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STATE OF WASHINGTON

STATE BUILDING CODE COUNCIL

Washington State Energy Code Development

Standard Energy Code Proposal Form

Code being amended: ☒ Commercial Provisions ☐ Residential Provisions

Code Section # ____ C407_____

Brief Description:

This change provides multiple revisions to Section C407 Total Building Performance.

1. Adds clarifications resulting from questions and interpretation requests posed by user of the new C407 approach including:
    a. That mandatory requirements are based on the WSEC and not ASHRAE 90.1
    b. Simulation of yet-to-be designed components (typically tenant build-outs) shall be assumed to meet the requirements of the WSEC and not ASHRAE 90.1

2. Adds credential and experience requirements for energy modelers

3. Increases the stringency of the building performance factors used to set emissions targets which are based on regulated loads only by 10% over the previous code. Note that if the carbon emissions factors in Table C407.3(1) are updated during development of the 2022 code, the Building Performance Factors in Table C407.3(2) should be updated by PNNL to match the intent of this proposal.

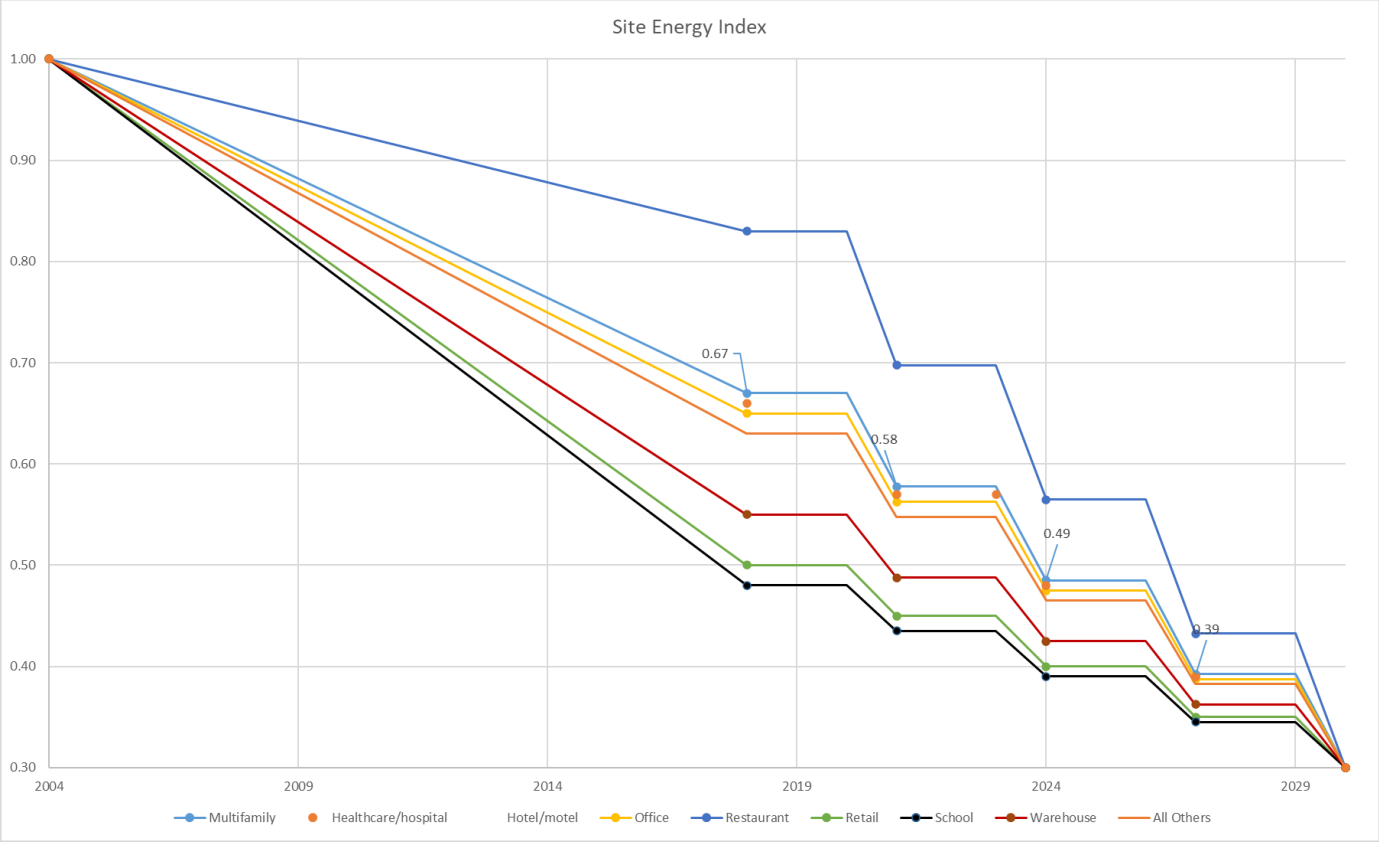
4. Added a second metric for compliance based on site energy performance that includes all loads (regulated and unregulated). The target for this new site energy metric is based on a tiered improvement from the 2018 WSEC to a 0.3 site energy use performance index by 2030 compared to the Appendix G Standard 90.1-2004 baseline (see table and graph below). This is meant to meet the intent of the Washington State policy goal of having a code in 2030 that will result in new buildings that use 30% of the site energy of a building built to the 2006 WSEC.

