional labor will add around 20 minutes of production time to each floor produced. For a plant producing eight floors per day, the increased production time will be around 160 minutes per day. At that rate of production, the line will have to move about every 50 minutes. Therefore, the increased labor required will either slow production or require new additional labor resources. Whether production is reduced, or additional

labor is required, the overall cost of the home will be increased, but these costs were not considered in the DOE analysis.

Further, the DOE analysis assumes that the floor joists are 2x6 with insulation up to and including R-22, and 2x8 floor joists insulated to R-30 and above. Currently, 90 percent of floors produced use 2x6 floor joists. Therefore, the increased joists depth will add approximately a 33 percent material cost increase which will be around \$200 per 14x76 floor. This 2-inch floor joist change will also increase the shipping height. This additional 2 inches only compounds the issue discussed about the truss changes.

15. DOE requests comment on the proposed updates to the installation of insulation criteria as it applies to manufactured homes construction only.

In Table 460.103 the instructions should clarify the location where baffles are required by adding the following underlined text:

Component	Installation Requirements
Baffles	Baffles must be constructed using a solid material, maintain an opening equal or greater than the size of the vents, and extend over the top of the attic insulation <u>where insulation is restrained from full depth in order to maintain 1-inch minimum air space between insulation and roof decking.</u>

In Table 460.103 instructions for “eave vents” should be deleted. This requirement is not within the 2021 IECC nor does it provide insulation installation instructions. Furthermore, it should be acceptable to use nonpermeable insulation adjacent to ventilated soffits as long as required free air path is maintained.

16. DOE requests comments on whether there are any of the 2021 IECC updates relevant to manufactured housing that should be considered as part of this rulemaking. Specifically, DOE requests comment on whether the 2021 IECC updates for installation criteria for access hatches and doors, baffles and shafts are applicable to manufactured housing and should be considered in this rulemaking.

While the IECC is respected in the construction industry, it was introduced as a standard specific to commercial and site-built residential housing with no input from the manufactured housing industry. Given that the IECC essentially ignores all the construction aspects unique to manufactured housing, requiring the industry to comply with a building code that was developed without the benefit of our industry’s knowledge or participation is not an appropriate solution. For example, the baffle requirements included in the proposal will not work because the closest you can get to the rim rail is inside the face and not the outside edge. That simply will not work for manufactured homes.

17. DOE requests comment on the proposed updates to the air barrier criteria as it applies to manufactured homes construction only. Further, DOE requests comment whether the SNOPR proposal continues to be designed to achieve air leakage sealing requirements of 5 ACH.

There is substantial evidence that the prescriptive building thermal envelope air leakage standards incorporated within the rule are adequate to ensure homes achieve an air leakage rate of 5ACH. Further, MHI believes that whole house air leakage testing is unnecessary.

18. DOE requests comments on whether there are any of the 2021 IECC updates relevant to manufactured housing that should be considered as part of this rulemaking. Specifically, DOE requests comment on whether the 2021 IECC updates for air barrier criteria for recessed lighting, narrow cavities and plumbing are applicable to manufactured housing and should be considered in this rulemaking. If so, DOE requests comment on whether the requirements would alter the 5 ACH designation.

MHI does not believe that recessed lighting needs specification on air leakage rates as these fixtures are usually IC rate and significantly airtight. Further, MHI does not believe that additional information needs to be added to the proposed rule for narrow cavities as any such activities are rare in manufactured housing and when they do occur, they generally do not disrupt the air barrier and are insulated or gasketed. Finally, MHI does not believe that additional information needs to be added to the proposed rule for wiring and plumbing as most often these utilities are routed in the floor systems within the thermal envelope and larger vent piping is already caulked and sealed.

However, because the IECC essentially ignores all the construction aspects unique to manufactured housing, requiring the industry to comply with a building code that was developed without the benefit of our industry's knowledge or participation is not an appropriate solution. This is a perfect example of why the IECC is not the appropriate building code for manufactured housing. Further, holes in the floor, such as under bathtubs and showers, must be exempted from sealing to permit the installation of p-traps in 2x6 floor systems. These holes do not allow air intrusion from the exterior because the exterior floor air barrier is the bottom board and is not the floor itself. These are just a few examples why the most appropriate code to utilize to update energy standards for manufactured homes is the HUD Code. MHI does not believe any additional information needs to be added to the proposed rule to address recessed lighting, narrow cavities, and plumbing.

