



STATE OF WASHINGTON

## STATE BUILDING CODE COUNCIL

141-2018  
Rev 7/12/18

### 2015 Washington State Energy Code Development Standard Energy Code Proposal Form

Code being amended:  [Commercial](#) Provisions  [Residential](#) Provisions  
(A MS Word version of the code is linked to the name)

Code Section # Primarily Section C407, but related requirements in C401.2, C402.4.1.3, C402.4.1.4, C403.5, C403.6.10

**Brief Description: This proposal will replace the current whole building performance path in the code with the procedures ASHRAE Standard 90.1 Appendix G along with Washington State specific performance targets to maintain the stringency of the Washington code. Targets are based on the carbon emissions that are used in the Washington State Life Cycle Cost Analysis Tool (Economic Data Input Sheet). Targets are developed based on a comparison of prototype buildings representing good practice and compliance with the Washington code Integrated Draft as compared to the Appendix G baseline requirements. Targets are then reduced by an additional 7% in accordance with current Washington State C407 procedures accounting for when two additional efficiency measures are included. This is because two options are included in the target calculation analysis.**

Proposed code change text: (Copy the existing text from the Integrated Draft, linked above, and then use underline for new text and ~~strikeout~~ for text to be deleted.)

**C401.2 Application.** Commercial buildings shall comply with one of the following:

1. The requirements of Sections C402, C403, C404, C405, C406, C408, C409 and C410.
2. The requirements of Section C407. ~~The building energy consumption shall be equal to or less than 87, 90 or 93 percent of the standard reference design building, depending on the option selected per Section C407.3.~~

**C402.4.1.3 Increased vertical fenestration area with high-performance fenestration.** The vertical *fenestration* area (not including opaque doors and opaque spandrel panels) is permitted to exceed 30% but shall not exceed 40% of the gross above grade wall area, for the purpose of prescriptive compliance with Section C402.1.3 provided that each of the following conditions are met:

1. The vertical *fenestration* shall have the following U-factors:
  - a. Non-metal framing (all) = 0.28
  - b. Metal framing (fixed) = 0.34
  - c. Metal framing (operable) = 0.36
  - d. Metal framing (entrance doors) = 0.60
2. The SHGC of the vertical fenestration shall be less than or equal to 0.35, adjusted for projection factor in compliance with C402.4.3.

An area-weighted average shall be permitted to satisfy the U-factor requirement for each fenestration product category listed in Item 1 of this section. Individual fenestration products from different fenestration product categories shall not be combined in calculating the area-weighted average *U*-factor.

~~The compliance path described in this section is not permitted to be used for the Total Building Performance compliance path in Section C407.~~ The compliance path described in this section is permitted to be used for the component performance alternative in Section C402.1.5, provided that the requirements of Section C402.1.5 are met.

**C402.4.1.4 Increased vertical fenestration area with high-performance mechanical systems.** The vertical fenestration area (not including opaque doors and opaque spandrel panels) is permitted to exceed 30 percent but shall not exceed 40 percent of the gross above-grade wall area, for the purpose of prescriptive compliance with Section C402.1.4 or for the component performance alternative in Section C402.1.5, provided that the mechanical system complies with all requirements of Section C403.3.5, dedicated outdoor air systems (DOAS) without utilizing the exceptions to Section C403.3.5. ~~This increased glazing fraction is not permitted to be used to establish the reference case for the Total Building Performance compliance path in Section C407.~~

**C403.3.5 Dedicated outdoor air systems (DOAS).** For office, retail, education, libraries and fire stations, outdoor air shall be provided to each occupied space by a dedicated outdoor air system (DOAS) which delivers 100 percent outdoor air without requiring operation of the heating and cooling system fans for ventilation air delivery.

