2024 Washington State Energy Code—Commercial Provisions

Cost-Benefit Analysis and Small Business Economic Impact Report

June 2026

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Legend for Proposals

Positive Net-Cost	*
Neutral	Blank
Negative Net-Cost	**

2024 Washington State Energy Code, Commercial Provisions: Cost-Benefit Analysis & Small Business Economic Impact

Executive Summary

This report presents the determinations made by the Washington State Building Code Council ("SBCC") as required in RCW 34.05.328 for the adopted amendments to the 2024 Washington State Energy Code, Commercial Provisions (chapter 51-11C WAC; "the rule").

The 2024 code change cycle is all about building safer buildings, energy-efficiency, and addressing the unique character of Washington. This year, many voices came together: engineers, business owners, public officials, and advocates, to offer ideas on how building standards can better protect lives, save money, and support new technology. These ideas were evaluated by a panel of 17 technical experts appointed by the SBCC

RCW 19.27.031 instructs the SBCC to adopt or amend the model codes through a three-year state building code adoption cycle. For the 2024 code adoption cycle the SBCC received 168 petitions for the 2024 Washington State Energy Code, Commercial Provisions (chapter 51-11C WAC). The Council approved 123 to include in the draft rule for public comment. Of these 123 petitions, 40 were editorial or clarifying in nature with no change to the technical requirements and no change in economic impact and 27 made technical adjustments or added supporting language without impacting cost. These 67 proposals are outlined in Appendix B. For the remaining 55 petitions, 30 have been evaluated by a third-party analyst and are shown in Appendix A. The other 25 appear in the main body of the report.

The 32 proposals analyzed by the independent third-party economic analyst span five categories: Building Envelope and Fenestration (6 proposals), Mechanical Systems, Water Heating and Fan Efficacy (7 proposals), Lighting, Controls and Food Service Equipment (12 proposals), Whole Building Performance and Energy Credits (4 proposals), and Existing Buildings — Alterations and Commissioning (3 proposals). The analyses were prepared in accordance with Washington State Office of Financial Management (OFM) Life-Cycle Cost Analysis (LCCA) methodology, using updated 2024/2025 Washington State utility rates and OFM standard financial parameters over a 50-year study life. All 32 proposals are recommended for adoption. Twenty-eight proposals are confirmed cost-effective under standard OFM LCCA methodology or alternative analytical frameworks. Six proposals (198, 210, 236 — editorial/cost-neutral; 267 — marginally negative LCC justified on avoided-cost and policy-alignment grounds; 289 — operational reliability; 264 CZ 4C — marginal on floor-area basis) are recommended on non-LCCA grounds with full analytical justification in the respective detailed report.

For the remainder of the petitions, 79 proposals analyzed were deemed to be cost neutral and 13 were deemed to decrease first costs. The SBCC concludes, based on reasonable understanding of the quantified and qualitative costs and benefits likely to arise from the adopted rule, that the benefits of the adopted rule amendments are greater than the costs.

After considering alternatives to the adopted rule's contents, as well as the goals and objectives of the authorizing statute, SBCC determined that the adopted rule represents the least burdensome alternative of possible rule contents meeting these goals and objectives.

Based on research and analysis required by the Regulatory Fairness Act (RFA) – RCW 19.85.070 – SBCC has determined the adopted rule is not likely to impose disproportionate compliance costs on small business. During its review, SBCC included disproportion-minimizing features in the rule where it is legal and feasible to do so.

What's Changing and Why

Making homes, businesses, and public institutions more energy efficient will save money, create good local jobs, enhance energy security, reduce pollution that causes global warming, and speed economic recovery while reducing the need to invest in costly new generation. The State Energy Code Act, RCW 19.27A, sets forth the statutory authority and goals for the adoption and amendment of the Washington State Energy Code. The primary goals are to construct increasingly energy efficient homes and buildings that help achieve the broader goal of building zero fossil-fuel greenhouse gas emission homes and buildings by the year 2031 [*RCW 19.27A.020 (2)(a)*] and incrementally move towards achieving a seventy percent reduction in annual net energy consumption by 2031 [*RCW 19.27A.160*]. Amendments must increase the energy efficiency of typical newly constructed nonresidential buildings [*RCW 19.27A.025(1)(a)*].

Most petitions had a deep and sometimes lively review, with technical experts helping sort through practical impacts before final determinations were made. Some ideas, especially those requiring a lot of new equipment or changes, went through a workgroup review for fine-tuning, but they reflect real-world needs from building professionals and consumers. Where costs or operations could be affected, the changes went through an extra round of listening and adjustment to make sure the final outcome felt fair for everyone involved. In this report you will see the preliminary cost benefit analysis.

The SBCC is publishing this proposed rule to gather public input on the potential effects. Once adopted, the new standards will help create buildings that stand up to earthquakes, run more efficiently, and provide cleaner air, all of which benefits public health and safety for Washingtonians.

SBCC concludes, based on reasonable understanding of the quantified and qualitative costs and benefits likely to arise from the adopted rule, that the benefits of the adopted rule amendments are greater than the costs.

After considering alternatives to the adopted rule's contents, as well as the goals and objectives of the authorizing statute, SBCC determined that the adopted rule represents the least burdensome alternative of possible rule contents meeting these goals and objectives.

Based on research and analysis required by the Regulatory Fairness Act (RFA) – RCW 19.85.070 – SBCC has determined portions of the adopted rule are likely to impose disproportionate compliance costs on small business. Therefore, SBCC included disproportion-minimizing features in the rule where it is legal and feasible to do so.

Significant Changes in the 2024 Edition

The following are some of the more noteworthy changes coming forward in the 2024 edition of the Washington State Energy Code, Residential Provisions. The list does not include all of the changes but highlights those that will require a shift in design or current practice.

- New sections and requirements were added in Sections C104, C401.5 and C408.8 to help correlate and facilitate future compliance with the building performance standard adopted by Commerce as part of the Washington State Clean Buildings Standard.
- Removal of the fossil fuel pathway established in Section C401.3 of the 2021 WSEC. The requirements and allowances for fossil fuel appliances have been integrated into the main body of the code and Section C406.
- Removal of the CMU wall insulation exceptions and adopting the IECC requirements for mass walls.
- Increased slab and wall insulation requirements. The requirements for heated and unheated slab insulation have been increased to match the values anticipated to be adopted for the 2024 IECC and 2025 ASHRAE 90.1, along with similar changes to prescriptive wall insulation requirements.

- Triple glazing requirements for windows. A minimum of twenty percent of vertical glazing must meet a lower U-factor. If the building exceeds 30% glazing, then the requirement for higher performing windows is applied to a minimum of 35 percent. The base requirement for windows is U-0.32, with the increased performance at U-0.22.
- Improved fan efficiency requirements in Section C403.8.3. A new table is added to provide FEI requirements by fan type rather than one generic value. Requirements were also added for air circulating fans in Section C403.8.6. The efficacy requirements for H/ERV fans is improved from 1.2 cfm/W to 1.7 cfm/W.
- Revised lighting requirements. This includes a 10% decrease in lighting power and revisions to exterior and dwelling lighting. There is also a reduction in the retail lighting allowance. Lighting control areas are limited to a maximum of 2,500 square feet rather than 5,000 and the length of exterior façade is limited to 60 feet. New requirements are added for plant lighting outside of controlled environment horticultural lighting.
- New requirement for most new commercial food service equipment to meet Energy Star efficiencies.
- New C406 formatting to more closely match that of the model code, with a number of new credit options. Some of the new options (as well as some of the existing options) are still being modeled and evaluated by PNNL to set the appropriate credit values.
- The commissioning threshold for lighting is lowered from 10 kW to 7 kW.
- Replacement space and water heating equipment is required to meet the efficiency requirements in Section C403 in most cases.
- Appendix CA is revised to align and coordinate with ASHRAE 90.1 Appendix A. A number of the WSEC tables were removed to in favor of a reference to the updated and expanded tables in ASHRAE 90.1.

Small Business Engagement Statement

The Washington State Building Code Council (SBCC) conducted an open and inclusive public process for the 2024 Washington State Energy Code—Commercial Provisions, including Council meetings noticed, multiple Technical Advisory Group (TAG) meetings, and dedicated public listening sessions at which small businesses and their representatives were invited to comment on petitions. Notice of these opportunities was broadly distributed through the SBCC website, email lists, and industry associations, and written comments were accepted throughout the rulemaking period so that small HVAC contractors, builders, designers, and other affected firms had multiple avenues to be heard. While participation levels varied by proposal, the Council took reasonable and practicable steps each time to solicit, receive, and consider small-business input before finalizing the proposed rule language.

Affected NAICS Sector

NAICS Code	Affected Proposals
111419 Other food crops grown under cover	24-GP1-239
111998 Other miscellaneous crop farming	24-GP1-239
221118 Other electric power generation	24-GP1-187, 24-GP1-202, 24-GP1-231, 24-GP1-235, 24-GP1-253, 24-GP1-277
221330 Steam and air conditioning supply	24-GP1-231, 24-GP1-253, 24-GP1-277

236116 Multifamily Housing Construction	24-GP1-149, 24-GP1-153, 24-GP1-163, 24-GP1-167, 24-GP1-168, 24-GP1-169, 24-GP1-174, 24-GP1-176, 24-GP1-187, 24-GP1-199, 24-GP1-202, 24-GP1-209, 24-GP1-214, 24-GP1-221, 24-GP1-223, 24-GP1-235, 24-GP1-238, 24-GP1-242, 24-GP1-247, 24-GP1-255, 24-GP1-256, 24-GP1-258, 24-GP1-260, 24-GP1-261, 24-GP1-268, 24-GP1-269, 24-GP1-270, 24-GP1-271, 24-GP1-272, 24-GP1-273, 24-GP1-275, 24-GP1-276, 24-GP1-278, 24-GP1-279, 24-GP1-292
236118 Remodeling and renovating construction	24-GP1-163, 24-GP1-173, 24-GP1-187, 24-GP1-214, 24-GP1-235, 24-GP1-247, 24-GP1-267, 24-GP1-270, 24-GP1-279
236210 Industrial building construction	24-GP1-149, 24-GP1-164, 24-GP1-163, 24-GP1-165, 24-GP1-169, 24-GP1-175, 24-GP1-176, 24-GP1-179, 24-GP1-187, 24-GP1-199, 24-GP1-202, 24-GP1-209, 24-GP1-214, 24-GP1-221, 24-GP1-223, 24-GP1-234, 24-GP1-235, 24-GP1-238, 24-GP1-239, 24-GP1-255, 24-GP1-256, 24-GP1-260, 24-GP1-258, 24-GP1-261, 24-GP1-263, 24-GP1-264, 24-GP1-268, 24-GP1-269, 24-GP1-270, 24-GP1-275, 24-GP1-276, 24-GP1-279, 24-GP1-292
236220 Commercial and institutional construction	24-GP1-149, 24-GP1-164, 24-GP1-163, 24-GP1-165, 24-GP1-167, 24-GP1-169, 24-GP1-173, 24-GP1-175, 24-GP1-176, 24-GP1-179, 24-GP1-187, 24-GP1-199, 24-GP1-202, 24-GP1-209, 24-GP1-214, 24-GP1-221, 24-GP1-223, 24-GP1-234, 24-GP1-235, 24-GP1-238, 24-GP1-242, 24-GP1-246, 24-GP1-247, 24-GP1-255, 24-GP1-256, 24-GP1-258, 24-GP1-260, 24-GP1-261, 24-GP1-263, 24-GP1-264, 24-GP1-265, 24-GP1-268, 24-GP1-269, 24-GP1-270, 24-GP1-271, 24-GP1-272, 24-GP1-273, 24-GP1-275, 24-GP1-276, 24-GP1-278, 24-GP1-279, 24-GP1-292
238110 Poured concrete foundation and structure contractors	24-GP1-221, 24-GP1-223, 24-GP1-255, 24-GP1-256
238120 Structural steel and precast concrete contractors	24-GP1-221, 24-GP1-223, 24-GP1-261
238130 Framing contractors	24-GP1-261
238190 Other foundation, structure and building exterior contractors	24-GP1-255, 24-GP1-256, 24-GP1-261, 24-GP1-264
238220 HVAC Contractors	24-GP1-174, 24-GP1-175, 24-GP1-231, 24-GP1-235, 24-GP1-238, 24-GP1-242, 24-GP1-253, 24-GP1-267, 24-GP1-268, 24-GP1-269, 24-GP1-270, 24-GP1-271, 24-GP1-272, 24-GP1-273, 24-GP1-275, 24-GP1-276, 24-GP1-277, 24-GP1-278, 24-GP1-293
238290 Other building equipment contractors	24-GP1-173, 24-GP1-238, 24-GP1-267
238210 Electrical Contractors	24-GP1-164, 24-GP1-165, 24-GP1-234, 24-GP1-238, 24-GP1-247
238310 Drywall and Insulation Contractors	24-GP1-176, 24-GP1-179, 24-GP1-261, 24-GP1-260, 24-GP1-264, 24-GP1-269
238990 Other specialty trade contractors	24-GP1-149, 24-GP1-164, 24-GP1-153, 24-GP1-163, 24-GP1-165, 24-GP1-167, 24-GP1-168, 24-GP1-173, 24-GP1-174, 24-GP1-179, 24-GP1-187, 24-GP1-202, 24-GP1-209, 24-GP1-214, 24-GP1-231, 24-GP1-234, 24-GP1-235, 24-GP1-238, 24-GP1-239, 24-GP1-246,

	24-GP1-253, 24-GP1-258, 24-GP1-261, 24-GP1-264, 24-GP1-275, 24-GP1-276, 24-GP1-277, 24-GP1-292
238350 Door and Window Construction	24-GP1-176, 24-GP1-169
238390 Duct Installers	24-GP1-276
321911 Wood Window and Door Manufacturing	24-GP1-169, 24-GP1-176
323321 Metal window and door manufacturing	24-GP1-169, 24-GP1-176
326199 Vinyl Window and Door Manufacturing	24-GP1-169, 24-GP1-176
327331 Concrete block and brick manufacturing	24-GP1-264
333415 HVAC equipment manufacturers	24-GP1-273
335122 Commercial, industrial, and institutional lighting fixture manufacturing	24-GP1-239
335129 Other lighting equipment manufacturing	24-GP1-239
531110 Lessors of residential buildings and dwellings	24-GP1-242
531120 Lessors of nonresidential buildings and dwellings	24-GP1-242
541310 Architectural Services	24-GP1-163, 24-GP1-165, 24-GP1-167, 24-GP1-168, 24-GP1-169,24-GP1-174, 24-GP1-176, 24-GP1-179, 24-GP1-187, 24-GP1-199, 24-GP1-214, 24-GP1-221, 24-GP1-223, 24-GP1-234, 24-GP1-242, 24-GP1-246, 24-GP1-247, 24-GP1-255, 24-GP1-256, 24-GP1-261, 24-GP1-265, 24-GP1-268, 24-GP1-279, 24-GP1-292
541330 Engineering Services	24-GP1-149, 24-GP1-202, 24-GP1-209, 24-GP1-221, 24-GP1-223, 24-GP1-231, 24-GP1-235, 24-GP1-238, 24-GP1-239, 24-GP1-242, 24-GP1-247, 24-GP1-253, 24-GP1-258, 24-GP1-267, 24-GP1-268, 24-GP1-270, 24-GP1-271, 24-GP1-272, 24-GP1-273, 24-GP1-275, 24-GP1-277, 24-GP1-278, 24-GP1-293
541350 Building Inspection Services	24-GP1-163, 24-GP1-247, 24-GP1-272, 24-GP1-273, 24-GP1-276
541380 Testing Laboratories and Services	24-GP1-276
541490 Other specialized design services	24-GP1-149, 24-GP1-164, 24-GP1-153, 24-GP1-163, 24-GP1-165, 24-GP1-167, 24-GP1-168, 24-GP1-173, 24-GP1-174, 24-GP1-187, 24-GP1-199, 24-GP1-202, 24-GP1-209, 24-GP1-214, 24-GP1-221, 24-GP1-223, 24-GP1-231, 24-GP1-234, 24-GP1-235, 24-GP1-238, 24-GP1-239, 24-GP1-246, 24-GP1-253, 24-GP1-258, 24-GP1-263, 24-GP1-265, 24-GP1-268, 24-GP1-271, 24-GP1-275, 24-GP1-277, 24-GP1-292
541690 Other Scientific and Technical Consulting Services	24-GP1-149, 24-GP1-153, 24-GP1-163, 24-GP1-167, 24-GP1-168, 24-GP1-174, 24-GP1-187, 24-GP1-199, 24-GP1-202, 24-GP1-209, 24-GP1-214, 24-GP1-221, 24-GP1-223, 24-GP1-231, 24-GP1-235, 24-GP1-239, 24-GP1-253, 24-GP1-258, 24-GP1-275, 24-GP1-276, 24-GP1-277

Jobs Impact Statement

During this rulemaking, the SBCC did not receive quantitative evidence demonstrating that the proposed rules will either create or eliminate jobs in the affected industries. Stakeholder comments and the economic analysis indicate that the petitions primarily clarify existing practice, align with national standards, and reduce regulatory burden, but no data were submitted that would support a defensible numeric estimate of job gains or job losses attributable to these specific changes.

Key Findings

- **Net Economic Impact:** All petitions show neutral to positive economic impact
- **Small Business Burden:** Minor positive to neutral; no petitions create a disproportionate burden to small business
- **Public Benefit:** Significant health, safety, energy efficiency, and regulatory clarity improvements
- **Industry Alignment:** Most amendments codify existing industry practices or align with national standards

Individual Measures

1. Log Number: 24-GP1-153

Code Section/Title: 2024 WSEC-C, Section C406.2.21; Group R-2 induction cooktops

Proponent/Author: Shashank Singh, Delta E

1.1. Description & Rationale

A. **Summary of current Baseline (without proposal):**
   - No efficiency credits are available for the installation of induction cooktops.

B. **Summary of Baseline with changes:**
   - Provides an additional option for achieving the efficiency credits necessary to comply with Section C406 by installation of induction cooktops in a minimum of 50 percent of the dwelling units in Group R-2 occupancy buildings.

C. **Rational Statement:**
   - Induction cooktops are more efficient than traditional electric cooktops and gas stoves, leading to reduced energy usage. This proposal incentivizes the use of induction technology in residential projects, aligning with state energy conservation policies.

D. **TAG Modification:**
   - The TAG modified the petition to reduce the requirement from 100 percent of the installed cooktops to a minimum of 50 percent, with an allowance for the credits to be prorated based on the percentage installed. The TAG also asked PNNL to calculate the appropriate credit value and see if the installation of gas cooktops also warranted a credit value. Information has not been received thus far from PNNL on this issue.

1.2. Economic Cost Analysis

A. **Construction Cost Impact:**
   - As this is a proposed addition to the C406 section option menu, it is an optional measure that an owner can pursue if they determine it is cost-effective. Induction cooktops generally have a

higher upfront cost compared to traditional electric or gas stoves. However, after accounting for available rebates and the overall lifecycle cost savings through reduced energy consumption, the investment could be economically beneficial. These long-term savings may significantly offset the initial expenditure, making it a viable option for many projects.

	Induction Cooktop	Gas Cooktop	Electric Cooktop
First cost	$1000-3000	$350-700	$700-1200
Lifespan (yrs)	10-15	13-17	10-15
Energy efficiency	85-90%	32-40%	75-80%

B. **Implementation/Plan Review/Inspection Costs:**
   - There is no additional time necessary for plan review or inspection.

C. **Life-Cycle Costs:**
   - The lifespan of an induction cooktop is equivalent to that of an electric cooktop but slightly less than a gas cooktop. By adopting induction cooktops, building owners and tenants can expect reduced energy consumption, leading to lower utility bills. The higher efficiency of induction cooktops, which convert about 85- 90% of energy to heat, means less energy waste compared to electric stoves (75-80% efficiency) and gas stoves (32-40% efficiency.
   - As this is a proposed change to the C406 section, it is an optional measure that an owner can pursue if they determine it is cost-effective. Induction cooktops generally have a higher upfront cost compared to traditional electric or gas stoves. However, after accounting for available rebates and the overall lifecycle cost savings through reduced energy consumption, the investment could be economically beneficial. These long-term savings may significantly offset the initial expenditure, making it a viable option for many projects.

1.3. Economic Benefit Analysis

A. **Direct Cost Savings:**
   - This is one of many options for achieving the efficiency credits necessary to comply with Section C406. This is a determination of benefits to be made by the designer/builder/owner as to whether the long term savings is beneficial over the higher first cost.

B. **Operational Benefits:**
   - building owners and tenants can expect reduced energy consumption, leading to lower utility bills.
   - Induction cooktops do not emit the toxic gases—such as nitrogen dioxide, benzene or carbon monoxide—that are produced by gas cooktops.

C. **Other Benefits:**
   - Encouraging the adoption of induction cooktops will contribute to lower greenhouse gas emissions (specially in regions with low carbon intensity electricity), as these cooktops are more energy-efficient and do not rely on fossil fuels like gas stoves.

1.4. Small Business Economic Impact

A. **Small Business NAICS Categories Affected:**

   - 236116 Multifamily construction
   - 238990 Other specialty trade contractors
   - 541490 Other specialized design services
   - 541690 Other scientific and technical consulting services

B. **Compliance Burden Comparison:**

- No additional economic impacts to small business. This is one of many options that can be selected based on the building design and other features/options used to comply with the requirements of Section C406.

C. **Potential Disproportion/Mitigation:**
   - There is no disproportional impact.

1.5. Least Burdensome Alternative

- This proposal is the least burdensome approach, providing additional options and flexibility for meeting code requirements. The TAG decreased the impact of this measure by allowing a fraction of the installed cooktops to not be induction and still be able to claim a portion of the available credits.

1.6. Conclusion

- The proposed amendment provides additional options for meeting the code without adding requirements.

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2. Log Number: 24-GP1-163*

Code Section/Title: 2024 WSEC-C, Section 502.2; Air leakage testing for additions

Proponent/Author: Duane Jonlin, Seattle Dept. of Construction and Inspection

2.1. Description & Rationale

E. **Summary of current Baseline (without proposal):**
   - Additions are required to comply with the air leakage testing in Section C402.5.

F. **Summary of Baseline with changes:**
   - Additions smaller than 500 square feet are not required to perform air leakage testing.

G. **Rational Statement:**
   - Exempts very small additions from the air leakage testing requirements.

2.2. Economic Cost Analysis

D. **Construction Cost Impact:**
   - Will decrease construction cost for additions less than 500 square feet.

E. **Implementation/Plan Review/Inspection Costs:**
   - No significant change to plan review/inspection time.

F. **Life-Cycle Costs:**
   - Estimated increase in energy use of 0.47 kWh per square foot annually, or about $.0.05 per square foot.

G. Other Costs:

Slight decrease in revenue for air barrier testing agencies.

2.3. Economic Benefit Analysis

D. **Direct Cost Savings:**
   - See the Construction Cost Impact above.
   - Estimate savings per unit *(if feasible):* $300 estimated for testing in the Seattle area for additions of this size.

E. **Operational Benefits:**

- Provides flexibility for UA calculations.
- Ensures the energy code accommodates real-world challenges.

F. **Other Benefits:**

- Balances energy efficiency with practicality, ensuring the code remains both effective and adaptable to unique building scenarios.

2.4. Small Business Economic Impact

D. **Small Business NAICS Categories Affected:**

- 236116 Multifamily construction
- 236118 Remodeling and renovating construction
- 236210 Industrial building construction
- 236220 Commercial and institutional building construction
- 238990 Other specialty trade contractors
- 541310 Architectural services
- 541350 Building inspection services
- 541490 Other specialized design services
- 541690 Other scientific and technical consulting services

E. **Compliance Burden Comparison:**

- Small business contracts are likely to benefit from the lessening of requirements and not incur the added cost of air leakage testing for small additions.

F. **Potential Disproportion/Mitigation:**

- There is no disproportional impact.

2.5. Least Burdensome Alternative

- This proposal is the least burdensome approach, adopting a more relaxed requirement for additions without a marked decrease in efficiency.

2.6. Conclusion

- The proposed amendment provides a more cost-effective manner of providing small additions without the added cost of air leakage testing.

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3. Log Number: 24-GP1-165

Code Section/Title: 2024 WSEC-C, Section C405.2.5.1; Daylight responsive controls function

Proponent/Author: Duane Jonlin, Seattle Department of Construction and Inspection

3.1. Description & Rationale

A. **Summary of current Baseline (without proposal):**

- Under the current 2024 WSEC-C, daylight responsive lighting controls are required to meet functional criteria in Section C405.2.5.1, including independent control of primary and secondary sidelit zones, toplit zones, field-calibratable sensors, continuous dimming to low output, and shut-off capability.
- The baseline code limits the maximum controlled area per daylight responsive control device to 2,500 square feet but does not limit the maximum lineal façade length a single sensor can control, and it does not specify default setpoints for daylight control activation.

B. **Summary of Baseline with changes:**

- The proposal revises Section C405.2.5.1 to add an explicit limitation that a single daylight responsive control device shall not serve more than 60 lineal feet of façade while retaining the existing 2,500 square foot area limit.
- The proposal also sets a default initial activation setpoint for daylight-responsive controls of 30 footcandles, or not more than 110 percent of the illuminance level specified on the construction documents, thereby standardizing calibration practices in the absence of project-specific commissioning.

C. **Rational Statement:**

- The primary rationale is to improve correlation between daylight control zones and actual local light and shadow patterns on building façades by preventing a single sensor from controlling very long runs of glazing that experience different shading conditions.
- More fine-grained zones and default setpoints are expected to increase realized lighting energy savings, reduce instances of over- or under-lighting near façades, and align with long-standing practice in the Seattle energy code, which has successfully used similar limits.

3.2. Economic Cost Analysis

A. **Construction Cost Impact:**

- This proposal increases construction costs modestly by requiring additional daylight control zones (and therefore additional controllers) where long façades would otherwise be controlled by a single sensor; the proponent estimates an incremental construction cost of approximately 0.18 dollars per square foot of façade area served by daylight controls.
- The cost estimate is based on an additional controller cost of 330 dollars per device (RSMeans 26 09 23 0170) and a reduction in maximum zone size from 2,500 square feet to a representative 1,080 square feet (18 feet by 60 feet), yielding a cost increase from approximately 0.13 dollars per square foot to 0.31 dollars per square foot and a differential of 0.18 dollars per square foot.
- Estimate per unit *(if feasible):* Incremental first cost = 0.18 dollars per square foot of daylight-controlled area along the affected façade segments.
- Total potential range for typical projects:

  Small tenant or single-story retail with limited façade glazing: negligible to low incremental cost (one additional controller or none). Large commercial, institutional, or industrial buildings with extensive sidelit zones: low to moderate incremental cost, on the order of a few hundred to a few thousand dollars per project depending on façade length and configuration.

B. **Implementation/Plan Review/Inspection Costs:**

- Plan reviewers and inspectors already verify the presence and zoning of daylight-responsive controls; under this proposal, they will additionally confirm that each sensor serves no more than 60 lineal feet of façade and that default setpoints are documented, which can typically be checked within existing lighting control submittal review time.
- The proponent indicates no additional enforcement time per permit application (zero hours), and the proposal does not introduce new reporting requirements beyond what the current lighting control documentation already provides.

C. **Life-Cycle Costs:**

- `Life-cycle costs include the incremental first cost of additional controllers offset by recurring annual energy and demand savings from more effective daylight dimming, resulting in reduced lighting energy use and associated cooling loads over the life of the building.

- Using the proponent's cited controlled experiment on daylighting, which shows approximately 32 percent lighting savings plus cooling and demand benefits, and adjusting historical costs for inflation, the present-day value of daylight control savings is estimated at about 0.38 dollars per square foot of daylight control area; assuming one-third of building area is in daylight-controlled zones, baseline savings are around 0.12 dollars per square foot and the proposed finer zoning is expected to improve this by 20 percent, yielding an incremental energy value of 0.024 dollars per square foot annually and corresponding long-term net savings.

D. **Other Costs:**

- There are no anticipated additional fines, fees, or record-keeping costs associated with this change beyond standard lighting control documentation; calibration access and default setpoints are addressed within the normal scope of design and commissioning.
- Training needs for designers, electrical contractors, and commissioning agents are minimal because similar zoning practices and default settings have been in use for decades under the Seattle energy code, and the new requirements align with current industry practice for advanced lighting controls.

3.3. Economic Benefit Analysis

A. **Direct Cost Savings:**

- Direct construction cost savings are not expected; instead, the proposal trades a small increase in first cost for greater operating savings from improved daylighting performance.
- Over the service life of the lighting system, the incremental annual savings of approximately 0.024 dollars per square foot of daylight-controlled area can exceed the one-time cost of additional controllers, providing a net positive economic outcome to building owners and tenants, especially in buildings with long operating hours.

B. **Operational Benefits:**

- Operational benefits include more stable and appropriate light levels near façades, better occupant comfort, and reduced complaints about glare or insufficient light caused by sensors responding to average or non-representative daylight conditions over long façades.
- The proposal supports higher realized energy savings from existing daylighting provisions by aligning sensor coverage with localized shading and daylight patterns, thereby increasing the effectiveness of automatic dimming and shutoff functions and reducing both lighting energy and cooling loads.

C. **Other Benefits:**

- The change enhances code clarity by explicitly limiting the façade length per sensor and setting default calibration thresholds, reducing ambiguity and variability in design and commissioning practice across jurisdictions.
- Societal and environmental benefits include lower greenhouse gas emissions associated with reduced electricity consumption, as well as improved visual environments for occupants, which can support productivity and satisfaction in commercial, institutional, and industrial spaces.

3.4. Small Business Economic Impact

A. **Small Business NAICS Categories Affected:**

- 236210 Industrial building construction
- 236220 Commercial and institutional construction
- 238210 Electrical contractors and other wiring installation contractors
- 541310 Architectural services
- 541490 Other specialized design services

B. **Compliance Burden Comparison:**

- The incremental design and equipment costs per project are relatively small and scale with the extent of daylight-controlled façade; the per-employee or per-revenue burden is not expected to be materially higher for small firms than for large firms because the same control strategies and products are used across project sizes.
- Overall, the proposal represents a minor cost increase with a neutral to positive impact on small businesses, as energy savings and improved lighting quality can reduce operating expenses and enhance space marketability without imposing significant additional compliance complexity.

C. **Potential Disproportion/Mitigation:**

- Because the added cost per controller is modest and the requirements are proportional to façade length and daylighted area, there is no clear indication that small businesses face a disproportionate burden; therefore, no special compliance modifications or waivers are proposed.
- Jurisdictions and utilities may, however, choose to support adoption through education, design guidance, or incentives for advanced lighting controls, which would further mitigate any perceived small-business impact while preserving the energy benefits of finer-grained daylight zoning.

3.5. Least Burdensome Alternative

- This proposal refines an existing mandatory daylighting requirement by specifying maximum façade length and default setpoints rather than introducing new categories of buildings or systems, and it leverages control technologies that are already commonly installed to comply with current WSEC-C Sections C405.2.5.1 through C405.2.5.3; as such, it represents a targeted, least burdensome means to increase realized savings from daylighting.
- No less restrictive alternative has been identified that would achieve a comparable improvement in daylighting performance and energy savings while maintaining code clarity and enforceability; given that similar provisions have been successfully implemented in Seattle for decades, the proposal is considered a practical and minimally burdensome refinement of existing code requirements.

3.6. Conclusion

- This proposal refines an existing mandatory daylighting requirement by specifying maximum façade length and default setpoints rather than introducing new categories of buildings or systems, and it leverages control technologies that are already commonly installed to comply with current WSEC C sections C405.2.5.1 through C405.2.5.3; as such, it represents a targeted, least burdensome means to increase realized savings from daylighting.
- No less restrictive alternative has been identified that would achieve a comparable improvement in daylighting performance and energy savings while maintaining code clarity and enforceability; given that similar provisions have been successfully implemented in Seattle for decades, the proposal is considered a practical and minimally burdensome refinement of existing code requirements.

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4. Log Number: 24-GP1-167*

Code Section/Title: 2024 WSEC-C, Sections C405.3, C405.4.1; Decorative plant lighting

Proponent/Author: Duane Jonlin, Seattle Dept. of Construction and Inspection

4.1. Description & Rationale

A. **Summary of current Baseline (without proposal):**
   - All horticultural lighting must meet the same efficacy rating.

B. **Summary of Baseline with changes:**
   - Lighting for decorative plants is permitted to be less stringent.

C. **Rational Statement:**
   - Allows for a less stringent standard for plant growth lighting for decorative plants.

4.2. Economic Cost Analysis

A. **Construction Cost Impact:**
   - Modest reduction in lighting cost, allowing fixtures that are more appropriate for decorative plant lighting.
   - Estimate per unit *(if feasible):* Approximately $50 less per fixture for decorative plant growth lighting

B. **Implementation/Plan Review/Inspection Costs:**
   - No significant change to plan review/inspection time.

C. **Life-Cycle Costs:**
   - Estimated small increase in lighting power; however, it is doubtful that horticultural-grade fixtures have been installed for moderate display areas.

4.3. Economic Benefit Analysis

A. **Direct Cost Savings:**
   - See the Construction Cost Impact above.
   - Estimate savings per unit *(if feasible):* $50 per fixture for decorative plant growth lighting.

B. **Operational Benefits:**
   - Allows for lower cost, non-professional grade lighting to be used for esthetic displays.

C. **Other Benefits:**
   - Balances energy efficiency with practicality, ensuring the code remains both effective and adaptable to unique building scenarios.

4.4. Small Business Economic Impact

A. **Small Business NAICS Categories Affected:**
   - 236116 Multifamily construction
   - 236220 Commercial and institutional building construction
   - 238990 Other specialty trade contractors
   - 541310 Architectural services
   - 541490 Other specialized design services
   - 541690 Other scientific and technical consulting services

B. **Compliance Burden Comparison:**
   - Small business contracts are likely to benefit from the lessening of requirements and not incur the added cost of professional grade horticultural lighting.

C. **Potential Disproportion/Mitigation:**
   - There is no disproportional impact.

4.5. Least Burdensome Alternative

- This proposal is the least burdensome approach, adopting a more relaxed requirement for decorative interior plant displays without a marked decrease in efficiency.

4.6. Conclusion

- The proposed amendment provides a more cost-effective manner of lighting small, non-productive plant displays with growth lighting without the added cost of horticultural production lighting.

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5. Log Number: 24-GP1-168*

Code Section/Title: 2024 WSEC-C, Section C409.1; Submetering thresholds

Proponent/Author: Duane Jonlin, Seattle Dept. of Construction and Inspection

5.1. Description & Rationale

A. **Summary of current Baseline (without proposal):**
- Metering threshold for Group R-2 occupancy (multifamily) includes the entire building.

B. **Summary of Baseline with changes:**
- Limits metering threshold for Group R-2 occupancy (multifamily) to just the common areas, rather than the entire building, and permits larger multifamily buildings to substitute renewables or other efficiency credits for submetering. For all buildings, exempt rated corridors and stairwells from plug load submetering requirement.

C. **Rational Statement:**
- Multifamily building advocates have requested that alternatives to submetering be provided to make more effective use of construction funds, arguing that multifamily buildings are unlikely to have staff on-site able to interpret and act on submetering data. Note that the dwelling units are already separately metered, and the house meter only meters the common areas, so this code amendment effectively establishes the same threshold for multifamily that applies to all other buildings. For multifamily buildings, only those larger than 50,000 or 60,000 square feet will have to comply with this section, because common areas comprise 15 – 20% of gross floor area.

5.2. Economic Cost Analysis

A. **Construction Cost Impact:**

- Reduction in construction cost for multifamily buildings with common areas smaller than 10,000 square feet.
- Estimate per unit *(if feasible):* Approximately $0.50 per square foot savings for areas that will no longer need to be metered.
- For a 40,000 sf multifamily building, assuming that submetering would add $0.50/sf cost, 40,000 x 0.5 = $20,000 savings
  Potential reduction in construction cost for larger multifamily buildings with common areas greater than 10,000 sf., while providing equivalent energy savings.
  For a 55,000 sf building with 10,000 sf of common area, the solar option would cost: 0.12 W/sf @ $3.50/W installed cost x 10,000 sf common area = 0.12 x 3.50 x 10,000 = $4,200

B. **Implementation/Plan Review/Inspection Costs:**
- No significant change to plan review/inspection time.

C. **Life-Cycle Costs:**

- Significant long-term cost savings through reduced future retrofitting costs, when decarbonization can take place at minimal cost, not requiring upgrades to the utility service or main panel.

5.3. Economic Benefit Analysis

A. **Direct Cost Savings:**
   - See the Construction Cost Impact above.
   - Estimate savings per unit *(if feasible):* $0.50 per square foot for multifamily buildings in areas other than lobbies/common areas.

B. **Operational Benefits:**
   - When decarbonization takes place, no upgrades to the utility service or main panel are necessary.

C. **Other Benefits:**
   - Slight decrease in construction costs while maintaining an equivalent energy impact.

5.4. Small Business Economic Impact

A. **Small Business NAICS Categories Affected:**
   - 236116 Multifamily construction
   - 238990 Other specialty trade contractors
   - 541310 Architectural services
   - 541490 Other specialized design services
   - 541690 Other scientific and technical consulting services

B. **Compliance Burden Comparison:**
   - Small business contracts are likely to benefit from the lessening of requirements.

C. **Potential Disproportion/Mitigation:**
   - There is no disproportional impact.

5.5. Least Burdensome Alternative

- This proposal is the least burdensome approach, adopting a more relaxed requirement for metering that eliminates redundancy.

5.6. Conclusion

- The proposed amendment provides a more cost-effective manner of metering multifamily residential buildings.

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6. Log Number: 24-GP1-170

Code Section/Title: 2024 WSEC-C, Section C406.2.20; Thermal imaging of building envelope

Proponent/Author: Duane Jonlin, Seattle Department of Construction and Inspection

6.1. Description & Rationale

A. **Summary of current Baseline (without proposal):**
   - No efficiency credits are available for thermal imaging to show the integrity of the thermal building envelope.

B. **Summary of Baseline with changes:**

- Provides an additional option for achieving the efficiency credits necessary to comply with Section C406 through the use of thermographic images of the building thermal envelope.

C. **Rational Statement:**
   - Provide credit for thermal imaging. This would allow someone to check their thermal building envelope and easily see where there are air leaks, gaps in insulation or thermal bridging. This ensures a much better insulated building.

D. **TAG Modification:**
   - The TAG directed PNNL to calculate the credit values for this option rather than accepting the proponent value.

6.2. Economic Cost Analysis

A. **Construction Cost Impact:**
   - This adds another optional credit path in Section C406 and is not a code requirement. For those that choose this pathway, Prices range from $400 for a small, simple building to $5,000 for large complex commercial properties, or from $0.04 to $0.20 per square foot.

B. **Implementation/Plan Review/Inspection Costs:**
   - There is no additional time necessary for plan review or inspection.

C. **Life-Cycle Costs:**
   - Better insulation would result in an assumed 2 percent annual energy savings, based on the percentage of heating energy in EUI.

6.3. Economic Benefit Analysis

A. **Direct Cost Savings:**
   - This is one of many options for achieving the efficiency credits necessary to comply with Section C406. There are various federal and state incentives to offset first cost.

B. **Operational Benefits:**
   - Thermal imaging shows where there are air leaks, gaps in insulation or thermal bridging, allowing easier remediation and better overall thermal performance of the building.

C. **Other Benefits:**
   a. Provides a cost effective additional option for satisfying code requirements.

6.4. Small Business Economic Impact

A. **Small Business NAICS Categories Affected:**
   - 236116 Multifamily construction
   - 236210 Industrial building construction
   - 236220 Commercial and institutional building construction
   - 238990 Other specialty trade contractors
   - 541310 Architectural services
   - 541330 Engineering services
   - 541380 Testing Laboratories and Services
   - 541490 Other specialized design services
   - 541690 Other scientific and technical consulting services

B. **Compliance Burden Comparison:**
   - This measure would have a positive effect on small businesses that provide imaging services.

C. **Potential Disproportion/Mitigation:**
   - There is no disproportional impact.

6.5. Least Burdensome Alternative

- This proposal is the least burdensome approach, providing additional options and flexibility for meeting code requirements.

6.6. Conclusion

- The proposed amendment provides additional options for meeting the code without adding requirements.

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7. Log Number: 24-GP1-174*

Code Section/Title: 2024 WSEC-C, Section C404.3.3; Water supply for Group R-2 occupancies.

Proponent/Author: Duane Jonlin, Seattle Dept. of Construction and Inspection

7.1. Description & Rationale

A. **Summary of current Baseline (without proposal):**
- Water supply piping may be sized using one of three methods in the Uniform Plumbing Code: Section 610, Appendix A or Appendix M.

B. **Summary of Baseline with changes:**
- Requires use of plumbing code Appendix M (rather than Appendix A) for plumbing distribution piping, only for Group R-2 occupancies, in recognition of the low-flow shower heads and faucets already required in Washington state. This proposal allows pipe sizing to be one pipe size larger than the minimum size calculated using Appendix M. The credit values in Table C406.2 are adjusted to reflect the reduction in pipe sizing in the base code.

C. **Rational Statement:**
- Appendix M mandates use of the Water Demand Calculator, which results in significant pipe size reduction, providing significant energy savings and construction cost savings for piping, insulation, and pumps, along with other benefits. Reduction from 42 credits to 10 credits for Group R-2 in the C406 tables: Appendix M pipe sizing is already required in this proposal, except that one pipe size larger than the minimum prescribed by Appendix M is allowed. This credit is to further reduce pipe sizes down to the minimum prescribed by Appendix M.

7.2. Economic Cost Analysis

A. **Construction Cost Impact:**
- Use of Appendix M pipe sizing significantly reduces both energy use and construction costs, while still providing a large margin of safety for peak loads.
- Total potential range for typical projects: 2024 CASE Report: For mid-rise multifamily using heat pump water heaters: $647/unit savings. For a 45-unit apartment building, averaging Pittsburgh & NYC savings to approximate Seattle savings: PEX piping: $33,154 NYC + $28,226 Pittsburgh – average $30,690 / 45 units = $683/unit savings
  For this analysis, we use the lower of these two, $647/unit savings, plus savings in SPU connection and installation costs of $588/unit, assuming a change from 3” pipe to 2” pipe, using the lower fees for non-arterial streets. The overall savings are split between the basic SEC requirement to use pipe no more than one pipe size larger than that determined through the plumbing code Appendix M calculator, and the C406 credit for using the minimum size determined by Appendix M.
  SPU cost for 1-1/2” pipe installation and connection $15,970
  SPU cost for 3” pipe (2” high-flow meter) $29,345 connection & installation
  Difference: $29,345 - $15,970 = $13,375 / 45 units = $297/unit
  Total $647 piping + $297 SPU connection = $944/unit savings

B. **Implementation/Plan Review/Inspection Costs:**
- No significant change to plan review/inspection time.

C. **Life-Cycle Costs:**
- Lower annual energy and water demand.

7.3. Economic Benefit Analysis

A. **Direct Cost Savings:**
   - See the Construction Cost Impact above.
   - Estimate savings per unit *(if feasible):* Approximately $700 reduction per dwelling unit.

B. **Operational Benefits:**
   - When decarbonization takes place, no upgrades to the utility service or main panel are necessary.

C. **Other Benefits:**
   - Appendix M mandates use of the Water Demand Calculator, which results in significant pipe size reduction, providing significant energy savings and construction cost savings for piping, insulation, and pumps.

7.4. Small Business Economic Impact

A. **Small Business NAICS Categories Affected:**
   - 236116 Multifamily construction
   - 238220 HVAC/mechanical/plumbing contractors
   - 238990 Other specialty trade contractors
   - 541310 Architectural services
   - 541490 Other specialized design services
   - 541690 Other scientific and technical consulting services

B. **Compliance Burden Comparison:**
   - This measure would not have a significant effect on small businesses over larger businesses.

C. **Potential Disproportion/Mitigation:**
   - There is no disproportional impact.

7.5. Least Burdensome Alternative

- This proposal is the least burdensome approach, incorporating water saving industry standards into the code to facilitate energy savings with minimal cost.

7.6. Conclusion

- The proposed amendment provides a more cost-effective manner of sizing water supply piping in multifamily residential buildings.

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8. Log Number: 24-GP1-179*

Code Section/Title: 2024 WSEC-C, C402.1.1.2, Table C402.1.3

Proponent/Author: Brett Conway, Mackenzie

8.1. Description & Rationale

A. **Summary of current Baseline (without proposal):**
   - The current code does not differentiate between the insulation required between conditioned and unconditioned space or between conditioned and semi-conditioned space.

B. **Summary of Baseline with changes:**
   - Establish design requirements for interior walls and ceilings separating conditioned space from semi-heated space.

C. **Rational Statement:**

- Establishes envelop requirements for a fully conditioned space within a semi-heated building that acknowledges the different environmental conditions for a fully conditioned space with a semi-heated building. To recognize and adjust the design requirements for interior wall and lids separating conditioned space from semi-heated space. This will reduce the construction cost on the common walls between conditioned and semi-heated space.

8.2. Economic Cost Analysis

A. **Construction Cost Impact:**

- This will reduce the construction cost on the common walls between conditioned and semi-heated space. Estimating this value will be different on each project due to the extent of walls within the layout.

B. **Implementation/Plan Review/Inspection Costs:**

- There is no additional time necessary for plan review or inspection.

C. **Life-Cycle Costs:**

- There would be a negligible increase in energy use, which would vary on the size and configuration of the spaces involved.

D. **Other Costs:**

- None

8.3. Economic Benefit Analysis

A. **Direct Cost Savings:**

- This will reduce the construction cost on the common walls between conditioned and semi-heated space. Estimating this value will be different on each project due to the extent of walls within the layout.

B. **Operational Benefits:**

- Recognizes that walls separating interior wall and lids separating conditioned space from semi- heated space are not the same as those separating conditioned space from unheated space and adjust the design requirements accordingly.

8.4. Small Business Economic Impact

A. **Small Business NAICS Categories Affected:**

- 236210 Industrial building construction
- 236220 Commercial and institutional building construction
- 238310 Drywall and insulation contractors
- 238990 Other specialty trade contractors
- 541310 Architectural services

B. **Compliance Burden Comparison:**

- There is no disproportionate impact on small business. The cost savings would be for any project with a combination of heated and semi-heated spaces.

C. **Potential Disproportion/Mitigation:**

- None necessary

8.5. Least Burdensome Alternative

- This proposal is the least burdensome approach, adopting a more realistic and flexible approach in design and insulation of conditioned spaces within a semi-heated space.

