2021

WASHINGTON STATE ENERGY CODE
Progress Toward 2030

Progress Toward Reducing Energy Consumption in Buildings Required by RCW 19.27A.160
(ESSSB 5854, Chapter 423, Laws of 2009)

2021 Report to the Legislature
March 2023

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Executive Summary:

On-Track Incremental Improvement in the 2021 Washington State Energy Code

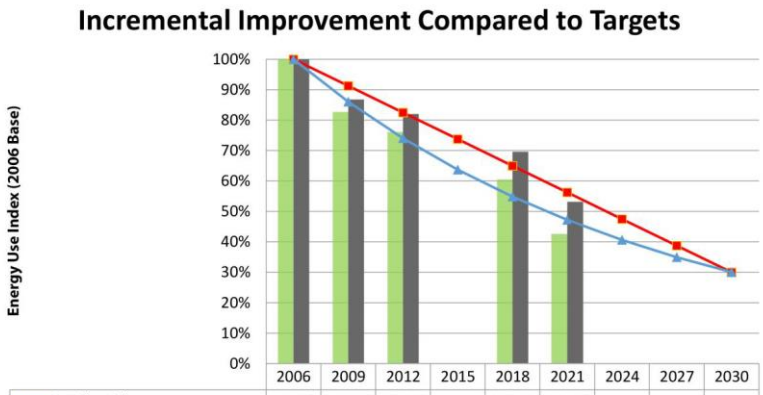
The Washington State Building Code Council (Council) submits this report to the Legislature as required by RCW 19.27A.160. The report addresses progress toward a 70 percent reduction in net annual energy consumption in newly constructed residential and nonresidential buildings by 2031, compared to the 2006 Washington State Energy Code (WSEC). Additionally, RCW 19.27A.020(2)(a) states that the Washington state energy code shall be designed 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.Building energy efficiency is the single largest factor in the region's future electric needs.

"The Northwest Power Act defines cost-effective energy efficiency as the resource of first choice when considering new resources." From 2021 Regional Power Plan https://www.nwcouncil.org/regional-power-planning-pacific-northwest

The 2021 WSECs are an incremental improvement over the 2018 codes. The 2021 WSECs are predicted to achieve approximately 57.6% in Residential buildings and approximately 47% in Commercial buildings compared to the 2006 WSEC.

A major impediment to the acceptance of the ever-increasing building energy consumption reduction is training for the designers, contractors and those responsible for compliance. A large part of that impediment to training is funding. Adequate funding, or at least increased funding, will have immediate results in reducing building energy consumption. RCW 19.27A.150 (3)(c) calls for the Department of Commerce to address the need for enhanced code training and enforcement.

Figure 1



	2006	2009	2012	2015	2018	2021	2024	2027	2030
Residential	100%	82.7%	76.1%		60.5%	42.4%			
Commercial	100%	86.8%	82.0%		69.6%	53.0%			
Target: 8.75 % savings compared to the 2006 WSEC	100%	91%	83%	74%	65%	56%	48%	39%	30%
Target: 14% savings compared to each previous code	100%	86%	74%	64%	55%	47%	41%	35%	30%

Significant Measures

Table 1: Significant measures for the Commercial Energy Code adopted by the Council that save energy compared to the 2018 WSEC:

Section	Description of Significant Change
C402.1.4.3	PTAC U-factors: New section requires heat loss for PTAC, PTHP and other through-wall mechanical equipment to be calculated as part of the envelope using the U-factor compliance method, with corresponding changes to Tables C402.1.3 and C402.1.4
C403.1.1, Appendix D	HVAC TSPR: Adds multifamily residential to the list of occupancy types required to comply with the Total System Performance Ratio comparison, as well as providing system updates and clarifications to the procedure.
C403.1.4, C503.4.6	Space Heating Proposal: Requires heat pump space heating rather than fossil fuel or electric space heating for all buildings to provide a reduction in carbon emissions. Exceptions are provided to allow electric resistance heating for small loads and as supplemental heating.
C403.13	Indoor Horticulture Dehumidification: Adds requirements for dehumidification efficiency for indoor growing facilities.