**Exceptions:**

1. Occupied spaces that are not ventilated by a mechanical ventilation system and are only ventilated by a natural ventilation system per Section 402 of the *International Mechanical Code*.
2. High efficiency variable air volume (VAV) systems complying with Section C403.6.10. This exception shall not be used as a substitution for a DOAS per Section C406.6 ~~or as a modification to the requirements for the Standard Reference Design per Section C407~~
3. **C403.6.10 High efficiency variable air volume (VAV) systems.** For HVAC systems subject to the requirements of Section C403.3.5 but utilizing Exception 2 of that section, a high efficiency VAV system may be provided without a separate parallel DOAS when the system is designed, installed, and configured to comply with all of the following criteria (this exception shall not be used as a substitution for a DOAS per Section C406.6 ~~or as a modification to the requirements for the Standard Reference Design per Section C407~~):

**Section C407**

*Delete everything from Section C407.3 to end of section C407 and replace with the following.*

**C407.3 Performance-based compliance.** Compliance with this section requires compliance with ASHRAE Standard 90.1 Appendix G, Performance Rating Method in accordance with Standard 90.1 Section 4.2.1 with the following modifications.

**C407.3.1** The mandatory requirements of Section G1.2.1a of Standard 90.1, are not required to be met.

**C407.3.2** The reduction in annual carbon emissions of the proposed building design associated with on-site renewable energy shall not be more than 3 percent of the total carbon emissions of the baseline building design.

**C407.3.3** References to energy cost in Section 4.2.1.1 and Appendix G shall be replaced by carbon emissions calculated by multiplying site energy consumption by the carbon emission factor from Table C407.1

**C407.3.4** The Building Performance Factors in Table 4.2.1.1 shall be replaced with those in Table C407.2.

**Table C407.1 . Carbon Emissions Factors**

Type	CO2e (lb/unit)	Unit
Electricity	0.82	kWh
Natural Gas	11.7	Therm
Oil	19.2	Gallon
Propane	10.5	Gallon
Other*	195.00	mmBTU
On-site renewable energy	0.00	

\*District energy systems may use alternative emission factors supported by calculations approved by the code official

**Table C407.2 – Building Performance Factors (BPF) to be Used for Compliance with Section C407.3**

<u>Building Area Type</u> <sup>1</sup>	<u>Multifamily</u>	<u>Healthcare/ hospital</u>	<u>Hotel/motel</u>	<u>Office</u>	<u>Restaurant</u>	<u>Retail</u>	<u>School</u>	<u>Warehouse</u>	<u>All Others</u>
<u>Building Performance Factor</u>	<u>0.59</u>	<u>0.54</u>	<u>0.64</u>	<u>0.57</u>	<u>0.68</u>	<u>0.48</u>	<u>0.37</u>	<u>0.47</u>	<u>0.54</u>

Purpose of code change: The switch to the Appendix G methodology provides a number of benefits to projects complying with the Washington State energy code Performance path.

1. Projects modeling for LEED compliance or ASHRAE Standard 189.1 will no longer need to create a second baseline for code compliance saving project costs and potential errors from having to follow two separate baseline model rulesets.
2. The Appendix G approach provides credit for good design practices that are not recognized by the current Washington State performance approach, including:
  - a. Optimized building orientation
  - b. Optimized window area
  - c. Efficient HVAC system type selection
  - d. Right sizing of HVAC equipment
  - e. Efficient use of thermal mass
3. Since Appendix G is widely used nationally, several organizations are developing tools that will automate the generation of the baseline model. If the baseline is generated automatically by approved software, the jurisdiction can save time by not having to review that portion of the model.
4. There is a detailed manual providing guidance to modelers implementing the procedures and numerous training opportunities offered as well.
5. Since the building performance is rated on a fixed scale with net zero energy being one endpoint, it will aid Washington State in tracking its progress toward legislated target of 70% reduction in energy use
6. Prevents Washington State code developers from having to maintain their own performance ruleset while allowing them to set stringency at any appropriate level.

Your amendment must meet one of the following criteria. Select at least one:

- |  |  |
|--|--|
| <input type="checkbox"/> Addresses a critical life/safety need.  | <input checked="" type="checkbox"/> Consistency with state or federal regulations. |
| <input checked="" type="checkbox"/> Addresses a specific state policy or statute.<br>(Note that energy conservation is a state policy) | <input checked="" type="checkbox"/> Addresses a unique character of the state.     |
|  | <input type="checkbox"/> Corrects errors and omissions.                            |

Check the building types that would be impacted by your code change:

