

**MN Department of Labor and Industry,
Construction Codes and Licensing Division**

2025 Residential Energy Code Technical Advisory Group

**Code Change Proposal Compilation for the
Review of the **2024 IRC - Chapter N11****



CODE CHANGE PROPOSAL FORM

(Must be submitted electronically)

Author/requestor: [Amanda Spuckler](#)

Date: [6-27-2023](#)
Revised [4.9.25](#)

Email address: amanda.spuckler@state.mn.us

Model Code: [IRC Chapter 11](#)

Telephone number: [651-284-5361](#)

Code or Rule Section:
[1322.0100 \(N1101.1\)](#)

Firm/Association affiliation, if any: [DLI](#)

Code or rule section to be changed: [1322.0100 subp. 2 \(N1101.1\)](#)

Intended for Technical Advisory Group ("TAG"): [Residential Energy](#)

General Information

Yes **No**

- | | | |
|--|-------------------------------------|-------------------------------------|
| A. Is the proposed change unique to the State of Minnesota? | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| B. Is the proposed change required due to climatic conditions of Minnesota? | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| C. Will the proposed change encourage more uniform enforcement? | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| D. Will the proposed change remedy a problem? | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| E. Does the proposal delete a current Minnesota Rule, chapter amendment? | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| F. Would this proposed change be appropriate through the ICC code development process? | <input type="checkbox"/> | <input checked="" type="checkbox"/> |

Proposed Language

1. The proposed code change is meant to:

change language contained the model code book? If so, list section(s).

change language contained in an existing amendment in Minnesota Rule? If so, list Rule part(s).
[Part 1322.0100, subp. 2](#)

delete language contained in the model code book? If so, list section(s).

delete language contained in an existing amendment in Minnesota Rule? If so, list Rule part(s).

add new language that is not found in the model code book or in Minnesota Rule.

2. Is this proposed code change required by Minnesota Statute? If so, please provide the citation.

3. Provide *specific* language you would like to see changed. Indicate proposed new words with underlining and ~~striketrough~~ words proposed for deletion. Include the entire code (sub) section or rule subpart that contains your proposed changes.

Replaces N1101.1 with the following:

Subp. 2. Scope. This code applies to the following residential buildings and associated systems and equipment;

a. IRC-1 single-family dwellings, IRC-2 Two-family dwellings, IRC-3 townhouses, and IRC-4 accessory structures; and

b. Buildings or portions of buildings containing Group I-1, R-2, R-3, or R-4 occupancies where the entire composite building is three stories or less in height above grade plane as defined in the Residential Provisions of the 2012 IECC.

4. Will this proposed code change impact other sections of a model code book or an amendment in Minnesota Rule? If so, please list the affected sections or rule parts.
No

Need and Reason

1. Why is the proposed code change needed? Please provide a general explanation as well as a specific explanation for any changes to numerical values (heights, area, etc.)
The change provides users with the scope of the code in the scoping section. Currently, code users must refer to the definition of “residential” in chapter 11 of the IRC to determine which structures are considered residential for the purposes of the code. The proposal changes how scoping information is presented but not the scope of the code.
2. Why is the proposed code change a reasonable solution?
The code change is reasonable because it provides a code user with scoping information without requiring them to refer to the definitions section. It is simply more convenient.
3. What other factors should the TAG consider?
None.

Cost/Benefit Analysis

1. Will the proposed code change increase or decrease costs? Please explain and provide estimates if possible.
N/A
2. If there is an increased cost, will this cost be offset by a safety or other benefit? Please explain. If the benefit is quantifiable (for example energy savings), provide an estimate if possible.
N/A
3. If there is a cost increase, who will bear the costs? This can include government units, businesses, and individuals.
N/A
4. Are there any enforcement or compliance cost increases or decreases with the proposed code change? Please explain.

N/A

5. Will the cost of complying with the proposed code change in the first year after the rule takes effect exceed \$25,000 for any one small business or small city ([Minn. Stat. § 14.127](#))? A small business is any business that has less than 50 full-time employees. A small city is any statutory or home rule charter city that has less than ten full-time employees. Please explain.

N/A

Regulatory Analysis

1. What parties or segments of industry are affected by this proposed code change?
[Building contractors, mechanical contractors, architects, engineers, municipal building officials, building inspectors, building managers and homeowner](#)
2. Can you think of other means or methods to achieve the purpose of the proposed code change? What might someone opposed to this code change suggest instead? Please explain what the alternatives are and why your proposed change is the preferred method or means to achieve the desired result.
[An alternative would be to leave the existing scoping language and require code users to refer to definitions chapter to determine scoping. The proposed change eliminates the need to refer to the definitions and ensures code users are aware of the scoping based on information given in the scoping section.](#)
3. What are the probable costs or consequences of not adopting the code change, including those costs or consequences borne by identifiable categories of affected parties, such as separate classes of government units, businesses, or individuals?
[None](#)
4. Are you aware of any federal or state regulation or requirement related to this proposed code change? If so, please list the federal or state regulation or requirement and your assessment of any differences between the proposed code change and the federal regulation or requirement.

N/A

***Note: Incomplete forms may be returned to the submitter with instruction to complete the form. Only completed forms can considered by the TAG.



CODE CHANGE PROPOSAL FORM

(Must be submitted electronically)

Author/requestor: [Amanda Spuckler](#)

Date: [6/27/2023](#) revised
[4/9/2025](#)

Email address: amanda.spuckler@state.mn.us

Model Code: [IRC Ch 11](#)

Telephone number: [651-284-5361](#)

Code or Rule Section: [N1101](#)
[\(R301\)](#)

Firm/Association affiliation, if any: [DLI](#)

Code or rule section to be changed: [N1101\(R301\)](#), [Figure 1101.7 \(R301.1\)](#), and [Table N1101.7 \(R301.1\)](#)

Intended for Technical Advisory Group ("TAG"): [Residential Energy](#)

General Information

Yes **No**

- | | | |
|--|-------------------------------------|-------------------------------------|
| A. Is the proposed change unique to the State of Minnesota? | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| B. Is the proposed change required due to climatic conditions of Minnesota? | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| C. Will the proposed change encourage more uniform enforcement? | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| D. Will the proposed change remedy a problem? | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| E. Does the proposal delete a current Minnesota Rule, chapter amendment? | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| F. Would this proposed change be appropriate through the ICC code development process? | <input type="checkbox"/> | <input checked="" type="checkbox"/> |

Proposed Language

1. The proposed code change is meant to:

change language contained the model code book? If so, list section(s).

change language contained in an existing amendment in Minnesota Rule? If so, list Rule part(s).

delete language contained in the model code book? If so, list section(s).

[Delete N1101.7 \(R301.1\) and replace with list of MN counties and climate zones](#)

[Delete section N1101.7.1 \(R301.2\) warm humid climates](#)

[Delete section N1101.7.2 \(R301.3\) describing how to determine climate zone for locations not assigned to one](#)

[Delete Figure N1101.7 \(R301.1\) US Map Depicting Climate Zones](#)

[Delete Table N1101.7 \(R301.1\) Climate zones, moisture regimes, and warm humid designations by state, county, and territory](#)

delete language contained in an existing amendment in Minnesota Rule? If so, list Rule part(s).

add new language that is not found in the model code book or in Minnesota Rule.

2. Is this proposed code change required by Minnesota Statute? If so, please provide the citation.
No

3. Provide *specific* language you would like to see changed. Indicate proposed new words with underlining and ~~strikethrough~~ words proposed for deletion. Include the entire code (sub) section or rule subpart that contains your proposed changes.

IRC Section N1101.7 (R301.1) and all subsections are deleted in their entirety and replaced with the following:

Section N1101.7 (R301) Climate Zones.

The following counties are located in climate zone 7: Aitkin, Beltrami, Carlton, Cass, Clearwater, Cook, Crow Wing, Hubbard, Itasca, Kittson, Koochiching, Lake, Lake of the Woods, Mahnomon, Marshall, Norman, Pennington, Pine, Polk, Red Lake, Roseau, St. Louis, Wadena. All other counties are located in climate zone 6A.

Figure N1101.7 (R301.1) is deleted.

Table N1101.7 (R301.1) is deleted.

4. Will this proposed code change impact other sections of a model code book or an amendment in Minnesota Rule? If so, please list the affected sections or rule parts.

The proposed change is necessary to coordinate with changes to climate zones in adopted part 1323.0514 which modifies ASHRAE 90.1-2019 section 5.1.4 Climate.

Need and Reason

1. Why is the proposed code change needed? Please provide a general explanation as well as a specific explanation for any changes to numerical values (heights, area, etc.)

The change is needed to coordinate with changes and updates to climate zones in adopted chapter 1323, the Minnesota Commercial Energy Code. Chapter 11 of the 2024 IRC and ASHRAE 90.1-2019 use the climate zone data from ASHRAE Standard 169, which assigns Fillmore, Houston, and Winona counties to climate zone 5A. The adopted chapter 1323 assigned those 3 counties to climate zone 6A to maintain two climate zones in Minnesota.

The proposed change also eliminates a lengthy table that provides climate zone information for each U.S. county as well as section N1101.7.2 (R301.3) which describes how to determine the climate zone for a location that is not assigned to one. The table and section are unnecessary because all MN counties are assigned to a climate zone by the proposed code change.

2. Why is the proposed code change a reasonable solution?

The code change is a reasonable solution so both the commercial and residential energy codes assign counties to the same climate zones. The change will also eliminate a lengthy table and sections with climate zone information that is not applicable to Minnesota.

3. What other factors should the TAG consider?

ASHRAE Standard 169 assigns the following counties that were previously in climate zone 7 to 6A: Becker, Clay, Grant, Kanabec, Mille Lacs, Otter Tail, and Wilkin. The updated chapter 1323 and the unamended chapter 11 of the 2024 IRC also assign those counties to climate zone 6A. The proposed code change also assigns those counties to climate zone 6A.

Cost/Benefit Analysis

1. Will the proposed code change increase or decrease costs? Please explain and provide estimates if possible.
No changes to costs, or minimal, because the chapter 11 of the 2024 IRC applies similar requires to climate zones 6A and 5A. Furthermore, Fillmore, Houston, and Winona counties currently comply with climate zone 6A requirements.
2. If there is an increased cost, will this cost be offset by a safety or other benefit? Please explain. If the benefit is quantifiable (for example energy savings), provide an estimate if possible.
The benefits of the proposed code change are uniformity and consistency with the commercial energy code. The addition of a third climate zone in Minnesota could result in confusion without the benefit of improved energy efficiency or cost savings.
3. If there is a cost increase, who will bear the costs? This can include government units, businesses, and individuals.
Homeowners
4. Are there any enforcement or compliance cost increases or decreases with the proposed code change? Please explain.
N/A
5. Will the cost of complying with the proposed code change in the first year after the rule takes effect exceed \$25,000 for any one small business or small city ([Minn. Stat. § 14.127](#))? A small business is any business that has less than 50 full-time employees. A small city is any statutory or home rule charter city that has less than ten full-time employees. Please explain.
N/A

Regulatory Analysis

1. What parties or segments of industry are affected by this proposed code change?
Building contractors, mechanical contractors, architects, engineers, municipal building officials, building inspectors, building managers and homeowners
2. Can you think of other means or methods to achieve the purpose of the proposed code change? What might someone opposed to this code change suggest instead? Please explain what the alternatives are and why your proposed change is the preferred method or means to achieve the desired result.
None. Not adopting the proposed code change will result in unnecessary confusion with the commercial energy code.
3. What are the probable costs or consequences of not adopting the code change, including those costs or consequences borne by identifiable categories of affected parties, such as separate classes of government units, businesses, or individuals?
The probable consequence is inconsistent application and enforcement of the code.
4. Are you aware of any federal or state regulation or requirement related to this proposed code change? If so, please list the federal or state regulation or requirement and your assessment of any differences between the proposed code change and the federal regulation or requirement.
No.

Code Change Proposal RE-10.2 (Revised 3/4/25)



CODE CHANGE PROPOSAL FORM
(Must be submitted electronically)

Author/requestor: Eric Fowler

Date: 2/26/25

Email address: fowler@fresh-energy.org

Model Code: 2024 IRC

Telephone number: 507-933-0393

Code or Rule Section: Residential Energy Code

Firm/Association affiliation, if any: Fresh Energy

Code or rule section to be changed: N1104.5

Intended for Technical Advisory Group (“TAG”):

General Information

Yes **No**

- A. Is the proposed change unique to the State of Minnesota?
- B. Is the proposed change required due to climatic conditions of Minnesota?
- C. Will the proposed change encourage more uniform enforcement?
- D. Will the proposed change remedy a problem?
- E. Does the proposal delete a current Minnesota Rule, chapter amendment?
- F. Would this proposed change be appropriate through the ICC code development process?

Proposed Language

1. The proposed code change is meant to:

- change language contained the model code book? If so, list section(s).
- change language contained in an existing amendment in Minnesota Rule? If so, list Rule part(s).
- delete language contained in the model code book? If so, list section(s).
- delete language contained in an existing amendment in Minnesota Rule? If so, list Rule part(s).
- add new language that is not found in the model code book or in Minnesota Rule.

2. Is this proposed code change required by Minnesota Statute? If so, please provide the citation.

No, it is not, however, minimum requirements for EV ready and capable parking spaces in commercial and multifamily buildings passed during the 2023 legislative session.

3. Provide *specific* language you would like to see changed. Indicate proposed new words with underlining and ~~strikethrough~~ words proposed for deletion. Include the entire code (sub) section or rule subpart that contains your proposed changes.

Add new definitions as follows:

AUTOMOBILE PARKING SPACE. A space within a building or private or public parking lot, exclusive of driveways, ramps, columns, office and work areas, for the parking of an automobile.

ELECTRIC VEHICLE (EV). An automotive-type vehicle for on-road use, such as passenger automobiles, buses, trucks, vans, neighborhood electric vehicles, and electric motorcycles, primarily powered by an electric motor that draws current from a building electrical service, EVSE, a rechargeable storage battery, a fuel cell, a photovoltaic array, or another source of electric current.

Electric Vehicle Capable Space (EV Capable Space). A designated automobile parking space that is provided with electrical infrastructure necessary for the future installation of an EVSE load of 6.2 kVA or greater, including electrical panel capacity and space to support a circuit, and raceways, both underground and surface mounted.

Electric Vehicle Supply Equipment (EVSE). The conductors, including the ungrounded, grounded, and equipment grounding conductors, and the Electric Vehicle connectors, attachment plugs, and all other fittings, devices, power outlets, or apparatus installed specifically for the purpose of transferring energy between the premises wiring and the Electric Vehicle.

Electric Vehicle Ready Space (EV Ready Space). A designated automobile parking space that is provided with a branch circuit terminating in an outlet, junction box, or receptacle that will support an installed EVSE load of 6.2 kVA or greater.

Electric Vehicle Supply Equipment Installed Space (EVSE Space). An automobile parking space that is provided with a dedicated EVSE connection.

Add new text as follows:

N1104.5 (R404.5) Electric Vehicle Power Transfer Infrastructure.

New one- and two-family dwellings and townhouses with automobile parking spaces shall be provided in accordance with this section. All other new residential parking facilities shall be provided with electric vehicle power transfer infrastructure in accordance with Minnesota Rules Chapters 1323.

N1104.5.1 (R404.5.1) Quantity.

Each dwelling unit with a designated attached or detached garage or other onsite private parking provided adjacent to the dwelling unit shall be provided with one EV capable space, EV ready space, or EVSE space.

N1104.5.2 (R404.5.2) EV Capable Spaces.

Each EV capable space used to meet the requirements of R404.5 shall comply with all of the following:

1. A continuous raceway with a minimum of ¾ inch internal diameter or cable assembly shall be installed between a suitable panelboard or other on-site electrical distribution equipment and an enclosure or outlet located within 6 feet (1828 mm) of the EV capable space.
2. The installed raceway or cable assembly shall be sized and rated to supply a minimum circuit capacity in accordance with Section R404.5.5.
3. The electrical distribution equipment to which the raceway or cable assembly connects shall have sufficient dedicated space and spare electrical capacity for a two-pole circuit breaker or set of fuses.
4. The electrical enclosure or outlet and the electrical distribution equipment directory shall be marked: "For future electric vehicle supply equipment (EVSE)."

N1104.5.3 (R404.5.3) EV Ready Spaces.

Each branch circuit serving EV ready spaces shall comply with all of the following:

1. Termination at an outlet or enclosure, located within 6 feet (1828 mm) of each EV ready space it serves and marked "For electric vehicle supply equipment (EVSE)."
2. Service by an electrical distribution system and circuit capacity in accordance with Section R404.5.5.
3. Designation on the panelboard or other electrical distribution equipment directory as "For electric vehicle supply equipment (EVSE)."

N1104.5.4 (R404.5.4) EVSE Spaces.

An installed EVSE with multiple output connections shall be permitted to serve multiple EVSE spaces. Each EVSE serving either a single EVSE space or multiple EVSE spaces shall comply with the following:

1. Be served by an electrical distribution system in accordance with Section R404.5.5.
2. Have a nameplate charging capacity of not less than 6.2 kVA per EVSE space served. Where an EVSE serves three or more EVSE spaces and is controlled by an energy management system in accordance with Section R404.5.5, the nameplate charging capacity shall be not less than 2.1 kVA per EVSE space served
3. Be located within 6 feet (1828 mm) of each EVSE space it serves.
4. Be installed in accordance with NFPA 70 and be listed and labeled in accordance with UL 2202 or UL 2594.

N1104.5.5 (R404.5.5) Electrical distribution system capacity.

The branch circuits and electrical distribution system serving each EV capable space, EV ready space and EVSE space used to comply with Section R404.5 shall comply with one of the following:

1. Sized for a calculated EV charging load of not less than 6.2 kVA per EVSE, EV ready or EV capable space. Where a circuit is shared or managed, it shall be in accordance with NFPA 70.

2. The capacity of the electrical distribution system and each branch circuit serving multiple EVSE spaces, EV ready spaces or EV capable spaces designed to be controlled by an energy management system in accordance with NFPA 70 shall be sized for a calculated EV charging load of not less than 2.1 kVA per space. Where an energy management system is used to control EV charging loads for the purposes of this section, it shall not be configured to turn off electrical power to EVSE or EV ready spaces used to comply with Section R404.5.

4. Will this proposed code change impact other sections of a model code book or an amendment in Minnesota Rule? If so, please list the affected sections or rule parts.

Not necessarily, though EV charging provisions may be consolidated into the construction code.

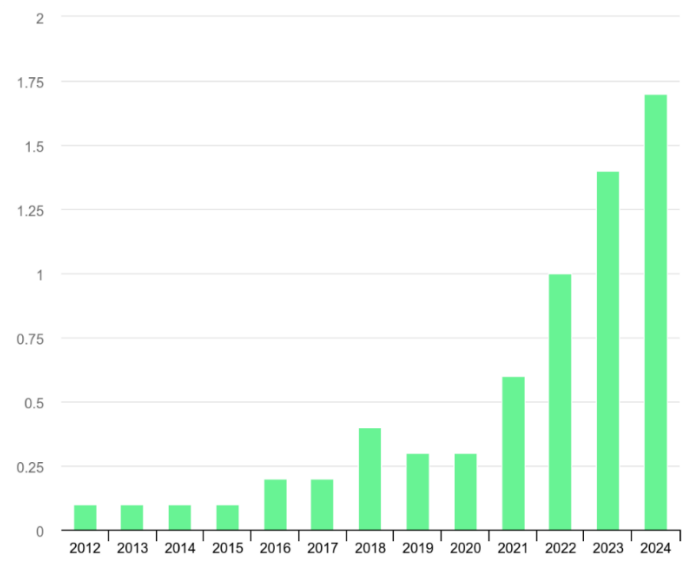
Need and Reason

1. Why is the proposed code change needed? Please provide a general explanation as well as a specific explanation for any changes to numerical values (heights, area, etc.)

This is an updated version of a code change proposal approved by this TAG during discussion of the 2021 IECC. Definitions have been updated to align with new language from the 2024 IECC Appendix RE. Similarly, minimum electrical capacity per space has been updated from 40 amps at 240 volts to 6.2 kVA, which slightly relaxes the requirement, and matches the new IECC appendix text.

Additional specifications and definitions have been copied from appendix RE for clarity and flexibility. The effect of this proposal is still the same: to require at least one EV capable parking where parking is provided. However, where the requirement is exceeded through provision of an EV ready or an EVSE installed space, this language provides additional guidance for those installations.

Electric vehicle adoption is on the rise in Minnesota, and across the country, as options expand, battery technology improves, and upfront prices come closer to gasoline-powered vehicles. This growth is exponential, not linear. By preparing new homes with consumer options in mind, the Department will reduce the burden of costly retrofits post-construction, and maintain a code that provides for the “use of modern methods, devices, materials and techniques,” as required by statute. Minnesota would also be following the lead of numerous other jurisdictions who have included EV ready or capable spaces as part of new residential construction, including California, Illinois, Maryland, and cities in Arizona, Colorado,



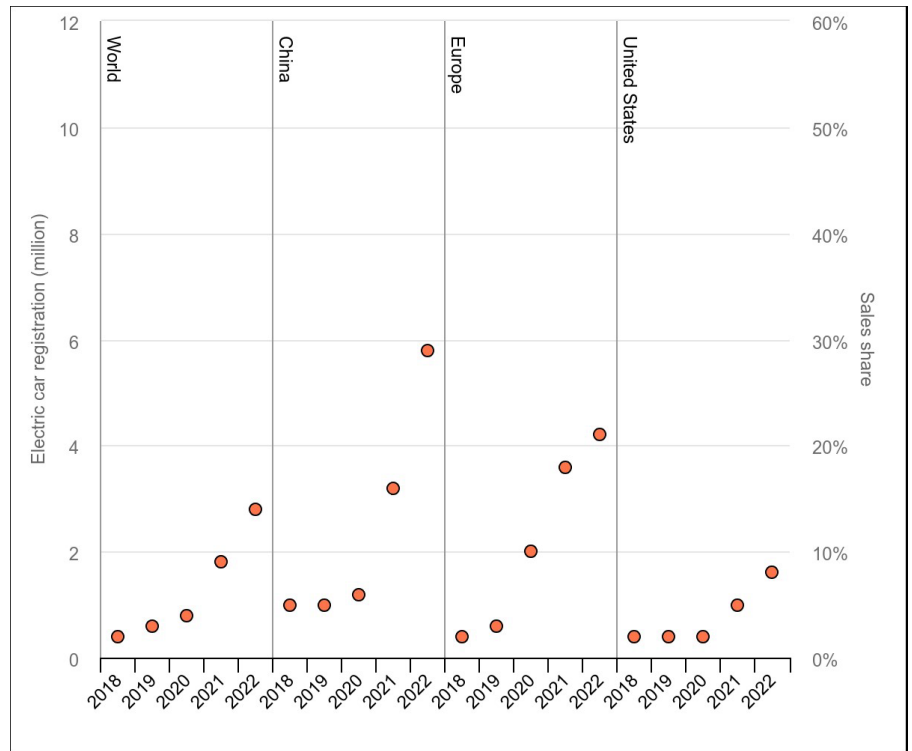
Millions of EV sales in the United States

Delaware, Georgia, and Missouri, as well as Vancouver.¹

New EV sales in the United States hovered around a quarter million each year from 2016 to 2020, and has since grown to over 1.7 million new vehicles in 2024.²

EVs are on track to pass 10% of new vehicle sales soon in the United States, while globally they were almost 15% of sales in 2022.³

This trend holds true in Minnesota as well, where 65,679 light-duty EVs were registered as of November 2024, up from 13,015 in February 2020.⁴ Additionally, about 7%⁵ of all new light-duty vehicle sales in Minnesota were electric in 2024, compared to 1.7% of light-duty vehicle sales in 2020.⁶ This trend is expected to continue as EV familiarity increases, EVs reach price parity with



¹ ICC, “2021 Electric Vehicles and Building Codes: A Strategy for Greenhouse Gas Reduction,” published October 2021; see Table 1: Sample EV-Integrated Code Provisions, which lists the jurisdictions that require EV Ready Space(s) for new single-family construction. (<https://codes.iccsafe.org/content/ICCEVBCSGGR2021P1/current-approaches-to-ev-integrated-codes>).

MD Public Safety Code § 12-205 (2024)

Corinne Reichert, “Illinois Right to Charge Law Requires New Homes and Apartments to Support EV Charging,” *CNET*, June 22, 2023, <https://www.cnet.com/home/illinois-right-to-charge-law-requires-new-homes-and-apartments-to-support-ev-charging/>; City of Atlanta, “City of Atlanta Passes ‘EV Ready’ Ordinance into Law,” November 21, 2017, <https://www.atlantaga.gov/Home/Components/News/News/10258/1338?backlist=/>.

Rachel Sawicki, “New Castle County Amends Codes to Expand Electric Vehicle Charging,” *Bay to Bay News*, October 27, 2021, <https://baytobaynews.com/stories/new-castle-county-amends-codes-to-expand-electric-vehicle-charging,62104>.

² IEA, Electric car sales, 2012-2024, IEA, Paris <https://www.iea.org/data-and-statistics/charts/electric-car-sales-2012-2024>, IEA. Licence: CC BY 4.0

³ IEA, Electric car registrations and sales share in China, United States and Europe, 2018-2022, IEA, Paris <https://www.iea.org/data-and-statistics/charts/electric-car-registrations-and-sales-share-in-china-united-states-and-europe-2018-2022>, IEA. Licence: CC BY 4.0

⁴ Current registration number from EvaluateMN, via MnDOT Electric Vehicle Dashboard: <https://www.dot.state.mn.us/sustainability/electric-vehicle-dashboard.html>.

⁵ Alliance for Automotive Innovation, “Electric Vehicle Quarterly Report: Q3 2024”, at page 8. Through Q3 2024.

⁶ Sales number from 2020 retrieved from the Electric Vehicle Dashboard hosted by the Alliance for Automotive Innovation.: <https://www.autosinnovate.org/EVDashboard>

gasoline vehicles,⁷ and purchase incentives from utilities and government continue over the next several years.⁸

Globally, sales projections range from 40% market share by 2030 to over 60% market share by 2030, according to analysis by IEA and RMI.⁹

This market share has been driven in part by lower prices and expanded options for EVs. In 2024, the average price for an EV cost only \$5,800 more than the average price for a new gasoline-powered passenger vehicle, with options starting as low as \$29,280.¹⁰ Additionally, as more EVs have entered the new vehicle marketplace, a robust used EV market will continue to grow that offers access to EVs at a more affordable price for more consumers. Affordability will be further spurred by the availability of a used EV tax credit for up to \$4,000 for vehicles costing \$25,000 or less.¹¹

Minnesota residents seeking to charge their electric vehicle at home may face a number of costs, including an electric service upgrade, wiring a 240 volt circuit to the charging location, and installing Electric Vehicle Supply Equipment (EVSE), commonly known as an EV charger. This proposal does not require installation of EVSE, or even wiring the circuit, but preserves consumer choice by requiring space in the electric panel for the circuit, and at minimum, conduit for easy installation of the circuit without digging or other costly, invasive work.

This cost is often unexpected for new EV owners, and spurred Xcel Energy to offer a “home wiring rebate”¹² to help defray the cost and support EV adoption in its service territory, while also supporting EVs in its service territories getting onto a time-varying electricity rate that optimizes use of the electric grid, to the benefit of both the EV owner and general grid customers. Level 2 charging enables EV owners to participate in utility pricing programs that offer lower electricity prices at times of the day when load is lowest on the electric grid (typically overnight, when wind power is also most prevalent), thereby optimizing use of the electric grid and renewable energy, while also saving the EV owner money. A Level 2 Charger is typically required to participate in these beneficial utility programs, as well as future developments that would enable EVs to power a home or return energy to the grid (vehicle-to-home and vehicle-to-grid applications, respectively)¹³.

2. Why is the proposed code change a reasonable solution?

⁷ InsideEVs, “EVs May Get Cheaper Than Gas Cars As Early As Next Year. Here’s Why”, posted August 6, 2024: <https://insideevs.com/news/729153/ev-price-parity-ice-2025-2026/>

⁸ Ibid. EV purchases incentives for new vehicles at the federal level range up to \$7,500 in tax credits, while used EVs can qualify for up to \$4,000 of tax credits for their purchaser. Income limits apply to these purchase incentives, and not all models are eligible, but notably these incentives have added pressure to the broader EV market to bring down prices. See: <https://money.com/ev-vs-gas-cars-price-difference-decreasing/>. As of this submission, no final action removing the federal EV tax credits has occurred.

⁹ “EVs to surpass two-thirds of global car sales by 2030, putting at risk nearly half of oil demand, new research finds,” RMI, <https://rmi.org/press-release/evs-to-surpass-two-thirds-of-global-car-sales-by-2030-putting-at-risk-nearly-half-of-oil-demand-new-research-finds/>

¹⁰ Kelly Blue Book, “How Much Are Electric Cars?” posted January 15, 2025. <https://www.kbb.com/car-advice/how-much-electric-car-cost/>

¹¹ U.S. Department of Energy, “Federal Tax Credits for Pre-owned Plug-in Electric and Fuel Cell Vehicles” (webpage), last updated 1/16/2024. (<https://www.fueleconomy.gov/feg/taxused.shtml>). As of this submission, no final action on removing federal tax credits for EVs has occurred.

¹² Xcel Energy’s Home Wiring Rebate program approved by the Department of Commerce November 2024. See [Decision in CIP-23-92](#)

¹³ Digitaltrends, “EV bidirectional charging: what it is and how to get it,” published October 11, 2024 (<https://www.digitaltrends.com/cars/ev-bidirectional-charging-what-is-it-how-to-get/>)

This proposal will prepare residents for charging at home as a growing number of Minnesotans opt for electric vehicles. The proposal allows flexibility for builders to provide conduit or to pre-wire for a charger, without requiring the installation of Electric Vehicle Supply Equipment.

3. What other factors should the TAG consider?

Economy wide, EVs advance efficiency significantly, wasting only about 11% of energy compared to the roughly 80% wasted by gasoline powered cars.¹⁴ EVs eliminate a major source of air pollution, with health impacts both local and global. Finally, they give consumers the option to use local sources of energy, including utility scale renewable electricity or even power from a resident's own rooftop or community solar.

Cost/Benefit Analysis

1. Will the proposed code change increase or decrease costs? Please explain and provide estimates if possible.

This code will only nominally increase costs.

2. If there is an increased cost, will this cost be offset by a safety or other benefit? Please explain. If the benefit is quantifiable (for example energy savings), provide an estimate if possible.