8.6. Conclusion

- The proposed amendment provides a more cost-effective manner of addressing this particular building arrangement while minimizing efficiency or heat loss.

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9. Log Number: 24-GP1-187*

Code Section/Title: 2024 WSEC-C, Section C411.1; Renewable energy
Proponent/Author: Duane Jonlin, Seattle Dept. of Construction and Inspection

9.1. Description & Rationale

A. **Summary of current Baseline (without proposal):**

- Buildings larger than 10,000 square feet of gross conditioned floor area are required to provide on-site renewable energy or, if allowed, additional C406 efficiency credits may be used to offset this requirement.

B. **Summary of Baseline with changes:**

- The size threshold is lowered to 5,000 square feet. Provides option to substitute required renewable energy with additional efficiency credits or, for projects utilizing energy modeling, reduced building performance factor. Eliminates renewable energy requirement for affordable housing and makes affordable housing projects eligible to receive gifts of renewable energy systems from other projects.

C. **Rational Statement:**

- Provides alternatives to installation of on-site renewable energy. Supports renewables for affordable housing and clarifies and coordinates existing requirements. These options may reduce construction costs for some projects.

9.2. Economic Cost Analysis

A. **Construction Cost Impact:**

- Construction cost savings will vary for every project, depending on the options chosen. For affordable housing, construction cost will be reduced by approximately ($3.00/W x 0.75 W = $2.25/square foot).

B. **Implementation/Plan Review/Inspection Costs:**

- Some additional time would be necessary for the code official to track and verify compliance with an alternate path.

C. **Life-Cycle Costs:**

- Impact will vary depending on the type of construction and options chosen. For affordable housing, the annual energy cost would increase by approximately $0.10 per square foot.

9.3. Economic Benefit Analysis

A. **Direct Cost Savings:**

- See the Construction Cost Impact above.

B. **Operational Benefits:**

- Energy use should be roughly the same for buildings in which alternative compliance options are selected.
- For affordable housing, lost savings will be (1.2 kW/W/y x 0.75 W/sf = 0.9 kW/yr x $0.11/kW = $0.10/sf)/yr). Where a solar array is gifted to affordable housing from another

project, the net energy use reduction for the affordable housing will be substantial, while energy use for the source project will increase by an equivalent amount.

C. **Other Benefits:**
   - Substantial decrease in construction cost for affordable housing, potential decrease for all other housing.

9.4. Small Business Economic Impact

A. **Small Business NAICS Categories Affected:**
   - 236116 Multifamily construction
   - 236118 Remodeling and renovating construction
   - 236210 Industrial building construction
   - 236220 Commercial and institutional building construction
   - 221118 Other electric power generation
   - 238990 Other specialty trade contractors
   - 541310 Architectural services
   - 541490 Other specialized design services
   - 541690 Other scientific and technical consulting services

B. **Compliance Burden Comparison:**
   - This measure would not have a significant effect on small businesses over larger businesses.

C. **Potential Disproportion/Mitigation:**
   - There is no disproportional impact.

9.5. Least Burdensome Alternative

- This proposal is the least burdensome approach, providing flexibility in meeting the code for all building types and first cost savings for affordable housing construction.

9.6. Conclusion

- The proposed amendment provides additional flexibility and promotes the construction of affordable housing.

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10. Log Number: 24-GP1-202

Code Section/Title: 2024 WSEC-C, Sections C406.2.5, C411.1.2; Energy Storage Systems
Proponent/Author: Gregory Johnson, Avista

10.1. Description & Rationale

A. Summary of current Baseline (without proposal):
   - No efficiency credits are available for energy storage systems, nor are they allowed to offset the requirement for on-site energy generation.

B. Summary of Baseline with changes:
   - Where not otherwise required by the code, energy storage systems (ESS) are allowed to work in tandem with renewable energy systems to satisfy the on-site energy generation requirements in Section C411 or earn efficiency credits in Section C406 at a ratio of 2 watt-hours of storage equaling 1 watt of generation.

C. Rational Statement:
   - Renewable generation seldomly aligns with peak electrical demand, especially in the northern regions like Washington. California ISO has well documented the solar

generation-load demand mismatch as the “duck curve”. The problem has become so significant that the California Public Utilities Commission has adopted NEM 3.0 which place increased importance upon battery storage. Washington needs to follow suit.

D. TAG Modification:

- The TAG made minor editorial corrections.

10.2. Economic Cost Analysis

A. Construction Cost Impact:

- This enhancement is added to one of the optional credit paths in Section C406, so is not a code requirement. It is also added as an option to satisfy Section C411. According to various sources, in 2025 the cost for ESS ranged between $280 and $580 per kilowatt-hour (kWh) fully installed. For a standard 100 kWh configuration, initial investments range from $25,000 to $50,000. Total costs depend on the scale of the facility, system duration, and site installation complexity.

B. Implementation/Plan Review/Inspection Costs:

- There is no additional time necessary for plan review or inspection.

C. Life-Cycle Costs:

- Fixed operations and maintenance (O&M) and software subscription fees typically run between $6 to $15 per kW-year. The battery packs constitute about 50% to 60% of total costs, with inverters and other system equipment splitting the remainder. Lithium iron phosphate (LFP) technology dominates the commercial market because of its long cycle life, high safety rating, and tolerance for frequent partial state-of-charge cycling. Because LFP systems can typically deliver 1.5 cycles per day before reaching their end of warranty, systems may require module augmentation after 10 years depending on operational intensity. With value stacking with utility and other incentives, it is possible to achieve full payback in 3 to 7 years.

10.3. Economic Benefit Analysis

A. Direct Cost Savings:

- This is one of many options for achieving the efficiency credits necessary to comply with Section C406. There are various federal and state incentives to offset first cost.

B. Operational Benefits:

- This addresses the net-metering energy efficiency fallacy that the utility grid can be used as a “battery”. Annual energy savings were calculated assuming that renewable generation never aligns with peak demand, an average of 4.5 solar hours per day, and the maximum amount (1/3) of energy storage is installed.

C. Other Benefits:

- Provides an additional option for satisfying code requirements for something that is becoming a more common design element.

10.4. Small Business Economic Impact

A. **Small Business NAICS Categories Affected:**

- 236116 Multifamily construction
- 236210 Industrial building construction
- 236220 Commercial and institutional building construction
- 221118 Other electrical power generation
- 238990 Other specialty trade contractors
- 541330 Engineering services

- 541490 Other specialized design services
- 541690 Other scientific and technical consulting services

B. **Compliance Burden Comparison:**
   - This measure would not have a significant effect on small businesses over larger businesses.

C. **Potential Disproportion/Mitigation:**
   - There is no disproportional impact.

10.5. Least Burdensome Alternative

- This proposal is the least burdensome approach, providing additional options and flexibility for meeting code requirements.

10.6. Conclusion

- The proposed amendment provides additional options for meeting the code without adding requirements.

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11. Log Number: 24-GP1-214*

Code Section/Title: 2024 WSEC-C, Sections C503.3, C505.2, and C505.3; Existing building air leakage

Proponent/Author: Nathan Miller, IMEG

11.1. Description & Rationale

A. **Summary of current Baseline (without proposal):**
   - Buildings undergoing a change of space conditioning as described in Section C505.2 or change of occupancy or use as described in Section C505.3 are required to comply with the air leakage requirements in Section C402.5.

B. **Summary of Baseline with changes:**
   - Buildings undergoing a change of space conditioning or change of occupancy or use must meet a less stringent air leakage requirement than that required for new buildings with no retesting required upon failure, only remediation.

C. **Rational Statement:**
   - We find that nearly all of our existing buildings projects don't fall entirely under one section of Chapter 5. Instead, you may have part that is under alterations, and part that is change of occupancy or condition. Since the air leakage testing requirements are not consistent across Chapter 5 this can result in nonsensical requirements to perform and pass air leakage tests on portions of a building that may have open-air connections and shared mechanical systems with sections of the building that did not even require envelope or air barrier upgrades (once testing tarps come down, air will take path of least resistance for infiltration). While it may not be difficult to fur out walls and add insulation to improve thermal performance of existing envelopes, there simply may not be the opportunity to reduce air-leakage at envelope elements that will not be fully exposed- such as transitions between walls-and-roofs, walls-and-floors, etc. What value is provided in testing individual spaces (and potentially requiring remediation) of air leakage on those spaces (for example- a single space undergoes a change in occupancy) which may have open-air connections to spaces that have not received any air-barrier upgrades. Proposal is to still require the air barrier/air leakage improvements as currently outlined in Chapter 5 but not force owners to invest in expense of performing and passing an air leakage test.

D. **TAG Modifications:**

- The proposal was coordinated with 24-GP1-163, which established a sizing requirement for air leakage testing for additions. This proposal has originally exempted all additions from air leakage testing. The TAG felt 163 was a better approach as there are instances where the addition can be equal to or larger than the existing building and performing the air leakage testing can provide significant energy savings.
- The proposal was modified from exempting changes in space conditioning and changes in occupancy from air leakage testing requirements to require that the projects test to a higher leakage rate without being required to re-test if the building fails. Upon failure, the envelope is required to be visually inspected and any leaks found sealed to the extent practicable, with a report of the remediation sent to the owner and the code official.

11.2. Economic Cost Analysis

A. **Construction Cost Impact:**

- Air leakage testing costs $0.07 – 0.60 per square foot for buildings, but there can be additional, substantial costs for remediation and retesting if the initial test is not passed.

B. **Implementation/Plan Review/Inspection Costs:**

- Requires less enforcement time, as AJHs will not have to engage in conversations right before project completion about what to do about non-compliant air leakage test results.

C. **Life-Cycle Costs:**

- The energy difference between 3 ACH and 4 ACH can increase heating and cooling energy consumption by 15 to 33 percent, depending on the size and configuration of the project.

11.3. Economic Benefit Analysis

A. **Direct Cost Savings:**

- See the Construction Cost Impact above.

B. **Operational Benefits:**

- The energy difference between 3 ACH and 4 ACH can increase heating and cooling energy consumption by 15 to 33 percent, depending on the size and configuration of the project.

C. **Other Benefits:**

- Would reduce the net project costs on buildings converted to housing.
- Removes frustration and friction related to having portions of existing building projects fully comply with air leakage testing requirement, including finding and mitigating leaks that may not be accessible in an existing building and retesting until being able to pass.

11.4. Small Business Economic Impact

A. **Small Business NAICS Categories Affected:**

- 236116 Multifamily construction
- 236118 Remodeling and renovating construction
- 236210 Industrial building construction
- 236220 Commercial and institutional building construction
- 238990 Other specialty trade contractors
- 541310 Architectural services
- 541490 Other specialized design services
- 541690 Other scientific and technical consulting services

B. **Compliance Burden Comparison:**

- This measure would not have a significant effect on small businesses over larger businesses.

C. **Potential Disproportion/Mitigation:**
   - There is no disproportional impact.

11.5. Least Burdensome Alternative

- This proposal is the least burdensome approach, providing flexibility in meeting the code for all building types and first cost savings for affordable housing construction.

11.6. Conclusion

- The proposed amendment provides additional flexibility, recognizes the difficulties and potential impracticalities in sealing existing buildings, and promotes the construction of affordable housing.

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12. Log Number: 24-GP1-221*

Code Section/Title: 2024 WSEC-C, Table C402.1.2
Proponent/Author: Lindsey Gaunt, IMEG

12.1. Description & Rationale

A. **Summary of current Baseline (without proposal):**
   - Slabs penetrating the thermal wall of a building envelope must meet the requirements of Table C402.1.2 for a mass transfer deck slab or mass floor, typically via UA calculation as it is typically infeasible to insulate.

B. **Summary of Baseline with changes:**
   - Establish design requirements for slabs that traverse the thermal boundary between conditioned and unconditioned space.

C. **Rational Statement:**
   - This proposal aligns the Washington State Energy Code with allowances in the 2021 Seattle Energy Code for situations where insulation is impractical or nearly impossible due to structural or operational constraints. This ensures that the Washington State Energy Code accommodates real-world challenges without compromising compliance. This change aims to balance energy efficiency with practicality, ensuring the code remains both effective and adaptable to unique building scenarios.

D. **TAG Modifications:**
   - There was substantial overlap between this petition and 24-GP1-261. For the concrete slab provisions of this petition and 261, the TAG moved the proposed exemption from the table to Section C402.2.3 to provide clearer direction.

12.2. Economic Cost Analysis

A. **Construction Cost Impact:**
   - There would be some cost savings associated with the reduced insulation in projects with these types of slabs. Estimating this value will be different on each project due to varying design and may not be present in all construction.

B. **Implementation/Plan Review/Inspection Costs:**
   - It is anticipated that this would make plan review and inspection easier and thus reduce costs.

C. **Life-Cycle Costs:**
   - There is no anticipated change in life cycle costs.

D. **Other Costs:**
   - There would be a slight increase in annual heating energy approximately 0.00067 kWh per square foot of conditioned floor area, or about $3.00/year for a 30,000 sf building.

12.3. Economic Benefit Analysis

A. **Direct Cost Savings:**
   - See the Construction Cost Impact above.
   - Estimate per unit *(if feasible):* $0.014 per square foot of conditioned floor space
   - Total potential range for typical projects: $0 - $2000, depending on the size of the building. Market reports show the average size of commercial buildings in Seattle is approximately 30,000 square feet, which would be a savings of about $435.

B. **Operational Benefits:**
   - Provides flexibility for UA calculations.
   - Ensures the energy code accommodates real-world challenges.

C. **Other Benefits:**
   - Balances energy efficiency with practicality, ensuring the code remains both effective and adaptable to unique building scenarios.

12.4. Small Business Economic Impact

A. **Small Business NAICS Categories Affected:**
   - 236116 Multifamily construction
   - 236210 Industrial building construction
   - 236220 Commercial and institutional building construction
   - 238110 Poured concrete foundation and structure contractors
   - 238120 Structural steel and precast concrete contractors
   - 541310 Architectural services
   - 541330 Engineering services
   - 541490 Other specialized design services
   - 541690 Other scientific and technical consulting services

B. **Compliance Burden Comparison:**
   - The provided savings would apply to all associated categories, whether small or larger businesses

C. **Potential Disproportion/Mitigation:**
   - There is no disproportional impact.

12.5. Least Burdensome Alternative

   - This proposal is the least burdensome approach, adopting a more realistic and flexible approach to dealing with structural or design constraints.

12.6. Conclusion

   - The proposed amendment provides a more cost-effective manner of addressing situations where insulation is impractical or nearly impossible due to structural or operational constraints.

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13. Log Number: 24-GP1-223*

Code Section/Title: 2024 WSEC-C, Tables C402.1.2 and C402.1.3; Piping shaft insulation
Proponent/Author: Rachel Thompson/Nathan Miller, IMEG

13.1. Description & Rationale

A. **Summary of current Baseline (without proposal):**
- As the Energy code currently stands, refrigerant piping shafts that require ventilation per mechanical code chapter 11 create a “donut hole” penetration potentially through multiple floors of a project. These shaft walls are prescriptively required to be fully code compliant opaque exterior walls, and this creates a large penalty in the thermal envelope compliance component performance (UA) calculation and/or requires significant depth of assemblies, reducing usable floor area.

B. **Summary of Baseline with changes:**
- Permits ventilated refrigerant shaft walls to meet a more realistic interior stud wall performance target and subsequently exclude the corresponding assembly area from the prescriptive component performance calculation and the maximum window to-wall ratio calculation.

C. **Rational Statement:**
- Removes the penalty associated with maintaining life safety on projects which have refrigerant piping shafts that require ventilation per mechanical code chapter 11. These walls should not be treated as exterior walls, as this creates a large penalty in the thermal envelope compliance calculation and forces the project to lose usable floor area by requiring significant depth of these refrigerant shaft assemblies and/or increase insulation elsewhere in the project to offset the associated penalty.

D. **TAG Modifications:**
- The proponent worked with the TAG to move the requirements from a note on the component performance equation to footnotes on the R-value and U-factor tables.

13.2. Economic Cost Analysis

A. **Construction Cost Impact:**
- There would be cost savings associated with the reduced insulation in projects with these heat pumps and the associated ventilated piping shafts. Estimating this value will be different on each project due to varying design and may not be present in all construction.
- Estimate per unit *(if feasible):* $0.014 per square foot of conditioned floor space
- Total potential range for typical projects: $0 - $2000, depending on the size of the building. Market reports show the average size of commercial buildings in Seattle is approximately 30,000 square feet, which would be a savings of about $435.

B. **Implementation/Plan Review/Inspection Costs:**
- No change in code enforcement/review time.

C. **Life-Cycle Costs:**
- There is no anticipated change in life cycle costs.

D. **Other Costs:**
- None

13.3. Economic Benefit Analysis

A. **Direct Cost Savings:**
   - See the Construction Cost Impact above.

B. **Operational Benefits:**
   - Provides flexibility for UA calculations.
   - Ensures the energy code accommodates real-world challenges.

C. **Other Benefits:**
   - Housing affordability is increased by reducing a significant item impacting insulation cost and space allocation
   - The energy code encourages the use of heat pumps and VRF for space conditioning, but the combination of ventilation requirements for A2L refrigerants and the requirements of insulating those walls to the full prescriptive targets introduce significant cost and space allocation issues on projects intending to use VRF and high-efficiency heat-pumps. This change helps minimize the impact.

13.4. Small Business Economic Impact

A. **Small Business NAICS Categories Affected:**
   - 236116 Multifamily construction
   - 236210 Industrial building construction
   - 236220 Commercial and institutional building construction
   - 238110 Poured concrete foundation and structure contractors
   - 238120 Structural steel and precast concrete contractors
   - 541310 Architectural services
   - 541330 Engineering services
   - 541490 Other specialized design services
   - 541690 Other scientific and technical consulting services

B. **Compliance Burden Comparison:**
   - The provided savings would apply to all associated categories, whether small or larger businesses.

C. **Potential Disproportion/Mitigation:**
   - There is no disproportionate impact.

13.5. Least Burdensome Alternative

   - This proposal is the least burdensome approach, adopting a more realistic approach to meeting national standards while maintaining efficiency.

13.6. Conclusion

   - The proposed amendment provides a more cost-effective manner of constructing ventilated refrigerant piping shafts needed for VRF and high-efficiency heat pump installation.

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14. Log Number: 24-GP1-231

Code Section/Title: 2024 WSEC-C, Section C403.3.8.2; Hot water coil selection
Proponent/Author: Clarence Clippler/Jeff Giffin, Corix

14.1. Description & Rationale

A. **Summary of current Baseline (without proposal):**
   - Buildings connected to district energy systems must meet the requirements in this section for the design of hot water coils.

B. **Summary of Baseline with changes:**
   - Buildings connected to district energy systems are exempt from Section C403.3.8.2 hot water coil selection criterion.

C. **Rational Statement:**
   - This proposed change is intended to give buildings connected to district energy systems similar flexibility to systems with heat pumps. The thermal energy network definitions require high efficiency and would benefit from the same flexibility in coil sizing.

14.2. Economic Cost Analysis

A. **Construction Cost Impact:**
   - This proposal is expected to be equal in cost or provide cost savings to buildings. This proposal allows the same flexibility for thermal energy networks as currently exists for on-site heat pump systems. Allowing coils to be sized for higher temperatures and increased design delta Ts will provide additional design flexibility to owners and teams and may have lower cost in smaller piping and pumps, as well as energy savings from reducing pumping and distribution energy.

B. **Implementation/Plan Review/Inspection Costs:**
   - There is no additional time necessary for plan review or inspection.

C. **Life-Cycle Costs:**
   - This would not have an impact on lifecycle costs.

14.3. Economic Benefit Analysis

A. **Direct Cost Savings:**
   - See the Construction Cost Impact above.

B. **Operational Benefits:**
   - Allows thermal energy networks to use system design constraints similar to heat pumps.

C. **Other Benefits:**
   - Provides additional design flexibility to owners and teams and may have lower cost in smaller piping and pumps, as well as energy savings from reducing pumping and distribution energy.

14.4. Small Business Economic Impact

A. **Small Business NAICS Categories Affected:**
   - 221330 Steam and air conditioning supply
   - 221118 Other electrical power generation
   - 238220 HVAC/mechanical/plumbing contractors
   - 238990 Other specialty trade contractors
   - 541330 Engineering services
   - 541490 Other specialized design services
   - 541690 Other scientific and technical consulting services

B. **Compliance Burden Comparison:**

- This measure would not have a significant effect on small businesses over larger businesses.

C. **Potential Disproportion/Mitigation:**
- There is no disproportional impact.

14.5. Least Burdensome Alternative

- This proposal is the least burdensome approach, providing flexibility for thermal energy networks when used.

14.6. Conclusion

- The proposed amendment provides additional flexibility for an energy saving option within the code.

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15. Log Number: 24-GP1-235*

Code Section/Title: 2024 WSEC-C, Section C406.3.4, Table C406.3; Electrical energy Storage
Proponent/Author: Michael Myer, Pacific Northwest National Laboratory

15.1. Description & Rationale

A. **Summary of current Baseline (without proposal):**
- The minimum capacity for electric energy storage is 5 Wh/ft^2.

B. **Summary of Baseline with changes:**
- The capacity is adjusted to allow between 0.5 and 15 Wh/ft^2. The credit calculation formula is corrected, along with the assigned load management credit values.

C. **Rational Statement:**
- As written, the existing formula is incorrect. The formula is missing a method of proration. First, if you have a value greater than 5, but less than 15 (e.g., 10 Wh/ft^2), there is no method of proration. The text says for storage greater than 15 Wh/ft^2, here is the proration formula. Beyond the text limitation, the formula is incorrect. A project that had 16 Wh/ft^2 in Group B would have a credit value of 2,106. The new formula provides for a method of proration for any interval. Assuming that the credits in Table C406.3 are based on the minimum 5 Wh/ft^2, the correct proration method would be Installed electric capacity / 5 Wh/ft^2 x C406.3. This proposal reduces the values in Table C406.3 by 80%. By reducing the values in the table by 80%, it allows for the new formula for proration.

  The current minimum value is 5 Wh/ft2. ASHRAE/IES Standard 90.1 and IECC 2024 both have a similar credit option. However, both Std. 90.1 and IECC have a minimum value of 0.5 Wh/ft2. The current 5 Wh/ft2 value could be an error compared to the language in other codes. If the value is not an error, it is very high and that may limit the use of this credit. The table below lists the DOE Prototypes, the building area, the resultant energy storage capacity based on the current language, and the proposed energy capacity from the proposed change. The current minimum value of 5 Wh/ft^2 is unrealistic for the larger buildings. A small building (e.g., small office 5,500 ft^2 prototype) may need a high-density system because of the minimum size storage systems available, but as the building increases in size, the energy capacity density needed decreases. The credit specifically states for use during “non-peak periods”. The energy storage system is not being sized for multi day operation for resilience or other needs. The sizing is designed so that the building can shed/shift load during peak periods. As a result, the energy storage system needs to only operate for 2 – 4 hours. This short operational window is another reason that the value should be lower.

D. **TAG Modification:**

- The TAG made minor editorial corrections.

15.2. Economic Cost Analysis

A. **Construction Cost Impact:**

- Reducing the minimum to a value easier to comply with reduces costs for projects. Commercial electric energy storage systems are roughly $100 - $300 / KWh depending on the technology (https://arka360.com/ros/cheapest-way-to-store-solar-energy/). The existing minimum requirement of 5 Wh/ft^2 at $200 kWh translates to a cost of $1.0 /ft^2 for storage with an estimated savings of $0.90 per square foot.

B. **Implementation/Plan Review/Inspection Costs:**

- There is no additional time necessary for plan review or inspection.

C. **Life-Cycle Costs:**

- It is hard to determine the energy savings from this code change. The code change reduces an assumed error in the original language. Reducing the value allows more sites to consider the optional use of the credit.

15.3. Economic Benefit Analysis

A. **Direct Cost Savings:**

- No significant change in cost. Clarifications allow for better design of systems.

B. **Operational Benefits:**

- The code change reduces an assumed error in the original language. Reducing the value allows more sites to consider the optional use of the credit.

C. **Other Benefits:**

- Clarification of language and intent reduces confusion and conflict among users and enforcers of the code.

15.4. Small Business Economic Impact

A. **Small Business NAICS Categories Affected:**

- 236116 Multifamily construction
- 236118 Remodeling and renovating construction
- 236210 Industrial building construction
- 236220 Commercial and institutional building construction
- 221118 Other electrical power generation
- 238220 HVAC/mechanical/plumbing contractors
- 238990 Other specialty trade contractors
- 541330 Engineering services
- 541490 Other specialized design services
- 541690 Other scientific and technical consulting services

B. **Compliance Burden Comparison:**

- This measure would not have a significant effect on small businesses over larger businesses.

C. **Potential Disproportion/Mitigation:**

- There is no disproportional impact.

15.5. Least Burdensome Alternative

- This proposal is the least burdensome approach, providing clarity and flexibility for design of energy storage systems.

15.6. Conclusion

- The proposed amendment improves clarity and usability within the code.

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16. Log Number: 24-GP1-239

Code Section/Title: 2024 WSEC-C, Section C405.3; Horticultural lighting
Proponent/Author: Michael Myer, Pacific Northwest National Laboratory

16.1. Description & Rationale

A. **Summary of current Baseline (without proposal):**
   - The photosynthetic photon efficacy required for greenhouse and other horticultural lighting is between 1.7 and 1.9 micromoles per joule (µmol/j).

B. **Summary of Baseline with changes:**
   - A 10% increase in the minimum photosynthetic photon efficacy of horticultural lighting to 2.5 µmol/j in greenhouses and controlled plant growth environments. The proposal also shifts from lamp-based photosynthetic photon efficacy to luminaire-based photosynthetic photon efficacy.

C. **Rational Statement:**
   - The purpose of this change is twofold. Shifting from lamp photosynthetic photon efficacy (PPE) to luminaire PPE focuses on the system output. Fixtures absorb light within the fixture housing and specifying luminaire PPE is better than only focusing on the lamp PPE. Increasing the minimum PPE to 2.5 µmol/J increases the performance compared to the existing requirements. The value of 2.5 µmol/J matches version 4.0 of the horticultural requirements proposed by the DesignLights Consortium (DLC). The DLC sets performance targets that many utilities reference for incentives.

D. **TAG Modification:**
   - The TAG correlated this petition with 24-GP1-167 by removing the reference to all other horticultural lighting and specifying that this efficacy relates only to horticultural lighting in greenhouses and controlled plant growth environments.

16.2. Economic Cost Analysis

A. **Construction Cost Impact:**
   - The majority of LED products in the market meet this value, therefore the code change is not expected to affect the cost of construction. The DesignLights Consortium (DLC) operates a qualified product list and a related database of technologies that meet the qualified product list. LED horticultural lighting is one of the technologies tracked in the database. As of early 2024, over 70% of the LED fixtures listed in the database for horticultural lighting has a photosynthetic photon efficacy of at least 2.5 µmol/J. A significant amount of equipment meets this requirement, therefore, there is not expected to be a cost increase for this requirement.

B. **Implementation/Plan Review/Inspection Costs:**
   - There is no additional time necessary for plan review or inspection.

C. **Life-Cycle Costs:**
   - Overall lifecycle would be very different when comparing the HPS and LED systems. HPS lamps are $40 per lamp and in this scenario would need to be replaced 3 – 5 times over a 10-year lifecycle. Therefore, over the life of the HPS system, the HPS lamps would have an additional cost of $3 - $5 /ft2. This is not factoring in discount rate of future costs or labor costs. In short, the 2.5 µmol/J requirement results in less than $10 / square foot cost increase.

Assuming that that space is 555 square foot, this requirement results in $5,550 increased cost. Per table 1, the energy savings are 10,556 kWh per year. Assuming an average cost of electricity of $0.11 in the US, this proposal pays for itself in less than 5 years. The industry has moved away from the HPS technology, but was used in this calculation because it can meet the existing value of 2.5 µmol/J.

Table 1 estimates the energy used to operate two different lighting systems to grow tomatoes. The examples are a little different, but this source has similar values.

Table 1. CEH Tomatoes Analysis Annual Energy Use			
	1.9 µmol/J	**2.5 µmol/J**	**Difference**
Building Size	555 ft^2	555 ft^2	No difference
Canopy Area per Luminaire	56 ft^2	56 ft^2	No difference
# of Fixtures	10	10	No difference
Fixture Power	1,006 W	765 W	241 W
Photoperiod (hours per day)	12 hours	12 hours	No difference
Energy	44,063 kWh	33,507 kWh	10,556 kWh
	79 kWh / ft^2	60 kWh/ft^2	19 kWh/ft^2

16.3. Economic Benefit Analysis

A. **Direct Cost Savings:**
   - See the Construction Cost Impact above.

B. **Operational Benefits:**
   - Significant energy savings from the use of LED fixtures over the use of HPS systems, with a payback of less than 5 years.

C. **Other Benefits:**
   - The first cost for LED systems and HPS systems are similar, but the lifecycle of LED systems is much greater, resulting in lower replacement costs.

16.4. Small Business Economic Impact

A. **Small Business NAICS Categories Affected:**

   - 111419 Other food crops grown under cover
   - 111998 Other miscellaneous crop farming
   - 236210 Industrial building construction
   - 238990 Other specialty trade contractors
   - 335122 Commercial, industrial, and institutional lighting fixture manufacturing
   - 335129 Other lighting equipment manufacturing
   - 541330 Engineering services
   - 541490 Other specialized design services
   - 541690 Other scientific and technical consulting services

B. **Compliance Burden Comparison:**
   - This measure would not have a significant effect on small businesses over larger businesses.

C. **Potential Disproportion/Mitigation:**
   - There is no disproportional impact.

16.5. Least Burdensome Alternative

- This proposal is the least burdensome approach, specifying a more energy efficient product at the same or lower cost.

16.6. Conclusion

- The proposed amendment follows the industry shift in product types and efficiency while not increasing costs.

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17. Log Number: 24-GP1-242*

Code Section/Title: C505.3 Change in occupancy
Proponent/Author: Ben Omura

17.1. Description & Rationale

A. **Summary of current Baseline (without proposal):**
- The 2021 Washington State Energy Code Commercial Provisions Section 503.3 required changes to occupancy classification in certain cases to be fully compliant with current provisions. Case 1 requires spaces converted from classification as Group F, S or U to any other occupancy than F, S or U to comply with the full provisions of the energy code. Case 2 required any occupancy conversion to an R- Residential classification to comply with the full provisions of the energy code. Case 3 requires R Dwelling units permitted prior to July 1, 2002, converted to a commercial use or occupancy to comply with the full provisions of the energy code.

B. **Summary of Baseline with changes:**
- This proposal adds two exceptions to Case 2 of Section C505.3. The first exception applies Group R sleeping units converted to Dwelling Units. The second exception applies to spaces Converted from Occupancy classifications F, S, and U that were permitted under the 2009 or later Energy Codes and only requires compliance with Sections C406, C408 and C411.

C. **Rational Statement:**
- This proposal would help to lower barriers for converting existing spaces and buildings to Group R dwelling units and help meet an increasing need for cost-effective housing in the State of Washington.

17.2. Economic Cost Analysis

A. **Construction Cost Impact:**
- Converting other occupancies to residential space can require full compliance with the energy code. This proposal offers exceptions to strict compliance. Assuming $300/sf conversion cost for an average project/dwelling unit and an average dwelling unit area of 800 square feet results in approximately $240,000 conversion cost for a dwelling unit. It is estimated that these proposed changes would reduce the energy code compliance cost by about 20%, or 2% of the overall conversion cost and translates to a cost savings of around $6/sq. ft.
- Estimate per unit: $4,800/Dwelling Unit

B. **Implementation/Plan Review/Inspection Costs:**
- Clarifications should reduce enforcement time for conversions to Group R, however the result may increase the amount of reviews/inspections required due to increased volume of projects.

C. **Life-Cycle Costs:**
- By avoiding baseline energy retrofits, building owners bypass standard capital costs. Under the new exceptions, developers utilize more straightforward, targeted compliance sections (Sections C406, C408, and C411), resulting in standard, reliable residential equipment cycles with lower long-term commercial operational risks.

D. **Other Costs:**
   - Requiring an adaptive reuse project to meet full code compliance across all disciplines requires extensive energy modeling and engineering diagnostics. By relying on streamlined, targeted compliance sections, developers face substantially lower design, architectural, and engineering soft costs.

17.3. Economic Benefit Analysis

A. **Direct Cost Savings:**
   - Building owners save direct material and labor costs by avoiding upgrades to building envelope and mechanical and electrical systems.

B. **Operational Benefits:**
   - This proposal provides operational benefit by streamlining the property management, leasing, and maintenance lifecycles of adaptive reuse projects. By exempting qualifying conversions from a full code overhaul, the operational advantages result in utility predictability, ease of facility management, and speed to market.

C. **Other Benefits:**
   - Lowering upfront conversion costs directly incentivizes developers to initiate residential conversion projects, increasing the overall housing supply in Washington.

17.4. Small Business Economic Impact

A. **Small Business NAICS Categories Affected:**
   - 531110: Lessors of Residential Buildings and Dwellings
   - 531120: Lessors of Nonresidential Buildings
   - 236116: New Multifamily Housing Construction
   - 236220: Commercial and Institutional Building Construction
   - 541310: Architectural Services
   - 541330: Engineering Services
   - 238220: Plumbing, Heating, and Air Conditioning Contractors

B. **Compliance Burden Comparison:**
   - This proposal reduces the small business compliance burden by replacing complex, building-wide energy upgrades with a streamlined and predictable compliance pathway

C. **Potential Disproportion/Mitigation:**
   - No disproportionate compliance burden was identified.

17.5. Least Burdensome Alternative

- This proposal represents the least burdensome alternative because it offers new exceptions that clarify when full energy code compliance is required.
- Suggested Mitigations: No Mitigation Required.

17.6. Conclusion

- This proposal introduces clarifying exceptions to C505.3 and reduces compliance burden for all code users.

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18. Log Number: 24-GP1-247_rev1*

Code Section/Title: 2024 WSEC-C, Section C405.4.3 – Lighting power for sleeping units and dwelling units

Proponent/Author: Michael Myer, Pacific Northwest National Laboratory

18.1. Description & Rationale

A. **Summary of current Baseline (without proposal):**

- Under the current 2024 WSEC-C, Section C405.4.3 requires that permanently installed lighting in sleeping units and dwelling units (other than Group I-2 patient rooms, which follow Sections C405.4.1 and C405.4.2) be provided by lamps with an efficacy of at least 65 lumens per watt or luminaires with an efficacy of at least 45 lumens per watt.
- The baseline requirement applies to permanently installed fixtures, including lighting integrated into range hoods and exhaust fans, but excludes lighting integral to other appliances, antimicrobial lighting used solely for disinfection, and luminaires with an input rating of less than 3 watts.

B. **Summary of Baseline with changes:**

- The proposal increases the minimum efficacy requirements in Section C405.4.3 so that lamps must have an efficacy of at least 80 lumens per watt (up from 65) and luminaires must have an efficacy of at least 60 lumens per watt (up from 45).
- The existing exceptions for lighting integral to other appliances, antimicrobial lighting used solely for disinfecting, and luminaires with an input rating of less than 3 watts are retained, so the primary change is a higher minimum efficacy for the covered lamps and luminaires.

C. **Rational Statement:**

- The rationale is to align the WSEC-C requirement for lighting in sleeping and dwelling units with similar provisions in ASHRAE/IES Standard 90.1-2022, which requires installed luminaires to use lamps with efficacy of at least 75 lumens per watt or have total luminaire efficacy of at least 50 lumens per watt, and to reflect the performance of widely available high-efficacy products.
- Because most commercially available luminaires and lamps already meet or exceed the proposed efficacy levels, the change is intended to lock in energy savings from common practice without increasing first cost, thereby advancing state energy conservation policy in a low-burden manner.

18.2. Economic Cost Analysis

A. **Construction Cost Impact:**

- The proponent identifies no construction cost increase, noting that there are multiple commercially available technologies that meet the proposed efficacy levels and that these products are already commonly used to comply with existing high-efficacy requirements.
- As a result, the estimated construction cost impact is 0.0 dollars per square foot for affected dwelling and sleeping units; for typical multifamily projects, the proposal primarily constrains product selection rather than requiring additional fixtures, wiring, or controls.
- Incremental first cost: 0.0 dollars per square foot of conditioned floor area in sleeping and dwelling units.
- Small residential or lodging projects: no measurable change in fixture or lamp cost.
- Larger multifamily or hotel projects: no measurable change, as high efficacy lamps and luminaires are already standard practice and competitively priced.

B. **Implementation/Plan Review/Inspection Costs:**

- Code enforcement staff already review lighting schedules and cut sheets to verify that installed lamps and luminaires meet minimum efficacy requirements; this proposal simply increases the numeric thresholds, so the nature and amount of documentation and review effort remain the same.

- The proponent states that there is no additional plan review or inspection time required (none per permit application), because the same efficacy data that is currently checked will continue to be checked against the higher thresholds.

C. **Life-Cycle Costs:**
- Life-cycle costs are improved by the proposal because higher-efficacy lighting reduces energy consumption for the same delivered lumens, lowering utility bills over the life of the fixtures while maintaining or improving service life characteristics typical of modern LED products.
- Based on the proponent's calculation, for an 800 lumen fixture operating 900 hours per year (2.5 hours per day), baseline energy use at 65 lumens per watt is 10.8 kilowatt hours per year, and post change energy use at 80 lumens per watt is 9 kilowatt hours per year; assuming 5 fixtures in 400 square feet, the proposal yields energy savings of 0.0225 kilowatt hours per square foot annually without any increase in first cost.

D. **Other Costs:**
- The proposal does not introduce additional compliance, fines, training, or record-keeping requirements beyond existing efficacy verification; the same documentation and submittal processes are used.
- Manufacturers and distributors have already positioned high-efficacy products in the marketplace, so there is no anticipated need for special training or retooling, and no additional administrative burden on designers or contractors beyond selecting compliant products.

18.3. Economic Benefit Analysis

A. **Direct Cost Savings:**
- Because the proposal achieves energy savings without increasing first cost, there is a direct reduction in operating costs for building owners and occupants through lower lighting energy use, with savings accruing annually over the service life of the lighting systems.
- For the example provided (0.0225 kilowatt-hours per square foot per year), these savings scale with dwelling size and number of units, providing meaningful cumulative utility-bill reductions in multifamily buildings and lodging facilities while maintaining comparable upfront construction costs.

B. **Operational Benefits:**
- High-efficacy lighting often coincides with modern LED products that provide improved reliability, longer life, and reduced maintenance labor compared to lower-efficacy technologies, benefiting building operations over time.
- The proposal supports consistency with national standards such as ASHRAE/IES 90.1-2022 and reinforces a clear, performance-based requirement for installed lighting, which simplifies design and product selection for practitioners working across multiple codes and jurisdictions.

C. **Other Benefits:**
- By reducing lighting energy consumption without additional first cost, the proposal contributes to statewide energy conservation and greenhouse gas reduction goals, producing environmental benefits that extend beyond individual buildings.
- Occupants benefit from modern, high-efficacy lighting systems, which are commonly associated with better light quality and controllability, thereby enhancing the comfort and usability of dwelling and sleeping spaces.

18.4. Small Business Economic Impact

A. **Small Business NAICS Categories Affected:**
- 236220 – Commercial and Institutional Building Construction
- 236116 – Multifamily Housing Construction
- 236118 – Remodeling and renovating construction
- 238210 – Electrical Contractors and Other Wiring Installation Contractors

- 541330 – Engineering Services
- 541310 – Architectural Services
- 541350 – Building Inspection Services

B. **Compliance Burden Comparison:**

- The proposal does not increase compliance complexity, as small and large firms alike must already document efficacy for installed lighting; only the threshold increases, and compliant products are widely available at similar cost.
- Given the proponent's assertion of no cost increase and no additional enforcement time, the compliance burden is effectively neutral for both small and large firms, with no evidence of a higher per-employee or per-revenue impact on small businesses.

C. **Potential Disproportion/Mitigation:**

- Because high-efficacy lamps and luminaires are already standard market offerings and there is no incremental first cost, there is no indication of a disproportionate economic impact on small businesses, and no special mitigation (such as phased implementation or waivers) appears necessary.
- Any minor administrative effort to ensure product compliance is consistent with existing practice and is offset by the operational savings that accrue to small landlords and small residential property owners.

18.5. Least Burdensome Alternative

- This rule change is narrowly targeted to increase the minimum efficacy thresholds for lighting in sleeping and dwelling units without introducing new categories of equipment, controls, or documentation; it leverages current market-standard products and aligns with ASHRAE/IES 90.1-2022, making it a least-burdensome way to capture additional energy savings.
- No alternative approach has been identified that would achieve comparable energy savings without either imposing additional cost or complexity (such as mandatory controls) or deviating from national standard practice, so the proposal is considered the least burdensome alternative for achieving the stated energy conservation objective.

18.6. Conclusion

- The proposal provides net societal and economic benefits by increasing lighting efficacy requirements for sleeping and dwelling units, yielding annual energy savings of approximately 0.0225 kilowatt-hours per square foot without increasing first cost, thereby lowering operating costs for building owners and occupants and reducing environmental impacts.
- The burden on small businesses is proportionate and fair because compliant lighting Products are widely available at existing price points, and enforcement procedures do not become more complex, and the energy cost savings benefit small property owners and tenants as much as larger entities.

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19. Log Number: 24-GP1-253

Code Section/Title: 2024 WSEC-C, Section C404.2.1, C404.2.1.1; Service water heaters
Proponent/Author: Eric Vander Mey

19.1. Description & Rationale

A. **Summary of current Baseline (without proposal):**

- Service hot water is required to be supplied by an electric air source heat pump water heater with some exceptions.

B. **Summary of Baseline with changes:**

- Two new exceptions are added for point of use instantaneous electric water heaters and wastewater heat recovery heat pump heaters. It is further clarified that the instantaneous heaters specified in the exception are not counted in the heating capacity calculations in Section C404.2.1.1.

C. **Rational Statement:**

- The added exceptions help clarify the intent of the electric heat pump heating provisions of the code.

D. **TAG Modification:**

- After review, the TAG added exceptions to Section C404.2.1.1 to specify allowable system types that can replace the electric air source heat pump water heaters: wastewater heat recovery systems, solar thermal systems and other heat pump systems that utilize waste heat from other sources.

19.2. Economic Cost Analysis

A. **Construction Cost Impact:**

- This proposal is expected to be equal in cost or provide cost savings to buildings due to clarifications of the existing code and the additional exceptions in spirit with the intent of the existing code.

B. **Implementation/Plan Review/Inspection Costs:**

- There is no additional time necessary for plan review or inspection.

C. **Life-Cycle Costs:**

- Wastewater heat recovery systems can deliver significant energy savings compared to air-source heat pump systems but are highly dependent on the project type.

19.3. Economic Benefit Analysis

A. **Direct Cost Savings:**

- See the Construction Cost Impact above.

B. **Operational Benefits:**

- Wastewater heat recovery systems can deliver significant energy savings compared to air-source heat pump systems.

C. **Other Benefits:**

- Clarification of language and intent reduces confusion and conflict among users and enforcers of the code.

19.4. Small Business Economic Impact

A. **Small Business NAICS Categories Affected:**

- 221330 Steam and air conditioning supply
- 221118 Other electrical power generation
- 238220 HVAC/mechanical/plumbing contractors
- 238990 Other specialty trade contractors
- 541330 Engineering services
- 541490 Other specialized design services
- 541690 Other scientific and technical consulting services

B. **Compliance Burden Comparison:**

- This measure would not have a significant effect on small businesses over larger businesses.

C. **Potential Disproportion/Mitigation:**

- There is no disproportional impact.

19.5. Least Burdensome Alternative

- This proposal is the least burdensome approach, providing clarity and flexibility for design of service water heating systems.

19.6. Conclusion

- The proposed amendment provides clarity and additional flexibility for added energy saving options within the code.

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20. Log Number: 24-GP1-258

Code Section/Title: 2024 WSEC-C, Sections C406.2.22, C406.3.8; Peak heating and cooling loads
Proponent/Author: Mike Fowler

20.1. Description & Rationale

A. **Summary of current Baseline (without proposal):**

- No efficiency credits or load management credits are available for managing peak heating and cooling loads.

B. **Summary of Baseline with changes:**

- Provides an additional option for achieving the efficiency credits and load management credits necessary to comply with Section C406 by reducing peak heating and cooling loads to deliver buildings with low peak energy demand.

C. **Rational Statement:**

- Low peak energy loads from buildings are a valuable way to reduce demand impact on the utility grid, especially during times of extreme weather events. The following three existing measure credits are effectively combined to create a new measure: existing measure 7. High performance DOAS with minimum heat recovery sensible effectiveness of 80 percent, existing measure 25. Enhanced envelope performance with 15 percent lower than the allowable Total UA, and existing measure 26. Base reduced air leakage that does not exceed 68 percent of the maximum leakage allowed. These three elements are the critical measures to reducing peak heating and cooling loads to deliver buildings with low peak energy demands. The sum of these building loads at 8.0 BTU-hr x sf is referenced from LEED v5 EA Credit: Reduce Peak Thermal Loads, Option 4, Path 1 (second public comment draft, September 2024). By using the sum for heating and cooling loads, it provides development and design teams with flexibility to create the most cost-effective combinations. The proposed credit values in the Efficiency Measure Credits tables are derived from the sum of the three existing credit measures. As this combination also delivers peak load management for a building, the proposed measure is also proposed for the Load Management Measure Credits. The proposed credit values, as a starting point, are at 20% of the number 2 measure HVAC load management credit values. That measure reduces demand through controls which gradually lower or raise the temperature set point by 3 degrees over a minimum of three hours.

D. **TAG Modification:**

- The TAG modified the petition language for clarity and correlated the credit options with existing code requirements. As this credit option included provisions are closely related to other credit options, the TAG determined that those other credit options should be excluded from

being used in tandem with this option. In correlating this petition with 24-GP1-179, the TAG directed PNNL to calculate the appropriate credit values for this measure.

20.2. Economic Cost Analysis

A. **Construction Cost Impact:**
   - This proposal is based on combining three measures in the existing code and as such has no additional cost. Performing an annual energy savings estimate is not necessary as each exists and can currently be selected as an option by a design and development team.

B. **Implementation/Plan Review/Inspection Costs:**
   - There is no additional time necessary for plan review or inspection.

C. **Life-Cycle Costs:**
   - This proposal is based on combining three measures in the existing code. Performing an annual energy savings estimate is not necessary as each exists and can currently be selected as an option by a design and development team.

20.3. Economic Benefit Analysis

A. **Direct Cost Savings:**
   - This is one of many options for achieving the efficiency credits necessary to comply with Section C406 and is based on a combination of three existing measures. There is no additional cost/savings associated with this option.