19. DOE requests comment on the proposal to require that total air leakage of duct systems for all manufactured homes is to be less than or equal to 4 cfm per 100 square feet of conditioned floor area.

The proposed rule limits "total air leakage" of the duct system whereas current testing, such as that done for Energy Star homes, is based on air leakage to the exterior. Testing leakage to the outside requires the use of a second machine used simultaneously. This would be a more extensive and costly test with increased failure rates while providing little benefit in terms of energy savings. Where ducts are in the floor, and contained within the bottom board, they typically do not leak to the exterior and should be exempt. Again, since no testing requirements are included in this proposal, it is impossible to know the costs or procedures of achieving such levels.

Although MHI supports efforts to limit duct leakage, we believe such tests should be limited to testing of duct systems in the factory only, where such test provides the best value to consumers. MHI encourages the DOE to clarify the testing requirements to encourage effective use of current processes to ensure supply duct systems maintain a leakage of less than 4 cfm per 100 square feet of conditioned floor area as installed and tested within the building facility.

20. DOE requests comment on DOE's interpretation of R403.1 and the proposed updates to the thermostat and controls requirements. In addition, DOE requests comments on whether there are any of the 2021 IECC updates relevant to manufactured housing that should be considered as part of this rulemaking.

MHI believes programmable thermostats should remain an option for the homebuyer. Programmable thermostats do not come preset as indicated within §460.202(b)(3) and requiring home manufacturers to

program thermostats as proposed prior to the home being installed and powered would be overly burdensome, ineffective and unnecessary. Homeowners should be advised to program their thermostats. Moreover, the desire for programmable thermostats should be dependent on consumer-demand. Many consumers find programmable thermostats to be too complicated to use, and prefer a more traditional thermostat. Lastly, any pre-program requirements should be part of regulation requirements on thermostat manufacturers if deemed appropriate rather than on home manufacturers.

21. DOE requests comment on DOE’s interpretation of R403.5 and the proposed updates to the service hot water requirements. In addition, DOE requests comments on whether there are any of the 2021 IECC updates relevant to manufactured housing that should be considered as part of this rulemaking. Specifically, DOE requests comment on whether the circulating hot water system temperature limit should be included as a requirement.

Circulating hot water systems are not typically used in manufactured homes. Further, 24 CFR 3280 already has provisions for scald prevention that limit the temperature of hot water. Additional requirements would be redundant and unnecessary.

22. DOE requests comment on the proposal to include the 2021 IECC fan efficacy standard requirements. DOE requests comment on whether any of the fan efficacy requirements are not applicable to manufactured homes.

The applicability of the increased efficacy standards would be dependent upon the additional costs associated, and the return on investment of the increased mechanical ventilation requirements, which the DOE did not take into account. Furthermore, the definition of “whole house fan” should be revised to align with the definition within the 2021 IECC which limits the fan efficacy requirements to fan used for “whole house ventilation” purposes rather than spot ventilation.

23. DOE requests comment on whether the HRV and ERV provisions under 2021 IECC for site-built homes are applicable to manufactured homes and whether they would be cost-effective. Specifically, DOE requests comment on costs for the HRV and ERV requirements as it applies to manufactured homes in all climate zones.

HRV and ERV provisions would add significantly to the cost of manufactured homes and 24 CFR 3280 already contains provisions for providing fresh air within a manufactured home. HRV and ERV are products mainly promoted by those appliance manufacturers and have been found in many cases to increase moisture related problems and increased energy usage, specifically in the southern climates.

24. DOE requests comment on the above ventilation strategies, including (but not limited to) cost, performance, noise, and any other important attributes that DOE should consider, including those related to mitigation measures. While the alternate ventilation approaches are not integrated into the analysis presented as part of this proposal, DOE is giving serious consideration as to whether it should incorporate one or more of these options as part of its final rule based on any additional data and public comments it receives.