Providing an EV Ready Space at a Level 2 capacity of 6.2 kVA (between 30 and 40 A on a 208 or 240V circuit) in new construction adds minimal cost. The Southwest Energy Efficiency Project (SWEET) estimates the incremental cost at about \$50 per space, depending on the distance between the electric panel and the parking space.¹⁵ Research by NBI and NRDC estimates the cost at \$115.¹⁶

New construction with 200 amp service is typically more than enough to allow for Level 2 charging.¹⁷ Many homeowners are even able to charge an EV with a 100 amp panel, making the need for more than the standard 200 amp service extremely unlikely, especially in small and modest sized homes.¹⁸

Alternatively, retrofitting homes for Level 2 Charging is much costlier. Estimates vary widely from \$300-\$5,000.¹⁹ In Xcel Energy's 2023 Transportation Electrification Plan, they estimated that

¹⁴ "Electrifying transportation reduces emissions AND saves massive amounts of energy," Yale Climate Connections, 2022, <https://yaleclimateconnections.org/2022/08/electrifying-transportation-reduces-emissions-and-saves-massive-amounts-of-energy/>

¹⁵ SWEET, "SWEET guide to EV infrastructure building codes,"(webpage), under section "Cost implications: EV building codes save people money." (<https://www.swenergy.org/ev-infrastructure-building-codes/>)

¹⁶ Page 22, "Cost Study of the Building Decarbonization Code," NBI, 2022, <https://newbuildings.org/resource/cost-study-of-the-building-decarbonization-code/>

¹⁷ Energy Star, https://www.energystar.gov/products/energy_star_home_upgrade/make_your_home_electric_ready

¹⁸ "Yes, it's possible to electrify a home on just 100 amps," Canary Media, December 2023, <https://www.canarymedia.com/articles/electrification/yes-its-possible-to-electrify-a-home-on-just-100-amps>

¹⁹ "An electric car charging station installation costs \$750 to \$2,600 for a Level 2 charger, 240-volt outlet, wiring, and wall mounting. Some EV charger installations cost \$2,000 to \$5,000 for extensive wiring or if the electrical panel needs upgrading." [2023 EV Charging Station Cost | Install Level 2 or Tesla \(homeguide.com\)](https://www.homeguide.com/2023-ev-charging-station-cost-install-level-2-or-tesla/) updated September 2023

New 240v outlet: "totaling \$300 or so" [Cost To Install An Electrical Outlet: GFCI, 220v, 240v – Forbes Home](https://www.forbes.com/home-improvement/electrical/cost-to-install-an-electrical-outlet-gfci-220v-240v/) "if you need to mount the system from zero: do the wiring, and install a new service panel and 240 V outlet - add about \$1000 - \$1500 to your estimate" [How Much Does It Cost To Install An EV Charger? \(jdpower.com\)](https://www.jdpower.com/2022/12/01/how-much-does-it-cost-to-install-an-ev-charger/) December 2022

installing a dedicated 240 V circuit in their Minnesota service territory cost \$880 on average, with costs varying by site but reaching a maximum of \$5,000 for a single project.²⁰

Assuming incremental EV ready costs of \$115 compared to retrofit costs of \$880, only 14% of residents would need to install EVSE in their EV ready parking space to realize overall cost savings of \$820 per 100 homes.²¹ If the (conservative) IEA estimates of 40% EV market share by 2030 are correct, then 20% of residents or more might install EVSE in their EV ready parking space, realizing cost savings of \$6,100 per 100 homes.²²

None of these estimates include savings from the lower operation costs of EVs compared to an internal combustion engine. According to AAA, an electric vehicle (EV) will save roughly \$1,039 per year in total fuel and maintenance costs compared to a comparable gasoline vehicle.²³

The estimates above also leave out the impact on human health and healthcare costs that EVs reduce by lowering fossil fuel combustion. Research lead by the Harvard Chan School of Public Health found that “more than 8 million people died in 2018 from fossil fuel pollution,” equating to about 1 in 5 deaths worldwide.²⁴ Across the United States, research published in the journal *Environmental Research: Health* estimated that US oil and gas causes roughly \$77 billion in health impacts every year. The health harms are also local and measurable. Researchers in Rochester, Minnesota studied almost 20,000 people over 11 years and found “significant relationships between asthma exacerbations and residential proximity to traffic.”²⁵ By simply making it easier for residents to eliminate nearby sources of fossil fuel pollution, we can continue protecting the health and welfare of Minnesotans inside of buildings and out.

A small investment during new construction will save homeowners substantial future costs and give them more options. Given the market trends identified in the reason statement, it is not a question of whether homes will need EV charging infrastructure, but when. Failing to adopt this proposal would mean saddling future homeowners with substantially higher costs. Instead, the Department should ensure “use of modern methods, devices, materials and techniques” in new residences by adopting this proposal.

3. If there is a cost increase, who will bear the costs? This can include government units, businesses, and individuals.

Cost will be passed to homeowner and will save cost over retrofit.

4. Are there any enforcement or compliance cost increases or decreases with the proposed code change? Please explain.

²⁰ Pg. 52, Xcel Energy, 2023 Integrated Distribution Plan - Appendix H: Transportation Electrification Plan (filed Nov 1, 2023) ([link](#))

²¹ In a 100 home universe: $100 \times \$115 = \$11,500$ for all EV ready compared to $14 \times \$880 = \$12,320$ for retrofit costs. Total saved: $12,320 - 11,500 = \$820$.

²² In a 100 home universe: $100 \times \$115 = \$11,500$ for all EV ready compared to $20 \times \$880 = \$17,600$ for retrofit costs. Total saved: $17,600 - 11,500 = \$6,100$.

²³ “\$709 in fuel savings assuming 15,000 miles, and \$330 saved in maintenance, repair, and tires” according to “True Cost of Electric Vehicles,” AAA, <https://www.aaa.com/autorepair/articles/true-cost-of-ev>

²⁴ “Fossil fuel air pollution responsible for 1 in 5 deaths worldwide,” Harvard Chan School of Public Health, 2021, <https://www.hsph.harvard.edu/c-change/news/fossil-fuel-air-pollution-responsible-for-1-in-5-deaths-worldwide/>

²⁵ Lindgren P, Johnson J, Williams A, Yawn B, Pratt GC. Asthma exacerbations and traffic: examining relationships using link-based traffic metrics and a comprehensive patient database. *Environ Health*. 2016 Nov 3;15(1):102. doi: 10.1186/s12940-016-0184-2. PMID: 27809853; PMCID: PMC5094142.

This system can be inspected during normal electrical inspection and will increase the cost of compliance.

5. Will the cost of complying with the proposed code change in the first year after the rule takes effect exceed \$25,000 for any one small business or small city ([Minn. Stat. § 14.127](#))? A small business is any business that has less than 50 full-time employees. A small city is any statutory or home rule charter city that has less than ten full-time employees. Please explain.

No, see cost estimates above.

Regulatory Analysis

1. What parties or segments of industry are affected by this proposed code change?

This proposed code change would require additional electrical and/or laborer work.

2. Can you think of other means or methods to achieve the purpose of the proposed code change? What might someone opposed to this code change suggest instead? Please explain what the alternatives are and why your proposed change is the preferred method or means to achieve the desired result.

There is no other clear policy tool to prepare Minnesota homes for EV charging and avoid steep retrofit costs.

3. What are the probable costs or consequences of not adopting the code change, including those costs or consequences borne by identifiable categories of affected parties, such as separate classes of government units, businesses, or individuals?

This proposal will save homeowners the costly burden of upgrading their homes to provide electric vehicle charging.

4. Are you aware of any federal or state regulation or requirement related to this proposed code change? If so, please list the federal or state regulation or requirement and your assessment of any differences between the proposed code change and the federal regulation or requirement.

No, although legislation passed in the 2023 Minnesota legislative session requiring adding electric vehicle charging to the commercial building code.

***Note: Incomplete forms may be returned to the submitter with instruction to complete the form. Only completed forms can be considered by the TAG.



CODE CHANGE PROPOSAL FORM

(Must be submitted electronically)

Author/requestor: Jonny Kocher

Date: 4/3/25

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Model Code: 2024 IRC

Telephone number: 619-459-4267

Code or Rule Section: Res Energy Code

Firm/Association affiliation, if any: RMI

Code or rule section to be changed: N1104 (R404)

Intended for Technical Advisory Group ("TAG"): Residential Energy

General Information

Yes **No**

- | | | |
|--|-------------------------------------|-------------------------------------|
| A. Is the proposed change unique to the State of Minnesota? | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| B. Is the proposed change required due to climatic conditions of Minnesota? | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| C. Will the proposed change encourage more uniform enforcement? | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| D. Will the proposed change remedy a problem? | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| E. Does the proposal delete a current Minnesota Rule, chapter amendment? | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| F. Would this proposed change be appropriate through the ICC code development process? | <input checked="" type="checkbox"/> | <input type="checkbox"/> |

Proposer Context

This code proposal passed the Minnesota Residential Energy Code TAG process in 2024. Since Minnesota didn't publish those changes to the 2021 IRC code, I was asked to resubmit this code proposal for consideration and approval for the 2024 IRC update.

Proposed Language

- The proposed code change is meant to:
 - change language contained in the model code book? If so, list section(s).
 - change language contained in an existing amendment in Minnesota Rule? If so, list Rule part(s).
 - delete language contained in the model code book? If so, list section(s).
 - delete language contained in an existing amendment in Minnesota Rule? If so, list Rule part(s).
 - add new language that is not found in the model code book or in Minnesota Rule.
- Is this proposed code change required by Minnesota Statute? If so, please provide the citation. [While this code change is not required by Minnesota Statute, it is aligned with the intent of Statute and other state policy. Statute 326B.106 Subdivision 1 Paragraph \(g\) requires that Minnesota's residential energy code must achieve a reduction in annual net energy consumption of 70% or more compared to the 2006 International Energy Conservation Code by 2038. Statute does not explicate whether this requirement applies to new buildings, existing buildings, or both. This code change](#)

would improve the energy efficiency of future existing buildings by setting forward-looking new construction requirements. The electric appliances whose installation is facilitated by readiness requirements are generally more efficient and conserve energy compared to fuel-burning appliances for the same end uses. For example, heat pump equipment generally reduces space and water heating energy use by more than 50% compared to efficient fuel-burning equipment, and usually reduces energy used for cooling as well.

Additionally, acknowledging that the residential energy code's scope is conservation only, this proposal is incidentally compatible with state policy concerning clean and climate-friendly market transformation. Under the Smarter Buildings and Construction initiative of the Minnesota Climate Action Framework, one of the suggested state action steps included: "Develop clear options for building owners and families to make informed environmentally preferable selections for their building materials and products, including appliances such as furnaces, water heaters, and cooktops/ovens."¹ Creating readiness requirements will enable building owners to make these informed, energy-saving selections in the future without it being prohibitively expensive.

3. Provide *specific* language you would like to see changed. Indicate proposed new words with underlining and ~~strikethrough~~ words proposed for deletion. Include the entire code (sub) section or rule subpart that contains your proposed changes.

N1104.5 Electrification-ready circuits. Water heaters, household clothes dryers, and cooking appliances that use fuel gas or liquid fuel shall comply with Sections N1104.5.1 through N1104.5.3. The main electrical panel shall include spare circuits and be sized to meet the future load required by this section. Each spare circuit shall be labeled with the word "spare." Space shall be reserved in the electrical panel for each reserved circuit for the installation of an overcurrent device. Capacity for the future circuits required in this section shall be included in the load calculations of the original installation.

N1104.5.1 Cooking appliances. A circuit capable of feeding a future 240-volts, 40-amperes load
Exception: Cooking appliances not installed in an individual dwelling unit.

N1104.5.2 Household clothes dryers. A circuit capable of feeding a future 240-volts, 30-amperes load.
Exception: Clothes dryers not installed in an individual dwelling unit.

N1104.5.3 Water heaters. A circuit capable of feeding a future 240-volts, 30-amperes load.
Exception: Water heaters serving multiple dwelling units in a R-2 occupancy

**TABLE N1105.2
 REQUIREMENTS FOR SIMULATED BUILDING PERFORMANCE**

| SECTION | TITLE |
|----------------|---------------------------------------|
| <u>N1104.5</u> | <u>Electrification-ready circuits</u> |

**TABLE N1106.2
 REQUIREMENTS FOR ENERGY RATING INDEX**

| SECTION^a | TITLE |
|----------------------------|---------------------------------------|
| <u>N1104.5</u> | <u>Electrification-ready circuits</u> |

¹ <https://climate.state.mn.us/sites/climate-action/files/Climate%20Action%20Framework.pdf>, page 19

4. Will this proposed code change impact other sections of a model code book or an amendment in Minnesota Rule? If so, please list the affected sections or rule parts.

No

Need and Reason

1. Why is the proposed code change needed? Please provide a general explanation as well as a specific explanation for any changes to numerical values (heights, area, etc.)
Currently it is very expensive for consumers to switch from gas water heaters, gas stoves and gas dryers to their electric alternatives due to inadequate electrical infrastructure. This expense is one of the primary barriers to consumer adoption of higher-efficiency electric appliances.
2. Why is the proposed code change a reasonable solution?
This proposal enhances customer choice by making it easy for homeowners to choose either electric or gas appliances to meet their water heating, cooking or clothes drying demands. By ensuring that a home built with gas or propane can easily accommodate future electric appliances and equipment, this proposal preserves the option to transition to dramatically higher efficiency and potentially lower operating cost equipment without prohibitively high retrofit costs.
3. What other factors should the TAG consider?
n/a

Cost/Benefit Analysis

1. Will the proposed code change increase or decrease costs? Please explain and provide estimates if possible.
The cost will increase upfront costs. This proposal only requires that space be available on the building electrical panel to accommodate appropriate future circuits; this lean version of electric readiness will cost less than any provisions of which we are aware that have been subject to a cost study. Regarding the cost of full electric readiness, inclusive of appropriate branch circuits and receptacles as required by Appendix NK: A cost analysis from the New Buildings Institute estimated that the electrical infrastructure would cost between \$0 and \$710. Group14 Engineering and the California Energy Commission estimate that the upfront costs of full electric readiness ranges between \$500 to \$1,010.^{2,3,4} We would expect the high end of these ranges to be approximately halved for this proposal, based on the methodology of these studies, such that the cost would range between \$0 and \$505.
2. If there is an increased cost, will this cost be offset by a safety or other benefit? Please explain. If the benefit is quantifiable (for example energy savings), provide an estimate if possible.
The cost of meeting these electric-ready requirements when the house is being built is marginal. In comparison, the cost of retrofitting a building for these requirements can be an order of magnitude higher and act as a barrier for the homeowner to choose electric appliances.

An electrification engineering study by Group 14 reports that the electrical modifications needed to install a HP heating system and a HPWH is \$2,100 as a retrofit compared to \$500 as an original install for a 3,000 sq ft single family home. The California Energy Commission cost study found that the retrofit cost to add electrical infrastructure for water heating, space heating, dryers and cooking appliances after construction is at least \$2,560 (likely higher), compared to the upfront cost of around \$1,010 to do

² NBI, Cost of Decarbonization Code, 2022, page 26

<https://filesnewbuilding.s3.amazonaws.com/wp-content/uploads/2022/04/BuildingDecarbCostStudy.pdf>

³ California Energy Commission, 2022, page 2-3

<https://efiling.energy.ca.gov/GetDocument.aspx?tn=238049&DocumentContentId=71300>

⁴ Group 14, 2020, page 12

<https://www.communityenergyinc.com/wp-content/uploads/Building-Electrification-Study-Group14-2020-11.09.pdf>

it during construction. These studies indicate that it is about 3-4 times less expensive to do this work during construction. Not making new buildings electric-ready would leave homeowners exposed to potentially high retrofit costs in the future and will greatly inhibit customer choice and, therefore, the future housing stock's energy efficiency.

3. If there is a cost increase, who will bear the costs? This can include government units, businesses, and individuals.
Construction contractors and developers will bear most of the costs. The substantial cost savings for reduced costs of future retrofits will benefit homeowners.
4. Are there any enforcement or compliance cost increases or decreases with the proposed code change? Please explain.
There will be a negligible impact in inspection and enforcement cost when code inspectors ensure this portion of the code is complied with.
5. Will the cost of complying with the proposed code change in the first year after the rule takes effect exceed \$25,000 for any one small business or small city ([Minn. Stat. § 14.127](#))? A small business is any business that has less than 50 full-time employees. A small city is any statutory or home rule charter city that has less than ten full-time employees. Please explain.
No. This will not impact businesses or cities. This is a residential code proposal.

Regulatory Analysis

1. What parties or segments of industry are affected by this proposed code change?
Electrical contractors will have slightly more work because of this proposal.
2. Can you think of other means or methods to achieve the purpose of the proposed code change? What might someone opposed to this code change suggest instead? Please explain what the alternatives are and why your proposed change is the preferred method or means to achieve the desired result.
This is a feasible option to cost-effectively prepare homes for future energy efficiency improvements via adoption of efficient electric appliances. The other two main options available are to move towards full electric readiness, as the original 2021 proposal recommended, or not require any electric readiness at all. The main argument against requiring any electric readiness is the upfront cost, which I have already addressed by showing that this will save thousands of dollars of future retrofit costs.
3. What are the probable costs or consequences of not adopting the code change, including those costs or consequences borne by identifiable categories of affected parties, such as separate classes of government units, businesses, or individuals?
If we continue to plan solely for fuel-burning appliances for multiple end uses in new buildings without preparing for the future energy transition, a huge amount of energy savings in the future housing stock - on the order of 30-50% - will be significantly more costly to achieve. Various co-benefits not under the jurisdiction of the energy code would also be more costly to achieve, including improved indoor and outdoor air quality and reduced greenhouse gas emissions.
4. Are you aware of any federal or state regulation or requirement related to this proposed code change? If so, please list the federal or state regulation or requirement and your assessment of any differences between the proposed code change and the federal regulation or requirement.
By preparing for electric ready homes, consumers whose appliances break between now and 2031 will be able to take advantage of local, state or utility incentives that could encourage installation of high-efficiency electric appliances.

***Note: Incomplete forms may be returned to the submitter with instruction to complete the form. Only completed forms can be considered by the TAG.



CODE CHANGE PROPOSAL FORM

(Must be submitted electronically)

Author/requestor: [Steve Shold](#)

Date: [9/8/2023](#) (Updated 3/11/25)

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Model Code: [2024 IRC](#)

Telephone number: [651-284-5312](#)

Code or Rule Section: [N1102.2.5](#)

Firm/Association affiliation, if any: [Dept of Labor & Industry](#)

Code or rule section to be changed: [N1102.2.5](#)

Intended for Technical Advisory Group ("TAG"): [Residential Energy](#)

General Information

Yes **No**

- | | | |
|--|-------------------------------------|-------------------------------------|
| A. Is the proposed change unique to the State of Minnesota? | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| B. Is the proposed change required due to climatic conditions of Minnesota? | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| C. Will the proposed change encourage more uniform enforcement? | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| D. Will the proposed change remedy a problem? | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| E. Does the proposal delete a current Minnesota Rule, chapter amendment? | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| F. Would this proposed change be appropriate through the ICC code development process? | <input checked="" type="checkbox"/> | <input type="checkbox"/> |

Proposed Language

1. The proposed code change is meant to:

change language contained the model code book? If so, list section(s).

change language contained in an existing amendment in Minnesota Rule? If so, list Rule part(s).

delete language contained in the model code book? If so, list section(s).
[N1102.2.5 Exception #2.](#)

delete language contained in an existing amendment in Minnesota Rule? If so, list Rule part(s).

add new language that is not found in the model code book or in Minnesota Rule.

2. Is this proposed code change required by Minnesota Statute? If so, please provide the citation.

3. Provide *specific* language you would like to see changed. Indicate proposed new words with underlining and ~~striketrough~~ words proposed for deletion. Include the entire code (sub) section or rule subpart that contains your proposed changes.

N1102.2.5 (R402.2.5) Access hatches and doors.

Access hatches and doors from conditioned to unconditioned spaces such as attics and crawl spaces shall be insulated to the same R-value required by Table N1102.1.3 for the wall or ceiling in which they are installed.

Exceptions:

1. Vertical doors providing access from conditioned spaces to unconditioned spaces that comply with the fenestration requirements of Table N1102.1.3 based on the applicable climate zone specified in Chapter 3.
- ~~2. Horizontal pull-down, stair-type access hatches in ceiling assemblies that provide access from conditioned to unconditioned spaces in Climate Zones 0 through 4 shall not be required to comply with the insulation level of the surrounding surfaces provided the hatch meets all of the following:
 - ~~a. 2.1. The average U factor of the hatch shall be less than or equal to U-0.10 or have an average insulation R-value of R-10 or greater.~~
 - ~~b. 2.2. Not less than 75 percent of the panel area shall have an insulation R-value of R-13 or greater.~~
 - ~~c. 2.3. The net area of the framed opening shall be less than or equal to 13.5 square feet (1.25 m²).~~
 - ~~d. 2.4. The perimeter of the hatch edge shall be weatherstripped.~~~~

The reduction shall not apply to the component performance alternative in Section N1102.1.5.

4. Will this proposed code change impact other sections of a model code book or an amendment in Minnesota Rule? If so, please list the affected sections or rule parts.
No.

Need and Reason

1. Why is the proposed code change needed? Please provide a general explanation as well as a specific explanation for any changes to numerical values (heights, area, etc.)
The content in the second exception applies to climate zones 0 through 4 which are not located in Minnesota.
2. Why is the proposed code change a reasonable solution?
As noted above, it does not have application to Minnesota.
3. What other factors should the TAG consider?
 1. An unlimited quantity of exterior doors and windows complying with the fenestration requirements in Table N1102.1.3 can be installed within the thermal envelope.
 2. Section N1102.4.4 allows one side-hinged opaque door assembly not greater than 24sf to be exempted from the U-factor requirement in in Section N1102.1.2.
 3. Section N1102.4.1 permits an area-weighted average of fenestration products to satisfy the U-factor requirements.

Cost/Benefit Analysis

1. Will the proposed code change increase or decrease costs? Please explain and provide estimates if possible.
No.
2. If there is an increased cost, will this cost be offset by a safety or other benefit? Please explain. If the benefit is quantifiable (for example energy savings), provide an estimate if possible.
No.
3. If there is a cost increase, who will bear the costs? This can include government units, businesses, and individuals.
N/A
4. Are there any enforcement or compliance cost increases or decreases with the proposed code change? Please explain.
No.
5. Will the cost of complying with the proposed code change in the first year after the rule takes effect exceed \$25,000 for any one small business or small city ([Minn. Stat. § 14.127](#))? A small business is any business that has less than 50 full-time employees. A small city is any statutory or home rule charter city that has less than ten full-time employees. Please explain.
N/A

Regulatory Analysis

1. What parties or segments of industry are affected by this proposed code change?
Building contractors, designers, municipal building inspectors, and homeowners.
2. Can you think of other means or methods to achieve the purpose of the proposed code change? What might someone opposed to this code change suggest instead? Please explain what the alternatives are and why your proposed change is the preferred method or means to achieve the desired result.
Since the change removes content that would not have had an impact on Minnesota anyway, the only alternate would be to leave the language as written in model code. However, including items that have zero application leads to confusion and complication with application and enforcement.
3. What are the probable costs or consequences of not adopting the code change, including those costs or consequences borne by identifiable categories of affected parties, such as separate classes of government units, businesses, or individuals?
None.
4. Are you aware of any federal or state regulation or requirement related to this proposed code change? If so, please list the federal or state regulation or requirement and your assessment of any differences between the proposed code change and the federal regulation or requirement.
N/A.

***Note: Incomplete forms may be returned to the submitter with instruction to complete the form. Only completed forms can be considered by the TAG.



CODE CHANGE PROPOSAL FORM

(Must be submitted electronically)

Author/requestor: [Chris Rosival](#)

Date: ~~03/12/2025~~ revised 04/10/25

Email address: chris.rosival@state.mn.us

Model Code: [2024 IRC](#)

Telephone number: [651-284-5510](tel:651-284-5510)

Code or Rule Section: [N1102.1.6](#)

Firm/Association affiliation, if any: [DLI](#)

Code or rule section to be changed: [N1102.1.6](#)

Intended for Technical Advisory Group ("TAG"): [Residential Energy Code](#)

General Information

Yes **No**

- | | | |
|--|-------------------------------------|-------------------------------------|
| A. Is the proposed change unique to the State of Minnesota? | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| B. Is the proposed change required due to climatic conditions of Minnesota? | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| C. Will the proposed change encourage more uniform enforcement? | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| D. Will the proposed change remedy a problem? | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| E. Does the proposal delete a current Minnesota Rule, chapter amendment? | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| F. Would this proposed change be appropriate through the ICC code development process? | <input checked="" type="checkbox"/> | <input type="checkbox"/> |

Proposed Language

1. The proposed code change is meant to:

change language contained the model code book? If so, list section(s).
[N1106.1.6](#)

change language contained in an existing amendment in Minnesota Rule? If so, list Rule part(s).

delete language contained in the model code book? If so, list section(s).

delete language contained in an existing amendment in Minnesota Rule? If so, list Rule part(s).

add new language that is not found in the model code book or in Minnesota Rule.

2. Is this proposed code change required by Minnesota Statute? If so, please provide the citation.

3. Provide *specific* language you would like to see changed. Indicate proposed new words with underlining and ~~striketrough~~ words proposed for deletion. Include the entire code (sub) section or rule subpart that contains your proposed changes.

N1102.1.6 (R402.1.6) Rooms containing fuel-burning appliances. ~~In Climate Zones 3 through 8, where open combustion air ducts provide combustion air to open combustion~~ serve fuel-burning appliances, the combustion air openings must be interlocked with the main burner to prevent operation of the appliance when the combustion air supply damper is not fully open. Proper operation of the interlock shall be verified. ~~the appliances and combustion air opening shall be located outside the building thermal envelope or enclosed in a room that is isolated from inside the building thermal envelope. Such rooms shall be sealed and insulated in accordance with the building thermal envelope requirements of Table N1102.1.3, where the walls, floors and ceilings shall meet a minimum of the basement wall R-value requirement. The door into the room shall be fully gasketed and any water lines and ducts in the room insulated in accordance with Section N1103. The combustion air duct shall be insulated where it passes through conditioned space to an R-value of not less than R-8.~~

Exceptions:

1. Direct vent appliances with both intake and exhaust pipes installed continuous to the outside.
 2. Fireplaces ~~and stoves~~ complying with Sections N1102.5.2 and R1006.
4. Will this proposed code change impact other sections of a model code book or an amendment in Minnesota Rule? If so, please list the affected sections or rule parts.

Need and Reason

1. Why is the proposed code change needed? Please provide a general explanation as well as a specific explanation for any changes to numerical values (heights, area, etc.)

The model code language creates a problem in Minnesota. Our climate would cause freezing issues to water pipes in the room.

2. Why is the proposed code change a reasonable solution?

This would allow a reasonable alternative that could save energy. Restricting combustion air into the building and regulating how it is introduced will reduce energy loss.

3. What other factors should the TAG consider?

Cost/Benefit Analysis

1. Will the proposed code change increase or decrease costs? Please explain and provide estimates if possible.

This proposed code change will save money as construction of a thermally isolated room, or basement, will not be needed. If the basement is unfinished, and the fuel-burning appliance is in the basement, the entire basement would have to be thermally isolated.

2. If there is an increased cost, will this cost be offset by a safety or other benefit? Please explain. If the benefit is quantifiable (for example energy savings), provide an estimate if possible.

3. If there is a cost increase, who will bear the costs? This can include government units, businesses, and individuals.
4. Are there any enforcement or compliance cost increases or decreases with the proposed code change? Please explain.
5. Will the cost of complying with the proposed code change in the first year after the rule takes effect exceed \$25,000 for any one small business or small city ([Minn. Stat. § 14.127](#))? A small business is any business that has less than 50 full-time employees. A small city is any statutory or home rule charter city that has less than ten full-time employees. Please explain.

Regulatory Analysis

1. What parties or segments of industry are affected by this proposed code change?
Installers, builders and homeowners
2. Can you think of other means or methods to achieve the purpose of the proposed code change? What might someone opposed to this code change suggest instead? Please explain what the alternatives are and why your proposed change is the preferred method or means to achieve the desired result.
3. What are the probable costs or consequences of not adopting the code change, including those costs or consequences borne by identifiable categories of affected parties, such as separate classes of government units, businesses, or individuals?
4. Are you aware of any federal or state regulation or requirement related to this proposed code change? If so, please list the federal or state regulation or requirement and your assessment of any differences between the proposed code change and the federal regulation or requirement.

***Note: Incomplete forms may be returned to the submitter with instruction to complete the form. Only completed forms can be considered by the TAG.



CODE CHANGE PROPOSAL FORM

(Must be submitted electronically)

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Model Code: 2024 IRC

Telephone number: 612-335-3483

Code or Rule Section: N1105

Firm/Association affiliation, if any: Center for Energy and Environment (CEE)

Topic of proposal: *Simulated Building Performance*

Code or rule section to be changed: N1105 (R405)

Intended for Technical Advisory Group ("TAG"): *Residential Energy Code*

General Information

Yes **No**

- | | | |
|--|-------------------------------------|-------------------------------------|
| A. Is the proposed change unique to the State of Minnesota? | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| B. Is the proposed change required due to climatic conditions of Minnesota? | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| C. Will the proposed change encourage more uniform enforcement? | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| D. Will the proposed change remedy a problem? | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| E. Does the proposal delete a current Minnesota Rule, chapter amendment? | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| F. Would this proposed change be appropriate through the ICC code development process? | <input checked="" type="checkbox"/> | <input type="checkbox"/> |

Proposed Language

1. The proposed code change is meant to:

change language contained the model code book? If so, list section(s).

change language contained in an existing amendment in Minnesota Rule? If so, list Rule part(s).

delete language contained in the model code book? If so, list section(s).

[N1105 \(R405\) Simulated Building Performance](#)

delete language contained in an existing amendment in Minnesota Rule? If so, list Rule part(s).

add new language that is not found in the model code book or in Minnesota Rule.

Summary:

This proposal removes the Simulated Building Performance compliance pathway to allow for a simplified residential energy code, reduced burden on code officials, reduced complexity in the code development process and increased confidence in the equity of the code.

The Simulated Building Performance compliance pathway utilizes whole-building energy modeling to compare a proposed building's energy use to a reference building that meets the prescriptive requirements. Builders use approved software to model the proposed design, allowing for trade-offs between different building components, and to demonstrate that the proposed design will use at least 20% less energy than the reference building. On-site verification by a certified rater is part of this process to ensure the construction practices and modeled inputs match as well as testing for certain key performance metrics, such as air leakage.

Since the Simulated Building Performance pathway and ERI pathway use the same software and raters, it is common practice to receive results for each pathway and submit whichever is better. This demonstrates a bias between the two approaches, which we feel is not necessary for Minnesota to introduce during a time of significant change and advancement.

As Minnesota continues to adopt new model codes and code advancement amendments to meet the statutory requirements in Minnesota Statute 326B.106, it will become increasingly difficult to ensure alignment between the prescriptive code and the performance pathways. This is especially true for the Simulated Building Performance pathway, compared to the ERI Pathway, due to the complexity and nuances of this pathway. Keeping the Simulated Building Performance pathway will slow down the code adoption process, increase the complexity of the code, and increase training needs for building officials, while providing little benefit to builders because the benefit of increased flexibility can be offered with the ERI pathway.

2. Is this proposed code change required by Minnesota Statute? If so, please provide the citation. The Simulated Building Performance pathway would have to be adjusted in line with the other compliance pathways to achieve the statutory requirements in Minnesota Statute 326B.106. This is a complex and nuanced process.
3. Provide *specific* language you would like to see changed. Indicate proposed new words with underlining and ~~striktthrough~~ words proposed for deletion. Include the entire code (sub) section or rule subpart that contains your proposed changes.

N1105 (R405) Simulated Building Performance

This section has been removed as a compliance option.

[delete all other text in this section, but keep section heading to avoid renumbering the following sections]

4. Will this proposed code change impact other sections of a model code book or an amendment in Minnesota Rule? If so, please list the affected sections or rule parts.
No.

Need and Reason

1. Why is the proposed code change needed? Please provide a general explanation as well as a specific explanation for any changes to numerical values (heights, area, etc.)
Minnesota is working to adopt a residential energy code at least as efficient as the 2024 IRC Ch. 11 requirements. When in effect, this will be the first new residential energy code in Minnesota since 2015, which was based on the 2012 IECC. The 2024 code introduces new building practices, such as advances in insulation, that will mark a significant step forward for the building industry in Minnesota. Furthermore, the 2024 code introduces a new compliance pathway in the ERI Pathway, which code officials will be working to familiarize themselves with. Considering minimal practical

differences between the compliance process for the Simulated Building Performance pathway and the more commonly used HERS Index used in the ERI Pathway, we do not believe this layer of complexity is advantageous for Minnesota.

Furthermore, analysis and evaluation would be required on behalf of the Residential Energy Code TAG to ensure that the final prescriptive pathway and the simulated building performance pathways align to ensure fairness and equity in the code. With the numerous additional factors accounted for within both the reference home and the modeled new construction home, this is a challenging and unnecessary feat that provides little benefit to Minnesota.

2. Why is the proposed code change a reasonable solution?

We believe removing the Simulated Building Performance pathway is a reasonable solution because it allows builders to have the flexibility of a performance pathway with the ERI option, while reducing the complexity of the code.

3. What other factors should the TAG consider?

The Simulated Building Performance pathway is available in Minnesota's current energy code (total building performance), but is very rarely used.

There is a shortage of certified raters in Minnesota to conduct these tests, especially in rural areas, making this pathway inaccessible to those builders.

Cost/Benefit Analysis

1. Will the proposed code change increase or decrease costs? Please explain and provide estimates if possible.

No change – potential to lower education needs for builders and code officials

2. If there is an increased cost, will this cost be offset by a safety or other benefit? Please explain. If the benefit is quantifiable (for example energy savings), provide an estimate if possible.

There is no anticipated cost increase related to this proposal.