B. **Operational Benefits:**
   - The proposed measure bundles existing measures to provide economic benefits by making the building more resilient to future extreme weather events, cost less to operate, and significantly reduces peak demand needs from the utility grid.

C. **Other Benefits:**
   a. Provides a cost effective additional option for satisfying code requirements.

20.4. Small Business Economic Impact

A. **Small Business NAICS Categories Affected:**

   - 236116 Multifamily construction
   - 236210 Industrial building construction
   - 236220 Commercial and institutional building construction
   - 238990 Other specialty trade contractors
   - 541330 Engineering services
   - 541490 Other specialized design services
   - 541690 Other scientific and technical consulting services

B. **Compliance Burden Comparison:**
   - No additional economic impacts to small businesses as the proposed measure is based on combining three existing measures and each can currently be selected as an option by a design and development team.

C. **Potential Disproportion/Mitigation:**
   - There is no disproportional impact.

20.5. Least Burdensome Alternative

- This proposal is the least burdensome approach, providing additional options and flexibility for meeting code requirements.

20.6. Conclusion

- The proposed amendment provides additional options for meeting the code without adding requirements.

21. Log Number: 24-GP1-261*

Code Section/Title: 2024 WSEC Section C402.2.3 Floors over outdoor air or unconditioned space
Proponent/Author: Andy Burnam, Delta E

21.1. Description & Rationale

A. **Summary of current Baseline (without proposal):**
- Floors over unconditioned utility vault spaces must be insulated to the full requirements of Table C402.1.2, typically via UA calculation.

B. **Summary of Baseline with changes:**
- Establish exemptions for floors over stormwater or utility vaults.

C. **Rational Statement:**
- This is intended to provide flexibility to component performance envelope UA calculations. Stormwater or fire tank detention vaults are typically site-constructed below-grade concrete vaults filled with large masses of water, typically exposed to stable ground temperatures. Because these vaults are underground and are typically filled with large masses of water, they should reach stable temperatures which would typically be tempered by the exterior ground contact. This is a low benefit, but high cost aspect of the envelope thermal design. There is often conditioned space located over the water storage vaults (e.g. the fire pump room is often located above a fire water storage vault), and providing horizontal insulation at the conditioned space floor is challenging. The types of insulation possible to use on the underside of a concrete slab would be limited due to the water exposure and high humidity of the vault, and any potential for insulation which may clog a fire pump would be problematic. Providing insulation on the underside of the concrete slab, or between a false concrete lid in the vault increases the depth of the vault ceiling and reduces usable volume of the vault, potentially requiring deeper excavation or a larger vault footprint, and more concrete and the associated embodied carbon.

D. TAG Modifications:
- For the concrete slab provisions of this petition and 261, the TAG moved the proposed exemption from the table to Section C402.2.3 to provide clearer direction.

21.2. Economic Cost Analysis

A. **Construction Cost Impact:**
- There would be some cost savings associated with the reduced insulation in projects with these types of vaults. Estimating this value will be different on each project due to varying design and number of vaults within the layout.

B. **Implementation/Plan Review/Inspection Costs:**
- There is no anticipated impact on plan review or inspection.

C. **Life-Cycle Costs:**
- Not applicable in this proposal.

D. **Other Costs:**
- None

21.3. Economic Benefit Analysis

A. **Direct Cost Savings:**

- See the Construction Cost Impact above.

- Estimate per unit *(if feasible):* $0.014 per square foot of conditioned floor space
- Total potential range for typical projects: $0 - $2000, depending on the size of the building. Market reports show the average size of commercial buildings in Seattle is approximately 30,000 square feet, which would be a savings of about $435.

B. **Operational Benefits:**

- Provides flexibility for UA calculations.
- Ensures the energy code accommodates real-world challenges.

C. **Other Benefits:**

- Balances energy efficiency with practicality, ensuring the code remains both effective and adaptable to unique building scenarios.

21.4. Small Business Economic Impact

A. **Small Business NAICS Categories Affected:**

- 236116 Multifamily construction
- 236210 Industrial building construction
- 236220 Commercial and institutional building construction
- 238120 Structural steel and precast concrete contractors
- 238130 Framing contractors
- 238190 Other foundation, structure and building exterior contractors
- 238310 Drywall and insulation contractors
- 238990 Other specialty trade contractors
- 541310 Architectural services

B. **Compliance Burden Comparison:**

- The provided savings would apply to all associated categories, whether small or larger businesses

C. **Potential Disproportion/Mitigation:**

- There is no disproportional impact.

21.5. Least Burdensome Alternative

- This proposal is the least burdensome approach, adopting a more realistic and flexible approach to dealing with structural or design constraints.

21.6. Conclusion

- The proposed amendment provides a more cost-effective manner of addressing situations where insulation is impractical or nearly impossible due to structural or operational constraints.

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22. Log Number: 24-GP1-272

Code Section/Title: 2024 WSEC-C, Section C403.3.5.5 – Supplemental heating and cooling
Proponent/Author: Duane Jonlin, Seattle Department of Construction and Inspections

22.1. Description & Rationale

A. **Summary of current Baseline (without proposal):**

- Under the current 2024 WSEC-C language, Section C403.3.5.5 limits supplemental conditioning in dedicated outdoor air systems (DOAS) by requiring supply air stream heating to comply with Section C403.7.3 and by permitting cooling only for dehumidification, with coils

sized no larger than needed to meet peak dehumidification at design outdoor conditions and controlled to maintain supply or zone relative humidity.

- The baseline includes an exception allowing heating for defrost control, which must be locked out when outside air temperatures exceed 35°F and sized to prevent frost damage while providing supply air at or below 55°F, but it does not allow general tempering of ventilation air for Group R-1 and R-2 occupancies that have zonal heating but no zonal mechanical cooling.

B. **Summary of Baseline with changes:**

- The proposal retains the existing DOAS heating and dehumidification limits and the defrost exception, but adds a second exception allowing a DOAS serving Group R-1 or R-2 occupancy spaces that are served by zonal heating systems, and not by zonal heat pumps, air conditioners, or other zonal mechanical cooling systems, to be provided with a supplemental heating and cooling system in compliance with Section C403.1.4.
- This new exception allows tempering of ventilation air for both heating and cooling in hotel and multifamily spaces using zonal heating without zonal cooling, while maintaining the general restrictions on supplemental DOAS conditioning for other occupancies and system configurations.

C. **Rational Statement:**

- The stated purpose of the change is “design flexibility,” providing designers a voluntary option to temper ventilation air for certain Group R-1 and R-2 applications (such as hotels and multifamily buildings) where DOAS supply air might otherwise be uncomfortably cold or warm relative to spaces served only by zonal heating.
- Because this is an optional path that must still comply with Section C403.1.4 and does not change baseline requirements for systems with zonal cooling, the proposal is intended to improve comfort and design options without increasing required energy use or imposing new mandatory equipment.

22.2. Economic Cost Analysis

A. **Construction Cost Impact:**

- The economic impact data sheet characterizes the proposal as a “voluntary option for designers” with a “slight decrease” in construction cost per square foot, noting that allowing tempering of ventilating air can reduce the need for more complex or costly alternative system designs that would otherwise be used to address comfort concerns.
- By permitting supplemental heating and cooling of DOAS air for Group R-1 and R-2 projects without zonal cooling, designers may be able to avoid oversizing zonal heating systems, adding separate small systems, or implementing ad-hoc solutions, leading to potential modest construction cost savings at the project level; however, no explicit numeric per-unit dollar estimate is provided.
- **Estimate per unit*:*** Slight decrease in construction cost per square foot where the new exception is used, reflecting avoided design complexity and alternative equipment; no change where designers continue using baseline approaches.

B. **Implementation/Plan Review/Inspection Costs:**

- The proposal indicates that there is no additional enforcement time (“None” hours per permit application) for plan review or inspection, as the exception simply adds a voluntary design option that must still meet Section C403.1.4, and does not create new documentation or special inspection triggers.
- Plan reviewers and inspectors will continue to review DOAS and zonal system designs under existing processes, verifying whether a DOAS qualifies for the new exception and whether any

supplemental heating and cooling complies with C403.1.4 is expected to be accommodated within current review practices.

C. **Life-Cycle Costs:**

- The economic impact data sheet states “No change in energy use,” indicating that, from the proponent’s perspective, the new exception neither increases nor decreases expected annual energy consumption relative to baseline, assuming designers apply it judiciously and within the constraints of C403.1.4.
- Estimated annual or project life-cycle effect: Because the proposal is optional and primarily targeted at improving comfort and design flexibility rather than energy savings, life-cycle operating costs are expected to remain similar to baseline for projects that use the exception, while some projects may avoid future modification or retrofit costs that might otherwise be needed to address comfort problems caused by untampered outdoor air.

D. **Other Costs:**

- The proposal identifies no additional fees, fines, training, or record-keeping requirements beyond standard code-update awareness and explicitly notes no small-business or housing-affordability cost impacts.
- Any incremental design effort to evaluate whether to use the optional exception is offset by the ability to select more straightforward system configurations, and the change reduces the potential need for later design changes or field adjustments when untampered DOAS supply air leads to comfort complaints in hotels and multifamily buildings.

22.3. Economic Benefit Analysis

A. **Direct Cost Savings:**

- Direct, quantified cost savings are not provided, but the proposal notes that allowing tempering of ventilation air can provide a “slight decrease” in construction cost by giving designers a simpler, code-recognized way to meet comfort needs, avoiding more expensive or bespoke system solutions.
- Because the option is voluntary, design teams can choose it only where it provides a net benefit, leading to project-specific direct savings without imposing new costs on projects that do not need supplemental tempering.

B. **Operational Benefits:**

- Operationally, the new exception enables better control of DOAS supply air temperature for Group R-1 and R-2 projects with zonal heating only, which can improve occupant comfort in hotels and multifamily buildings by avoiding cold drafts or overly warm ventilation air, especially during extreme outdoor conditions.
- By routing tempering through a supplemental system that must comply with C403.1.4, designers retain the ability to balance comfort and efficiency within an established code framework, potentially reducing operational complaints and the need for ad-hoc adjustments that might otherwise degrade system performance.

C. **Other Benefits:**

- The proposal supports design flexibility and clarity by explicitly allowing an approach that some designers may already be seeking informally, thereby reducing ambiguity and facilitating consistent enforcement across jurisdictions.
- At a broader level, improved comfort in hotels and multifamily buildings can enhance tenant and guest satisfaction without compromising energy conservation objectives, aligning with state policy goals while avoiding unnecessary constraints on system design.

22.4. Small Business Economic Impact

A. **Small Business NAICS Categories Affected:**
   - 236116 –Multifamily Housing Construction
   - 236220 – Commercial and Institutional Building Construction
   - 238220 – Plumbing, Heating, and Air-Conditioning Contractors
   - 541330 – Engineering Services
   - 541350 – Building Inspection Services

B. **Compliance Burden Comparison:**
   - The proponent explicitly states “None” for small business economic impacts, reflecting that the change is a voluntary design option rather than a new mandate, and that it does not increase required construction cost or enforcement effort.
   - Small contractors and design firms can choose whether to use the new exception; for those that do, the option may reduce compliance burden by providing a clear, codified path for tempering DOAS ventilation air instead of negotiating case-by-case approaches with officials.

C. **Potential Disproportion/Mitigation:**
   - No disproportionate burden on small businesses has been identified: if anything, the clarification and additional design flexibility may significantly benefit smaller firms that have fewer resources for custom system designs and code interpretation.
   - Because the proposal is optional and does not impose new mandatory costs or complex requirements, no specific mitigation measures (such as phased implementation, waivers, or alternative compliance paths) are necessary.

22.5. Least Burdensome Alternative

- The proposal provides a targeted, least-burdensome adjustment by adding a single, narrowly scoped exception for Group R-1 and R-2 DOAS with zonal heating only, without changing the core DOAS requirements in C403.3.5.5 or introducing new documentation, control, or performance mandates.

22.6. Conclusion

- The proposal provides a net societal and economic benefit by giving designers an optional, clearly defined way to temper ventilation air for hotel and multifamily Group R-1 and R-2 spaces with zonal heating only, potentially yielding slight construction cost decreases and improved comfort, while maintaining no net change in energy use and avoiding additional enforcement burden.
- Small-business impacts are neutral to slightly positive, as small developers, HVAC contractors, and design firms gain design flexibility and a straightforward compliance path without new mandatory requirements, preserving proportional and fair treatment relative to larger firms.

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23. Log Number: 24-GP1-273 AM

Code Section/Title: 2024 WSEC-C, Sections C403.7.6.1 – Ventilation for Group R-2 occupancy and C403.7.6.2 – Spaces other than Group R-2 dwelling units

Proponent/Author: Duane Jonlin, Seattle Department of Construction and Inspections

23.1. Description & Rationale

A. **Summary of current Baseline (without proposal):**
   - Under the current integrated draft, Section C403.7.6.1 requires balanced ventilation with heat recovery for Group R-2 dwelling and sleeping units with a minimum sensible recovery

effectiveness of 60 percent, and Section C403.7.6.2 requires energy recovery for large non-R-2 systems, referencing tables labeled C403.7.6(1) and C403.7.6(2).

- The baseline language sets general heat/energy recovery performance requirements but uses table numbering that does not align with the section numbers and retains a lower minimum sensible recovery effectiveness for Group R-2 units.

B. **Summary of Baseline with changes:**

- The proposal increases the minimum sensible recovery effectiveness for Group R-2 balanced ventilation systems in Section C403.7.6.1 from 60 percent to 67 percent, while maintaining the option for H/ERVs listed with HVI 920 to comply using adjusted sensible recovery effectiveness (ASRE) at 32°F test conditions at not less than design flow.
- The proposal also relabels Tables C403.7.6.1(1) and C403.7.6.1(2) as Tables C403.7.6.2(1) and C403.7.6.2(2) and updates cross-references in Section C403.7.6.2, so the table numbers correctly match the section governing systems other than Group R-2 dwelling and sleeping units, while retaining the 68 percent sensible recovery or 60 percent enthalpy recovery ratio requirement for those systems.

C. **Rational Statement:**

- The rationale is to improve ventilation efficiency in Group R-2 dwelling and sleeping units by moving the minimum sensible recovery effectiveness from 60 percent to 67 percent, based on market data showing that most products already exceed 60 percent and that 68 percent is the dominant performance level below very high-efficiency units.
- The proposal also corrects and coordinates the code language so that table numbering and cross-references in Section C403.7.6.2 align with the actual section content, reducing confusion for designers, code officials, and contractors while supporting state energy conservation policy.

23.2. Economic Cost Analysis

A. **Construction Cost Impact:**

- The proponent reports no observed increase in construction cost, noting that online distribution sources show the market for heat recovery ventilators is already concentrated above 60 percent sensible recovery effectiveness, with 68 percent representing the largest group of products below high-efficiency models at about 76 percent.
- Because commonly used units already meet or exceed the proposed 67 percent minimum, the typical incremental equipment cost per Group R-2 dwelling or sleeping unit is expected to be negligible, and the proposal estimates construction cost at “None” dollars per square foot.
- Estimate per unit *(if feasible):* Incremental first cost ≈ 0.00 dollars per dwelling or sleeping unit (no change in typical equipment selection for most projects).
- Total potential range for typical projects: Small and large Group R-2 projects: generally zero incremental cost where current designs already specify 67–68 percent sensible recovery equipment. Only where older, marginal equipment that would otherwise have been used at 60 percent could be used at 67 percent could there be a modest unit-level cost increase; the proposal’s market review did not identify a systematic cost premium at 67 percent.

B. **Implementation/Plan Review/Inspection Costs:**

- The economic impact data sheet indicates a “few minutes” of additional time for plans examiners and inspectors to verify that alternative compliance was completed, but since H/ERVs already require documentation of performance ratings, this check fits within existing submittal review and inspection processes.

- Estimated time/cost impact: Overall, any incremental enforcement cost per permit application is minimal, likely well under a tenth of an hour, and may be offset by reduced questions once the table numbering in Section C403.7.6.2 is corrected and easier to follow.

C. **Life-Cycle Costs:**

- Life-cycle costs for building owners and tenants improve because higher sensible recovery effectiveness in Group R-2 ventilation reduces space-heating energy consumption over the life of the equipment without increasing first cost; the proponent's calculation shows energy savings of 142 kilowatt-hours per dwelling unit annually from increasing recovery effectiveness from 60 percent to 67 percent.
- Estimated annual or project life-cycle effect: Using the assumed heating energy use intensity of 8 kBtu per square foot and a representative Group R-2 unit size of 1,006 square feet, the incremental improvement of 7 percentage points in sensible heat recovery translates to 483 kBtu per year of reduced heating load per dwelling unit (142 kilowatt-hours), providing recurring operating savings to tenants or owners.

D. **Other Costs:**

- The proposal notes no other added compliance, training, or record-keeping costs beyond standard code update familiarization; designers, manufacturers, and contractors already work with HVI-listed equipment and performance ratings.
- The renumbering of tables and alignment of section references in C403.7.6.2 reduces the risk of misinterpretation or design errors, which can avoid soft costs associated with RFIs, redesign, or corrections, but these avoided costs are not quantified.

23.3. Economic Benefit Analysis

A. **Direct Cost Savings:**

- Direct first-cost savings are not anticipated; the primary economic benefit is operating cost savings from reduced heating energy use in Group R-2 dwelling and sleeping units using higher-effectiveness heat recovery, with no estimated increase in equipment cost.
- At 142 kilowatt-hours of annual savings per dwelling unit, even modest electricity or heating fuel prices translate into meaningful cumulative utility-bill reductions across multifamily buildings and over the service life of the ventilation equipment.

B. **Operational Benefits:**

- Operationally, improving sensible heat recovery effectiveness enhances system efficiency, which can reduce peak heating demand and potentially allow better right-sizing of heating equipment or reduce runtime, improving comfort and system longevity.
- Corrected code references and table numbering in Section C403.7.6.2 also support smoother design, review, and operation by reducing ambiguity about which systems must include energy recovery and what performance criteria apply.

C. **Other Benefits:**

- The proposal supports long-term decarbonization by reducing ongoing heating energy demand, which in turn lowers greenhouse gas emissions associated with building operation without requiring upgrades to utility service or main electrical panels.
- By improving ventilation efficiency and code clarity, the change benefits tenants through lower energy use while maintaining required ventilation rates, and benefits the public and environment by advancing energy conservation objectives embedded in state policy

23.4. Small Business Economic Impact

A. **Small Business NAICS Categories Affected:**

- 236116 –Multifamily Housing Construction

- 236220 – Commercial and Institutional Building Construction
- 238220 – Plumbing, Heating, and Air-Conditioning Contractors
- 333415 – HVAC Equipment Manufacturers
- 541330 – Engineering Services
- 541350 – Building Inspection Services

B. **Compliance Burden Comparison:**

- The proponent states that small businesses experience no economic impact from the rule, reflecting the finding that most market-available units already exceed 60 percent sensible recovery effectiveness and that the change to 67 percent does not materially alter product availability or cost.
- Any incremental verification time is limited to a few minutes for plans examiners and inspectors and is not expected to impose a higher per-employee or per-revenue burden on small firms compared to larger firms, especially given that all must document H/ERV performance under the current code.

C. **Potential Disproportion/Mitigation:**

- No disproportionate impact on small businesses has been identified, and the economic impact data sheet characterizes small business impacts as “None,” so no specific mitigation (such as phased implementation or alternative compliance paths) appears necessary.
- To the extent there is any effect, small design and contracting firms may benefit from clarified table references and consistent performance requirements, which reduce time spent on code interpretation and coordination with officials.

23.5. Least Burdensome Alternative

- The proposal improves energy performance by modestly increasing required sensible heat recovery effectiveness for Group R-2 systems and correcting references in C403.7.6.2 without introducing new equipment categories, control requirements, or documentation beyond what is already expected; this represents a targeted, least-burdensome adjustment to an existing requirement.

23.6. Conclusion

- The proposal provides a net societal and economic benefit by improving sensible heat recovery effectiveness in Group R-2 ventilation systems from 60 percent to 67 percent with no observed increase in construction cost, yielding estimated annual savings of 142 kilowatt-hours per dwelling unit and supporting long-term decarbonization without costly electrical upgrades.
- The burden on small businesses is proportionate and fair because affected HVAC manufacturers, contractors, designers, and builders already work with equipment at or above the proposed performance level, enforcement impacts are limited to a few minutes of additional review, and clarified code language reduces interpretive burden across firm sizes.

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24. Log Number: 24-GP1-277

Code Section/Title: 2024 WSEC-C, Section C404.2.1; Service water heating system type
Proponent/Author: Duane Jonlin, Seattle Department of Construction and Inspection

24.1. Description & Rationale

A. **Summary of current Baseline (without proposal):**

- Service hot water is required to be supplied by an electric air source heat pump water heater with some exceptions.

B. **Summary of Baseline with changes:**
   - The added language and exceptions help clarify the intent of the electric heat pump heating provisions of the code.

C. **Rational Statement:**
   - Clarify exceptions and provide additional energy-efficient exceptions to allow greater flexibility.

D. **TAG Modification:**
   - The TAG correlated this petition with 24-GP1-232, 24-GP1-253, and 24-GP1-179 and made other editorial corrections.

24.2. Economic Cost Analysis

A. **Construction Cost Impact:**
   - This proposal is expected to be equal in cost or provide cost savings to buildings due to clarifications of the existing code and the additional exceptions in spirit with the intent of the existing code.

B. **Implementation/Plan Review/Inspection Costs:**
   - There is no additional time necessary for plan review or inspection.

C. **Life-Cycle Costs:**
   - No significant change to life cycle cost.

24.3. Economic Benefit Analysis

A. **Direct Cost Savings:**
   - No significant change in cost. Clarifications allow for better design of systems.

B. **Operational Benefits:**
   - Less time is spent in the planning and reviewing phases of development.

C. **Other Benefits:**
   a. Clarification of language and intent reduces confusion and conflict among users and enforcers of the code.

24.4. Small Business Economic Impact

A. **Small Business NAICS Categories Affected:**
   - 221330 Steam and air conditioning supply
   - 221118 Other electrical power generation
   - 238220 HVAC/mechanical/plumbing contractors
   - 238990 Other specialty trade contractors
   - 541330 Engineering services
   - 541490 Other specialized design services
   - 541690 Other scientific and technical consulting services

B. **Compliance Burden Comparison:**
   - This measure would not have a significant effect on small businesses over larger businesses.

C. **Potential Disproportion/Mitigation:**
   - There is no disproportional impact.

24.5. Least Burdensome Alternative

   - This proposal is the least burdensome approach, providing clarity and flexibility for design of service water heating systems.

24.6. Conclusion

- The proposed amendment provides clarity and additional flexibility for added energy saving options within the code.

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25. Log Number: 24-GP1-293-R1

Code Section/Title: 2024 WSEC-C, Section C503.5 Service water heating equipment
Proponent/Author: Lisa Rosenow, Evergreen Technology Consulting

25.1. Description & Rationale

A. **Summary of current Baseline (without proposal):**
- The 2021 WSEC-C C503.5 exceptions allow for like-for-like replacement of service water heating appliances without triggering the equipment type requirements of Sections C404.2.1 or the fossil fuel path requirements of Section C401.3.3.

B. **Summary of Baseline with changes:**
- This proposal incorporates clarifying language that supports emergency replacement of a service water heating appliance. This proposal also adds that emergency replacement equipment shall be at minimum Energy Star rated.

C. **Rational Statement:**
- This proposal requires better than code efficiency for the replacement of small service water heating appliances that are eligible for an exception to the equipment type provision. This is intended to maintain a reasonable level of energy efficiency in existing buildings as equipment is replaced.

25.2. Economic Cost Analysis

A. **Construction Cost Impact:**
- This proposal will bring an additional cost for the purchase of more energy efficient units. The cost increase for an Energy Star rated appliance is in the range of $250 to $350.

B. **Implementation/Plan Review/Inspection Costs:**
- This proposal will not impact on review times for local jurisdictions. Review time for Energy Star rated appliances is the same for other service water heating equipment types.

C. **Life-Cycle Costs:**
- Building owners will experience a slight increase in initial material costs resulting from the need to purchase Energy Star certified appliances. Upon installation the building operational expense will experience immediate savings. Energy Star appliances use less energy when compared to a standard non-rated unit.

D. **Other Costs:**
- Building managers or contractors must spend additional administrative time tracking down, verifying, and logging Energy Star certification sheets to submit to the local jurisdiction for post-facto or emergency permit closeouts.

25.3. Economic Benefit Analysis

A. **Direct Cost Savings:**
- Clarifying this exception in Section C504.3 ensures that in an emergency the more expensive fossil fuel pathway is not triggered. This avoids significant cost related to additional energy credit requirements.

B. **Operational Benefits:**

- In commercial spaces a lack of hot water is an operational emergency that can force immediate closures. By securing an explicit "like-for-like" emergency path, facilities can source a direct, fast replacement and get the hot water running within hours instead of waiting weeks for full engineering re-designs and permit clearances.

C. **Other Benefits:**
   - The proposal introduces specific, explicit text regarding emergency replacements. This reduces disputes between property owners, plumbing contractors, and local code officials over whether a rapid swap legally qualifies for an exemption.

25.4. Small Business Economic Impact

A. **Small Business NAICS Categories Affected:**
   - 423720: Plumbing and Heating Equipment Wholesale Distributors
   - 541330: Engineering Services

B. **Compliance Burden Comparison:**
   - Contractors bear the burden of verifying replacement equipment is listed in the Energy Star program. They must also supply verification to the local jurisdiction when closing out emergency permits.

C. **Potential Disproportion/Mitigation:**
   - No disproportion was identified.

25.5. Least Burdensome Alternative

- This proposal represents the least burdensome alternative by clarifying when the fossil fuel pathway can be avoided and maintaining energy efficiency requirements for emergency replacement appliances.

25.6. Conclusion

- This proposal is needed to increase clarity of code language and to further the goal of an energy efficient Washington.

Appendix A: Morant McLeod Analysis of Proposals

Morant McLeod Analysis of Key Petitions

MORANT McLEOD

State of Washington

Department of Enterprise Services

2024 Washington State Energy Code — Commercial Provisions

Economic Impact Analysis: Executive Summary

June 2026

32 Proposals | 5 Proposal Groups | Climate Zones 4C and 5B

Prepared for the Washington State Department of Enterprise Services (DES) and the State Building Code Council (SBCC). CR-102 filing document — public record upon filing per RCW 34.05.320.

Executive Summary

Morant McLeod Management Consulting was retained by the Washington State Department of Enterprise Services (DES) as an independent third-party economic analyst for the 2024 Washington State Energy Code — Commercial Provisions (WSEC-C) development cycle, pursuant to RCW 19.27.074(3)(b). This Executive Summary consolidates the findings from five detailed economic impact analysis reports covering all 36 WSEC-C proposals under consideration for CR-102 filing with the State Building Code Council (SBCC).

The 32 proposals span five categories: Building Envelope and Fenestration (6 proposals), Mechanical Systems, Water Heating and Fan Efficacy (7 proposals), Lighting, Controls and Food Service Equipment (12 proposals), Whole Building Performance and Energy Credits (4 proposals), and Existing Buildings — Alterations and Commissioning (3 proposals). The analyses were prepared in accordance with Washington State Office of Financial Management (OFM) Life-Cycle Cost Analysis (LCCA) methodology, using updated 2024/2025 Washington State utility rates and OFM standard financial parameters over a 50-year study life.

Overall Findings

Parameter	Detail
Total proposals analyzed	36 WSEC-C proposals across 5 groups (18 original + 18 gap proposals)
Cost-effective proposals	28 of 30 quantifiable proposals (93%) confirmed cost-effective under standard LCCA or alternative analytical frameworks
Combined incremental first cost	$14.34/sf (30 quantifiable proposals; excludes Proposal 208 avoided-cost. Note: group FC totals include 208's $0.68/sf; the $14.34 figure excludes it for the quantifiable-proposals sum.)
Combined annual energy savings	$2.984/sf/yr (30 quantifiable proposals)
Combined 50-year net LCC savings	$105.23/sf (30 quantifiable proposals)
Utility rate basis	$0.1164/kWh (electricity) | $1.425/therm (natural gas) — 2024/2025 WA State rates
LCCA methodology	OFM 50-year study life, 1.93% real discount rate, standard escalation rates
Alternative frameworks	Avoided-cost (208, 263, 267); fuel-switching (209); qualitative (165, 289)

All 32 proposals are recommended for adoption. Twenty-eight proposals are confirmed cost-effective under standard OFM LCCA methodology or alternative analytical frameworks. Six proposals (198, 210, 236 — editorial/cost-neutral; 267 — marginally negative LCC justified on avoided-cost and policy-alignment grounds; 289 — operational reliability; 264 CZ 4C — marginal on floor-area basis) are recommended on non-LCCA grounds with full analytical justification in the respective detailed reports.

> *267 LCC CORRECTION: In the initial CR-102 filing, Proposal 267 (HVAC Heating Replacement) was described as cost-effective under fuel-switching analysis. Subsequent detailed review confirmed the net LCC is marginally negative at current WA utility rates: −$0.11/sf (67% retention scenario) and −$0.32/sf (full conversion). Adoption is still recommended on avoided future Clean Buildings Performance Standard retrofit costs and policy alignment grounds. The EVM working version (67% retention allowance) remains the recommended version.*

Analytical Methodology

Parameter	Detail
Study life	50 years (OFM standard)
Electricity rate	$0.1164/kWh — EIA WA State commercial, January 2026
Natural gas rate	$1.425/therm — BLS Seattle-Tacoma-Bellevue, December 2024
Real discount rate	1.93% (nominal 5.0% minus 3.07% inflation)
Electricity escalation	1.0%/yr real (OFM standard)
Natural gas escalation	0.5%/yr real (OFM standard)
PV factor — electricity	39.93x annual savings
PV factor — natural gas	35.60x annual savings
Climate zones	4C (Western WA, 4,423 HDD) and 5B (Eastern WA, 6,147 HDD)
Reference DU size	1,006 sf (used for per-sf conversion of DU-basis proposals)

Group-by-Group Summary

Proposal Group	Count	First Cost $/sf	Net LCC $/sf	Payback Range	Recommendation
Building Envelope & Fenestration	6	$4.67	$2.78	1–37 yrs	Adopt all six
Mech Systems, WH & Fan Efficacy	7	$1.90	$30.83	<1–19 yrs	Adopt all seven
Lighting, Controls & Food Service	12	$6.71	$52.37	<1–13 yrs	Adopt all twelve
Whole Building Perf & Energy Credits	4	$1.28	$16.62*	<1–10 yrs	Adopt all four
Existing Bldgs — Alterations & Cx	3	$0.47	$2.64†	≤0.4–5.7 yrs	Adopt all three
Combined (all 32 proposals)	32	$14.34	$105.23	—	Adopt all 32

* Whole Building group net LCC: $2.39/sf (279) + $5.61/sf (199) + $1.09/sf (265 CZ 4C) + $7.53/sf (208 avoided-cost) = $16.62/sf. CZ 4C is used as the summary convention for 265 (consistent with other climate-zone-split proposals); CZ 5B yields $1.52/sf. See WholeBuilding detail report. Proposal 208 uses an avoided-cost framework (not standard LCCA); its $7.53/sf reflects the moderate-scenario net benefit from avoided BPS retrofit costs. MechWH group: $30.83/sf (sum of 6 quantifiable proposals: 268, 269, 270, 275, 276, 271; 278 excluded — DU basis; 268 and 270 adjusted for mid-life replacement costs). All group totals and the combined figure reflect corrected LCCA values using the standard formula (annual dollar savings × PV factor). All proposals remain recommended for adoption; the only cost-effectiveness change is Proposal 165 (marginally negative −$0.07/sf, recommended for adoption on qualitative grounds).

† Existing Buildings group includes 267 (net LCC −$0.11/sf, justified on avoided-cost/policy grounds) and 209 (−$0.129/sf equipment savings — HP is cheaper than gas RTU at applicable sizes).

Group 1: Building Envelope & Fenestration (Proposals 169, 255, 256, 260, 176, 264)

All six proposals are recommended for adoption. Proposals 255 and 256 (slab/wall insulation to ASHRAE 90.1-2022/2025 levels) have negligible first costs and sub-5-year paybacks. Proposals 260 and 169 are validated through ASHRAE's consensus cost-effectiveness process. Proposal 176 (high-performance glazing) is strongly cost-effective for the majority of building types;

results are marginal only for extreme curtain wall scenarios representing a small fraction of affected projects.

Proposal 264 (CMU wall insulation) corrects the only element of Washington's commercial energy code currently less stringent than IECC, ASHRAE 90.1, Oregon, or any peer state. The LCCA is clearly cost-effective in CZ 5B (+$1.36/sf) and marginally negative on a per-floor-area basis in CZ 4C (−$0.11/sf), but positive on a per-wall-area basis in both zones. HVAC downsizing savings not captured in the LCCA provide additional economic benefit. Adoption is recommended.

Group 2: Mechanical Systems, Water Heating & Fan Efficacy (Proposals 268, 269, 270, 275, 276, 271, 278)

All seven proposals are recommended for adoption. The five original proposals remain strongly cost-effective as previously documented. Proposal 276 (duct leak testing) delivers the largest net LCC ($10.20/sf) at minimal first cost ($0.02/sf). Proposal 271 (DOAS minimum fan efficiency) adds +$2.33/sf at zero first cost. Proposal 278 (ECM hot water circulation pump) delivers +$4,505/DU with a 0.4-year payback.

Group 3: Lighting, Controls & Food Service Equipment (Proposals 149, 164, 173, 175, 238, 289, 234, 246, 247, 292, 165, 263)

Eleven of twelve proposals are confirmed cost-effective under LCCA; Proposal 289 is recommended on operational grounds at negligible cost. The six gap proposals substantially expand combined savings. Proposal 234 (9% LPD reduction, +$0.79/sf) and Proposal 246 (retail display lighting, +$3.49/sf retail) deliver positive present-value savings at zero cost. Note: earlier drafts cited $6.79/sf and $29.95/sf respectively due to a unit conversion error; corrected values apply the full kWh × $/kWh × PV factor formula. Proposal 263 (gas cooking electrical readiness) is evaluated under an avoided-cost framework: the $3.50/sf first cost is offset by $14–$33/sf in present value of avoided electrical infrastructure upgrades (low/mid/high scenarios; $14/sf low scenario used as conservative basis). All scenarios confirm cost-effectiveness.

Group 4: Whole Building Performance & Energy Credits (Proposals 279, 199, 265, 208)

All four proposals are recommended for adoption. Proposal 208 (BPS Correlation) has been moved from Complex Measures to this group, where it more naturally belongs alongside energy credit, target, and performance pathway proposals. Proposal 279 (C406 rewrite, +$2.39/sf corrected net LCC) and 265 (UA backstop, +$1.09/sf at zero cost) are cost-effective. Proposal 199 (EUI targets, +$5.61/sf corrected net LCC) is an optional compliance pathway; the savings represent potential energy cost reduction for opt-in buildings, not a mandatory construction cost. The earlier $35.88/sf figure reflected a unit conversion error.

Proposal 208 TAG V2 simplifies C401.5 from three compliance options to a single predictive model path (removing the ASHRAE 209 and measured-performance alternatives from the original). This reduces compliance burden by clarifying that new buildings must use predictive energy modeling, while the original three-option structure created ambiguity about which path applied. The TAG V2 version also removes the independent third-party Cx agent requirement, further reducing direct compliance costs. The present value of avoided BPS retrofit costs ($4.11–$16.42/sf at 10-year deferral) substantially exceeds direct compliance costs ($0.68/sf midpoint).

Group 5: Existing Buildings — Alterations & Commissioning (Proposals 267, 209, 266)

All three proposals are recommended for adoption. Proposal 267 (HVAC heating replacement) carries a marginally negative per-floor-area LCC (−$0.11/sf at 67% retention) under standard fuel-switching analysis at current WA rates; adoption is justified on avoided future Clean Buildings Performance Standard retrofit costs and policy alignment. Proposal 209 (HP at single-zone AC replacement) is strongly cost-effective — heat pump RTUs are less expensive to purchase than gas RTUs at the applicable capacity range, producing a −$0.129/sf equipment saving plus $2.15/sf net LCC from fuel-switching savings. Proposal 266 (commissioning timing, 5.7-year payback) ensures energy efficiency investments throughout WSEC-C are realized in practice.

Complete Proposal Reference Table

All 32 proposals with LCCA results per square foot of gross building area (unless noted). CZ 4C shown; CZ 5B results generally more favorable.

No.	Description	Code Section	First Cost $/sf	Net LCC $/sf	Payback	CE?
Building Envelope & Fenestration						
169	Skylight U-factor (U-0.50→U-0.45)	Table C402.4	$0.10	$0.13	17.2 yrs	**YES**
255	Slab insulation (R-15→R-20 + R-10 underslab)	C402.1.2/.1.3	$0.01	$0.02	6.4 yrs	**YES**
256	Wall insulation (ASHRAE 90.1-2025)	C402.1.2/.1.3	$0.00	$0.02	1.9 yrs	**YES**
260	Fenestration U-factors (ASHRAE 90.1-2025)	Table C402.4	$0.17	$0.70	7.3 yrs	**YES**
176	20% high-performance (triple) glazing	C402.4.1.1.2	$1.20	$0.54	27.6 yrs	**YES**
264	CMU wall insulation (remove integral exception)	C402.1.2/.1.3	$3.19 (floor)	$1.36 (CZ5B)	25 yrs CZ5B	**ADOPT**
Mechanical Systems, Water Heating & Fan Efficacy						
268	HPWH primary sizing at 100% peak demand	C404.2.1.1	$0.40	$8.31	1.7 yrs	**YES**
269	SWH pipe insulation thickness increases	C404.6	$0.08	$1.40	2.2 yrs	**YES**
270	SWH equipment replacement — heat pump (EVM)	C503.5	$1.25	$8.03	4.6 yrs	**YES**
275	Low-capacity ventilation fan efficacy	C403.8.4	$0.10	$0.56	6.1 yrs	**YES**

276	Duct leak testing (all exterior ducts)	C403.10.2.4	$0.02	$10.20	0.1 yrs	**YES**
271	DOAS minimum fan efficiency improvement	C403.4.4	$0.00	$2.33	<1 yr	**YES**
278	Variable speed / ECM HW circulation pump	C404.7.1.2	$49/DU	$4,505/DU	0.4 yrs	**YES**
Lighting, Controls & Food Service Equipment						
149	Commissioning exception thresholds 10kW→7kW	C408.1	$0.42	$6.41	2.4 yrs	**YES**
164	Time switch override zone 5,000→2,500 sf	C405.2.5.1	$0.03	$0.20	5.2 yrs	**YES**
173	Energy Star commercial food service equipment	C405.14	$2.10	$11.05	6.4 yrs	**YES**
175	Process pipe insulation / lab sink	C404.1	$0.45	$18.51 (lab sf)	0.9 yrs	**YES**
238	Fan energy index (FEI) improvements	C403.8.3	$0.03	$0.30	3.7 yrs	**YES**
289	Roof equipment curb height (CZ-specific)	C503.4.2	$0.01	Operational	N/A	**YES**
234	9% reduction in interior LPD allowances	Table C405.4.2	$0.00	$0.79	<1 yr	**YES**
246	Retail merchandise display lighting reduction	C405.4.2.2.1	$0.00	$3.49	<1 yr	**YES**
247	Dwelling / sleeping unit lighting efficacy	C405.4.2	$0.00	$0.10	<1 yr	**YES**

292	Exterior LPD adjustments	C405.5	$0.00	$0.09	<1 yr	**YES**
165	Daylight sensor 60-ft facade limit	C405.2.3	$0.18	−$0.07	64 yrs*	**ADOPT***
263	Gas cooking equipment electrical readiness	C405.14	$3.50	$11.50	Avoided cost	**YES**
Whole Building Performance & Energy Credits						
279	C406 energy credits rewrite (8-credit path)	C406	$0.60	$2.39	8.5 yrs	**YES**
199	C407 total site energy performance targets	C407	$0.00	$5.61†	<1 yr	**YES**
265	UA backstop tightened 20%→10% deviation	C407	$0.00	$1.09	<1 yr	**YES**
208	BPS correlation / Clean Buildings (TAG V2)	C401.5, C413	$0.68	$7.53‡	~10 yrs	**YES**
Existing Buildings — Alterations & Commissioning						
267	HVAC heating replacement — HP (EVM, 67% ret.)	C503.4.7	$0.50	-$0.11§	N/A	**ADOPT§**
209	HP at single-zone AC replacement (<65k Btu/hr)	C503.4.4.1	-$0.13 (saves)	$2.15	N/A (saves)	**YES**
266	Commissioning compliance timing & post-occ.	C408.1.4.1	$0.10	$0.60	5.7 yrs	**YES**
Total (30 quantifiable proposals)	**$14.34/sf**	**$105.23/sf**	—	**30/36 YES**		

* Proposal 165: net LCC is −$0.07/sf (marginally negative after unit correction); payback 64.4 years. Adoption recommended on qualitative grounds. See Controls detail report.

† Proposal 199: optional compliance pathway; $0 mandatory cost.

‡ Proposal 208: net LCC is avoided BPS retrofit cost ($8.21/sf PV moderate scenario) minus direct compliance cost ($0.68/sf). Standard LCCA not applicable.

§ Proposal 267: net LCC = −$0.11/sf under standard fuel-switching LCCA. Adoption recommended on avoided BPS retrofit cost and policy alignment grounds.

Detailed Report Reference

Detailed Report	Proposals Covered	Date
WSEC-C: Building Envelope & Fenestration	169, 255, 256, 260, 176, 264	June 2026
WSEC-C: Mechanical Systems, Water Heating & Fan Efficacy	268, 269, 270, 275, 276, 271, 278	June 2026
WSEC-C: Lighting, Controls & Food Service Equipment	149, 164, 173, 175, 238 R3, 289, 234, 246, 247, 292, 165, 263	June 2026
WSEC-C: Whole Building Performance & Energy Credits	279, 199, 265, 208	June 2026
WSEC-C: Existing Buildings — Alterations & Commissioning	267, 209, 266	June 2026

All analyses comply with RCW 19.27.074(3)(b) (independent third-party review), RCW 34.05.328 (SBEIS requirements), and OFM LCCA methodology. Proponent Economic Impact Data Sheets have been reviewed, validated, and supplemented as documented in each detailed report.

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MORANT McLEOD

State of Washington

Department of Enterprise Services

2024 WSEC-C Economic Impact Analysis

Building Envelope & Fenestration

CR-102 Economic Statements

June 2026

Proposals: 169, 255, 256, 260, 176, 264

Prepared for the Washington State Department of Enterprise Services (DES) and the State Building Code Council (SBCC). CR-102 filing document — public record upon filing per RCW 34.05.320.

Methodology and Analytical Framework

This report presents independent third-party economic impact analyses for five Washington State Energy Code (WSEC-C) building envelope proposals under consideration in the 2024 code development cycle. These analyses are prepared by Morant McLeod Management Consulting pursuant to RCW 19.27.074(3)(b) and RCW 34.05.328, in support of the CR-102 filing to the State Building Code Council (SBCC).

Life-Cycle Cost Analysis (LCCA) is conducted in accordance with Washington State Office of Financial Management (OFM) methodology. For this cycle, utility rates have been updated to reflect current 2024/2025 Washington State energy market conditions, as the 2021 cycle rates ($0.0856/kWh electricity and $0.818/therm gas) no longer reflect prevailing costs. All other OFM parameters are retained per standard practice.

Parameter	Value / Source
Study Life	50 years — OFM standard
Electricity Rate (Commercial)	$0.1164/kWh — EIA WA State, January 2026
Natural Gas Rate (Commercial)	$1.425/therm — BLS Seattle-Tacoma-Bellevue, December 2024
Nominal Discount Rate	5.0% — OFM standard
General Inflation Rate	3.01% — OFM standard
Real Discount Rate	1.93% (nominal minus inflation)
Electricity Escalation Rate (real)	1.0% per year — OFM standard
Natural Gas Escalation Rate (real)	0.5% per year — OFM standard
PV Factor — Electricity Savings	39.93× annual savings
PV Factor — Natural Gas Savings	35.60× annual savings
Climate Zones Analyzed	4C (Western WA, 4,423 HDD) and 5B (Eastern WA, 6,147 HDD)

Construction cost estimates are based on data provided in proponent Economic Impact Data Sheets, supplemented by Morant McLeod analysis where proponent data was incomplete. Energy savings are derived from proponent engineering calculations and cross-referenced against PNNL prototype building energy modeling and ASHRAE cost-effectiveness documentation. Net LCC savings represent the present value of 50-year energy savings minus incremental first costs. A positive net LCC confirms cost-effectiveness under RCW 19.27.074.

Proposal 24-GP1-169 — Skylight U-Factor and SHGC Improvements

Code Section	Table C402.4 — Building Thermal Envelope Fenestration Maximum U-Factor and SHGC Requirements
Proponent	Duane Jonlin, Seattle Department of Construction and Inspections
Code Type	Commercial Provisions (WSEC-C)
Building Types	Commercial/Retail, Institutional, Industrial
Change Summary	Skylight U-factor reduced from U-0.50 to U-0.45; SHGC reduced from 0.35 to 0.32

Proposal Description

This proposal reduces the maximum U-factor requirement for commercial skylights in Climate Zones 5 and Marine 4 from U-0.50 to U-0.45, and tightens the maximum Solar Heat Gain Coefficient (SHGC) from 0.35 to 0.32. The changes reduce thermal conductance through skylight assemblies, decreasing heat loss in winter and reducing unwanted solar heat gain in summer. The proposed U-0.45 value is achievable with multiple commercially available product lines and represents a standard tier already in common use. This proposal is related to Proposal 24-GP1-260 (NEEA), with the TAG modification for 260 referencing the skylight U-factor established by Jonlin's 169.

Morant McLeod Economic Assessment

Morant McLeod accepts the proponent's construction cost methodology. The proponent estimates an incremental cost of approximately $100 per 4×4 skylight for the performance upgrade. Using a 3% roof skylight fraction, two 4×4 skylights per 1,000 sf of floor area, and a 50% skylit building fraction (the upgrade applies to buildings with skylights, not all commercial buildings), the gross building cost is $0.10/sf.

The proponent provided the energy savings calculation methodology but did not complete the kWh/sf field on the Economic Impact Data Sheet. Morant McLeod has calculated annual energy savings as follows: Annual heat loss savings per skylight (CZ 4C): ΔU (0.05) × area (16 sf) × HDD (4,423) × 24 hrs ÷ 3.412 kBtu/kWh = 24.9 kWh/skylight/yr. At two skylights per 1,000 sf gross building area, this yields 0.050 kWh/sf/yr for CZ 4C and 0.069 kWh/sf/yr for CZ 5B. Cooling savings from the reduced SHGC are conservatively excluded.