Section	Description of Significant Change
C403.3.2.4	Include Split Systems in HP Requirement: Requires packaged and split systems providing heating and cooling, or cooling only to be heat pumps. The requirement previously applied to packaged systems with both heating and cooling.
C403.3.4	Boiler Controls: Adds requirements from ASHRAE 90.1 for high capacity gas-fired hot water boiler systems to have condensing boilers.
C403.3.4.2	High capacity space heating boiler: Adds requirements from ASHRAE 90.1 for high capacity gas-fired hot water boiler systems to have condensing boilers
C403.3.5.1	ERV requirements for DOAS: Increase the ERV effectiveness to 60 percent enthalpy recovery effectiveness or 68 percent minimum sensible recovery effectiveness, from the previous values of 50/60 percent. The exception is also limited to 650 square feet, with a smaller allowance for occupant load.
C403.4.1.7	DR Thermostats: Adds a requirement for demand responsive controls for thermostats in all buildings except health care and assisted living. It does not require participation in any demand response programs.
C403.7.1	DCV: Replaces the current DCV language with a new section and removes the energy recover exception and reduces various thresholds. Requires gas sensors in spaces and systems required to have VSD control. Correlating changes to C403.3.5.1 and C503.4.4.
C403.8, C503.4	Fan Power Allowance Tables: Updates the approach to fan power limitations and aligns with the Title 24 method. It also moves the threshold down to cover smaller nameplate HP fans.
C404.14	DR Water Heaters: Bring in demand response requirements for water heaters between 40 and 120 gallons to provide grid flexibility as a step towards decarbonization
C404.2.1, C404.7, C503.5.9	Heat Pump Water Heating: Provide heat pump water heating rather than fossil fuel or electric resistance water heating in commercial buildings to provide a reduction in carbon emissions. Exceptions are provided to allow electric resistance heating when used for hand washing.
C405.5.1	Exterior Building Grounds Lighting: Lowers the threshold for lighting efficacy requirements from 50 watts to 25 watts and simplifies the language.
C405.5.3	Exterior Lighting: Updates the exterior lighting tables in response to changes in technology, with an approximate 40 percent reduction across the board.

Section	Description of Significant Change
C406	Additional Efficiency Credits: Increases the required number of energy efficiency credits to be achieved. The requirements were increased approximately 16 percent, if the heat pump water heating proposal is adopted, and by approximately 33 percent if it is not. Section C406 was reformatted and now sets credit requirements by occupancy type. The metric for credit options was changed to carbon emission and a standard of 0.1% reduction per point was set as the basis.
C406.3	Load Management: Adds load management requirements for new buildings to prepare buildings to interact efficiency with the evolving electrical grid in the future. Corresponding change also made to Section C403.4.11.1.
C411.1	On-Site Renewable Energy: Requires on-site renewable energy generation for commercial buildings over 10,000 square feet.
C412	Compressed Air: New section proposed to regulate compressed air systems based on language from the Seattle code and California's Title 24 (2022 edition). This would apply to process loads.
C503.6	Reduce Threshold for LPA Compliance on Remodels: Requires alterations replacing 20% or more of existing lighting fixtures to comply with the lighting power allowance in Section C405. The previous threshold was 50%.

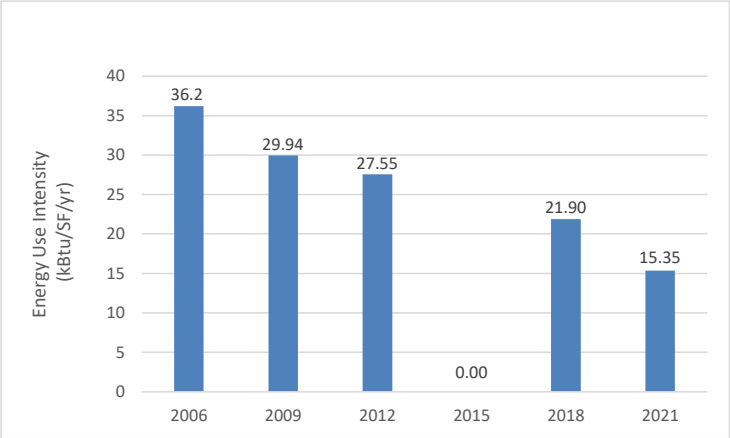
Table 2: Significant measures for the Residential Energy Code adopted by the Council that save energy compared to the 2018 WSEC:

