STATE OF WASHINGTON

STATE BUILDING CODE COUNCIL

Washington State Energy Code Development

Standard Energy Code Proposal Form

Jan 2022

Log No. 24-GP1-208 Vers. 2

Code being amended: ☒ Commercial Provisions ☐ Residential Provisions

Code Sections:

Add new Sections C104.6.2.2 and C104.6.2.3, add new Definitions to C202, add new Section C401.5, C408.8, C408.8.1, C408.8.2, C408.8.3, C409.1.4, edit Section C409.2, add new Sections C413, C413.1, C413.2, C413.2.1, C413.3, C413.3.1, C413.3.2, C413.3.2.1, C413.3.2.2, C413.3.2.3, C413.3.2.4, C413.3.2.5, C413.3.3, C502.3, C503.10 and a new standard reference in Chapter 6.

Brief Description:

The following proposed code changes for the Washington State Energy Code (WSEC) establish a set of requirements for newly constructed buildings, as well as additions and alterations to existing buildings, to ensure code requirements result in the intended energy savings as well as facilitate future compliance with the Washington State Clean Building Performance Standard (BPS) that they will be subjected to once operational.

It is intended to assure that those buildings have the capability to meet future BPS performance targets.

In summary the proposed changes add requirements for:

1. The creation of a predictive energy model, including specifying Building Energy Modeling software and simulation program testing requirements and acceptance criteria for the modeling inputs that demonstrates compliance with future BPS targets.
2. Additional commissioning requirements, including third-party verification, and require commissioning activities before issuing a building permit.
3. Enhanced metering requirements to ensure measured energy use is available for BPS reporting.
4. More detailed building documentation to be provided to the building owner including commissioning documentation, a detailed Operations & Maintenance (O&M) program, and an Energy Performance report.

This is achieved by:

- Introducing new definitions that support the proposed code changes.
- Clarifying metering requirements to enable separate energy consumption monitoring for each fuel type, energy supply source, and building end-use.
- Leveraging existing standards such as:
    - Washington State Clean Buildings Performance Standard, specifically Section 6: Operations and Maintenance Requirements, and Normative Annex L.
    - ASHRAE Standard 140, Standard Method of Test for the Evaluation of Building Energy Analysis Computer Programs.
    - ASHRAE Standard 202, Commissioning Process for Building and Systems.
    - Canadian Standard Association Z5020:2023, Building Energy Modelling, Section 6.2, Absolute Models and Section 8.3, Building Energy Performance Verification.

Proposed code change text:

<<Add Sections C104.6.2.2 and C104.6.2.3:>>

C104.6.2.2 Additional Building Operations and Maintenance Information. Buildings, subject to *BPS* requirements after occupancy, shall meet the requirements of this section. Operating and maintenance information shall be provided to the building *owner*. This information shall include but not be limited to the information specified in Section C104.6.2.1, and all other requirements in the Washington State Clean Buildings Performance Standard (BPS) Section 6 and Normative Annex L not included in C104.6.2.1.

Informative Note: It is recommended that the operating and maintenance plan meets the requirements of the Washington State Clean Buildings Performance Standard (BPS) Informative Annex D, which provides the operations and maintenance requirements for building envelope, domestic hot water systems, heating, ventilating and air-conditioning systems, refrigeration systems, lighting systems, controls systems and electric power distribution and on-site generation systems.

C104.6.2.3 Energy Performance Report. Buildings required to comply with Section C413 shall meet the requirements of this section. The Energy Performance Report meeting the requirements of Section C413.2.1 shall be provided to the building *owner* and the *code official*. Where applicable, the input files of the predictive model and the weather file used to determine building energy performance following Section C413 shall be provided.

<<Add Definitions to SECTION C202 GENERAL DEFINTIONS:>>

BUILDING PERFORMANCE STANDARD (BPS). The adopted Washington State Clean Building Performance Standard at the time of building permit application.

BPS PERFORMANCE METRIC. A unit of measurement used during the design phase or during operation to express *BPS* performance targets that a building will be subject to once it is put into operation.

BPS PREDICTED PERFORMANCE. The estimated post-occupancy energy performance of a building and the associated building site based on the results of the *predictive model* excluding energy use of systems and components exempt from the *BPS* compliance, accounting for *BPS* renewable energy requirements, expressed using the *BPS* performance metric and normalized as required by the *BPS*.

PREDICTIVE MODEL. A computer representation of the actual proposed building design, or portion thereof, developed for the purpose of estimating energy use of the building after it is occupied.