HRV and ERV provisions would add significant construction costs. If implemented with the furnace, as most current ventilating systems are, significant redesign would be required to increase the size of the furnace compartment to accommodate the additional equipment and ductwork. Currently ventilation strategies in manufactured housing have proven to be efficient and effective for many years. In fact, the current IECC recognizes a process developed and commonly used by the manufactured housing industry as an accepted application in residential and commercial construction.

25. DOE requests comment on the cost-effectiveness and feasibility of requiring R-20+5 for the exterior wall insulation for climate zones 2 and 3 Tier 2/Untiered manufactured homes. DOE also requests comment on the sensitivity analysis for R-21 that would result in positive LCC savings for all cities.

The use of continuous insulation is problematic due to the required changes in design, associated costs, and need for products that don't exist. The increase in unit width due to the addition of continuous foam will require a reduction in the structural floor width equal to the thickness of the insulation. This will require redesign of the chassis system, trusses, and retooling of fixtures and jigs within the plant. Any reduction in interior width, due to increases in exterior width, will eliminate or require significant redesign of many singlewide models that incorporate a bathroom with adjacent hallway that are already at the minimum widths permitted under 24 CFR 3280. Furthermore, standard doors for manufactured homes are designed for overall wall thicknesses of 4- or 6-inches and increasing the thickness will require the use of extension jambs or the development of new products to accommodate increased wall widths. Permitting the use of R-21 only in lieu of R-20+5 is necessary.

26. DOE requests comment on the inputs to the conversion cost estimates.

Because the threshold cost is updated annually and because it is assumed that the list price must be updated, the cost to update model plans would be a reoccurring annual cost rather than a one-time cost. This must also be revised so that cost is not a consideration for Tier 2 homes. As currently proposed, the retail price must be determined for all homes to determine if it is above or under the threshold. The Tier 2 definition should not have a threshold price. Instead, a Tier 2 home should be defined as "A manufactured home that is not qualified as a Tier 1 home."

27. DOE requests comment on the shipment breakdown per tier and using a substitution effect of 20 percent on shipments to account for the shift in homes sold to the lower tiered standard. DOE requests comment on whether it should use a different substitution effect value for this analysis – and if so, why. (Please provide data in support of an alternative substitution effect value.)

Currently, very few homes are produced at the Tier 1 level of under \$55,000. It is unlikely that additional homes will be manufactured at that level. Instead, MHI expects an overall reduction in the manufacturing and purchasing of manufactured homes across the board.

28. DOE requests comment on the calculation of deadweight loss presented above and the extent to which there are market failures in the no-standards case.

Deadweight loss will increase as a result of this proposal, as many potential consumers will be priced out of purchasing a manufactured home.

29. DOE requests comment on the number of manufacturers of manufactured housing producing home covered by this rulemaking.

As of September 2021, there are 138 plants and 33 corporations producing manufactured homes in the country. As a result of this proposed rulemaking, all manufacturers will be negatively impacted.

30. DOE requests comment on the cost to update model plans and the number of model plans to update as a result of the proposed rule; on the types of equipment and capital expenditures that would be necessitated by the proposal; and the total cost of updating product offerings and manufacturing facilities. DOE requests comment on how these values would differ for small

manufacturers. DOE requests comment on its estimate of average annual revenues for small manufacturers of manufactured housing.

Because the threshold cost is updated annually and because it is assumed that the list price must be updated, the cost to update model plans would be a reoccurring annual cost rather than a one-time cost. This must also be revised so that cost is not a consideration for Tier 2 homes. As currently proposed, the retail price must be determined for all homes to determine if it is above or under the threshold. The Tier 2 definition should not have a threshold price. Instead, a Tier 2 home should be defined as “A manufactured home that is not qualified as a Tier 1 home.”

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See the report and analysis linked here for related statements by MHI, MHARR, TMHA, and more context and analysis:

[Shock! Manufactured Housing Institute Boldly Gives ‘Unforced Error’ Doc After Favorable Court Ruling, MHI Charged ‘Throwing Lifeline’ to DOE Energy Rule MHI Admits Harms MH – MHI, MHARR Analysis](#)

<https://www.manufacturedhomepronews.com/masthead/shock-manufactured-housing-institute-boldly-gives-unforced-error-doc-after-favorable-court-ruling-mhi-charged-throwing-lifeline-to-doe-energy-rule-mhi-admits-harms>