- |  |  |   |
|--|--|---|
| <input type="checkbox"/> Single family/duplex/townhome | <input checked="" type="checkbox"/> Multi-family 4 + stories | <input checked="" type="checkbox"/> Institutional |
| <input type="checkbox"/> Multi-family 1 – 3 stories    | <input checked="" type="checkbox"/> Commercial / Retail      | <input checked="" type="checkbox"/> Industrial    |

Your name                      Michael Rosenberg

Your organization          Pacific Northwest National  
Laboratory

Other contact name [Click here to enter text.](#)

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**Instructions:** Send this form as an email attachment, along with any other documentation available, to: [sbcc@ga.wa.gov](mailto:sbcc@ga.wa.gov). For further information, call the State Building Code Council at 360-407-9280. **Deadline for all 2018 code change proposals is \_\_\_\_\_.**

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**Table C407.2 – Building Performance Factors (BPF) to be Used for Compliance with Section C407.3**

	<u>Building Area Type<sup>1</sup></u>	<u>Multifamily</u>	<u>Healthcare/ hospital</u>	<u>Hotel/motel</u>	<u>Office</u>	<u>Restaurant</u>	<u>Retail</u>	<u>School</u>	<u>Warehouse</u>	<u>All Others</u>
<u><i>1.0 lbs CO2/kWh</i></u>	<u>Building Performance Factor</u>	<u>0.60</u>	<u>0.54</u>	<u>0.64</u>	<u>0.58</u>	<u>0.65</u>	<u>0.49</u>	<u>0.39</u>	<u>0.46</u>	<u>0.57</u>
<u><i>0.82 lbs CO2/kWh</i></u>	<u>Building Performance Factor</u>	<u>0.59</u>	<u>0.54</u>	<u>0.64</u>	<u>0.57</u>	<u>0.68</u>	<u>0.48</u>	<u>0.37</u>	<u>0.47</u>	<u>0.54</u>
<u><i>0.46lbs CO2/kWh</i></u>	<u>Building Performance Factor</u>	<u>0.54</u>	<u>0.54</u>	<u>0.63</u>	<u>0.53</u>	<u>0.75</u>	<u>0.46</u>	<u>0.31</u>	<u>0.50</u>	<u>0.53</u>

## **Economic Impact Data Sheet**

Briefly summarize your proposal's primary economic impacts and benefits to building owners, tenants and businesses. See <https://fortress.wa.gov/ga/apps/SBCC/File.ashx?cid=6075> for directions for lifetime cost analysis procedure.

**The proposal is expected to save modeling costs for building owners pursuing LEED, Standard 189.1 (IGCC) or other beyond code programs since a second baseline model will not be needed. It could potentially save additional modeling costs if software becomes available to automate the process generating the baseline models. Jurisdiction review costs should be reduced if nationally developed compliance documentation is required.**

Provide your best estimate of the construction cost (or cost savings) of your code change proposal?

**\$0.07/square foot for a 50,000 ft2 building** (For residential projects, also provide [Click here to enter text.](#)/ dwelling unit)

Show calculations here, and list sources for costs/savings, or attach backup data pages

**Typical modeling costs vary significantly, but communication with several modelers indicate that a cost of \$0.18 - \$0.24/ft2 for a 50,000 ft2 building with a single baseline model is reasonable. If a second baseline model is needed, costs can be expected to increase by 1/3 or about\$0.07/ft2.**

Provide your best estimate of the annual energy savings (or additional energy use) for your code change proposal?

**While the proposed code change is expected to result in increased energy savings for projects choosing this path, it is impossible to estimate savings as there is an infinite number of design solutions that can satisfy the new requirement.**

[Click here to enter text.](#)KWH/ square foot (or) [Click here to enter text.](#)KBTU/ square foot

(For residential projects, also provide [Click here to enter text.](#)KWH/KBTU / dwelling unit)

Show calculations here, and list sources for energy savings estimates, or attach backup data pages

List any code enforcement time for additional plan review or inspections that your proposal will require, in hours per permit application:

**Codes enforcement time is expected to decrease based on available compliance documentation, higher quality of models due to a more universal ruleset, and potentially elimination of the baseline model review if automated software is used.**

**All questions must be answered to be considered complete. Incomplete proposals will not be accepted.**