

# Oregon Department of **ENERGY**

Oregon Energy Code  
Q&A Session for  
Proposals

Facilitator: Roger Kainu  
August 9, 2022  
1:30-3:00pm



# 2023 ORSC Energy Code Proposal Process

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## Outline for today:

- New Rules
- How to submit changes
- Supporting information for submitting a proposal

# Residential Energy Code Adoption Rules

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## New Rules for the 2023 ORSC Adoption Process:

- [OAR 918-008-0250](#).
- Page 4 of the Code Amendment Proposal Application
  - Show all the work for compliance
  - Assumptions and baseline must be understood, and repeatable by BCD staff and stakeholders.

# ORSC Adoption Web Pages

← → ↻ <https://www.oregon.gov/bcd/Pages/index.aspx> A 🔍 ☆ 🏠

An official website of the State of Oregon [Here's how you know »](#)

**OREGON.GOV** Home BCD news Boards Code programs Laws & rules Licensing Continuing education Inspector training Permits  
Forms Contact us Email updates

### Codes and standards

- Adopted codes online
- Statewide alternate methods
- Statewide code interpretations
- Laws and rules

### Permits and services

- Statewide permitting services

### Licensing

- Renew a license
- License holder search
- Continuing education
- Enforcement

### Inspectors

- Inspector certifications

### Current topics

- Wildfire hazard mitigation - SB 762
- Wildfire damage resources
- Fire Hardening Grant Program

### Boards, hearings, and committees

- Boards
- Code adoption and review
- Rulemaking hearings and committees
- View live meetings

### Local and regional services

- Local Building Department Directory
- Building department administration
- Regional program services
- Drug lab properties
- Public records request
- Building official list

## BCD Home Page:

- Select “Code adoption and review”
- Select “ORSC – Oregon Residential Specialty Code”

# ORSC Adoption Web Pages

July 5 -  
Aug. 21,  
2022

**Code amendment proposal period** | Code amendment proposals will be accepted until Aug. 21, 2022.

[Submit a code amendment proposal.](#)

## Energy efficiency proposal resources

\*New requirements for energy efficiency proposals have been adopted.

The application describes those requirements in detail.

- Base code and BCD proposed provisions: [2023 ORSC - Draft Chapter 11, Energy Efficiency](#)
- Modeling
  - [2021 ORSC - Baseline inputs and assumptions](#)
  - [2023 ORSC - Baseline inputs and assumptions](#)
  - Fuel costs
    - Energy Source: Electricity
      - BTU Unit Conversion: 3,413 BTU/kWh
      - Price(\$): 0.110
    - Energy Source: Natural gas
      - BTU Unit Conversion: 100,000 BTU/Therm
      - Price(\$): 1.149

## Oregon Residential Specialty Code Adoption

- Link for submitting a code proposal
- Draft copy of “[2023 ORSC – Draft Chapter 11, Energy Efficiency](#)”
- Baseline inputs and Assumptions spreadsheets (I&A) for the 2021 code and 2023 Baseline document
- Fuel costs for energy sources

# CH 11 Draft Document

## Baseline document for proposals.

- Blue shows minimum revisions proposed for inclusion in 2023 ORSC to meet ZERH-Equivalent v.06 performance.
- Starting point for the code committee review
  - Bold, Blue Underline: New for 2023
  - ~~Blue Strikeout~~: Deleted from 2021
- Proposed changes:
  - Red, bold underline for adding language
  - ~~Red strikethrough~~ for deleting language

**CHAPTER 11  
ENERGY EFFICIENCY**

**PART I—ENERGY CONSERVATION**

**SECTION N1101  
SCOPE**

**N1101.1 General.** The provisions of this chapter regulate the exterior envelope, as well as the design, construction and selection of heating, ventilating and air-conditioning systems, lighting and piping insulation required for the purpose of effective conservation of energy within a building or structure governed by this code.

All conditioned spaces within residential buildings shall comply with Table N1101.1(1) and one additional measure from Table N1101.1(2).

**Exceptions:**

1. Application to existing buildings shall comply with Section N1101.2.
2. Application to additions shall comply with Section N1101.3.
3. Heated or cooled detached *accessory structures* that are not habitable shall meet the following envelope requirements without any additional measures: Walls: R-21/U-0.064; Roofs: R-38/U-0.027 (attic) or R-20 continuous insulation/U-0.048 (above deck); Windows: U-0.35; Opaque doors: U-0.70; Roll-up doors: U-0.50.
4. New buildings using Section N1105.3.1, Exception 3, shall select two additional measures from Table N1101.1(2).