5. Adds allowances for reductions in site energy to be satisfied by use of on-site or off-site renewable energy sources and improvements to unregulated loads, as approved by the jurisdiction. The remaining existing carbon metric will not allow credit for improvements in unregulated loads or renewable energy systems, thus preserving the energy efficiency of the building itself.

6. Sets criteria for how off-site renewable energy systems will be credited patterned after those in ASHRAE Standards 189.1 and 228. This includes discounting of credit, requirements for tracking renewable energy certificates, and other documentation.

Site Energy Performance Index Improvement through 2030

Site Energy Performance Index									
Year	Multifamily	Healthcare/hospital	Hotel/motel	Office	Restaurant	Retail	School	Warehouse	All Others
2004	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
2018	0.67	0.66	0.73	0.65	0.83	0.50	0.48	0.55	0.63
2019	0.67	0.66	0.73	0.65	0.83	0.50	0.48	0.55	0.63
2020	0.67	0.66	0.73	0.65	0.83	0.50	0.48	0.55	0.63
2021	0.58	0.57	0.62	0.56	0.70	0.45	0.44	0.49	0.55
2022	0.58	0.57	0.62	0.56	0.70	0.45	0.44	0.49	0.55
2023	0.58	0.57	0.62	0.56	0.70	0.45	0.44	0.49	0.55
2024	0.49	0.48	0.52	0.48	0.57	0.40	0.39	0.43	0.47
2025	0.49	0.48	0.52	0.48	0.57	0.40	0.39	0.43	0.47
2026	0.49	0.48	0.52	0.48	0.57	0.40	0.39	0.43	0.47
2027	0.39	0.39	0.41	0.39	0.43	0.35	0.35	0.36	0.38
2028	0.39	0.39	0.41	0.39	0.43	0.35	0.35	0.36	0.38
2029	0.39	0.39	0.41	0.39	0.43	0.35	0.35	0.36	0.38
2030	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30



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

- See attached document.

Purpose of code change:

- To provide clarifications based on interpretation requests and user inquiries.
- To increase stringency to match the expected improvement in prescriptive requirements
- To provide greater quality assurance by requiring qualified modelers
- To provide a metric to support site energy use reduction

- To encourage improvements in loads currently not regulated by the code

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

☐ Addresses a critical life/safety need.

☒ The amendment clarifies the intent or application of the code.

☒ Addresses a specific state policy or statute.
(Note that energy conservation is a state policy)

☒ Consistency with state or federal regulations.

☐ Addresses a unique character of the state.

☐ Corrects errors and omissions.

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

☐ Single family/duplex/townhome

☐ Multi-family 1 – 3 stories

☒ Multi-family 4 + stories

☒ Commercial / Retail

☒ Institutional

☐ Industrial

Your name	Michael Rosenberg	Other contact name	Click here to enter text.
Your organization	Pacific Northwest National Laboratory	Email address	michael.rosenberg@pnnl.gov
		Phone number	(509) 375-1995

Instructions: Send this form as an email attachment, along with any other documentation available, to: sbcc@des.wa.gov. For further information, call the State Building Code Council at 360-407-9278.

Economic Impact Data Sheet

Briefly summarize your proposal's primary economic impacts and benefits to building owners, tenants and businesses.

This proposal will ensure low energy use and emissions from buildings that chose to use the optional C407 whole-building performance path.