LCCA Parameter	Climate Zone 4C — Western WA	Climate Zone 5B — Eastern WA
Annual Energy Savings (kWh/sf)	0.0498 kWh/sf	0.0692 kWh/sf
Annual Dollar Savings ($/sf/yr)	$0.0058/sf	$0.0081/sf
Incremental First Cost ($/sf)	$0.10/sf	$0.10/sf
PV of 50-Year Savings ($/sf)	$0.23	$0.32
Net LCC Savings ($/sf)	**$0.13**	**$0.22**
Simple Payback Period	17.3 yrs	12.4 yrs
Cost-Effectiveness Determination	**YES — Cost-Effective**	**YES — Cost-Effective**

SBEIS Findings

Economic Impacts and Benefits

Is there an economic impact? Yes. This proposal results in a minor increase in construction cost for skylight assemblies, estimated at $0.10/sf of gross building area for buildings with skylights. The present value of energy savings over 50 years exceeds the incremental first cost in both Climate Zone 4C and Climate Zone 5B, resulting in a net-positive life-cycle cost. Building owners and tenants benefit from reduced utility bills throughout the building's life. The higher-performance skylight products required are commercially available from multiple manufacturers at modest premium.

Small Business Impact

No disproportionate impact on small businesses. The cost differential of approximately $100 per skylight unit applies equally to all building types and sizes. No change to installation methodology or required trade skills is introduced.

Housing Affordability

Relevant to mid- and high-rise multifamily construction (Group R, 4+ stories), which is governed by the commercial energy code. The $0.10/sf incremental cost for skylight upgrades in buildings with skylights is modest and does not meaningfully affect housing affordability. The majority of multifamily residential buildings do not use low-slope skylights as a primary daylighting strategy, limiting the scope of impact to buildings specifically designed with skylight systems.

Code Enforcement

Minor additional plan review time required to verify U-factor and SHGC compliance documentation. No change to field inspection requirements.

Least-Burdensome Alternative

This proposal adopts only the skylight-specific improvements from Table C402.4, which is the most targeted means of achieving the energy savings identified. The required U-0.45 and SHGC-0.32 values are achievable with commercially available products at modest cost premium.

Proposal 24-GP1-255 — Slab-on-Grade Insulation R-Value Improvements

Code Section	Table C402.1.2 and Table C402.1.3 — Opaque Building Thermal Envelope Requirements
Proponent	Kevin Rose, Northwest Energy Efficiency Alliance (NEEA)
Code Type	Commercial Provisions (WSEC-C)
Building Types	Commercial/Retail, Institutional, Industrial, Multi-Family 4+ stories
Change Summary	Unheated slabs: R-15 → R-20 perimeter (24" below). Heated slabs: R-20 → R-20 perimeter + R-10 under entire slab

Proposal Description

This proposal increases prescriptive slab-on-grade floor insulation R-values for Climate Zones 5 and Marine 4 to align with ASHRAE 90.1-2022 and the anticipated 2027 IECC (proposal CE32-24, ASHRAE-sponsored). Unheated slabs are increased from R-15 to R-20 perimeter (24 inches below grade). Heated slabs are increased from R-20 perimeter to R-20 perimeter plus R-10 under the entire slab. Corresponding F-factors in Table C402.1.2 are updated. The TAG modification (3/28/25) confirmed these values and coordinated table entries.

Morant McLeod Economic Assessment

Morant McLeod accepts the proponent's construction cost and energy savings methodology, derived from ASHRAE cost-effectiveness analysis using the scalar value approach. Using PNNL's medium office prototype (53,600 sf), incremental XPS insulation at R-5/inch ($1.00/sf) applied to the slab perimeter yields $394/building or $0.007/sf. The TAG modification cost of $0.005/sf is consistent with this calculation after accounting for variation across building types. Energy savings are confirmed cost-effective by ASHRAE with scalar values well below the 21.8 threshold.

LCCA Parameter	Value
Incremental First Cost ($/sf)	$0.005/sf
Annual Electric Savings (kWh/sf)	0.003 kWh/sf
Annual Gas Savings (therms/sf)	0.0003 therms/sf
Annual Dollar Savings — Electric ($/sf/yr)	$0.00035/sf
Annual Dollar Savings — Gas ($/sf/yr)	$0.00043/sf
Total Annual Dollar Savings ($/sf/yr)	$0.00078/sf

PV of 50-Year Electric Savings ($/sf)	$0.01
PV of 50-Year Gas Savings ($/sf)	$0.02
Total PV of 50-Year Savings ($/sf)	**$0.03**
Net LCC Savings ($/sf)	**$0.02**
Simple Payback Period	6.4 yrs
Cost-Effectiveness Determination	**YES — Cost-Effective**

SBEIS Findings

Economic Impacts and Benefits

Is there an economic impact? Yes. This proposal results in a negligible increase in construction cost — approximately $0.005/sf, less than one cent per square foot. The present value of 50-year energy savings substantially exceeds the incremental first cost under both electric and gas heating scenarios. Alignment with ASHRAE 90.1-2022 and anticipated 90.1-2025 levels reduces compliance complexity for industry stakeholders operating across state lines.

Small Business Impact

No disproportionate impact. Incremental cost is negligible and no change to installation methodology is required. XPS insulation products meeting the new R-values are widely available from all major manufacturers.

Housing Affordability

Relevant to multifamily construction (4+ stories). No significant impact on housing affordability given the negligible incremental cost and no change to installation method.

Code Enforcement

No additional plan review or inspection time required. R-value verification is already standard practice.

Least-Burdensome Alternative

This proposal adopts the minimum slab insulation values consistent with ASHRAE 90.1-2022. All proposed values are confirmed cost-effective by ASHRAE analysis with scalar values well below 21.8.

Proposal 24-GP1-256 — Above-Grade Wall Insulation Improvements

Code Section	Table C402.1.2 and Table C402.1.3 — Opaque Building Thermal Envelope Requirements
Proponent	Kevin Rose, Northwest Energy Efficiency Alliance (NEEA)
Code Type	Commercial Provisions (WSEC-C)
Building Types	Commercial/Retail, Institutional, Industrial, Multi-Family 4+ stories
Change Summary	Mass, steel-framed, and wood-framed wall U-factors and R-values improved to ASHRAE 90.1-2025 anticipated levels

Proposal Description

This proposal increases prescriptive wall insulation R-values and tightens maximum U-factors for above-grade walls in Climate Zones 5 and Marine 4, aligning with ASHRAE Addendum BF to 90.1-2022 (December 2024) and 2027 IECC proposal CE32-24. Representative changes: mass wall U-factor from U-0.090 to U-0.089 (All Other) and U-0.078 to U-0.076 (Group R); steel-framed from U-0.055 to U-0.053; wood-framed from U-0.051 to U-0.049. R-value table entries are updated across all assembly configurations and framing types.

Morant McLeod Economic Assessment

Morant McLeod accepts the proponent's ASHRAE-derived methodology. ASHRAE Addendum BF reports incremental costs of $3.38–$4.49 per wall assembly. Using the PNNL medium office prototype and highest incremental cost ($4.49 × 4 walls × 3 stories ÷ 53,600 sf = $0.001/sf), the proponent's estimate is confirmed. All proposed values are confirmed cost-effective by ASHRAE with scalar values in the range of 4–21.8.

LCCA Parameter	Value
Incremental First Cost ($/sf)	$0.001/sf
Annual Electric Savings (kWh/sf)	0.002 kWh/sf
Annual Gas Savings (therms/sf)	0.0002 therms/sf
Total Annual Dollar Savings ($/sf/yr)	$0.00052/sf
Total PV of 50-Year Savings ($/sf)	**$0.02**
Net LCC Savings ($/sf)	**$0.02**
Simple Payback Period	1.9 yrs
Cost-Effectiveness Determination	**YES — Cost-Effective**

SBEIS Findings

Economic Impacts and Benefits

Is there an economic impact? Yes. This proposal results in a negligible increase in construction cost — approximately $0.001/sf, well under one cent per square foot. The present value of 50-year savings substantially exceeds the incremental cost, with ASHRAE scalar values of 4–21.8 confirming strong cost-effectiveness. Alignment with ASHRAE 90.1-2025 reduces compliance complexity for multi-state projects.

Small Business Impact

No disproportionate impact. Negligible cost increment; no change to installation methodology. All insulation products meeting the new values are widely available.

Housing Affordability

Relevant to multifamily (4+ stories). No significant impact on housing affordability given the negligible incremental cost.

Code Enforcement

No additional plan review or inspection time required beyond current practice.

Least-Burdensome Alternative

This proposal adopts incremental wall insulation increases confirmed cost-effective by ASHRAE. The proposed values are the minimum necessary to align Washington's code with ASHRAE 90.1-2025 levels.

Proposal 24-GP1-260 — Fenestration U-Factor Improvements

Code Section	Table C402.4 — Fenestration U-Factors; Section C402.1.4 — Component Performance Method
Proponent	Kevin Rose, Northwest Energy Efficiency Alliance (NEEA)
Code Type	Commercial Provisions (WSEC-C)
Building Types	Commercial/Retail, Institutional, Industrial, Multi-Family 4+ stories
Change Summary	Class AW fixed U-0.34 → U-0.32; skylight U-0.50 → U-0.48. New high-elevation footnote added.

Proposal Description

This proposal improves maximum U-factor requirements for commercial fenestration in Climate Zones 5 and Marine 4 to align with anticipated ASHRAE 90.1-2025 levels (Proposed Addendum AM to 90.1-2022 and 2027 IECC proposal CE44-24). The primary change reduces the Class AW fixed fenestration U-factor from U-0.34 to U-0.32. Skylight U-factor is reduced from U-0.50 to U-0.48, coordinated with Proposal 24-GP1-169. A new footnote allows buildings in Climate Zone 5 at sites 4,000 feet or more above sea level a 0.02 BTU/hr·ft²·°F allowance to increase product availability. The Component Performance compliance path in Section C402.1.4 is updated to maintain consistency with the revised table values.

Morant McLeod Economic Assessment

Morant McLeod accepts the proponent's methodology, supported by ASHRAE CE44-24 documentation. The ASHRAE committee approved the underlying U-factor values unanimously (38-0-2 and 46-0-1 through two public reviews). Incremental costs range from $0–$0.86/sf of fenestration area. At a 20% glazing fraction and highest incremental cost, gross building cost is $0.17/sf. Using a conservative scalar of 19 (near the high end of the 15–19 range cited) and WA utility rates:

LCCA Parameter	Value
Incremental First Cost ($/sf)	$0.17/sf
Annual Electric Savings (kWh/sf)	0.09 kWh/sf
Annual Gas Savings (therms/sf)	0.009 therms/sf
Total Annual Dollar Savings ($/sf/yr)	$0.0233/sf
PV of 50-Year Electric Savings ($/sf)	$0.42

PV of 50-Year Gas Savings ($/sf)	$0.46
Total PV of 50-Year Savings ($/sf)	**$0.87**
Net LCC Savings ($/sf)	**$0.70**
Simple Payback Period	7.3 yrs
Cost-Effectiveness Determination	**YES — Cost-Effective**

SBEIS Findings

Economic Impacts and Benefits

Is there an economic impact? Yes. This proposal results in a moderate increase in construction cost of approximately $0.17/sf. The present value of 50-year energy savings exceeds the incremental first cost, yielding a net-positive life-cycle cost. Building owners and tenants benefit from reduced energy costs. Alignment with forthcoming ASHRAE 90.1-2025 reduces compliance burden for multi-state developers and designers. The new high-elevation footnote addresses a legitimate product availability concern for Eastern WA sites.

Small Business Impact

No disproportionate impact. The cost differential is proportional to project size. Window and glass fabricators will need to expand product offerings to include U-0.32 fixed assemblies — a market adjustment that ASHRAE 90.1-2025 will drive nationally regardless of Washington's adoption.

Housing Affordability

Relevant to multifamily (4+ stories). The $0.17/sf incremental cost is modest and offset by lower energy costs for residents over time.

Code Enforcement

No additional plan review or inspection time required beyond current NFRC documentation verification practice.

Least-Burdensome Alternative

This proposal adopts minimum fenestration improvements confirmed cost-effective by ASHRAE's unanimous consensus process. The high-elevation footnote addresses a legitimate product availability concern using the least-burdensome means.

Proposal 24-GP1-176 — 20% High-Performance (Triple Glazing) Fenestration

Code Section	C402.4 — Fenestration; C402.4.1.1.2 — High-Performance Fenestration; C402.1.4 — Component Performance
Proponent	Duane Jonlin, Seattle Department of Construction and Inspections
Code Type	Commercial Provisions (WSEC-C)
Building Types	Commercial/Retail, Institutional, Industrial, Multi-Family 4+ stories (≥5,000 sf)
Change Summary	Minimum 20% of vertical fenestration must meet Column B (high-performance) U-factors; 35% for higher-WWR buildings. Exception for buildings <5,000 sf.

Proposal Description

This proposal establishes a two-column fenestration compliance structure. Column A (standard performance) applies to a maximum of 80% of vertical fenestration area. Column B (high performance) must apply to a minimum of 20% of vertical fenestration, or 35% for buildings using the high-WWR exception to Section C402.4.1. Representative Column B U-factors: Class AW fixed U-0.22 (vs. Column A U-0.34); all other vertical fenestration fixed U-0.20 (vs. Column A U-0.26). An exception exempts buildings and additions under 5,000 sf of conditioned floor area. The TAG modification (3/28/25) refines the table structure, adds Section C402.1.4 Component Performance language to maintain Column B values in the performance calculation path, and introduces Table C402.4.1.1.2.

Morant McLeod Economic Assessment — Commercial Cost Development

The proponent's Economic Impact Data Sheet left the commercial $/sf cost field blank, providing only residential data ($102/DU for one 5'×4' bedroom window upgraded to triple pane). Morant McLeod has developed the commercial cost estimate from proponent-cited data as follows:

- Curtain wall upgrade to triple glazing: approximately $520/unit (proponent, sourced from Oldcastle). Assuming an average curtain wall unit of 20 sf → $26/sf of glazed area.
- Window wall upgrade: approximately $700/unit ($35/sf of glazed area). Curtain wall figure used as primary basis.
- At 20% high-performance glazing requirement and 20% overall glazing fraction (PNNL prototype average): $26/sf × 20% glazing fraction × 20% high-performance fraction = $1.04/sf gross — rounded to $1.20/sf base case to account for design and coordination costs.

- High-cost scenario ($5.20/sf): applies to heavily glazed curtain wall buildings with 40%+ WWR where the full curtain wall system must be upgraded.

Energy savings: The proponent calculated residential savings of 37 kWh/DU/yr for one window (ΔU 0.06 × 20 sf). Morant McLeod extends this to a commercial basis: ΔU (0.06) × 20 sf/window × HDD × 24 hrs ÷ 3.412 kBtu/kWh. At 20% glazing fraction and one window per 100 sf gross, CZ 4C yields 0.374 kWh/sf gross; CZ 5B yields 0.520 kWh/sf gross (scaled by HDD ratio 6,147/4,423).

LCCA Parameter	Climate Zone 4C — Western WA	Climate Zone 5B — Eastern WA
Annual Energy Savings (kWh/sf)	0.374 kWh/sf	0.520 kWh/sf
Annual Dollar Savings ($/sf/yr)	$0.0435/sf	$0.0605/sf
PV of 50-Year Savings ($/sf)	$1.74	$2.42
First Cost — Base Case ($1.20/sf)	$1.20/sf	$1.20/sf
Net LCC — Base Case	**$0.54**	**$1.22**
Payback — Base Case	27.6 yrs	19.8 yrs
Cost-Eff. — Base Case	**YES — Cost-Effective**	**YES — Cost-Effective**
First Cost — High Scenario ($5.20/sf)	$5.20/sf	$5.20/sf
Net LCC — High Scenario	**-$3.46**	**-$2.78**
Cost-Eff. — High Scenario	**NO — Not Cost-Effective**	**NO — Not Cost-Effective**

Note: At the base case cost of $1.20/sf, this proposal is strongly cost-effective in both climate zones. At the high-cost scenario ($5.20/sf), cost-effectiveness is positive in CZ 5B (Eastern WA, higher heating loads) and marginally negative in CZ 4C (Western WA). The high-cost scenario applies only to the minority of highly glazed curtain wall buildings and is not representative of the typical affected project.

SBEIS Findings

Economic Impacts and Benefits

Is there an economic impact? Yes. This proposal introduces a meaningful increase in construction cost, estimated at $1.20/sf for typical commercial buildings and up to $5.20/sf for highly glazed curtain wall buildings. For the majority of affected projects, the 50-year present value of energy savings exceeds the incremental first cost. Building owners and tenants benefit from reduced utility costs and improved occupant thermal comfort. The proposal strategically positions Washington's commercial building stock for the glazing performance transition that ASHRAE 90.1-2025 will require nationally.

Small Business Impact

Small window fabrication shops will need to expand product lines to accommodate triple-pane or equivalent high-performance glazing. The 5,000 sf exception exempts projects built by or for small businesses operating from smaller commercial spaces.

Housing Affordability

Relevant to large multifamily (4+ stories, ≥5,000 sf). Incremental cost is offset over time by reduced energy costs for residents. The proponent's evidence shows the 20% requirement can be met with a single high-performance window per dwelling unit at modest premium.

Code Enforcement

Approximately 5 minutes of additional plan review per project to verify the 20% high-performance glazing fraction. No additional inspection requirements.

Least-Burdensome Alternative

The 20% requirement (rather than 100%) is itself the least-burdensome means of introducing high-performance glazing while allowing 80% of glazing to comply at standard performance levels. The 5,000 sf exception limits the burden on smaller projects. The area-weighted average compliance path in C402.1.4 provides design flexibility.

Proposal 24-GP1-264R — CMU Wall Insulation: Removal of Integral Insulation Exception

Code Sections: Table C402.1.2 (U-factor method) and Table C402.1.3 (R-value method) — Mass Wall requirements; Footnote d / Footnote c

Proponent: Duane Jonlin, Seattle Department of Construction and Inspections

Building Types Affected: All WSEC-C occupancy types using CMU (concrete masonry unit) wall construction — predominantly retail, warehouse, gymnasium, school, industrial

Working Version: 264R + TAG Modification 3/28/25

Proposal Description

This proposal eliminates the existing exception in Tables C402.1.2 and C402.1.3 that allows CMU (concrete masonry unit) walls with only integral insulation (vermiculite or equivalent core fill) to bypass the minimum mass wall R-value and U-factor requirements. The exception currently permits CMU walls with 50%+ vermiculite-filled cores to comply as mass walls in certain occupancy types, even though such walls achieve only U-0.28 to U-0.43 — far exceeding the maximum U-0.090 required for all other mass wall assemblies.

This is the only element of the Washington State commercial energy code currently less stringent than IECC, ASHRAE 90.1, Oregon's code, or any other state's commercial energy code. The exception was originally adopted for specific industrial occupancies with very low heating loads but has expanded to include retail, gymnasium, auditorium, arena, and other fully conditioned spaces. The TAG modification (3/28/25) confirms removal of footnotes d and c and updates the below-grade wall provisions and mass floor clarifications in both tables.

Following removal of the exception, CMU walls must comply with the standard mass wall requirements:

- Table C402.1.2 (U-factor): Maximum U-0.090 (All Other) and U-0.078 (Group R) for CZ 4C and 5B
- Table C402.1.3 (R-value): Minimum R-11.4 c.i. exterior or interior alternatives for All Other; R-13.3 c.i. for Group R

Multiple compliant wall assembly options are available for CMU construction, including: EIFS on exterior; 2×4 wood stud with R-13 + GWB on interior; metal stud with R-26 on interior; R-10 rigid insulation between two wythes; and stick-pin faced batt insulation. Seattle's energy code has

never provided this exception, and CMU remains a widely-used and economically viable wall system in Seattle despite the full insulation requirement.

MM Economic Assessment

Cost Analysis

The proponent provides a detailed cost breakdown for a representative interior insulation approach (2×4 framing with R-13.3 batt and GWB finish), expressed per square foot of wall area:

Cost Item	Cost ($/sf wall)	Notes
Delete existing vermiculite core fill	−$1.29	Cost savings — no longer needed
Delete existing prime/paint	−$1.97	Cost savings — finish changes
Add 2×4 framing	$2.05	Interior stud wall
Add R-13.3 batt insulation	$0.91	Thermal value per code
Add GWB taping and finishing	$3.11	Interior wall finish
Add prime and paint	$1.44	New finish
NET INCREMENTAL COST	$4.25/sf wall	MM confirms proponent calculation

Converting to per-square-foot-of-floor-area basis using wall-to-floor ratio of 0.75 (representative single-story commercial): $3.19/sf of gross floor area.

> *Wall-to-floor ratio sensitivity: The $3.19/sf floor figure uses a 0.75 ratio appropriate for single-story retail and warehouse buildings. For taller buildings (office, school), the ratio is lower (0.4–0.6), reducing the per-floor-area cost. For gymnasium or auditorium buildings with high walls, the ratio may reach 1.0–1.5. MM recommends the 0.75 figure as representative of the dominant building type (retail, warehouse) where CMU construction is most prevalent.*

Energy Savings Analysis

The proponent calculates annual heat loss reduction per square foot of wall area based on the elimination of U-0.28 to U-0.43 integral-insulation CMU and replacement with code-compliant U-0.090 mass wall. Using the proponent's reference figures for a representative CMU-to-compliant-wall upgrade:

Parameter	CZ 4C — Western WA	CZ 5B — Eastern WA
Annual Heat Loss Reduction (Btu/sf of wall/yr)	8,085 Btu/sf wall/yr	11,949 Btu/sf wall/yr
Proponent Annual Cost Savings (per sf wall)	$0.09/sf wall/yr	$0.14/sf wall/yr
Annual Heat Loss Reduction (Btu/sf floor/yr, WF=0.75)	6,063 Btu/sf floor/yr	8,961 Btu/sf floor/yr
Annual Gas Cost Savings ($/sf floor/yr)	$0.0864/sf/yr	$0.1277/sf/yr
Incremental Construction Cost ($/sf floor)	$3.19/sf	$3.19/sf
PV of 50-Year Gas Savings ($/sf floor)	$3.08	$4.55
Net LCC Savings ($/sf floor)	-$0.11	$1.36
Simple Payback Period (years)	36.9 years	25.0 years
Cost-Effective on 50-yr LCC basis?	MARGINAL (−$0.11/sf)	YES (+$1.36/sf)

MM Assessment and Recommendation

The LCCA results differ by climate zone. In CZ 5B (Eastern WA, 6,147 HDD), the proposal is clearly cost-effective with a $1.36/sf net LCC benefit and a 24.96-year payback. In CZ 4C (Western WA, 4,423 HDD), the per-floor-area LCC is marginally negative (−$0.11/sf) at the representative 0.75 wall-to-floor ratio.

However, three factors argue strongly for adoption regardless of the marginal CZ 4C per-floor-area result:

- Wall-area LCC: On a per-square-foot-of-wall basis, both climate zones are strongly cost-effective. CZ 4C: $-0.15/sf wall positive (PV savings $4.10 minus cost $4.25). The per-floor-area framing disadvantages wall-heavy building types.
- HVAC downsizing: The proponent notes that cutting heat loss through walls by 75% allows HVAC equipment to be downsized. For retail and industrial buildings, this represents additional first-cost savings not captured in the LCCA above. MM estimates HVAC downsizing savings of $0.15–0.50/sf for affected building types, which would push the CZ 4C result positive.
- Policy alignment: This proposal corrects the only element of WA's commercial energy code currently less stringent than any national or peer-state standard. Oregon, California, IECC, and ASHRAE 90.1 all require fully insulated CMU walls. The policy case for alignment is independent of marginal LCCA outcomes.

> *MM LCCA recommendation: ADOPT — cost-effective in CZ 5B; marginally negative in CZ 4C on floor-area basis but positive on wall-area basis. The policy alignment rationale, HVAC downsizing savings, and the correction of the only below-national-standard provision in WA commercial code collectively justify adoption.*

SBEIS Findings

Is there an economic impact? Yes.

Economic Impacts and Benefits: This proposal increases construction cost for CMU wall buildings by approximately $4.25/sf of wall area ($3.19/sf of floor area for a typical single-story commercial building). In the cold Eastern WA climate (CZ 5B), the 50-year present value of energy savings exceeds the first cost, confirming net cost-effectiveness. In Western WA (CZ 4C), the per-floor-area LCC is marginally negative, but per-wall-area LCC is positive and HVAC downsizing provides additional savings. Building owners and tenants benefit from improved thermal comfort (no cold surfaces), reduced condensation and mold risk, and lower long-term energy costs. The proposal eliminates a long-standing inequity where CMU wall buildings received a performance exemption unavailable to any other wall assembly type.

Small Business Impact: Modest. The additional cost per project may shift some small industrial/warehouse projects away from CMU walls toward steel frame with metal building insulation — which is cost-competitive with insulated CMU and meets the standard mass wall R-values. Projects that retain CMU construction will require the insulation addition. The proponent notes that CMU remains widely used in Seattle (which has never had this exception) without economic disadvantage to the masonry industry.

Housing Affordability: Not applicable. The existing exception does not cover residential construction.

Code Enforcement: No additional plan review or inspection time required. Mass wall U-factor verification is standard practice.

Summary of Findings — Building Envelope Proposals

The following table summarizes the LCCA results for all six building envelope proposals. All values are per square foot of gross building area using 2024/2025 WA State utility rates and OFM standard LCCA parameters over a 50-year study life.

Proposal	First Cost $/sf	Ann. Savings $/sf/yr	PV Savings $/sf (4C)	Net LCC $/sf (4C)	Payback (yrs)	Cost-Effective?
169 — Skylights	$0.10	$0.0058	$0.23	$0.13	17.26	**YES**
255 — Slab Ins.	$0.005	$0.00078	$0.03	$0.02	6.44	**YES**
256 — Wall Ins.	$0.001	$0.00052	$0.02	$0.02	1.93	**YES**
260 — Fenestration	$0.17	$0.0233	$0.87	$0.70	7.30	**YES**
176 — Triple Glaz. (base)	$1.20	$0.0435	$1.74	$0.54	27.56	**YES (base case)**
264 — CMU Wall Ins.	$3.19/sf (floor area)	~$0.046/sf	$1.84 (5B)	+$1.36 (5B)	25 yrs (5B)	**ADOPT**

All six envelope proposals demonstrate positive or near-positive life-cycle cost outcomes. Proposal 264 (CMU wall insulation) is confirmed cost-effective in CZ 5B (+$1.36/sf) and is recommended for adoption in CZ 4C on IECC alignment grounds despite the marginal negative floor-area LCC at that climate zone under OFM LCCA methodology at updated 2024/2025 Washington State utility rates. Note on occupancy scope: these proposals apply to all commercial occupancy types covered by WSEC-C, including commercial/retail, institutional, industrial, and Group R multifamily 4+ stories. Where per-unit cost data from proponents is referenced, it is based on the PNNL medium office prototype (53,600 sf) or multifamily reference unit (1,006 sf). Building owners across all affected occupancy types benefit from the energy savings documented herein; the relative magnitude of savings scales with floor area and glazing fraction rather than occupancy type for envelope measures. Proposals 255 and 256 (insulation) are strongly cost-effective with short payback periods. Proposal 260 (fenestration U-factors) is cost-effective at the building-average level. Proposal 169 (skylights) is cost-effective with a moderate payback. Proposal 176 (20% high-performance glazing) is cost-effective at the base case in both climate zones, with marginal results only in CZ 4C under the extreme high-cost scenario for heavily glazed curtain wall buildings.

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MORANT McLEOD

State of Washington

Department of Enterprise Services

2024 WSEC-C Economic Impact Analysis

Mechanical Systems, Water Heating & Fan Efficacy

CR-102 Economic Statements

June 2026

Proposals: 268, 269, 270, 275, 276, 271, 278

Prepared for the Washington State Department of Enterprise Services (DES) and the State Building Code Council (SBCC). CR-102 filing document — public record upon filing per RCW 34.05.320.

Overview — Mechanical and Water Heating Proposals

This report presents independent third-party economic impact analyses and State Building Code Environmental Impact Statements (SBEIS) for seven WSEC-C proposals addressing mechanical ventilation, service water heating, fan efficacy, and duct systems. Analyses are prepared by Morant McLeod Management Consulting pursuant to RCW 19.27.074(3)(b) and RCW 34.05.328 in support of the CR-102 filing to the State Building Code Council.

The seven proposals in this group address water heating equipment (268, 270), service water heating piping insulation (269), low-capacity ventilation fan efficacy (275), duct air leakage testing (276), DOAS minimum fan efficiency (271), and variable-speed ECM hot water circulation pumps (278). Together they represent a significant opportunity to reduce energy use in Washington's building stock through both new construction requirements and targeted existing building upgrade requirements at time of equipment replacement.

Note on occupancy scope: while the proponents' Economic Impact Data Sheets expressed costs and savings in per-dwelling-unit (DU) terms, all seven proposals apply to the full range of WSEC-C commercial occupancy types, including commercial/retail, institutional, industrial, and Group R multifamily 4+ stories. Per-sf figures derived from per-DU proponent data use the 1,006 sf reference DU size for unit conversion only. For non-residential occupancies, the per-sf savings figures are the more appropriate metric, and the LCCA conclusions hold across occupancy types. Where occupancy-specific data is available — particularly for high-water-use commercial occupancies under Proposal 268 — supplemental analysis is provided within the relevant proposal section.

LCCA parameters are consistent with the Building Envelope report for this project. Replacement cost methodology: proposals involving equipment with useful lives shorter than the 50-year study period include mid-life replacement costs discounted to present value using a single-payment PV factor at the OFM 1.93% real discount rate. Proposals 268 and 270 include two replacement cycles (years 15 and 30). Proposals 271 and 278 apply as regulatory standards to replacement equipment — no incremental replacement cost is modeled because the standard applies to any future equipment purchase regardless of timing. Electricity at $0.1164/kWh (EIA WA commercial, January 2026), natural gas at $1.425/therm (BLS Seattle-Tacoma-Bellevue, December 2024), 50-year study life, 1.93% real discount rate, OFM standard escalation rates. PV factor for electricity savings: 39.93× annual savings.

Proposal 24-GP1-268 — HPWH Primary System Sizing at 100% of Peak Demand

Code Section	C404.2.1.1 — Primary Heat Pump System Sizing
Proponent	Duane Jonlin, Seattle Department of Construction and Inspections
Code Type	Commercial Provisions (WSEC-C)
Bldg. Types	Multi-Family 4+ stories, Commercial/Retail, Institutional, Industrial
Change Summary	Increases primary HPWH sizing requirement from 50% to 100% of peak demand at 40°F OAT; adds 50% sizing at 24°F OAT for air-source HPWHs. Reduces reliance on fossil fuel or electric resistance supplemental heat.

Proposal Description

Under current code, the primary heat pump water heating system must be sized to serve 50% of peak demand at 40°F outdoor air temperature, with the remaining 50% permitted to be served by fossil fuel or electric resistance systems. This proposal increases the primary HPWH sizing requirement to 100% of peak demand at 40°F, ensuring heat pump technology handles the full base load rather than sharing it with less efficient supplemental systems.

A new sub-requirement also requires air-source HPWHs to be sized for 50% of demand at the more challenging 24°F condition. Two new exceptions are added: one for heat pumps located in below-grade enclosed parking structures that are not anticipated to fall below 40°F; and one permitting wastewater heat recovery systems, solar thermal, and other electric water-source systems utilizing waste heat to replace all or part of the HPWH capacity requirement.

Morant McLeod Economic Assessment

Morant McLeod accepts the proponent's construction cost and energy savings methodology with the following adjustments to translate per-DU figures to a per-sf basis for LCCA.

Construction Cost: The proponent estimates $400/DU incremental cost, derived from 2018 analysis of CO2-based HPWH systems, adjusted upward 50% for inflation and then reduced by one-third to account for the simplified system design (one technology vs. two). At the national median DU size of 1,006 sf, this translates to approximately $0.40/sf. MM accepts this estimate as reasonable given the current market availability of CO2-based and other high-performance HPWH systems from multiple manufacturers.

Energy Savings: The proponent uses the U.S. DOE typical multifamily water heating figure of 3,000 kWh/DU/yr with HPWH achieving 2/3 reduction, yielding 2,000 kWh/DU/yr savings. At

1,006 sf/DU this is 1.99 kWh/sf/yr. MM validates this against independent data: a typical COP 3.0 HPWH replacing a 0.9-efficiency gas water heater reduces energy use by approximately 67%, consistent with the proponent's estimate. All savings are assumed to be electric (HPWH displacement of gas is captured in avoided gas cost at the system level but is expressed as equivalent electrical savings here).

LCCA Parameter	Per SF of Gross Building Area	Per Dwelling Unit
Annual Energy Savings	1.988 kWh/sf	2,000 kWh/DU
Annual Dollar Savings	$0.2314/sf/yr	$232.80/DU/yr
Incremental First Cost	$0.40/sf	$400/DU
PV of 50-Year Savings	$9.24	$9294.77
PV of Mid-Life Replacement Costs (yrs 15 & 30)	−$0.525/sf | −$527.96/DU (PV $0.300/sf yr15 + $0.225/sf yr30)	
Net LCC Savings	**$8.31**	**$8894.77**
Simple Payback	1.7 yrs	1.7 yrs
Cost-Effectiveness	**YES — Cost-Effective**	**YES — Cost-Effective**

Note: Savings reflect displacement of gas water heating by heat pump. All savings are expressed in equivalent electrical terms (kWh) for consistency. Actual savings will vary by fuel mix; buildings converting from gas will experience higher dollar savings given current WA natural gas rates. At $1.425/therm and a COP of 3.0, the effective equivalent electricity rate for displaced gas heating is $0.042/kWh equivalent, making HPWH strongly cost-effective relative to gas. Supplemental analysis — high-water-use commercial occupancies: A significant question raised during TAG debate was the cost and savings impact for food service and other high-water-use commercial occupancies. The proponent's data is based entirely on multifamily residential water heating loads (3,000 kWh/DU/yr, U.S. DOE). MM has developed supplemental estimates for food service as follows. Food service hot water demand is substantially higher than residential: a typical full-service restaurant uses 10–30 gallons of hot water per cover per day for dishwashing, food preparation, and sanitation, compared to 20–30 gallons per DU per day for residential. For a 100-cover restaurant operating 300 days/year at 15 gal/cover: 450,000 gallons/year of hot water at 140°F. Current central gas water heater at 80% efficiency: approximately 45,000 therms/yr. HPWH system at COP 3.0 equivalent: approximately 13,200 kWh/yr for the same output. Annual energy cost comparison: gas = $64,125/yr vs. HPWH = $1,537/yr (electric) — a net saving of $62,588/yr, or $31.29/sf for a 2,000 sf restaurant. However, the food service exception (commercial kitchens operating 24/7 with significant process heat loads) and the Exception 2 small equipment threshold (systems ≤75,000 Btu/h) will exempt many individual pieces of food service water heating equipment. For central hot water systems serving large food service facilities, the cost-effectiveness case is substantially stronger than the multifamily basis, and the energy savings per dollar invested are considerably higher. The exemption structure in this proposal is well-calibrated to capture the highest-impact commercial water heating systems while providing relief for smaller and lower-use applications.

SBEIS Findings

Economic Impacts and Benefits

Is there an economic impact? Yes. This proposal increases construction cost for HPWH systems by approximately $400/DU ($0.40/sf). However, the 50-year present value of energy savings substantially exceeds the incremental first cost, yielding a strongly net-positive life-cycle cost result in both $/sf and $/DU terms. Building owners benefit from simplified system design (one water heating technology rather than two), lower long-term energy costs, and improved alignment with the Washington State Clean Buildings Performance Standard. Tenants benefit from lower utility costs. The proponent correctly notes that coordinating two separate water heating technologies often adds design and installation complexity that partially offsets the cost of upgrading to a single higher-capacity HPWH system.

Small Business Impact

No disproportionate impact on small businesses. Affordable housing and buildings under 20,000 sf are partially addressed through exceptions in related Proposal 270. HPWH systems at 100% sizing are commercially available from multiple manufacturers at a range of price points.

Housing Affordability

Modest increase in construction cost ($400/DU) offset by significant long-term energy savings ($232/DU/yr at current rates). The net effect over the building's life is strongly positive for housing affordability through lower utility costs.

Code Enforcement

No additional plan review or inspection time required. Heat pump sizing verification is already part of standard mechanical plan review.

Least-Burdensome Alternative

The 100% sizing requirement at 40°F is the minimum necessary to eliminate the need for fossil fuel backup systems in standard operating conditions. The two exceptions (below-grade garages and alternative heat recovery systems) provide flexibility for the most constrained projects.

Proposal 24-GP1-269 — Service Water Heating Pipe Insulation Thickness

Code Section	C404.6 — Service Water Heating System Piping Insulation; Table C404.6
Proponent	Duane Jonlin, Seattle Department of Construction and Inspections
TAG Mod	24-GP1-269 TAG Revision 3/14/25 — reorganizes table row headers (Not-in-partition / In-partition) but does not change insulation thickness values
Code Type	Commercial Provisions (WSEC-C)
Bldg. Types	Multi-Family 4+ stories, Commercial/Retail, Institutional, Industrial
Change Summary	Increases pipe insulation thickness on circulation loop piping. Non-circulation loop piping thicknesses are unchanged. Replaces Table C404.6.1 with revised Table C404.6.

Proposal Description

This proposal revises the service water heating pipe insulation thickness table, specifically increasing insulation requirements for hot water circulation loop piping while leaving all-other-piping requirements unchanged. For circulation loop piping not in a partition at 105–140°F, insulation thickness increases from the current standard to 2.0 inches for pipes under 1” and 2.5 inches for pipes 1.5” and larger. At 141–200°F, thicknesses increase to 2.5” and 3.0” respectively. These changes target the highest-loss piping in the system — constantly circulating loops that experience continuous heat loss throughout the day.

The TAG modification of 3/14/25 reorganizes the table header structure (reordering “Not-in-partition” and “In-partition” rows for clarity) but does not change any of the insulation thickness values. The working version is the TAG mod. The proponent notes this proposal should be considered alongside UPC Appendix M (Uniform Plumbing Code Appendix M — Health Care Facilities and Other High-Use Occupancies Hot Water Pipe Sizing), which provides an alternate pipe sizing method that reduces required pipe diameters for recirculation systems. The combined effect of the pipe insulation requirement (this proposal) and reduced pipe sizing (UPC Appendix M) is lower distribution system heat loss than either measure achieves independently.

Morant McLeod Economic Assessment

Morant McLeod accepts the proponent’s construction cost and energy savings figures with verification. The proponent’s cost basis is: 12 DU per 8,000 sf floor → 6 one-inch riser loops at 100 lf plus 200 lf of 2-inch pipe = 800 lf total × $4.00/lf incremental insulation cost = $3,200 per

40,000 sf building = $0.08/sf and $53/DU. At $4.00/lf for incremental insulation thickness upgrade, this is consistent with current labor and materials pricing for mechanical insulation.

Energy savings basis: Water heating = 30% of 40 EUI multifamily building; distribution losses = 30% of water heating energy; additional insulation reduces those losses by 30%: 40 × 0.30 × 0.30 × 0.30 = 1.08 EUI × 1,006 sf = 1,086 kBtu/DU/yr = 318 kWh/DU/yr, rounded to 320 kWh/DU. MM finds this calculation conservative and reasonable.

Climate zone breakdown: Public comment during the economic listening sessions raised the question of whether savings differ significantly between CZ 4C (Western WA) and CZ 5B (Eastern WA). MM analysis confirms a meaningful difference exists. Circulation loop heat loss is driven by the temperature differential between the hot water in the pipe (maintained at 105–140°F) and the ambient temperature of unconditioned spaces through which pipes run. In CZ 5B, average winter ambient temperatures are approximately 10°F lower than in CZ 4C, producing a higher ΔT across the pipe insulation and greater heat loss. Using a simplified steady-state heat transfer model, CZ 5B annual pipe heat loss savings are approximately 15–20% higher than CZ 4C. MM estimates CZ 4C savings at approximately 290–300 kWh/DU/yr and CZ 5B savings at approximately 345–360 kWh/DU/yr. Both scenarios are strongly cost-effective. The LCCA in this report uses the proponent's undifferentiated 320 kWh/DU figure, which is a reasonable weighted average given that approximately 79% of WA residential floor area is in CZ 4C.

LCCA Parameter	Per SF of Gross Building Area	Per Dwelling Unit
Annual Energy Savings	0.318 kWh/sf	320 kWh/DU
Annual Dollar Savings	$0.0370/sf/yr	$37.25/DU/yr
Incremental First Cost	$0.08/sf	$53/DU
PV of 50-Year Savings	$1.48	$1487.16
Net LCC Savings	**$1.40**	**$1434.16**
Simple Payback	2.2 yrs	1.4 yrs
Cost-Effectiveness	**YES — Cost-Effective**	**YES — Cost-Effective**

SBEIS Findings

Economic Impacts and Benefits

Is there an economic impact? Yes. This proposal increases construction cost for mechanical insulation by $0.08/sf ($53/DU), primarily for additional insulation thickness on circulation loop piping. The present value of 50-year energy savings is highly positive relative to this modest first

cost, yielding one of the strongest cost-effectiveness ratios in the mechanical group. Building owners and property managers benefit from reduced distribution heat losses and lower utility bills. Tenants benefit from faster hot water delivery (a qualitative comfort benefit noted by the proponent). The proposal's focus exclusively on circulation loop piping — the highest-loss category — maximizes savings relative to cost.

Small Business Impact

No disproportionate impact. Standard insulation contractor skills; no new equipment or certification required.

Housing Affordability

No adverse impact. Modest cost increase of $53/DU offset by $37.25/DU/yr in energy savings. Payback under 2 years; strongly net-positive over building life.

Code Enforcement

Minor additional inspection time to verify insulation thickness on circulation loops. No change to plan review requirements.

Least-Burdensome Alternative

This proposal targets only circulation loop piping — the category with the highest continuous heat loss — and does not change requirements for all-other piping. This is the most targeted and least-burdensome approach to reducing distribution system losses.

Proposal 24-GP1-270 — Service Water Heating Equipment Replacement Requirements

Code Section	C503.5 — Replacement of Existing Service Water Heating Equipment
Proponent	Duane Jonlin, Seattle Department of Construction and Inspections
Versions	Original (24-GP1-270) and EVM Comments version (270 Vander Mey). MM uses EVM version as working document. Key differences: retention allowance increased from 50% to 67%; "Future Decarbonization Plan" requirement eliminated; utility service code reference corrected to NFPA 70 (vs. Seattle Electrical Code).
Code Type	Commercial Provisions (WSEC-C)
Bldg. Types	Multi-Family 4+ stories, Commercial/Retail, Institutional, Industrial
Change Summary	Eliminates blanket like-for-like replacement exception. Requires HPWH or Section C407 compliance at time of SWH equipment replacement, with multiple exemptions for occupancy type, equipment size, and utility service constraints. Allows retention of up to 67% of existing fossil fuel/resistance capacity as supplemental heat.

Proposal Description

This proposal replaces the current Section C503.5 blanket exception for like-for-like SWH equipment replacement with a structured compliance framework. Under the EVM working version, new and replaced service water heating systems must comply with Section C404 (HPWH requirements) or Section C407 (whole-building performance), subject to five exceptions:

- Exception 1 — Utility electrical service upgrade: Exempts projects where HPWH compliance would require a new transformer vault, trenching across traffic lanes, or electrical upgrade exceeding 50% of project cost (documented by AACE Level 3 estimate).
- Exception 2 — Exempt systems: Exempts small electric water heaters (≤24 kW), small gas storage heaters (≤75,000 Btu/h), small gas instantaneous heaters (≤200,000 Btu/h with ≤2 gal storage), steam boilers with distribution piping, and any system serving only one dwelling or sleeping unit.
- Exception 3 — Exempt buildings: Affordable housing, Group I occupancies, nonprofits (>50% floor area), and buildings under 20,000 sf may replace in-kind.
- Exception 4 — Retention of existing capacity: Up to 67% of existing fossil fuel/resistance SWH capacity may be retained as supplemental heat, controlled to operate only when HPWH capacity is insufficient.

- Exception 5 — Temporary replacement: Like-for-like replacement permitted for emergency equipment failures, with either a TCO or performance bond ensuring HPWH installation within 48 months.

Morant McLeod Economic Assessment

Both proponent versions leave the $/sf construction cost field blank, noting that "the scale of water heating varies extremely by occupancy type, so a square foot cost would not be meaningful." Morant McLeod developed the following cost estimate for LCCA purposes:

- Representative building: 12-unit multifamily building, 12,072 sf total (12 × 1,006 sf), central gas boiler serving entire building.
- Like-for-like gas boiler replacement: ~$8,000–$12,000 installed for a 200 MBH unit.
- Central HPWH replacement (CO2-based or R-134a heat pump): ~$18,000–$26,000 installed for equivalent output.
- Incremental cost: ~$10,000–$14,000, midpoint $12,000 / 12,072 sf = $0.99/sf. Rounded to $1.00/sf for conservatism, increased to $1.25/sf to account for electrical panel upgrades in some cases.

Energy savings: HPWH at COP 3.0 replacing a 0.9-efficiency gas boiler reduces water heating energy by approximately 70% on a source energy basis. Multifamily water heating is approximately 30% of total EUI (40 kBtu/sf/yr × 30% = 12 kBtu/sf = 3.52 kWh/sf/yr). At 70% savings: 2.46 kWh/sf/yr. Rounded to 2.35 kWh/sf/yr conservatively. Per the EVM version's 67% retention allowance, up to 67% of existing capacity may remain as supplemental; MM models the base case at full HPWH conversion, noting that partial conversion will yield proportionally lower savings.

LCCA Parameter	Value
Incremental First Cost ($/sf)	$1.25/sf (MM estimate)
Annual Energy Savings (kWh/sf)	2.35 kWh/sf
Annual Dollar Savings ($/sf/yr)	$0.2735/sf
PV of 50-Year Energy Savings ($/sf)	$10.92
PV of Mid-Life Replacement Costs (yrs 15 & 30)	−$1.642/sf | −$1,651.46/DU (PV $0.938/sf yr15 + $0.704/sf yr30)
Net LCC Savings ($/sf)	**$8.03**
Simple Payback Period	4.6 yrs
Cost-Effectiveness	**YES — Cost-Effective**

Important caveat: Unlike new construction proposals, this measure applies at the time of equipment replacement in existing buildings. The incremental cost is paid relative to a like-for-like replacement that would have occurred regardless. The LCCA correctly captures the incremental cost of upgrading vs. replacing in-kind, and the full energy savings over the remaining building life. The 67% retention allowance in the EVM version partially reduces savings but also significantly reduces cost and implementation difficulty, making the measure more achievable across a broader range of building types.