**N1101.2 Application to existing buildings.** Alteration and repairs, historic buildings and change of use or occupancy to buildings, structures or portions thereof shall comply with the requirements in Sections N1101.2.1 through N1101.2.3.

**N1101.2.1 Alteration and repair.** Alterations and repairs affecting energy conservation measures shall conform to the requirements specified in this chapter.

preservation office(r) or by official action of a local government.

**N1101.2.3 Change of occupancy or use.** Definition of “change of use” for purposes of Section N1101.2.3 is a change of use in an existing residential building and shall include any of the following: any unconditioned spaces such as an attached garage, basement, porch, or canopy that are to become conditioned spaces; any unconditioned, inhabitable space that is to become conditioned space, such as a large attic.

**N1101.2.3.1 Change of use.** A building that changes use, without any changes to the components regulated in this chapter, is required to comply with Table N1101.2 to the greatest extent practical. Changes of use that are greater than 30 percent of the existing building heated floor area or more than 400 square feet (37 m<sup>2</sup>) in area, whichever is less, shall be required to select one measure from Table N1101.3.

**N1101.2.3.2 Change of occupancy.** Alteration and repair of conditioned nonresidential buildings, such as a small church or school, that are changing occupancy to residential dwellings shall use Table N1101.2 to the greatest extent practical and select one measure from Table N1101.1(2), or Table N1101.3.

**Exception:** The minimum component requirements shall be disregarded when thermal performance calculations are completed for change of use to Group R-3 occupancy, when such calculations demonstrate similar performance to the requirements of Table N1101.2.

**TABLE N1101.2  
EXISTING BUILDING COMPONENT REQUIREMENTS**

BUILDING COMPONENTS	REQUIRED PERFORMANCE	EQUIVALENT VALUE
Wall insulation	U-0.083	R-15
Flat ceiling	U-0.025	R-49

# Proposal Application Document

## All proposed code changes:

- **Part I** - Show code change
- **Part II** - Proposal requirements
  - Administration of code is outside of code change scope
  - Other laws, rules, or codes
- **Part III** - Proposal criteria (any revision)
  - How to describe for the code committee
  - Fiscal

## Energy code changes:

- **Part IV**: Alignment with new rules
  - Modeling of energy savings
  - Cost of revisions



## Code Amendment Proposal Application

Department of Consumer & Business Services

Building Codes Division

1535 Edgewater NW, Salem, Oregon

Mailing address: P.O. Box 14470, Salem, OR 97309-0404

Phone: 503-378-4133, Fax: 503-378-2322

Oregon.gov/bcd

Read the entire code amendment proposal application before completing this form. Please complete all parts before submitting your proposal and refer to the provided checklist.

### APPLICANT INFORMATION

Name:	Date:	
Representing (if applicable):	Work phone:	
Mailing address:	Cell phone:	
City:	State:	Zip:
Email address:		

### PROPOSAL INFORMATION

Specialty code:
Code section(s):
Briefly explain the subject of your proposal:

### INSTRUCTIONS AND CHECKLIST

Fill in all the information above and submit this page, signed and dated, with the required supplementary information for Parts I, II, III, and IV described on page 2 of this application. This application may be submitted by mail to the mailing address above, or by email to [BCD.PTSPtech@oregon.gov](mailto:BCD.PTSPtech@oregon.gov).

#### Summary checklist for the applicant:

- Part I** Code amendment language is attached in the proper format.
- Part II** Amendment proposal requirements for amending the code have been reviewed.
- Part III** Amendment proposal criteria questions have been answered and are attached.
- Part IV** If applicable, additional ORSC energy efficiency amendment proposal information is attached.

# Proposal Format

Examples of format for showing revisions in the proposal application

- Existing 2021 ORSC language (black font), modifying is **red** font
- Modifying baseline revisions for 2023 ORSC to meet ZERH equivalency (**blue** font)

Copy the language into the proposal and mark up as shown for each proposed change.