PREDICTED PERFORMANCE. The estimated post-occupancy energy performance of the building and the associated building site which includes all energy end-uses.

<< Add Section C401.5>>

C401.5. Application to buildings subject to BPS. Buildings subject to *BPS* requirements shall comply with Sections C104.6.2.2, C104.6.2.3, C408.8, and C413.2 and shall comply with one of the following options:

1. Develop a *predictive model* in accordance with Section C413.3. The *BPS predicted performance* of new *buildings*, *additions* to existing buildings, and/or *alterations* to existing buildings, shall be less than or equal to the *BPS* performance target as required by the *BPS* at the time of building permit application.

2. Comply with ASHRAE Standard 209 Section 4.2.1. and demonstrate that the *predicted performance* of a new *building*, *addition* to an existing building, and/or *alteration* to an existing *building*, shall be less than or equal to the *BPS* performance target as required by the *BPS* at the time of *building* permit application. The simulation program shall comply with C413.3.2.1 and the energy modeler shall comply with C413.3.2.2. The projected *predicted performance* shall comply with Section C413.3.3.

3. Demonstrate that the *predicted performance* of a new *building*, *addition* to an existing building, and/or *alteration* to an existing *building*, shall be less than or equal to the *BPS* performance target as required by the *BPS* at the time of *building* permit application, using a minimum of 24 months of measured energy performance of at least two existing *buildings* under the direct control of the building owner that are similar in size, construction and operation as the proposed design. When approved by the *code official*, engineering calculations shall be permitted to adjust the measured energy performance of the existing *building* to account for the differences between it and the new *building*, addition to an existing *building*, and/or alteration to an existing *building*.

Informative Note: At the time of construction, developing a predictive model in accordance with option 1 above is the recommended method for determining that future BPS energy performance goals are achievable.

<< Add Sections C408.8, C408.8.1, C408.8.2, C408.8.3>>

C408.8 Additional Commissioning Requirements. Buildings, subject to *BPS* requirements, shall comply with Sections C408.8.1 through 408.8.3.

C408.8.1 Commissioning Activities Prior to Building Permit Issuance. The following commissioning activities shall be completed prior to issuance of a building permit:

1. A copy of the *commissioning plan* shall be submitted to the *owner* and incorporated into the construction documents.
2. *The* owner shall designate a *certified commissioning professional* to manage commissioning activities before the completion of construction documents. The construction documents shall identify the *certified commissioning professional*.
3. The *certified commissioning professional* shall submit the design review report to the *building owner*.
4. Construction phase commissioning requirements shall be incorporated into construction documents.

C408.8.2 Project System Manual. The system manual shall provide the information needed to understand, operate, and maintain the building's systems and assemblies and shall include the required commissioning documents in accordance with this section. The System Manual and all project commissioning documents shall comply with ASHRAE/IES Standard 202. The *certified commissioning professional* shall certify completion of the required commissioning process and provide a System Manual that includes the following commissioning documents to the *owner* and design teams:

1. *Owner's* Project Requirements. Identify project goals, measurable performance criteria, cost considerations, benchmarks, and success criteria.
2. Basis of Design. Document and record the concepts, calculations, decisions, and product selections used to meet both the *Owner's* Project Requirements and applicable regulatory requirements, standards and guidelines.
3. Commissioning Plan. Include the *Commissioning Plan* in accordance with Section C408.1.2.
4. Design Review Report. Detail compliance of the design with the *Owner's* Project Requirements and provisions of this standard. This commissioning design review shall not be considered a design peer review or a code or regulatory review.
5. Training Plan. A written document that details the expectations, schedule, duration, and deliverables for the commissioning activities related to training of project operations and maintenance personnel, users, and occupants. The construction documents shall require the *certified commissioning professional* to provide a Training Plan to the *owner* prior to occupancy.
6. Preliminary Commissioning Report. The *certified commissioning professional* shall provide a Preliminary Commissioning Report in accordance with Sections C408.1.3, C408.1.4, and all of the following:
    1. Documentation of the training of operating personnel and building occupants on commissioned systems, and a plan for the completion of any deferred trainings not completed at the time of report preparation.
    2. A list of deferred tests that cannot be performed at the time of report preparation and a plan for the required commissioning, training, and operating conditions for their completion.
7. Final Commissioning Report. The construction documents shall require the *certified commissioning professional* to provide a Final Commissioning Report to the *owner* before completion of the contractor's general warranty period.
8. Operation and Maintenance Manuals. Operating and maintenance information shall be provided in accordance with Sections C104.6.2.1 and C104.6.2.2.