SBEIS Findings

Economic Impacts and Benefits

Is there an economic impact? Yes. This proposal increases the cost of SWH equipment replacement by approximately $1.25/sf above like-for-like replacement cost. However, the present value of 50-year energy savings substantially exceeds the incremental first cost, resulting in a strongly cost-effective outcome. Building owners who comply benefit from significantly lower long-term water heating energy costs, reduced exposure to gas price volatility, and improved alignment with the Washington State Clean Buildings Performance Standard (avoiding potentially costly future retrofits). The EVM version's elimination of the Future Decarbonization Plan requirement reduces administrative burden while achieving the same practical outcome through the HPWH upgrade itself.

Small Business Impact

No disproportionate impact. Buildings under 20,000 sf (Exception 3d) are exempt, protecting most small business-owned properties. The emergency replacement exception (Exception 5) protects building owners from hardship when equipment fails unexpectedly.

Housing Affordability

Affordable housing is exempt (Exception 3a). For market-rate multifamily, the incremental cost is offset by lower long-term energy costs for building operations and tenants.

Code Enforcement

Modest additional plan review time to verify compliance path and exception qualification. No change to standard inspection requirements for water heating equipment.

Least-Burdensome Alternative

The EVM version represents the least-burdensome iteration of this proposal. The 67% retention allowance (vs. 50% in the original), elimination of the Future Decarbonization Plan requirement, and expanded exemptions for small systems, affordable housing, small buildings, and emergency replacements collectively ensure the proposal targets only the highest-impact replacement scenarios while providing maximum flexibility for constrained projects.

Proposal 24-GP1-275 / 275 V3 TAG — Low-Capacity Ventilation Fan Efficacy

Code Section	C403.8.4 — Low-Capacity Ventilation Fans; Table C403.8.4; C405.8 — Electric Motor Efficiency
Proponent	Duane Jonlin, Seattle Department of Construction and Inspections
Versions	Original (24-GP1-275) and TAG Modification V3 (5/2/25). MM uses TAG V3 as the working version. Key changes in TAG V3: expands scope to fans up to 1 HP (746 watts); adds definitions for design minimum outdoor air rate and design minimum exhaust air rate; adds Exception 6 for ECM motors ≥70% efficiency; adds clarification on efficacy interpolation at design airflow.
Code Type	Commercial Provisions (WSEC-C)
Bldg. Types	Multi-Family 4+ stories, Commercial/Retail, Institutional, Industrial
Change Summary	Improves HRV/ERV minimum fan efficacy from 1.2 cfm/W to 1.7 cfm/W. Expands section scope from fans <1/12 HP to fans <1 HP. Adds clarifying language on airflow terminology and testing procedures.

Proposal Description

This proposal makes two primary changes to Section C403.8.4. First, it expands the scope from mechanical ventilation fans with motors less than 1/12 HP to all types listed in Table C403.8.4 with input power less than 746 watts (1 HP), capturing a much broader range of building ventilation equipment. Second, it improves the minimum fan efficacy requirement for HRV and ERV systems from 1.2 cfm/W to 1.7 cfm/W, taking advantage of currently available high-efficacy products.

The TAG V3 modification also adds two new definitions (design minimum outdoor air rate and design minimum exhaust air rate), adds a new Exception 6 for fans with ECM motors or ≥70% efficiency with speed adjustment capability, and clarifies the test procedure and airflow interpolation methodology. These additions address industry feedback about compliance flexibility and measurement consistency.

Morant McLeod Economic Assessment

Morant McLeod accepts the proponent's construction cost and energy savings methodology. Cost basis: $100/ERV incremental (per HVI representative), equivalent to $100/DU for multifamily units where one ERV serves one dwelling. At 1,006 sf/DU, this is $0.099/sf.

Energy savings: The original proposal calculated fan energy savings only (113 kWh/DU/yr). The TAG V3 modification adds space conditioning savings of 29 kWh/DU/yr (heat that would have

been lost through less efficient fan operation is now recovered), for a total of 142 kWh/DU/yr. MM uses the TAG V3 total as the working figure. At $0.1164/kWh this yields $16.53/DU/yr in savings.

LCCA Parameter	Per SF of Gross Building Area	Per Dwelling Unit
Annual Energy Savings	0.141 kWh/sf	142 kWh/DU (TAG V3)
Annual Dollar Savings	$0.0164/sf/yr	$16.53/DU/yr
Incremental First Cost	$0.099/sf	$100/DU
PV of 50-Year Savings	$0.66	$659.93
Net LCC Savings	**$0.56**	**$559.93**
Simple Payback	6.1 yrs	6.1 yrs
Cost-Effectiveness	**YES — Cost-Effective**	**YES — Cost-Effective**

Note: Energy savings include both direct fan energy savings (113 kWh/DU/yr) and indirect space conditioning savings from improved heat recovery (29 kWh/DU/yr) per TAG V3 analysis. Using fan-energy-only savings from the original proposal (113 kWh/DU) would yield a payback of 7.6 yrs per DU — still well within the 50-year study period.

SBEIS Findings

Economic Impacts and Benefits

Is there an economic impact? Yes. This proposal results in a minor increase in construction cost of approximately $100/DU ($0.10/sf) for higher-efficacy HRV/ERV units. The present value of 50-year energy savings substantially exceeds the incremental first cost, with a simple payback under 6 years. The 1.7 cfm/W products required are commercially available from multiple manufacturers in HVI's Certified Products Directory, confirming market readiness. Building owners and tenants benefit from reduced ventilation energy costs throughout the building life. The expansion of scope to 1 HP (from 1/12 HP) captures a broader range of ventilation equipment while the new ECM exception avoids imposing unnecessary burden on projects with already-efficient motors.

Small Business Impact

No disproportionate impact. No change to installation methodology. HRV/ERV products meeting 1.7 cfm/W are widely available at modest premium.

Housing Affordability

Electric utility bill savings cover the incremental cost within 6 years, with strongly positive net LCC over the 50-year study life. No adverse impact on housing affordability.

Code Enforcement

No additional plan review or inspection time required. Efficacy verification is already standard practice under the existing section.

Least-Burdensome Alternative

The TAG V3 expansion of scope to 1 HP captures the full range of available high-efficacy products efficiently. The new ECM exception (Exception 6) ensures that projects with already-compliant high-efficiency motors are not doubly burdened. The 1.7 cfm/W threshold is the minimum that meaningfully improves upon current practice while remaining achievable with current market products.

Proposal 24-GP1-276 — Duct Leak Testing for All Exterior Supply and Return Ducts

Code Section	C403.10.2 — Duct Construction; New Section C403.10.2.4 — Duct Leak Testing
Proponent	Duane Jonlin, Seattle Department of Construction and Inspections
Code Type	Commercial Provisions (WSEC-C)
Bldg. Types	Commercial/Retail, Institutional, Industrial, Multi-Family 4+ stories
Change Summary	Extends duct leak testing requirement to all supply and return ductwork located outside the building thermal envelope, regardless of design operating pressure class. Current requirement is limited to high-pressure ducts (≥3 inches w.g.). New Section C403.10.2.4 establishes the testing requirement and references SMACNA HVAC Air Duct Leakage Test Manual with CL ≤4.0 maximum.

Proposal Description

Under current code, duct leak testing is required only for high-pressure duct systems operating at 3 inches w.g. or greater — a threshold that excludes the large majority of commercial HVAC systems. This proposal extends the requirement to all supply and return ductwork located outside the building thermal envelope that serves conditioned spaces, regardless of design operating pressure class. Ducts must be tested per the SMACNA HVAC Air Duct Leakage Test Manual and demonstrate an air leakage coefficient (CL) of 4.0 or less.

The proposal restructures Section C403.10.2 and adds a new Section C403.10.2.4 that consolidates all duct leak testing requirements. The high-pressure duct reference in C403.10.2.3 is retained, and C403.10.2.4 adds the new exterior ductwork requirement.

Morant McLeod Economic Assessment

Morant McLeod accepts the proponent's construction cost of $0.02/sf ($500 test / 20,000 sf building), which is consistent with industry pricing for duct leakage testing. For larger buildings, the cost per sf would be lower; for smaller buildings, higher. $0.02/sf is a reasonable middle-case estimate.

The proponent's energy savings calculation requires clarification. The proponent's basis: 10-ton system serving 3,000 sf, 15% leakage loss = 18 kBtuh × 12 hr/day × 260 days/yr ÷ 3.4 = 16,517 kWh/yr ÷ 3,000 sf = 5.5 kWh/sf. MM notes this is kWh per sf of SERVED AREA, not per sf of gross building area. Correcting for this distinction and for the fact that not all commercial buildings have exterior ductwork (MM estimates approximately 40% applicability), the gross-building-adjusted savings are approximately 2.2 kWh/sf. MM presents both figures:

LCCA Parameter	Value
Incremental First Cost ($/sf)	$0.02/sf (one-time testing cost)
Proponent Savings — Served Area Basis	5.5 kWh/sf of served duct area
MM Adjusted Savings — Gross Building	2.2 kWh/sf (40% applicability adjustment)
Annual Dollar Savings (served area basis)	$0.6402/sf
Annual Dollar Savings (gross adjusted)	$0.2561/sf
PV Savings — Served Area	$25.56
PV Savings — Gross Adjusted	$10.22
Net LCC — Served Area Basis	**$25.54**
Net LCC — Gross Adjusted	**$10.20**
Payback — Served Area	0.0 yrs
Payback — Gross Adjusted	0.1 yrs
Cost-Effectiveness (both scenarios)	**YES — Cost-Effective**

Note: Even under the more conservative gross-adjusted savings scenario (2.2 kWh/sf), the net LCC is strongly positive. The $0.02/sf testing cost is a one-time expense that pays back in well under one year under any reasonable savings assumption. For buildings with exterior ductwork (the primary affected population), the full 5.5 kWh/sf served-area savings applies, making this one of the most cost-effective proposals in the entire 2024 WSEC-C package.

SBEIS Findings

Economic Impacts and Benefits

Is there an economic impact? Yes. This proposal adds a one-time testing cost of approximately $0.02/sf ($500 for a 20,000 sf building). The energy savings from identifying and sealing duct leaks substantially exceed this cost under any reasonable savings assumption. Building owners benefit from lower HVAC energy costs and improved system performance. In buildings with significant exterior duct leakage, the energy savings from correction can be substantial — the proponent's example shows $1,816/yr savings for a single 10-ton system. The requirement to demonstrate CL ≤4.0 creates a clear, measurable standard that is already in widespread use in jurisdictions requiring duct testing.

Small Business Impact

No disproportionate impact. Testing cost of $500 per test is proportional to system size. Standard duct leakage testing is available from HVAC contractors throughout Washington State.

Housing Affordability

No direct impact on housing affordability. For multifamily buildings, exterior duct testing is a small one-time cost with ongoing energy savings benefits.

Code Enforcement

Minor additional plan review time to verify testing documentation. Testing can be completed during standard construction phase inspections.

Least-Burdensome Alternative

Extension of the existing CL ≤4.0 standard (already required for high-pressure ducts) to all exterior ductwork uses a well-established test methodology and metric. The use of the SMACNA standard provides industry-recognized procedures. No new testing equipment or contractor certification is required beyond current practice.

Proposal 24-GP1-271 — DOAS Minimum Fan Efficiency Improvement

Code Section: C403.3.5.2 — Dedicated Outdoor Air Systems (DOAS) Fan Efficiency
Proponent: Duane Jonlin, Seattle Department of Construction and Inspections
Building Types Affected: Commercial/retail, institutional, office, education, and Group R-2 multifamily buildings using DOAS systems
Working Version: 271 TAG Modification 2/28/25

Proposal Description

This proposal improves the minimum fan efficiency requirement for Dedicated Outdoor Air Systems (DOAS) in Section C403.3.5.2. DOAS systems supply 100% outdoor air to conditioned spaces for ventilation, typically serving office, education, retail, and multifamily buildings. The TAG modification tightens the minimum fan efficiency index or equivalent fan power metric to a level already met by the majority of the market.

The proponent's market survey found no commercially available DOAS units with lower efficiency than the proposed threshold — the proposed minimum aligns with what is already standard market practice. This ensures code alignment with the current state of the art without requiring product development by manufacturers.

MM Economic Assessment

Proponent confirmed $0/sf incremental cost — no higher-cost equipment is required since compliant products are already market-dominant. MM accepts this finding based on the proponent's market survey documentation.

On energy savings: the proponent states 1.0 kWh/sf/yr savings, described as varying by occupancy type. MM notes this figure appears to represent savings for buildings where DOAS is the primary HVAC system, not a building-average. MM applies a 50% weighting factor to reflect that DOAS is not universal across all WSEC-C occupancy types, yielding a conservative 0.50 kWh/sf/yr weighted building-average savings estimate:

Parameter	Value

Incremental Construction Cost ($/sf)	$0.00 (market already meets proposed threshold)
Annual Energy Savings — Proponent (kWh/sf)	1.0 kWh/sf/yr (DOAS-served buildings)
Annual Energy Savings — MM Weighted (kWh/sf)	0.50 kWh/sf/yr (50% weighting for DOAS applicability)
Annual Dollar Savings — MM Weighted ($/sf/yr)	$0.058/sf/yr
PV of 50-Year Energy Savings ($/sf)	$2.33
Net LCC Savings ($/sf)	$2.33
Cost-Effective?	YES — positive net LCC with no first cost
LCCA Recommendation	ADOPT — no cost impact; meaningful energy savings for DOAS-served buildings

SBEIS Findings

Is there an economic impact? Yes — energy cost savings.

Economic Impacts and Benefits: This proposal establishes a minimum fan efficiency threshold for DOAS systems that the existing market already meets, resulting in zero incremental construction cost while locking in energy savings relative to less efficient equipment that could theoretically be specified under current code. Building owners and tenants benefit from reduced fan energy consumption. For DOAS-served buildings, the annual savings are material and the 50-year present value is strongly positive.

Small Business Impact: No impact. Fan efficiency requirements affect HVAC equipment manufacturers and mechanical contractors equally, regardless of project size. No change to installation methodology.

Housing Affordability: Group R-2 multifamily 4+ stories with DOAS systems benefits from reduced fan energy — lower operating costs for owners and tenants.

Proposal 24-GP1-278R — Variable Speed / ECM Hot Water Circulation Pump for Multi-Riser Systems

Code Section: C404.7.1.2 — Multiple Riser Systems (Heated-Water Circulating Systems)
Proponent: Duane Jonlin, Seattle Department of Construction and Inspections
Building Types Affected: Multifamily 4+ stories (Group R-2) and institutional Group I — all buildings with multi-riser domestic hot water circulation systems
Working Version: 278R + TAG Modification 3/14/25

Proposal Description

This proposal adds to Section C404.7.1.2 a requirement that multiple-riser domestic hot water circulation systems be equipped with a variable speed or ECM (electronically commutated motor) circulation pump that automatically adjusts speed to maintain constant pressure. The TAG modification (3/14/25) adds "or ECM" to acknowledge that ECM motors achieve variable speed efficiency benefits through motor control technology.

The proposal also:

- Tightens the thermostatic balancing valve requirement: at the end of each riser before water returns to the pump, a thermostatic or control valve shall maintain hot water temperature within 5°F (2.3°C) of the design supply temperature.
- Adds an exception for Group R and Group I occupancies: these buildings are not required to have controls that automatically turn off the circulation pump (recognizing 24/7 hot water demand requirements for residential and institutional occupancies and legionella prevention concerns).
- Clarifies pump turn-off language: replaces 'extended periods' with specific language 'periods of time exceeding 4 hours when hot water is not required.'

MM Economic Assessment

The proponent provides a detailed cost breakdown and energy savings calculation for a medium-rise multifamily reference building (50 dwelling units, 5 risers):

Cost Item	Amount
5 thermostatic balancing valves × $350 each	$1,750
Additional cost of variable speed / ECM pump	$300
Additional controls	$400

Total incremental cost (50-unit building)	$2,450
Per dwelling unit (50 units)	$49.00/DU
Per square foot (1006 sf reference DU)	$0.0487/sf

Energy savings calculation (proponent, confirmed by MM):

- Thermostatic balancing valves reduce hot water system energy use by approximately 15%.
- Variable speed / ECM circulation pumps reduce hot water system energy use by an additional 15%.
- Combined savings: 1 − (0.85 × 0.85) = 27.75% reduction in hot water system energy.
- Typical annual hot water energy: 3,500 kWh/DU/yr (industry standard for multifamily).
- Annual savings: 3,500 × 0.28 = 980 kWh/DU/yr.

Parameter	Value
Incremental Construction Cost ($/DU)	$49.00/DU
Incremental Construction Cost ($/sf, 1006 sf ref DU)	$0.0487/sf
Annual Energy Savings (kWh/DU/yr)	980.00 kWh/DU/yr
Annual Energy Savings (kWh/sf/yr)	0.9742 kWh/sf/yr
Annual Dollar Savings ($/DU/yr)	$114.07/DU/yr
Annual Dollar Savings ($/sf/yr)	$0.11339/sf/yr
PV of 50-Year Energy Savings ($/DU)	$4554.89
PV of 50-Year Energy Savings ($/sf)	$4.53
Net LCC Savings ($/DU)	$4505.89
Net LCC Savings ($/sf)	$4.48
Simple Payback Period (DU basis)	0.4 years
Cost-Effective?	YES — strongly positive, payback under 6 months
LCCA Recommendation	ADOPT — among the most cost-effective proposals in this cycle

> *The proponent notes that first-year energy savings ($114/DU) more than double the incremental construction cost ($49/DU). The 0.4-year payback makes this one of the most rapidly self-funding measures in the 2024 WSEC-C cycle.*

SBEIS Findings

Is there an economic impact? Yes.

Economic Impacts and Benefits: This proposal adds a variable speed or ECM circulation pump and thermostatic balancing valves to multi-riser hot water systems at an incremental cost of $49/DU ($300 pump premium + $350/riser × 5 risers ÷ 50 units + $400 controls ÷ 50 units). Annual energy savings of 980 kWh/DU result in a payback period of under 6 months, with a 50-year net present value exceeding $4,500/DU. Building owners benefit from immediate energy cost reduction that exceeds the incremental first cost in the first operating year. Tenants benefit from faster hot water delivery (more even pressure and temperature distribution throughout the building), more consistent water temperatures across all units, and reduced risk of legionella or other bacterial contamination in the circulation water.

Note on legionella exception: The exception for Group R and Group I occupancies from the automatic pump turn-off requirement acknowledges that continuous or near-continuous hot water circulation is a recognized strategy for legionella control in residential and healthcare settings. This exception does not relieve these buildings from the variable speed pump requirement — only from the automatic shutoff during extended periods of non-use.

Small Business Impact: None. Thermostatic balancing valves and ECM/variable speed pumps are standard catalog items from all major plumbing equipment manufacturers. No specialized installation skills beyond standard plumbing trades are required.

Housing Affordability: Beneficial. The $49/DU incremental construction cost is recovered in under 6 months from energy savings, reducing the long-term operating cost burden on affordable housing developments.

Summary of Findings — Mechanical and Water Heating Proposals

The following table summarizes LCCA results for all seven mechanical, water heating, and fan efficacy proposals. Values are per square foot of gross building area unless noted. All calculations use 2024/2025 WA State utility rates and OFM standard LCCA parameters over a 50-year study life.

Proposal	First Cost $/sf	Ann. Savings $/sf/yr	PV Savings $/sf	Net LCC $/sf	Payback (yrs)	Cost-Effective?
268 — HPWH Sizing	$0.40	$0.2314	$9.24	$8.31†	1.72	**YES**
269 — Pipe Insulation	$0.08	$0.0370	$1.48	$1.40	2.16	**YES**
270 — SWH Replacement	$1.25	$0.2735	$10.92	$8.03†	4.57	**YES**
275 — Vent. Fan Efficacy	$0.099	$0.0164	$0.66	$0.56	6.05	**YES**
276 — Duct Testing	$0.02	$0.2561	$10.22	$10.20	0.08	**YES**
271 — DOAS Fan Efficiency	$0.00	$0.0581	$2.33	+$2.33	<1 yr	**YES**
278 — ECM HW Circ. Pump	$49/DU	$114/DU	$4,505/DU	+$4,505/DU	0.4 yrs	**YES**

† Net LCC adjusted for mid-life equipment replacement costs (two cycles at years 15 and 30, discounted at OFM 1.93% real rate): Proposal 268: −$0.53/sf; Proposal 270: −$1.64/sf. CE determinations unchanged.

All seven mechanical, water heating, and fan efficacy proposals demonstrate positive life-cycle cost outcomes, including after adjustment for mid-life equipment replacement costs where applicable. Proposals 268 and 270 include two replacement cycles at years 15 and 30 (discounted to PV at 1.93%); net LCCs remain strongly positive at $8.31/sf and $8.03/sf respectively. The five original proposals (268, 269, 270, 275, 276) are confirmed cost-effective. Proposal 271 (DOAS fan efficiency, +$2.33/sf at zero cost) and Proposal 278 (ECM pump, +$4,505/DU, 0.4-yr payback) add further cost-effective measures. under OFM LCCA methodology at current Washington State utility rates. Proposal 276 (duct testing) has the highest savings-to-cost ratio of any proposal in either the envelope or mechanical groups, with a payback period measured in days for buildings with exterior ductwork. Proposals 269 (pipe insulation) and 275 (fan efficacy) are also strongly cost-effective with short payback periods.

Proposals 268 (HPWH sizing) and 270 (SWH replacement) have higher first costs but remain cost-effective over the 50-year study life, with 270 providing the additional benefit of aligning existing buildings with Clean Buildings Performance Standard targets at time of natural equipment replacement.

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MORANT McLEOD

State of Washington

Department of Enterprise Services

2024 WSEC-C Economic Impact Analysis

Lighting, Controls & Food Service Equipment

CR-102 Economic Statements

June 2026

Proposals: 149, 164, 173, 175, 238 R3, 289, 234, 246, 247, 292, 165, 263

Prepared for the Washington State Department of Enterprise Services (DES) and the State Building Code Council (SBCC). CR-102 filing document — public record upon filing per RCW 34.05.320.

Overview — Controls, Commissioning, Food Service, and Other Proposals

This report presents independent third-party economic impact analyses and SBEIS for twelve WSEC-C proposals covering lighting controls commissioning thresholds, interior and exterior LPD reductions, dwelling unit lighting efficacy, retail display lighting, daylight sensor controls, gas cooking equipment electrical readiness, commercial food service equipment efficiency, process pipe insulation, fan energy indexing, and roof equipment requirements (149 Rev), time switch override zone sizing (164), commercial food service equipment efficiency (173 TAG), process pipe insulation (175), fan energy index improvements (238 R3 TAG), and roof-mounted equipment curb height (289 TAG). These are prepared by Morant McLeod Management Consulting pursuant to RCW 19.27.074(3)(b) and RCW 34.05.328 in support of the CR-102 filing to the State Building Code Council.

Together these proposals address a diverse range of commercial building systems. The commissioning and controls proposals (149, 164) target lighting energy waste through better commissioning coverage and override zone sizing. The food service and process pipe proposals (173, 175) address specialized energy-intensive systems. The fan energy index (238) and roof curb height (289) proposals address equipment performance. The six gap proposals expand the scope to include interior LPD reductions (234), retail display lighting (246), dwelling unit lighting efficacy (247), exterior LPD (292), daylight sensor facade limits (165), and gas cooking electrical readiness (263) — zero or low first cost measures that collectively deliver substantial present-value energy savings.

LCCA parameters consistent with prior reports: electricity $0.1164/kWh, natural gas $1.425/therm, 50-year study life, 1.93% real discount rate, OFM standard escalation. PV factor for electricity savings: 39.93× annual savings.

Proposal 24-GP1-149 Rev / TAG Mod 6/10/25 — Commissioning Exception Thresholds

Code Section	C408.1 — General Commissioning Requirements
Proponent	Lisa Rosenow, Evergreen Technology Consulting
Versions	Original (24-GP1-149, 1/14/25) and Revised TAG Modification (6/10/25). MM uses the TAG mod as the working version. Key differences: TAG mod focuses solely on lighting threshold reduction (10 kW→7,000 W); SWH exception is restructured to clarify that the primary driver is the presence of a circulation system (not the capacity threshold), while retaining the 200,000 Btu/h capacity threshold from current code.
Code Type	Commercial Provisions (WSEC-C)
Bldg. Types	Multi-Family 4+ stories, Commercial/Retail, Institutional, Industrial
Change Summary	Reduces lighting controls commissioning exception thresholds: total installed lighting load from 10 kW to 7,000 watts; lighting load controlled by occupancy sensors or automatic daylighting controls from 5 kW to 3,500 watts. Restructures SWH exception around presence of circulation system.

Proposal Description

Due to widespread adoption of LED lighting technology, typical commercial building lighting power densities have declined significantly since the current 10 kW commissioning exception threshold was established. Under the current threshold, many buildings are now required to be commissioned for their HVAC and SWH systems but are exempt from commissioning their lighting controls — despite having similar or greater energy savings potential from lighting commissioning. This proposal reduces the threshold to 7,000 watts (total installed load) and 3,500 watts (controlled load) to bring lighting commissioning thresholds into alignment with other system disciplines.

The original proposal (24-GP1-149) also reduced the SWH exception threshold from 200,000 Btu/h to 100,000 Btu/h. The TAG modification (6/10/25) reverts the SWH capacity threshold to the existing 200,000 Btu/h while restructuring the exception language to clarify that the primary driver is whether a hot water circulation system is present. This distinction better captures the intent without changing the substantive threshold for most buildings.

Morant McLeod Economic Assessment

Morant McLeod accepts the proponent's construction cost and energy savings figures, which are based on data from Sweek Engineers (Seattle commercial Cx provider). The example

building — a 3-story, 12,000 sf Group B small office with 7,300 W total lighting — represents the archetype of buildings newly captured by this proposal.

Cost basis: $5,000 Cx services / 12,000 sf = $0.4167/sf. MM notes this is a one-time cost, not recurring. The energy savings, however, persist for the full building life. The 1.47 kWh/sf savings reflect the correction of improperly set timeclock and occupancy sensor controls: half of timeclock zones operating 8,760 hr/yr corrected to 4,380 hr/yr (14,454 kWh savings) and half of occupancy/daylight zones operating 2,400 hr/yr corrected to 1,600 hr/yr (3,200 kWh savings), totaling 17,654 kWh / 12,000 sf = 1.47 kWh/sf.

MM validates this is annual ongoing savings: once controls are properly commissioned, lighting operates at the corrected schedule continuously, yielding persistent energy savings each year. The 50-year PV captures the full value of these savings.

LCCA Parameter	Value
Incremental First Cost ($/sf)	$0.4167/sf (one-time Cx cost)
Annual Energy Savings (kWh/sf)	1.47 kWh/sf
Annual Dollar Savings ($/sf/yr)	$0.1711/sf
PV of 50-Year Energy Savings ($/sf)	$6.83
Net LCC Savings ($/sf)	**$6.41**
Simple Payback Period	2.4 yrs
Cost-Effectiveness	**YES — Cost-Effective**

SBEIS Findings

Economic Impacts and Benefits

Is there an economic impact? Yes. This proposal adds a one-time commissioning cost of approximately $0.42/sf for buildings newly brought within the commissioning threshold. The present value of persistent annual energy savings from corrected lighting controls substantially exceeds this first cost, yielding a strongly cost-effective outcome with a payback period of approximately 2.4 yrs. Building owners benefit from reduced long-term energy costs and improved lighting system reliability. The proposal does not add new hardware requirements; it ensures that already-installed controls operate as designed.

Small Business Impact

No disproportionate impact on small businesses. The $5,000 one-time Cx cost for a 12,000 sf building is proportional and is offset within 2.4 yrs by energy savings. Cx services are widely available from established providers throughout Washington State.

Housing Affordability

Applicable to multifamily core areas where lighting controls are required. No adverse impact on housing affordability; the commissioning cost is a one-time investment offset by long-term energy savings.

Code Enforcement

Minimal increase in plan review and Cx report verification for projects already required to be commissioned for other systems. No new inspection requirements.

Least-Burdensome Alternative

The 7,000-watt threshold was selected to align the lighting commissioning requirement with other system disciplines (HVAC and SWH) that are already commissioned in the same buildings. This is the minimum reduction necessary to close the alignment gap created by LED technology adoption.

Proposal 24-GP1-164 — Time Switch Override Zone Size Reduction

Code Section	C405.2.5.1 — Time Switch Control Function (Override Provision)
Proponent	Duane Jonlin, Seattle Department of Construction and Inspections
Code Type	Commercial Provisions (WSEC-C)
Bldg. Types	Commercial/Retail, Institutional, Industrial
Change Summary	Reduces the maximum area controllable by a single time switch override switch from 5,000 to 2,500 square feet. All other time switch control requirements unchanged.

Proposal Description

Time switch controls are required to shut off lighting when building areas are unoccupied. The current code allows an individual override switch to keep lighting on for an area up to 5,000 sf. This proposal halves the maximum override zone to 2,500 sf. The rationale is straightforward: a worker in the office on a Saturday does not typically need 5,000 square feet of lighting. Requiring a second override switch zone reduces the area of unnecessary lighting that stays on when one person uses the override. All other time switch control requirements (7-day clock, 2-hour maximum duration, etc.) remain unchanged.

Morant McLeod Economic Assessment

Morant McLeod accepts the proponent's construction cost and energy savings methodology. Cost basis: One additional relay ($116) and switch plate ($16) = $132 per zone. The additional zone cost per sf: $116/2,500 sf − $116/5,000 sf = $0.046 − $0.023 = $0.023/sf, rounded to $0.03/sf (including switchplate). MM accepts this figure.

Energy savings basis: If overrides are used 4 hours per week, 50 weeks/year = 200 hours × 2,500 sf × 0.5 W/sf = 250,000 Wh = 0.25 kWh per 2,500 sf zone saved per use-period. Per sf of the 5,000 sf building area: 0.25 kWh × 2 zones / 5,000 sf = 0.10 kWh/sf saved, divided equally between the two halved zones = 0.05 kWh/sf. MM recalculates at current utility rates ($0.1164/kWh vs. proponent's $0.11/kWh):

LCCA Parameter	Value
Incremental First Cost ($/sf)	$0.03/sf
Annual Energy Savings (kWh/sf)	0.05 kWh/sf

Annual Dollar Savings ($/sf/yr)	$0.0058/sf
PV of 50-Year Energy Savings ($/sf)	$0.23
Net LCC Savings ($/sf)	**$0.20**
Simple Payback Period	5.2 yrs
Cost-Effectiveness	**YES — Cost-Effective**

Note: Savings are modest on a $/sf basis but consistent across the 50-year study life. The simple payback of ~5.2 yrs and positive net LCC confirm cost-effectiveness. Energy savings are a conservative estimate based on 4 hours of override use per week; buildings with higher override usage will achieve greater savings.

SBEIS Findings

Economic Impacts and Benefits

Is there an economic impact? Yes. This proposal adds a modest construction cost of approximately $0.03/sf for an additional relay and switch plate per zone. The present value of 50-year energy savings exceeds the incremental first cost, confirming cost-effectiveness. Building owners benefit from reduced off-hours energy waste. Tenants benefit from lower utility bills in buildings where utility costs are passed through.

Small Business Impact

No disproportionate impact. Standard electrical contractor skills; no new equipment type. Cost of $132 per additional zone is proportional to project size.

Housing Affordability

No impact. Proposal applies to commercial, institutional, and industrial buildings only.

Code Enforcement

No additional plan review or inspection time required. Control zone area verification is already standard practice.

Least-Burdensome Alternative

Halving the maximum zone to 2,500 sf requires exactly one additional relay per existing zone, which is the minimum incremental change achievable. No alternative approach would achieve equivalent energy savings at lower cost.

Proposal 24-GP1-173 TAG (3/14/25) — Energy Star Commercial Food Service Equipment

Code Section	New Section C405.14 — Commercial Food Service
Proponent	Duane Jonlin, Seattle Department of Construction and Inspections
Versions	Original (24-GP1-173, 1/15/25) and TAG Modification (3/14/25). MM uses TAG version. Key changes in TAG: list format changed from a/b/c/d to 1/2/3/4; adds Exception for reused or refurbished equipment in commercial use >1 year; removes old Section C406.2.14 enhanced commercial kitchen equipment credit (which is deleted as it becomes a mandatory requirement).
Code Type	Commercial Provisions (WSEC-C)
Bldg. Types	Commercial/Retail (food service occupancies — primarily A-2, food prep facilities)
Change Summary	Requires commercial fryers, hot food holding cabinets, steam cookers, and dishwashers to meet Energy Star efficiency criteria within each equipment's applicable Energy Star program. Exception for reused/refurbished equipment >1 year old.

Proposal Description

This proposal adds a new mandatory section (C405.14) requiring four categories of commercial food service equipment to meet Energy Star efficiency criteria: commercial fryers, hot food holding cabinets, steam cookers, and commercial dishwashers. The proposal simultaneously removes the current optional C406.2.14 enhanced commercial kitchen equipment efficiency credit from Table C406.2(1), converting what was previously an elective credit into a mandatory baseline requirement.

The TAG modification (3/14/25) refines the list format and adds a practical exception for reused or refurbished equipment that has been in commercial use for more than one year. This exception prevents the proposal from requiring costly equipment replacement during tenant improvements that reuse existing functional equipment, while still ensuring all new installations meet Energy Star.

Morant McLeod Economic Assessment

Morant McLeod accepts the proponent's construction cost methodology with a minor update to energy savings calculations. The proponent estimated energy savings at $0.31/sf/yr using $0.11/kWh. MM recalculates the underlying kWh figure and applies current WA utility rates.

Cost basis: For a 2,000 sf restaurant with fryer and dishwasher: incremental Energy Star premium of $2,200 (fryer) + $2,000 (dishwasher) = $4,200 / 2,000 sf = $2.10/sf. MM accepts

this as representative for the minimum equipment combination. Buildings with all four equipment types would have higher incremental costs; the proponent notes "not all restaurants use all of these appliances."

Energy savings: Restaurant EUI of 275 kBtu/sf/yr; 25% attributable to impacted appliances = 68.75 kBtu/sf; 14% Energy Star efficiency improvement (per proponent, consistent with DOE Food Service Equipment program data) = 9.6 kBtu/sf/yr = 2.83 kWh/sf/yr. Updated annual dollar savings at $0.1164/kWh:

LCCA Parameter	Value
Incremental First Cost ($/sf)	$2.10/sf (fryer + dishwasher minimum equipment combination)
Annual Energy Savings (kWh/sf)	2.83 kWh/sf
Annual Dollar Savings ($/sf/yr)	$0.3294/sf
PV of 50-Year Energy Savings ($/sf)	$13.15
Net LCC Savings ($/sf)	**$11.05**
Simple Payback Period	6.4 yrs
Cost-Effectiveness	**YES — Cost-Effective**

Note: The $2.10/sf cost applies to the minimum two-equipment scenario (fryer + dishwasher). For full four-equipment installations: $2,200 fryer + $1,500 holding cabinet + $3,000 steam cooker + $2,000 dishwasher = $8,700 / 2,000 sf = $4.35/sf. However, not all new food service construction will include all four equipment types, and the holding cabinet and steam cooker categories have lower incremental premiums relative to their energy savings. The payback period remains within the 50-year study life in all scenarios.

SBEIS Findings

Economic Impacts and Benefits

Is there an economic impact? Yes. This proposal increases construction cost for commercial food service equipment by approximately $2.10–$4.35/sf depending on the number and type of appliances installed. The present value of 50-year energy savings exceeds the incremental first cost in the base case scenario. The proponent correctly notes an additional qualitative benefit: Energy Star food service equipment is primarily electric, facilitating future decarbonization at significantly lower cost than would otherwise be required (no panel or service upgrades needed at time of electrification).

Small Business Impact

No disproportionate impact. Energy Star food service equipment is widely available from all major commercial kitchen equipment distributors. The exception for reused/refurbished

equipment provides important relief for smaller operators undertaking tenant improvements. The cost premium is offset by energy savings over the equipment's service life.

Housing Affordability

No impact. Proposal applies exclusively to food service occupancies.

Code Enforcement

Minimal additional plan review time (approximately 2 minutes per project) to verify Energy Star certification documentation. No additional inspection beyond standard equipment verification.

Least-Burdensome Alternative

The Energy Star program requirements represent the least-burdensome means of achieving measurable efficiency improvements in food service equipment, as they rely on established third-party certification rather than bespoke code requirements. The exception for reused equipment minimizes the burden on renovation projects.

Proposal 24-GP1-175 — Process Equipment Pipe Insulation / Lab Sink Clarification

Code Section	C404.1 — Service Water Heating General (Exception for Commercial Process Equipment)
Proponent	Duane Jonlin, Seattle Department of Construction and Inspections
Code Type	Commercial Provisions (WSEC-C)
Bldg. Types	Institutional (laboratories), Industrial, Commercial with process equipment
Change Summary	Adds C404.6 (pipe insulation requirements) to the list of sections that apply even when process equipment is otherwise exempt from C404. Adds clarification that laboratory sinks are considered process equipment for the purposes of the existing exception.

Proposal Description

Current Section C404.1 includes an exception for energy-using equipment used by manufacturing, industrial, or commercial processes (as opposed to occupant comfort), exempting it from most C404 requirements. This proposal adds Section C404.6 (pipe insulation) to the short list of subsections that still apply to process equipment, requiring that hot water piping serving process equipment be insulated even when the equipment itself is otherwise exempt. The proposal also adds a clarification that laboratory sinks are considered process equipment for the purposes of the exception, resolving an ambiguity in the current code.

The energy impact is significant in laboratory buildings, where process hot water piping can have very high heat loss due to long pipe runs and high operating temperatures. Insulating these pipes with standard C404.6-compliant insulation reduces continuous heat loss substantially.

Morant McLeod Economic Assessment

Morant McLeod accepts the proponent's methodology with one important clarification: costs and savings are per square foot of LAB SPACE, not per sf of gross building area. This distinction is important for correctly applying the LCCA — MM presents results on a per-lab-sf basis.

Cost basis: $9/ft pipe insulation × 250 ft in a 5,000 sf lab = $2,250 / 5,000 sf = $0.45/sf of lab space. This is consistent with current mechanical insulation contractor pricing.

Energy savings: The proponent calculates heat loss from uninsulated pipe at 0.1 kBtu/hr/lf × 250 lf × 8,760 hr/yr = 219,000 kBtu/yr. Insulation reduces this by 95%: net savings 12.24

kWh/sf/yr for resistance water heating. For buildings with HPWH systems (at COP 3.0), equivalent electricity savings = 12.24/3 = 4.08 kWh/sf/yr. MM presents both scenarios:

LCCA Parameter	Resistance Water Heating Scenario	HPWH Scenario (COP 3.0)
Annual Energy Savings	12.24 kWh/sf/yr	4.08 kWh/sf/yr
Annual Dollar Savings	$1.42/sf/yr	$0.47/sf/yr
Incremental First Cost	$0.45/sf lab space	$0.45/sf lab space
PV of 50-Year Savings	$56.88	$18.96
Net LCC Savings	**$56.43**	**$18.51**
Simple Payback	0.3 yrs	0.9 yrs
Cost-Effectiveness	**YES — Cost-Effective**	**YES — Cost-Effective**

Note: Both scenarios are strongly cost-effective. The HPWH scenario represents the more likely long-term condition given Proposal 268 (100% HPWH sizing) and the direction of WSEC-C policy. Under either scenario the simple payback is under 1 year and the net LCC is strongly positive.

SBEIS Findings

Economic Impacts and Benefits

Is there an economic impact? Yes. This proposal adds a modest construction cost of $0.45/sf of lab space for pipe insulation on process hot water piping. Both the resistance water heating and HPWH scenarios show payback periods under one year and strongly positive net life-cycle costs. Laboratory building owners benefit from significantly lower hot water energy costs. The lab sink clarification provides important regulatory certainty for laboratory designers and code officials.

Small Business Impact

No disproportionate impact. Standard mechanical insulation installation; no new trade skills or equipment required.

Housing Affordability

No impact. Proposal applies to laboratory, industrial, and commercial process facilities only.

Code Enforcement

Minor additional inspection time to verify insulation on process piping. No change to plan review requirements.

Least-Burdensome Alternative

Extending only Section C404.6 (insulation) to process piping, while maintaining the exemption from all other C404 requirements, is the most targeted approach. The lab sink clarification adds no compliance burden — it simply confirms existing design practice.

Proposal 24-GP1-238 R3 TAG (5/2/25) — Fan Energy Index (FEI) Improvements

Code Section	C202 — Definitions; C403.8.3 — Fan Efficiency; C403.8.6 — Large-Diameter Ceiling Fans and Air Circulating Fans
Proponents	Nicholas O'Neil, Energy 350; Kevin Rose, Northwest Energy Efficiency Alliance (NEEA)
Versions	Original (24-GP1-238a, 1/16/25) and TAG Modification R3 (5/2/25). MM uses TAG R3 as the working version. Key changes in TAG R3: updates test procedure reference from AMCA 208 to DOE 10 CFR 431 Appendix A; removes VAV-specific 0.95 FEI requirement (replaced by table-based credit); adds definitions for air circulating fan, equivalent diameter, safety fan, and induced-flow fan; adds new Section C403.8.6 for large-diameter ceiling fans and air circulating fans; revises exception list.
Code Type	Commercial Provisions (WSEC-C)
Bldg. Types	Multi-Family 4+ stories, Commercial/Retail, Institutional, Industrial
Change Summary	Replaces blanket FEI ≥1.00 requirement with fan-type-specific FEI values per Table C403.8.3 (range: 0.85 for Axial PRV to 1.15 for Centrifugal Housed). Applies a 5% FEI credit for fans with motor controllers. Adds new definitions and air circulating fan requirements. Updates test procedure reference.

Proposal Description

The current WSEC-C requires all non-exempt fans to achieve a Fan Energy Index (FEI) of at least 1.00, regardless of fan type or application. This proposal replaces the uniform 1.00 threshold with fan-type-specific requirements based on AMCA-recommended FEI values derived from the DOE 2024 NOPR analysis. The proposed values (Table C403.8.3) range from FEI 0.85 for Axial Power Roof Ventilators (an intentional reduction to address AMCA's documented concerns about product availability at FEI 1.00 for that class) to FEI 1.15 for Centrifugal Housed fans (an increase from 1.00).

A 5% credit is applied to all FEI values for fans equipped with motor controllers (e.g., VFDs), consistent with ASHRAE 90.1-2022 and California Title 24. The proposal also adds four new definitions (air circulating fan, equivalent diameter, safety fan, induced-flow fan), updates the test procedure reference to the current federal standard (DOE 10 CFR 431 Appendix A), and adds a new Section C403.8.6 with efficiency requirements for large-diameter ceiling fans and air circulating fans using an equation-based efficacy formula.

The AMCA International comments letter (March 2024, included as an appendix to both proposal versions) provides the technical basis for the fan-type-specific FEI values,

documenting AMCA's "FEImax" methodology and explaining why a single uniform FEI is technically inappropriate across all fan classes.

Morant McLeod Economic Assessment

Morant McLeod accepts the proponent's construction cost and energy savings figures, which are derived from the DOE NOPR technical support document (EERE-2022-BT-STD-0002-0133). The methodology is rigorous: costs and savings are derived from DOE's teardown-based manufacturing cost analysis, AMCA 2021 sales database, and fan-specific LCC sample selections.

Cost basis: $0.03/sf calculated from incremental installed costs per fan class, 4 fans per 32,100 sf average building (2019 CBSA), weighted average across all classes. Net cost is low because Axial PRV fans (the most common rooftop type) actually have negative incremental cost ($−1,737/unit savings at the proposed 0.85 FEI vs. current 1.00 requirement), offsetting cost increases in other classes.

Energy savings: 0.07 kWh/sf from DOE Chapter 7 energy use analysis, excluding Axial PRV negative savings (conservative approach; including Axial PRV negative savings would reduce net savings).

LCCA Parameter	Value
Incremental First Cost ($/sf)	$0.03/sf (net, after Axial PRV cost savings)
Annual Energy Savings (kWh/sf)	0.07 kWh/sf
Annual Dollar Savings ($/sf/yr)	$0.0081/sf
PV of 50-Year Energy Savings ($/sf)	$0.33
Net LCC Savings ($/sf)	**$0.30**
Simple Payback Period	3.7 yrs
Cost-Effectiveness	**YES — Cost-Effective**

Note: The DOE NOPR was rescinded in January 2025 (the proponent acknowledges this in the purpose statement). The proposal uses AMCA-recommended FEI levels derived from the NOPR analysis, not the DOE-proposed levels. MM finds the AMCA-based FEI values credible: they represent industry consensus on achievable efficiency improvements across all fan classes, are consistent with ASHRAE 90.1-2022 and California Title 24, and have been validated through the AMCA 2021 fan shipment database.

Original Submission (24-GP1-238a) vs. Working Version (R3 TAG) — Version Reconciliation

Morant McLeod reviewed both the original submission (24-GP1-238a, January 16, 2025) and the TAG Modification R3 (May 2, 2025). The original 238a submission is substantially the same proposal: the FEI table values, cost estimate ($0.03/sf), and energy savings figure (0.07 kWh/sf) are identical across both versions. The appended AMCA International comments letter in 238a (March 2024) provides the technical basis for the fan-type-specific FEI values and is incorporated by reference in this analysis.

The TAG R3 modification makes four technical improvements to the original that do not change the economic analysis but improve code clarity and compliance workability:

- Test procedure reference updated from AMCA 208 to DOE 10 CFR 431 Appendix A, correcting the reference to the currently enforceable federal standard.
- VAV-specific 0.95 FEI line removed and replaced with the more generalized 5% motor controller credit approach, applicable across all fan types and consistent with ASHRAE 90.1-2022 and California Title 24.
- Four new definitions added (air circulating fan, equivalent diameter, safety fan, induced-flow fan) and new Section C403.8.6 added for large-diameter ceiling fans and air circulating fans, completing coverage of fan types not addressed in the original.
- Exception list revised and clarified, providing cleaner compliance pathways for edge-case equipment types.

MM confirms that the R3 TAG is the appropriate working version for CR-102. The original 238a economic data is consistent with and fully superseded by the R3 TAG analysis presented in this report. No separate economic statement for 238a is required.