3. If there is a cost increase, who will bear the costs? This can include government units, businesses, and individuals.

There is no anticipated cost increase related to this proposal.

4. Are there any enforcement or compliance cost increases or decreases with the proposed code change? Please explain.

A potential compliance cost decrease due to reducing the complexity of the code and therefore the training required to enforce it

5. Will the cost of complying with the proposed code change in the first year after the rule takes effect exceed \$25,000 for any one small business or small city ([Minn. Stat. § 14.127](#))? A small business is any business that has less than 50 full-time employees. A small city is any statutory or home rule charter city that has less than ten full-time employees. Please explain.

No.

Regulatory Analysis

1. What parties or segments of industry are affected by this proposed code change?

Builders and designers

2. Can you think of other means or methods to achieve the purpose of the proposed code change? What might someone opposed to this code change suggest instead? Please explain what the

alternatives are and why your proposed change is the preferred method or means to achieve the desired result.

The more popular performance pathway, the ERI Pathway, could be removed instead with similar benefits.

3. What are the probable costs or consequences of not adopting the code change, including those costs or consequences borne by identifiable categories of affected parties, such as separate classes of government units, businesses, or individuals?
None recognized
4. Are you aware of any federal or state regulation or requirement related to this proposed code change? If so, please list the federal or state regulation or requirement and your assessment of any differences between the proposed code change and the federal regulation or requirement.

N/A

***Note: The information you provide in this code change proposal form is considered Public Data and used by the TAG to consider your proposed modification to the code. Any code change proposal form submitted to DLI may be reviewed at public TAG meetings and used by department staff and the Office of Administrative Hearings to justify the need and reasonableness of any proposed rule draft subject to administrative review and is available to the public.

****Note: Incomplete forms will be returned to the submitter with instruction to complete the form. Only completed forms will be accepted and considered by the TAG. The submitter may be asked to provide additional information in support of the proposed code change.



CODE CHANGE PROPOSAL FORM

(Must be submitted electronically)

Author/requestor: Isaac Smith

Date: 3/24/2025

Email address: ismith@mncee.org

Model Code: 2024 IRC

Telephone number: 612-335-3483

Code or Rule Section: N1106

Firm/Association affiliation, if any: Center for Energy and Environment (CEE)

Topic of proposal: *ERI Performance Pathway*

Code or rule section to be changed: N1106.5 (R406.5)

Intended for Technical Advisory Group ("TAG"): *Residential Energy Code*

General Information

Yes **No**

- | | | |
|--|-------------------------------------|-------------------------------------|
| A. Is the proposed change unique to the State of Minnesota? | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| B. Is the proposed change required due to climatic conditions of Minnesota? | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| C. Will the proposed change encourage more uniform enforcement? | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| D. Will the proposed change remedy a problem? | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| E. Does the proposal delete a current Minnesota Rule, chapter amendment? | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| F. Would this proposed change be appropriate through the ICC code development process? | <input checked="" type="checkbox"/> | <input type="checkbox"/> |

Proposed Language

1. The proposed code change is meant to:

change language contained in the model code book? If so, list section(s).

[N1106.5 \(R406.5\) ERI-based compliance](#)

change language contained in an existing amendment in Minnesota Rule? If so, list Rule part(s).

delete language contained in the model code book? If so, list section(s).

delete language contained in an existing amendment in Minnesota Rule? If so, list Rule part(s).

add new language that is not found in the model code book or in Minnesota Rule.

Summary:

This proposal decreases the maximum ERI in the ERI compliance path to 48 for Climate Zone 6 and 47 for climate zone 7 and eliminates the onsite power production (OPP) option, which is out of scope of Minnesota energy code. Here is an overview of the reasons for this change:

- Performance pathways are intended to be equal to or more stringent than the prescriptive pathway, but a comparison of the 2021 and 2024 model codes plus ERI modeling results of standard MN housing types following industry standard practice show that this is not the case in the 2024 model code. The proposed max ERIs better aligns the ERI pathway with the prescriptive requirements.
- An evaluation of current and past residential construction in Minnesota shows that the model code ERI targets are already easily being achieved by the majority of builders. The prescriptive code is an incremental improvement in energy savings and the pathway should also show an incremental improvement.
- Lowering the max ERI sets the state up for a uniform improvement of 6 points in max ERI each code cycle between now and the 326B.106 state statutory requirement deadline of 2038, with a target of a max ERI of 30. This would allow for transparency and forward planning for builders and building officials.
- Minnesota energy code regulates energy conservation, not energy source or fuel type. While some jurisdictions may use the ERI pathway as established in the model code, eliminating credit for OPP brings the pathway in line with Minnesota law and practice.
- Further details are provided in [Appendix A](#) at the end of this code change proposal.

2. Is this proposed code change required by Minnesota Statute? If so, please provide the citation. Minnesota Statute 326B.106, states “Beginning in 2026, the commissioner shall act on the new model residential energy code by adopting each new published edition of the International Energy Conservation Code or a more efficient standard. The residential energy code in effect in 2038 and thereafter must achieve a 70 percent reduction in annual net energy consumption or greater, using the 2006 International Energy Conservation Code State Level Residential Codes Energy Use Index for Minnesota, as published by the United States Department of Energy's Building Energy Codes Program, as a baseline. The commissioner shall adopt residential energy codes from 2026 to 2038 that incrementally move toward achieving the 70 percent reduction in annual net energy consumption. By January 15 of the year following each new code adoption, the commissioner shall submit a report on progress under this section to the legislative committees with jurisdiction over the energy code.”

The ERI Pathway is an index-based scale with a 2006 home (as defined in [ANSI 301-2019](#)) achieving a score of 100 and a net-zero home achieving a score of 0. Therefore, the ERI Pathway maximum score will need to be at or below 30 by 2038 to meet statutory requirements. Taking incremental steps toward this level starting with this code cycle will make this easier for the market to achieve the statutory requirements.

3. Provide *specific* language you would like to see changed. Indicate proposed new words with underlining and ~~strikethrough~~ words proposed for deletion. Include the entire code (sub) section or rule subpart that contains your proposed changes.

N1106.5 (R406.5) ERI-based compliance.

Compliance based on an ERI analysis requires that the rated design and each confirmed as-built dwelling unit be shown to have an ERI less than or equal to the applicable value indicated in [Table N1106.5. Onsite power production \(OPP\) shall not be factored into the ERI for code compliance, where compared to the ERI reference design, as follows:](#)

- ~~1. 1. Where on-site renewables are not installed, the values under ENERGY RATING INDEX NOT INCLUDING OPP apply.~~
~~2. 2. Where on-site renewables are installed, the values under ENERGY RATING INDEX WITH OPP apply.~~

~~Exception: Where the ERI analysis excludes on-site power production (OPP), the values under ENERGY RATING INDEX NOT INCLUDING OPP shall be permitted to be applied.~~

TABLE N1106.5 (R406.5)
 MAXIMUM ENERGY RATING INDEX

| CLIMATE ZONE | ENERGY RATING INDEX NOT INCLUDING OPP | ENERGY RATING INDEX WITH OPP |
|--------------------|---------------------------------------|---|
| 0 and 1 | 51 | 35 |
| 2 | 51 | 34 |
| 3 | 50 | 33 |
| 4 | 53 | 40 |
| 5 | 54 | 43 |
| 6 | 53 48 | 43 |
| 7 | 52 47 | 46 |
| 8 | 52 | 46 |

4. Will this proposed code change impact other sections of a model code book or an amendment in Minnesota Rule? If so, please list the affected sections or rule parts.
 No.

Need and Reason

1. Why is the proposed code change needed? Please provide a general explanation as well as a specific explanation for any changes to numerical values (heights, area, etc.)
 In 2024, Minnesota state statute 326B.106 was passed, stating that the Minnesota Residential Energy Code shall achieve a 70% improvement in efficiency by 2038 over a 2006 baseline. The statute also stipulates that the energy code must incrementally improve each cycle and that each new model code must be reviewed during this time. In order to achieve the 2038 efficiency requirement, past trajectory has shown that relying on minimum requirements in the model code will not be sufficient. Furthermore, it is best for the market to make incremental improvements towards the requirement in each code cycle to smooth the transition to the required 70% improvement. Therefore, adopting strengthening amendments to the model code each code cycle is the most effective way to meet these requirements. Based on a thorough analysis of market readiness, cost, data and stakeholder engagement, the proposed amendment was selected as an effective step toward meeting these requirements.

The proposed amendment, designed primarily to align the prescriptive and ERI pathways in the code, is critical to achieving equity in the code. In the 2024 IECC model code, the ERI pathway is easier to achieve than the prescriptive pathway. This is evident when comparing the max ERI in the 2021 and the 2024 model codes. In the 2021 model code, the max ERI is 51.3 for climate zone 6 and 53 in the 2024 model code (50.35 and 52, respectively, for climate zone 7). This does not align with changes to prescriptive path when comparing these model codes. The 2024 prescriptive path improved efficiency requirements for air-leakage, windows, and energy recovery ventilation, but these efficiency improvements were not carried over to the ERI pathway. Pacific Northwest National Lab’s (PNNL) analysis of the prescriptive paths found a 13% reduction in site energy use intensity (EUI) when comparing 2021 to 2024 (for climate zones 6 and 7). Therefore, you would expect the max ERI to reduce in a similar fashion ($51.3 * 0.87 = 44.6$ ERI), yet the 2024 max ERI increases, allowing for less efficient homes compared to the 2021 model code. This makes the ERI pathway easier to achieve than the prescriptive in the 2024 IECC model code. This must be addressed. If not addressed, builders who have limited access and familiarity with the ERI pathway would have an undue burden.

Modeling homes built to the prescriptive path consistently leads to ERI numbers below the model code levels of 53 and 52 (see [Appendix A](#)). Reducing the max ERI to 48 and 47 better aligns the ERI pathway with the prescriptive pathway. This change will ensure that the ERI pathway is not easier than the prescriptive pathway, while still allowing builders flexibility with how this performance level is achieved.

2. Why is the proposed code change a reasonable solution?

The MN Advanced Energy Codes Partnership is an initiative focused on achieving Minnesota's statutory requirements around energy code efficiency in new construction. As part of this work, the Partnership has identified key guiding principles for developing new efficiency requirements, to ensure these requirements have the highest impact with least possible burden on the market. These guiding principles include:

- Ease of market adoption
 - Requirements should be as easy as possible for designers and builders to implement, including products that are currently easily available and implementable by the existing workforce
- Least cost
 - Requirements should have the lowest lifetime cost to implement, accounting for the initial cost as well as energy savings over the lifetime of the measure.
- Collaborative approach
 - Engage stakeholders and listen to their feedback
 - Inclusive of all voices and experiences
- Data-driven decisions
 - Decisions should be guided by data, including the best possible information on cost, market readiness, and energy savings.

The proposed amendment aligns with these guiding principles:

- Ease of Market Adoption:
 - While Minnesota does not currently have a ERI pathway for residential energy code compliance, over half the new homes built in Minnesota in 2024 received an ERI. ERI data from 2024 shows that the average ERI was 47, indicating that the proposed max ERIs are largely in line with current building practices and would not cause undue burden on the industry.
 - The proposed values also ensure equity between the prescriptive pathway and the ERI pathway, ensuring rural market areas do not have more stringent compliance requirements than urban market areas that have easier access to the ERI path.
- Least Cost:
 - As most new residential homes are achieving the proposed ERI values today, and the prescriptive pathway already requires similar performance levels, we do not anticipate any immediate cost impact
 - Adopting the proposed values puts Minnesota on track to reduce ERI values by 6 each cycle to achieve statutory efficiency requirements. This allows builders to have a clear line of sight to what's ahead and plan for this. This will inherently reduce the costs of compliance throughout the following code cycles as builders are able to be planful.
- Collaborative Approach:
 - We have presented this plan to the AECIP Advisory Committee, soliciting feedback both in the meeting and with a follow-up survey, and have presented these values to TAG members and stakeholders ahead of the TAG meetings. These meetings have introduced new factors to be considered and data to be analyzed, which we have followed up on.
 - We met with Jason Toves and Stella Carr from International Code Council (ICC), who confirmed that the max ERI values are not derived from the prescriptive pathway and recommended that we do our own ERI baselining to determine the correct value, which we have outlined in [Appendix A](#)
- Data-Driven Decisions:
 - We have used significant data, including current and historic RESNET data, which covers more than 50% of new residential construction in Minnesota, and modeling exercises, to determine the proposed values.

3. What other factors should the TAG consider?

Lowering the max ERI is a clear and easy way to ensure alignment between the prescriptive and ERI pathways. A quantitative modeling process was completed to evaluate the ERI for homes that meet the 2024 model code's prescriptive path (see [Appendix A](#) for more details on the modeling process). This process involved modeling eight different house types that represent the variety of construction seen in Minnesota. The ERI for these homes ranges from 48-50 in climate zone 6 (climate Zone 7 typically results in an ERI that is 1 point lower, 47-49). Setting the max ERI to 48 for climate zone 6 and 47 for climate zone 7 will ensure that the ERI pathway produces a home that is at least as efficient as the prescriptive path. Furthermore, these ERI results do not incorporate the prescriptive path's N1108 (R408) Additional Energy Efficiency Requirements as it was difficult to incorporate the credit table into the modeled homes given the variety of options. This means a prescriptive path home would actually achieve an even lower ERI than our model predicts, and, if anything, this proposal to reduce max ERI to 48 and 47 is conservative.

Not only do the proposed values align with modeling outputs and put Minnesota on a linear path to achieving statutory requirements, the proposed values are sympathetic to current market conditions. For the last 5 years, between 2019 and 2023, the average HERS Index (ERI equivalent) in Minnesota has been between 50-51. In 2024, data from RESNET shows the average ERI dropping to 47, indicating the proposed values are largely meeting builders where they are at today.

Cost/Benefit Analysis

1. Will the proposed code change increase or decrease costs? Please explain and provide estimates if possible.
Given current ERI scores in MN, this change should not increase costs for most builders. In fact, performance pathways can often be a lower-cost compliance pathway for builders compared to the prescriptive pathway due to the flexibility they offer.
2. If there is an increased cost, will this cost be offset by a safety or other benefit? Please explain. If the benefit is quantifiable (for example energy savings), provide an estimate if possible.
Lower ERI equates to lower energy use and therefore energy savings. However, this change is not expected to increase costs when compared to current construction practices.
3. If there is a cost increase, who will bear the costs? This can include government units, businesses, and individuals.
There is no anticipated cost increase related to this proposal.
4. Are there any enforcement or compliance cost increases or decreases with the proposed code change? Please explain.
No. This is simply a change to a compliance option that is already being considered with the adoption of the 2024 model code.
5. Will the cost of complying with the proposed code change in the first year after the rule takes effect exceed \$25,000 for any one small business or small city ([Minn. Stat. § 14.127](#))? A small business is any business that has less than 50 full-time employees. A small city is any statutory or home rule charter city that has less than ten full-time employees. Please explain.
No.

Regulatory Analysis

1. What parties or segments of industry are affected by this proposed code change?
Builders and designers
2. Can you think of other means or methods to achieve the purpose of the proposed code change? What might someone opposed to this code change suggest instead? Please explain what the

alternatives are and why your proposed change is the preferred method or means to achieve the desired result.

With a commitment to equity in the code, the ERI Pathway will have to achieve a score of 30 by 2038 to align with a prescriptive pathway that meets statutory requirements. Alternatives would include making larger jumps in the ERI Pathway in future cycles (not recommended due to market impacts) or eliminating the ERI Pathway (not recommended due to loss of flexibility; impact on builders).

3. What are the probable costs or consequences of not adopting the code change, including those costs or consequences borne by identifiable categories of affected parties, such as separate classes of government units, businesses, or individuals?

If a change is not made to the max ERI in the model code, there will be a large inequity in the code requirements between homes built to the prescriptive vs. the ERI pathway. In other words, builders that use the ERI pathway as it appears in the model code can build a lower performing home when compared to a home built following the prescriptive pathway.

While there are a variety of reasons a builder may choose to use the prescriptive pathway over the performance pathways, a large reason is a shortage of qualified raters in large areas of rural Minnesota, making this pathway less accessible to builders in those areas. It would also be unfair to builders not familiar with the ERI pathway, who may not realize they are held to a stricter standard by following the prescriptive pathway.

4. Are you aware of any federal or state regulation or requirement related to this proposed code change? If so, please list the federal or state regulation or requirement and your assessment of any differences between the proposed code change and the federal regulation or requirement.

ASHRAE 90.2 2024, ASHRAE's residential energy standard, sets the max ERI for climate zones 6 and 7 at 46. This code was approved by ASHRAE, IES and ANSI in the summer of 2024.

Energy Rating Index Compliance Alternative (N1106)

Lowering the Max Allowable ERI is needed to create equity in the code

Overview

What is the ERI?

The Energy Rating Index (ERI) is analogous to the Home Energy Rating System (HERS) Index, where a certified HERS rater visits a home, enters information about the home into software, which models the home and generates a rating. These ratings are on a scale from 100 to 0, where 100 represents a home built to the 2006 IECC model code with market average appliances for that time¹, and 0 represents a home that is net zero, so a lower rating represents a home that uses less energy.

It is important to note that this pathway (and the simulated building performance pathway) uses modeling to determine code compliance, and the information required to generate these models includes home appliances that are not covered by code. This includes - furnaces, air-conditioners, refrigerators and freezers, clothes washer and dryers, and dishwashers, all of which impact the rating/model and therefore code compliance.

Recent ERI Code Changes

When comparing the 2021 and 2024 model code you can see the max allowable ERI goes up between 2021 and 2024 (see table below). This is counterintuitive, because the prescriptive path in the 2024 model code improved the efficiency requirements for windows, air-leakage, and energy recovery ventilation. Pacific Northwest National Lab's (PNNL) analysis of the prescriptive paths found a 13% reduction in site energy use intensity (EUI) when comparing 2021 to 2024 (for climate zones 6 and 7). Therefore, you would expect the max ERI to reduce in a similar fashion ($51.3 * 0.87 = 44.6$ ERI), yet the 2024 max ERI increases, allowing for less efficient homes compared to the 2021 model code.

This indicates that the ERI pathway is not aligning with the prescriptive path, and therefore it must be addressed to ensure equity in the code.

| | | 2021 IECC | 2024 IECC |
|---------|----------------|----------------------|-----------|
| Max ERI | Climate Zone 6 | $54 * 0.95 = 51.3^2$ | 53 |
| | Climate Zone 7 | $53 * 0.95 = 50.35$ | 52 |

HERS/ERI Participation

Since 2020 over 45,000 homes built in MN have received a HERS index, which represents roughly half of the homes built in the state. Builders are primarily pursuing this rating to qualify for utility programs, but given the volume of participation it has become a robust data set that represents current new construction practices. These are also the builders that are most likely to use the ERI compliance path. The average rating from 2020 to 2023 was between 50 and 51, with an average rating of 47 in 2024. This indicates how

¹ [4 ENERGY RATING CALCULATION PROCEDURES - 2019 ANSI/RESNET/ICC 301 STANDARD FOR THE CALCULATION AND LABELING OF THE ENERGY](#)

² 2021 IECC max ERI values are multiplied by 0.95 as required by the code and discussed further in section N1108 below.

popular this code compliance pathway will be with builders, as many are familiar with this rating and know that they can use the ERI pathway to meet code. It also shows that builders are easily meeting the 2024 ERI requirements with current building practices, even though we know that <5% of these homes would meet the 2024 prescriptive path based on the wall insulation requirements alone.



* % of MN homes that received a rating that year (# of rated homes / # of homes built) from annual RESNET report
 ^ preliminary 2024 data

Code Change Proposal

The goal of the code change proposal is to ensure that no compliance path is significantly easier for a builder to achieve compared to another. The simplest way to do this is to lower the maximum allowable ERI to a value that is equivalent to the prescriptive path. Making this change will promote fairness, equity and strengthen confidence in the code process.

ERI Modeling Exercise

We completed a modeling exercise to understand the ERI a home would achieve if it met the 2024 prescriptive path. To do this, we generated 8 different house types that represent a variety of construction that exists in Minnesota today, with house type 4 representing the typical home in terms of size and type.

Prescriptive Path Inputs

- Wall insulation – R-20 +5
- Attic insulation – R-49
- Foundation Walls – R-15
- Slab Perimeter – R-10
- Air leakage – 2.5 ACH50
- Window: U-0.28; SHGC 0.30
- Doors: R-5

- ERV - 65% SRE
- Duct leakage to outside– 4cfm/100sq.ft.
- Pipe insulation – R-3

Home Appliance Inputs – not covered by code

The ERI and Simulated Building Performance pathways are modeling pathways that include appliances that are not covered by code. To determine what values to enter in the model for these appliances we evaluated data from RESNET for over 35,000 homes built in MN between 2020 and 2023. For each of these inputs, we used a conservative approach, typically selecting values that were less efficient than the market average for that appliance. Details on the inputs selected for these appliances are outlined below.

Furnace Efficiency Input – 92 AFUE

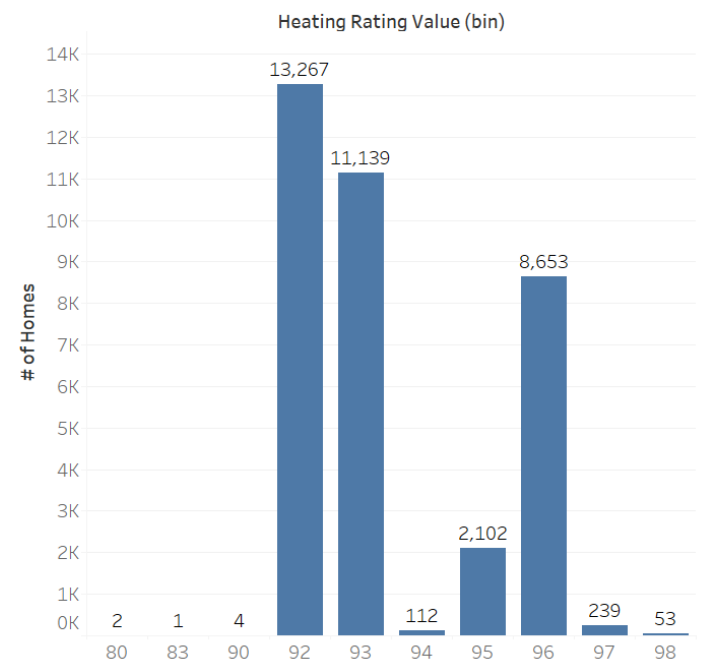
Market average – 93.6 AFUE

The average furnace efficiency from 35,590 HERS ratings from 2020-2023 was 93.6.

Market Distribution

To be conservative, 92 AFUE was used in the modeling exercise. For reference, adjusting the furnace efficiency from 92 to 95 AFUE would lower the ERI by 1.1 for house type 4.

Heating System Efficiency



Air-Conditioning Efficiency Input – 14 SEER

Market average – 13.94

The average cooling efficiency from 36,149 HERS ratings from 2020-2023 was 13.94.

Starting January 1, 2023, the federal minimum standard requires a 14 SEER AC or higher, so 14 SEER was selected.

Water Heating Efficiency Input – 0.70 UEF

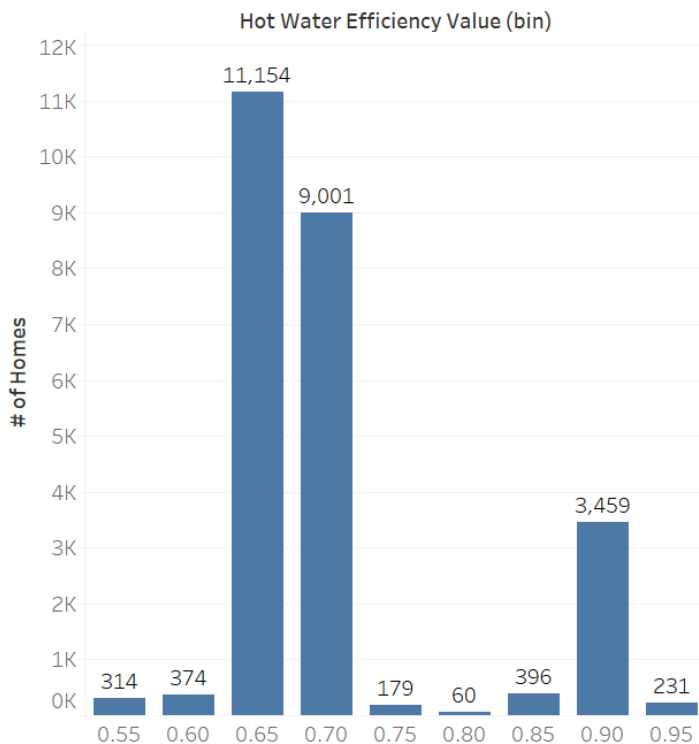
Market average – 0.74 UEF

The average gas water heater efficiency from 25,168 HERS ratings from 2020-2023 was 0.74 UEF.

Market Distribution

The vast majority of water heaters are 50-gallon gas water heaters. A 0.70 unit is slightly below market average but is representative of the market. For house type 4, upgrading a water heater from 0.70 to 0.92 would lower the ERI by 2.7.

Hot Water Bin



HERS Reference Appliances

Clothes Washer, Dryer and Dishwasher

The clothes washer, dryer, and dishwasher were all input into the software using the 'HERS Reference' option. This option is used when no appliance is in place and represents higher energy use compared to the other options a rater can select (Standard, ENERGY STAR, etc.). This is a conservative approach as most appliances use less energy than the HERS Reference. Energy use details for these options can be found here - <https://ekotrope.freshdesk.com/support/solutions/articles/17000106467-appliance-default-values>

Gas Oven and Dryer

A gas oven and gas dryer were selected. Choosing an electric oven or electric dryer results in a slightly lower ERI (<0.5), so selecting gas options represents a worst-case scenario for these appliances.

Refrigerator and Freezer

The software requires HERS Raters to enter the total energy consumption of every refrigerator and freezer in the home as a kWh/year value. For this modeling exercise a value of 691 kWh/yr was used for each home type.

For reference, the large refrigerator on the left (pictured below) from a recent new construction site visit uses 670 kWh per year and refrigerator on the right is a smaller refrigerator that uses 370 kWh/yr.



Again, a fair value was selected, which represents larger refrigerators often seen in new construction homes, as to not skew the data to lower ERI outcomes.

Lighting – 100% LEDs

LED lighting has become ubiquitous and is required by federal standards for most lights.

Section N1108 (R408) – Additional Efficiency Requirements

The 2021 model code requires the max ERI to be multiplied by 0.95 to account for the prescriptive path requirements outlined in section N1108. This section outlines a series of credits that are equivalent to 5% energy savings and are required for the prescriptive path. This section includes a variety of options that were not considered in this modeling exercise. Therefore, the results outlined below are a conservative representation of what a prescriptive home would achieve using the ERI pathway.

Modeling Results

| <u>House #</u> | <u>House Type</u> | <u>Foundation Type</u> | <u>Number of Bedrooms</u> | <u>Size of the House (sq.ft.)</u> | <u>ERI</u> |
|----------------|-------------------|------------------------|---------------------------|-----------------------------------|------------|
| 1 | Townhome | Slab on grade | 3 | 1900 | 50 |
| 2 | Townhome | Basement | 3 | 2500 | 50 |
| 3 | Single Family | Basement | 3 | 2500 | 50 |
| 4 | Single Family | Basement | 4 | 3699 | 50 |
| 5 | Single Family | Slab on grade | 3 | 1500 | 50 |

| | | | | | |
|---|---------------|---------------|---|------|----|
| 6 | Single Family | Basement | 4 | 4490 | 50 |
| 7 | Single Family | Slab on grade | 4 | 2500 | 48 |
| 8 | Single Family | Slab on grade | 4 | 3500 | 49 |

Conclusion

The modeling results show a range of ERIs from 48 to 50, with the majority of homes achieving a 50. If you apply a 5% savings factor to account for section N1107, this results in an ERI of 47.5 ($50 \times 0.95 = 47.5$). Again, in an effort to be conservative and recommend an achievable max ERI, we are recommending a maximum allowable ERI of 48 for climate zone 6. This ERI is also sympathetic to current market conditions where the average ERI of over 8,000 rated homes in MN in 2024 was 47.

All of these homes were modeled in climate zone 6 (St. Paul, MN). Modeling house type 4 in climate zone 7 (Duluth, MN) reduced the ERI by 1. This aligns with the 2021 and 2024 model code requirements, where the maximum allowable ERI's for climate zone 7 are 1 point lower than climate zone 6. Therefore, our code change proposal is recommending a maximum allowable ERI of 47 for climate zone 7.

***Note: The information you provide in this code change proposal form is considered Public Data and used by the TAG to consider your proposed modification to the code. Any code change proposal form submitted to DLI may be reviewed at public TAG meetings and used by department staff and the Office of Administrative Hearings to justify the need and reasonableness of any proposed rule draft subject to administrative review and is available to the public.

****Note: Incomplete forms will be returned to the submitter with instruction to complete the form. Only completed forms will be accepted and considered by the TAG. The submitter may be asked to provide additional information in support of the proposed code change.



CODE CHANGE PROPOSAL FORM

(Must be submitted electronically)

Author/requestor: Erin Sherman

Date: March 24, 2025 (Revised June 11, 2025)

Email address: esherman@rmi.org

Model Code: 2024 IECC-R

Telephone number: 518 364 3763

Code or Rule Section: Multiple

Firm/Association affiliation, if any: RMI

Topic of proposal: Energy efficiency metrics, credits, & goals

Code or rule section to be changed: IRC N1101.1 (R101.2), N1101.6 (R202), N1101.13 (R401.2), N1105.3.2 (R405.4.2), N1108.2 (R408.2), Not explicitly adopted but informing approach: Appendix NG (Appendix RG)

Intended for Technical Advisory Group ("TAG"): Residential energy efficiency

General Information

Yes **No**

- | | | |
|--|-------------------------------------|-------------------------------------|
| A. Is the proposed change unique to the State of Minnesota? | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| B. Is the proposed change required due to climatic conditions of Minnesota? | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| C. Will the proposed change encourage more uniform enforcement? | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| D. Will the proposed change remedy a problem? | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| E. Does the proposal delete a current Minnesota Rule, chapter amendment? | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| F. Would this proposed change be appropriate through the ICC code development process? | <input checked="" type="checkbox"/> | <input type="checkbox"/> |

Proposed Language

1. The proposed code change is meant to:

- change language contained the model code book? If so, list section(s).
N1101.1 (R101.2), N1101.6 (R202), N1101.13 (R401.2), N1105.3.2 (R405.4.2), N1108.2 (R408.2), Appendix NG (Appendix RG).
- change language contained in an existing amendment in Minnesota Rule? If so, list Rule part(s).
- delete language contained in the model code book? If so, list section(s).
- delete language contained in an existing amendment in Minnesota Rule? If so, list Rule part(s).

add new language that is not found in the model code book or in Minnesota Rule.

Summary

Why? This proposal would require a dwelling unit's compliance with the energy code to be judged in relation to a single conservation objective regardless of fuels used in the dwelling unit. This change would recognize situations in which some appliance types are categorically more efficient than others and allow builders to select more efficient appliance categories to earn credit toward code compliance. By adding these new options within compliance pathways, this proposal would improve the feasibility and affordability of implementing Minnesota Statute 326B.106 Subdivision 1 Paragraph (g), which requires a 70% reduction in annual net energy consumption from 2006 model code levels for new dwelling unit permits by 2038.

How are conservation objectives unequal in the model code?

- **Code structure:** In the model code, every compliance pathway works by setting a baseline or standard reference design and requiring a home to exceed that baseline's efficiency by a certain amount to comply. While the details differ between compliance pathways, they all set baselines that are specific to the appliance types proposed in the home. In other words, a home with gas-burning space and water heating equipment is compared to a baseline model with gas-burning space and water heating equipment, and a home with all-electric equipment is compared to an all-electric baseline model.
- **Unequal baselines and goals:** Due to inherent qualities of different home energy technologies, however, baselines using different equipment types vary widely in energy efficiency. The code generally sets equal requirements for percent improvement relative to the baseline regardless of equipment types used, such that code-compliant homes must meet highly divergent effective conservation objectives depending on equipment type.
- **Results and lost opportunity:** Pacific Northwest National Laboratory energy models for the 2024 IECC suggest that in Climate Zone 6A (specifically in Rochester, MN), a single-family home using gas equipment for space and water heating uses over 40% more energy than an otherwise similar home that uses electric heat pumps for those end uses. If builders were able to earn credit toward compliance for the higher efficiency of electric heat pumps, it would create lower-cost compliance options to reach the annual net energy consumption levels required by Minnesota Statute.