<< Add Section C409.1.4 >>

C409.1.4 Additional Metering Requirements. *Buildings* subject to *BPS* requirements shall comply with this Section. Additional energy use metering devices shall be installed, as necessary, to monitor the energy consumption, regardless of fuel type, of all *buildings*, building activity types, systems or components that the *BPS* permits to be excluded from the reported building energy consumption or for non-target spaces.

<< Edit Section C409.2 >>

C409.2 Energy source metering. Buildings shall have a meter at each energy source to monitor the energy consumption of each fuel type separately. For each fuel type, energy supply source, and end use listed in Section C409.2.1 through C409.2.4, meters shall collect data for the whole building or for each separately metered portion of the building where not exempted by the exception to Section C409.1.

<< Add Sections C413, C413.1, C413.2, C413.3, C413.3.1, C413.2.1, C413.3.2.1, C413.3.2.2, C413.3.2.3, C413.3.2.4, C413.3.2.5, C413.3.3. >>

C413: Assessing Expected Building and Site Energy Performance

C413.1 Applicability. Buildings, subject to *BPS* requirements, shall comply with Section 413. This section provides requirements for assessing the expected energy performance of new buildings, additions, and alterations to evaluate their ability to comply with the *BPS*.

C413.2 Submittals. An Energy Performance Report shall be submitted to the *code official*.

C413.2.1 Energy Performance Report. The Energy Performance Report shall include the following sections.

1. The Executive Summary section shall include the building's activity types as defined by the *BPS* (e.g., office, cafeteria, retail, , non target space, etc.), gross floor area, project scope (new construction, addition, or alteration), and the building performance standard target determined following Section 3 alongside the projected energy performance determined following Section 4.
2. Project Overview section shall include a list of building activity types, the gross floor area of each, whether each area is heated and/or cooled, whether it is a new construction or alteration, and the number of stories above and below grade.
3. The Building Performance Standard Target section shall summarize the *BPS* requirements applicable to the building based on the adopted policies at the time of building permit, including the actual target, the building activity type(s), site to *BPS performance metric* conversion factors, rules for handling the renewable energy, and systems exempt from the *BPS* compliance.

In addition, the section shall include the *BPS* reporting period and all future periods.

4. Energy Performance section includes the following:
   a. Projected building energy consumption by end use and energy source broken out as required in C409, including separate reporting of energy used by systems and components exempt from the *BPS*.
   b. Summary of the annual energy generated by each on-site electricity generation system.
   c. Summary of the gross *predicted performance* and *BPS predicted performance* determined in accordance with Section C413.3.3, when demonstrating compliance using Section 401.5 option 1.
   d. Summary of the predicted performance in accordance with ASHRAE Standard 209 Section 5.7.3.1, when demonstrating compliance using Section 401.5 option 2.
   e. Summary of the measured energy performance, by building, fuel type and end use used when demonstrating compliance using Section 401.5 option 3.
   f. The applicable *BPS performance metric* target(s)
5. Description of the Energy-related features
6. Operating Conditions Assumptions section shall describe all of the following:
   a) The key operating assumptions used in the analysis for each applicable *predictive model*
   b) The requirements for a proposed design in accordance with ASHRAE 90.1 Normative Appendix G Section G3,
   c) The additional requirements in Section C413.3.2.

C413.3 Predictive Model

C413.3.1 General. This section describes requirements for developing a *predictive model* for C401.5 options 1 and 2.

C413.3.2 Modeling Requirements The predictive model shall meet the requirements of C407, ASHRAE Standard 90.1 Normative Appendix G Section G3 for the *proposed design* and the additional requirements specified in this section.

C413.3.2.1 Simulation Program Requirements. The following ASHRAE Standard 140 test results, input files, and modeler reports for each tested version of a simulation program shall be posted on a publicly available website:

1) Test results demonstrating the simulation program was tested in accordance with ASHRAE Standard 140 Annex A3 and that meet or exceed the values for "The Minimum Number of Range Cases within the Test Group to Pass" for all test groups in ASHRAE Standard 140, Table A3-14.
2) Test results of the simulation program and input files used for generating the ASHRAE Standard 140 test cases and the results of the other simulation programs included in ASHRAE Standard 140, Annexes B8 and B16.
3) The modeler report in ASHRAE Standard 140, Annex A2, Attachment A2.7. Report Blocks A and G shall be completed for results exceeding the maximum or falling below the minimum of the reference values shown in ASHRAE Standard 140 Table A3-1 through Table A3-13, and Report Blocks A and E shall be completed for any omitted results.