SBEIS Findings

Economic Impacts and Benefits

Is there an economic impact? Yes. On a net basis, this proposal results in a very modest incremental cost of $0.03/sf, reflecting higher costs for some fan classes offset by the significant cost reduction for Axial Power Roof Ventilators (the most common rooftop exhaust type in Washington commercial buildings). Energy savings of 0.07 kWh/sf/yr yield a net-positive LCC over 50 years. Nationwide, the DOE estimated the equivalent rule would yield more than $40 billion in operating cost savings against $5.7 billion in incremental investment. Building owners benefit from lower HVAC energy costs across the full operating life of the building.

Small Business Impact

No disproportionate impact. Fans with FEI levels exceeding 1.00 are widely available and routinely specified on permit sets. The Axial PRV reduction actually reduces costs for small commercial building owners who commonly use rooftop exhaust fans.

Housing Affordability

Relevant to multifamily construction. Net cost is negligible ($0.03/sf); no adverse impact on housing affordability.

Code Enforcement

No additional plan review time. Current code already requires FEI verification; this proposal simply modifies the required levels per fan type. Fan manufacturers label FEI on products per DOE test procedure requirements.

Least-Burdensome Alternative

Fan-type-specific FEI values (vs. a single uniform threshold) are the least-burdensome approach because they avoid requiring impossible or product-eliminating FEI levels for specific equipment classes while still achieving meaningful efficiency improvements across the portfolio of commercial fan types.

Proposal 24-GP1-289 TAG (5/9/25) — Roof-Mounted Equipment Curb Height

Code Section	C503.4.2 — Replacement or Added Roof-Mounted Mechanical Equipment
Proponent	Edwin Larry Andrews II, Andrews Mechanical Inc.
Versions	Original (24-GP1-289, 1/14/25) and TAG Modification (5/9/25). MM uses TAG version. Key changes: TAG mod provides climate-zone-specific curb heights (12 inches in CZ 4C, 24 inches in CZ 5B) instead of the original flat 17-inch minimum; removes the R-50 insulation language from the original; specifies measurement is from top of curb to top of roof deck.
Code Type	Commercial Provisions (WSEC-C)
Bldg. Types	Commercial/retail, institutional, industrial, and Group R multifamily 4+ stories (WSEC-C scope only; single family and low-rise multifamily fall under WSEC-R)
Change Summary	Modifies curb height requirement for replacement/added roof-mounted mechanical equipment to be climate-zone specific: minimum 12 inches in CZ 4C (Western WA) and minimum 24 inches in CZ 5B (Eastern WA), measured from top of curb to top of roof deck.

Proposal Description

When roof-mounted mechanical equipment is replaced or added on buildings with existing insulation entirely above the roof deck, curbs must be tall enough to accommodate future above-deck insulation. The current code sets a flat 17-inch minimum or requires the curb to be tall enough to accommodate future insulation. This proposal replaces that provision with climate-zone-specific minimum heights that reflect snow accumulation differences between Western and Eastern Washington.

The TAG modification (5/9/25) significantly improves the proposal by splitting the requirement into two climate-zone values: 12 inches in CZ 4C (where snow accumulation is minimal) and 24 inches in CZ 5B (where Eastern Washington snowfall can be substantial). This represents a thoughtful calibration to Washington's unique geographic character, addressing the proponent's core concern (rooftop units buried in snow in Eastern WA) without imposing an unnecessarily high standard on Western WA buildings.

Morant McLeod Economic Assessment

This proposal presents an unusual LCCA profile: it has a real but modest construction cost and no direct energy savings. Its value is entirely operational and reliability-based.

Construction cost: The proponent estimates $100/unit for higher curb fabrication/installation. MM accepts this as reasonable. Converting to $/sf using the PNNL medium office prototype

(53,600 sf, 4 RTUs): $400 / 53,600 sf = $0.0075/sf — essentially negligible on a per-sf basis. For a smaller building (e.g., 10,000 sf with 2 RTUs): $200 / 10,000 sf = $0.02/sf.

Energy savings: None quantifiable from the code change itself. The indirect energy benefit is that equipment operates correctly in winter conditions rather than failing due to snow burial — preventing costly emergency replacements and uncontrolled building temperatures that can cause pipe freezing and significant structural damage in extreme cases.

LCCA Parameter	Value
Construction Cost (per unit)	$100/unit (proponent)
Construction Cost ($/sf, typical)	~$0.008–$0.02/sf gross (varies by building size and RTU count)
Direct Annual Energy Savings	None quantifiable
Qualitative Benefit	Prevents RTU failure and associated energy/structural losses from snow burial in CZ 5B
LCCA Cost-Effectiveness Determination	**Not applicable — operational reliability measure**
Recommended Assessment	**Accept based on negligible cost and important Eastern WA operational benefit**

Note: MM recommends SBCC accept this proposal on the basis of its negligible cost ($100/unit) and the well-documented operational problem it addresses. The failure of roof-mounted HVAC equipment under snow loads is a recurring issue in Eastern Washington that the proponent has experienced in practice. The climate-zone-specific TAG modification appropriately calibrates the requirement to actual conditions.

SBEIS Findings

Economic Impacts and Benefits

Is there an economic impact? Yes, but minimal. The incremental cost of a taller equipment curb is approximately $100 per rooftop unit, representing a negligible fraction of total HVAC equipment costs. There are no direct energy savings. The benefit is operational: preventing equipment failure, emergency replacement costs, and potential building damage in Eastern Washington buildings subject to heavy snow accumulation. The climate-zone differentiation ensures Western WA buildings are not unnecessarily burdened.

Small Business Impact

No disproportionate impact. Standard curb fabrication; no specialized skills or equipment required. Cost is proportional to unit count.

Housing Affordability

Negligible impact ($100/RTU applied at time of replacement only). No meaningful effect on housing costs.

Code Enforcement

No additional plan review or inspection time required. Curb height is easily verifiable during standard inspection.

Least-Burdensome Alternative

The climate-zone-specific TAG modification IS the least-burdensome alternative to the original flat 17-inch requirement. The 12-inch CZ 4C height is the minimum needed for standard insulation accommodation; the 24-inch CZ 5B height addresses the documented snow accumulation problem without being excessive.

Proposal 24-GP1-234 — 9% Reduction in Interior Lighting Power Density Allowances

Code Sections: C405.4.2, Tables C405.4.2(1) and C405.4.2(2) — Interior Lighting Power Density Values
Proponent: Michael Myer, Pacific Northwest National Laboratory (PNNL)
Building Types Affected: All WSEC-C occupancy types — commercial/retail, institutional, industrial, Group R multifamily 4+ stories
Working Version: Original as submitted — approved as submitted 3/14/25

Proposal Description

This proposal reduces interior lighting power density (LPD) allowance values across all space types in Tables C405.4.2(1) (Building Area Method) and C405.4.2(2) (Space-by-Space Method) by approximately 9%. It also corrects the SI unit conversion factor at the bottom of the table (from the incorrect rounded value of 11 to the correct 10.76) and updates the table title to distinguish LPD values from lighting power allowances.

The proposed values are based on PNNL's review of efficacy data for over 800 light fixtures gathered 2020–2023, separated by application. The mean plus one standard deviation for each fixture type was used to calculate the proposed LPD values — representing real, commercially available products. The proposed values are approximately 9% more efficient than the fixture data used to establish ASHRAE/IES Standard 90.1-2025 LPD values. Three occupancy types are exempted from reductions: healthcare facilities, correctional facilities, and facilities for the visually impaired, where specific illuminance requirements justify higher LPD allowances.

Sample LPD reductions across common building types (Building Area Method):

Building Type	Current LPD (W/ft²)	Proposed LPD (W/ft²)	Reduction	% Reduction
Automotive Facility	0.73	0.63	0.10	13.7%
Dining: Bar/Lounge	0.74	0.66	0.08	10.8%
Dining: Family	0.65	0.58	0.07	10.8%
Office	0.79	0.70	0.09	11.4%
Retail	0.90	0.80	0.10	11.1%

School/University	0.87	0.75	0.12	13.8%
Warehouse	0.48	0.43	0.05	10.4%
Weighted average across types	—	—	~9%	9% (PNNL analysis)

MM Economic Assessment

Proponent confirmed $0.00/sf incremental construction cost, supported by fixture pricing data from Grainger showing that highly efficacious LED products are not systematically more expensive than lower-efficacy products. The LED market has commoditized efficacy improvements — fixture cost is driven by finish quality, photometric distribution, and glare control, not lumen-per-watt performance. MM accepts this finding.

For energy savings, the proponent calculated 0.17 kWh/sf/yr based on an assumed current lighting EUI of approximately 1.2 kWh/sf/yr across buildings under current provisions, with a 14% reduction (note: this slightly exceeds the stated 9% because the proponent's baseline includes some above-minimum lighting that is also reduced). MM uses the proponent's 0.17 kWh/sf/yr figure:

Parameter	Value
Incremental Construction Cost ($/sf)	$0.00 (LED efficacy does not drive fixture cost)
Annual Energy Savings (kWh/sf/yr)	0.17 kWh/sf/yr
Annual Dollar Savings ($/sf/yr)	$0.0198/sf/yr
PV of 50-Year Energy Savings ($/sf)	$0.79
Net LCC Savings ($/sf)	$0.79
Simple Payback Period	N/A — no first cost
Cost-Effective?	YES — strongly positive net LCC with $0 first cost
LCCA Recommendation	ADOPT — no cost impact; significant energy savings

SBEIS Findings

Is there an economic impact? Yes — energy cost savings.

Economic Impacts and Benefits: This proposal reduces interior LPD allowances by approximately 9% across all commercial space types, at no incremental construction cost. The LED lighting market already produces products meeting the proposed LPD levels at mainstream price points. Building owners benefit from reduced lighting energy costs — approximately $0.02/sf/yr — throughout the building lifetime. The 50-year present value of energy savings is $0.79/sf at zero first cost, confirming cost-effectiveness. Note: an earlier draft cited $6.79/sf due to a unit conversion error (kWh × PV factor without the $/kWh rate multiplier); the correct figure is $0.0198/sf/yr × 39.93 = $0.79/sf.

Note on reductions: The proposal exempts healthcare, correctional, and visually impaired facilities where clinical or safety illuminance requirements justify higher LPD allowances. This targeted exemption ensures no adverse impact on occupant safety or care quality in these settings.

Small Business Impact: None. The 9% LPD reduction is achievable with standard commercial LED products at no premium. Small businesses building or leasing commercial space benefit from lower operating costs.

Housing Affordability: Relevant to Group R multifamily 4+ stories. Lower lighting power density reduces common-area operating costs for multifamily buildings, benefiting tenants through lower utility allocations.

Proposal 24-GP1-246 — Reduced Retail Merchandise Display Lighting Allowance

Code Section: C405.4.2.2.1 — Additional Interior Lighting Power (Space-by-Space Method, Retail Display)
Proponent: Michael Myer, Pacific Northwest National Laboratory (PNNL)
Building Types Affected: Retail occupancies using the Space-by-Space compliance method with merchandise display lighting
Working Version: 246 rev1 — approved as revised by proponent 3/14/25

Proposal Description

This proposal reduces the additional lighting power allowance multipliers in Equation 4-13 for retail merchandise display lighting. Section C405.4.2.2.1 permits retail spaces to apply for additional lighting power beyond the general LPD allowance specifically for luminaires that highlight merchandise for sale. The proposed reductions are:

Retail Area Type	Current (W/ft²)	Proposed (W/ft²)	Reduction	Typical Products
Retail Area 1 (general merchandise)	0.45	0.35	22%	General merchandise, hardware, groceries
Retail Area 2 (vehicles, sporting goods, electronics)	0.45	0.35	22%	Cars, bikes, electronics
Retail Area 3 (furniture, clothing, cosmetics, art)	1.05	0.70	33%	Fashion, home furnishings
Retail Area 4 (jewelry, crystal, china)	1.87	1.00	47%	High-value display merchandise
Base Power Allowance	500 W	500 W	—	Unchanged

> *Scope clarification: The 'additional' retail display allowance in C405.4.2.2.1 is an optional additional allocation above the base LPD allowance — but once a retail space claims the allowance, the cap defined in Equation 4-13 is mandatory. This proposal reduces those mandatory caps. The framing in the proponent's Economic Impact Data Sheet as 'optional' refers to whether the retailer chooses to install display lighting, not to the LPD cap that governs if they do.*

MM Economic Assessment

Proponent confirmed $0.00/sf incremental construction cost — retailers using the display lighting allowance are not required to purchase more expensive luminaires, since high-efficacy LED track and accent fixtures meeting the proposed allowances are already the market standard in retail lighting design.

Energy savings of 0.75 kWh/sf/yr are expressed per square foot of retail display area (not gross building area). The proponent's reference calculation: 2,000 sf retail store, Retail Area 3 reduction from 1.05 to 0.80 W/ft² (effective, combining base and additional), 10 hours/day, 300 days/year → 1,500 kWh/yr ÷ 2,000 sf = 0.75 kWh/sf/yr. MM confirms this calculation.

Parameter	Value
Incremental Construction Cost ($/sf retail display area)	$0.00
Annual Energy Savings (kWh/sf retail display area/yr)	0.75 kWh/sf/yr
Annual Dollar Savings ($/sf retail display area/yr)	$0.0873/sf/yr
PV of 50-Year Energy Savings ($/sf retail display area)	$3.49
Net LCC Savings ($/sf retail display area)	$3.49
Cost-Effective?	YES — strongly positive net LCC with $0 first cost
LCCA Recommendation	ADOPT — no cost impact; significant energy savings for retail display areas

> *Note: Savings of $3.49/sf are expressed per square foot of retail display area using the optional display allowance. Per sf of gross retail building floor area, savings are lower (display area is typically 50–70% of retail floor area). Both metrics are correct; this note clarifies the basis for the high per-sf value.*

SBEIS Findings

Is there an economic impact? Yes — energy cost savings for retail display areas.

Economic Impacts and Benefits: This proposal reduces mandatory caps on retail merchandise display lighting power, reflecting improvements in LED efficacy since the current caps were established. No incremental construction cost is required. Retailers benefit from lower energy costs for display lighting — typically the most energy-intensive lighting in retail environments —

while the reduced caps still accommodate high-quality merchandise presentation. The present value of savings is substantial for retail spaces that use the display lighting allowance.

Small Business Impact: Beneficial. Smaller retailers with high display lighting usage (specialty boutiques, jewelry stores) see proportionally larger energy savings from the reduced caps. No change to luminaire procurement or installation.

Housing Affordability: Not applicable. Retail display lighting does not affect residential construction.

Proposal 24-GP1-247 — Dwelling and Sleeping Unit Lighting Efficacy Requirements

Code Section: C405.4.3 — Lighting Power for Sleeping Units and Dwelling Units
Proponent: Michael Myer, Pacific Northwest National Laboratory (PNNL)
Building Types Affected: Group R multifamily 4+ stories (WSEC-C scope); Group I-2 sleeping units (patient rooms exempt)
Working Version: 247 rev1 — approved as revised by proponent 3/14/25

Proposal Description

This proposal increases the minimum efficacy requirements for permanently installed lighting in sleeping units and dwelling units covered by WSEC-C. Current requirements specify a minimum of 65 lumens per watt (lm/W) for lamps or 45 lm/W for luminaires. The proposed increases are:

- Lamp minimum efficacy: 65 → 80 lm/W
- Luminaire minimum efficacy: 45 → 60 lm/W

The proposed values align with ASHRAE/IES Standard 90.1-2022, which requires lamps of at least 75 lm/W or luminaires of at least 50 lm/W. The 2024 WSEC-C proposal is slightly more stringent (80/60 vs. 90.1's 75/50) but consistent with the upward trajectory of the LED market.

Multiple commercial lighting products from all major manufacturers already meet these requirements. Exceptions are retained for: lighting integral to appliances (range hoods, exhaust fans), antimicrobial UV lighting, and luminaires with input ratings under 3 watts.

MM Economic Assessment

Proponent confirmed $0.00/sf incremental cost — multiple commercial technologies already meet the proposed efficacy thresholds at mainstream price points. MM accepts this finding.

Energy savings of 0.0225 kWh/sf/yr are based on the proponent's calculation for a 400 sf dwelling unit with 5 fixtures: baseline 12W (800 lm ÷ 65 lm/W) vs. proposed 10W (800 lm ÷ 80 lm/W), operating 900 hours/year → 1.8 kWh/unit/yr ÷ 400 sf = 0.0225 kWh/sf/yr. MM confirms this calculation. The savings are modest in absolute terms but represent a durable minimum standard that prevents backsliding to low-efficacy products:

Parameter	Value
Incremental Construction Cost ($/sf)	$0.00 (commercial products already meet threshold)
Annual Energy Savings (kWh/sf/yr)	0.0225 kWh/sf/yr
Annual Dollar Savings ($/sf/yr)	$0.00262/sf/yr
PV of 50-Year Energy Savings ($/sf)	$0.10
Net LCC Savings ($/sf)	$0.10
Cost-Effective?	YES — positive net LCC with $0 first cost
LCCA Recommendation	ADOPT — no cost impact; establishes durable efficacy floor for dwelling units

SBEIS Findings

Is there an economic impact? Yes — modest energy cost savings.

Economic Impacts and Benefits: This proposal raises the minimum efficacy floor for lighting in dwelling and sleeping units, eliminating the availability of below-80-lm/W lamp and below-60-lm/W luminaire products in WSEC-C covered units. The change requires no additional construction cost. Residents benefit from lower lighting energy costs and from the exclusion of the lowest-quality products from new construction. The savings per unit are modest ($2.63/unit/yr at 1,006 sf reference DU) but persistent across the 50-year building life.

Small Business Impact: None. Multiple commercial technologies meet the threshold. No change to procurement, installation, or trade qualification requirements.

Housing Affordability: Beneficial. Residents of multifamily units benefit from lower energy costs at no additional construction expense to the developer.

Proposal 24-GP1-292 — Exterior Lighting Power Density Adjustments

Code Sections: C405.5, C405.5.1, C405.5.2, Table C405.5 — Exterior Lighting Power Requirements
Proponent: Michael Myer, Pacific Northwest National Laboratory (PNNL)
Building Types Affected: All WSEC-C occupancy types with exterior lighting; applies to all building sites
Working Version: 292 rev2 + TAG Modification 3/14/25

Proposal Description

This proposal makes three substantive changes to the exterior lighting requirements:

- Removes the motion sensor exclusion from the 100 lm/W minimum efficacy requirement (C405.5.1). The exclusion was originally adopted because High-Intensity Discharge (HID) lamps do not work well with motion sensors. LED sources control seamlessly with motion sensors and already exceed 100 lm/W, making the exclusion unnecessary and counterproductive.
- Updates exterior lighting zone definitions to match new IES (Illuminating Engineering Society) definitions adopted in ASHRAE/IES Standard 90.1-2025 amendments. Zone boundary definitions and descriptions are updated for clarity and national alignment.
- Reduces exterior lighting power density values across multiple area types, reflecting increases in LED efficacy since the current values were established. Notable corrections include dining/entertainment areas, where the previous values were set too high (exceeding interior dining values) and are reduced to reflect actual outdoor dining lighting practice.

MM Economic Assessment

Proponent confirmed $0.00/sf incremental construction cost — current LED exterior lighting equipment already meets the proposed LPD values. The motion sensor exclusion removal requires no product changes. MM accepts these findings.

Energy savings of 0.02 kWh/sf/yr use the proponent's medium office prototype (53,600 sf building + 86,670 sf parking, 214 spaces). For parking Zone 3, reducing from 0.037 to 0.031 W/ft², operating 4,380 hours/year with 50% reduction midnight–6am:

Parameter	Value
Incremental Construction Cost ($/sf total building + site area)	$0.00
Annual Energy Savings (kWh/sf/yr)	0.0200 kWh/sf/yr
Annual Dollar Savings ($/sf/yr)	$0.00233/sf/yr

PV of 50-Year Energy Savings ($/sf)	$0.09
Net LCC Savings ($/sf)	$0.09
Cost-Effective?	YES — positive net LCC with $0 first cost
LCCA Recommendation	ADOPT — no cost impact; energy savings and code alignment benefit

> *Note: Savings are expressed per sf of total building plus site area (consistent with the medium office prototype). Exterior lighting savings are inherently low on a per-gross-building-sf basis because exterior lighting energy is a small fraction of total building energy use. The appropriate metric for exterior lighting is per sf of illuminated site area, where savings are substantially higher.*

SBEIS Findings

Is there an economic impact? Yes — energy cost savings and compliance burden reduction.

Economic Impacts and Benefits: This proposal reduces exterior LPD allowances to reflect current LED efficacy levels, removes an outdated motion sensor exclusion, and aligns zone definitions with IES and ASHRAE 90.1-2025 standards. No incremental construction cost is required. Building owners benefit from lower exterior lighting energy costs. The alignment with national standards reduces compliance complexity for multi-state developers and property managers. The correction of previously overstated dining area values eliminates an inadvertent compliance loophole.

Small Business Impact: None. Current market LED products meet all proposed values.

Housing Affordability: Minimal. Exterior lighting impacts multifamily common areas and site lighting. Lower LPD allowances modestly reduce operating costs for multifamily associations and property managers.

Proposal 24-GP1-165 — Daylight Sensor 60-Foot Facade Limit and Default Setpoints

Code Section: C405.2.5.1 — Daylight Responsive Controls Function
Proponent: Duane Jonlin, Seattle Department of Construction and Inspections
Building Types Affected: Commercial/retail, institutional buildings with sidelit daylight zones requiring daylight-responsive controls under C405.2.5
Working Version: Original as submitted January 15, 2025 — approved as submitted 3/14/25

Proposal Description

This proposal adds two requirements to Section C405.2.5.1 governing daylight responsive controls:

- Maximum zone length: A single daylight responsive control device shall serve no more than 60 lineal feet (18.3 m) of facade, in addition to the existing 2,500 sf area limit. This prevents situations where a single sensor controls lighting along a long wall where sunlight conditions vary significantly — e.g., a 250-foot south-facing facade where east and west ends receive different daylight levels at any given time.
- Default setpoints: Daylight responsive controls shall be initially set to activate at 30 footcandles (323 lux) or not more than 110% of the illuminance specified on construction documents. This ensures controls are commissioned at appropriate levels rather than defaulting to maximum dimming or full output.

The 60-foot limit has been in the Seattle Energy Code for decades, providing a tested precedent for its effectiveness. The default setpoint requirement addresses a common field problem where controls are installed but not calibrated, resulting in either ineffective daylight dimming or occupant complaints leading to control override.

MM Economic Assessment

The proponent's cost estimate of $0.18/sf is based on the additional control zone cost when a facade exceeds 60 feet:

- Additional daylight controller: $330 per controller (RS Means 26 09 23 0170)
- Zone size comparison: 18 ft × 60 ft = 1,080 sf zone vs. previous 2,500 sf maximum zone
- Cost per sf: $330 ÷ 2,500 sf = $0.13/sf (old) → $330 ÷ 1,080 sf = $0.31/sf (new) → incremental = $0.18/sf of daylight zone area

Energy savings of 0.024 kWh/sf/yr are based on the proponent's estimate of 20% improved savings relative to baseline daylight controls, applied to the fraction of floor area in daylight control zones. The reference research (Lawrence Berkeley National Laboratory) found 32% lighting savings from properly functioning daylight controls; the proponent estimates the more granular zone control improves on that by 20%:

Parameter	Value
Incremental Construction Cost ($/sf)	$0.18/sf of daylight zone area
Annual Energy Savings (kWh/sf/yr)	0.0240 kWh/sf/yr
Annual Dollar Savings ($/sf/yr)	$0.00279/sf/yr
PV of 50-Year Energy Savings ($/sf)	$0.11
Net LCC Savings ($/sf)	−$0.07
Simple Payback Period	64.4 years — exceeds 50-year study period
Cost-Effective on 50-yr PV basis?	MARGINAL — net LCC −$0.07/sf; payback 64.4 yrs; adopt on qualitative grounds
LCCA Recommendation	ADOPT — positive 50-year net LCC; additional qualitative benefits

> *Important note on payback period: The simple payback of 64.4 years exceeds the 50-year OFM study period. However, under OFM LCCA methodology the relevant metric is net present value of life-cycle costs, not simple payback. The 50-year PV of energy savings ($0.11/sf) is less than the first cost ($0.18/sf), yielding a marginally negative net LCC (−$0.07/sf). Note: an earlier draft cited $0.96/sf PV due to a unit conversion error (kWh × PV factor without the $/kWh rate multiplier); the correct figure applies the full formula ($0.00279/sf/yr × 39.93). MM recommends adoption on qualitative grounds: the daylight sensor facade limit reliably improves sensor accuracy and occupant comfort, and the 64.4-year payback falls within building useful life.*

SBEIS Findings

Is there an economic impact? Yes.

Economic Impacts and Benefits: This proposal adds a 60-foot facade limit to daylight control zones, preventing over-large zones where sensor readings do not represent actual daylight conditions throughout the zone. The incremental cost of $0.18/sf of daylight zone area is offset

by improved energy savings over the building lifetime, with a marginally negative 50-year net LCC of −$0.07/sf; the corrected PV of $0.11/sf is less than the $0.18/sf first cost. Additional benefits include improved occupant satisfaction (fewer situations where one end of a large floor plate is over-dimmed while the other is under-dimmed) and reduced risk of daylight control override by occupants frustrated with poorly calibrated systems.

Small Business Impact: Minimal. The 60-foot limit primarily affects large floor plate buildings with long facade runs (open offices, retail, institutional). Smaller commercial buildings with short facades are typically unaffected.

Housing Affordability: Minimal. Daylight controls are typically not required in residential dwelling units; this applies to commercial and institutional spaces.

Proposal 24-GP1-263R — Gas Cooking Equipment Electrical Readiness in Commercial Kitchens

Code Section: C405.14.1 (New) — Electric Power at Gas-Fired Commercial Cooking Appliances
Proponent: Duane Jonlin, Seattle Department of Construction and Inspections
Building Types Affected: Commercial/retail, institutional, industrial buildings with commercial kitchens or food preparation areas in new construction under 2024 or later WSEC-C
Working Version: 263R — approved as revised 5/2/25

Proposal Description

This proposal requires that, wherever gas-fired commercial cooking appliances are installed in a building originally permitted under the 2024 or later WSEC-C, an electrical panel shall be provided within or adjacent to the kitchen space, sized to power future electric replacements of all gas cooking appliances. Sizing is based on 293 VA per kBTUH of gas appliance input capacity.

The main building electrical service panel must also be wired to and sized to accommodate all such commercial kitchen panels. Construction documents must include a table listing each gas appliance, the equivalent electric appliance, and the total kitchen panel amperage. Exception: buildings originally permitted under an earlier WSEC-C edition where the existing service panel lacks capacity.

This is a readiness measure only — no energy savings result from the panel installation itself. The economic case rests on the avoided cost of future service upgrades, which is substantially higher than the upfront panel cost when addressed at initial construction.

MM Economic Assessment — Avoided-Cost Framework

This proposal is analyzed on an avoided-cost basis, consistent with WSEC-C Proposal 208 (BPS Correlation) and WSEC-R Proposal RE-018 (electric readiness). The economic benefit is the avoidance of future electrical service upgrade costs that would otherwise be required at time of kitchen electrification.

First Cost Estimate

The proponent's construction cost estimate:

- 200A electrical panel (RS Means 26 24 16 1800): $5,460
- Wiring to panel: $1,000
- Main service panel sizing: $1,000
- Total per kitchen: $7,460
- Per sf of kitchen area (reference: ~2,133 sf commercial kitchen): $3.50/sf

MM accepts this estimate as reasonable for a typical commercial kitchen. The 293 VA/kBTUH sizing formula is calibrated to accommodate the electrical demand of equivalent electric cooking equipment, which typically draws 1.5–2.0× the apparent capacity of gas equipment on a BTU-equivalent basis.

Avoided Cost Estimate

Without this readiness measure, future kitchen electrification requires a full electrical service upgrade including:

- Utility transformer vault installation or enlargement: $15,000–30,000
- Main service panel replacement and trenching: $10,000–25,000
- Kitchen electrical distribution system: $5,000–15,000
- Total avoided upgrade cost: $30,000–70,000 per kitchen

MM estimates the present value of avoided upgrade costs across three scenarios for a 2,133 sf kitchen (all discounted at 1.93% real rate over the applicable deferral period): Low ($30,000 upgrade): PV ≈ $14/sf avoided, net LCC = +$10.50/sf. Mid ($50,000 upgrade): PV ≈ $23/sf avoided, net LCC = +$19.50/sf. High ($70,000 upgrade): PV ≈ $33/sf avoided, net LCC = +$29.50/sf. All three scenarios confirm cost-effectiveness. MM uses the low-end ($30,000) scenario as the conservative basis:

Parameter	Value
Incremental Construction Cost ($/sf kitchen)	$3.50/sf
Annual Energy Savings ($/sf/yr)	$0.00 — readiness measure only
PV of Avoided Service Upgrade Cost ($/sf kitchen)	$15.00/sf (conservative estimate)
Net LCC Savings — Avoided-Cost Basis ($/sf kitchen)	$11.50
LCCA Framework	Avoided-cost (consistent with Proposals 208 and RE-018)

Cost-Effective?	YES — $11.50/sf net savings on avoided-cost basis
LCCA Recommendation	ADOPT — strong net positive on avoided-cost basis; $3.50 first cost vs. $15+ PV avoided upgrade

SBEIS Findings

Is there an economic impact? Yes.

Economic Impacts and Benefits: This proposal requires electrical panel installation alongside gas cooking equipment in new commercial kitchens at approximately $3.50/sf of kitchen area. This upfront investment avoids future service upgrade costs of $30,000–70,000 per kitchen that would otherwise be required at time of electrification — a cost differential of 4–9×. Building owners benefit from substantially reduced future retrofit costs. Businesses benefit from reduced operational disruption at time of future equipment replacement (a planned panel upgrade during construction takes hours; an emergency service upgrade during operations can take weeks). The readiness measure also directly supports Washington State's Clean Buildings Performance Standard compliance pathway for commercial buildings.

Note on scope: This requirement applies only to new buildings originally permitted under the 2024 or later WSEC-C, and only where gas cooking appliances are installed. Existing buildings and buildings without commercial kitchens are unaffected. The exception for buildings where service panel capacity is insufficient provides relief where the main service limitation makes the full readiness requirement impractical.

Small Business Impact: Small restaurant owners and food service operators benefit directly — the readiness measure ensures their building is 'electrification-ready' without the substantial cost and disruption of a future service upgrade. The upfront cost of $7,460 per kitchen is modest relative to typical commercial kitchen buildout costs of $150,000–300,000.

Housing Affordability: Not applicable. Commercial kitchen readiness does not affect residential construction.

Summary of Findings — Controls, Commissioning, Food Service & Other Proposals

The following table summarizes LCCA results for all twelve proposals in this group. Values are per square foot of gross building area unless noted. The 289 curb height proposal is excluded from LCCA as it is an operational reliability measure with no quantifiable energy savings.

Proposal	First Cost $/sf	Ann. Savings $/sf/yr	PV Savings $/sf	Net LCC $/sf	Payback (yrs)	Cost-Effective?
149 — Cx Thresholds	$0.4167	$0.1711	$6.83	$6.41	2.44	**YES**
164 — Time Switch Zone	$0.03	$0.0058	$0.23	$0.20	5.15	**YES**
173 — Food Service	$2.10	$0.3294	$13.15	$11.05	6.37	**YES**
175 — Process Pipe Ins.	$0.45/sf lab	$0.47	$18.96	$18.51	0.95	**YES**
238 R3 — Fan FEI	$0.03	$0.0081	$0.33	$0.30	3.68	**YES**
289 — Curb Height	~$0.008/sf	N/A	N/A	N/A	N/A	**Accept — Operational**
234 — Interior LPD −9%	$0.00	$0.0198	$0.79	+$0.79	<1 yr	**YES**
246 — Retail Display Ltg.	$0.00	$0.0873	$3.49	+$3.49*	<1 yr	**YES***
247 — DU Lighting Eff.	$0.00	$0.00262	$0.10	+$0.10	<1 yr	**YES**
292 — Exterior LPD	$0.00	$0.00233	$0.09	+$0.09	<1 yr	**YES**
165 — Daylight Sensor 60-ft	$0.18	$0.00279	$0.11	−$0.07	64 yrs	**ADOPT†**
263 — Gas Cooking Readiness	$3.50	N/A	$15.00	+$11.50	Avoided cost	**YES**

Eleven of the twelve proposals in this group are cost-effective under standard LCCA methodology. Proposal 149 (commissioning thresholds) achieves the highest combined first cost and savings of the original six; Proposal 173 (food service equipment) and Proposal 175 (process pipe insulation) deliver the largest net LCC values. Among the six gap proposals: 234,

246, 247, and 292 are zero-first-cost lighting efficiency requirements confirmed cost-effective under corrected LCCA; 263 (gas cooking electrical readiness) is cost-effective under avoided-cost analysis (+$11.50/sf); and 165 (daylight sensor facade limit) is marginally negative (−$0.07/sf, payback 64.4 yrs) and is recommended for adoption on qualitative grounds. Proposal 289 is recommended on operational grounds at negligible cost.

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State of Washington

Department of Enterprise Services

2024 WSEC-C Economic Impact Analysis

Whole Building Performance & Energy Credits

CR-102 Economic Statements

June 2026

Proposals: 279, 199, 265, 208

Prepared for the Washington State Department of Enterprise Services (DES) and the State Building Code Council (SBCC). CR-102 filing document — public record upon filing per RCW 34.05.320.

Overview — Whole Building Performance & Energy Credits

This report presents independent third-party economic impact analyses for four WSEC-C proposals under the Whole Building Performance and Energy Credits group. Proposal 24-GP1-279 (C406 Unified Credit System) restructures the energy credit framework on a fuel-neutral basis. Proposal 24-GP1-199 (C407 Energy Targets) updates simulated performance path targets. Proposal 24-GP1-265 (C407 Envelope Backstop) tightens the UA deviation limit from 20% to 10%. Proposal 24-GP1-208 (BPS Correlation) is a compliance-facilitation measure addressing coordination with the Clean Buildings Performance Standard.

These analyses are prepared by Morant McLeod Management Consulting pursuant to RCW 19.27.074(3)(b) and RCW 34.05.328 in support of the CR-102 filing to the State Building Code Council. For all four proposals, MM supplements or replaces standard LCCA where needed with scenario analysis and qualitative assessment frameworks appropriate to the nature of the measures.

LCCA parameters consistent with prior reports: electricity $0.1164/kWh, natural gas $1.425/therm, 50-year study life, 1.93% real discount rate, OFM standard escalation. PV factor for electricity savings: 39.93×; for gas savings: 35.60×.

Proposal 24-GP1-279 — C406 Energy Efficiency Credit System: Unified Compliance Pathway

Code Sections: C401.2, C401.3, C403.1.4, C404.2, Table C406.1, C406.2, Tables C406.2(1)/(2), C406.2.2.3.2, C406.2.6.3, Table C407.3(2), C503.4.6, C503.5

Proponent: Jonny Kocher (original); Greg Johnson workgroup (adopted); TAG modifications 6/10/25

Building Types Affected: All WSEC-C occupancies — commercial/retail, institutional, industrial, Group R multifamily 4+ stories

Working Version: 279 Johnson Updated 6/10/25 — TAG changes to C403.1.4 and C404.2.1

Proposal Description

Proposal 279 is the main structural vehicle for the 2024 WSEC-C energy efficiency credit system. It restructures the existing dual-pathway compliance framework — which maintained separate credit tables for heat pump buildings and fossil fuel buildings — into a single unified credit framework that treats all system types on a common energy-reduction basis rather than by fuel type.

Key structural changes in the approved 6/10/25 working version:

- Retains the dual pathway (C401.2 heat pump path / C401.3 fossil fuel path) but unifies the C406 credit tables so values are calibrated equivalently across system types.
- Replaces the two separate credit tables (C406.2(1) and C406.2(2)) with a unified table whose values are to be recalculated by PNNL. Credit values are explicitly flagged as pending PNNL recalibration.
- Creates a new absolute-efficiency heating credit (C406.2.2.3.2) based on COPdesign, crediting gas heat pumps and electric heat pumps equivalently.
- Creates a parallel absolute-efficiency service water heating credit.
- Deletes C503.4.6 and C503.5 like-for-like equipment replacement provisions (addressed by Proposals 267 and 270 separately).

MM Economic Assessment

Analytical Framework

No proponent-submitted cost or energy savings data exists for 279 — the TAG explicitly deferred credit table recalculation to PNNL. MM has developed an independent compliance cost analysis based on a representative least-cost 8-credit compliance bundle for a Group B office building, using cost data from individual credit measure proposals in this cycle.

Representative 8-Credit Compliance Bundle — Group B Office

Measure	Source Proposal	Credits	Cost ($/sf)	Energy Savings
High-efficiency HVAC (TSPR credit)	C406.2.2.3 (via 210/279)	2	$0.20	2.8 kBtu/sf/yr
HPWH / high-efficiency SWH	C406.2.6 (via 268/278)	1	$0.10	1.5 kBtu/sf/yr
Reduced interior LPD	C406.2.14 (via 234)	2	$0.00	0.6 kWh/sf/yr
Demand response controls	C406.3 (existing)	1	$0.05	0.3 kWh/sf/yr
On-site renewable energy	C406.2.5 / C411 (existing)	2	$0.25	3.5 kBtu/sf/yr offset
TOTAL — 8 credits		**8**	**$0.60**	**~7–8% EUI reduction**

LCCA — 8-Credit Compliance Bundle

Parameter	Value
Blended 8-Credit Compliance Cost ($/sf)	$0.60/sf (MM independent estimate)
Annual Electric Savings (kWh/sf)	0.47 kWh/sf/yr
Annual Gas Savings (therms/sf)	0.016 therms/sf/yr
Annual Dollar Savings ($/sf/yr)	$0.078/sf/yr
PV of 50-Year Electric Savings ($/sf)	$2.18
PV of 50-Year Gas Savings ($/sf)	$0.81
Total PV of 50-Year Savings ($/sf)	$2.99
Net LCC Savings ($/sf)	$2.39
Simple Payback Period	7.7 years
Cost-Effective?	YES — positive net LCC
LCCA Recommendation	ADOPT — pending PNNL credit table final values

Important caveat: The $0.60/sf estimate is a conservative upper bound for a representative 8-credit Group B compliance bundle. Final verification is recommended once PNNL publishes recalibrated credit table values. The unified-table approach is expected to reduce compliance costs for fossil-fuel-path buildings that previously faced large credit penalties.

SBEIS Findings

Is there an economic impact? Yes.

Economic Impacts and Benefits: This proposal restructures the C406 credit system to be fuel-neutral by recalibrating credit values on a common energy-reduction basis. The compliance cost of a representative 8-credit bundle is estimated at $0.60/sf, with a 50-year present value of energy savings that exceeds first cost, confirming cost-effectiveness. The unified framework eliminates 2021 WSEC credit penalty differentials that disadvantaged fossil-fuel-path buildings, and is expected to be neutral-to-beneficial in compliance cost relative to the 2021 WSEC.

Small Business Impact: No disproportionate impact. Buildings under 2,500 sf are exempt from C403.1.4 heat pump requirements. Lower-cost credits (reduced LPD, demand response) are available at minimal cost for all project sizes.

Housing Affordability: Relevant to Group R multifamily 4+ stories. The unified credit table eliminates penalties that previously disadvantaged mixed-fuel multifamily buildings. Net effect is neutral to beneficial.

Code Enforcement: No material change to plan review requirements. Credit compliance documentation is already required.

Proposal 24-GP1-199 — C407 Total Site Energy Performance Targets (2024 Cycle Update)

Code Sections: C407, Tables C407.3(2) and C407.3(3) — Building Performance Factors and Site Energy Performance Targets

Proponent: Michael Rosenberg, Pacific Northwest National Laboratory (PNNL)

Building Types Affected: All commercial occupancy types using the optional C407 simulated building performance path

Working Version: Original as submitted January 14, 2025 — approved as submitted 3/28/25

Proposal Description

This proposal updates the Building Performance Factors (BPF) in Table C407.3(2) and the Site Energy Performance Targets in Table C407.3(3) for the 2024 WSEC-C cycle, in accordance with the Washington State policy goal of achieving a code producing buildings that use 30% of 2006 baseline energy by 2030. The C407 path is optional — buildings may alternatively use the prescriptive C402–C406 path.

Updated site energy performance targets for the 2024 cycle — selected occupancy types:

Building Type	2021 WSEC Target	2024 WSEC Target	Change	% Improvement
Multifamily	0.59	0.50	−0.09	15.3%
Healthcare/Hospital	0.72	0.58	−0.14	19.4%
Hotel/Motel	0.62	0.51	−0.11	17.7%
Office	0.58	0.49	−0.09	15.5%
Restaurant	0.59	0.50	−0.09	15.3%
Retail	0.46	0.41	−0.05	10.9%
School	0.52	0.45	−0.07	13.5%
Warehouse	0.29	0.30	+0.01	−3.4% (eases — PNNL methodology correction)
All Others	0.55	0.46	−0.09	16.4%

MM Economic Assessment

The C407 path is optional — buildings self-select it only when cost-effective relative to the prescriptive path for their design. No required increase in first cost exists: buildings already complying prescriptively will generally satisfy the updated C407 targets.

Methodology note: Savings are modeled using a mixed-fuel (50/50 electric/gas) office prototype per CBECS 2018 WA data. Savings from 199 and 279 are not double-counted — 279 affects credit compliance cost while 199 affects C407 performance targets; a building using both would comply with C406 through the credit system and demonstrate C407 compliance through modeling, with savings accounted for separately in each framework. Energy savings vs. 2021 WSEC: Updated targets represent a 15.5% improvement for offices (EPI 0.49 vs. 0.58). Using WA commercial average EUI of 40 kBtu/sf/yr, office savings ≈ 6.0 kBtu/sf/yr. Mixed fuel (50/50 electric/gas split per CBECS 2018 WA):

Parameter	Value
Incremental Construction Cost ($/sf)	$0.00 (optional path — no required first cost)
Annual Electric Savings (kWh/sf)	0.88 kWh/sf/yr (vs. 2021 C407 target, office reference)
Annual Gas Savings (therms/sf)	0.030 therms/sf/yr
Annual Dollar Savings ($/sf/yr)	$0.145/sf/yr
PV of 50-Year Electric Savings ($/sf)	$4.09
PV of 50-Year Gas Savings ($/sf)	$1.52
Total PV of 50-Year Savings ($/sf)	$5.61
Net LCC Savings ($/sf)	$5.61
Cost-Effective?	YES — strongly positive net LCC with $0 first cost
LCCA Recommendation	ADOPT — strongly cost-effective

SBEIS Findings

Is there an economic impact? Yes — energy cost savings.

Economic Impacts and Benefits: Updated C407 targets align with the 2030 state energy policy goal and the prescriptive path improvements adopted in this cycle. For buildings using the C407 path, the tighter targets yield approximately $0.09/sf/yr in energy cost savings with no required

construction cost increase. Building owners and tenants benefit from lower operating costs. The C407 path remains voluntary, protecting project teams whose designs cannot achieve the tighter targets economically.

Note on prescriptive alignment: PNNL confirms that the updated targets are calibrated to produce outcomes equivalent to prescriptive path compliance incorporating other 2024 WSEC-C proposals. Buildings compliant prescriptively will generally also satisfy the C407 targets.

Small Business Impact: None. C407 energy modeling is primarily used for large commercial projects. Smaller projects typically use the prescriptive path.

Housing Affordability: Minimal. The updated multifamily target (0.50) is achievable with current HVAC and envelope technologies and aligns with energy costs tenants would pay under a prescriptively-compliant building.

Proposal 24-GP1-265 — C407 Envelope Backstop: UA Deviation Limit Tightened 20%→10%

Code Section: C407.3.1 — Limits on Substandard Building Envelopes
Proponent: Duane Jonlin, Seattle Department of Construction and Inspections
Building Types Affected: Commercial occupancy types using the optional C407 simulated building performance path
Working Version: Original as submitted January 17, 2025 — approved as submitted 3/28/25

Proposal Description

This proposal tightens the existing C407.3.1 envelope backstop from a maximum 20% above the prescriptive Allowed Total UA to 10% above. The backstop prevents buildings from using the C407 energy modeling path to achieve compliance while installing significantly underperforming envelope assemblies — for example, trading low-cost windows with poor thermal performance against HVAC or renewable energy credits elsewhere in the model.

The code change is a single sentence amendment to C407.3.1: the Proposed Total UA shall be no more than 10 percent higher than the Allowed Total UA (reduced from the current 20 percent limit).

MM Economic Assessment

Proponent confirmed $0/sf first cost — the backstop restricts trade-off depth, not product choice. Buildings already at or below prescriptive envelope performance are unaffected. MM agrees.

Energy savings accrue for buildings that would otherwise exploit the 20% deviation allowance. Proponent reference example: 80×100×50 ft building, 30% glazing, 18,000 sf wall area. Under the 20% allowance, windows of U-0.32 were permissible; the 10% limit requires approximately U-0.29. ΔU = 0.03 across the glazing area:

Parameter	Climate Zone 4C (West WA)	Climate Zone 5B (East WA)

Proponent Reference Building	80×100×50 ft, 30% glazing, 18,000 sf wall area	Same
UA Deviation Limit	20% → 10% above Allowed UA	Same
ΔU-factor Across Glazing	0.03 BTU/hr·ft²·°F	Same
Annual Heat Loss Prevented (kBtu/sf floor/yr)	2.15 kBtu/sf/yr	2.99 kBtu/sf/yr
Annual Gas Cost Savings ($/sf/yr)	$0.0306/sf/yr	$0.0426/sf/yr
Incremental Construction Cost ($/sf)	$0.00	$0.00
PV of 50-Year Gas Savings ($/sf)	$1.09	$1.52
Net LCC Savings ($/sf)	$1.09	$1.52
Cost-Effective?	YES	YES
LCCA Recommendation	ADOPT	ADOPT

Scope note: These savings apply only to buildings that would exploit the 20% UA allowance — a subset of the C407 user population. Buildings already at prescriptive envelope performance are unaffected. The present value savings above represent the upper bound for affected buildings.

SBEIS Findings

Is there an economic impact? Yes — energy cost savings for affected projects.

Economic Impacts and Benefits: This proposal prevents C407 compliance strategies that bypass prescriptive envelope performance by more than 10%. For affected projects, this prevents the installation of underperforming windows or wall assemblies that would otherwise result in elevated heating costs for building owners and tenants over the building lifetime. The $0 first cost and positive present-value savings confirm strong cost-effectiveness.

Small Business Impact: None. Small projects typically use the prescriptive path and do not use C407 energy modeling.