How does this proposal equalize conservation objectives? This proposal makes four structural changes to achieve equal conservation objectives regardless of fuels used in the dwelling unit:

1. Set equal reference models for dwelling units, regardless of fuels used. (To use an analogy: This is like having every runner start at the same starting line in a race.)
2. Set equal conservation objectives relative to those reference models. (To continue the analogy: This is like setting the same finish line for every runner in the race.)
3. Offer options to earn due credit toward compliance through selecting efficient appliance types.
4. Use site energy efficiency as the conservation objective metric.

Each of these changes affect all compliance pathways. This proposal would also adopt conservation objectives consistent with Appendix NG, the 10%-higher-efficiency stretch code appendix, and make select additional adjustments to offset the reduced baseline efficiency from using a natural gas baseline for all new dwelling units.

Note: This proposal specifies that certain conservation objectives and credits be recalculated to reflect site energy savings to align with Minnesota statute. Should the TAG and/or CCAC be interested in adopting this proposal, they should seek technical assistance from an organization with appropriate energy modeling experience, such as MN CEE or PNNL, to recalculate figures appropriately. RMI can assist in the identification or provision of an appropriate technical assistance resource if requested.

2. Is this proposed code change required by Minnesota Statute? If so, please provide the citation. This change would assist Minnesota to cost-efficiently comply with statute: 326B.106 Subdivision 1 Paragraph (g). It is not strictly required by the statute.
3. Provide *specific* language you would like to see changed. Indicate proposed new words with underlining and ~~strikethrough~~ words proposed for deletion. Include the entire code (sub) section or rule subpart that contains your proposed changes.

Prescriptive Compliance

Amend as follows.

N1108.2 (R408.2) Additional energy efficiency credit requirements. Residential buildings shall earn not less than ~~40~~ 20 credits from not less than two measures specified in Table N1108.2. Five additional credits shall be earned for *dwelling units* with more than 5,000 square feet (465 m2) of *living space* located above *grade plane*. To earn credit as specified in Table N1108.2 for the applicable *climate zone*, each measure selected for compliance shall comply with the applicable subsections of Section N1108. Each *dwelling unit* of *sleeping unit* shall comply with the selected measure to earn credit. Interpolation of credits between measures shall not be permitted.

Add rows to **Table N1108.2** as follows. The credit values for these new measures were calculated with assistance from Pacific Northwest National Laboratory to reflect site energy improvements compared to a standard reference design that uses a natural gas furnace and a natural gas tank water heater, neither of which may exceed the Department of Energy’s currently effective minimum efficiency standard for those products.

| MEASURE NUMBER | MEASURE DESCRIPTION | CREDIT VALUE | |
|----------------------|---|----------------|----------------|
| | | Climate Zone 6 | Climate Zone 7 |
| <u>N1108.2.2(15)</u> | <u>Federal Minimum Efficiency Heat pump</u> | <u>17</u> | <u>16</u> |
| <u>N1108.2.3(8)</u> | <u>Federal Minimum Efficiency Electric storage water heater</u> | <u>12</u> | <u>12</u> |

Add option under **N1108.2.2** as follows:

15. Federal Minimum Efficiency Heat pump: Air source heat pump having an efficiency rating equal to or exceeding the minimum required by federal law for the geographic location where the equipment is installed. A dwelling unit shall be permitted to earn this credit in addition to other credits in Section N1108.2.2. A dwelling unit shall be permitted to earn a percentage of this credit equal to the percentage of the zone design heating load served by electric heat pump equipment.

Add a row in **Table N1108.2.3** as follows:

| MEASURE NUMBER | WATER HEATER | SIZE AND DRAW PATTERN | TYPE | EFFICIENCY |
|----------------|--------------|-----------------------|------|------------|
| | | | | |

| | | | | |
|--------------|---|-----|--|---|
| N1108.2.3(8) | Federal Minimum Efficiency Electric storage water heater | Any | Electric storage water heater. Note that a dwelling unit shall be permitted to earn this credit in addition to other credits in Section N1108.2.3. | Any efficiency equal to or exceeding currently effective US Department of Energy minimum energy efficiency standards |
|--------------|---|-----|--|---|

Simulated Building Performance Compliance

Add a definition to **Section N1101.6** as follows:

SITE ENERGY USE. The metric indicating the total amount of energy consumed by a *building* in 1 year.

Amend as follows:

N1105.2 (R405.2) Simulated building performance compliance. Compliance based on *simulated building performance* requires that a *building* comply with the following:

1. The requirements of the sections indicated within **Table N1105.2**.
2. The proposed total *building thermal envelope* thermal conductance, TC, shall be less than or equal to the *building thermal envelope* TC using the prescriptive *U*-factors and *F*-factors from **Table N1102.1.2** multiplied by ~~1.08~~ 1.05 in Climate Zones 0, 1 and 2, and ~~1.15~~ in Climate Zones ~~3 through 8~~ in accordance with **Equation 11-1** and **Section N1102.1.5**. ~~The area-weighted maximum fenestration SHGC permitted in Climate Zones 0 through 3 shall be 0.30.~~
3. ~~For each dwelling unit with one or more fuel-burning appliances for space heating, water heating, or both, the~~ The annual energy cost site energy use of the each dwelling unit shall be less than or equal to 80 70 percent of the annual energy cost site energy use of the standard reference design. For all other dwelling units, the annual energy cost of the dwelling unit shall be less than or equal to 85 percent of the annual energy cost of the standard reference design. For each *dwelling unit* with greater than 5,000 square feet (465 m²) of *living space* located above *grade plane*, the annual energy cost site energy use of the *dwelling unit* shall be reduced by an additional 5 percent of annual energy cost site energy use of the *standard reference design*. ~~Energy prices shall be taken from an approved source, such as the US Energy Information Administration's state energy data system prices and expenditures reports. Code officials shall be permitted to require time-of-use pricing in energy cost calculations.~~

Exceptions:

1. ~~The energy use based on source energy expressed in Btu or Btu per square foot of conditioned floor area shall be permitted to be substituted for the energy cost. The source energy multiplier for electricity shall be 2.51. The source energy multiplier for fuels other than electricity shall be 1.09.~~
2. ~~The energy use based on site energy expressed in Btu or Btu per square foot of conditioned floor area shall be permitted to be substituted for the energy cost.~~

Amend **Table N1105.4.2(1)** to require a *standard reference design* that uses *minimum-efficiency natural gas equipment* for space and water heating as follows. Rows not depicted, including sub-rows, are unchanged.

**TABLE N1105.4.2(1)
SPECIFICATIONS FOR THE STANDARD REFERENCE AND PROPOSED DESIGNS**

| BUILDING COMPONENT | STANDARD REFERENCE DESIGN | PROPOSED DESIGN |
|--|---|--|
| Heating systems ^{d, e, j, k} | Fuel type/capacity: <u>natural gas, with capacity the same as proposed design.</u> | As proposed. |
| | Product class: <u>if the proposed design uses only natural gas heating systems, same as proposed design. For any proposed heating systems that do not use natural gas, the standard reference design shall include a heating system of a product class that uses natural gas. For proposed designs with forced air or electric resistance radiative heating systems, substitute a furnace. For proposed designs with hydronic heating systems, substitute a boiler.</u> | As proposed. |
| | Efficiencies: | |
| | Heat pump: complying with 10 CFR §430.32. | As proposed. |
| | Fuel gas and liquid fuel furnaces: <u>complying with and having efficiency ratings equal to the minimum requirements of 10 CFR §430.32.</u> | <u>Forced air and electric resistance heating systems</u> as proposed. |
| | Fuel gas and liquid fuel boilers: <u>complying with and having efficiency ratings equal to the minimum requirements of 10 CFR §430.32.</u> | <u>Hydronic heating systems</u> as proposed. |
| Service water heating ^{d, g, k} | Fuel type and product class: same as proposed design <u>natural gas tank water heater complying with and having efficiency ratings equal to the minimum requirements of 10 CFR §430.32.</u> | As proposed. |
| Thermal distribution systems | Duct insulation: in accordance with Section N1103.3.3. | Duct insulation: as proposed. ^{m, k} |
| | Duct location: | Duct location: as proposed. ^l |

SI unit information and footnotes a, b, and c are unchanged. Amend footnote d as follows:

d. For a proposed design with multiple heating, cooling or water heating systems using different **fuel types** product classes, the applicable standard reference design system capacities and **fuel types**

[product classes](#) shall be weighted in accordance with their respective loads as calculated by accepted engineering practice for each ~~equipment and fuel type~~ [product class](#) present.

Footnotes e and f are unchanged. Amend footnote g as follows:

g. For a proposed design without a proposed water heater, the following assumptions shall be made for ~~both~~ the proposed design and the standard reference design. ~~For a proposed design with a heat pump water heater, the following assumptions shall be made for the standard reference design, except the fuel type shall be electric.~~

Fuel type: [for the standard reference design, natural gas. For the proposed design, the same as the predominant heating fuel type in the proposed design.](#)

Rated storage volume: 40 gallons

Draw pattern: medium

Efficiency: Uniform Energy Factor complying with [and not exceeding the minimum efficiency requirements of 10 CFR § 430.32](#)

Footnotes h and i are unchanged. Delete footnotes j and k. Renumber footnote l as footnote j. Renumber footnote m as footnote k.

ERI Compliance

Amend as follows. The to-be-determined ERI values in the new **Table N1106.5** columns shall be calculated such that they result in equivalent site energy outcomes for a building that uses natural gas for space and water heating and attains the ERI indicated in the model code's **Table N1106.5** and a building that meets the enumerated requirements and attains the increased, electric-heat-building ERI.

N1106.3 (R406.3) Building thermal envelope. The proposed total *building thermal envelope* thermal conductance (TC) shall be less than or equal to the required total *building thermal envelope* TC using the prescriptive *U*-factors and *F*-factors from Table N1102.1.2 multiplied by ~~1.08~~ [1.05](#) in ~~Climate Zones 0, 1 and 2, and by 1.15 in Climate Zones 3 through 8,~~ in accordance with ~~Equation 4-2 and~~ Section N1102.1.5. ~~The area-weighted maximum fenestration SHGC permitted in Climate Zones 0 through 3 shall be 0.30.~~

N1106.5 (R406.5) ERI-based compliance. Compliance based on an *Energy Rating Index* (ERI) analysis requires that the *rated design* and each confirmed as-built *dwelling unit* be shown to have an *ERI* less than or equal to the applicable value indicated in **Table N1106.5** where compared to the *ERI reference design* as follows:

1. Where [the building uses purchased energy that is not electricity for space heating or service water heating](#) ~~on-site renewables are not installed~~, the maximum ENERGY RATING INDEX NOT INCLUDING OPP, [MIXED-FUEL BUILDING](#) applies.
- [2. Where the building does not use purchased energy that is not electricity for space heating or service water heating, the maximum ENERGY RATING INDEX NOT INCLUDING OPP, ELECTRIC HEAT BUILDING applies.](#)
- ~~2. Where on-site renewables are installed, the maximum ENERGY RATING INDEX WITH OPP applies.~~

Amend table as follows.

**TABLE N1106.5
MAXIMUM ENERGY RATING INDEX**

| CLIMATE ZONE | ENERGY RATING INDEX NOT INCLUDING OPP | ENERGY RATING INDEX WITH OPP |
|-------------------------|---------------------------------------|---|
|-------------------------|---------------------------------------|---|

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| | <u>MIXED-FUEL BUILDING</u> | <u>ELECTRIC HEAT BUILDING</u> | |
|--------------------|----------------------------|-------------------------------|---------------|
| 0 and 1 | 51 | - | 35 |
| 2 | 51 | - | 34 |
| 3 | 50 | - | 33 |
| 4 | 53 | - | 40 |
| 5 | 54 | - | 43 |
| 6 | 53 <u>48</u> | <u>TBD</u> | 43 |
| 7 | 52 <u>47</u> | <u>TBD</u> | 46 |
| 8 | 52 | - | 46 |

4. Will this proposed code change impact other sections of a model code book or an amendment in Minnesota Rule? If so, please list the affected sections or rule parts.

No.

Need and Reason

1. Why is the proposed code change needed? Please provide a general explanation as well as a specific explanation for any changes to numerical values (heights, area, etc.)
- Statute 326B.106 requires that Minnesota must update its energy code to achieve a 70 percent reduction from baseline in annual net energy consumption or greater by 2038. The baseline is the 2006 International Energy Conservation Code State Level Residential Codes Energy Use Index. This baseline is based on site energy use index. Reaching 70% reduction from each baseline without rewarding more efficient appliance types will require expensive, restrictive measures.
 - The structure of the IECC has historically prevented designers from complying by selecting efficient product classes. While efficiency within a product class could count toward compliance, minimum-efficiency products could not - even if they use far less energy than a high-efficiency product of another class. This structural decision means that a building that uses efficient product classes, such as heat pumps and heat pump water heaters, must reach a much more stringent conservation objective in order to comply with the code than a building that uses less efficient product classes, such as combustion-fueled space and water heaters. This disincentivizes efficient product classes to the detriment of building energy efficiency and financial outcomes for both the builder and the occupant.
 - The lack of a single conservation objective limits the extent to which the code can increase in efficiency over time while providing builders with the maximum flexibility to choose how to comply. Because space and water heating comprise such a large share of total dwelling unit energy use - around 50%, depending on the climate zone - a major reduction to the energy use for those end uses can lead to a commensurately large drop in total dwelling unit energy. This drop is roughly equivalent to the total energy savings from code modeled by

PNNL between the 2006 IECC and the 2021 IECC, as well as approximately half the energy savings needed to reach Minnesota's statutory goal of a 70% net energy savings by 2038. If that efficiency cannot be encouraged by the code due to its structure, and builders cannot claim it toward compliance, each successive edition of the code will be drastically more limited in the means available to achieve efficiency improvements.

2. Why is the proposed code change a reasonable solution?

This code change makes minimal changes to the process to comply with and enforce the code, while still creating a level playing field between fuel types and doing so in a manner that is highly conservative with regard to federal energy conservation law.

3. What other factors should the TAG consider?

1. While this code proposal includes modifications to N1105, the proponent also supports other proposals that would remove this section entirely to simplify compliance and enforcement.
2. While this code proposal includes modifications to N1106, the proponent also supports other proposals that would reduce maximum ERI scores to better align with the prescriptive pathway's efficiency outcomes.
3. Should this code proposal proceed, the maximum ERI scores for electric heat buildings should be informed by analysis from MN CEE.

Cost/Benefit Analysis

1. Will the proposed code change increase or decrease costs? Please explain and provide estimates if possible.

Three scenarios for cost changes in homes complying via the prescriptive pathway are described below. The [US Department of Energy's 2024 IECC cost-effectiveness analysis](#) was used as a reference for likely builder decisions within the prescriptive pathway, and the [National Residential Efficiency Measures Database](#) was used as a cost reference, with cost adjustments informed by RSMMeans and [Federal Reserve price indices for single-family home construction](#). All scenarios have the following characteristics, which were selected based on their relative prevalence in Minnesota according to US Department of Energy Building Energy Codes Program publications:

- Single-family home
- Heated basement
- Climate zone 6A
- Under 5000 sq ft in size

Scenario 1: Typical Heat Pump Appliances

Of our three scenarios, this scenario includes high-efficiency appliance types that would receive credit toward compliance proportionate to their energy savings in comparison to less efficient appliance types.

The DOE prototype home that matches this scenario adopts the following credits in N1108 to earn 10 total credits:

- Integrated heat pump water heater: UEF = 3.30, worth 3 credits
- 80% of Ducts in Conditioned Space, worth 7 credits

A homebuilder intending to use heat pump equipment presented with a code that requires 20, rather than 10, N1108 credits, and offers 17 credits for the selection of a typical heat pump and 12 credits for the selection of an electric storage water heater, would earn at least 29 total credits and

would not need to undertake additional measures from N1108. Therefore, the measures considered by PNNL would be unnecessary. Based on home center retail prices for the relevant equipment, this would have the following first-cost impacts:

- Instead of installing a UEF >3.0 water heater (\$1700), the builder could install a UEF 0.93 water heater (\$500), saving \$1200.
- The builder could forgo locating ducts in conditioned space (-\$1800 for duct location, +\$1000 for duct insulation, thus -\$800 total).
- Overall, the builder would save \$2000.

Scenario 2: High Efficiency Gas Appliances

Homes using gas appliances and not pursuing efficiency opportunities through selection of higher-efficiency appliance categories would not have additional credits available under this code proposal, but would need to earn 20 credits instead of 10.

The DOE prototype home that most closely matches this scenario adopts the following credits in N1108 to earn 10 total credits:

- Gas-Fired Instant WH, UEF 0.95, worth 6 credits
- Compact Hot Water Distribution, worth 2 credits
- HRV installed, worth 2 credits (note that in Minnesota, balanced ventilation is required in new dwelling units, so this credit may not be appropriate or available)

Notably, this prototype does not claim credits associated with a high-efficiency air conditioner or furnace. Considering anecdotes from state and national code development processes, new homes are relatively unlikely to be equipped with 80% AFUE furnaces. If this prototype claimed the existing credit for a furnace with 95% AFUE (\$2180), it would earn an additional 6 credits. Making the conservative assumption that the home otherwise would have been sold with minimum-efficiency heating equipment (\$1520), the homebuilder would spend \$660 on these credits.

Additionally, this prototype does not claim the 7-9 credits associated with ducts in conditioned space. For new homes with heated basements in Minnesota, again anecdotally, it is relatively unlikely that more than 20% of ducts would not be located in conditioned space. (Note that US DOE and PNNL's 2024 prototypes locate ducts in conditioned space for homes with conditioned basements by default, meaning this incremental cost would be zero – see PDF page [32-33](#).)

Making the conservative assumption that all ducts otherwise would have been located in unconditioned space, the homebuilder could locate 100% of ducts in conditioned space at a cost of about \$800 (\$1800 additional for the shift in duct location, \$1000 less due to savings from duct insulation).

The sum of existing credits (10), minus the HRV credit (2), plus efficient furnace (6) and duct location (9) credits would exceed the 20-credit requirement (23 credits total) at an incremental cost of \$1460. If desired, the builder could drop the Compact Hot Water Distribution measure (2 credits) though US DOE and PNNL estimate that this credit reduces single-family home construction costs by \$1590 ([Table 3.2.4](#)).

Scenario 3: Minimum Efficiency Gas Appliances

While it is uncommon for new homes to be sold with minimum-efficiency appliances as home buyers expect high performance, and efficient equipment is a cost-effective method to reduce energy use, demonstrating the feasibility of such an approach to construction is important under some interpretations of federal energy law. Considering the same prototype from Scenario 2:

- Gas-Fired Instant WH, UEF 0.95, worth 6 credits
- Compact Hot Water Distribution, worth 2 credits

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- HRV installed, worth 2 credits (note that in Minnesota, balanced ventilation is required in new dwelling units, so this credit may not be appropriate or available)

A new home with all-minimum-efficiency gas appliances could not earn the Gas-Fired Instant WH credit and would need to earn 16 total credits to meet the 20-credit requirement. Among possible approaches, a builder could select a boiler to claim the 10-point Ductless or Hydronic Thermal Distribution credit and achieve a 15% reduction in total TC (6 credits). Alternatively, a builder could select a higher TC reduction and renewable energy credits to reach 16 total credits. These are relatively cost-intensive, but technically feasible, pathways; note, however, that in some cases attainment of “reduction in total TC” credits may result in opportunities to downsize or eliminate certain HVAC equipment and partially offset construction cost increases.

2. If there is an increased cost, will this cost be offset by a safety or other benefit? Please explain. If the benefit is quantifiable (for example energy savings), provide an estimate if possible.

There is no estimated cost increase for all-electric buildings that include heat pump equipment. The increased cost for mixed-fuel buildings would be associated with an approximate 10% reduction in energy use. US DOE and [PNNL estimate](#) that, in climate zone 6 (using a Minnesota exemplar city), the unamended 2024 IECC saves typical households \$191 annually (Table 4.2) compared to the unamended 2021 IECC by saving 5.64% of total energy costs ([Table ES.1](#)). Assuming a proportionate savings increase, this code change would save households in new mixed-fuel homes an additional \$338 per year.

3. If there is a cost increase, who will bear the costs? This can include government units, businesses, and individuals.
Cost savings and cost increases will both be borne by builders and homebuyers, depending on the different potential effects described above.

4. Are there any enforcement or compliance cost increases or decreases with the proposed code change? Please explain.
No. The structure and options to comply with the code as amended by this proposal are unchanged from the base code. There are also no changes to prescriptive path envelope requirements that would require a specialized version of REScheck to be developed.

5. Will the cost of complying with the proposed code change in the first year after the rule takes effect exceed \$25,000 for any one small business or small city ([Minn. Stat. § 14.127](#))? A small business is any business that has less than 50 full-time employees. A small city is any statutory or home rule charter city that has less than ten full-time employees. Please explain.
If any small businesses obtain permits and construct more than 17 new mixed fuel homes in the year following the code change, experience circumstances aligned with the conservative assumptions in the above analysis, do not increase home selling price at least proportionately and/or build on spec, and do not alter their construction practices to use more efficient appliance types, this rule could cost such a small business over \$25,000. This scenario does not seem likely, though given the contractor-heavy employment structure of some general contractors, it is hypothetically possible.

Regulatory Analysis

1. What parties or segments of industry are affected by this proposed code change?

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The new home construction industry and manufacturers that supply energy-related products for home construction (e.g., insulation, HVAC equipment, air sealing, etc.) will be affected.

2. Can you think of other means or methods to achieve the purpose of the proposed code change? What might someone opposed to this code change suggest instead? Please explain what the alternatives are and why your proposed change is the preferred method or means to achieve the desired result.

The alternative to this proposed change is to maintain the status quo, which does not credit heat pumps or heat pump water heaters for their higher energy performance. The proposed changes are preferable because they credit efficiency improvements that are ignored by the model code. These will enable a more realistic and affordable pathway to achieving Minnesota's statutory residential new construction energy efficiency requirements.

3. What are the probable costs or consequences of not adopting the code change, including those costs or consequences borne by identifiable categories of affected parties, such as separate classes of government units, businesses, or individuals?

This code proposal helps credit the higher energy performance of heat pumps and heat pump water heaters by adding a credit for those appliances in the prescriptive pathway, by setting less aggressive ERI scores for electric buildings and by measuring the performance pathway against a common standard reference design using natural gas appliances. The model code does not credit the higher energy savings of these measures, which will result in an increased cost of compliance to attain the energy efficiency goals required by statute. This increases costs of complying with the code for homebuilders, and in turn for homebuyers.

4. Are you aware of any federal or state regulation or requirement related to this proposed code change? If so, please list the federal or state regulation or requirement and your assessment of any differences between the proposed code change and the federal regulation or requirement.

Statute 326B.106 requires that Minnesota must update its energy code to achieve a 70 percent or greater reduction from baseline in annual net energy consumption by 2038. The baseline is the 2006 International Energy Conservation Code State Level Residential Codes Energy Use Index. This baseline is based on site energy use index. This proposal aligns credits and pathways to align with baseline.

***Note: The information you provide in this code change proposal form is considered Public Data and used by the TAG to consider your proposed modification to the code. Any code change proposal form submitted to DLI may be reviewed at public TAG meetings and used by department staff and the Office of Administrative Hearings to justify the need and reasonableness of any proposed rule draft subject to administrative review and is available to the public.

****Note: Incomplete forms will be returned to the submitter with instruction to complete the form. Only completed forms will be accepted and considered by the TAG. The submitter may be asked to provide additional information in support of the proposed code change.



CODE CHANGE PROPOSAL FORM

(Must be submitted electronically)

Author/requestor: Mike Moore, Stator LLC, Representing the Home Ventilating Institute

Date: April 9, 2025

Email address: mmoore@statorllc.com

Model Code: Residential Energy

Telephone number: 303.408.7015

Code or Rule Section: N1103.6

Firm/Association affiliation, if any: Stator LLC

Code or rule section to be changed: N1103.6

Intended for Technical Advisory Group ("TAG"): Residential Energy Code

General Information

Yes **No**

- | | | |
|--|-------------------------------------|-------------------------------------|
| A. Is the proposed change unique to the State of Minnesota? | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| B. Is the proposed change required due to climatic conditions of Minnesota? | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| C. Will the proposed change encourage more uniform enforcement? | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| D. Will the proposed change remedy a problem? | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| E. Does the proposal delete a current Minnesota Rule, chapter amendment? | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| F. Would this proposed change be appropriate through the ICC code development process? | <input checked="" type="checkbox"/> | <input type="checkbox"/> |

Proposed Language

- The proposed code change is meant to:
 - change language contained the model code book? If so, list section(s). *N1103.6*
 - change language contained in an existing amendment in Minnesota Rule? If so, list Rule part(s).
 - delete language contained in the model code book? If so, list section(s).
 - delete language contained in an existing amendment in Minnesota Rule? If so, list Rule part(s).
 - add new language that is not found in the model code book or in Minnesota Rule.
- Is this proposed code change required by Minnesota Statute? If so, please provide the citation. *Adoption of this proposed code change, is supported (but not required) by Sec. 29. Minnesota Statutes 2022, section 326B.106, subdivision 1 which states, "(d) Notwithstanding paragraph (c), the commissioner shall act on each new model residential energy code...The commissioner may adopt amendments prior to adoption of the new energy codes, as amended for use in Minnesota, to*

advance construction methods, technology, or materials, or, where necessary to protect the health, safety, and welfare of the public, or to improve the efficiency or use of a building.”

3. Provide *specific* language you would like to see changed. Indicate proposed new words with underlining and ~~striethrough~~ words proposed for deletion. Include the entire code (sub) section or rule subpart that contains your proposed changes.
Please see the text at the end of this code change proposal form for proposed modifications.
4. Will this proposed code change impact other sections of a model code book or an amendment in Minnesota Rule? If so, please list the affected sections or rule parts.
These proposed changes will only affect other sections of MN Rules where such sections reference MN 1322.0403.5.

Need and Reason

1. Why is the proposed code change needed? Please provide a general explanation as well as a specific explanation for any changes to numerical values (heights, area, etc.)
The proposed code changes would maintain existing requirements in MN 1322.0403 Section R403.5.5 to ensure that HRVs and ERVs are designed to perform in MN's cold climate.
2. Why is the proposed code change a reasonable solution?
The proposed code change maintains the existing requirement in MN 1322.0403 Section R403.5.5 to ensure that HRVs and ERVs are designed to perform in MN's cold climate.
3. What other factors should the TAG consider?
The model code does not address performance in cold climates, and maintaining MN's current requirements in this regard will support delivery of outdoor air and maintenance of IAQ when outdoor ambient air temperature is very low.

Cost/Benefit Analysis

1. Will the proposed code change increase or decrease costs? Please explain and provide estimates if possible.
Because the proposed requirement is currently in MN's energy code, the proposed change to the model code will not increase or decrease costs.
2. If there is an increased cost, will this cost be offset by a safety or other benefit? Please explain. If the benefit is quantifiable (for example energy savings), provide an estimate if possible.
N/A
3. If there is a cost increase, who will bear the costs? This can include government units, businesses, and individuals.
N/A
4. Are there any enforcement or compliance cost increases or decreases with the proposed code change? Please explain.
None are anticipated.
5. Will the cost of complying with the proposed code change in the first year after the rule takes effect exceed \$25,000 for any one small business or small city ([Minn. Stat. § 14.127](#))? A small business is any business that has less than 50 full-time employees. A small city is any statutory or home rule charter city that has less than ten full-time employees. Please explain.
No.

Regulatory Analysis

1. What parties or segments of industry are affected by this proposed code change?

N/A.

2. Can you think of other means or methods to achieve the purpose of the proposed code change? What might someone opposed to this code change suggest instead? Please explain what the alternatives are and why your proposed change is the preferred method or means to achieve the desired result.

A field test could be conducted to ensure that HERVs continue to operate as expected during cold conditions, but such a test would need to be conducted under extreme winter conditions, and coordinating the timing of such a test would be impractical in most cases.

3. What are the probable costs or consequences of not adopting the code change, including those costs or consequences borne by identifiable categories of affected parties, such as separate classes of government units, businesses, or individuals?

If MN does not maintain its current requirement for cold temperature performance, HERVs may not deliver outdoor air during very cold conditions.

4. Are you aware of any federal or state regulation or requirement related to this proposed code change? If so, please list the federal or state regulation or requirement and your assessment of any differences between the proposed code change and the federal regulation or requirement.

Canada's [Energy Efficiency Regulations](#) require HERVs to be certified at -13°F (25°C) or to be "marked for use only where the outdoor design temperature is greater than or equal to -10°C."

***Note: Incomplete forms may be returned to the submitter with instruction to complete the form. Only completed forms can be considered by the TAG.

HVI Proposal – Modify Chapter 11 of the 2024 IRC as follows:

1103.6 (R403.6) Mechanical ventilation. *Buildings and dwelling units shall be provided with mechanical ventilation that complies with the requirements of the *International Residential Code* or *International Mechanical Code*, as applicable, or with other *approved* means of ventilation. Outdoor air intakes and exhausts shall have automatic or gravity dampers that close when the ventilation system is not operating.*

1103.6.1 (R403.6.1) Heat or energy recovery ventilation. *Dwelling units shall be provided with a heat recovery or energy recovery ventilation system in Climate Zones 6, 7, and 8. The system shall be a balanced ventilation system with a sensible recovery efficiency (SRE) of not less than 65 percent at 32°F (0°C) at an airflow greater than or equal to the design airflow. The SRE shall be determined from a listed value or from interpolation of listed values. The heat recovery or energy recovery ventilation system shall have either:*

1. An SRE rating developed in accordance with HVI Publication 920 at -13°F (25°C); or
2. Documentation prepared by a professional engineer licensed by the state of Minnesota, stating that the unit is designed to provide outdoor air at an outdoor air temperature of -13°F (-25°C).



CODE CHANGE PROPOSAL FORM

(Must be submitted electronically)

Author/requestor: Isaac Smith, John Smith, Jim Kumon

Date: 5/15/2025

Email address: ismith@mncee.org

Model Code: 2024 IRC

Telephone number: 612-335-3483

Code or Rule Section: N1102

Firm/Association affiliation, if any: Center for Energy and Environment (CEE), Heirloom Properties,

Topic of proposal: *Air Leakage Metric*

Code or rule section to be changed: N1102.5.1.3 (R402.5.1.3)

Intended for Technical Advisory Group ("TAG"): *Residential Energy Code*

General Information

Yes **No**

- | | | |
|--|-------------------------------------|-------------------------------------|
| A. Is the proposed change unique to the State of Minnesota? | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| B. Is the proposed change required due to climatic conditions of Minnesota? | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| C. Will the proposed change encourage more uniform enforcement? | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| D. Will the proposed change remedy a problem? | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| E. Does the proposal delete a current Minnesota Rule, chapter amendment? | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| F. Would this proposed change be appropriate through the ICC code development process? | <input checked="" type="checkbox"/> | <input type="checkbox"/> |

Proposed Language

1. The proposed code change is meant to:

change language contained the model code book? If so, list section(s).
[N1102.5.1.3 Maximum air leakage rate](#)

change language contained in an existing amendment in Minnesota Rule? If so, list Rule part(s).

delete language contained in the model code book? If so, list section(s).

delete language contained in an existing amendment in Minnesota Rule? If so, list Rule part(s).

add new language that is not found in the model code book or in Minnesota Rule.

Summary:

This proposal changes the air leakage metric from ACH50 (air changes per hour at 50 Pascals) to CFM50 (cubic feet per minute at 50 Pascals) of air infiltration of the total building envelope area. The current volumetric metric of ACH50 inherently favors larger homes by allowing them to meet code requirements despite having higher total leakage, while holding smaller homes to a more strict standard. By shifting to CFM50 with the calculated cfm/sq. ft., air leakage would be assessed based on the exterior envelope area of the building, creating a fair, consistent and performance-based standard across all home sizes. It is the air leakage rate through the building enclosure that is the important parameter to identify the air tightness of the structure. Using ACH can and is misleading, giving larger volume houses a misleading advantage while penalizing slab on grade houses.