Provide your best estimate of the construction cost (or cost savings) of your code change proposal? (See OFM Life Cycle Cost **Analysis tool** and **Instructions;** use these **Inputs**. **Webinars on the tool can be found Here and Here**)

$Click here to enter text./square foot (For residential projects, also provide $Click here to enter text./ dwelling unit)

The C407 Performance path is an optional path meant to allow design flexibility and therefore there is no required increase in first cost or design cost.

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

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

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

Projects choosing this path will be required to use ~ 13% less site energy than was required by the 2018 WSEC. As shown in the table above (all other column), a building built to the new requirement will have a site energy performance index of 0.55 compared to 0.63, a 13% reduction.

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

The addition of the source energy metric may require some additional time (~1 hour) for a building official to review for the first few projects only.

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

SECTION C202
GENERAL DEFINITIONS

Community renewable energy system. an off-site renewable energy system for which the owner has purchased or leased renewable energy capacity along with other subscribers.

Directly owned off-site renewable energy system. an off-site renewable energy system owned by the building project owner.

~~Virtual~~ Renewable **power purchase agreement**. a power purchase agreement for off-site renewable energy where the owne agrees to purchase renewable energy output and the associated renewable energy certificates at a fixed price schedule.

SECTION C407
TOTAL BUILDING PERFORMANCE

C407.1 Scope. This section establishes criteria for compliance using total building performance. All systems and loads shall be included in determining the total building performance including, but not limited to: Heating systems, cooling systems, service water heating, fan systems, lighting power, receptacle loads and process loads.

Exception: Energy used to recharge or refuel vehicles that are used for on-road and off-site transportation purposes.

C407.2 Mandatory requirements. Compliance with Section C407 ~~this section~~ also requires compliance with those sections shown in Table C407.2.

The building permit application for projects utilizing this method shall include in one submittal all building and mechanical drawings and all information necessary to verify that the building envelope and mechanical design for the project corresponds with the annual energy analysis. If credit is proposed to be taken for lighting energy savings, then an electrical permit application shall also be submitted and approved prior to the issuance of the building permit. If credit is proposed to be taken for energy savings from other components, then the corresponding permit application (e.g., plumbing, boiler, etc.) shall also be submitted and approved prior to the building permit application. Otherwise, components of the project that would not be approved as part of a building permit application shall be modeled ~~the same in both the proposed building and the *standard reference design* and shall comply with~~ in the baseline per ASHRAE Standard 90.1 Appendix G and in the proposed model per the requirements of ~~this code~~ the WSEC.

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.

1. The mandatory requirements of the WSEC are required to be met, instead of those of Section G1.2.1a of Standard 90.1 ~~are not required to be met~~.
2. Compliance with Section C407 requires meeting both an emissions and site energy reduction target in accordance with the following:
   a. ~~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.3.~~ **Carbon emissions target**. The carbon emissions targets is focused on regulated load energy efficiency thus shall be met only via regulated load savings without consideration of the contribution of on-site or off-site renewable energy or unregulated load savings. Adjustments to the PCI_t to account for the contribution of renewable energy found in Standard 90.1-2019 Appendix G Section 4.2.1.1 shall not be used. 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 C407.3(1).~~4.~~ The building performance factors in Table C4.2.1.1 shall be replaced with those in Table C407.3(2).
   b. **Site energy target**. The site energy performance target shall be met including the contributions of on-site and off-site renewable energy as described in Section C407.3.2 as well as the contribution of improvements in unregulated loads as allowed by Section C407.3.3. Compliance with the site energy performance target requires that the proposed building site energy use/baseline building site energy use ≤ site energy performance target from Table C407.3(2).
3. Documentation requirements in Section G1.3.2.d shall be replaced by a list showing compliance with the mandatory provisions of Table C407.2.

4. Documentation requirements in Section G1.3.2.e shall be replaced by a list of aspects of the proposed design that are less stringent than the prescriptive requirements of the Washington State Energy Code.

5. Forms demonstrating compliance with Appendix G developed by the U.S. Department of Energy shall be completed and submitted to the code official. Those forms are available at https://www.energycodes.gov/software/ashrae-standard-901-performance-based-compliance-form.

6. References to yet-to-be-designed future building components in the Proposed Building Performance column of Table G3.1 shall be modified to reference the corresponding sections of the Washington State Energy Code in lieu of the requirements of Standard 90.1, in the following sections of the table:

   a. 1. Design Model, subclause c.

   b. 6. Lighting, subclause c

   c. 11. Service Water-Heating Systems, subclause c.

   d. 12. Receptacle and Other Loads, subclause b.