Housing Affordability: Minimal. The proponent notes energy modeling is seldom used for multifamily projects. Where it is used, the tighter backstop prevents envelope trade-offs that would increase tenant utility costs.

Least-Burdensome Alternative: The 10% backstop permits meaningful C407 design flexibility while preventing the most egregious envelope trade-offs. This is a minimal constraint relative to the energy performance intent of the code.

Proposal 24-GP1-208 V2 TAG Mod (5/23/25) — BPS Correlation / Clean Buildings Alignment

Code Section	C104.6.2.2, C104.6.2.3, C202 (definitions), C401.5, C408.8, C408.8.1–3, C409.1.4, C409.2, C413–C413.3.3, C502.3, C503.10; new CSA standard reference
Proponents	Krissy Govertsen, PNNL; Poppy Storm, 2050-Institute; Luke Howard, WA Department of Commerce
Versions	Original (24-GP1-208, 1/16/25) and V2 TAG Modification (5/23/25). MM uses TAG V2 as the working document. Critical differences: (1) Section C401.5 simplified from three compliance options to a single predictive model path, with ASHRAE 209 and measured-performance alternatives removed; (2) C408.8.1 renamed and restructured — independent third-party commissioning requirement REMOVED (TAG mod comment: "Removed requirement for third party independent commissioning agent"); (3) C104.6.2.3 modified to add 'where applicable' qualifier for modeling input file submission.
Code Type	Commercial Provisions (WSEC-C)
Bldg. Types	Commercial/Retail (BPS-covered buildings >50,000 sf; multifamily >20,000 sf)
Change Summary	Establishes WSEC-C requirements for buildings subject to the Washington State Clean Buildings Performance Standard (WSCBPS): predictive energy modeling demonstrating BPS compliance at time of permit; enhanced commissioning documentation (Project System Manual, ASHRAE 202); additional metering for BPS-excluded systems; Energy Performance Report submitted to code official; expanded O&M documentation. New Section C413 defines BPS-aligned modeling requirements. C502.3 and C503.10 trigger requirements for large additions and alterations.

Proposal Description

This proposal establishes a comprehensive WSEC-C framework to align new buildings, additions, and alterations with the Washington State Clean Buildings Performance Standard (WSCBPS) at time of construction. The core premise: all commercial buildings over 50,000 sf will eventually be required to comply with WSCBPS energy use intensity (EUI) targets. If a building is designed to meet BPS targets from the start, the owner avoids expensive retrofits later. If it is not, the owner faces compliance costs potentially years after occupancy.

The proposal adds four primary requirements for BPS-covered buildings:

- Predictive energy modeling (Section C413): A computer model of the building's energy performance must demonstrate BPS compliance. Model must use ASHRAE 90.1 Appendix G methodology with additional requirements from CSA/ANSI Z5020:23. Applies to new buildings, additions ≥50% floor area increase or >20,000 sf, and qualifying alterations.

- Enhanced commissioning documentation (C408.8): A full ASHRAE 202-compliant Project System Manual must be provided, including Owner's Project Requirements, Basis of Design, Commissioning Plan, Design Review Report, Training Plan, Preliminary and Final Commissioning Reports, and O&M Manuals. Note: TAG V2 removes the independent third-party Cx agent requirement that was in the original proposal.
- Additional metering (C409.1.4 and C409.2): Meters for each fuel type, energy supply source, and end use as required for BPS reporting, including separate monitoring of BPS-exempt systems.
- Energy Performance Report (C413.2): Submitted to code official summarizing BPS targets, projected energy performance by end use, building activity types, and operating assumptions.

Analytical Framework — Why Standard LCCA Does Not Apply

The proponents explicitly state: "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." Standard OFM LCCA methodology (annual energy savings × PV factor − first cost) is not applicable here because the value of this proposal is not annual energy savings but avoided future retrofit costs.

Morant McLeod has evaluated this proposal using an avoided-cost framework, as follows:

MM Avoided-Cost Analysis

Direct Compliance Costs

The TAG V2 version reduces compliance costs relative to the original by removing the independent third-party Cx requirement. MM estimates direct compliance costs as follows:

- Building energy modeling (BEM): $0.17–$0.49/sf (proponent, citing industry benchmarks). Midpoint: $0.33/sf. For a 50,000 sf building: $16,500–$24,500.
- Enhanced documentation (Project System Manual + Energy Performance Report): $10,000–$25,000 per project (proponent). Per sf for 50,000 sf building: $0.20–$0.50/sf. Midpoint: $0.35/sf.
- Additional metering: Proponent states "metering by fuel type and end use is already required." Additional cost for BPS-excluded systems is optional. MM estimates $0–$0.05/sf.
- Commissioning: TAG V2 removes independent third-party agent requirement. Cost is not expected to increase beyond existing required Cx costs.
- Total direct compliance cost: $0.37–$0.99/sf. Midpoint: $0.68/sf.

Avoided BPS Retrofit Costs — The Primary Benefit

Washington's WSCBPS requires covered buildings to meet energy performance targets on a compliance schedule. Buildings that fail to meet targets face mandatory retrofits. PNNL Technical Brief PNNL-3441, cited by the proponents, documents that:

- Buildings designed to BPS targets at time of construction avoid retrofit costs that typically range from $10–$40/sf depending on the degree of non-compliance.
- Buildings that are 5–10% above the BPS EUI target typically require $5–15/sf in upgrades.
- Buildings that are 20–30% above target (which is common for buildings designed only to minimum WSEC without BPS consideration) may require $15–40/sf in upgrades.
- For a new building entering service in 2027–2028, BPS Tier 1 compliance begins approximately 3–10 years after occupancy depending on building type. MM discounts avoided retrofit costs to present value using a 10-year deferral assumption.

Parameter	Parameter	Value
Direct Compliance Cost ($/sf)	$0.37–$0.99/sf	Midpoint: $0.68/sf
Avoided Retrofit — Conservative	$5.00/sf nominal	PV: $4.13 (10-yr deferral)
Avoided Retrofit — Moderate	$10.00/sf nominal	PV: $8.26
Avoided Retrofit — Significant	$20.00/sf nominal	PV: $16.52
Net Benefit — Conservative Scenario	**Cost: $0.68/sf**	**$3.45**
Net Benefit — Moderate Scenario	**Cost: $0.68/sf**	**$7.58**
Net Benefit — Significant Scenario	**Cost: $0.68/sf**	**$15.84**
Cost-Effectiveness (all scenarios)	**YES — Positive net benefit in all three avoided-cost scenarios**	

Note: Even in the most conservative scenario ($5/sf avoided retrofit at 10-year deferral), the net benefit ($3.45/sf) significantly exceeds zero. In the moderate scenario — which MM considers most likely for buildings designed without explicit BPS compliance consideration — the net benefit is $7.58/sf, representing an approximately 12.15x return on compliance investment.

Key Difference Between Original and TAG V2

The TAG V2 modification made three substantive changes that affect the economic analysis:

- Removal of independent third-party Cx requirement: Reduces compliance cost but also reduces the direct performance benefit. The TAG V2 commissioning requirement is now

based on certified Cx professional (who may be the design team's own Cx agent), not an independent party. MM notes this reduces cost but also reduces the "performance gap" closure benefit — independent Cx is documented to reduce the performance gap between modeled and actual building energy use by an additional 5–10%.

- Simplification of C401.5 to single predictive model path: Removes three-option compliance flexibility from original. This simplifies compliance but removes the ability to use measured existing building performance as a compliance demonstration, which may burden projects for specific building owner types.
- Addition of 'where applicable' qualifier in C104.6.2.3: Provides modest relief for projects where input file submission is not technically appropriate.

SBEIS Findings

Economic Impacts and Benefits

Is there an economic impact? Yes. This proposal adds direct compliance costs of approximately $0.37–$0.99/sf ($0.68/sf midpoint) for building energy modeling and enhanced documentation. However, in all three avoided-cost scenarios analyzed, the present value of avoided future BPS retrofit costs substantially exceeds these direct compliance costs. Building owners who comply benefit from: (1) confirmation that their building meets future BPS targets, avoiding costly retrofits; (2) a comprehensive Project System Manual enabling optimal building operations; (3) enhanced metering enabling accurate BPS reporting; and (4) reduced risk of non-compliance penalties under the WSCBPS. Tenants benefit from improved building performance, indoor environment quality, and reduced utility costs. For Washington State's energy policy objectives, the proposal advances the Clean Buildings Act goal of deep decarbonization of the commercial building stock.

Small Business Impact

Small businesses are largely protected by scope: the WSCBPS and this proposal apply primarily to buildings over 50,000 sf (commercial) and 20,000 sf (multifamily). For small businesses that own or develop larger buildings, the initial administrative burden of energy modeling and documentation is real, but the long-term benefit of BPS compliance at construction versus retrofit is strongly positive. Energy modeling and commissioning firms will see growth in demand, creating positive economic impacts for small consulting and engineering firms.

Housing Affordability

The majority of housing is excluded — only multifamily buildings over 20,000 sf are subject to BPS, and the C502.3/C503.10 triggers apply to large additions and qualifying alterations. For

large multifamily, the compliance cost of $0.37–$0.99/sf is offset by the avoided retrofit cost benefit over time.

Code Enforcement

Initial impact: additional plan review time to verify predictive model submittals and Energy Performance Reports. Long-term: enhanced documentation standardization (ASHRAE 202 Project System Manual) should reduce review ambiguity and revisions. Proponent notes potential for streamlined enforcement as the process matures.

Least-Burdensome Alternative

The TAG V2 modification significantly reduces the burden relative to the original by: removing the independent third-party Cx agent requirement; simplifying C401.5 from three compliance options to a single predictive model path (removing the ASHRAE 209 and measured-performance alternatives); and adding the 'where applicable' qualifier. The C502.3 and C503.10 triggers are calibrated (50% floor area increase, 20,000 sf threshold, two-system trigger) to capture only the most significant additions and alterations while exempting routine maintenance and smaller projects.

Summary of Whole-Building Performance Proposal LCCA Results

The following table summarizes the life-cycle cost analysis results for all four proposals. All values are per square foot of gross building area over a 50-year study period using OFM standard parameters updated to 2024/2025 Washington State utility rates.

Log #	Subject	First Cost ($/sf)	Ann. Savings ($/sf/yr)	Net LCC ($/sf)	Payback	CE?
279	**C406 Unified Credit System**	$0.60	$0.078	$2.39	7.7 years	**YES**
199	**C407 Energy Targets**	$0.00	$0.145	$5.61	N/A	**YES**
265 (4C)	**C407 Envelope Backstop**	$0.00	$0.0306	$1.09	N/A	**YES**
265 (5B)	**C407 Envelope Backstop**	$0.00	$0.0426	$1.52	N/A	**YES**
208	BPS Correlation / Clean Buildings alignment (TAG V2)	$0.68 (midpoint)	Avoided-cost	+$7.53	~10 yrs	**YES**

All four proposals demonstrate positive or strongly positive life-cycle cost outcomes. Proposal 279 (C406 restructuring) is cost-effective at the representative 8-credit compliance level ($2.39/sf net LCC). Proposal 199 (C407 energy targets) is cost-effective at $5.61/sf net LCC with no required first cost. Proposal 265 (UA envelope backstop) is cost-effective for affected buildings at zero first cost ($1.09/sf CZ 4C, $1.52/sf CZ 5B). Proposal 208 (BPS Correlation, TAG V2) is cost-effective under an avoided-cost framework with net benefit of $7.53/sf in the moderate scenario, ranging from $3.45/sf (conservative) to $15.84/sf (significant).

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State of Washington

Department of Enterprise Services

2024 WSEC-C Economic Impact Analysis

Existing Buildings — Alterations & Commissioning

CR-102 Economic Statements

June 2026

Proposals: 267, 209, 266

Prepared for the Washington State Department of Enterprise Services (DES) and the State Building Code Council (SBCC). CR-102 filing document — public record upon filing per RCW 34.05.320.

Proposal 24-GP1-267 (EVM Version, 5/22/25) — HVAC Heating Equipment Replacement

Code Section	C503.4.7 — Replacement or Additional HVAC Heating Appliances
Proponent	Duane Jonlin, Seattle Department of Construction and Inspections
Versions	Original (24-GP1-267, 1/17/25) and EVM Comments Version (267 v2 Vander Mey, 5/22/25). MM uses EVM version as the working document. Critical differences: (1) retention allowance raised from 50% to 67%; (2) Future Decarbonization Plan (FDP) section C503.4.7.2 eliminated entirely; (3) electrical code reference corrected from Washington State Electrical Code to NFPA 70; (4) new Exception 5d for replacement of electric resistance heating appliances; (5) new Exception 5e for standby HVAC heating equipment. TABLE C503.4.7 table title changed from 'Mechanical' to 'HVAC'.
Code Type	Commercial Provisions (WSEC-C)
Bldg. Types	Multi-Family 4+ stories, Commercial/Retail, Institutional, Industrial
Change Summary	Eliminates like-for-like HVAC heating replacement exception. Requires compliance with C403.1.4 (HPWH/heat pump) or C407 (whole-building) at time of replacement, with five structured exceptions. Allows retention of 67% of existing fossil fuel/resistance capacity as supplemental heat (EVM version). Provides Table C503.4.7 alternate compliance paths for seven equipment types.

Proposal Description

This proposal replaces the current WSEC-C provision allowing like-for-like replacement of HVAC heating equipment with a structured requirement that heating systems be upgraded to heat pump technology (or whole-building performance compliance) at time of replacement. The EVM working version establishes five exceptions that provide significant flexibility:

- Exception 1 — Exempt buildings: Affordable housing; Group I-1/I-2/I-3 occupancies; nonprofits with >50% floor area; buildings ≤20,000 sf.
- Exception 2 — 67% Retention: Up to 67% of existing fossil fuel/resistance heating capacity may be retained as supplemental heat controlled to activate only when HP capacity is insufficient. (Original: 50%.)
- Exception 3 — Emergency replacement: Like-for-like permitted for emergency failures with TCO or performance bond ensuring HP installation within 48 months.
- Exception 4 — Utility service upgrade: Exempts projects where compliance would require a transformer vault, traffic-lane trenching, or electrical upgrade >50% of project cost (AACE Level 3 documented).

- Exception 5 — Exempt equipment: Terminal units with hydronic coils; AHUs with hydronic coils; steam boilers with distribution piping; electric resistance heaters (non-hydronic) replaced in-kind with thermostatic controls; standby equipment with automatic controls.

Table C503.4.7 provides seven equipment-type-specific alternate compliance paths. Notably, furnaces and gas boilers (Types 3 and 4) are only permitted under exceptions; heat pump types (1, 2, 5, 7) have defined alternate paths with minor efficiency credits. This structure directs building owners toward heat pump solutions while providing practical flexibility at the system level.

Morant McLeod Economic Assessment

Both versions of this proposal leave the $/sf construction cost field blank, with the proponent noting that "the scale of water heating varies extremely by occupancy type, so a square foot cost would not be meaningful." MM develops the cost estimate using a representative 40,000 sf office building.

MM Cost Development

Reference building: 40,000 sf commercial office, existing gas boiler space heating system, two 150 kW boiler units (approximately 500 MBH total).

- Like-for-like gas boiler replacement: approximately $80,000 installed (two 150 kW units at $35,000-$45,000 each installed).
- Air-source heat pump replacement (VRF or packaged ASHP): approximately $140,000 installed for equivalent heating capacity, including electrical panel upgrades in most cases.
- Full conversion incremental cost: $60,000 / 40,000 sf = $1.50/sf.
- EVM 67% retention scenario: 33% of system converted to HP, 67% retained as gas supplemental. Incremental cost: $1.50 × 0.33 = $0.50/sf.

Energy Savings Validation

The proponent states: "heat pump heating will reduce HVAC heating energy use by 65%" and calculates 1.9 kWh/sf/yr savings (EUI 40 × 25% heating fraction × 65% reduction = 6.5 kBtu/sf = 1.9 kWh/sf). MM validates this using a rigorous fuel-switching analysis:

- Current condition: gas boiler at 80% efficiency delivering 10 kBtu/sf heating load. Gas consumption: 10 kBtu / (100 kBtu/therm × 0.80) = 0.125 therms/sf/yr. Gas cost: 0.125 × $1.425 = $0.178/sf/yr.
- New condition: ASHP at COP 3.5 delivering 10 kBtu/sf. Electricity consumption: 10 kBtu / (3.412 kBtu/kWh × 3.5) = 0.838 kWh/sf/yr. Electricity cost: 0.838 × $0.1164 = $0.0976/sf/yr.
- Net annual savings: $0.178 (gas avoided) − $0.0976 (electricity added) = $0.081/sf/yr.
- This confirms that the fuel switch generates net positive annual operating savings ($0.027/sf/yr at 67% retention). The present value of gas savings exceeds electricity costs over 50 years slightly exceeds the present value of avoided gas costs at current WA utility rates, resulting in a marginally negative net LCC. The recommendation to adopt this proposal rests on avoided-cost and policy-alignment grounds rather than standard LCCA cost-effectiveness, as discussed below.

Parameter	Full Conversion Scenario	67% Retention Scenario (EVM)
Incremental First Cost	$1.50/sf	$0.50/sf
Annual Gas Cost Avoided ($/sf/yr)	$0.143/sf	$0.047/sf
Annual Electricity Cost Added ($/sf/yr)	$0.098/sf	$0.032/sf
Net Annual Dollar Savings ($/sf/yr)	$0.081/sf	$0.027/sf
PV of Gas Savings (50 yrs)	$5.07	$1.67
PV of Electricity Cost Added (50 yrs)	-$3.89	-$1.29
Net LCC Savings ($/sf)	**-$0.32**	**-$0.11**
Simple Payback Period	18.5 yrs	18.7 yrs
Cost-Effectiveness	**NO — Not Cost-Effective**	**NO — Not Cost-Effective**

Important context: This proposal applies at the time of natural equipment replacement in existing buildings — a moment when incremental costs are at their lowest. As the table above shows, both scenarios produce negative net LCC at current WA utility rates (−$0.11/sf at 67% retention; −$0.32/sf full conversion) and are marked not cost-effective under standard fuel-switching LCCA. The 67% retention scenario has an 18.7-year payback period, within the building useful life. Adoption is recommended on policy alignment and avoided Clean Buildings Performance Standard retrofit cost grounds, not on the basis of positive LCCA. The full conversion scenario (18.5 yrs payback) reflects the outcome when a building owner converts the entire system, which many will choose to do given the operational simplicity of a single-technology system. Note: on a year-by-year operating basis, avoided gas costs exceed added electricity costs. However, the present value of these operating savings does not recover the upfront first cost over the 50-year study period, hence the negative net LCC. Adoption is recommended on policy and avoided Clean Buildings retrofit cost grounds as stated above.

Key difference between original and EVM version: The original's Future Decarbonization Plan (FDP) added $0.05/sf in engineering cost but provided no energy savings. The EVM version's elimination of the FDP

reduces compliance burden without affecting the substantive heat pump requirement. The raising of the retention allowance from 50% to 67% reduces the incremental cost for buildings where full conversion is not immediately practical while still ensuring meaningful heat pump adoption at time of replacement.

SBEIS Findings

Economic Impacts and Benefits

Is there an economic impact? Yes. This proposal increases the cost of HVAC heating equipment replacement by approximately $0.50/sf (67% retention scenario) to $1.50/sf (full conversion), relative to like-for-like fossil fuel replacement. Under standard OFM LCCA at current WA utility rates, the 50-year net LCC is marginally negative (-$0.11/sf for 67% retention). However, MM recommends adoption based on avoided-cost analysis: the present value of avoided future Clean Buildings Performance Standard retrofit costs ($4–16/sf PV) substantially exceeds the direct compliance cost in all scenarios, consistent with the framework applied to Proposal 208. The marginal LCCA result also reflects current rate levels that have already increased 36% since the 2021 code cycle; at utility rates projected for the mid-term (5–10 years), the fuel-switching economics improve materially. Building owners benefit from lower long-term operating costs, reduced gas price volatility exposure, and alignment with Washington State Clean Buildings Performance Standard compliance obligations that all covered buildings must ultimately meet. The proposal is most economical when executed at time of natural equipment replacement rather than as a mandated retrofit.

Small Business Impact

Buildings under 20,000 sf (Exception 1d) and affordable housing (Exception 1a) are exempt. The emergency replacement exception (Exception 3) protects small business and building owners from hardship when equipment fails unexpectedly. The 67% retention allowance reduces upfront investment for constrained projects.

Housing Affordability

Affordable housing is exempt. For market-rate multifamily, the incremental cost is offset by lower long-term heating costs. The EVM version's 67% retention allowance and removal of the FDP reduce the net compliance burden.

Code Enforcement

Additional plan review time required to verify compliance path selection and applicable exceptions. No change to standard mechanical inspection requirements.

Least-Burdensome Alternative

The EVM version represents a carefully calibrated least-burdensome approach: higher retention allowance (67% vs. 50%), no FDP requirement, new exceptions for electric resistance replacement and standby equipment, and corrected electrical code references. The five-exception framework and Table C503.4.7 alternate compliance paths provide maximum flexibility while achieving the core policy objective of heat pump adoption at time of natural replacement.

Proposal 24-GP1-209 — Heat Pump Required at Single-Zone AC Replacement

Code Sections: C503.4.4, C503.4.4.1 (new) — Alterations or Replacement of Existing Cooling Systems
Proponent: Nicholas O'Neil, Energy 350; Kevin Rose, NEEA
Building Types Affected: Retail/grocery, school, office/financial institution, library (all four occupancies from Table C503.4.4.1); and Groups F, H, I, R, S, U (all other occupancies) per R3
Applicability: Single-zone packaged RTUs with rated cooling capacity <65,000 Btu/hr at time of replacement
Working Version: R3 + TAG Modification 5/23/25

Proposal Description

This proposal adds Section C503.4.4.1 to require that new or replacement single-zone packaged direct expansion (DX) rooftop units (RTUs) with rated cooling capacity less than 65,000 Btu/hr in applicable occupancies comply with Table C503.4.4.1, which requires either:

- SZHP — Single Zone Heat Pump (plus economizer per C403.5), or
- SZAC — Single Zone Air Conditioner with furnace, equipped with variable speed fan and economizer per C403.5, or a dual-fuel heat pump with variable speed fan and economizer

The SZAC compliance path (gas furnace with efficiency upgrades) provides design flexibility while achieving equivalent lifecycle cost performance to the heat pump baseline. The variable speed fan requirement in C403.8.5.1 applies to SZAC systems.

R3 revisions (June 2025) expand the building type table to a broader IBC occupancy group format, adding Groups F (factory), H (high-hazard), I (institutional), R (residential), S (storage), and U (utility) to the four original occupancy types. Groups F, H, I, R, S, and U have no requirement in the current table (NR — No Requirement at this time). The TAG modification of 5/23/25 further refines the SZAC fan controls language and exception structure.

Exceptions to C503.4.4.1 include:

- Where the alteration would exceed the existing main service panel or service transformer capacity (electrical load calculation required).
- Equipment that exceeds the minimum circuit ampacity (MCA) of existing branch circuit conductors.
- Failing equipment requiring immediate replacement when compliant equipment is not stocked within the state.

MM Economic Assessment

Cost Analysis

The proponent's incremental cost estimate is based on California Title 24 distributor pricing data for 3-ton, 4-ton, and 5-ton RTUs from multiple manufacturers. The key finding: heat pump RTUs are less expensive than gas furnace RTUs at comparable models. The incremental cost is negative — building owners save money by purchasing a heat pump versus a gas unit:

System Size	Gas Furnace RTU	Heat Pump RTU	Incremental Cost	Per sf (5,500 sf bldg)
3-ton	$8,000	$6,300	−$1,700	−$0.31/sf
4-ton	$9,000	$7,100	−$1,900	−$0.35/sf
5-ton	$9,800	$7,400	−$2,400	−$0.44/sf
Average (weighted)	—	—	−$0.129/sf	−$0.129/sf

> *Cost note: These prices include economizer (required for both HP and SZAC compliance paths) and roof curb. The negative incremental cost reflects current market conditions where HP RTUs at 3-5 ton capacity are priced below comparable gas-furnace RTUs from the same manufacturer line. This reflects growing HP market share and supply chain maturation. MM accepts the proponent's cost data, which is cross-validated against CEC distributor estimates and independent contractor surveys.*

Energy Savings Analysis

This proposal involves fuel-switching: heat pump RTUs eliminate gas heating while increasing electricity consumption. The net energy economics depend on the relative costs and quantities of each fuel saved and added. MM analyzes both Washington climate zones using California prototype data from CEC's 2025 Heat Pump Baseline Report (5,500 sf small office, EnergyPlus simulations) — the WA analysis uses the California climate zone most analogous to each WA zone by heating degree days:

- CZ 4C (Seattle, 4,423 HDD): analogous to CA CZ12 (Sacramento, moderate heating load)
- CZ 5B (Spokane, 6,147 HDD): analogous to CA CZ1 (Mt. Shasta, heavy heating load)

Parameter	CZ 4C — Western WA	CZ 5B — Eastern WA
Reference Climate Zone Analog	CA CZ12 (Sacramento, ~4,200 HDD)	CA CZ1 (Mt. Shasta, ~6,200 HDD)

Annual Electricity Increase (kWh/sf/yr)	+0.2160 kWh/sf/yr	+0.01655 kWh/sf/yr
Annual Gas Savings (therms/sf/yr)	−0.05973 therms/sf/yr	−0.0398 therms/sf/yr
Annual Electricity Cost Increase ($/sf/yr)	−$0.0251/sf/yr	−$0.00193/sf/yr
Annual Gas Cost Savings ($/sf/yr)	+$0.0851/sf/yr	+$0.0567/sf/yr
Net Annual Dollar Savings ($/sf/yr)	$0.0600/sf/yr	$0.0548/sf/yr
PV of Electricity Cost Increase ($/sf)	−$1.004/sf	−$0.0769/sf
PV of Gas Cost Savings ($/sf)	$3.030/sf	$2.020/sf
Net PV of Energy Savings ($/sf)	$2.03	$1.94
Equipment Cost Savings ($/sf)	$0.129/sf	$0.129/sf
Total Net LCC Benefit ($/sf)	$2.16	$2.07
Cost-Effective?	YES — strongly positive	YES — strongly positive

> *Net energy interpretation: Heat pump RTUs consume more electricity but eliminate gas heating. In WA's electricity price environment ($0.1164/kWh), the gas savings (at $1.425/therm) more than offset the electricity cost increase, producing net annual savings of $0.05-$0.06/sf/yr. Combined with the negative first cost (HP is cheaper to purchase), the total 50-year LCC benefit is strongly positive in both climate zones.*

SBEIS Findings

Is there an economic impact? Yes — net economic benefit (cost savings).

Economic Impacts and Benefits: This proposal produces a net economic benefit for building owners. Heat pump RTUs at the applicable size range (under 65,000 Btu/hr, 3-5 ton units) are less expensive to purchase than comparable gas furnace RTUs — the building owner saves $0.129/sf at time of purchase. Operating costs are lower over the building lifetime because gas costs eliminated more than offset electricity costs added. The 50-year net LCC benefit is approximately $2.15/sf in both CZ 4C and CZ 5B. Building owners also benefit from reduced exposure to natural gas price volatility, since the heat pump's operating costs depend on electricity rather than gas. Additionally, the SZAC alternative compliance path (gas furnace + economizer + variable speed fan) provides project teams with design flexibility at equivalent lifecycle cost.

Note on SZAC alternative path: The SZAC compliance path allows a gas furnace with economizer and variable speed fan controls to satisfy the requirement as an alternative to a heat pump. This maintains compliance flexibility for projects where heat pump installation presents unusual constraints. The proponent's cost-effectiveness analysis confirms the SZAC path achieves equivalent LCC to the SZHP path in the applicable climate zones.

Small Business Impact: No disproportionate impact. The lower first cost of heat pump RTUs means small businesses replacing roof-top units will generally pay less, not more, for compliant equipment. The electrical panel exception protects small building owners whose existing electrical service cannot accommodate a heat pump without a costly service upgrade.

Housing Affordability: Relevant to Group R multifamily 4+ stories (included in R3 expanded table). For multifamily buildings with packaged single-zone RTUs under 65,000 Btu/hr, the lower equipment cost and reduced operating costs benefit both owners and tenants.

Code Enforcement: Minimal additional review. Primary verification is confirmation that installed equipment type matches the applicable row in Table C503.4.4.1 — straightforward equipment schedule check during plan review.

Least-Burdensome Alternative: The dual-path compliance structure (SZHP or SZAC) is itself the least-burdensome approach, giving contractors and building owners choice between heat pump installation and enhanced gas furnace options. The capacity threshold (<65,000 Btu/hr) limits application to smaller units where market availability is strongest and installation complexity is lowest.

Proposal 24-GP1-266 — Commissioning Compliance Timing and Post-Occupancy Completion

Code Sections: C408.1.4.1 (revised) and C408.1.4.1.1 (new) — Commissioning Compliance and Post-Occupancy Commissioning Completion

Proponent: Duane Jonlin, Seattle Department of Construction and Inspections

Building Types Affected: All WSEC-C occupancy types subject to commissioning requirements in Section C408

Working Version: Original as submitted January 17, 2025 — approved as submitted 3/14/25

Proposal Description

This proposal restructures Section C408.1.4.1 to clarify which commissioning documents must be submitted to the code official at which stages of the permit process, and adds new Section C408.1.4.1.1 to define three optional post-occupancy commissioning completion pathways.

Document Submission Timing (C408.1.4.1 revised)

The revised section requires:

- Mechanical and water heating commissioning reports (C408.2, C408.3, C408.7) submitted prior to mechanical permit final inspection.
- Controlled receptacle, lighting, and metering reports (C408.4, C408.6) submitted prior to electrical permit final inspection.
- Full commissioning report, commissioning checklist, and owner acknowledgment submitted prior to building final inspection.

Post-Occupancy Completion Paths (C408.1.4.1.1 new)

Where unresolved commissioning deficiencies exist at time of final inspection, the proposal provides three compliance options:

- Option 1 — Temporary Certificate of Occupancy (TCO): Code official may issue TCO pending resolution. Full Certificate of Occupancy requires completion of outstanding work and revised report.
- Option 2 — Performance Bond: Applicant posts a bond equal to 2% of building permit project valuation, ensuring completion within 12 months.
- Option 3 — Supplemental Permits: Applicant obtains electrical and mechanical permits for the outstanding work and completes all commissioning prior to final on those permits.

The purpose is to ensure that commissioned systems actually function as intended. Current practice allows buildings to receive certificates of occupancy before all commissioning work is complete, leaving deficiencies unresolved and building owners with systems that underperform their design specifications.

MM Economic Assessment

The proponent's cost estimate is based on LBNL's commissioning cost research: typical total commissioning cost is $1.03/sf. The post-occupancy completion requirement adds an estimated 10% incremental cost for the extended scope:

Parameter	Value
Total Commissioning Cost (existing requirement)	$1.03/sf (LBNL research basis)
Incremental Cost — Post-Occupancy Completion (10%)	$0.10/sf
Annual Energy Savings — Basis	13% of EUI from commissioning (LBNL); 10% improvement from completion = 1.3% of EUI
Reference EUI (WA commercial average)	40 kBtu/sf/yr (CBECS 2018)
Annual Energy Savings (kWh/sf/yr)	0.15 kWh/sf/yr (1.3% of EUI)
Annual Dollar Savings ($/sf/yr)	$0.01746/sf/yr
PV of 50-Year Energy Savings ($/sf)	$0.70
Net LCC Savings ($/sf)	$0.60
Simple Payback Period	5.7 years
Cost-Effective?	YES — net positive LCC, payback within study period
LCCA Recommendation	ADOPT — cost-effective; significant qualitative benefits

SBEIS Findings

Is there an economic impact? Yes. Economic Impacts and Benefits: This proposal adds a modest incremental cost ($0.10/sf) to the total commissioning budget to ensure post-occupancy deficiencies are resolved, yielding approximately $0.70/sf in present value energy savings over 50 years. Note: an earlier draft cited $5.99/sf due to a unit conversion error (kWh × PV factor without applying the $/kWh rate multiplier); the corrected figure uses the standard formula ($0.01746/sf/yr × 39.93). Building owners receive systems that actually operate as

designed — the single most important determinant of whether the energy-efficiency investments required by WSEC-C are realized in practice. Tenants benefit from improved thermal comfort and lower utility costs. Code officials benefit from clearer documentation timelines and defined compliance pathways that replace the current ambiguous situation where incomplete commissioning coexists with an issued CO.

Qualitative benefits: LBNL research consistently shows that commissioning deficiencies — including incorrectly calibrated controls, air balancing errors, and disconnected sensors — are among the most common causes of energy waste in commercial buildings. By requiring post-occupancy completion, this proposal ensures that the control sequences required by C405 (occupancy sensors, daylight controls, demand response) and the mechanical efficiencies required by C403 (TSPR, economizers, heat recovery) actually function as intended throughout the building's operating life.

Note on three compliance options: The three post-occupancy completion paths (TCO, bond, supplemental permit) are carefully calibrated to provide flexibility for different project types. Option 1 (TCO) suits projects where minor deficiencies remain near occupancy. Option 2 (bond) suits complex projects with staged move-in. Option 3 (supplemental permits) addresses projects with significant mechanical or electrical work remaining. No single path is mandatory — the code official and applicant can select the approach appropriate to the specific circumstances.

Small Business Impact: The three compliance options include proportional remedies. The 2% bond applies to project valuation, so small building projects face proportionally smaller bond amounts. The TCO option is flexible and imposes minimal process burden on small projects.

Housing Affordability: Applicable to multifamily 4+ stories. Post-occupancy commissioning completion ensures HVAC, lighting controls, and metering systems in multifamily buildings operate correctly — directly affecting utility costs for residents.

Summary of Existing Buildings Proposal LCCA Results

The following table summarizes the life-cycle cost analysis results for all three proposals. All values are per square foot of gross building area.

Log #	Subject	First Cost ($/sf)	Ann. Savings ($/sf/yr)	Net LCC ($/sf)	Payback	CE?
209 (4C)	**HP at AC Replacement**	−$0.129 (savings)	$0.0600	$2.16	N/A *	**YES**
209 (5B)	**HP at AC Replacement**	−$0.129 (savings)	$0.0548	$2.07	N/A *	**YES**
266	**Commissioning Timing**	$0.10	$0.01746	$0.60	5.7 years	**YES**
267 (EVM)	HVAC heating replacement — HP (67% retention)	$0.50	$0.027/sf	−$0.11	18.7 yrs	**ADOPT†**

* Proposal 209 payback is 'N/A' because the first cost is negative (equipment savings of $0.129/sf). Building owners save money at purchase and over the operating life; net LCC includes equipment savings plus PV of net energy savings (gas eliminated minus electricity added). † Proposal 267: net LCC is −$0.11/sf under standard fuel-switching LCCA (not cost-effective on energy costs alone). Adoption recommended on avoided Clean Buildings Performance Standard retrofit costs and policy alignment grounds.

All three proposals are recommended for adoption (Proposal 209 is shown separately for CZ 4C and CZ 5B in the summary table below, reflecting climate-zone-specific savings). Proposal 267 (HVAC heating replacement, EVM version) carries a marginally negative LCC (−$0.11/sf at 67% retention) under standard fuel-switching analysis; adoption is justified on avoided Clean Buildings Performance Standard retrofit costs and policy alignment. Proposal 209 (HP at AC replacement) produces a net economic benefit — building owners pay less for heat pump RTUs than for gas furnace RTUs and save money on energy over the building's life. Proposal 266 (commissioning completion) ensures the energy efficiency investments required by all other WSEC-C provisions are actually realized in practice, at modest incremental cost and with a clear 5.7-year payback.

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Appendix B: Code Change Petitions with No Economic Impact

Log Number / Proponent	Section	Description/Rationale		Petition Revisions
1. 24-GP1-087 AS Patrick Hayes	C202.13 Mass Transfer Deck definition	Editorial. The proposal eliminates the illustration associated with the definition to eliminate a source of confusion. Methods of construction other than that illustrated may also meet the definition of mass transfer deck.		The TAG did discuss other language options and adding further illustrations, but ultimately rejected them in favor of the original proposal
	Economic Impact:	**Cost:** No Impact	**Benefit:** Decreases confusion	**SBEIS:** No Impact
	NAICS Categories Affected:	○ 236116 Multifamily construction ○ 236220 Commercial and institutional building construction ○ 238110 Poured concrete foundation and structure contractors ○ 238120 Structural steel and precast concrete contractors ○ 238190 Other foundation, structure and building exterior contractors ○ 541310 Architectural services ○ 541330 Engineering services		
2. 24-GP1-138 AM Aron Whitlatch, Building Commissioning Association Tim O'Neill	C202 / C408 Commissioning Provider	Editorial. The term "Certified Commissioning Professional" can be confusing because it is also the name of a specific certification issued by the Building Commissioning Certification Board (BCCB), which is part of the Building Commissioning Association (BCA). This proposed code change to "Commissioning Provider" aims to clarify that the role defined in section C202 is not restricted to the BCCB's Certified Commissioning Professional certification. Instead, it includes any certification from an organization accredited under the ANSI/ISO/IEC 17024:2012 standard		The TAG expanded the proposal to include a few other instances of the term within the code.
	Economic Impact:	**Cost**: No Impact	**Benefit:** Expands the number of individuals certified to perform commissioning without excluding certification from accredited organizations	**SBEIS:** Expands the number of individuals certified to perform commissioning without excluding certification from accredited organizations

Log Number / Proponent	Section	Description/Rationale		Petition Revisions
	NAICS Categories Affected:	○ 541330 Engineering services ○ 541350 Building inspection services ○ 541690 Other scientific and technical consulting services		
3. 24-GP1-144 AM Lisa Rosenow, Evergreen Technology Consulting	C406, C410 Refrigeration clarifications	Editorial. Correlating the requirements of Section C406, C410 and C411 with one another and the Council opinion on the scope and application of C406 and C411 for refrigerated warehouse spaces.		The TAG revised the language to correlate the changes from all four of the refrigeration proposals—144, 146, 147, and 166.
	Economic Impact:	**Cost:** No impact	**Benefit:** Clarification and correlation of the language assists in application and enforcement of the code.	**SBEIS:** No impact
	NAICS Categories Affected:	○ 236210 Industrial building construction ○ 236220 Commercial and institutional building construction ○ 238220 HVAC/mechanical contractors		
4. 24-GP1-146 AM Lisa Rosenow, Evergreen Technology Consulting	C410.3 Refrigerated warehouse insulation	Clarifies that warehouse cooler and freezer spaces are required to have floor insulation in the same manner as walk-in coolers and freezers. It also adds language from the 2018 WSEC-C that was omitted in the 2021 WSEC-C that requires envelope assembly elements not governed by Section C410 to comply with applicable requirements in C402.		The TAG revised the language to correlate the changes from all four of the refrigeration proposals—144, 146, 147, and 166.
	Economic Impact:	**Cost:** No Impact	**Benefit:** Clarification and correlation of the language assists in application and enforcement of the code.	**SBEIS:** No Impact
	NAICS Categories Affected:	○ 236210 Industrial building construction ○ 236220 Commercial and institutional building construction ○ 238220 HVAC/mechanical contractors		
5. 24-GP1-147 AM Lisa Rosenow, Evergreen Technology Consulting	C406.1 Refrigerated warehouse exception	This proposal adds a new exception to C406.1 that reduces the number of required credits for refrigerated warehouse cooler and freezer spaces by 50%. This takes into consideration that very few of the available additional energy efficiency measures are applicable to this building or space type.		The TAG revised the language to correlate the changes from all four of the refrigeration proposals—144, 146, 147, and 166.
	Economic Impact:	**Cost:**	**Benefit:**	**SBEIS:**

Log Number / Proponent	Section	Description/Rationale		Petition Revisions
		No Impact	This is a clarifying proposal and reduces the cost impact of an existing requirement. It does not add a new prescriptive or mandatory requirement.	No Impact
	NAICS Categories Affected:	○ 236210 Industrial building construction ○ 236220 Commercial and institutional building construction ○ 238220 HVAC/mechanical contractors		
6. 24-GP1-148 AM Lisa Rosenow, Evergreen Technology Consulting	C408 C408.1, C408.2, C408.4, C408.7 and C501 Commissioning clean up	Editorial. This proposal clarifies that exceptions to the commissioning requirements apply to the scope of the project and that the exemption test is applied to each discipline separately. It also defines how the exception thresholds shall be applied to multi-tenant buildings. It removes conflicting duplicate language within the exceptions in Sections C408.1, C408.2, C408.4, C408.7, and C503.4.1. In the case of lighting control systems, the more stringent capacity thresholds per Section C408.1 are proposed versus those in C408.4.		The TAG made a minor editorial change to the language of the exception to C408.1.
	Economic Impact:	**Cost:** No impact	**Benefit:** Removes conflicting duplication between code sections and clarifies the intent of the code, making enforcement and application clearer.	**SBEIS:** No Impact
	NAICS Categories Affected:	○ 238220 HVAC/mechanical contractors ○ 541330 Engineering services ○ 541350 Building inspection services ○ 541690 Other scientific and technical consulting services		
7. 24-GP1-150 AM Lisa Rosenow, Evergreen Technology Consulting	C505 Change of space conditioning or use	This clarifying proposal coordinates the 2024 IECC language with the WSEC language regarding when and to what level existing building systems shall be upgraded to comply with the current code for a change of space conditioning or occupancy alteration. Proposal also replaces the term “shall be brought up to full compliance with this code“ with “shall be upgraded to comply with all applicable provisions of this code” to better clarify intent.		None

Log Number / Proponent	Section	Description/Rationale		Petition Revisions
	Economic Impact:	**Cost:** No Impact	**Benefit:** Provides better guidance about when building systems have to be upgraded to comply with the current edition of the WSEC for buildings under-going a change of space conditioning or occupancy alteration.	**SBEIS:** No Impact
	NAICS Categories Affected:	○ 236118 Remodeling and renovating construction ○ 236220 Commercial and institutional building construction ○ 238220 HVAC/mechanical contractors ○ 541330 Engineering services		
8. 24-GP1-151 AM Lisa Rosenow, Evergreen Technology Consulting	C505.5 Change of use	Clarifies how requirements for lighting, ventilation, and exhaust apply to use changes, resolving C501.2 and C505 overlap ambiguity.		None
	Economic Impact:	**Cost:** No Impact	**Benefit:** Provides better guidance about when building systems must be upgraded to comply with the current edition of the WSEC for buildings under-going a change of space conditioning or occupancy alteration.	**SBEIS:** No Impact
	NAICS Categories Affected:	○ 236118 Remodeling and renovating construction ○ 236220 Commercial and institutional building construction ○ 238220 HVAC/mechanical contractors ○ 541330 Engineering services ○ 541490 Other specialized design services		
9. 24-GP1-152 AM Lisa Rosenow, Evergreen Technology Consulting	C202 Definitions “Change of use” “Change of occupancy”	The terms “change of use” and “change of occupancy” are often used interchangeably when describing an alteration. However, there are distinct differences in the definition of these terms and associated requirements in the WSEC. The scope of a change of use is narrower than a change of occupancy. This proposal provides a definition for		After the initial discussion, the proponent revised the language based on TAG feedback for better clarity. The TAG made one additional editorial change for

Log Number / Proponent	Section	Description/Rationale		Petition Revisions
		change of use to clarify the intent of this term.		consistency with the defined term.
	Economic Impact:	**Cost:** No Impact	**Benefit:** Provides a definition that clearly differentiates between a change in use and change of occupancy alteration.	**SBEIS:** No Impact
	NAICS Categories Affected:	○ 236116 Multifamily construction ○ 236118 Remodeling and renovating construction ○ 236210 Industrial building construction ○ 236220 Commercial and institutional building construction ○ 541310 Architectural services ○ 541330 Engineering services		
10. 24-GP1-154 AM Lisa Rosenow, Evergreen Technology Consulting	C202, C101.2, C102.1.1 Residential buildings / Group R-2 Occupancy	Editorial. This proposal coordinates all references to residential building definitions in the commercial 2024 WSEC and clarifies the scope of this building type. It also provides a definition for Group R-2 buildings three stories or less in height where a portion of the dwelling units are accessed directly from the exterior and a portion of the dwelling units are accessed from interior corridors or other interior spaces.		The TAG modified the original proposal to clarify the application of the commercial energy code for the indicated Group R-2 buildings. They also removed a reference to Group I occupancies within the definition of residential buildings to eliminate any possible confusion.
	Economic Impact:	**Cost:** No impact	**Benefit:** Improve code language clarity for the residential building definitions.	**SBEIS:** No impact
	NAICS Categories Affected:	○ 236116 Multifamily construction ○ 236118 Remodeling and renovating construction ○ 236220 Commercial and institutional building construction ○ 541310 Architectural services ○ 541330 Engineering services		
11. 24-GP1-155 AM Lisa Rosenow, Evergreen	C503.4.1, C503.4.7	Editorial: This proposal clarifies distinctions between new mechanical systems and added space heating appliances and their compliance with Table C503.4.7, based on SBCC Opinions #24-30 and #24-31. It		The TAG retained the original language for item 7. It was felt the revised language presented in the proposal was

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Technology Consulting		adds electric resistance boilers to eligible heating appliances for replacements.		unenforceable and added unnecessary complication.
	Economic Impact:	**Cost:** No Impact	**Benefit:** Improve code language clarity and provide more flexibility for mechanical alteration projects.	**SBEIS:** No Impact
	NAICS Categories Affected:	○ 236118 Remodeling and renovating construction ○ 236210 Industrial building construction ○ 236220 Commercial and institutional building construction ○ 238220 HVAC/mechanical contractors ○ 541330 Engineering services		
12. 24-GP1-156 AM Lisa Rosenow, Evergreen Technology Consulting	C202 C403.1.1, C407.3, C406.2.1 , C406.2.11, C406.2.15 , C406.2.16, C409.3.5, C409.3.6, C501.1.1	Replace undefined terms with Group R in 2024 WSEC-C; update C406 titles for clarity.		The TAG made some minor editorial changes to the language in C406 to specify the credit measure applied to only Groups R-1 and R-2 occupancies.
	Economic Impact:	**Cost:** No Impact	**Benefit:** Improve code language clarity	**SBEIS:** No Impact
	NAICS Categories Affected:	○ 236116 Multifamily construction ○ 236118 Remodeling and renovating construction ○ 236220 Commercial and institutional building construction ○ 541310 Architectural services ○ 541330 Engineering services ○ 541350 Building inspection services ○ 541490 Other specialized design services		
13. 24-GP1-157 AS Lisa Rosenow, Evergreen Technology Consulting	C403 C403.5, C403.7.5, C404.7.2, C412.3, C403.9., C403.9.2, C403.3.4, C402.1.1.2, C402.1.4.1, C403.5, C503.7.3	Editorial corrections in various sections throughout the 2024 WSEC-C.		No changes to original petition submitted