2. Is this proposed code change required by Minnesota Statute? If so, please provide the citation.
No
3. Provide *specific* language you would like to see changed. Indicate proposed new words with underlining and ~~strikethrough~~ words proposed for deletion. Include the entire code (sub) section or rule subpart that contains your proposed changes.

N1102.5.1.3 (R402.5.1.3) Maximum air leakage rate.

Where tested in accordance with Section N1102.5.1.2, the air leakage rate for buildings, dwelling units or sleeping units shall be as follows:

1. Where complying with Section N1101.13.1, the building or the dwelling units or sleeping units in the building shall have an air leakage rate not greater ~~than 4.0 air changes per hour in Climate Zones 0, 1 and 2; 3.0 air changes per hour in Climate Zones 3 through 5; and 2.5 air changes per hour~~ 0.18 cubic feet per minute per square foot [1.1 L/(s × m²)] of the testing unit enclosure area that separates conditioned space from the exterior in Climate Zones 6 ~~and 7 through 8~~.
2. Where complying with Section N1101.13.2 or N1101.13.3, the building or the dwelling units or sleeping units in the building shall have an air leakage rate not greater than ~~4.0 air changes per hour, or 0.22~~ 0.18 cubic feet per minute per square foot [1.1 L/(s × m²)] of the building thermal envelope area or the dwelling testing enclosure area, ~~as applicable~~.

Exceptions:

1. Where dwelling units or sleeping units are attached or located in an R-2 occupancy, and are tested without simultaneously testing adjacent dwelling units or sleeping units, the air leakage rate is permitted to be not greater than ~~0.27~~ 0.20 cubic feet per minute per square foot [1.4 L/(s × m²)] of the testing unit enclosure area. Where adjacent dwelling units are simultaneously tested in accordance with ASTM E779, the air leakage rate is permitted to be not greater than ~~0.27~~ 0.20 cubic feet per minute per square foot [1.4 L/(s × m²)] of the testing unit enclosure area that separates conditioned space from the exterior.
 - ~~2. Where buildings have 1,500 square feet (139.4 m²) or less of conditioned floor area, the air leakage rate is permitted to be not greater than 0.27 0.18 cubic feet per minute per square foot [1.4L/(s × m²)].~~
4. Will this proposed code change impact other sections of a model code book or an amendment in Minnesota Rule? If so, please list the affected sections or rule parts.

Yes, as follows:

N1102.5.1.2 (R402.5.1.2) Air leakage testing.

The building or each dwelling unit or sleeping unit in the building shall be tested for air leakage. Testing shall be conducted in accordance with ANSI/RESNET/ICC 380, ASTM E779, ASTM E1827 or ASTM E3158 and reported ~~as air leakage in cfm per square foot of building envelope area at a~~

Code Change Proposal RE-43

pressure differential of 0.2 inch water gauge (50 Pascals). Where required by the code official, testing shall be conducted by an approved third party. A written report of the results of the test shall be signed by the party conducting the test and provided to the code official. Testing shall be performed at any time after creation of all penetrations of the building thermal envelope have been sealed.

During testing:

1. Exterior windows and doors, fireplace and stove doors shall be closed, but not sealed, beyond the intended weatherstripping or other infiltration control measures.
2. Dampers including exhaust, intake, makeup air, backdraft and flue dampers shall be closed, but not sealed beyond intended infiltration control measures.
3. Interior doors, where installed at the time of the test, shall be open.
4. Exterior or interior terminations for continuous ventilation systems shall be sealed.
5. Heating and cooling systems, where installed at the time of the test, shall be turned off.
6. Supply and return registers, where installed at the time of the test, shall be fully open.

Exception: For heated, attached private garages and heated, detached private garages accessory to one- and two-family dwellings and townhouses not more than three stories above grade plane in height, building thermal envelope tightness and insulation installation shall be considered acceptable where the items in Table N1102.5.1.1, applicable to the method of construction, are field verified. Where required by the code official, an approved third party independent from the installer shall inspect both air barrier and insulation installation criteria. Heated, attached private garage space and heated, detached private garage space shall be thermally isolated from all other habitable, conditioned spaces in accordance with Sections N1102.2.13 and N1102.4.5, as applicable.

Need and Reason

1. Why is the proposed code change needed? Please provide a general explanation as well as a specific explanation for any changes to numerical values (heights, area, etc.)

The proposed amendment is critical to achieving equity in the code among building types and sizes. The current metric, ACH50 (air changes per hour at 50 Pascals), is volumetric and inherently favors larger homes. As a result, larger homes can meet the code's air leakage requirements while allowing significantly more total leakage than smaller homes. Switching to cfm/sq. ft. of envelope area, as proposed, aligns the air leakage metric with the surface area through which the air actually leaks, allowing for consistent evaluation regardless of building size. This change promotes fairness and aligns with best practices increasingly being adopted in programs across the country.

2. Why is the proposed code change a reasonable solution?

The switch from ACH50 to cfm/sq. ft. is reasonable for a variety of reasons, including:

- Eliminates a measurement system, ACH50, which is commonly recognized as being biased toward larger volume buildings.
- Using cfm per square foot of envelope area directly measures how much air is leaking through each square foot of a building's exterior surfaces when pressurized, providing a clear, surface-based metric that reflects the actual pathways for air leakage, regardless of the size of the building.
- No change in testing procedure is needed, as the current testing protocol calculates both metrics.
- There is a current trend in other countries (including most European countries), commercial energy codes and above-code certification programs to use cfm/sq. ft. to measure air leakage

The proposed value of 0.18 is reasonable for a variety of reasons, including:

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- When considering a sample of a variety of buildings, here is what the calculated cfm/sq. ft. values equated to

| ACH50 Value | Range (cfm/sq. ft.) | Mode | Median |
|-------------|---------------------|------|--------|
| 2.0 | 0.07 - 0.20 | 0.11 | 0.13 |
| 2.5* | 0.08 – 0.23 | 0.13 | 0.14 |
| 3.0 | 0.11 - 0.30 | 0.20 | 0.20 |

* Model code value

This shows that 0.18 cfm/sq. ft. is a reasonable metric that will not press the air leakage requirements significantly at a time when the market is adjusting to a changing metric

- About 92% of homes built-in Minnesota between 2020 and 2023 meet this metric
- When considering the same set of homes (n=34,759), using RESNET data, the average air leakage was 0.13 cfm/sq. ft.

- What other factors should the TAG consider?

N/A

Cost/Benefit Analysis

- Will the proposed code change increase or decrease costs? Please explain and provide estimates if possible.

The proposed code change should not impact costs

- If there is an increased cost, will this cost be offset by a safety or other benefit? Please explain. If the benefit is quantifiable (for example energy savings), provide an estimate if possible.

N/A

- If there is a cost increase, who will bear the costs? This can include government units, businesses, and individuals.

N/A

- Are there any enforcement or compliance cost increases or decreases with the proposed code change? Please explain.

There are not. The testing procedure is the same and the air leakage report generated to report on ACH50 also includes cfm/sq. ft. values.

- Will the cost of complying with the proposed code change in the first year after the rule takes effect exceed \$25,000 for any one small business or small city ([Minn. Stat. § 14.127](#))? A small business is any business that has less than 50 full-time employees. A small city is any statutory or home rule charter city that has less than ten full-time employees. Please explain.

No.

Regulatory Analysis

- What parties or segments of industry are affected by this proposed code change?

Contractors, specifically those who often build larger homes, may need to adapt construction practices or air sealing techniques to meet the new metric and ensure compliance.

- Can you think of other means or methods to achieve the purpose of the proposed code change? What might someone opposed to this code change suggest instead? Please explain what the alternatives are and why your proposed change is the preferred method or means to achieve the desired result.

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No, cfm/sq. ft. is the only reasonable alternative to the current metric due to the uniform testing procedure and industry familiarity with the metric. The alternative would be to not make a change and continue accepting the volumetric bias of the current metric.

3. What are the probable costs or consequences of not adopting the code change, including those costs or consequences borne by identifiable categories of affected parties, such as separate classes of government units, businesses, or individuals?
If no change is made, larger homes will continue to be allowed to be leakier than smaller homes and consequently less efficient and durable than smaller homes.
4. Are you aware of any federal or state regulation or requirement related to this proposed code change? If so, please list the federal or state regulation or requirement and your assessment of any differences between the proposed code change and the federal regulation or requirement.

N/A



CODE CHANGE PROPOSAL FORM

(Must be submitted electronically)

Author/requestor: Isaac Smith, Randy King

Date: 6/16/2025

Email address: ismith@mncee.org

Model Code: 2024 IRC

Telephone number: 612-335-3483

Code or Rule Section: N1106

Firm/Association affiliation, if any: Center for Energy and Environment (CEE), Prokore

Topic of proposal: Building Thermal Envelope Backstop - Performance Pathways

Code or rule section to be changed: N1105.2 (R405.2) and N1106.3 (R406.3)

Intended for Technical Advisory Group ("TAG"): Residential Energy Code

General Information

Yes **No**

- | | | |
|--|-------------------------------------|-------------------------------------|
| A. Is the proposed change unique to the State of Minnesota? | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| B. Is the proposed change required due to climatic conditions of Minnesota? | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| C. Will the proposed change encourage more uniform enforcement? | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| D. Will the proposed change remedy a problem? | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| E. Does the proposal delete a current Minnesota Rule, chapter amendment? | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| F. Would this proposed change be appropriate through the ICC code development process? | <input checked="" type="checkbox"/> | <input type="checkbox"/> |

Proposed Language

1. The proposed code change is meant to:

change language contained in the model code book? If so, list section(s).
N1105.2 (R405.2) and N1106.3 (R406.3)

change language contained in an existing amendment in Minnesota Rule? If so, list Rule part(s).

delete language contained in the model code book? If so, list section(s).

delete language contained in an existing amendment in Minnesota Rule? If so, list Rule part(s).

add new language that is not found in the model code book or in Minnesota Rule.

Summary:

This proposal aligns the thermal envelope requirements across both the performance and prescriptive compliance paths. The following points highlight the rationale for this change:

- The building thermal envelope has the greatest impact on a home's energy use and is the most difficult and costly component to upgrade after construction. A thermal envelope built today will likely remain unchanged for the next 100 years.
- New construction presents the best—and often only—opportunity to create an energy-efficient envelope. The energy code should ensure that all new homes, regardless of compliance path, meet a strong baseline for envelope performance.
- Aligning envelope requirements across code pathways promotes consistency and ensures a more level playing field for builders.
- Builders will still retain design flexibility. The component performance alternative (Section N1102.1.5) remains available in all pathways, allowing trade-offs between envelope components while maintaining equivalent overall performance.

2. Is this proposed code change required by Minnesota Statute? If so, please provide the citation. Minnesota Statute 326B.106, states “Beginning in 2026, the commissioner shall act on the new model residential energy code by adopting each new published edition of the International Energy Conservation Code or a more efficient standard. The residential energy code in effect in 2038 and thereafter must achieve a 70 percent reduction in annual net energy consumption or greater, using the 2006 International Energy Conservation Code State Level Residential Codes Energy Use Index for Minnesota, as published by the United States Department of Energy's Building Energy Codes Program, as a baseline. The commissioner shall adopt residential energy codes from 2026 to 2038 that incrementally move toward achieving the 70 percent reduction in annual net energy consumption. By January 15 of the year following each new code adoption, the commissioner shall submit a report on progress under this section to the legislative committees with jurisdiction over the energy code.”

This Statute will not be achieved without improving the building envelope. This change is critical to setting MN on a pathway to achieve this goal, while aligning the envelope requirements across all code paths and leveling the playing field for all builders.

3. Provide *specific* language you would like to see changed. Indicate proposed new words with underlining and ~~strikethrough~~ words proposed for deletion. Include the entire code (sub) section or rule subpart that contains your proposed changes.

N1106.3 (R406.3) Building thermal envelope.

The proposed total building thermal envelope thermal conductance (TC) shall be less than or equal to the required total building thermal envelope TC using the prescriptive U-factors and F-factors from Table N1102.1.2 ~~multiplied by 1.08 in Climate Zones 0, 1 and 2, and by 1.15 in Climate Zones 3 through 8, in accordance with Equation 11-6 and Section N1102.1.5. The area-weighted maximum fenestration SHGC permitted in Climate Zones 0 through 3 shall be 0.30.~~

N1105.2 (R405.2) Simulated building performance compliance.

Compliance based on simulated building performance requires that a building comply with the following:

1. *The requirements of the sections indicated within Table N1105.2.*
2. *The proposed total building thermal envelope thermal conductance (TC) shall be less than or equal to the required total building thermal envelope TC using the prescriptive U-factors and F-*

~~factors from [Table N1102.1.2](#) multiplied by 1.08 in Climate Zones 0, 1 and 2, and 1.15 in Climates Zones 3 through 8, in accordance with Equation 11-6 and [Section N1102.1.5](#). The area-weighted maximum fenestration SHGC permitted in Climate Zones 0 through 3 shall be 0.30.~~

~~Equation 11-6~~

~~For Climate Zones 0 - 2: $TC_{Proposed\ design} \leq 1.08 \times TC_{Prescriptive\ reference\ design}$~~

~~For Climate Zones 3 - 8: $TC_{Proposed\ design} \leq 1.15 \times TC_{Prescriptive\ reference\ design}$~~

Note: The TAG has heard a code change proposal for removing the Simulated Building Performance pathway, but the TAG has not yet voted on this proposal. If the Simulated Building Performance pathway remains a part of the Minnesota residential energy code going forward, the above changes outlined for section N1105.2 should be implemented to ensure equivalence with the other two compliance pathways.

4. Will this proposed code change impact other sections of a model code book or an amendment in Minnesota Rule? If so, please list the affected sections or rule parts.
No.

Need and Reason

1. Why is the proposed code change needed? Please provide a general explanation as well as a specific explanation for any changes to numerical values (heights, area, etc.)

This code change proposal promotes equity in the code by ensuring all builders are held to the same standard for the building's thermal envelope, which is the component that has the greatest impact on energy performance, durability, and resiliency.

This change still gives builders flexibility in how they meet the thermal envelope requirements by maintaining the building component performance alternative. This alternative lets builders choose how they meet the envelope requirements without sacrificing envelope performance.

This change also ensures that the building component that is the hardest to upgrade after construction is built to the highest standard in the model code, which will avoid the need for future investments in the building envelope and set MN on a pathway to meet the statutory goals.

2. Why is the proposed code change a reasonable solution?
The MN Advanced Energy Codes Partnership is an initiative focused on achieving Minnesota's statutory requirements around energy code efficiency in new construction. As part of this work, the Partnership has identified key guiding principles for developing new efficiency requirements, to ensure these requirements have the highest impact with least possible burden on the market. These guiding principles include:
 - Ease of market adoption
 - Requirements should be as easy as possible for designers and builders to implement, including products that are currently easily available and implementable by the existing workforce
 - Least cost
 - Requirements should have the lowest lifetime cost to implement, accounting for the initial cost as well as energy savings over the lifetime of the measure.
 - Collaborative approach
 - Engage stakeholders and listen to their feedback
 - Inclusive of all voices and experiences
 - Data-driven decisions

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- Decisions should be guided by data, including the best possible information on cost, market readiness, and energy savings.

The proposed amendment aligns with these guiding principles:

- Ease of Market Adoption:
 - This change will set clear requirements for all builders across the state of Minnesota.
 - This proposal will ensure equity between the prescriptive pathway and the performance pathways, ensuring rural market areas do not have more stringent compliance requirements than urban market areas that have easier access to the performance paths.
- Least Cost:
 - This change levels the playing field for all builders, so everyone has to meet the same envelope requirements.
- Collaborative Approach:
 - We have presented this idea to the AECOP Advisory Committee, soliciting feedback both in the meeting and with a follow-up survey, and have presented these values to TAG members and stakeholders ahead of the TAG meetings. These meetings have introduced new factors to be considered and data to be analyzed, which we have followed up on.
 - This is the second proposal CEE is bringing forward to increase the equity between the prescriptive and ERI performance pathways. This proposal is a reaction to the feedback that was received when discussing the previous proposal and concerns that were raised. Numerous TAG members have approached CEE to discuss alternative options and this proposal is a result of those discussions.
- Data-Driven Decisions:
 - We are simply applying the envelope requirements for the prescriptive path to all compliance pathways, leveling the playing field and efficiency requirements for all buildings.

3. What other factors should the TAG consider?

The TAG should consider the long-term significance of the building thermal envelope. It has the single greatest impact on a home's energy use and is also the most difficult and expensive element to improve after construction is complete. Because the envelope installed during construction will likely remain unchanged for the life of the home—potentially 100 years or more—getting it right from the start is critical. New construction represents the best, and often only, opportunity to ensure a high-performance envelope. For this reason, the energy code should require a strong baseline level of envelope efficiency across all compliance paths, so that every newly built home starts with a durable and energy efficient envelope.

Cost/Benefit Analysis

1. Will the proposed code change increase or decrease costs? Please explain and provide estimates if possible.
This proposal will help ensure equivalent cost and performance across all of the code pathways.
2. If there is an increased cost, will this cost be offset by a safety or other benefit? Please explain. If the benefit is quantifiable (for example energy savings), provide an estimate if possible.
Buildings that were not going to meet the prescriptive path envelope requirements may see an increase in cost that will be offset by the energy savings from a better performing building envelope.
3. If there is a cost increase, who will bear the costs? This can include government units, businesses, and individuals.

Builders that were not planning to meet the prescriptive path envelope requirements may see an increase in cost.

4. Are there any enforcement or compliance cost increases or decreases with the proposed code change? Please explain.
No, this simplifies the enforcement and compliance for the building envelope.
5. Will the cost of complying with the proposed code change in the first year after the rule takes effect exceed \$25,000 for any one small business or small city ([Minn. Stat. § 14.127](#))? A small business is any business that has less than 50 full-time employees. A small city is any statutory or home rule charter city that has less than ten full-time employees. Please explain.
No.

Regulatory Analysis

1. What parties or segments of industry are affected by this proposed code change?
Builders
2. Can you think of other means or methods to achieve the purpose of the proposed code change? What might someone opposed to this code change suggest instead? Please explain what the alternatives are and why your proposed change is the preferred method or means to achieve the desired result.
No. It is critical that all new homes have an energy efficient envelope.
3. What are the probable costs or consequences of not adopting the code change, including those costs or consequences borne by identifiable categories of affected parties, such as separate classes of government units, businesses, or individuals?

Failing to align the thermal envelope requirements across compliance paths could lead to long-term inefficiencies and missed energy savings in the housing stock. Because the thermal envelope is both the most impactful element of a home's energy performance and the most difficult and expensive to upgrade after construction, homes built with lower envelope performance today will likely remain that way for decades—potentially 100 years—locking in higher energy use and utility costs for homeowners.

Homeowners, especially low-income households, may bear the brunt of this burden through higher energy bills and reduced comfort. Utilities and government agencies could also face higher program costs in the future if they need to compensate for these inefficiencies through retrofit programs or increased energy demand. Meanwhile, builders who follow the prescriptive pathway may be at a competitive disadvantage compared to those using pathways with weaker envelope requirements, creating an uneven playing field.

In short, not adopting this change risks locking in avoidable energy waste, higher long-term costs for individuals and institutions, and a missed opportunity to ensure consistency and fairness across code compliance pathways.

4. Are you aware of any federal or state regulation or requirement related to this proposed code change? If so, please list the federal or state regulation or requirement and your assessment of any differences between the proposed code change and the federal regulation or requirement.
No

Code Change Proposal RE-44

***Note: The information you provide in this code change proposal form is considered Public Data and used by the TAG to consider your proposed modification to the code. Any code change proposal form submitted to DLI may be reviewed at public TAG meetings and used by department staff and the Office of Administrative Hearings to justify the need and reasonableness of any proposed rule draft subject to administrative review and is available to the public.

****Note: Incomplete forms will be returned to the submitter with instruction to complete the form. Only completed forms will be accepted and considered by the TAG. The submitter may be asked to provide additional information in support of the proposed code change.



CODE CHANGE PROPOSAL FORM

(Must be submitted electronically)

Author/requestor: [John G. Smith, P.E.](#)
Email address:

Date: [May 30, 2025](#) Rev [June 12, 2025](#)

Telephone number:

Model Code: [Residential Energy Code](#)
Code or Rule Section: [IRC N1102](#)

Firm/Association affiliation, if any: [ACEC](#)

Code or rule section to be changed:

[N1102.1.4 \(R402.1.4\)](#) and [N1102.1.5 \(R402.1.5\)](#) R value computation, Component Performance Alternative

Intended for Technical Advisory Group ("TAG"): [Residential Energy](#)

General Information

Yes **No**

- | | | |
|--|-------------------------------------|-------------------------------------|
| A. Is the proposed change unique to the State of Minnesota? | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| B. Is the proposed change required due to climatic conditions of Minnesota? | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| C. Will the proposed change encourage more uniform enforcement? | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| D. Will the proposed change remedy a problem? | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| E. Does the proposal delete a current Minnesota Rule, chapter amendment? | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| F. Would this proposed change be appropriate through the ICC code development process? | <input checked="" type="checkbox"/> | <input type="checkbox"/> |

Proposed Language

1. The proposed code change is meant to:

change language contained in the model code book? If so, list section(s).
[N1102.1.5 \(R402.1.5\)](#) Component performance alternative

change language contained in an existing amendment in Minnesota Rule? If so, list Rule part(s).

delete language contained in the model code book? If so, list section(s).

delete language contained in an existing amendment in Minnesota Rule? If so, list Rule part(s).

add new language that is not found in the model code book or in Minnesota Rule.

2. Is this proposed code change required by Minnesota Statute? If so, please provide the citation.

No

3. Provide *specific* language you would like to see changed. Indicate proposed new words with underlining and ~~strikethrough~~ words proposed for deletion. Include the entire code (sub) section or rule subpart that contains your proposed changes.

N1102.1.4 (R402.1.4) R-value computation: *Cavity insulation* alone shall be used to determine compliance with the *cavity insulation R-value* requirements in Table N1102.1.3 (R402.1.3). Where *cavity insulation* is installed in multiple layers, the *R-values of the cavity insulation* layers shall be summed to determine compliance with the *cavity insulation R-value* requirements. The manufacturer's settled *R-value* shall be used for blown-in insulation. *Continuous insulation* (ci) alone shall be used to determine compliance with the *continuous insulation R-value* requirements in Table N1102.1.3 (R402.1.3). Where *continuous insulation* is installed in multiple layers, the *R-values of the continuous insulation* layers shall be summed to determine compliance with the *continuous insulation R-value* requirements. *Cavity insulation R-values* shall not be used to determine compliance with the *continuous insulation R-value* requirements in Table N1102.1.3 (R402.1.3). Computed *R-values* shall not include an *R-value* for other building materials or air films. Where *insulated siding* is used for the purpose of complying with the *continuous insulation* requirements of Table N1102.1.3 (R402.1.3), the manufacturer's *labeled R-value* for *insulated siding* shall be reduced by R-0.6. The total area of wall fenestration shall not exceed 25% of the above grade wall area and shall comply with Table N1102.1.3 (R402.1.3).

~~**N1102.1.5 (R402.1.5) Component performance alternative.** Where the proposed total building thermal envelope thermal conductance (TC_p) is less than or equal to the required total building thermal conductance (TC_r) using factors in Table N1102.1.2, the building shall be considered to be in compliance with Table N1102.1.2. The total thermal conductance (TC) shall be determined in accordance with Equation 11-5. Proposed U-factors and slab-on-grade F-factors shall be taken from ANSI/ASHRAE/IES 90.1 Appendix A or determined using a method consistent with the ASHRAE Handbook of Fundamentals and shall include the thermal bridging effects of framing materials. In addition to TC compliance, the SHGC requirements of Table N1102.1.2 and the maximum fenestration U-factors of Section N1102.6 shall be met.~~

~~**Equation 11-5** $TC_p \leq TC_r$~~

~~Where:~~

~~$TC_p = U_p A + F_p P$~~

~~$TC_r = U_r A + F_r P$~~

~~$U_p A$ = the sum of proposed U-factors times the assembly areas in the proposed building.~~

~~$F_p P$ = the sum of the proposed F-factors times the slab-on-grade perimeter lengths in the proposed building.~~

~~U_rA = the sum of U factors in Table N1102.1.2 times the same assembly areas as in the proposed building.~~

~~F_rP = the sum of F factors in Table N1102.1.2 times the same slab on grade perimeter lengths as in the proposed building.~~

~~**Exception:** For Climate Zones 0, 1 and 2, the value of F_rP shall be equal to the value of F_pP.~~

N1102.1.5 (R402.1.5) Total UA alternative: Where alternative construction assemblies are proposed, the combined total overall thermal transmittance (U_o) factors for walls, roof/ceilings, and floors over unheated spaces plus the overall F factor shall be less than or equal to the calculated combined total thermal transmittance and F factor using the maximum values in Table N1102.1.2 (R402.1.2.1). The calculations shall be performed using a method consistent with the ASHRAE Handbook of Fundamentals and shall include the thermal bridging effects of framing materials where appropriate. In addition to UA compliance, the maximum fenestration U-factors of Section N1102.6 shall be met. The overall performance shall meet or exceed the requirements of Section N1102.1.5.1 Performance criteria.

That is:

$$\underline{\text{Zone 6: } U_{o\text{walls}}A_{\text{walls}} + U_{o\text{roof/ceiling}}A_{\text{roof/ceiling}} + U_{o\text{floor}}A_{\text{floor}} + F_pP \leq 0.110A_{\text{walls}} + 0.024A_{\text{roof/ceiling}} + 0.033A_{\text{floor}} + F_rP}$$

$$\underline{\text{Zone 7: } U_{o\text{walls}}A_{\text{walls}} + U_{o\text{roof/ceiling}}A_{\text{roof/ceiling}} + U_{o\text{floor}}A_{\text{floor}} + F_pP \leq 0.110A_{\text{walls}} + 0.024A_{\text{roof/ceiling}} + 0.028A_{\text{floor}} + F_rP}$$

(Editor's Comment on above equations: mathematical comparison symbol to represent "less than and or equal to" – Underline for "<" symbol doesn't show up)

N1102.1.5.1 Assembly calculations: Heat flow through a wall or ceiling assembly may be two dimensional rather than one dimensional due to differing component thermal resistances. The following three methods are acceptable to calculate the overall wall or ceiling assembly U value:

1. Series-parallel heat flow method.

$$\underline{R_o = R_{\text{indoor airfilm}} + R_{\text{int finishes}} + (R_{\text{frame}} \times R_{\text{cav}}) / [(F_{\text{cav}} \times R_{\text{frame}}) + (F_{\text{frame}} \times R_{\text{cav}})] + R_{\text{ext finishes}} + R_{\text{outdoor airfilm}}}$$

$$\underline{U_{\text{assembly}} = 1/R_o}$$

Where:

R_o = overall R value of wall assembly

U_{assembly} = overall U value of the wall assembly

R_{indoor airfilm} = resistance of indoor airfilm

R_{int finishes} = resistance of interior wall components

R_{frame} = resistance of framing components

R_{cav} = resistance of cavity components

F_{frame} = fraction of wall section that is framing. Typically 0.25.

F_{cav} = fraction of wall section that is cavity. Typically 0.75.

$R_{ext\ finishes}$ = resistance of exterior wall components

$R_{outdoor\ airfilm}$ = resistance of outdoor airfilm, typically taken at 25 mph wind = 0.17

- 2. Parallel-Path Method.** The overall U factor is the sum of the U factors of the fractional areas of the cavity and framing.

$$U_{assembly} = (F_{frame} \times U_{frame}) + (F_{cav} \times U_{cav})$$

Where:

F_{frame} = fraction of wall section area that is framing. Typically 0.25

U_{frame} = U factor of framing section of wall assembly airfilm to airfilm

F_{cav} = fraction of wall section area that is cavity. Typically 0.75

U_{cav} = U factor of cavity section of wall assembly airfilm to airfilm

- 3. Isothermal-Planes Method.** The overall U factor is the result of first calculating the U_{avg} of the framing and cavity sections to determine the R_{avg} . The R_{avg} is then added to the common indoor airfilm, interior wall/ceiling components, exterior wall/ceiling components and outdoor airfilm to determine the total $R_{assembly}$, which is used to determine the $U_{assembly}$.

$$U_{avg} = (F_{frame} \times U_{frame}) + (F_{cav} \times U_{cav})$$

$$R_{avg} = 1/U_{avg}$$

Using this calculated value for R_{avg} ,

$$R_{assembly} = R_{indoor\ airfilm} + R_{interior\ finishes} + R_{avg} + R_{outdoor\ finishes} + R_{outdoor\ airfilm}$$

$$U_{assembly} = 1/R_{assembly} = 1/(R_{indoor\ components} + R_{avs} + R_{outdoor\ components})$$

Where:

R_{avg} = average R-value of the combined framing and cavity excluding airfilms, interior wall/ceiling components and exterior components

$U_{avg} = 1/R_{avg}$ = average U-value of the combined framing and cavity excluding airfilms, interior wall/ceiling components and exterior components

N1102.1.5.2 Performance criteria. The combined overall thermal transmittance (U_o) factors for walls, roof/ceilings, and floors over unheated spaces used for the Total UA alternative method must be less than or equal to the values below. The total area of wall fenestration used in the calculations shall be as designed or 15% of the above grade wall area, whichever is greater.

1.1 0.100 Btu/h-ft²-°F for walls;

1.2 0.026 Btu/h-ft²-°F for roof/ceilings; and

1.3 0.033 Btu/h-ft²-°F (Zone 6) or 0.028 Btu/h ft² °F (Zone 7) for floors.

4. Will this proposed code change impact other sections of a model code book or an amendment in Minnesota Rule? If so, please list the affected sections or rule parts.

No

Need and Reason

1. Why is the proposed code change needed? Please provide a general explanation as well as a specific explanation for any changes to numerical values (heights, area, etc.)

The thermal performance of the building envelope for both heating and cooling is one of the paramount factors for energy efficiency. As such, it is important to establish the minimum allowable envelope thermal performance to reduce overall energy consumption. The building envelope should stand alone in its performance requirements, with no relaxation of requirements being allowed based on type of energy used or efficiency of mechanical and electrical systems or appliances.

Tables N1102.1.2 (R402.1.2) and N1102.1.3 (R402.1.3) identify envelope construction criteria for a code compliant building envelope. However, there is a serious oversight in not including thermal performance backstops which the building cannot exceed. This can allow excessive fenestration areas. To correct this oversight, the recommendation is to add backstops similar to as they existed in the 1994 MN Energy Code. If anything, these backstops may not be restrictive enough, as they are similar to what was used 30+ years ago. The recommended backstops are:

0.100 Btu/h-ft²-°F for walls;
0.026 Btu/h-ft²-°F for roof/ceilings; and
0.033 Btu/h-ft²-°F (Zone 6) or 0.028 Btu/h ft² °F (Zone 7) for floors.

(in 1994, the wall value was 0.110, roof/ceiling value was 0.026 and the floors value was 0.04).