C413.3.2.2 Energy Modeler Qualifications. The *predictive model* shall be created by persons qualified by education and training to perform such work. The submitted modeling documentation shall be signed by an energy analyst meeting the requirements of Section C407.3.

C413.3.2.3 Lighting. Where a complete lighting system is designed and submitted with the design document, the actual lighting power for each thermal block shall be modeled.

C413.3.2.4 HVAC Systems

a) Where the heating or cooling system was not submitted with design documents for the spaces that are expected to be conditioned once occupied, the heating and/or cooling system shall be modeled. System type shall be selected based on the local standard practice. System efficiency, controls, and ancillary features shall comply with but not exceed the requirements of Section C403.
b) Distribution system losses shall be accounted for.

C413.3.2.5 Other Modeling Inputs. Modeling inputs not prescribed in Normative Appendix G, or Section C413.3, including but not limited to operating schedules, miscellaneous equipment, and process loads, shall be established in accordance with the absolute predictive use case requirements in CSA/ANSI Z5020:23 Section 6.2.

C413.3.3 Projected Building Energy Performance. *BPS predicted performance* shall be determined using simulation results of the predictive model developed in accordance with Section C413.3.2 with the following adjustments:

a) Exclude energy use of systems and components exempt from compliance with the *BPS*.
b) Exclude contribution of renewable energy if renewable energy is included in simulation results but is not allowed to contribute toward compliance with the *BPS*.
c) Convert to the applicable *BPS performance metric* using conversion factors consistent with those required by the *BPS*.
d) Normalize the result as required for compliance with the *BPS*.

<< Add section C502.3 >>

C502.3 Additional Requirements for Additions. An *addition* that increases the gross conditioned floor area of an existing building by greater than or equal to 50%, or has a gross conditioned floor area greater than 20,000 square feet, shall comply with Section C401.5

<< Add section C503.10 >>

C503.10 Additional Requirements for Alterations. The alteration shall comply with Section C401.5 when the alteration meets two or more of the following criteria:

1. HVAC systems that account for more than 50% of the capacity serving either the heating or cooling loads of the alteration area. This includes HVAC unitary systems, HVAC terminal units, or components of HVAC central heating or cooling equipment. HVAC terminal units, for the purposes of this section, can include VAV boxes, fan-coil units, VRF room units, or water-loop heat pumps;
2. 50% or more of the luminaires in the alteration area;
3. 25% or more of the building envelope area of the alteration portion of the building, including new exterior cladding, fenestration, or insulation.

<< Add new Standard reference>>

CSA	Canadian Standards Association 5060 Spectrum Way Mississauga, Ontario, Canada L4W 5N6	
Standard reference number	Title	Referenced in code section number
AAMA/WDMA/CSA 101/I.S.2/A440—17	North American Fenestration Standard/Specification for Windows, Doors and Unit Skylights	Table C402.4, C402.4.1.1.2
CSA B55.1—2012	Test Method for Measuring Efficiency and Pressure Loss of DWHR Units	C404.10
CSA B55.2—2012	Drain Water Heat Recovery Units	C404.10
CSA/ANSI Z5020:23	Building Energy Modelling, Section 6.2, Absolute Models and Section 8.3, Building Energy Performance Verification	C413.3.2.5

Purpose of code changes:

Align the Washington State Energy Code (WSEC) with the Washington State Clean Buildings Standard (WSCBPS) through requirements to help ensure new buildings, additions and alterations to existing buildings are designed and constructed to comply with WSCBPS targets once operational thereby reducing the burden on building owners and operators. This alignment is achieved by requiring buildings that will be subjected to the WSCBPS to provide a predictive model demonstrating compliance with the WSCBPS performance target(s) using the BPS metric (energy use intensity target (EUIt), an Energy Performance Report is supplied, enhanced metering is required, a third-party agent completes commissioning, commissioning is required before a building occupancy permit is supplied, and operations and maintenance documentation is more explicit. There is flexibility in the language to account for any additional BPS that the buildings may be subject to. These proposed code changes align with PNNL Technical Brief PNNL-3441 "Building Performance Standards and Energy Code Alignment."