7. HVAC Systems, subclauses c and d of Table G3.1, shall meet the following requirements:

   a. For yet-to-be-designed systems in office, retail, library, education, and multifamily buildings and occupancies subject to the TSPR requirements of Section C403.1.1, the system type and efficiency parameters shall meet but not exceed those shown in Table D602.11 Standard Reference Design HVAC Systems.

   b. For all other buildings and occupancies, the system type shall be the same as the system modeled in the baseline design and shall comply with but not exceed the requirements of Section C403 in lieu of Standard 90.1.

   c. For HVAC Systems serving future tenant spaces, where the current building permit applies to only a portion of an HVAC system, and future components will receive HVAC services from systems included in the current building permit, those future components shall be modeled as the type required to complete the HVAC system portions under the current permit and shall meet but not exceed the requirements found in Section C403

8. The requirements for proposed and baseline building lighting system shall be modified in accordance to Addendum AF to Standard 90.1-2019.

WSEC Informative Note: Addendum AF to Standard 90.1-2019 is available at- https://www.ashrae.org/file%20library/technical%20resources/standards%20and%20guidelines/standards%20addenda/90_1_2019_af_bc_cd_db_20201116.pdf

9. Energy modeler qualifications: The energy analyst in responsible charge of the C407 submittal shall meet the following qualifications.

   a. One of the following professional certifications:

      i. ASHRAE Building Energy Modeling Professional (BEMP)

      ii. Association of Energy Engineer's Building Energy Simulation Analyst (BESA)

   b. Successfully completed at least 5 projects modeled following any version of ASHRAE Standard 90.1 Appendix G within the last three years that were reviewed and approved by and ~~AHJ~~ *code official* or rating authority.

WSEC Informative Note. The permit applicant is encouraged to schedule a pre-application meeting to discuss the modeling approach for any yet-to-be designed areas that are not included in the C407 permit submissions. In general, future permit submissions should not contribute energy savings to the C407 submission beyond prescriptive code requirements, assuming use of the base building HVAC systems. Future systems must be modeled for the base building permit as being no better than the current prescriptive code, because plans often change and the jurisdiction does not have a mechanism for ensuring that future tenant projects meet any beyond-code performance modeled in the original C407 submission.

C407.3.1 Limits on non-mandatory measures. The Proposed Total UA of the proposed building shall be no more than 20 percent higher than the Allowed Total UA as defined in Section C402.1.5.

Note that if proposal 21-GP1-78 is approved, Section 407.3.2 should be moved to Section C411 with the first clause below changed to C411.3 and subsequent section numbers adjusted. Reference above in Section 407.3 2b would be changed to C411.3

C407.3.2 On-site and off-site renewable energy accounting for use with Appendix G. Qualifying on-site and off-site renewable energy delivered or credited to the building project to comply with Section C407.3.clause 2.b shall meet the requirements of this Section. Renewable energy certificates for an on- or off-site renewable energy system shall be retired on behalf of the building owner for a period of not less than 15 years and tracked in accordance with Section C407.3.2.3 and submitted to the code official as part of the permit application.

C407.3.2.1 Qualifying types of off-site renewable energy systems.

1. ~~Systems that begin operation before January 1, 2022~~ Systems shall be connected to the Western Interconnection

2. Self-generation (an off-site renewable energy system owned by the building project owner); the system shall comply with Section C407.3.2.2
3. Community renewable energy facility; the system shall comply with Section C407.3.2.2
4. Purchase contract: the system shall comply with Section C407.3.2.3
5. Each source of renewable energy delivered to or credited to the building project t shall be multiplied by the factors in Table 407.3.2.1 and subtracted from the proposed building site energy use.