As noted, recommended hard backstop for walls is 0.100 Btu/h-ft²-°F. Based on this number, and using the insulation minimum R-values from Table N1102.1.3 (R402.1.3), the overall U factor for the walls was calculated based on different percentages of fenestration and are summarized below. Keep in mind that heat losses are $Q = U \times A_{\text{wall}} \times (T_{\text{indoor}} - T_{\text{outdoor}})$. Summer cooling loads include conductive heat gains plus the additional solar gains through the fenestration, which can be significant. Setting the described backstop would allow about 25% fenestration with the $U_{\text{glass}} = 0.27$. Typical houses have less than 20% fenestration area. Greater areas of fenestration will result in greater heat losses (or gains in the summer), with the winter increases reflected in the $U_o/0.100$ wall limit column below. The recommended backstop will allow about 25% fenestration, which should be more than generous. Greater than that will increase summer and winter loads.

| | | | | |
|---|------------------|-----------------|-------------------------|---|
| Set max wall to 0.10 | | | | |
| Prescriptive wall values: | | | | |
| U_g | 0.27 | | | |
| U_w | 0.049 | R20 + R5 CI | | |
| Framing to Cavity Ratio: 25%/75% | | | | |
| For changing glass areas, what is resulting overall | | | | |
| U_o which would satisfy UA alternative calculations? | | | | |
| | | | | |
| % Glass | % Framing | % Cavity | U_o | $U_o/0.10$ wall limit |
| 15.00% | 22.95% | 68.84% | 0.082 | 0.82 |
| 20.00% | 22.67% | 68.01% | 0.093 | 0.93 |
| 25.00% | 22.39% | 67.18% | 0.104 | 1.04 |
| 30.00% | 22.12% | 66.35% | 0.115 | 1.15 |
| 35.00% | 21.84% | 65.52% | 0.126 | 1.26 |
| 40.00% | 21.57% | 64.70% | 0.137 | 1.37 |
| 45.00% | 21.29% | 63.87% | 0.148 | 1.48 |
| 50.00% | 21.01% | 63.04% | 0.160 | 1.60 |
| | | | | |
| Setting wall U at 0.10 would allow about 25% glass area if $U_g = 0.27$ | | | | |
| Typical house is below 20% glass area | | | | |
| Using higher performance glass would allow more than 25% glass | | | | |

When using the R-value computation method described in N1102.1.4 (R402.1.4), all building components must meet or exceed Table N1102.1.3 (R402.1.2) values or assemblies. This method does not identify a restriction on the area of fenestration, which can result in increased energy consumption as described above. To minimize the energy consumption, the wall fenestration area needs to be limited to no greater than 25% using this method of compliance with the recommended wall backstop. If any building components exceed the values in Table N1102.1.2 (R402.1.2), this method cannot be used and the “Assemblies calculations” method must be used.

The “Assemblies calculations” method provides flexibility in using building components that individually may not meet the prescriptive requirements but taken collectively will provide equivalent building performance. Calculations are performed using proposed overall U factors and comparing the results to the overall U factors calculated using components complying with the performance based criteria. These calculations are easy to perform and can be set up in a spreadsheet that can be used on any project. The purpose of using the total fenestration area or 15% whichever is greater for calculations is to assure that high performing windows are used which reduce energy consumption and also provide better occupant comfort.

Any time you have adjacent building components with different R values you will have thermal bridging. Thermal bridging is often discussed when discussing cavity wall or cavity roof/ceiling construction. However, for standard wood frame construction it is not a significant issue. Main sources of thermal bridging are shelf angles, canopy attachments, z-girts, slab edges, balconies, parapets and metal stud construction. Where these conditions occur, adjustments to the overall R value may be necessary. Otherwise, the equations identified under “Assembly Calculations” are acceptable and do allow for some two dimensional heat flow. The differences in results from the three methods are summarized below.

| Summary comparing Series-Parallel Method, Parallel-Path Method, and Isothermal-Planes Method | | | | | |
|--|------------------------------|-------------------|------------------------|---------------------|--------------------|
| 2020 MN Code: | | | | | |
| R20 or R13 + R5 CI Zone 6 | | | | | |
| | | R20 Cavity | R13 Cav+ R5 CI | OPTION: | R21 Cavity |
| Series-Parallel: | U_{assembly}: | 0.062 | 0.063 | | 0.060 |
| Parallel-Path | U_o value: | 0.059 | 0.059 | | 0.058 |
| Isothermal-Planes | U_{assembly}: | 0.062 | 0.063 | | 0.061 |
| | Difference, %: | 4.0% | 6.6% | | 5.3% |
| | low to high | | | | |
| Proposed 2024 code: | | | | | |
| | | R30 Cavity | R20 Cav + R5 CI | R13 + R10 CI | R0 + R20 CI |
| Series-Parallel: | U_{assembly}: | 0.045 | 0.049 | 0.048 | 0.043 |
| Parallel-Path: | U_o value: | 0.045 | 0.046 | 0.045 | 0.042 |
| Isothermal-Planes: | U_{assembly}: | 0.047 | 0.049 | 0.048 | 0.043 |
| | Difference, %: | 2.8% | 6.0% | 6.3% | 2.0% |
| | low to high | | | | |

- Why is the proposed code change a reasonable solution?

This proposed change provides clarity to the calculation methods and eliminates the possibility of allowing buildings with much greater heat losses and gains than are intended by the code. This added wording is very similar to what was in the 1994 Minnesota Residential Energy Code. The deletion of the SHGC requirements was because they do not apply to Zones 6 and 7.

- What other factors should the TAG consider?

The goal is to reduce the energy consumption of houses while providing alternative compliance calculation methods. Not providing a backstop on overall U values could result in houses that meet the code from a component standpoint but greatly exceed the intended energy efficiency.

Cost/Benefit Analysis

- Will the proposed code change increase or decrease costs? Please explain and provide estimates if possible.

No change or reduction due to reduced glass area which is more expensive than framed wall area. It provides clarification to how calculations are to be performed which are not difficult to anyone understanding U value calculations. Calculations are not required for the prescriptive path but fenestration limits are clearly defined.

- If there is an increased cost, will this cost be offset by a safety or other benefit? Please explain. If the benefit is quantifiable (for example energy savings), provide an estimate if possible.
- If there is a cost increase, who will bear the costs? This can include government units, businesses, and individuals.
- Are there any enforcement or compliance cost increases or decreases with the proposed code change? Please explain.

No

5. Will the cost of complying with the proposed code change in the first year after the rule takes effect exceed \$25,000 for any one small business or small city ([Minn. Stat. § 14.127](#))? A small business is any business that has less than 50 full-time employees. A small city is any statutory or home rule charter city that has less than ten full-time employees. Please explain.

No

Regulatory Analysis

1. What parties or segments of industry are affected by this proposed code change?

General contractors, architects, engineers, owners.

2. Can you think of other means or methods to achieve the purpose of the proposed code change? What might someone opposed to this code change suggest instead? Please explain what the alternatives are and why your proposed change is the preferred method or means to achieve the desired result.

No

Proposed changes identify the correct methods to assure consistency in how the building envelope compliance is assured.

3. What are the probable costs or consequences of not adopting the code change, including those costs or consequences borne by identifiable categories of affected parties, such as separate classes of government units, businesses, or individuals?

Increased energy consumption of residential buildings.

4. Are you aware of any federal or state regulation or requirement related to this proposed code change? If so, please list the federal or state regulation or requirement and your assessment of any differences between the proposed code change and the federal regulation or requirement.

The goal of the energy code is to save energy, which is being promoted by the DOE and state of Minnesota.

***Note: Incomplete forms may be returned to the submitter with instruction to complete the form. Only completed forms can be considered by the TAG.



CODE CHANGE PROPOSAL FORM

(Must be submitted electronically)

Author/requestor: John G. Smith, P.E.

Date: June 25, 2025

Email address: jsmith@michaudcooley.com

Model Code: IRC N1101.9.1 (R302.1)

Code or Rule Section: 6.4.2 Calculations

Firm/Association affiliation, if any: ACEC

Code or rule section to be changed: MR 1322

Intended for Technical Advisory Group ("TAG"): Residential Energy Code

General Information

Yes **No**

- | | | |
|--|-------------------------------------|-------------------------------------|
| A. Is the proposed change unique to the State of Minnesota? | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| B. Is the proposed change required due to climatic conditions of Minnesota? | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| C. Will the proposed change encourage more uniform enforcement? | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| D. Will the proposed change remedy a problem? | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| E. Does the proposal delete a current Minnesota Rule, chapter amendment? | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| F. Would this proposed change be appropriate through the ICC code development process? | <input type="checkbox"/> | <input checked="" type="checkbox"/> |

Proposed Language

1. The proposed code change is meant to:

change language contained the model code book? If so, list section(s).

change language contained in an existing amendment in Minnesota Rule? If so, list Rule part(s).

delete language contained in the model code book? If so, list section(s).

delete language contained in an existing amendment in Minnesota Rule? If so, list Rule part(s).

add new language that is not found in the model code book or in Minnesota Rule.

2. Is this proposed code change required by Minnesota Statute? If so, please provide the citation.
No.

- Provide *specific* language you would like to see changed. Indicate proposed new words with underlining and words proposed to be deleted. Include the entire code (sub) section or rule subpart that contains your proposed changes.

Add the following new subsection:

N1101.9.1 (R302.1.1) Climatic Data Design Conditions

Climatic data design conditions to be used for the calculation of heating and cooling loads shall be determined by either of the following methods:

Method 1: Use weather conditions identified in Table N1101.9 (R302.1). Where the building city location is not listed, use the nearest listed city.

Method 2: Use 2021 ASHRAE weather data for the nearest city. This data is available at www.ASHRAE-meteo.info. Design temperatures shall be rounded to the nearest whole number. Winter design conditions shall be the mean extreme annual temperature. Summer conditions shall be the 1% annual cooling design conditions.

| CLIMATIC DATA DESIGN CONDITIONS | | |
|---------------------------------|----------------------------------|--------------------------------|
| City | Winter | Summer |
| | Design db °F ASHRAE Aver Mean | db °F/coinc wb °F ASHRAE 1% |
| Aitkin | -28 | 82/72 |
| Albert Lea | -19 | 86/72 |
| Alexandria AP | -23 | 85/70 |
| Bemidji AP | -31 | 82/67 |
| Brainerd Lakes | -28 | 85/69 |
| Cloquet | -24 | 82/68 |
| Crookston | -28 | 84/70 |
| Duluth AP | -23 | 81/68 |
| Ely | -34 | 82/67 |
| Eveleth-Virginia | -30 | 82/67 |
| Faribault | -20 | 88/73 |
| Fergus Falls | -26 | 85/70 |
| Grand Marais AP | -24 | 77/63 |
| Grand Rapids | -26 | 82/68 |
| Hibbing/Chisholm | -32 | 82/68 |
| International Falls AP | -35 | 82/68 |
| Litchfield | -20 | 86/72 |
| Little Falls | -26 | 86/70 |
| Mankato | -17 | 86/72 |
| Mpls/St. Paul AP | -17 | 88/72 |
| Montivedeo | -19 | 88/73 |
| Mora | -24 | 84/70 |
| Morris | -22 | 86/72 |
| New Ulm | -19 | 88/73 |
| Owatonna | -19 | 86/73 |
| Pequot Lakes | -31 | 85/68 |
| Pipestone | -20 | 86/73 |
| Redwood Falls | -19 | 88/73 |
| Rochester AP | -19 | 85/72 |
| Roseau | -30 | 84/72 |
| St. Cloud AP | -24 | 86/71 |
| Silver Bay | -28 | 82/66 |
| Thief River Falls | -27 | 82/69 |
| Tofte | -14 | 75/61 |
| Virginia | -31 | 82/67 |
| Warroad | -31 | 82/70 |
| Wheaton | -22 | 86/71 |
| Willmar | -21 | 86/72 |
| Winona | -17 | 88/73 |
| Worthington | -17 | 86/71 |

Need and Reason

- Why is the proposed code change needed?

The above table is very similar to what is currently in the 2020 Energy Code and was in the version previous to the current code. The source of the existing table is unknown, but assumed to be data

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from ASHRAE. ASHRAE Standard 90.1 includes no information of what design conditions to use, and the reference to Standard 183 similarly does not. It is important to have the outdoor design conditions for uniformity in design and to help assure that HVAC systems will perform as expected. The revised table updates to the revised 2021 ASHRAE-meteo data. This clearly identifies which weather data conditions to use for the heating and cooling conditions as the data includes many different statistical data points.

For comparison purposes, below is the weather data in the 2020 Energy Code:

**TABLE C403.1.1
CLIMATIC DATA DESIGN CONDITIONS**

| CITY | SUMMER Db/Wb °F | WINTER Db °F |
|----------------------|-----------------|--------------|
| Aitkin | 82/72 | -24 |
| Albert Lea | 85/72 | -15 |
| Alexandria | 86/70 | -21 |
| Bemidji | 84/68 | -24 |
| Cloquet | 82/68 | -20 |
| Crookston | 84/70 | -27 |
| Duluth | 81/67 | -20 |
| Ely | 82/68 | -29 |
| Eveleth | 82/68 | -26 |
| Faribault | 86/73 | -16 |
| Fergus Falls | 86/71 | -21 |
| Grand Rapids | 81/67 | -23 |
| Hibbing | 82/68 | -19 |
| International Falls | 83/67 | -28 |
| Litchfield | 85/71 | -18 |
| Little Falls | 86/71 | -20 |
| Mankato | 86/72 | -15 |
| Minneapolis/St. Paul | 88/72 | -15 |
| Montevideo | 86/72 | -17 |
| Mora | 84/70 | -21 |
| Morris | 84/72 | -21 |
| New Ulm | 87/73 | -15 |
| Owatonna | 86/73 | -16 |
| Pequot Lakes | 84/68 | -23 |
| Pipestone | 85/73 | -15 |
| Redwood Falls | 89/73 | -17 |
| Rochester | 85/72 | -17 |
| Roseau | 82/70 | -29 |
| St. Cloud | 86/71 | -20 |
| Thief River Falls | 82/68 | -25 |
| Tofte | 75/61 | -14 |
| Warroad | 83/67 | -29 |
| Wheaton | 84/71 | -20 |
| Willmar | 85/71 | -20 |
| Winona | 88/74 | -13 |
| Worthington | 84/71 | -14 |

For SI: °C = [(°F) - 32]/1.8
 Db = dry bulb temperature, degrees Fahrenheit.
 Wb = wet bulb temperature, degrees Fahrenheit.

2. Why is the proposed code change a reasonable solution?

Maintains design conditions which are similar to what have used for many years in Minnesota. Provides a standard method of determining the design conditions.

The 1% summer conditions track really close to our current Code, and that is why I propose using those values for the summer conditions.

The winter design condition gets a bit trickier. If you look at the various cities you do not necessarily see good correlation with our existing design conditions and either the 99.6 or mean average extreme value. When we have problems with mechanical systems (including damaging mechanical systems) it is typically during very cold conditions. That is why I would recommend the extreme mean value. From the overall selection of heating capacities, it will not make much difference. Where it does make a difference is in systems with higher percentages of outside air. We have a project we are commissioning with about 30% outside air where the engineer used -10.6 for winter design. During the recent very cold weather, the units were making frost in

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the mixed air chamber. If they had a higher percentage of OA, they would have made snow and clogged up the filters.

It is hard to convey the impact of very cold weather on mechanical systems, and these conditions can occur more often than a statistical analysis would indicate. When they do occur, it can cause some serious damage to mechanical and building systems. That is what I am trying to protect against. For sure, -10.6F (the 99.6% value) for a Mpls design is too warm. The average mean temperature is a better number in my opinion.

I would also note that years ago winter design conditions were based on weather data from December, January and February. The new ASHRAE winter tabulated data is based on the full year – 8,760 hours. This can skew the winter design conditions.

3. What other considerations should the TAG consider? None

Cost/Benefit Analysis

1. Will the proposed code change increase or decrease costs? Please explain.

No cost change. The modification carries forward an existing requirement.

2. If there is an increased cost, will this cost be offset by a safety or other benefit? Please explain.
N/A

3. Are there any enforcement or compliance cost increases or decreases with the proposed code change? Please explain. No.

4. Will the cost of complying with the proposed code change in the first year after the rule takes effect exceed \$25,000 for any one small business or small city? A small business is any business that has less than 50 full-time employees. A small city is any statutory or home rule charter city that has less than ten full-time employees. Please explain.

No.

Regulatory Analysis

1. What parties or segments of industry are affected by this proposed code change?
Architects, Engineers, Construction Contractors, Building Officials, Owners and Inspectors.
2. What are the probable costs to the agency and to any other State agencies of implementing and enforcing of the proposed rule? Is there an anticipated effect on state revenues?

There should be no additional costs to state agencies.

3. Are there less costly intrusive methods for achieving the purpose of the proposed rule?
No.
4. Can you think of other means or methods to achieve the purpose of the proposed code change? If so, please explain what they are and why your proposed change is the preferred method or means to achieve the desired result.
No.

Code Change Proposal RE-46

5. What are the probable costs of complying with the proposed rule, including the portion of the total costs that will be borne by identifiable categories of affected parties, such as separate classes of governmental units, businesses, or individuals?

None

6. What are the probable costs or consequences of not adopting the proposed rule, including those costs or consequences borne by identifiable categories of affected parties, such as separate classes of governmental units, businesses, or individuals?

There would be no uniformity of how heating and cooling loads are calculated.

7. Are you aware of any federal regulation or federal requirement related to this proposed code change? If so, please list the federal regulation or requirement and your assessment of any differences between the proposed rule and the federal regulation or requirement.

No.

8. Please include an assessment of the cumulative effect of the rule with other federal and state regulations related to the specific purpose of the rule.

N/A



CODE CHANGE PROPOSAL FORM

(Must be submitted electronically)

Author/requestor: Steve Shold

Date: 7/16/25

Email address: steve.shold@state.mn.us

Model Code: 2024 IRC

Telephone number: 651-284-5312

Code or Rule Section: N11 Energy

Firm/Association affiliation, if any: Dept of Labor

Topic of proposal: Below-grade wall alterations

Code or rule section to be changed: N1111.1.1.5

Intended for Technical Advisory Group ("TAG"): Residential Energy

General Information

Yes No

- A. Is the proposed change unique to the State of Minnesota? Yes No
- B. Is the proposed change required due to climatic conditions of Minnesota? Yes No
- C. Will the proposed change encourage more uniform enforcement? Yes No
- D. Will the proposed change remedy a problem? Yes No
- E. Does the proposal delete a current Minnesota Rule, chapter amendment? Yes No
- F. Would this proposed change be appropriate through the ICC code development process? Yes No

Proposed Language

1. The proposed code change is meant to:

change language contained in the model code book? If so, list section(s).

N1111.1.1.5

change language contained in an existing amendment in Minnesota Rule? If so, list Rule part(s).

delete language contained in the model code book? If so, list section(s).

delete language contained in an existing amendment in Minnesota Rule? If so, list Rule part(s).

add new language that is not found in the model code book or in Minnesota Rule.

2. Is this proposed code change required by Minnesota Statute? If so, please provide the citation.

3. Provide *specific* language you would like to see changed. Indicate proposed new words with underlining and ~~striketrough~~ words proposed for deletion. Include the entire code (sub) section or rule subpart that contains your proposed changes.
[See below.](#)
4. Will this proposed code change impact other sections of a model code book or an amendment in Minnesota Rule? If so, please list the affected sections or rule parts.
[No.](#)

Need and Reason

1. Why is the proposed code change needed? Please provide a general explanation as well as a specific explanation for any changes to numerical values (heights, area, etc.)
[Basement wall systems are a delicate ecosystem, and requiring insulation may potentially retard the ability for the walls to dry if there are moisture issues present. Adding insulation to below-grade walls needs to be addressed subjectively on a case-by-case basis between an owner and qualified contractor.](#)
2. Why is the proposed code change a reasonable solution?
[This omission of this requirement allows practical solutions to be addressed based on what is appropriate for the existing home.](#)
3. What other factors should the TAG consider?
[None.](#)

Cost/Benefit Analysis

1. Will the proposed code change increase or decrease costs? Please explain and provide estimates if possible.
[This proposal will potentially decrease first costs of a home alteration.](#)
2. If there is an increased cost, will this cost be offset by a safety or other benefit? Please explain. If the benefit is quantifiable (for example energy savings), provide an estimate if possible.
[NA](#)
3. If there is a cost increase, who will bear the costs? This can include government units, businesses, and individuals.
[NA](#)
4. Are there any enforcement or compliance cost increases or decreases with the proposed code change? Please explain.
[NA](#)
5. Will the cost of complying with the proposed code change in the first year after the rule takes effect exceed \$25,000 for any one small business or small city ([Minn. Stat. § 14.127](#))? A small business is any

business that has less than 50 full-time employees. A small city is any statutory or home rule charter city that has less than ten full-time employees. Please explain.

NA

Regulatory Analysis

1. What parties or segments of industry are affected by this proposed code change?
Designers, contractors, homeowners.
2. Can you think of other means or methods to achieve the purpose of the proposed code change? What might someone opposed to this code change suggest instead? Please explain what the alternatives are and why your proposed change is the preferred method or means to achieve the desired result.
The rebuttal to this proposal would be to make up the losses in energy savings elsewhere in the project. Determining what and how much would be difficult to assess.
3. What are the probable costs or consequences of not adopting the code change, including those costs or consequences borne by identifiable categories of affected parties, such as separate classes of government units, businesses, or individuals?
Potential issues not accepting the proposal include inviting moisture and mold issues into otherwise functional spaces.
4. Are you aware of any federal or state regulation or requirement related to this proposed code change? If so, please list the federal or state regulation or requirement and your assessment of any differences between the proposed code change and the federal regulation or requirement.
No.

Delete last sentence:

N1111.1.1.5 (R503.1.1.5) Below-grade wall alterations. Where an unconditioned below-grade space is changed to *conditioned space*, the *building thermal envelope* walls enclosing such space shall be insulated in accordance with Section N1102.1. ~~Where the below-grade space is *conditioned space* and where *building thermal envelope* walls enclosing such space are altered, they shall be insulated in accordance with Section N1102.1.~~

***Note: The information you provide in this code change proposal form is considered Public Data and used by the TAG to consider your proposed modification to the code. Any code change proposal form submitted to DLI may be reviewed at public TAG meetings and used by department staff and the Office of Administrative Hearings to justify the need and reasonableness of any proposed rule draft subject to administrative review and is available to the public.

****Note: Incomplete forms will be returned to the submitter with instruction to complete the form. Only completed forms will be accepted and considered by the TAG. The submitter may be asked to provide additional information in support of the proposed code change.



CODE CHANGE PROPOSAL FORM

(Must be submitted electronically)

Author/requestor: Steve Shold

Date: 7/16/25

Email address: steve.shold@state.mn.us

Model Code: 2024 IRC

Telephone number: 651-284-5312

Code or Rule Section: N11 Energy

Firm/Association affiliation, if any: Dept of Labor

Topic of proposal: Above-grade wall alterations

Code or rule section to be changed: N1111.1.1.3

Intended for Technical Advisory Group ("TAG"): Residential Energy

General Information

Yes No

- A. Is the proposed change unique to the State of Minnesota? Yes No
- B. Is the proposed change required due to climatic conditions of Minnesota? Yes No
- C. Will the proposed change encourage more uniform enforcement? Yes No
- D. Will the proposed change remedy a problem? Yes No
- E. Does the proposal delete a current Minnesota Rule, chapter amendment? Yes No
- F. Would this proposed change be appropriate through the ICC code development process? Yes No

Proposed Language

1. The proposed code change is meant to:

change language contained in the model code book? If so, list section(s).

N1111.1.1.3

change language contained in an existing amendment in Minnesota Rule? If so, list Rule part(s).

delete language contained in the model code book? If so, list section(s).

delete language contained in an existing amendment in Minnesota Rule? If so, list Rule part(s).

add new language that is not found in the model code book or in Minnesota Rule.

2. Is this proposed code change required by Minnesota Statute? If so, please provide the citation.

No.

3. Provide *specific* language you would like to see changed. Indicate proposed new words with underlining and ~~striketrough~~ words proposed for deletion. Include the entire code (sub) section or rule subpart that contains your proposed changes.

See below.

4. Will this proposed code change impact other sections of a model code book or an amendment in Minnesota Rule? If so, please list the affected sections or rule parts.

No.

Need and Reason

1. Why is the proposed code change needed? Please provide a general explanation as well as a specific explanation for any changes to numerical values (heights, area, etc.)

With the magnitude of claims to homeowner insurance policies over the past years, many insurance companies are rejecting payouts for “code upgrades”, placing the cost of updated code requirements squarely on the homeowner. The decision to add exterior continuous insulation should be the that of the owner to weigh the cost benefit of the improvement. The two provisions selected for omission go against the general tone of the code that does not require changes to existing construction.

2. Why is the proposed code change a reasonable solution?

This omission of this requirement allows practical solutions to be addressed based on what is appropriate for the existing home and owners budget.

3. What other factors should the TAG consider?

None.

Cost/Benefit Analysis

1. Will the proposed code change increase or decrease costs? Please explain and provide estimates if possible.

This proposal will potentially decrease first costs of a home alteration.

2. If there is an increased cost, will this cost be offset by a safety or other benefit? Please explain. If the benefit is quantifiable (for example energy savings), provide an estimate if possible.

NA

3. If there is a cost increase, who will bear the costs? This can include government units, businesses, and individuals.

NA

4. Are there any enforcement or compliance cost increases or decreases with the proposed code change? Please explain.

NA

5. Will the cost of complying with the proposed code change in the first year after the rule takes effect exceed \$25,000 for any one small business or small city ([Minn. Stat. § 14.127](#))? A small business is any business that has less than 50 full-time employees. A small city is any statutory or home rule charter city that has less than ten full-time employees. Please explain.

NA

Regulatory Analysis

1. What parties or segments of industry are affected by this proposed code change?
Designers, contractors, homeowners, and potentially the insurance industry.
2. Can you think of other means or methods to achieve the purpose of the proposed code change? What might someone opposed to this code change suggest instead? Please explain what the alternatives are and why your proposed change is the preferred method or means to achieve the desired result.
The rebuttal to this proposal would be to make up the losses in energy savings elsewhere in the project. Determining what and how much would be difficult to assess.
3. What are the probable costs or consequences of not adopting the code change, including those costs or consequences borne by identifiable categories of affected parties, such as separate classes of government units, businesses, or individuals?
Potential issues not accepting the proposal include inviting onerous and costly upgrades, as well as inviting potential flashing and bulk water management issues.
4. Are you aware of any federal or state regulation or requirement related to this proposed code change? If so, please list the federal or state regulation or requirement and your assessment of any differences between the proposed code change and the federal regulation or requirement.
No.

Delete items #2 & 3, then merge the section:

N1111.1.1.3 (R503.1.1.3) Above-grade wall alterations. (move paragraph #1 below up here) Above-grade wall alterations shall comply with the following as applicable:

1. Where wall cavities are exposed, the exposed cavities shall be filled with insulation complying with Section N1101.10.4. New cavities created shall be insulated in accordance with Section N1102.1 or an approved design that minimizes deviation from Section N1102.1. An interior vapor retarder shall be provided where required in accordance with Section R702.7.
2. Where exterior wall coverings and fenestration are added or replaced for the full extent of any exterior facade of one or more elevations of the building, continuous insulation shall be provided where required in accordance with Section N1102.1 or the wall insulation shall be in accordance with an approved design that minimizes deviation from Section N1102.1. Where specified, the continuous insulation requirement also shall comply with Section R702.7. Replacement exterior wall coverings shall comply with the water-resistance requirements of Section R703.1.1 and manufacturers' instructions.
3. Where new interior finishes or exterior wallcoverings are applied to the full extent of any exterior wall assembly of mass construction, insulation shall be provided in accordance with Section N1102.1 or an approved design that minimizes deviation from Section N1102.1.

***Note: The information you provide in this code change proposal form is considered Public Data and used by the TAG to consider your proposed modification to the code. Any code change proposal form submitted to DLI may be reviewed at public TAG meetings and used by department staff and the Office of

Code Change Proposal RE-48

Administrative Hearings to justify the need and reasonableness of any proposed rule draft subject to administrative review and is available to the public.

****Note: Incomplete forms will be returned to the submitter with instruction to complete the form. Only completed forms will be accepted and considered by the TAG. The submitter may be asked to provide additional information in support of the proposed code change.



CODE CHANGE PROPOSAL FORM

(Must be submitted electronically)

Author/requestor: [Steve Shold](#)

Date: [7/15/25](#)

Email address: steve.shold@state.mn.us

Model Code: [2024 IRC](#)

Telephone number: [651-284-5312](#)

Code or Rule Section: [N11 Energy](#)

Firm/Association affiliation, if any: [Dept of Labor](#)

Topic of proposal: [Residential Building Definition](#)

Code or rule section to be changed: [N1101.6](#)

Intended for Technical Advisory Group ("TAG"): [Residential Energy](#)

General Information

Yes **No**

- | | | |
|--|-------------------------------------|-------------------------------------|
| A. Is the proposed change unique to the State of Minnesota? | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| B. Is the proposed change required due to climatic conditions of Minnesota? | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| C. Will the proposed change encourage more uniform enforcement? | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| D. Will the proposed change remedy a problem? | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| E. Does the proposal delete a current Minnesota Rule, chapter amendment? | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| F. Would this proposed change be appropriate through the ICC code development process? | <input checked="" type="checkbox"/> | <input type="checkbox"/> |

Proposed Language

1. The proposed code change is meant to:

change language contained the model code book? If so, list section(s).

change language contained in an existing amendment in Minnesota Rule? If so, list Rule part(s).

delete language contained in the model code book? If so, list section(s).

delete language contained in an existing amendment in Minnesota Rule? If so, list Rule part(s).

add new language that is not found in the model code book or in Minnesota Rule.

Code Change Proposal RE-49

2. Is this proposed code change required by Minnesota Statute? If so, please provide the citation.
No
3. Provide *specific* language you would like to see changed. Indicate proposed new words with underlining and ~~striketrough~~ words proposed for deletion. Include the entire code (sub) section or rule subpart that contains your proposed changes.
See below
4. Will this proposed code change impact other sections of a model code book or an amendment in Minnesota Rule? If so, please list the affected sections or rule parts.
Yes, this will impact the scoping of the Commercial Energy Code, which will also need to be adjusted.

Need and Reason

1. Why is the proposed code change needed? Please provide a general explanation as well as a specific explanation for any changes to numerical values (heights, area, etc.)
Currently, certain residential occupancies at or below 3 stories scope to the Residential Energy Code (REC), while over 4 stories scope to the Commercial Energy Code (CEC). In these buildings that are 3 or less stories, some portions and occupancy types scope to the CEC, while the dwelling units scope to the REC. This becomes confusing and cumbersome to design, review, and inspect as the applicable code sections change based on what portion of the building is being evaluated.

This proposal seeks to decouple Residential and Commercial buildings, where buildings deemed Residential based on the scoping in 1309 would use the REC, and those that are scoped to the Commercial Building Code would follow the CEC (with specific limitations/exceptions for I occupancies).

This definition is exactly as written for “Building” in chapter 2 of the IRC, but with the word “Residential” added, and the reference to N11 removed.

2. Why is the proposed code change a reasonable solution?
Because it is unreasonable to apply the provisions of two different sets of standards to the same building. This will create clarity in the code.
3. What other factors should the TAG consider?
Scoping changes that will need to be accepted in the CEC TAG.

Cost/Benefit Analysis

1. Will the proposed code change increase or decrease costs? Please explain and provide estimates if possible.
NA
2. If there is an increased cost, will this cost be offset by a safety or other benefit? Please explain. If the benefit is quantifiable (for example energy savings), provide an estimate if possible.
NA

Code Change Proposal RE-49

3. If there is a cost increase, who will bear the costs? This can include government units, businesses, and individuals.
NA
4. Are there any enforcement or compliance cost increases or decreases with the proposed code change? Please explain.
No.
5. Will the cost of complying with the proposed code change in the first year after the rule takes effect exceed \$25,000 for any one small business or small city ([Minn. Stat. § 14.127](#))? A small business is any business that has less than 50 full-time employees. A small city is any statutory or home rule charter city that has less than ten full-time employees. Please explain.
NA

Regulatory Analysis

1. What parties or segments of industry are affected by this proposed code change?
This will have no impact on Residential designers, builders, contractors, code officials, and consumers.
2. Can you think of other means or methods to achieve the purpose of the proposed code change? What might someone opposed to this code change suggest instead? Please explain what the alternatives are and why your proposed change is the preferred method or means to achieve the desired result.
NA
3. What are the probable costs or consequences of not adopting the code change, including those costs or consequences borne by identifiable categories of affected parties, such as separate classes of government units, businesses, or individuals?
NA
4. Are you aware of any federal or state regulation or requirement related to this proposed code change? If so, please list the federal or state regulation or requirement and your assessment of any differences between the proposed code change and the federal regulation or requirement.
NA

N1101.6

RESIDENTIAL BUILDING. ~~For this chapter, includes detached one- and two-family dwellings and townhouses as well as Group R-2, R-3 and R-4 buildings three stories or less in height above grade plane.~~ Any one- or two-family dwelling or townhouse, or portion thereof, used or intended to be used for human habitation, for living, sleeping, cooking or eating purposes, or any combination thereof, or any accessory structure.