3. Heated or cooled detached accessory structures that are not habitable shall meet the following envelope requirements without any additional measures: Walls: R-21/U-0.064; Roofs: R-38/U-0.027 (attic) or R-20 continuous insulation/U-0.048 (above deck); Windows: U-0.35; Opaque doors: ~~U-0.70~~ **U-0.50**; Roll-up doors: U-0.50.

4. New buildings using Section N1105.3.1, Exception 3, shall select **two eight** additional measures from Table N1101.1(2).



# Draft 2023 Inputs and Assumptions Document

DRAFT 2023 Oregon Residential Specialty Code (ORSC) - Modeling Inputs & Assumptions					
	Component	Input	Assumption Notes	Methodology or Market & Data Source	
Building Components	Climate Zone	Salem & Redmond	Salem (4C) used in National reporting. Redmond represents most populous Metropolitan Statistical Area (MSA) in 5B.	<a href="#">Preliminary Energy Savings Analysis: 2018 IECC Residential Requirements.</a>	
	Size	2,376	54-ft-by-22 ft, two-story, 8.5-ft height each floor.	Methodology: <a href="#">PNNL-21294 Rev 1.</a>	
	Volume	20,196	2,376sf x 8.5-ft-high ceilings.		
	Number of Bedrooms	4	Occupants not specified in REM/Rate. Use bedrooms +1 (5) for number of occupants if necessary.	Methodology: <a href="#">DOE Zero Energy Ready Home National Program Requirements (Rev. 06). Exhibit 3: Benchmark Home Size.</a>	
	Orientation	South	Smallest wall w/ front door faces south. Rear door opposite.	Market: Typical home orientation on narrow deep lot.	
Envelope Components	Slab Edge Perimeter	R-15 w/ 2-ft. Vertical Depth (F-0.520)	Area: 1,188-sf (54-ft-by-22ft). Perimeter Length: 152-lf. Used for Slab-On-Grade (SOG) home analysis.		
	Underfloors	R-30 (U-0.033)	Area: 1,188-sf. Used for enclosed 'vented' crawl spaces (2' high) with thermal boundary location at the 'floor' and uninsulated foundation walls.	2021 ORSC, Table N1101.1(1) & ASHRAE 90.1 Appendix A for R-Values and U-Values; Insulated headers per <a href="#">Section N1104.5.2</a> . PNNL-21294 Rev 1 for dimensions; All REM/Rate envelope inputs assume Insulation Grade I.	
	Rim and Band Joist	R-21	Area: 152 sf (152 lineal feet x 1' height). Joist spacing = 24 inches o.c.		
	Wall Insulation - Above Grade	R-21 (U-0.059)	Area: 352-ft ea. (16'x 22' South/North) & 864-ft. ea. (54'x16' East/West). Intermediate Framing. 'Medium' Exterior Color.		
	Window Areas	Total: 356.4-sf. Each wall: 89.1-sf	No overhangs or shading. Previous AM #7 not proposed to continue.	PNNL-21294: 15% relative to (CFA), equally distributed to the cardinal directions.	
	Windows	U-0.27	SHGC 0.30		
	Exterior Doors	U-0.20	Area: 42-sf. (1-South/1-North)	2021 ORSC, Table N1101.1(1) & ASHRAE 90.1 Appendix A for U-Values. NEEA Regional Data indicates SHGC value. PNNL-21294 Rev 1 for dimensions.	
	Flat Ceilings	R-49 (U-0.021)	Area: 1,188-sf. Use REM/Rate default of 1,485 SF for Attic Exterior Area. 'Medium' Exterior Color		
Mechanical	Heating (Gas)	AFUE 94%	Additional Measure #1 - High Efficiency HVAC System (AM#1): Gas-fired furnace or boiler AFUE 94%	2023 ORSC, Table N1101.1(2). Furnace location in conditioned space per <a href="#">N1105.3 Installation of ducts</a> . Cooling tonnage and heating output capacity based on REM/Rate Equipment Sizing Summary Report or other modeling software analysis. Sensible Heat Fraction = 0.75 (Mid-	
	Cooling (Gas)	13 SEER	AM#1: WITH cooling. SEER = Federal Minimum standard.		
	Split Heat Pump (Electric)	HSPF 10.0	AM#1. Air source heat pump HSPF 10.0/15.0 SEER cooling		

# Draft 2023 Inputs and Assumptions Document

## Document proposed changes to I&A sheet, including any differences used in energy models

- For each component related to the proposal:
  - Show intended revisions of Input (**Bold, Red Underline**)
  - Changes in assumptions (if applicable)
  - Methodology used; source of data