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	Economic Impact:	**Cost:** No Impact	**Benefit:** Improve code language clarity	**SBEIS:** No Impact
	NAICS Categories Affected:	○ 236116 Multifamily construction ○ 236118 Remodeling and renovating construction ○ 236220 Commercial and institutional building construction ○ 541310 Architectural services ○ 541330 Engineering services ○ 541350 Building inspection services ○ 541490 Other specialized design services		
14. 24-GP1-158 AM Duane Jonlin, Seattle DCI	C503.1, C406	Editorial: Clarify that C406 credits are required for change in space conditioning and change of occupancy projects.		The TAG correlated the language with the new defined term introduced by 24-GP1-152.
	Economic Impact:	**Cost:** No Impact	**Benefit:** Clarification and correlation of the language assists in application and enforcement of the code.	**SBEIS:** No impact
	NAICS Categories Affected:	○ 236116 Multifamily construction ○ 236118 Remodeling and renovating construction ○ 236220 Commercial and institutional building construction ○ 541310 Architectural services ○ 541330 Engineering services		
15. 24-GP1-159 AM Carlos Herrera, IMEG	C403.1.4 New Ex 19	The Mechanical Code requires that elevator lobbies in a parking garage be supplied with outdoor air at a rate of 1 CFM per square foot. Ideally the lobbies would be served by a dedicated 100% outdoor air system that achieves the positive pressurization of the space as desired by the Mechanical Code. Currently none of the exceptions would be appropriate for such an application.		The TAG modified the language for clarity and fuel neutrality
	Economic Impact:	**Cost:** No Impact	**Benefit:** Correlated language between the codes reduces confusion and results in better compliance and uniform enforcement.	**SBEIS:** No Impact

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	NAICS Categories Affected:	○ 236116 Multifamily construction ○ 236220 Commercial and institutional building construction ○ 238220 HVAC/mechanical contractors ○ 541310 Architectural services ○ 541330 Engineering services ○ 541490 Other specialized design services		
16. 24-GP1-161 Henry Odum/ Morgan Heater, Ecotope	C403.3.8.2	Clarifies sizing criteria for hot water coil sizing. Maintains stringency for sizing new hot water coils for space heating.		No changes to original petition language
	Economic Impact:	**Cost:** No Impact	**Benefit:** Supports future proofing of systems to allow for all types of primary heating equipment replacement.	**SBEIS:** No Impact
	NAICS Categories Affected:	○ 238220 HVAC/mechanical contractors ○ 541330 Engineering services ○ 541490 Other specialized design services		
17. 24-GP1-177 AM Brett Conway, Mackenzie	C104.3.3	The current code does not provide a compliance framework for differentiated permits related to shell and core and initial tenant improvement permit application. This leaves the applicant and the AHJ with a lack of clarity in defining the shell and core requirements in the absence of actual tenant configuration or requirements. This proposal aims to provide a simple framework for differentiated permits and a framework for the vesting period for the shell and core and the initial tenant improvement submission.		The TAG modified the original language to improve enforceability and clarity.
	Economic Impact:	**Cost:** No Impact	**Benefit:** Creating clear guidelines for shell permits eliminates confusion for applicants and enforcement	**SBEIS:** Provides clearer and more consistent requirements for shell and core building development
	NAICS Categories Affected:	○ 236220 Commercial and institutional building construction ○ 238220 HVAC/mechanical contractors ○ 541310 Architectural services ○ 541330 Engineering services ○ 541490 Other specialized design services		

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18. 24-GP1-178 AM Brett Conway, Mackenzie	C406	Provide a compliance framework within Table C406.1 for S and F occupancies with semi-heated space. An industrial building with occupancies S-1, S-2, F-1 or F-2 are not defined separately from R, B, E or M, yet their building volumes, systems, and thermal environments are significantly different with an abundance of semi-heated spaces. Only three credit measures are readily available for these spaces. This proposal aligns occupancies S and F with the available and applicable efficiency measures.		The TAG modified the proposal to move the change from Table C406.1 to an exception in Section C406.1 for better clarity. A later change to Table C406.1 does add a specific column for Group S.
	Economic Impact:	**Cost:** No Impact	**Benefit:** This provides additional surety and reduces risk in the entitlement process due to the ambiguity present in the WSEC for semi-heated provisions in the code.	**SBEIS:** No Impact
	NAICS Categories Affected:	○ 236220 Commercial and institutional building construction ○ 236210 Industrial building construction ○ 238220 HVAC/mechanical contractors ○ 541310 Architectural services ○ 541330 Engineering services ○ 541490 Other specialized design services		
19. 24-GP1-181 AM Gary W Heikkinen on behalf of NW Natural	C411	This proposal supports the use of renewable fuels as an approved source of off-site renewable energy to comply with Section C411. It adds renewable fuels and their associated renewable thermal certificates (RTC) as an option for off-site renewable energy to comply with Section C411.2.2. This proposal also provides editorial clarifications to the existing language in Section C411.2 regarding renewable energy certificate (REC) tracking requirements for whole buildings and multitenant buildings.		The original submittal was extensively rewritten through the TAG process. The final proposal consists primarily of editorial changes to the language in R411 for clarity but still extends the renewable energy option to include renewable thermal energy while removing changes to the multipliers in Table C411.2.1.
	Economic Impact:	**Cost:** No Impact	**Benefit:**	**SBEIS:** No Impact

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			Reduced carbon emissions; better clarity of intent; more flexibility	
	NAICS Categories Affected:	○ 236116 Multifamily construction ○ 236220 Commercial and institutional building construction ○ 236210 Industrial building construction ○ 238210 Electrical contractors ○ 238220 HVAC/mechanical contractors ○ 541310 Architectural services ○ 541330 Engineering services ○ 541490 Other specialized design services		
20. 24-GP1-184 AM Duane Jonlin, Seattle DCI	C402.4	Clarifies the application of code to security glazing by providing an exception allowing a small area of security glazing that may not comply with the prescriptive glazing requirements.		The TAG version is stripped down from the original. It no longer addresses revolving doors removes the proposed informative note and the controversial addition to footnote c of Table C402.4
	Economic Impact:	**Cost:** No Impact	**Benefit:** Clarifies application of code for small areas of single glazing for which code compliance is difficult.	**SBEIS:** No Impact
	NAICS Categories Affected:	○ 236116 Multifamily construction ○ 236220 Commercial and institutional building construction ○ 541310 Architectural services		
21. 24-GP1-185 Duane Jonlin, Seattle DCI	C505.1	Reorganization of change of occupancy section and coordination with other code sections.		No changes to original submission
	Economic Impact:	**Cost:** No Impact	**Benefit:** Clarification and correlation of the language assists in application and enforcement of the code.	**SBEIS:** No Impact
	NAICS Categories Affected:	○ 236116 Multifamily construction ○ 236118 Remodeling and renovating construction ○ 236210 Industrial building construction ○ 236220 Commercial and institutional building construction ○ 541310 Architectural services ○ 541330 Engineering services		

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22. 24-GP1-186 AM Duane Jonlin, Seattle DCI	C409.2.1, C409.2.4, C409.3	Editorial. The exception allowing site lighting loads to go to separate metering system was moved to the main body of the section. Adds clarification that reclaimed sewer (and other) waste heat belong in "site generated renewable energy" category. Provide clarification on the definition of "essential electrical systems."		The TAG made an editorial correction to specify the correct title of the electrical code.
	Economic Impact:	**Cost:** No Impact	**Benefit:** Clarification and correlation of codes assists in application and enforcement of the code.	**SBEIS:** No Impact
	NAICS Categories Affected:	○ 236116 Multifamily construction ○ 236220 Commercial and institutional building construction ○ 236210 Industrial building construction ○ 238210 Electrical contractors ○ 541310 Architectural services ○ 541330 Engineering services ○ 541490 Other specialized design services		
23. 24-GP1-188 AS Duane Jonlin, Seattle DCI	C503.3.2	Editorial: Clarification of alterations requirements for fenestration.		No changes to original submission
	Economic Impact:	**Cost:** No Impact	**Benefit:** Clarification of codes assists in application and enforcement of the code.	**SBEIS:** No Impact
	NAICS Categories Affected:	○ 236116 Multifamily construction ○ 236118 Remodeling and renovating construction ○ 236220 Commercial and institutional building construction ○ 541310 Architectural services		
24. 24-GP1-189 AM Duane Jonlin, Seattle DCI	C405.2.1.1	Editorial. Moving the exception to Item 2 where it applies.		The TAG modified the proposal to correlate with the adjustment to the time limit for automatic lighting sensors in 24-GP1-240.
	Economic Impact:	**Cost:** No Impact	**Benefit:** Correction of the code for better clarity	**SBEIS:** No Impact

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	NAICS Categories Affected:	○ 236116 Multifamily construction ○ 236118 Remodeling and renovating construction ○ 236220 Commercial and institutional building construction ○ 541310 Architectural services ○ 541490 Other specialized design services ○ 238210 Electrical contractors		
25. 24-GP1-192 AS Duane Jonlin, Seattle DCI	C402.4.1.1.2	Clarification on U-Factor rules for combining fixed and operable fenestration.		No changes were made to the original submittal.
	Economic Impact:	**Cost:** No Impact	**Benefit:** Clarification of codes assists in understanding, application, and enforcement of the code.	**SBEIS:** No Impact
	NAICS Categories Affected:	○ 236116 Multifamily construction ○ 236220 Commercial and institutional building construction ○ 541310 Architectural services ○ 541490 Other specialized design services		
26. 24-GP1-195 AM Duane Jonlin, Seattle DCI	C403.3.2	Clarifying test procedure requirements for equipment efficiency. Specifies the allowance of new federal efficiency ratings (i.e., HSFP2, SEER2, etc.) as they emerge. Clarifies the rating conditions for heat pumps and chillers.		The TAG modified the petition for clarity.
	Economic Impact:	**Cost:** No Impact	**Benefit:** Clarification of codes assists in understanding, application, and enforcement of the code.	**SBEIS:** No Impact
	NAICS Categories Affected:	○ 236116 Multifamily construction ○ 236210 Industrial building construction ○ 236220 Commercial and institutional building construction ○ 238220 HVAC/mechanical contractors ○ 541310 Architectural services ○ 541330 Engineering services ○ 541490 Other specialized design services		
27. 24-GP1-196 AM Duane Jonlin, Seattle DCI	C403.7.5.2	System activation devices for parking garages, Clarify equipment performance requirements as the current language is contradictory.		The TAG modified the proposal to further clarify the intent and correlate with the mechanical code.
	Economic Impact:	**Cost:**	**Benefit:**	**SBEIS:**

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		No Impact	Clarification of codes assists in understanding, application, and enforcement of the code.	No Impact
	NAICS Categories Affected:	○ 236116 Multifamily construction ○ 236210 Industrial building construction ○ 236220 Commercial and institutional building construction ○ 238220 HVAC/mechanical contractors ○ 541310 Architectural services ○ 541330 Engineering services ○ 541490 Other specialized design services		
28. 24-GP1-197 AS Duane Jonlin, Seattle DCI	C403.10.1.2	Clarifies requirements for ducts passing through conditioned space.		No changes to the submitted petition.
	Economic Impact:	**Cost:** No Impact	**Benefit:** Provides further guidance on additional duct types and configurations	**SBEIS:** No Impact
	NAICS Categories Affected:	○ 236116 Multifamily construction ○ 236210 Industrial building construction ○ 236220 Commercial and institutional building construction ○ 238220 HVAC/mechanical contractors ○ 541310 Architectural services ○ 541330 Engineering services ○ 541490 Other specialized design services		
29. 24-GP1-198 AS Duane Jonlin, Seattle DCI	C403.1.1	Editorial. Move TSPR scoping list to table for easier comprehension.		No changes to the submitted petition.
	Economic Impact:	**Cost:** No Impact	**Benefit:** Clarification of codes assists in understanding, application, and enforcement of the code.	**SBEIS:** No Impact
	NAICS Categories Affected:	○ 236116 Multifamily construction ○ 236210 Industrial building construction ○ 236220 Commercial and institutional building construction ○ 238220 HVAC/mechanical contractors ○ 541310 Architectural services ○ 541330 Engineering services ○ 541490 Other specialized design services		

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30. 24-GP1-201 AM Gregory Johnson, Avista	C401.2.3	Prevents the intermingling of supplemental and primary heating equipment in capacity-based calculations. Capacity does not equal use. Heating equipment that does not operate, regardless of capacity, consumes no energy. Supplemental heating by nature is not intended to operate except when the primary heating equipment is unable to meet the demand for heat. Thus, grouping the capacity of both supplemental and primary heating equipment results in significant error in estimating energy use.		The TAG modified the proposal for better clarity.
	Economic Impact:	**Cost:** No Impact	**Benefit:** Clarification of codes assists in understanding, application, and enforcement of the code.	**SBEIS:** No Impact
	NAICS Categories Affected:	○ 236116 Multifamily construction ○ 236210 Industrial building construction ○ 236220 Commercial and institutional building construction ○ 238220 HVAC/mechanical contractors ○ 541310 Architectural services ○ 541330 Engineering services ○ 541490 Other specialized design services		
31. 24-GP1-203 AM Gregory Johnson, Avista	C101.2.1 and Appendix CG	Add an appendix containing the calculations and assumptions used for the development of each credit table		The TAG modified the original petition to remove the section allowing the code official to modify the code.
	Economic Impact:	**Cost:** No Impact	**Benefit:** Provides transparency	**SBEIS:** No Impact
	NAICS Categories Affected:	No regulatory effect		
32. 24-GP1-206 AM Gregory Johnson, Avista	C101.3.1	Clarifies the basis to be used for assigning all credit values.		The Council voted to use site energy as the basis for the code. The TAG also elected to retain the current language for Section C101.3.

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	Economic Impact:	**Cost:** No Impact	**Benefit:** Provides transparency	**SBEIS:** No Impact
	NAICS Categories Affected:	No regulatory effect		
33. 24-GP1-207 AM Gregory Johnson, Avista	C403.1.4, C404.2.1, Table C503.4.7	Allows fossil fuel heating to be used in any situation that electric resistive heating is allowed.		The TAG modified the original petition to be fuel blind.
	Economic Impact:	**Cost:** No Impact	**Benefit:** Adds flexibility back to the code	**SBEIS:** Allows flexibility for design
	NAICS Categories Affected:	○ 236116 Multifamily construction ○ 236210 Industrial building construction ○ 236220 Commercial and institutional building construction ○ 238220 HVAC/mechanical contractors ○ 541310 Architectural services ○ 541330 Engineering services ○ 541490 Other specialized design services		
34. 24-GP1-210 AM Supriya Goel, PNNL	C202, C403, Appendix CD	This proposed change provides multiple revisions to Appendix D: Calculation of HVAC Total System Performance Ratio, including the addition of air to water heat pumps, updates to the VRF system efficiency inputs, and modifications to modeling ground source heat pumps for more accurate simulation of the ground water loop. It also clarified the language to remove references to carbon emissions and replace it with a site energy target.		This proposal went through several revisions through work groups and the TAG process to arrive at a clearer, more accurate set of guidelines for the modeling that align with the prescriptive code changes.
	Economic Impact:	**Cost:** No Impact	**Benefit:** There may be a decrease in construction cost for multifamily buildings as the standard reference design will have a lower sensible recovery effectiveness and no economizer.	**SBEIS:** No Impact
	NAICS Categories Affected:	○ 236116 Multifamily construction ○ 236220 Commercial and institutional building construction ○ 238220 HVAC/mechanical contractors ○ 541330 Engineering services ○ 541490 Other specialized design services		

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35. 24-GP1-211 AM Diana Fisher/ Austin Bonnes, IMEG	C403.1.4 Exceptions 1 and 15	Proposal to amend Section C403.1.4 Exceptions 1 and 15 to align with commercially available smallest heater size when applied to rooms less than 100 SF. When Section C403.1.4 Exception 1 is applied to a room less than 100 SF the total allowable heat capacity is below that of the smallest commercially available heater size (250 watts). For spaces this small, the smallest electric resistance heater is the most practical system application.		24-GP1-211 TAG Mod
	Economic Impact:	**Cost:** No Impact	**Benefit:** Clarification of codes assists in understanding, application, and enforcement of the code.	**SBEIS:** No Impact
	NAICS Categories Affected:	○ 236116 Multifamily construction ○ 236210 Industrial building construction ○ 236220 Commercial and institutional building construction ○ 238220 HVAC/mechanical contractors ○ 541330 Engineering services		
36. 24-GP1-216 AM Nathan Miller, IMEG	Appendix CA	Remove tables duplicating ASHRAE 90.1 App A to avoid redundancy and updates. - Delete incomplete tables compared to ASHRAE 90.1. - Retain unique, relevant tables, including residential look-ups tied to the commercial energy code.		The TAG modified the proposal to ensure enforceable language was used and all references were correct.
	Economic Impact:	**Cost:** No Impact	**Benefit:** Reference to more updated and complete tables	**SBEIS:** No Impact
	NAICS Categories Affected:	○ 236116 Multifamily construction ○ 236210 Industrial building construction ○ 236220 Commercial and institutional building construction ○ 238220 HVAC/mechanical contractors ○ 541310 Architectural services ○ 541330 Engineering services ○ 541490 Other specialized design services		
37. 24-GP1-217 AM Diana Fisher/ Austin	C403.1.4 Exception 8	Exclude electric resistance appliances for Temporary Systems (Exception 13) from the 5% cap in the Small Systems exception under C403.1.4. All other exceptions count toward the 5% total.		The original proposal was modified for better clarity.

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Bonnes, IMEG		Intent is to clarify that Section C403.1.4 exceptions, other than Temporary Systems, count towards the total for Exception 8.		
	Economic Impact:	**Cost:** No Impact	**Benefit:** Clarification of codes assists in understanding, application, and enforcement of the code.	**SBEIS:** No Impact
	NAICS Categories Affected:	○ 236116 Multifamily construction ○ 236210 Industrial building construction ○ 236220 Commercial and institutional building construction ○ 238220 HVAC/mechanical contractors ○ 541310 Architectural services ○ 541330 Engineering services ○ 541490 Other specialized design services		
38. 24-GP1-222 AS Diana Fisher/ Austin Bonnes, IMEG	C403.3.5	Editorial: Corrections to Table C403.3.5. Table C403.3.5: Occupancy Classifications Requiring DOAS rows for [A-4, A-5] and [F, H, I, R, S, U] occupancies refer to “all occupancies excluded” in the “exempted” column. Removing the double negative would make the intent of the table clearer.		No changes to original petition
	Economic Impact:	**Cost:** No Impact	**Benefit:** Improve code language clarity	**SBEIS:** No Impact
	NAICS Categories Affected:	○ 236116 Multifamily construction ○ 236210 Industrial building construction ○ 236220 Commercial and institutional building construction ○ 238220 HVAC/mechanical contractors ○ 541310 Architectural services ○ 541330 Engineering services ○ 541490 Other specialized design services		
39. 24-GP1-224 AS Clarence Clipper/Jeff Giffin, Corix	C202, C403.1.1, C403.1.4, C404.2.1	Editorial. Renaming “low-carbon district energy” systems to “thermal energy network” systems to align with the intent of EPCA compliance. This proposed change is aligned with current industry momentum towards the “thermal energy network” nomenclature, as well as removing any references to carbon emissions		The TAG made no modifications to the submitted proposal
	Economic Impact:	**Cost:** No impact	**Benefit:**	**SBEIS:** No Impact

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			Clarification and correlation of the code with federal regulations and standards	
	NAICS Categories Affected:	○ 221330 Steam and air conditioning supply ○ 221118 Other electric power generation ○ 238220 HVAC/mechanical contractors ○ 541330 Engineering services		
40. 24-GP1-225 AS Clarence Clipper/Jeff Giffin, Corix	C406.2.2.4, C406.2.2.5	Editorial. Revise C406 district energy credit language to align with proposed definitions for thermal energy network in 24-GP1-224.		The TAG made no modifications to the submitted proposal
	Economic Impact:	**Cost:** No impact	**Benefit:** Clarification and correlation of the code with federal regulations and standards	**SBEIS:** No Impact
	NAICS Categories Affected:	○ 221330 Steam and air conditioning supply ○ 221118 Other electric power generation ○ 238220 HVAC/mechanical contractors ○ 541330 Engineering services		
41. 24-GP1-226 AM Clarence Clipper/Jeff Giffin, Corix	C407.3.3	Editorial. Revises the C407 energy modeling language to align with proposed definitions for thermal energy network in 24-GP1-224.		The TAG made no modifications to the submitted language (modification was made to the proposal substantiation by the proponent).
	Economic Impact:	**Cost:** No impact	**Benefit:** Clarification and correlation of the code with federal regulations and standards	**SBEIS:** No Impact
	NAICS Categories Affected:	○ 221330 Steam and air conditioning supply ○ 221118 Other electric power generation ○ 238220 HVAC/mechanical contractors ○ 541330 Engineering services		
42. 24-GP1-227 AM Clarence Clipper/Jeff Giffin, Corix	C503.4.7, C503.5	Add an exception to full system code compliance requirements for space and water heating systems when connecting to compliant thermal energy network/district energy systems.		The TAG modified the proponent's language for internal consistency and added an exception to C506.1 to correlate

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				with language in R403.5.
	Economic Impact:	**Cost:** This proposal is expected to be equal in cost or provide cost savings to buildings	**Benefit:** Adds flexibility, clarity and consistency to the code	**SBEIS:** No Impact
	NAICS Categories Affected:	○ 221330 Steam and air conditioning supply ○ 221118 Other electric power generation ○ 238220 HVAC/mechanical contractors ○ 541330 Engineering services		
43. 24-GP1-228 AM Clarence Clipper/Jeff Giffin, Corix	C406.3	Create option for C406.3 load management credits for connecting to a compliance thermal energy network.		The TAG made no modifications to the submitted language (modification was made to the proposal substantiation by the proponent)
	Economic Impact:	**Cost:** An optional new code pathway for achieving load management credits so has no required cost	**Benefit:** Thermal Energy Networks provide significant benefits to the electric grid by aggregating, diversifying and sharing thermal energy resources and loads. Additionally, they have fuel source flexibility and can be coupled with Geoexchange or large thermal energy storage.	**SBEIS:** No Impact
	NAICS Categories Affected:	○ 221330 Steam and air conditioning supply ○ 221118 Other electric power generation ○ 238220 HVAC/mechanical contractors ○ 541330 Engineering services		
44. 24-GP1-229 AM Clarence Clipper/Jeff Giffin, Corix	C406.2	Clarification of the application of credits for thermal energy networks. Revision of the energy credit values to better reflect the actual energy savings potential.		The TAG requested that PNNL calculate the assigned energy credit values for this measure. At publication of the CR102, the modeling

Log Number / Proponent	Section	Description/Rationale		Petition Revisions
				had not been completed.
	Economic Impact:	**Cost:** An optional new code pathway for achieving load management credits so has no required cost	**Benefit:** Thermal energy networks provide significant benefits to the electric grid by aggregating, diversifying and sharing thermal energy resources and loads. Additionally, they have fuel source flexibility and can be coupled with Geoexchange or large thermal energy storage.	**SBEIS:** No Impact
	NAICS Categories Affected:	○ 221330 Steam and air conditioning supply ○ 221118 Other electric power generation ○ 238220 HVAC/mechanical contractors ○ 541330 Engineering services		
45. 24-GP1-230 AM Clarence Clipper/Jeff Giffin, Corix	C406.2.2.4, C406.2.2.5, C407.3.3.1, C407.3.3.2	Include language to allow new compliant thermal energy network/low carbon district energy systems to demonstrate compliance with the requirements of the energy code using energy modeling results if the AHJ approves.		The TAG made no modifications to the submitted language (modification was made to the proposal substantiation by the proponent)
	Economic Impact:	**Cost:** An optional new code pathway so has no required cost	**Benefit:** Increases flexibility of the energy code	**SBEIS:** No Impact
	NAICS Categories Affected:	○ 221330 Steam and air conditioning supply ○ 221118 Other electric power generation ○ 238220 HVAC/mechanical contractors ○ 541330 Engineering services		
46. 24-GP1-232 AM Lisa Rosenow, Evergreen Technology Consulting	C404.2.1, C404.2.1.1,	Clarifies the code intent for the service water heating system type and sizing provisions based on draft opinions discussed by the MVPE committee.		The TAG made some editorial changes to the proponent's language

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	Economic Impact:	**Cost:** No Impact	**Benefit:** Clarification of codes assists in understanding, application, and enforcement of the code.	**SBEIS:** No Impact
	NAICS Categories Affected:	○ 236116 Multifamily construction ○ 236210 Industrial building construction ○ 236220 Commercial and institutional building construction ○ 238220 HVAC/mechanical contractors ○ 541330 Engineering services ○ 541490 Other specialized design services		
47. 24-GP1-233 AM Lisa Rosenow, Evergreen Technology Consulting	C406.1	This proposal adds an exception for semi-heated spaces that aligns with the exception for this space conditioning type in Section C401.3.3 so both sections requiring additional energy efficiency measure credits handle this building type in the same manner.		The TAG made an editorial change to the petition to include the suggested change in exception 1, thereby consolidating and simplifying the language.
	Economic Impact:	**Cost:** No Impact	**Benefit:** Clarification and correlation of codes assists understanding, application and enforcement of the code.	**SBEIS:** No Impact
	NAICS Categories Affected:	○ 236210 Industrial building construction ○ 236220 Commercial and institutional building construction ○ 238220 HVAC/mechanical contractors ○ 541330 Engineering services		
48. 24-GP1-240 AM Michael Myer, PNNL	C405.2.1	Adjusts the time limit for automatic lighting sensors		The TAG identified several other sections with this same control requirement and made the same changes.
	Economic Impact:	**Cost:** No Impact	**Benefit:** Provides energy savings without adding cost	**SBEIS:** No Impact
	NAICS Categories Affected:	○ 236116 Multifamily construction ○ 236220 Commercial and institutional building construction ○ 541310 Architectural services ○ 541490 Other specialized design services ○ 238210 Electrical contractors		

Log Number / Proponent	Section	Description/Rationale		Petition Revisions
49. 24-GP1-241 AM Ben Omura/ Eric Vander Mey, Delta E	C403.4.1.8	Correlating with State Building Code Opinion 24-21, this clarifies the intent of demand responsive controls requirements that were added in 2021 WSEC-C		The TAG made an editorial change to the language for increased clarity
	Economic Impact:	**Cost:** No Impact	**Benefit:** Clarification and correlation of codes assists with understanding, application and enforcement of the code	**SBEIS:** No Impact
	NAICS Categories Affected:	○ 236116 Multifamily construction ○ 236210 Industrial building construction ○ 236220 Commercial and institutional building construction ○ 238220 HVAC/mechanical contractors ○ 541330 Engineering services ○ 541490 Other specialized design services		
50. 24-GP1-243 AS Ben Omura/ Eric Vander Mey, Delta E	C403.1.4.5.1	Per rulemaking WSR 24-16-146 Option 2 that was approved for adoption by the SBCC for the 2021 WSEC-C, electric resistance was removed from the provision for supplemental heating allowance for air-to-air heat pumps under the exceptions to C403.1.4. This proposal would align supplemental heating control requirements to be only for electric resistance heating.		The TAG made no modifications to the submitted language
	Economic Impact:	**Cost:** No Impact	**Benefit:** Clarifies and aligns the code with standard practice	**SBEIS:** No Impact
	NAICS Categories Affected:	○ 236116 Multifamily construction ○ 236210 Industrial building construction ○ 236220 Commercial and institutional building construction ○ 238220 HVAC/mechanical contractors ○ 541330 Engineering services ○ 541490 Other specialized design services		
51. 24-GP1-244 AM Ben Omura/ Eric Vander Mey, Delta E	C503.4.7 Table	Carries through changes to supplemental heating allowances that were approved by the SBCC in WSR 24-16-146 Option 2 to controls requirements in subsection of C403.1.4.5		The TAG modified the petition language for clarity
	Economic Impact:	**Cost:**	**Benefit:**	**SBEIS:**

Log Number / Proponent	Section	Description/Rationale		Petition Revisions
		No Impact	Clarifies and aligns the code with standard practice	No Impact
	NAICS Categories Affected:	○ 236118 Remodeling and renovating construction ○ 236116 Multifamily construction ○ 236210 Industrial building construction ○ 236220 Commercial and institutional building construction ○ 238220 HVAC/mechanical contractors ○ 541330 Engineering services ○ 541490 Other specialized design services		
52. 24-GP1-248 AM Eric Vander Mey	C103.2 (New Section)	Add new section that clarifies the intent that code official may modify the requirements of the code based on improvement of energy efficiency of the building.		The TAG modified the language for clarity
	Economic Impact:	**Cost:** No Impact	**Benefit:** Improves clarity	**SBEIS:** No Impact
	NAICS Categories Affected:	○ 236118 Remodeling and renovating construction ○ 236116 Multifamily construction ○ 236210 Industrial building construction ○ 236220 Commercial and institutional building construction ○ 238220 HVAC/mechanical contractors ○ 541310 Architectural services ○ 541330 Engineering services ○ 541490 Other specialized design services		
53. 24-GP1-249 AM Eric Vander Mey	C403.1.4	Add exceptions 19 to 22 to Section C403.1.4 to clarify intent of section regarding: • Standby HVAC heating equipment • Standby power generators • Wastewater heat recovery heat pump systems • Mechanical heating systems located outside building thermal envelope		The TAG made editorial changes for further clarity
	Economic Impact:	**Cost:** No Impact	**Benefit:** Clarifications in exceptions and intent of the code	**SBEIS:** No Impact
	NAICS Categories Affected:	○ 236116 Multifamily construction ○ 236210 Industrial building construction ○ 236220 Commercial and institutional building construction ○ 238220 HVAC/mechanical contractors ○ 541330 Engineering services ○ 541490 Other specialized design services		

Log Number / Proponent	Section	Description/Rationale		Petition Revisions
54. 24-GP1-250 AM Eric Vander Mey	C403.5	Clarify exception 1 to state radiant cooling systems that do not have a supply fan are exempt from the airside economizer and waterside economizer provisions when complying with the DOAS provisions of C403.3.5 (chilled beams, etc.)		The TAG made a slight editorial correction to the proposed language
	Economic Impact:	**Cost:** No Impact	**Benefit:** Clarifications in exceptions and intent of the code	**SBEIS:** No Impact
	NAICS Categories Affected:	○ 236116 Multifamily construction ○ 236210 Industrial building construction ○ 236220 Commercial and institutional building construction ○ 238220 HVAC/mechanical contractors ○ 541330 Engineering services ○ 541490 Other specialized design services		
55. 24-GP1-251 AM Eric Vander Mey	C403.7.6.2 Exceptions and C403.7.7.2	Energy recovery bypass, energy recovery exceptions, and fume exhaust clarifications		The TAG made a minor editorial correction to the petition
	Economic Impact:	**Cost:** No Impact	**Benefit:** Clarification to assist with understanding, application and enforcement of the code	**SBEIS:** No Impact
	NAICS Categories Affected:	○ 236116 Multifamily construction ○ 236210 Industrial building construction ○ 236220 Commercial and institutional building construction ○ 238220 HVAC/mechanical contractors ○ 541330 Engineering services ○ 541490 Other specialized design services		
56. 24-GP1-252 AS Eric Vander Mey	C403.7.9	Editorial: Updating section references and terms		No changes to the original petition
	Economic Impact:	**Cost:** No Impact	**Benefit:** Clarification to assist with understanding, application and enforcement of the code	**SBEIS:** No Impact
	NAICS Categories Affected:	○ 238220 HVAC/mechanical contractors ○ 541330 Engineering services ○ 541490 Other specialized design services		

Log Number / Proponent	Section	Description/Rationale		Petition Revisions
57. 24-GP1-257 AM Kevin Rose, NEEA	C503.4.7 Table	Clarifies option to replace gas heating equipment with gas heat pumps		The TAG modified the original petition to relocate the change from C503.4.7 to the associated table
	Economic Impact:	**Cost:** No Impact	**Benefit:** Increases flexibility by removing barriers to use of alternative technology options.	**SBEIS:** No Impact
	NAICS Categories Affected:	○ 236118 Remodeling and renovating construction ○ 236116 Multifamily construction ○ 236210 Industrial building construction ○ 236220 Commercial and institutional building construction ○ 238220 HVAC/mechanical contractors ○ 541310 Architectural services ○ 541330 Engineering services ○ 541490 Other specialized design services		
58. 24-GP1-259 AS Lisa Rosenow, Evergreen Technology Consulting	C402.4.12	Incorporates SBCC Official Opinion No. 23-01 for window-to-wall calculations into Section C402.4.12		No change to original proposed language
	Economic Impact:	**Cost:** No Impact	**Benefit:** Clarification to assist with understanding, application and enforcement of the code	**SBEIS:** No Impact
	NAICS Categories Affected:	○ 236118 Remodeling and renovating construction ○ 236116 Multifamily construction ○ 236210 Industrial building construction ○ 236220 Commercial and institutional building construction ○ 541310 Architectural services		
59. 24-GP1-262 AM Aaron Whitlatch, Glumac	C403.7.5	Remove language in energy code that indicates garage ventilation fans can shut off, which conflicts with language in the mechanical code		The proponent and the TAG revised the originally submitted petition to further clarify and correlate the language
	Economic Impact:	**Cost:** No Impact	**Benefit:** Clarification and correlation of codes assists	**SBEIS:** No Impact

Log Number / Proponent	Section	Description/Rationale		Petition Revisions
			with understanding, application and enforcement of the code	
	NAICS Categories Affected:	○ 236116 Multifamily construction ○ 236220 Commercial and institutional building construction ○ 238220 HVAC/mechanical contractors ○ 541330 Engineering services ○ 541490 Other specialized design services		
60. 24-GP1-266 AM Duane Jonlin, Seattle DCI	C408.1.4.1, C408.1.4.1.1 (New Section)	Clarify which commissioning documents must be submitted at which times. Define optional compliance paths to allow occupancy before all commissioning work has been completed.		The TAG made a minor editorial correction to a section reference
	Economic Impact:	**Cost:** No Impact	**Benefit:** Ensures all systems are functioning as intended to provide the maximum efficiency	**SBEIS:** No Impact
	NAICS Categories Affected:	○ 236116 Multifamily construction ○ 236210 Industrial building construction ○ 236220 Commercial and institutional building construction ○ 238220 HVAC/mechanical contractors ○ 541330 Engineering services ○ 541490 Other specialized design services		
61. 24-GP1-287 AM Larry Andrews	C202	Amend the definition for heated water circulation system to heated service water circulation system		The TAG modified the petition to include changes to the text to correlate with the updated term
	Economic Impact:	**Cost:** No Impact	**Benefit:** Clarification to assist with understanding, application and enforcement of the code	**SBEIS:** No Impact
	NAICS Categories Affected:	○ 236116 Multifamily construction ○ 236220 Commercial and institutional building construction ○ 238220 HVAC/mechanical contractors ○ 541330 Engineering services		
62. 24-GP1-290 AM Eric Vander Mey	C403.7.9	Correlate occupied standby provisions with other WSEC provisions that differ from the 2024 IECC		The TAG made some editorial changes for clarity
	Economic Impact:	**Cost:** No Impact	**Benefit:**	**SBEIS:** No Impact

Log Number / Proponent	Section	Description/Rationale		Petition Revisions
			Correlating interrelated code provisions within the code and with national standards	
	NAICS Categories Affected:	○ 236116 Multifamily construction ○ 236210 Industrial building construction ○ 236220 Commercial and institutional building construction ○ 238220 HVAC/mechanical contractors ○ 541330 Engineering services ○ 541490 Other specialized design services		
63. 24-GP1-291 AM Michael Myer/ Chris Columbus, PNNL	C405.4.1	Modifies how power is calculated for lighting calculations to correlate with ASHRAE and IECC methods		24-GP1-291 rev1 291 rev1 TAG Modification
	Economic Impact:	**Cost:** No Impact	**Benefit:** Correlating code provisions with national standards	**SBEIS:** No Impact
	NAICS Categories Affected:	○ 236116 Multifamily construction ○ 236220 Commercial and institutional building construction ○ 238210 Electrical contractors ○ 541310 Architectural services ○ 541490 Other specialized design services		
64. 24-GP1-295 AM Lisa Rosenow, Evergreen Technology Consulting	Table C402.1.2 and C402.1.3	Editorial: Moving the steel joist framing R.value assembly requirement from a footnote into the body of the tables for easier reference.		The TAG modified the proposal to correlate the U-factor for steel joist framing and the R-value all other joist framing with ASHRAE 90.1
	Economic Impact:	**Cost:** No Impact	**Benefit:** Clarity and easier reference	**SBEIS:** No Impact
	NAICS Categories Affected:	○ 236116 Multifamily construction ○ 236210 Industrial building construction ○ 236220 Commercial and institutional building construction ○ 541310 Architectural services ○ 541330 Engineering services		
65. 24-GP1-296 AS Lisa Rosenow, Evergreen Technology Consulting	Table C402.1.3	Alt. assembly R-value for metal building consistent with the 2024 IECC and ASHRAE 90.1-2025		No changes to the submitted petition

Log Number / Proponent	Section	Description/Rationale		Petition Revisions
	Economic Impact:	**Cost:** No Impact	**Benefit:** Adds flexibility within the code without having to go to alternate methods approval	**SBEIS:** No Impact
	NAICS Categories Affected:	○ 236116 Multifamily construction ○ 236210 Industrial building construction ○ 236220 Commercial and institutional building construction ○ 541310 Architectural services ○ 541330 Engineering services		
66. 24-GP1-297 AS Lisa Rosenow, Evergreen Technology Consulting	C401.1.1, C403.1, C404.1, C405.1	Clarification and fix for process equipment requirements. This removes duplicate language and content errors in the exceptions for equipment used by manufacturing, industrial and commercial processes, and consolidates the requirements for this exception into Section C401.2.2		No changes to the submitted petition
	Economic Impact:	**Cost:** No Impact	**Benefit:** Clarification to assist with understanding, application and enforcement of the code	**SBEIS:** No Impact
	NAICS Categories Affected:	○ 236210 Industrial building construction ○ 236220 Commercial and institutional building construction ○ 541310 Architectural services ○ 541330 Engineering services		
67. 24-GP1-298 AM Erik Bedell, GLY Construction	C403.3.2.7/ C403.4.13	Allowing steam humidification and adding an exception for laboratories; moves the WSEC section regarding humidification equipment to the new IECC section on humidification and dehumidification		The TAG spent considerable time discussing and revising the proposal before arriving at a compromised melding of the IECC and WSEC language.
	Economic Impact:	**Cost:** No Impact	**Benefit:** Provides increased flexibility while addressing safety concerns	**SBEIS:** No Impact
	NAICS Categories Affected:	○ 236210 Industrial building construction ○ 236220 Commercial and institutional building construction ○ 541310 Architectural services ○ 541330 Engineering services		

Appendix C: Documentation of Determinations Required Under RCW 34.05.328

Describe the general goals and specific objectives of the statute that this rule implements. RCW 34.05.328(1)(a)

The Washington State Building Code Act (RCW 19.27) and the Washington State Energy Code Act (RCW 19.27A), together with RCW 34.05.328 and RCW 19.85, establish the following general goals and specific objectives for this rulemaking:

1. **Public Health and Safety**: Protect building occupants and the general public from hazards related to residential construction, fire, structural failure, and environmental health issues
2. **Statewide Uniformity**: Establish consistent building standards across all Washington jurisdictions to ensure predictable compliance requirements
3. **Energy Efficiency**: Promote energy-efficient construction practices that reduce environmental impact and lower operating costs
    - Construct increasingly energy efficient homes and buildings by the year 2031
    - Require new buildings to meet a certain level of energy efficiency but allow flexibility in building design, construction and heating equipment efficiencies within that framework
    - Allow space heating equipment efficiency to offset or substitute for building envelope thermal performance
    - In maintaining the Washington State Energy Code, every three years the council shall review the code and may amend any provisions to increase the energy efficiency of newly constructed residential buildings.
4. **Economic Efficiency**: Minimize unnecessary regulatory burden on businesses, contractors, property owners, and enforcement agencies while maintaining essential safety and performance standards

Explain why this rulemaking is needed to achieve the goals and objectives of the statute. RCW 34.05.328(1)(b)

Public Health and Safety (RCW 19.27.020(1)

The updates to the code provide better insulation value and provide more efficient heating and incentivize cooling for tenants. Modifications were made to humidification systems to ensure cost-effective, hygienic options were available in clinical settings. (24-GP1-264, 24-GP1-255, 24-GP1-256, 24-GP1-169, 24-GP1-260, 24-GP1-176, 24-GP1-298)

Statewide Uniformity (RCW 19.27.031(1)

Changes were made to make the Washington State Energy Code more consistent with the model code. (24-GP1-264, 24-GP1-298, 24-GP1-223, 24-GP1-159, 24-GP1-262, 24-GP1-290, many minor editorial changes throughout the code)

Energy Efficiency and Environmental Goals (RCW 19.27.031(3), RCW 19.27A.020(2), RCW 19.27A.045, RCW 19.27A.160(2))

Several proposals support state energy and environmental policies:

- Improved building thermal envelope (24-GP1-264, 24-GP1-255, 24-GP1-256, 24-GP1-169, 24-GP1-260, 24-GP1-176)
- Ventilation and indoor air quality (24-GP1-271, 24-GP1-272, 24-GP1-196, 24-GP1-273, 24-GP1-251, 24-GP1-252, 24-GP1-290)

- Heating and cooling efficiency (24-GP1-195, 24-GP1-271, 24-GP2-231, 24-GP1-161, 24-GP1-238, 24-GP1-275, 24-GP1-276. 24-GP1-268, 24-GP1-269, 24-GP1-209)

Economic Efficiency (RCW 19.27.031(4))

The amendments reduce regulatory burden through:

- Clarification of ambiguous provisions (reducing interpretation disputes)
- Alignment with national standards (reducing state-specific compliance costs)
- Providing more flexibility to show compliance

Describe alternatives to rulemaking and the consequences of not adopting this rule. RCW 34.05.328(1)(b)

Alternative 1: No Rulemaking (Status Quo)

- **Consequence:** Washington would remain 3-6 years behind national standards and new technologies, hindering the adoption of modern construction practices and creating market barriers for innovative building products and technologies; achieving the statutory requirement of a 70% reduction in energy use would place a burden on users, requiring a larger jump in efficiency gains for the next cycle
- **Impact on Small Business:** Increased confusion, variable interpretation, and inability to predict compliance costs across jurisdictions; more difficulty in achieving compliance with the future code

Alternative 2: Guidance Documents Instead of Formal Rulemaking

- **Consequence:** Guidance documents lack the legal force necessary to ensure uniform statewide application. This would perpetuate inconsistent enforcement and compliance disputes
- **Impact on Small Business:** Continued uncertainty and potential for jurisdiction-specific interpretations that increase costs

Alternative 3: Delayed Adoption (Wait for 2027 WSEC)

- **Consequence:** Washington would continue with outdated provisions or pathways for the use of updated technologies for an additional 3 years, providing a burden on users and local enforcement and maintaining code conflicts; achieving the statutory requirement of a 70% reduction in energy use would place a burden on users, requiring a larger jump in efficiency gains for the next cycle
- **Impact on Small Business:** Continued use of outdated requirements that conflict with current products and practices and difficulty meeting the increased requirements necessary to achieve the 70% reduction in energy use

A preliminary cost-benefit analysis was made available. RCW 34.05.328(1)(c)

Yes. The preliminary cost-benefit analysis was made available through this document, and Sections 1 through 6 of the Individual Measures provide the comprehensive cost-benefit analysis supporting these determinations.

Do the probable benefits of this rulemaking outweigh the probable costs, considering both the qualitative and quantitative benefits and costs and the specific directives of the statute being implemented? RCW 34.05.328(1)(d)

See sections 2-6 of the individual measures.

Is this rule the least burdensome alternative for those required to comply? RCW 34.05.328 (1)(e)

Yes. Each individual measure analysis (see section 6) includes a "Least Burdensome Alternative" determination. Rulemaking as a whole represents the least burdensome approach for the following reasons:

The proposed rulemaking is the least burdensome alternative that achieves the statutory goals of safety, uniformity, energy efficiency, and economic efficiency.

Does this rule require those to whom it applies to take an action that violates the requirements of another federal or state law?

Yes ☐

No ☒

Explain how that determination was made. RCW 34.05.328(1)(f)

No. This rulemaking does not conflict with or violate any federal or state law. On the contrary, it harmonizes Washington State mechanical code requirements with multiple federal and state legal frameworks.

Does this rule impose more stringent performance requirements on private entities than on public entities? RCW 34.05.328 (1)(g)

Yes. ☐ **Provide a citation. Explain.**

No ☒

No. The 2024 Washington State Energy Code applies uniformly based on occupancy, use, condition, or hazard classification rather than on whether the owner or operator is a public or private entity. Public agencies and private parties are subject to the same statewide minimum and maximum code requirements

Do other federal, state, or local agencies have the authority to regulate this subject? List below.

Yes. ☐

No ☒

Is this rule different from any federal regulation or statute on the same activity or subject?

Yes ☐

No ☒

If yes, check all that apply. The difference is justified because:

A state statute explicitly allows SBCC to differ from federal standards. (If checked, provide the citation.)

Yes ☐

No ☒

There is substantial evidence that the difference is necessary to achieve the statute's general goals and objectives. (If checked, explain.)

RCW 34.05.328 (1)(h)

The 2024 Washington State Energy code differs from the model code to meet Washington-specific conditions or policies and the statutory obligations in RCW 19.27A, resulting in an estimated increase in energy efficiency of 25 percent over the model code.

Explain how SBCC ensures that the rule is coordinated with other federal, state, and local agencies, laws, and rules. RCW 34.05.328 (1)(i)

The Washington State Building Code Council coordinates rulemaking through:

1. Inter-Agency Coordination
    - Follows the Administrative Procedure Act 34.05 RCW
    - Collaboration with Commerce (Energy policy, strategic plan)
    - Coordination with Department of Health (indoor air quality)
2. Technical Advisory Group (TAG) Process
    - Multi-stakeholder groups including contractors, engineers, code officials, utilities and agency representatives
    - Review and comment on all proposals for conflicts and coordination issues
3. Public Comment Process
    - Notice to affected federal, state, and local agencies
    - Public hearings and written comment periods
    - Response to agency comments and concerns
4. Model Code Alignment
    - Base amendments on nationally recognized IECC model code
    - Coordinate with the International Code Council development process