CODE CHANGE PROPOSAL FORM

(Must be submitted electronically)

Author/requestor: [Steve Shold](#)

Date: [7/14/25](#)

Email address: steve.shold@state.mn.us

Model Code: [2024 IRC](#)

Telephone number: [651-284-5312](#)

Code or Rule Section: [N11 Energy](#)

Firm/Association affiliation, if any: [Dept of Labor](#)

Topic of proposal: [Thermal Envelope Backstop](#)

Code or rule section to be changed: [N1101, N1105, N1106](#)

Intended for Technical Advisory Group ("TAG"):

General Information

Yes **No**

- | | | |
|--|-------------------------------------|-------------------------------------|
| A. Is the proposed change unique to the State of Minnesota? | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| B. Is the proposed change required due to climatic conditions of Minnesota? | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| C. Will the proposed change encourage more uniform enforcement? | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| D. Will the proposed change remedy a problem? | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| E. Does the proposal delete a current Minnesota Rule, chapter amendment? | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| F. Would this proposed change be appropriate through the ICC code development process? | <input checked="" type="checkbox"/> | <input type="checkbox"/> |

Proposed Language

1. The proposed code change is meant to:

change language contained the model code book? If so, list section(s).

[N1101.13, N1101.13.4](#)

[N1105.1, N1105.2](#)

[N1106.1, N1106.2](#)

change language contained in an existing amendment in Minnesota Rule? If so, list Rule part(s).

delete language contained in the model code book? If so, list section(s).

delete language contained in an existing amendment in Minnesota Rule? If so, list Rule part(s).

add new language that is not found in the model code book or in Minnesota Rule.

2. Is this proposed code change required by Minnesota Statute? If so, please provide the citation.

3. Provide *specific* language you would like to see changed. Indicate proposed new words with underlining and ~~striketrough~~ words proposed for deletion. Include the entire code (sub) section or rule subpart that contains your proposed changes.
[See below.](#)

4. Will this proposed code change impact other sections of a model code book or an amendment in Minnesota Rule? If so, please list the affected sections or rule parts.
[NA](#)

Need and Reason

1. Why is the proposed code change needed? Please provide a general explanation as well as a specific explanation for any changes to numerical values (heights, area, etc.)
[This change is needed to maintain an equal level of building efficiency for homes built under the prescriptive path and the performance paths. Without an even backstop, homes built to the performance pathway are permitted to have a less efficient thermal envelope due to trade-offs for equipment. This will result in different efficiency levels for homes built within the metro with access to HERS raters, versus those outside the metro following the prescriptive pathway. This proposal will set an achievable minimum envelope that will apply to all homes, also ushering in a durability component by limiting trading of envelope features. This will also ensure a minimum level of efficiency as equipment is changed during the life of the home.](#)

2. Why is the proposed code change a reasonable solution?
[This proposal primarily utilizes values that are currently in effect under the 2015 MN Residential Code, thus the values are achievable.](#)

3. What other factors should the TAG consider?

Cost/Benefit Analysis

1. Will the proposed code change increase or decrease costs? Please explain and provide estimates if possible.
[Construction practices are currently able to achieve these metrics with ease and materials widely available on the market. For homes built under the performance paths, it will provide a small limit to the ability to trade envelope for mechanical equipment. This could have a minor impact on the cost of the envelope. However, it will prevent the envelope from being built to less than 2015 MN code requirements. Additional cost will not be in addition to *current* construction costs for the envelope since it carries forward the current 2015 requirements.](#)

2. If there is an increased cost, will this cost be offset by a safety or other benefit? Please explain. If the benefit is quantifiable (for example energy savings), provide an estimate if possible.

Code Change Proposal RE-50

The benefit will be found in a durable thermal envelope that is not less than the 2015 values. This will limit potential issues from a weakened thermal envelope due to trading. Any increases in overall efficiency will also yield energy and operational savings to the owner.

3. If there is a cost increase, who will bear the costs? This can include government units, businesses, and individuals.
Any increase in cost, will be ultimately passed on to the consumer/owner.
4. Are there any enforcement or compliance cost increases or decreases with the proposed code change? Please explain.
No.
5. Will the cost of complying with the proposed code change in the first year after the rule takes effect exceed \$25,000 for any one small business or small city ([Minn. Stat. § 14.127](#))? A small business is any business that has less than 50 full-time employees. A small city is any statutory or home rule charter city that has less than ten full-time employees. Please explain.
No.

Regulatory Analysis

1. What parties or segments of industry are affected by this proposed code change?
Designers, Builders, Contractors, and Code Officials.
2. Can you think of other means or methods to achieve the purpose of the proposed code change? What might someone opposed to this code change suggest instead? Please explain what the alternatives are and why your proposed change is the preferred method or means to achieve the desired result.
An alternative would be to limit the allowable trading between mechanical equipment and envelope by percentages, or to set the 2024 tables as the backstop across all envelopes.
3. What are the probable costs or consequences of not adopting the code change, including those costs or consequences borne by identifiable categories of affected parties, such as separate classes of government units, businesses, or individuals?
Consequences include a lack of uniformity for homes built in MN. It also risks situations where equipment that was designed to offset envelope is replaced in the future with lessor equipment, nullifying the gains made by trading equipment for envelope.
4. Are you aware of any federal or state regulation or requirement related to this proposed code change? If so, please list the federal or state regulation or requirement and your assessment of any differences between the proposed code change and the federal regulation or requirement.
No.

***Note: The information you provide in this code change proposal form is considered Public Data and used by the TAG to consider your proposed modification to the code. Any code change proposal form submitted to DLI may be reviewed at public TAG meetings and used by department staff and the Office of

Administrative Hearings to justify the need and reasonableness of any proposed rule draft subject to administrative review and is available to the public.

****Note: Incomplete forms will be returned to the submitter with instruction to complete the form. Only completed forms will be accepted and considered by the TAG. The submitter may be asked to provide additional information in support of the proposed code change.

N1101.13 (R401.2) Application. Residential buildings shall comply with Section N1101.13.1, N1101.13.2, or N1101.13.3. All compliance paths shall be in accordance with or N1101.13.4.

Exception: Additions, alterations, repairs and changes of occupancy to existing buildings complying with Section N1109.

N1101.13.1 (R401.2.1) Prescriptive Compliance Option. The Prescriptive Compliance Option requires compliance with Sections N1101 through N1104 and Section N1108.

N1101.13.2 (R401.2.2) Simulated Building Performance Option. The Simulated Building Performance Compliance Option requires compliance with Section N1105.

N1101.13.3 (R401.2.3) Energy Rating Index Option. The Energy Rating Index (ERI) Option requires compliance with Section N1106.

N1101.13.4 (R401.2.4) Tropical Climate Region Option. The Tropical Climate Region Option requires compliance with Section N1107. **Minimum thermal envelope efficiency.** Building thermal envelope components and assemblies shall have minimum efficiencies in accordance with *U*-factors listed in Table 1101.13.4-1 or *R*-values listed in Table 1101.13.4-2. Additionally, buildings shall comply with the following:

1. Maximum air leakage shall not exceed 2.5 ACH. Testing shall be in accordance with section N1102.5.1.2.
2. The sum of glazed fenestration area shall not exceed 25% of the building thermal envelope area.

| TABLE N1101.13.4-1 – MINIMUM THERMAL ENVELOPE EFFICIENCY <i>U</i>-FACTORS^a | | |
|--|----------|----------|
| CLIMATE ZONE | 6 | 7 |
| VERTICAL FENESTRATION <i>U</i> -FACTOR | 0.32 | 0.32 |
| SKYLIGHT <i>U</i> -FACTOR | 0.55 | 0.55 |
| CEILING <i>U</i> -FACTOR | 0.026 | 0.026 |
| INSULATION ENTIRELY ABOVE ROOF DECK | 0.032 | 0.028 |
| WOOD-FRAMED WALL <i>U</i> -FACTOR | 0.048 | 0.048 |
| MASS WALL <i>U</i> -FACTOR ^b | 0.060 | 0.057 |
| FLOOR <i>U</i> -FACTOR | 0.033 | 0.028 |
| BASEMENT WALL <i>U</i> -FACTOR | 0.050 | 0.050 |
| UNHEATED SLAB <i>F</i> -FACTOR ^c | 0.48 | 0.48 |
| HEATED SLAB <i>F</i> -FACTOR ^c | 0.66 | 0.66 |

TABLE N1101.13.4-1 – MINIMUM THERMAL ENVELOPE EFFICIENCY U-FACTORS^a

| | | |
|---------------------------|-------|-------|
| CRAWL SPACE WALL U-FACTOR | 0.055 | 0.055 |
|---------------------------|-------|-------|

- a. Nonfenestration U-factors and F-factors shall be obtained from measurement, calculation, an approved source or Appendix NF where such appendix is adopted or approved.
- b. Mass walls shall be in accordance with Section N1102.2.6. Where more than half the insulation is on the interior, the mass wall U-factors shall not exceed 0.057 in Climate Zones 6 and 7.
- c. F-factors for slabs shall correspond to the R-values of Table N1102.1.3 and the installation conditions of Section N1102.2.10.1.

Table N1101.13.4-1 – THERMAL ENVELOPE MINIMUM EFFICIENCY R-VALUES^a

| CLIMATE ZONE | 6 | 7 |
|--|-------------------------------|-------------------------------|
| CEILING R-VALUE | R-49(38) | R-49(38) |
| INSULATION ENTIRELY ABOVE ROOF DECK | R-30ci | R-35ci |
| WOOD-FRAMED WALL R-VALUE ^d | 20, 13+5ci | 21 |
| MASS WALL R-VALUE ^e | 15/20 | 19/21 |
| FLOOR R-VALUE ^f | 30 | 38 |
| BASEMENT WALL R-VALUE ^b | 15 | 15 |
| UNHEATED SLAB R-VALUE & DEPTH ^c | 10ci, 4ft | 10ci, 4ft |
| HEATED SLAB R-VALUE ^c | R-10ci, 4ft and R-5 full slab | R-10ci, 4ft and R-5 full slab |
| CRAWL SPACE WALL R-VALUE ^b | 15 | 15 |

NR = Not Required, ci = Continuous Insulation.

- a. R-values are minimums. Where insulation is installed in a cavity that is less than the label or design thickness of the insulation, the installed R-value of the insulation shall be not less than the R-value specified in the table.
- b. Insulation for concrete and masonry foundation walls shall be installed according to N1102.2.9 and N1102.2.11 as applicable. A minimum of R-10 shall be installed on the exterior of the wall.
- c. Slab insulation shall be installed in accordance with Section N1102.2.10.1.
- d. The first value is cavity insulation; the second value is continuous insulation. Therefore, as an example, “13&5” means R-13 cavity insulation plus R-5 continuous insulation.
- e. Mass walls shall be in accordance with Section N1102.2.6. The second R-value applies where more than half of the insulation is on the interior of the mass wall.
- f. “30” means R-30 cavity insulation alone.

N1105.1 (R405.1) Scope. This section establishes criteria for compliance using *simulated building performance* analysis. Such analysis shall include heating, cooling, mechanical *ventilation* and service water-heating energy only. Such analysis shall be limited to *dwelling units*. ~~Spaces other than dwelling units in Group R-2, R-3 or R-4 buildings shall comply with Sections N1102 through N1104.~~

N1105.2 (R405.2) Simulated building performance compliance. Compliance based on simulated building performance requires that a building comply with the following:

1. The requirements of the sections indicated within Table N1105.2.
2. The proposed ~~total building thermal envelope thermal conductance (TC)~~ **minimum building thermal envelope efficiency** shall be **in accordance with section N1101.13.4.** ~~less than or equal to the required total building thermal envelope TC using the prescriptive U-factors and F-factors from Table N1102.1.2 multiplied by 1.08 in Climate Zones 0, 1 and 2, and 1.15 in Climate Zones 3 through 8, in accordance with Equation 11-6 and Section N1102.1.5. The area-weighted maximum fenestration SHGC permitted in Climate Zones 0 through 3 shall be 0.30.~~

Equation 11-6

~~For Climate Zones 0-2: $TC_{\text{Proposed design}} \leq 1.08 \times TC_{\text{Prescriptive reference design}}$~~

~~For Climate Zones 3-8: $TC_{\text{Proposed design}} \leq 1.15 \times TC_{\text{Prescriptive reference design}}$~~

3. For each dwelling unit with one or more fuel-burning appliances for space heating, water heating, or both, the annual energy cost of the dwelling unit shall be less than or equal to 80 percent of the annual energy cost of the standard reference design. For all other dwelling units, the annual energy cost of the proposed design shall be less than or equal to 85 percent of the annual energy cost of the standard reference design. For each dwelling unit with greater than 5,000 square feet (465 m²) of living space located above grade plane, the annual energy cost of the dwelling unit shall be reduced by an additional 5 percent of annual energy cost of the standard reference design. Energy prices shall be taken from an approved source, such as the US Energy Information Administration's State Energy Data System prices and expenditures reports. Code officials shall be permitted to require time-of-use pricing in energy cost calculations.

Exceptions:

- ~~1. The energy use based on source energy expressed in Btu or Btu per square foot of conditioned floor area shall be permitted to be substituted for the energy cost. The source energy multiplier for electricity shall be 2.51. The source energy multipliers shall be 1.09 for natural gas, 1.15 for propane, 1.19 for fuel oil and 1.30 for imported liquefied natural gas.~~
- ~~2. The energy use based on site energy expressed in Btu or Btu per square foot of conditioned floor area shall be permitted to be substituted for the energy cost.~~

N1106.1 (R406.1) Scope. This section establishes criteria for compliance using an Energy Rating Index (ERI) analysis. Such analysis shall be limited to dwelling units. ~~Spaces other than dwelling units in Group R-2, R-3, or R-4 buildings shall comply with Sections N1102 through N1104.~~

N1106.2 (R406.2) ERI compliance. Compliance based on the ERI requires that the rated design and as-built dwelling unit meet all of the following:

1. The requirements of the sections indicated within Table N1106.2.
2. Maximum ERI values indicated in Table N1106.5.
3. **The proposed minimum building thermal envelope efficiency shall be in accordance with section N1101.13.4.**



CODE CHANGE PROPOSAL FORM

(Must be submitted electronically)

Author/requestor: [Steve Shold](#)

Date: [7/15/25](#)

Email address: steve.shold@state.mn.us

Model Code: [2024 IRC](#)

Telephone number: [651-284-5312](#)

Code or Rule Section: [N11 Energy](#)

Firm/Association affiliation, if any: [Dept of Labor](#)

Topic of proposal: [Wall Insulation Options](#)

Code or rule section to be changed: [N1102](#)

Intended for Technical Advisory Group ("TAG"): [Residential Energy](#)

General Information

Yes No

- | | | |
|--|-------------------------------------|-------------------------------------|
| A. Is the proposed change unique to the State of Minnesota? | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| B. Is the proposed change required due to climatic conditions of Minnesota? | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| C. Will the proposed change encourage more uniform enforcement? | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| D. Will the proposed change remedy a problem? | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| E. Does the proposal delete a current Minnesota Rule, chapter amendment? | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| F. Would this proposed change be appropriate through the ICC code development process? | <input checked="" type="checkbox"/> | <input type="checkbox"/> |

Proposed Language

1. The proposed code change is meant to:

change language contained the model code book? If so, list section(s).

change language contained in an existing amendment in Minnesota Rule? If so, list Rule part(s).

delete language contained in the model code book? If so, list section(s).

delete language contained in an existing amendment in Minnesota Rule? If so, list Rule part(s).

X add new language that is not found in the model code book or in Minnesota Rule.

[N1102](#).

2. Is this proposed code change required by Minnesota Statute? If so, please provide the citation.

Code Change Proposal RE-51

No

3. Provide *specific* language you would like to see changed. Indicate proposed new words with underlining and ~~striketrough~~ words proposed for deletion. Include the entire code (sub) section or rule subpart that contains your proposed changes.

See new table below.

4. Will this proposed code change impact other sections of a model code book or an amendment in Minnesota Rule? If so, please list the affected sections or rule parts.

No

Need and Reason

1. Why is the proposed code change needed? Please provide a general explanation as well as a specific explanation for any changes to numerical values (heights, area, etc.)

With the latest energy advancements in the '24 code, some of the prescriptive options have gone away. Presently, the model code only allows one wall-cavity-only insulation option – R30, unless employing the performance paths, or trading under prescriptive – all of which require the access and ability to understand software-based modeling and simulations. This proposal adds two additional wall types, and exercises the trading by a simple to use and easily understood table format. This proposal adds back in the 2x6 R21 cavity only option that was available in the 2015 code (CZ-7), and adds in a modification to a 2x4 wall option that uses a higher R-value of 15, with only 1-1/2" CI instead of 2" as listed in the '24 model. To use these wall types, the code user will have 3 potential components they can trade: improved fenestration, attic insulation, or foundation wall insulation. If additional or different items are desired to trade, the user will need to use a total UA trade-ff, or one of the performance paths.

2. Why is the proposed code change a reasonable solution?

It is reasonable as it provides limited trading to allow builder flexibility in a simple to follow format.

3. What other factors should the TAG consider?

NA

Cost/Benefit Analysis

1. Will the proposed code change increase or decrease costs? Please explain and provide estimates if possible.

This is likely to reduce cost but reducing time to learn, use, and understand computer simulation, and by giving construction flexibility.

2. If there is an increased cost, will this cost be offset by a safety or other benefit? Please explain. If the benefit is quantifiable (for example energy savings), provide an estimate if possible.

3. If there is a cost increase, who will bear the costs? This can include government units, businesses, and individuals.

Code Change Proposal RE-51

4. Are there any enforcement or compliance cost increases or decreases with the proposed code change? Please explain.
None.
5. Will the cost of complying with the proposed code change in the first year after the rule takes effect exceed \$25,000 for any one small business or small city ([Minn. Stat. § 14.127](#))? A small business is any business that has less than 50 full-time employees. A small city is any statutory or home rule charter city that has less than ten full-time employees. Please explain.
NA

Regulatory Analysis

1. What parties or segments of industry are affected by this proposed code change?
Designers, builders, contractors, code officials, consumers.
2. Can you think of other means or methods to achieve the purpose of the proposed code change? What might someone opposed to this code change suggest instead? Please explain what the alternatives are and why your proposed change is the preferred method or means to achieve the desired result.
The computer sim options could be used, but those are and will remain to be fearful and not well understood options for some.
3. What are the probable costs or consequences of not adopting the code change, including those costs or consequences borne by identifiable categories of affected parties, such as separate classes of government units, businesses, or individuals?
Limitations for construction methods.
4. Are you aware of any federal or state regulation or requirement related to this proposed code change? If so, please list the federal or state regulation or requirement and your assessment of any differences between the proposed code change and the federal regulation or requirement.
No.

(See next page)

N1102.1.3 (R402.1.3) R-value alternative. Assemblies with an *R-value* of insulation materials equal to or greater than that specified in Table N1102.1.3 shall be an alternative to the *U-factor* or *F-factor* in Table N1102.1.2.

N1102.1.3.1 Alternative insulation options. Assemblies with an *R-value* of insulation materials equal to or greater than that specified in Table N1102.1.3.1 shall be an alternative to N1102.1.3.

(Table N1102.1.3 (R402.1.3) locates here)

| Component | Wall Cavity Insulation Only | | | Wall Cavity + Continuous Insulation | | |
|---|----------------------------------|----------------------------------|----------------------------------|-------------------------------------|----------------------------------|----------------------------------|
| | Option 1A | Option 1B | Option 1C | Option 2A | Option 2B | Option 2C |
| WOOD-FRAMED WALL <i>R</i> -VALUE ^d | 21 + 0 | 21 + 0 | 21 + 0 | 15 + 7.5 | 15 + 7.5 | 15 + 7.5 |
| FENESTRATION U-FACTOR | 0.23 | 0.27 | 0.27 | 0.25 | 0.27 | 0.27 |
| CEILING <i>R</i> -VALUE ^g | 49 | 60 | 49 | 49 | 55 | 49 |
| INSULATION ENTIRELY ABOVE ROOF DECK | 30 | 35 | 30 | 30 | 35 | 30 |
| BASEMENT WALL <i>R</i> -VALUE ^b | 15ci or 10ci+5 | 15ci or 10ci+5 | 15ci+5 | 15ci or 10ci+5 | 15ci or 10ci+5 | 15ci+5 |
| CRAWL SPACE WALL <i>R</i> -VALUE ^b | 15ci or 10ci+5 | 15ci or 10ci+5 | 15ci or 10ci+5 | 15ci or 10ci+5 | 15ci or 10ci+5 | 15ci or 10ci+5 |
| FLOOR <i>R</i> -VALUE ^f | 30 or 19+7.5ci or 20ci | 30 or 19+7.5ci or 20ci | 30 or 19+7.5ci or 20ci | 30 or 19+7.5ci or 20ci | 30 or 19+7.5ci or 20ci | 30 or 19+7.5ci or 20ci |
| MASS WALL <i>R</i> -VALUE ^e | 15/20 | 15/20 | 15/20 | 15/20 | 15/20 | 15/20 |
| UNHEATED SLAB <i>R</i> -VALUE & DEPTH | 10ci, 4ft | 10ci, 4ft | 10ci, 4ft | 10ci, 4ft | 10ci, 4ft | 10ci, 4ft |
| HEATED SLAB <i>R</i> -VALUE | R-10ci, 4ft and R-5 full slab | R-10ci, 4ft and R-5 full slab | R-10ci, 4ft and R-5 full slab | R-10ci, 4ft and R-5 full slab | R-10ci, 4ft and R-5 full slab | R-10ci, 4ft and R-5 full slab |

a. R-values are minimums. Where insulation is installed in a cavity that is less than the label or design thickness of the insulation, the installed R-value of the insulation shall be not less than the R-value specified in the table.

b. Insulation for concrete and masonry foundation walls shall be installed according to N1102.2.9 and N1102.2.11 as applicable. A minimum of R-15 shall be installed on the exterior of the wall.

c. Slab insulation shall be installed in accordance with Section N1102.2.10.1.

d. The first value is cavity insulation; the second value is continuous insulation. Therefore, as an example, "15&7.5" means R-15 cavity insulation plus R-7.5 continuous insulation.

e. Mass walls shall be in accordance with Section N1102.2.6. The second R-value applies where more than half of the insulation is on the interior of the mass wall.

f. "30" means R-30 cavity insulation alone.

g. Where Table N1102.1.4.1 requires R-49, installing R-38 insulation over 100 percent of the ceiling or attic area requiring insulation shall satisfy the requirement for R-49 insulation wherever the full height of uncompressed R-38 insulation extends over the wall top plate at the eaves in accordance with N1102.2.1. Similarly, where R-55 is required, installing R-44 insulation over 100 percent of the ceiling or attic area requiring insulation shall satisfy the requirement for R-55, and where R-60 is required, installing R-49 insulation over 100 percent of the ceiling or attic area requiring insulation shall satisfy the requirement for R-60.



CODE CHANGE PROPOSAL FORM

(Must be submitted electronically)

Author/requestor: Isaac Smith

Date: 7/16/25

Email address: ismith@mncee.org

Model Code: 2024 IRC

Telephone number: 612-335-3483

Code or Rule Section: N1102

Firm/Association affiliation, if any: Center for Energy and Environment (CEE)

Topic of proposal: Fenestration U-factor for Minnesota

Code or rule section to be changed: N1102.1.2 (R402.1.2)

Intended for Technical Advisory Group ("TAG"): Residential Energy Code

General Information

Yes **No**

- | | | |
|--|-------------------------------------|-------------------------------------|
| A. Is the proposed change unique to the State of Minnesota? | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| B. Is the proposed change required due to climatic conditions of Minnesota? | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| C. Will the proposed change encourage more uniform enforcement? | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| D. Will the proposed change remedy a problem? | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| E. Does the proposal delete a current Minnesota Rule, chapter amendment? | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| F. Would this proposed change be appropriate through the ICC code development process? | <input checked="" type="checkbox"/> | <input type="checkbox"/> |

Proposed Language

1. The proposed code change is meant to:

- change language contained the model code book? If so, list section(s).
[Table N1102.1.2 \(R402.1.2\) Maximum assembly u-factors and fenestration requirements](#)
- change language contained in an existing amendment in Minnesota Rule? If so, list Rule part(s).
- delete language contained in the model code book? If so, list section(s).
- delete language contained in an existing amendment in Minnesota Rule? If so, list Rule part(s).
- add new language that is not found in the model code book or in Minnesota Rule.

Summary:

This proposal recommends lowering the maximum vertical fenestration U-factor in Climate Zone 6 from 0.28 to 0.27, which would match the existing requirement in Climate Zone 7. This proposal would create a single, consistent statewide requirement for window performance requirements in new residential construction.

The primary motivation for this change is to promote uniformity in code enforcement and compliance across the state. Builders, designers, and code officials will benefit from a simplified set of requirements that reduce confusion and support consistent interpretation and implementation of the code.

In addition, products that meet or exceed a U-factor of 0.27 are readily available in the current residential market. These products are already being used extensively in Minnesota construction projects, making the proposed change low-risk and low-cost for the industry.

The proposed update is also consistent with national energy code trends. In particular, the 2027 IECC Residential Consensus Committee approved an update requiring a maximum U-factor of 0.27 for vertical fenestration in Climate Zones 4, 5, and 6, further validating the technical feasibility of this performance level in cold-climate regions such as Minnesota.

While the performance improvement from 0.28 to 0.27 is modest, it supports broader goals of improving thermal performance in Minnesota’s cold climate and aligns with national trends toward higher efficiency in building envelopes. Importantly, it also supports the state's long-term statutory goal of reducing residential energy use by 70% by 2038, as outlined in Minnesota Statute 326B.106.

2. Is this proposed code change required by Minnesota Statute? If so, please provide the citation.
No
3. Provide *specific* language you would like to see changed. Indicate proposed new words with underlining and ~~striketrough~~ words proposed for deletion. Include the entire code (sub) section or rule subpart that contains your proposed changes.
- 4.

TABLE N1102.1.2 (R402.1.2)

MAXIMUM ASSEMBLY U-FACTORS^a AND FENESTRATION REQUIREMENTS

| CLIMATE ZONE | 0 | 1 | 2 | 3 | 4 EXCEPT MARINE | 5 AND MARINE 4 | 6 | 7 AND 8 |
|-------------------------------------|-------|-------|-------|-------|-----------------|----------------|--------------------------------------|-------------------|
| VERTICAL FENESTRATION U-FACTOR | 0.50 | 0.50 | 0.40 | 0.30 | 0.30 | 0.28 | 0.28 0.27 ^d | 0.27 ^d |
| SKYLIGHT U-FACTOR | 0.60 | 0.60 | 0.60 | 0.53 | 0.53 | 0.50 | 0.50 | 0.50 |
| GLAZED VERTICAL FENESTRATION SHGC | 0.25 | 0.25 | 0.25 | 0.25 | 0.40 | NR | NR | NR |
| SKYLIGHT SHGC | 0.28 | 0.28 | 0.28 | 0.28 | 0.40 | NR | NR | NR |
| CEILING U-FACTOR | 0.035 | 0.035 | 0.030 | 0.030 | 0.026 | 0.026 | 0.026 | 0.026 |
| INSULATION ENTIRELY ABOVE ROOF DECK | 0.039 | 0.039 | 0.039 | 0.039 | 0.032 | 0.032 | 0.032 | 0.028 |

Code Change Proposal RE-52

| | | | | | | | | |
|-------------------------------------|-------|-------|-------|--------------------|-------|-------|-------|-------|
| WOOD-FRAMED WALL U-FACTOR | 0.084 | 0.084 | 0.084 | 0.060 | 0.045 | 0.045 | 0.045 | 0.045 |
| MASS WALL U-FACTOR ^b | 0.197 | 0.197 | 0.165 | 0.098 | 0.098 | 0.082 | 0.060 | 0.057 |
| FLOOR U-FACTOR | 0.064 | 0.064 | 0.064 | 0.047 | 0.047 | 0.033 | 0.033 | 0.028 |
| BASEMENT WALL U-FACTOR | 0.360 | 0.360 | 0.360 | 0.091 ^c | 0.059 | 0.050 | 0.050 | 0.050 |
| UNHEATED SLAB F-FACTOR ^c | 0.73 | 0.73 | 0.73 | 0.54 | 0.51 | 0.51 | 0.48 | 0.48 |
| HEATED SLAB F-FACTOR ^c | 0.74 | 0.74 | 0.74 | 0.66 | 0.66 | 0.66 | 0.66 | 0.66 |
| CRAWL SPACE WALL U-FACTOR | 0.477 | 0.477 | 0.477 | 0.136 | 0.065 | 0.055 | 0.055 | 0.055 |

For SI: 1 foot = 304.8 mm.

1. a. Nonfenestration U-factors and F-factors shall be obtained from measurement, calculation, an approved source or [Appendix NF](#) where such appendix is adopted or approved.
 2. b. Mass walls shall be in accordance with [Section N1102.2.6](#). Where more than half the insulation is on the interior, the mass wall U-factors shall not exceed 0.17 in Climate Zones 0 and 1, 0.14 in Climate Zone 2, 0.12 in Climate Zone 3, 0.087 in Climate Zone 4 except Marine, 0.065 in Climate Zone 5 and Marine 4, and 0.057 in Climate Zones 6 through 8.
 3. c. In Warm Humid locations as defined by [Figure N1101.7](#) and [Table N1101.7](#), the basement wall U-factor shall not exceed 0.360.
→
 4. d. A maximum U-factor of 0.30 shall apply in Marine Climate Zone 4 and Climate Zones 5 through 8 to vertical fenestration products installed in buildings located either:
 1. 1. Above 4,000 feet in elevation above sea level, or
 2. 2. In windborne debris regions where protection of openings is required by [Section R301.2.1.2](#).
 5. e. F-factors for slabs shall correspond to the R-values of [Table N1102.1.3](#) and the installation conditions of [Section N1102.2.10.1](#).
5. Will this proposed code change impact other sections of a model code book or an amendment in Minnesota Rule? If so, please list the affected sections or rule parts.
No

Need and Reason

1. Why is the proposed code change needed? Please provide a general explanation as well as a specific explanation for any changes to numerical values (heights, area, etc.)
This change is needed to improve consistency and clarity in Minnesota’s residential energy code by aligning the vertical fenestration U-factor in Climate Zone 6 (currently 0.28) with the existing requirement in Climate Zone 7 (0.27). Having a single statewide fenestration requirement reduces complexity in design, review, and enforcement.

The proposed revision also reflects current industry practice. Windows with a U-factor of 0.27 are already widely available and commonly used in residential construction across Minnesota. Many products meet or exceed this level, making the change practically achievable without major design or cost implications.

The proposed change from 0.28 to 0.27 is minor but aligns with national trends toward higher efficiency building envelopes. Notably, the 2027 IECC Residential Consensus Committee adopted an update setting the maximum allowable U-factor for vertical fenestration at 0.27 in Climate Zones 4, 5, and 6. This decision further affirms the suitability and practicality of the proposed change and aligns with Minnesota’s statutory objective to reduce residential energy consumption by 70% by the year 2038.

2. Why is the proposed code change a reasonable solution?

This proposal is reasonable because it achieves multiple benefits with minimal disruption:

- It simplifies compliance and enforcement by creating a unified U-factor requirement across the state.
- It leverages existing product availability, ensuring the requirement is achievable with current construction practices.
- It promotes incremental improvement in energy efficiency, which aligns with Minnesota's phased approach to meeting statutory efficiency targets.

3. What other factors should the TAG consider?

The commercial energy code TAG has approved a code change proposal to generally align residential low rise buildings with the residential energy code requirement, with some multifamily specific exceptions. Accepting this proposal would allow for alignment around a 0.27 U-value across the state and residential building types, greatly simplifying enforcement and compliance.

Cost/Benefit Analysis

1. Will the proposed code change increase or decrease costs? Please explain and provide estimates if possible.

The proposed change is not expected to increase costs in a significant way. Products that meet the proposed U-factor of 0.27 are widely available and commonly used in current residential construction across Minnesota. Therefore, any cost difference between U-0.28 and U-0.27 is expected to be negligible or already absorbed in typical project budgets.

2. If there is an increased cost, will this cost be offset by a safety or other benefit? Please explain. If the benefit is quantifiable (for example energy savings), provide an estimate if possible.