11	Envelope Components	Rim and Band Joist	R-21	Area: 152 sf (152 lineal feet x 1' height). Joist spacing = 24 inches o.c.	21294 Rev 1 for dimensions; All REM/Rate envelope inputs assume Insulation Grade I.
12		Wall Insulation - Above Grade	R-21 (U-0.059)	Area: 352-ft ea. (16'x 22' South/North) & 864-ft. ea. (54'x16' East/West). Intermediate Framing. 'Medium' Exterior Color.	
13		Window Areas	Total: 356.4-sf. Each wall: 89.1-sf	No overhangs or shading. Previous AM #7 not proposed to continue.	PNNL-21294: 15% relative to (CFA), equally distributed to the cardinal directions.
14		Windows	<del>U-0.27</del> <b><u>U-0.XX</u></b> <b><u>SHGC 0.YY</u></b>	SHGC 0.30 <b><u>Minimum SHGC added to code.</u></b>	
15		Exterior Doors	U-0.20	Area: 42-sf. (1-South/1-North)	2021 ORSC, Table N1101.1(1) & ASHRAE 90.1 Appendix A for U-Values. <b>NEEA Regional Data indicates SHGC value.</b> PNNL-21294 Rev 1 for dimensions.
16		Flat Ceilings	R-49 (U-0.021)	Area: 1,188-sf. Use REM/Rate default of 1,485 SF for Attic Exterior Area. 'Medium' Exterior Color	

# Energy Analysis Results

## Energy Model should show weighted annual energy use and cost for before (2023 baseline) and after proposed revision

- Weighting of results by Climate Zone, Heating fuel (Gas/Electric), Crawlspace vs. Slab on Grade (SOG), and Without AC (Gas homes)
- Weighting of each example using figures in I&A spreadsheet

43	4C, Gas, Crawl	23.93%		
44	4C, Gas, Crawl, NO A/C	12.66%		
45	4C, Electric, Crawl	3.76%		
46	4C, Electric, Crawl, Zonal	3.78%		
47	4C, Gas, SOG	8.19%		
48	4C, Gas, SOG, NO A/C	4.33%		
49	4C, Electric, SOG	1.29%		
50	4C, Electric, SOG, Zonal	1.30%	Homes with NO A/C are modeled without cooling. Zonal Homes are modeled without cooling and ducts.	Construction weights provided by NEEA in June of 2020.
51	5B, Gas, Crawl	16.46%		
52	5B, Gas, Crawl, NO A/C	8.71%		
53	5B, Electric, Crawl	2.58%		
54	5B, Electric, Crawl, Zonal	2.60%		
55	5B, Gas, SOG	5.64%		
56	5B, Gas, SOG, NO A/C	2.98%		
57	5B, Electric, SOG	0.89%		
58	5B, Electric, SOG, Zonal	0.89%		

# Energy Analysis Results

Energy Model should show at least the Simple Payback rollup, but Life Cycle Cost (LCC) is also acceptable.

Reach Code Proposal - Energy Savings Summary Worksheet						Proposed By: Organization(s) Name				
Savings Based on 2021 ORSC w/ Additional Measure #7 as of Nov. 2nd, 2020						Date Submitted: 12/XX/2020				
2021 ORSC Average (Mbtu)		0.00								
Item #	Component Description	Weighted Averages (Energy)				Weighted Averages (Costs)				Individual Component Notes and Data Sources
		Modeled Reach Code (Mbtu)	Savings Over Prev Item (Mbtu)	Cumulative Savings Over 2021 (Mbtu)	% Change Over ORSC 2021	Component Energy Cost Savings	Component Incremental Cost	Simple Payback (Years)	Comp. Lifespan (Years)	
1	Brief Description	0.00	n/a	0.00	#DIV/0!			#DIV/0!		Enter further item description and/or data source.
2	Brief Description	0.00	0.00	0.00	#DIV/0!			#DIV/0!		
3	Brief Description	0.00	0.00	0.00	#DIV/0!			#DIV/0!		
4	Brief Description	0.00	0.00	0.00	#DIV/0!			#DIV/0!		
5	Brief Description	0.00	0.00	0.00	#DIV/0!			#DIV/0!		
6	Brief Description	0.00	0.00	0.00	#DIV/0!			#DIV/0!		
7	Brief Description	0.00	0.00	0.00	#DIV/0!			#DIV/0!		
8	Brief Description	0.00	0.00	0.00	#DIV/0!			#DIV/0!		
9	Brief Description	0.00	0.00	0.00	#DIV/0!			#DIV/0!		
10	Brief Description	0.00	0.00	0.00	#DIV/0!			#DIV/0!		
<b>PROPOSED Reach Code (Mbtu)</b>		<b>0.00</b>		<b>0.00</b>	<b>#DIV/0!</b>	<b>\$</b>				
Assumed Costs of Energy		Elect. (kWh):	\$ 0.1128	Gas (Therm):	\$ 0.9614					