Table 407.3.2.1: Multipliers for Renewable Energy Procurement Methods

Location	Renewable Energy Source	Renewable Energy Factor
On-Site	On-site renewable energy system	1
Off-Site	*Directly owned off-site renewable energy system that begins operation after* ~~January 1st, 2022~~*submission of the initial permit application*	0.95
Off-Site	*Community renewable energy facility that begins operation after submission of the initial permit application*~~January 1st, 2022~~	0.95
Off-Site	*Directly owned off-site renewable energy system that begins operation before submission of the initial permit application*~~January 1st, 2022~~	0.75
Off-Site	*Community renewable energy facility that begins operation before submission of the initial permit application*~~January 1st, 2022~~	0.75
Off-Site	~~*Virtual*~~ *Renewable Power Purchase Agreement* (PPA)	0.75

C407.3.2.2 Documentation requirements for off-site renewable energy systems. Off-site renewable energy delivered or credited to the building project to comply with Section C407.3.clause 2.b shall be subject to a legally binding contract to procure qualifying off-site renewable energy. Qualifying off-site renewable energy shall meet the following requirements:

1. Documentation of off-site renewable energy procurement shall be submitted to the *code official*~~AHJ~~ .
2. The purchase contract shall have a duration of not less than 15 years. The contract shall be structured to survive a partial or full transfer of ownership of the building property.
3. ~~Renewable energy certificates associated with the purchase contract from an off-site renewable energy system shall be assigned exclusively to the building owner for a period of not less than 15 years and tracked in accordance with Section C407.3.2.3~~
3. Records on renewable power purchased by the building owner from the off-site renewable energy generator that specifically assign the RECs to the building owner shall be retained or retired by the building owner on behalf of the entity demonstrating financial or operational control over the building seeking compliance to this standard and made available for inspection by the *code official* ~~AHJ~~ upon request.
4. Where multiple buildings in a building project are allocated energy procured by a contract subject to this section, the owner shall allocate for not less than 15 years the energy procured by the contract to the

buildings in the building project. A plan on operation shall be developed which shall indicate how renewable energy produced from on-site or off-site systems that is not allocated before issuance of the certificate of occupancy will be allocated to new or existing buildings included in the building project.

C407.3.2.3 Renewable Energy Certificate Tracking. For multitenant buildings where RECs are transferred to tenants, the plan for operation shall include procedures for tracking the quantity and vintage of RECs that are required to be retained and retired**.** The plan shall include provisions to transfer the RECs to building tenants, or to retire RECs on their behalf in proportion to the gross conditioned and semiheated floor area leased or rented. The plan shall include provisions to use a REC tracking system that meets the requirements of Section V.B of the Green-e Framework for Renewable Energy Certification. The plan shall describe how the building owner will procure alternative qualifying renewable energy in the case that the renewable energy producer ceases.

C407.3.3 Credit for improvements in unregulated loads when using Appendix G. When calculating savings for site energy targets in accordance with Section C407.3.2b, but not when calculating savings for emissions targets in accordance with Section C407.3.2a, differences in the simulation of unregulated loads and equipment modeled in the baseline building design from those in the proposed design shall be approved by the building official based on documentation that the equipment installed in the proposed design represents a significant verifiable departure from documented current conventional practice. All unregulated equipment for which savings is claimed must be installed by the time of final inspection. The burden of this documentation is to demonstrate that accepted conventional practice would result in baseline building equipment different from that installed in the proposed design. Occupancy and occupancy schedules shall not be changed.

TABLE C407.3(1) CARBON EMISSIONS FACTORS

Type	CO2e (lb/unit)	Unit
Electricity	0.70	kWh
Natural Gas	11.7	Therm
Oil	19.2	Gallon
Propane	10.5	Gallon
Other[a]	195.00	mmBtu
On-site renewable energy	0.00	

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

TABLE C407.3(2)
BUILDING PERFORMANCE FACTORS (BPF) TO BE USED FOR COMPLIANCE WITH SECTION C407.3

Building Area Type	Building Performance Factor
Multifamily	~~0.58~~ 0.52
Healthcare/hospital	~~0.54~~ 0.49
Hotel/motel	~~0.64~~ 0.57
Office	~~0.56~~ 0.5

Restaurant	~~0.70~~ 0.63
Retail	~~0.47~~ 0.43
School	~~0.36~~ 0.33
Warehouse	~~0.48~~ 0.43
All Others	~~0.54~~ 0.49

TABLE C407.3(3)
SITE ENERGY PERFORMANCE TARGETS TO BE USED FOR COMPLIANCE WITH SECTION C407.3

Building Area Type	**Site Energy Performance Targets**
Multifamily	0.58
Healthcare/hospital	0.57
Hotel/motel	0.62
Office	0.56
Restaurant	0.70
Retail	0.45
School	0.44
Warehouse	0.49
All Others	0.55