N/A

3. If there is a cost increase, who will bear the costs? This can include government units, businesses, and individuals.

No cost increase expected

4. Are there any enforcement or compliance cost increases or decreases with the proposed code change? Please explain.

N/A

5. Will the cost of complying with the proposed code change in the first year after the rule takes effect exceed \$25,000 for any one small business or small city ([Minn. Stat. § 14.127](#))? A small business is any business that has less than 50 full-time employees. A small city is any statutory or home rule charter city that has less than ten full-time employees. Please explain.

N/A

Regulatory Analysis

1. What parties or segments of industry are affected by this proposed code change?

Minimal affects expected

2. Can you think of other means or methods to achieve the purpose of the proposed code change? What might someone opposed to this code change suggest instead? Please explain what the alternatives are and why your proposed change is the preferred method or means to achieve the desired result.

No

3. What are the probable costs or consequences of not adopting the code change, including those costs or consequences borne by identifiable categories of affected parties, such as separate classes of government units, businesses, or individuals?

N/A

4. Are you aware of any federal or state regulation or requirement related to this proposed code change? If so, please list the federal or state regulation or requirement and your assessment of any differences between the proposed code change and the federal regulation or requirement.

N/A

***Note: Incomplete forms may be returned to the submitter with instruction to complete the form. Only completed forms can considered by the TAG.



CODE CHANGE PROPOSAL FORM

(Must be submitted electronically)

Author/requestor: Isaac Smith

Date: 8/27/2025

Email address: ismith@mncee.org

Model Code: 2024 IRC

Telephone number: 612-335-3483

Code or Rule Section: N1108

Firm/Association affiliation, if any: Center for Energy and Environment (CEE)

Topic of proposal: Additional Efficiency Requirements – Version 2 based on TAG feedback

Code or rule section to be changed: N1108.2 (R408.2)

Intended for Technical Advisory Group (“TAG”): Residential Energy Code

General Information

Yes **No**

- | | | |
|--|-------------------------------------|-------------------------------------|
| A. Is the proposed change unique to the State of Minnesota? | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| B. Is the proposed change required due to climatic conditions of Minnesota? | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| C. Will the proposed change encourage more uniform enforcement? | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| D. Will the proposed change remedy a problem? | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| E. Does the proposal delete a current Minnesota Rule, chapter amendment? | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| F. Would this proposed change be appropriate through the ICC code development process? | <input checked="" type="checkbox"/> | <input type="checkbox"/> |

Proposed Language

1. The proposed code change is meant to:

change language contained the model code book? If so, list section(s).
N1108.2 (R408.2)

change language contained in an existing amendment in Minnesota Rule? If so, list Rule part(s).

delete language contained in the model code book? If so, list section(s).

delete language contained in an existing amendment in Minnesota Rule? If so, list Rule part(s).

add new language that is not found in the model code book or in Minnesota Rule.

Summary:

This proposal modifies the N1108 credit section to remove a credit that is required by code and modify items that are already standard building practices in Minnesota.

2. Is this proposed code change required by Minnesota Statute? If so, please provide the citation.
No
3. Provide *specific* language you would like to see changed. Indicate proposed new words with underlining and ~~striketrough~~ words proposed for deletion. Include the entire code (sub) section or rule subpart that contains your proposed changes.

TABLE N1108.2 (R408.2)
ADDITIONAL EFFICIENCY REQUIREMENTS

| MEASURE NUMBER | MEASURE DESCRIPTION | CREDIT VALUE | | | | | | | | |
|----------------|---|---------------------|----------------|----------------|------------------------------|-----------------------|----------------|----------------|----------------|----------------|
| | | Climate Zones 0 & 1 | Climate Zone 2 | Climate Zone 3 | Climate Zone 4 except Marine | Climate Zone 4 Marine | Climate Zone 5 | Climate Zone 6 | Climate Zone 7 | Climate Zone 8 |
| N1108.2.1.1(1) | ≥ 2.5% reduction in total TC | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 |
| N1108.2.1.1(2) | ≥ 5% reduction in total TC | 0 | 1 | 1 | 2 | 1 | 2 | 2 | 2 | 2 |
| N1108.2.1.1(3) | > 7.5% reduction in total TC | 0 | 1 | 2 | 2 | 2 | 2 | 3 | 3 | 3 |
| N1108.2.1.1(4) | > 10% reduction in total TC | 1 | 1 | 2 | 3 | 3 | 4 | 4 | 5 | 5 |
| N1108.2.1.1(5) | > 15% reduction in total TC | 1 | 2 | 2 | 4 | 4 | 5 | 6 | 7 | 8 |
| N1108.2.1.1(6) | > 20% reduction in total TC | 2 | 4 | 4 | 5 | 6 | 7 | 8 | 9 | 11 |
| N1108.2.1.1(7) | > 30% reduction in total TC | 3 | 6 | 6 | 8 | 8 | 11 | 12 | 13 | 16 |
| N1108.2.1.2(2) | U-factor and SHGC for vertical fenestration per Table N1108.2.1.2 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 |
| N1108.2.1.3(1) | Roof solar reflectance index (roof is part of the building thermal envelope and directly above cooled, conditioned space) | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| N1108.2.1.3(2) | Roof solar reflectance index (roof is above an unconditioned space that contains a duct system) | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

Code Change Proposal RE-53.1 (Revised 8/27/25)

| | | | | | | | | | | |
|----------------------------|---|----|----|----|-----------------|----|----|----|----|----|
| N1108.2.1.4 | Reduced air leakage | 1 | 1 | 1 | 2 | 1 | 3 | NA | NA | NA |
| N1108.2.2(1) ^b | Ground source heat pump | 14 | 14 | 14 | 15 | 10 | 15 | 17 | 18 | 21 |
| N1108.2.2(2) ^b | High-performance cooling (Option 1) | 5 | 4 | 3 | 2 | 1 | 1 | 1 | 1 | 1 |
| N1108.2.2(3) ^b | High-performance cooling (Option 2) | 6 | 4 | 3 | 2 | 1 | 1 | 1 | 1 | 1 |
| N1108.2.2(4) ^b | High-performance gas furnace (Option 1) | 0 | 1 | 2 | 5 | 3 | 6 | 7 | 7 | 9 |
| N1108.2.2(5) ^b | High-performance gas furnace (Option 2) | 0 | 1 | 2 | 4 | 3 | 5 | 6 | 7 | 8 |
| N1108.2.2(6) ^b | High-performance gas furnace (Option 3) | 0 | 1 | 1 | NA | NA | NA | NA | NA | NA |
| N1108.2.2(7) ^b | High-performance gas furnace and cooling (Option 1) | 5 | 5 | 4 | NA | NA | NA | NA | NA | NA |
| N1108.2.2(8) ^b | High-performance gas furnace and cooling (Option 2) | 6 | 5 | 5 | NA | NA | NA | NA | NA | NA |
| N1108.2.2(9) ^b | High-performance gas furnace and heat pump (Option 1) | 15 | 13 | 11 | NA ^e | NA | NA | NA | NA | NA |
| N1108.2.2(10) ^b | High-performance heat pump with electric resistance backup (Option 1) | 13 | 12 | 11 | 12 | NA | NA | NA | NA | NA |
| N1108.2.2(11) ^b | High-performance gas furnace and cooling (Option 3) | NA | NA | NA | 5 | 4 | 6 | 7 | 7 | 9 |
| N1108.2.2(12) ^b | High-performance gas furnace and cooling (Option 4) | NA | NA | NA | 6 | 5 | 7 | 8 | 8 | 10 |
| N1108.2.2(13) ^b | High-performance gas | NA | NA | NA | 12 | 8 | 11 | 11 | 12 | 12 |

Code Change Proposal RE-53.1 (Revised 8/27/25)

| | | | | | | | | | | |
|------------------------------|---|----|----|----|----|---|----|----|----|----|
| | furnace and heat pump (Option 2) | | | | | | | | | |
| N1108.2.2(14) ^b | High-performance heat pump with electric resistance backup (Option 2) | NA | NA | NA | 12 | 8 | 12 | 13 | 14 | 16 |
| N1108.2.3(1)(a) ^d | Gas-fired storage water heaters (Option 1) | 8 | 7 | 7 | 5 | 6 | 4 | 4 | 3 | 2 |
| N1108.2.3(1)(b) ^d | Gas-fired storage water heater (Option 2) | 9 | 8 | 8 | 6 | 7 | 5 | 4 | 4 | 3 |
| N1108.2.3(2)(a) ^d | Gas-fired instantaneous water heaters (Option 1) | 10 | 9 | 9 | 6 | 7 | 5 | 5 | 4 | 3 |
| N1108.2.3(2)(b) ^d | Gas-fired instantaneous water heaters (Option 2) | 11 | 10 | 9 | 6 | 7 | 6 | 5 | 4 | 3 |
| N1108.2.3(3) ^d | Electric water heaters (Option 1) | 10 | 9 | 9 | 7 | 6 | 4 | 3 | 3 | 2 |
| N1108.2.3(4) ^d | Electric water heaters (Option 2) | 8 | 8 | 8 | 6 | 5 | 4 | 3 | 3 | 2 |
| N1108.2.3(5)(a) ^d | Electric water heaters (Option 3) | 7 | 8 | 8 | 6 | 7 | 5 | 4 | 3 | 3 |
| N1108.2.3(5)(b) ^d | Electric water heaters (Option 4) | 8 | 9 | 10 | 7 | 8 | 5 | 5 | 4 | 3 |
| N1108.2.3(6) ^d | Electric water heaters (Option 5) | 10 | 9 | 9 | 7 | 6 | 4 | 3 | 3 | 2 |
| N1108.2.3(7)(a) ^d | Solar hot water heating system (Option 1) | 13 | 13 | 13 | 9 | 8 | 5 | 4 | 4 | 3 |
| N1108.2.3(7)(b) ^d | Solar hot water heating system (Option 2) | 10 | 9 | 9 | 6 | 7 | 6 | 5 | 4 | 3 |
| N1108.2.3(8) ^c | Compact hot water distribution | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| N1108.2.4(1) ^c | Ductless or hydronic thermal distribution | 3 | 4 | 5 | 7 | 8 | 10 | 10 | 10 | 14 |
| N1108.2.4(2) ^c | 100% of duct systems in conditioned space | 2 | 3 | 4 | 6 | 7 | 9 | 9 | 9 | 13 |
| N1108.2.4(3) ^c | ≥ 80% of ductwork inside conditioned space | 2 | 3 | 3 | 5 | 6 | 7 | 7 | 7 | 9 |

Code Change Proposal RE-53.1 (Revised 8/27/25)

| | | | | | | | | | | |
|---------------------------|--|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| N1108.2.4(4) ^c | Reduced total duct system leakage | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 |
| N1108.2.5(1) | ERV or HRV installed | 0 | 0 | 0 | 0 | 4 | 3 | 2 | 2 | 2 |
| N1108.2.5(2) ^c | ≤ 2.0 ACH50 with ERV or HRV installed | 0 | 0 | 0 | 4 | 4 | 8 | 5 | 5 | 5 |
| N1108.2.5(3) ^c | ≤ 2.0 ACH50 with a balanced ventilation system | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 4 | 4 |
| N1108.2.5(4) ^c | ≤ 1.5 ACH50 with ERV or HRV installed | 0 | 0 | 0 | 6 | 5 | 10 | 9 | 9 | 9 |
| N1108.2.5(5) ^c | ≤ 1.0 ACH50 with ERV or HRV installed | 0 | 0 | 1 | 7 | 6 | 12 | 12 | 12 | 12 |
| N1108.2.6 ^a | Energy efficient appliances | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 |
| N1108.2.7 | On-site renewable energy measures | 17 | 16 | 17 | 11 | 11 | 9 | 8 | 7 | 4 |
| N1108.2.8 ^c | Demand responsive thermostat | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| N1108.2.10 | Whole-home lighting control | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| N1108.2.11 | Higher efficacy lighting | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

NA = Not Applicable.

- a. Where the measure is selected, each dwelling unit, sleeping unit and common area where the measure is applicable must have the measure installed.
- b. Where multiple heating or cooling systems are installed, credits shall be determined using a weighted average of the square footage served by each system.
- c. Where the measure is selected, each dwelling unit and sleeping unit must comply with the measure.
- d. Where the measure is selected, each dwelling unit shall be served by a water heater meeting the applicable requirements. Where multiple service water heating systems are installed, credits shall be determined using a weighted average of the square footage served by each system.
- e. Eleven credits are available for Climate Zone 4 where the following measure is used: gas furnace and heat pump (Option 3): greater than or equal to 95% AFUE fuel gas furnace and 7.8 HSPF2, 15.2 SEER2 and 10.0 EER2 air source heat pump.

4. Will this proposed code change impact other sections of a model code book or an amendment in Minnesota Rule? If so, please list the affected sections or rule parts.
No

Need and Reason

1. Why is the proposed code change needed? Please provide a general explanation as well as a specific explanation for any changes to numerical values (heights, area, etc.)
The elimination of N1108.2.5(1) removes a duplication within the code, where credit is given for ERVs or HRV installation even though ERV/HRVs are required by code for climate zones 6 and 7. Failing to address this will essentially reduce the number of credits required for all new construction projects in Minnesota, reducing the energy efficiency of the code.

2. Why is the proposed code change a reasonable solution?
The N1108 credit section is intended to incent additional energy savings behaviors while providing flexibility to the builder. The changes were made to ensure that this table matches this intent in Minnesota. Credits should not be awarded for meeting prescriptive code requirements, as the credits are designed to increase the energy efficiency of new construction homes.
3. What other factors should the TAG consider?
N/A

Cost/Benefit Analysis

1. Will the proposed code change increase or decrease costs? Please explain and provide estimates if possible.
Given current MN building practice and the considerable amount of flexibility within the N1108 credit section, the proposed changes should not directly increase or decrease costs.
2. If there is an increased cost, will this cost be offset by a safety or other benefit? Please explain. If the benefit is quantifiable (for example energy savings), provide an estimate if possible.
N/A
3. If there is a cost increase, who will bear the costs? This can include government units, businesses, and individuals.
N/A
4. Are there any enforcement or compliance cost increases or decreases with the proposed code change? Please explain.
No
5. Will the cost of complying with the proposed code change in the first year after the rule takes effect exceed \$25,000 for any one small business or small city ([Minn. Stat. § 14.127](#))? A small business is any business that has less than 50 full-time employees. A small city is any statutory or home rule charter city that has less than ten full-time employees. Please explain.
No.

Regulatory Analysis

1. What parties or segments of industry are affected by this proposed code change?
Builders
2. Can you think of other means or methods to achieve the purpose of the proposed code change? What might someone opposed to this code change suggest instead? Please explain what the alternatives are and why your proposed change is the preferred method or means to achieve the desired result.
No. If these changes are not made, our concerns will not be addressed.
3. What are the probable costs or consequences of not adopting the code change, including those costs or consequences borne by identifiable categories of affected parties, such as separate classes of government units, businesses, or individuals?
Failing to address the duplication will essentially reduce the number of credits required for all new construction projects in Minnesota, reducing the energy efficiency of the code.

Code Change Proposal RE-53.1 (Revised 8/27/25)

4. Are you aware of any federal or state regulation or requirement related to this proposed code change? If so, please list the federal or state regulation or requirement and your assessment of any differences between the proposed code change and the federal regulation or requirement.

***Note: The information you provide in this code change proposal form is considered Public Data and used by the TAG to consider your proposed modification to the code. Any code change proposal form submitted to DLI may be reviewed at public TAG meetings and used by department staff and the Office of Administrative Hearings to justify the need and reasonableness of any proposed rule draft subject to administrative review and is available to the public.

****Note: Incomplete forms will be returned to the submitter with instruction to complete the form. Only completed forms will be accepted and considered by the TAG. The submitter may be asked to provide additional information in support of the proposed code change.



CODE CHANGE PROPOSAL FORM

(Must be submitted electronically)

Author/requestor: Mike Moore, Stator LLC, Representing the Home Ventilating Institute

Date: July 14, 2025

Email address: mmoore@statorllc.com

Telephone number: 303.408.7015

Model Code: 2024 IRC/IECC-R

Code or Rule Section: N1103.6.1 (R403.6.1), Table N1103.6.2 (R403.6.2)

Firm/Association affiliation, if any: Stator LLC

Code or rule section to be changed: N1103.6.1 (R403.6.1), Table N1103.6.2 (R403.6.2)

Intended for Technical Advisory Group ("TAG"): Residential Energy Code TAG

General Information

Yes **No**

- | | | |
|--|-------------------------------------|-------------------------------------|
| A. Is the proposed change unique to the State of Minnesota? | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| B. Is the proposed change required due to climatic conditions of Minnesota? | <input type="checkbox"/> | <input type="checkbox"/> |
| C. Will the proposed change encourage more uniform enforcement? | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| D. Will the proposed change remedy a problem? | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| E. Does the proposal delete a current Minnesota Rule, chapter amendment? | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| F. Would this proposed change be appropriate through the ICC code development process? | <input checked="" type="checkbox"/> | <input type="checkbox"/> |

Proposed Language

1. The proposed code change is meant to:

- change language contained the model code book? If so, list section(s). *Various*
- change language contained in an existing amendment in Minnesota Rule? If so, list Rule part(s).
- delete language contained in the model code book? If so, list section(s).
- delete language contained in an existing amendment in Minnesota Rule? If so, list Rule part(s).
- add new language that is not found in the model code book or in Minnesota Rule.

Summary: This proposal modifies heat and energy recovery ventilation (HERV) requirements to align with the latest action of the IECC-Residential Consensus Committee, the ASHRAE 90.1 Committee, and the IECC-C Consensus Committee. Each of these bodies has recently acted to increase the fan efficacy and SRE for small HERVs (i.e., from 1.2 cfm/W to 1.7 cfm/W and from 65 SRE to 67 SRE) to promote cost-effective energy savings.

2. Is this proposed code change required by Minnesota Statute? If so, please provide the citation.
No.
3. Provide *specific* language you would like to see changed. Indicate proposed new words with underlining and ~~striketrough~~ words proposed for deletion. Include the entire code (sub) section or rule subpart that contains your proposed changes.
Please see the text at the end of this code change proposal form for proposed modifications.
4. Will this proposed code change impact other sections of a model code book or an amendment in Minnesota Rule? If so, please list the affected sections or rule parts.
No.

Need and Reason

1. Why is the proposed code change needed? Please provide a general explanation as well as a specific explanation for any changes to numerical values (heights, area, etc.)
This proposal modifies heat and energy recovery ventilation (HERV) requirements to align with the latest actions of the IECC-Residential Consensus Committee, the ASHRAE 90.1 Committee, and the IECC-C Consensus Committee. Each of these bodies has recently acted to increase the fan efficacy and SRE for small HERVs (i.e., from 1.2 cfm/W to 1.7 cfm/W and from 65 SRE to 67 SRE).
2. Why is the proposed code change a reasonable solution?
The proposed code change has a good payback and aligns with the latest action of the IECC-Residential Consensus Committee, the ASHRAE 90.1 Committee, and the IECC-C Consensus Committee.
3. What other factors should the TAG consider?
This proposal will align minimum performance thresholds across national and state codes and standards. A similar proposal is being submitted to the Commercial Energy Code TAG.

Cost/Benefit Analysis

1. Will the proposed code change increase or decrease costs? Please explain and provide estimates if possible.
This proposal will increase costs. The incremental cost associated with improving HERV prescriptive performance thresholds from 1.2 cfm/W and an SRE of 65% to 1.7 cfm/W and an SRE of 67% is estimated at \$30. Fan energy savings are estimated at 113 kWh/yr, space cooling energy savings are estimated at -14 kWh/yr, and space heating energy savings are estimated at 7.5 therms, for a total monetized savings of \$23.13/yr. This yields a simple payback of 1.3 years. If financed over 30 years at 6%, the payments for the \$30 premium are \$0.18/month or \$2.16/year, meaning that the incremental cost of \$30 is expected to be cash positive (\$23.13 - \$2.16 = \$20.97) in the first year of operation.

**Assumptions/methodology:*

*Average, 2-bedroom apartment of 1,006 ft² (median size in U.S. for 2023, based on Census data)
Minimum continuous ventilation airflow in accordance with ASHRAE 62.2 = 53 cfm. This is for a typical 2-bedroom apartment unit.*

Location: Climate Zone 6A (i.e., Rochester, MN)

Building energy simulations: EnergyPlus v23.1.0 using US Department of Energy, Pacific Northwest National Lab's multifamily 2024 IECC Climate Zone 6A prototype model (gas-fired furnace space heating).

Annual fan energy savings:

53 cfm@1.7 cfm/W = 31.0 W

53 cfm@1.2 cfm/W = 43.9 W

Energy savings = 43.9 – 31.0 = 12.9 W x 8760 = 113,107 Wh = 113 kWh/yr

Annual space heating and cooling savings: -14 kWh and 7.5 therms (determined from building energy simulations).

Electricity rate: \$0.1473/kWh (U.S. DOE EIA 2023 residential price data for Minnesota)

HERV pricing: sourced from publicly available, internet retail pricing collected in March 2025 for a sample of models that were listed in HVI's Certified Products Directory at the time. The airflow assumed when interpolating for fan efficacy and SRE was 75 cfm. The bottom-quartile average price of units achieving 65% SRE and 1.2 cfm/W at 75 cfm was \$871. The bottom-quartile average price of units achieving 67% SRE and 1.7 cfm/W at 75 cfm was \$901, for a cost premium of \$30.

2. If there is an increased cost, will this cost be offset by a safety or other benefit? Please explain. If the benefit is quantifiable (for example energy savings), provide an estimate if possible.
Yes. See the answer to #1.
3. If there is a cost increase, who will bear the costs? This can include government units, businesses, and individuals.
Residents.
4. Are there any enforcement or compliance cost increases or decreases with the proposed code change? Please explain.
None are anticipated.
5. Will the cost of complying with the proposed code change in the first year after the rule takes effect exceed \$25,000 for any one small business or small city ([Minn. Stat. § 14.127](#))? A small business is any business that has less than 50 full-time employees. A small city is any statutory or home rule charter city that has less than ten full-time employees. Please explain.
No.

Regulatory Analysis

1. What parties or segments of industry are affected by this proposed code change?
Manufacturers of HERVs.
2. Can you think of other means or methods to achieve the purpose of the proposed code change? What might someone opposed to this code change suggest instead? Please explain what the alternatives are and why your proposed change is the preferred method or means to achieve the desired result.
Because the language aligns with the latest action of the IECC-R Consensus Committee, the IECC-C Consensus Committee, and the ASHRAE 90.1 Committee, this language to improve HERV performance is the preferred method.
3. What are the probable costs or consequences of not adopting the code change, including those costs or consequences borne by identifiable categories of affected parties, such as separate classes of government units, businesses, or individuals?
Not increasing the performance of small HERVs would result in higher operating costs borne by residents.

4. Are you aware of any federal or state regulation or requirement related to this proposed code change? If so, please list the federal or state regulation or requirement and your assessment of any differences between the proposed code change and the federal regulation or requirement.
There are no known U.S. state or federal regulations or requirements related to this proposed code change.

***Note: Incomplete forms may be returned to the submitter with instruction to complete the form. Only completed forms can considered by the TAG.

HVI Proposal – Modify Chapter 11 of the 2024 IRC as follows:

1103.6.1 (R403.6.1) Heat or energy recovery ventilation. *Dwelling units* shall be provided with a heat recovery or energy recovery ventilation system in Climate Zones 6, 7, and 8. The system shall be a balanced ventilation system with a sensible recovery efficiency (SRE) of not less than ~~65~~7 percent at 32°F (0°C) at an airflow greater than or equal to the design airflow. The SRE shall be determined from a listed value or from interpolation of listed values.

**TABLE N1103.6.2 (R403.6.2)
 FAN EFFICACY FOR WHOLE-HOUSE MECHANICAL VENTILATION SYSTEMS AND OUTDOOR AIR
 VENTILATION SYSTEMS^a**

| SYSTEM TYPE | AIRFLOW RATE (CFM) | MINIMUM EFFICACY (CFM/WATT) | TEST PROCEDURE |
|--------------------|---------------------------|------------------------------------|-----------------------|
| HRV or ERV | Any | 1. 2 7 ^a | CAN/CSA C439 |

[Note: Portions of table not shown remain unchanged]



CODE CHANGE PROPOSAL FORM

(Must be submitted electronically)

Author/requestor: Amy Schmidt

Date: July 16, 2025

Email address: amy@mynestsolutions.com

Model Code: IRC N11

Telephone number: 989-513-2169

Code or Rule Section: N1102/R402

Firm/Association affiliation, if any: Nest Solutions LLC

Topic of proposal: Foundation Insulation

Code or rule section to be changed: 1322

Intended for Technical Advisory Group ("TAG"): Residential Energy Code TAG

General Information

Yes **No**

- A. Is the proposed change unique to the State of Minnesota? Yes No
- B. Is the proposed change required due to climatic conditions of Minnesota? Yes No
- C. Will the proposed change encourage more uniform enforcement? Yes No
- D. Will the proposed change remedy a problem? Yes No
- E. Does the proposal delete a current Minnesota Rule, chapter amendment? Yes No
- F. Would this proposed change be appropriate through the ICC code development process? Yes No

Proposed Language

1. The proposed code change is meant to:

change language contained the model code book? If so, list section(s).

change language contained in an existing amendment in Minnesota Rule? If so, list Rule part(s).

delete language contained in the model code book? If so, list section(s).

X delete language contained in an existing amendment in Minnesota Rule? If so, list Rule part(s).

1322.0402

add new language that is not found in the model code book or in Minnesota Rule.

2. Is this proposed code change required by Minnesota Statute? If so, please provide the citation.

No

3. Provide *specific* language you would like to see changed. Indicate proposed new words with underlining and ~~striketrough~~ words proposed for deletion. Include the entire code (sub) section or rule subpart that contains your proposed changes.

Either adopt 2024 IECC Section R402 unamended (allowing the IRC to address moisture control and eliminate redundancy) or further amend with the following changes to existing sections of the MN amendments in 1322.0402. While it would be highly favored to be consistent with the 2024 IECC in its entirety the following changes are the most crucial as they are currently out of step with current successful building practices and adding cost.

R402.1.1.2 Exterior ~~draining~~ foundation insulation requirements. Any ~~Insulation assembly~~ installed on the exterior of the foundation walls and on the perimeter of slabs-on-grade that ~~permits water drainage~~ shall:

1. be made of water-resistant materials manufactured for that intended use;
2. be installed according to the manufacturer's installation instructions;
3. comply with either ASTM C578, C612, or C1029, as applicable; and
4. have a rigid, opaque, and weather-resistant protective covering to prevent the degradation of the insulation's thermal performance. The protective covering shall cover the exposed exterior insulation and extend a minimum of 6 inches (152 mm) below grade. The insulation and protective covering system shall be flashed in accordance with IRC section R703.8.

~~R402.1.1.3 Exterior nondraining foundation insulation requirements.~~ Any ~~insulation assembly~~ installed on the exterior of the foundation walls or on the perimeter of slabs-on-grade that ~~does not permit bulk water drainage~~ shall:

- ~~1. be made of water-resistant materials manufactured for that intended use;~~
- ~~2. be installed according to the manufacturer's installation instructions;~~
- ~~3. comply with either ASTM C578 or C1029, as applicable;~~
- ~~4. be covered with a 6-mil polyethylene slip sheet over the entire exterior surface; and~~
- ~~5. have a rigid, opaque, and weather-resistant protective covering to prevent degradation of the insulation's thermal performance. The protective covering shall cover the exposed exterior insulation and extend a minimum of 6 inches (152 mm) below grade. The insulation and protective covering system shall be flashed in accordance with IRC section R703.8.~~

4. Will this proposed code change impact other sections of a model code book or an amendment in Minnesota Rule? If so, please list the affected sections or rule parts.

No

Need and Reason

1. Why is the proposed code change needed? Please provide a general explanation as well as a specific explanation for any changes to numerical values (heights, area, etc.)

The current MN code requires unnecessary foundation insulation measures that are inconsistent with the national model code or any other state. These added requirements also add unnecessary cost. These requirements were based on two anecdotal and undocumented sources (see p.46 of the original due diligence study), not the actual due diligence study itself used as the basis for these provisions in the MN code. Consequently, these additional requirements (particularly the requirement for exterior 6 mil Poly) are not widely accepted by the industry as it draws a conclusion that has proven inaccurate by evidence or lack thereof of issues in similar climates and conditions. More importantly, a 2010 peer-reviewed ASCE journal article based on the analysis of multiple documented sources of field data on below grade performance of polystyrene insulations on many projects and sometimes up to 20 years of exposure indicates a very different story ([https://doi.org/10.1061/\(ASCE\)CR.1943-5495.0000012](https://doi.org/10.1061/(ASCE)CR.1943-5495.0000012)). It is also inconsistent with the ASCE 32 code-reference standard for construction and design of frost-protected shallow foundations and the HUD-funded and international research basis for that standard. Any issues that have occurred have largely been tied back to improper backfill materials, slope or other soil related drainage issues. Exterior foundation insulation especially insulation with low water absorption rate is a best practice for mitigating thermal, moisture and air foundation challenges. Care does need to be taken when backfilling to prevent damage to the insulation. Unfortunately, the application of 6 mil poly over the insulation does not make up for poor soil drainage issues nor does it protect the insulation when backfilling around the foundation. In fact, often poly which is less durable will be damaged itself and could trap moisture if exterior surface or ground water foundation drainage is not properly addressed per building code. The inclusion of exterior Poly is unnecessary, adds cost, and is also susceptible to damage upon backfill.

2. Why is the proposed code change a reasonable solution?

The national model code and other states have not altered this section of the code and there have not been widespread issues. Any issues that have occurred have largely been tied back to improper backfill materials, slope or other soil related drainage issues that are compliance matters adequately addressed in the building code. Relying on nationally vetted language is preferred as it has been proven out over decades.

3. What other factors should the TAG consider?

Because the current provisions of the MN code are different from the national and other state codes there is confusion in the field as to how to implement these requirements and also creates lots of questions about why MN has this complication and added cost. Furthermore this change does not affect energy savings.

Cost/Benefit Analysis

1. Will the proposed code change increase or decrease costs? Please explain and provide estimates if possible.

Decrease.

Code Change Proposal RE-55

2. If there is an increased cost, will this cost be offset by a safety or other benefit? Please explain. If the benefit is quantifiable (for example energy savings), provide an estimate if possible.

N/A

3. If there is a cost increase, who will bear the costs? This can include government units, businesses, and individuals.

N/A

4. Are there any enforcement or compliance cost increases or decreases with the proposed code change? Please explain.

Enforcement and compliance should be less complicated and decrease costs at the state and local level.

5. Will the cost of complying with the proposed code change in the first year after the rule takes effect exceed \$25,000 for any one small business or small city ([Minn. Stat. § 14.127](#))? A small business is any business that has less than 50 full-time employees. A small city is any statutory or home rule charter city that has less than ten full-time employees. Please explain.

No.

Regulatory Analysis

1. What parties or segments of industry are affected by this proposed code change?

Manufacturers, builders, code officials, state employees. The current requirement contradicts manufacturer's instructions and best building practice. It requires more inspection and explanation/education.

2. Can you think of other means or methods to achieve the purpose of the proposed code change? What might someone opposed to this code change suggest instead? Please explain what the alternatives are and why your proposed change is the preferred method or means to achieve the desired result.

Alternatively, better soil, drainage and backfill requirements could be placed directly into the IECC.

3. What are the probable costs or consequences of not adopting the code change, including those costs or consequences borne by identifiable categories of affected parties, such as separate classes of government units, businesses, or individuals?

Continued added costs and time for no real or proven benefit.

4. Are you aware of any federal or state regulation or requirement related to this proposed code change? If so, please list the federal or state regulation or requirement and your assessment of any differences between the proposed code change and the federal regulation or requirement.

Yes, the national model energy code (IECC) has preferred language. I believe MN is currently considering the 2024 IECC the language. See 2024 Sections R402 for the preferred language.

Code Change Proposal RE-55

***Note: The information you provide in this code change proposal form is considered Public Data and used by the TAG to consider your proposed modification to the code. Any code change proposal form submitted to DLI may be reviewed at public TAG meetings and used by department staff and the Office of Administrative Hearings to justify the need and reasonableness of any proposed rule draft subject to administrative review and is available to the public.

****Note: Incomplete forms will be returned to the submitter with instruction to complete the form. Only completed forms will be accepted and considered by the TAG. The submitter may be asked to provide additional information in support of the proposed code change.