*Simple Payback detail*

Savings Estimates		Weighted Ave.
Cost to Construct - Weighted Average		\$2,482
Savings over 2021 ORSC (Mbtu)		15.78
Percent Energy Savings		18.48%
Annual Cost Savings		\$374
<b>Simple payback in years</b>		<b>6.6</b>

*Simple Payback rollup*



# Cost Analysis Results

**Energy Model should show verifiable cost data. Example of Advanced Framing with R-21 Walls:**

<b>FRAMING DECREASE</b>	
2,376	SF
\$12.64	Materials/SF
<b>\$30,033</b>	<b>Total Materials</b>
<i>\$901</i>	<i>3% Savings per DOE/NAHB</i>
\$7.25	Labor/SF
<b>\$17,226</b>	<b>Total Labor</b>
<i>\$689</i>	<i>4% Savings per DOE</i>
<b>\$47,258.64</b>	<b>Labor + Materials</b>
\$19.89	Per/SF
\$19.89	NAHB Average
<b>\$1,590</b>	<b>L&amp;M Savings (Framing)</b>

<b>INSULATION INCREASE</b>	
2,376	SF
\$1.475	Materials/SF
<b>\$3,505</b>	<b>Total Materials</b>
<i>\$1,414</i>	<i>R-21 to R-23 Increase</i>
\$1.12	Labor/SF
<b>\$2,661</b>	<b>Total Labor</b>
<i>\$67</i>	<i>2.5% Increase</i>
<b>\$6,166</b>	<b>Labor + Materials</b>
\$2.60	Per/SF
\$2.00	NAHB Average
<b>\$1,480</b>	<b>L&amp;M Increase (Insul.)</b>

<b>\$110</b>	<b>ADV FRAMING SAVINGS w/ R-23</b>
\$9.99	9.1% Profit
\$5.38	4.9% Overhead
<b>\$125</b>	<b>TOTAL SAVINGS (ADV. R-23)</b>

**MUST Include  
(per new Rule)**

- Materials
- Labor
- Profit & Overhead

# Other Notes for Proposals

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- Look for Synergies with other proposals (work together)
- Review other proposals to see if you wish to provide input to committee
- As time permits, Division will be reaching out to proponents
  - Completeness of proposals
- Assistance with energy models?

# Home Size

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## **If proposing, information on energy use and costs relative to smaller and/or larger homes**

- Assumptions likely to remain the same between size models and I&A baseline:
  - Occupants, plug load, DHW use, orientation of home (incl. window ratio per exposure)
  - Assumptions likely to differ: Ventilation, envelope (maintain ratio of window-to-wall), HVAC system size, etc.
    - Proposal of what more/less is required relative to baseline code (based on the home size)

# ERI Compliance Path vs. “Modeling”

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## Energy Rating Index Compliance Path

- Energy “Modeling” outdated
- IECC Residential has ERI path (HERS rating)
  - Language ready to go, with only alignment of ERI score to “Code baseline”
  - ERI Target would be pending final document recommended by committee
  - Considering recommendation to code committee and Board



# Proposals for Energy Code Questions and Answers

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**QUESTIONS?**

**Discussion...**

## Meeting Wrap-up



- Action items identified and distributed
- Next meeting date 9/13/2022
- Any questions, please send to:  
[Roger.Kainu@Oregon.Gov](mailto:Roger.Kainu@Oregon.Gov)

- Meeting materials:  
<https://www.oregon.gov/energy/Get-Involved/Pages/Energy-Code-Stakeholder-Panel.aspx>

- BCD:  
<https://www.oregon.gov/bcd/Pages/index.aspx>