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	Krissy Govertsen	Email address	krissy.govertsen@pnnl.gov
Your organization	Pacific Northwest National Laboratory	Phone number	+1 (509) 372-6369
Your name	Poppy Storm	Email address	poppy.storm@2050-institute.org
Your organization	2050-Institute	Phone number	+1 (206) 650-7240
Your name	Luke Howard	Email address	Luke.howard@commerce.wa.gov
Your organization	Washington Department of Commerce	Phone number	+1 (360)-742-4386

Economic Impact Data Sheet

Is there an economic impact: ☒ Yes ☐ No

Briefly summarize your proposal's primary economic impacts and benefits to building owners, tenants, and businesses. If you answered "No" above, explain your reasoning.

The proposed code changes primarily focus on ensuring that buildings comply with the Washington State Clean Building Performance Standards (WSCBPS), which have significant economic impacts and benefits for building owners, tenants, and businesses.

All covered buildings must comply with the Washington Clean Buildings Performance Standard, including newly constructed buildings. Therefore, any added design and construction costs, to the extent that a code compliant new building might not meet the WSCBPS performance targets, are already necessary to ensure compliance with the WSCBPS. The proposed revisions ensure that, covered buildings at the time of construction, are designed to meet WSCBPS performance targets helping assure that costly retrofits will not be needed in the future. Additionally, energy savings can be attributed to these code changes by way of all covered buildings meeting the BPS target at the time of construction as opposed to several years later when the building is retrofitted.

By mandating the provision of building information, including energy performance documentation, a project system manual, and third-party commissioning before building permit issuance, building owners can ensure that their properties perform according to design specifications and have the necessary insights to optimize operations. This process leads to reduced energy costs and compliance with WSCBPS targets. Additionally, through precise metering of fuel types and end uses, owners can accurately monitor energy consumption and implement efficiency improvements, thereby satisfying the regulatory requirements of the Washington State Energy Code and the Washington State Clean Building Performance Standard. Adhering to these standards improves building performance, reduces energy costs, and protects owners from potential non-compliance penalties. For tenants, residing in buildings that comply with BPS often means lower utility costs and improved comfort, which can enhance tenant satisfaction and retention. Businesses benefit from demonstrating compliance with these environmental standards, improving their brand reputation and competitive positioning. Furthermore, the flexibility embedded in these changes allows buildings to adapt to additional BPS, ensuring broader compliance potential across different jurisdictions.

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 360-407-9255.

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

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)~~

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

Third party commissioning is not expected to increase the cost beyond the existing cost of commissioning already required.

Building Energy Modeling is known to vary widely due to building size and complexity of the model, however it is estimated to cost between $0.17/square foot and $0.49/square foot (Source).

Metering by fuel type and end use is already required. However, additional metering for exempt uses is optional and therefore the construction cost is not estimated.

Documentation is already required by the existing code. We anticipate the additional documentation requirements such as the Project System Manual and the Energy Performance Report between $10,000 and $25,000 depending on the size and complexity of the project.

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.

There are no direct quantifiable annual energy savings with these changes. The cost savings of these proposed code changes come from making design decisions that reduce the eventual cost of complying with the BPS.

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

The proposed code changes may initially impact code enforcement time by requiring additional review of detailed documentation such as predictive modeling reports and more comprehensive building information. However, in the long run, these changes could streamline enforcement processes by providing clearer and more standardized documentation such as leveraging the ASHRAE Standard 202, facilitating quicker assessments and approvals. The enhanced detail and accuracy in the documentation can reduce ambiguities and discrepancies, potentially lowering the likelihood of revisions or re-evaluations, thereby improving overall efficiency in code enforcement.

Small Business Impact. Describe economic impacts to small businesses:

The proposed code changes will affect small businesses as they may initially face increased administrative burdens due to the need for more detailed documentation and could result in higher upfront costs for predictive modeling. However, the long-term cost-saved and compliance with WSCBPS may outweigh these initial impacts. For small businesses

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 360-407-9255.

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

specializing in commissioning and energy modeling, the proposed code changes could present significant growth opportunities.

Housing Affordability. Describe economic impacts on housing affordability:

A majority of housing is excluded from these proposed code changes as only multifamily residential buildings >20,000 square feet are subject to the BPS.

Other. Describe other qualitative cost and benefits to owners, to occupants, to the public, to the environment, and to other stakeholders that have not yet been discussed:

Occupants will benefit from improved indoor air quality and thermal comfort from commissioning and better operations, enhancing overall well-being and productivity. The public will enjoy better community health outcomes and a stronger sense of environmental stewardship as the community at scale hits goals. The environment will benefit from reduced energy consumption and greenhouse gas emissions. Other stakeholders, such as policymakers, utility providers, and financial institutions, may face adaptation challenges but benefit from improved data for policy effectiveness, better energy management, and new opportunities for project financing.

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 360-407-9255.

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