Section	Description of Significant Change
R403.13	Heat Pump Space Heating: This new section requires that space heating be provided by a heat pump—either gas or electric—as a method to reduce greenhouse gas emissions and save energy. There are exceptions provided for dwellings with small heating loads and allowances for supplementary heating following the control requirements of Section R403.1.2.
R403.5.7	Heat pump Water Heating: This new section requires that service water heaters in single family dwellings, duplexes and townhouses be provided by heat pump water heaters. Exceptions are provided for small water heaters, small dwelling units, supplemental water heating systems, and some renewable energy systems. This includes allowances for both gas and electric heat pump water heaters.
R202	Definition of Residential Building: This definition change alters the scope of the Washington State Energy Code, Residential Provisions to resemble more closely that of the International Residential Code. Multifamily buildings with dwellings directly accessed from the outdoors will remain in the residential provisions, but other R-2 buildings are moved under the commercial provisions.
R406.2	Fuel Normalization: The table was revised to include more detailed descriptions of heating systems and supplemental systems.
R406.3	Additional Efficiency Credits: The number of credits required was adjusted based on the estimated savings needed to meet the 14% savings goal over the 2018 code, keeping in mind the gains already achieved through the base code changes. The options were updated based on base code requirements and the value of the credits is based on a 1200 kWh energy savings per point.
R402.4.1.3	Maximum Air Leakage Rate: The maximum leakage rate was reduced to 4 air changes per hour for single family and 0.25 cfm (the same as the commercial requirement) for multifamily.
R403.5.5	Water Heater Location: This section requires that water heaters be located within conditioned space except for highly efficient water heaters where the standby losses are overcome by the efficiency of the unit performance. An exception is provided for heat pump water heaters.

Table 3: Commercial Building Energy Use Savings Over 2018 WSEC-C by Type (Including Statewide Commercial Weighting by Building Floor Area)

Building Type	Annual Energy Savings (State Average)	Fraction of Total Floor Area (State Average)
Small Office	12.7%	6.2%
Large Office	8.8%	18.0%
Standalone Retail	19.2%	17.8%
Primary School	13.4%	9.2%
Small Hotel	32.5%	1.8%
Midrise Apartment	34.7%	47.0%

Figure 2: Residential Sector EUI by Code Year (2006 through 2021)



Method

In 2018, the SBCC contracted with Ecotope to establish an energy use baseline for the 2006 code to be used to evaluate building performance improvements.

For the 2021 code, the SBCC contracted with Pacific Northwest National Laboratory (PNNL) to evaluate the changes from the 2018 code. They assessed the life cycle costs and savings and greenhouse gas emissions impacts of those code changes, focusing on those changes noted above as significant measures. The methodology used for this analysis is consistent with the Washington State Office of Financial Management (OFM) Life Cycle Cost analysis. This analysis includes incremental initial costs, repairs, maintenance, and replacements. The residual value of equipment and components that have remaining useful life at the end of the study period is also included.

The cost-effectiveness analysis for the commercial code uses six building types represented by six prototype building energy models. The six prototypes shown in Table 3 provide a good representation over the overall code cost effectiveness without requiring simulation of all 16 standard prototype models and represent the energy impact of five of the eight commercial principle building activities that account for 70% of the state's new construction by floor area. The residential analysis used two prototypes—a single-family dwelling at 2,376 square feet and a multifamily dwelling unit at 1,200 square feet—with four foundation types and four heating system types.

Estimated Energy Savings

The estimated energy savings reported here were derived from the *Final Cost-Benefit Analysis of the 2021 WSEC* reports. See Appendix A.

Table 4: Commercial Building Energy Cost and Use Savings Over 2018 WSEC-C

Building Type	Annual Energy Savings	Annual Energy Cost Savings ($/ft^2)	Net Present Savings ($/ft^2)	Present Social Cost of Carbon ($/ft^2)	Net Present Social Cost of Carbon ($/ft^2)
Small Office	12.7%	$0.07	$0.64	$0.15	$0.79
Large Office	8.8%	$0.09	$1.69	$0.35	$2.04
Standalone Retail	19.2%	$0.11	$1.32	$0.51	$1.83
Primary School	13.4%	$0.08	$0.83	$0.40	$1.23
Small Hotel	32.5%	$0.28	$7.34	$2.85	$10.19
Midrise Apartment	34.7%	$0.29	$2.96	$0.94	$3.89

Table 5: Residential Building Energy Cost and Use Savings Over 2018 WSEC-C

Metric	Compared to 2018 WSEC-R
Annual (first year) energy cost savings ($)	$39
LCC savings ($)	-$580
SCC LCC savings ($)	$1,294
Total LCC savings ($)	$714
Added construction cost ($)	$548
First year carbon emissions savings (tons)	30.6
Simple payback period (yrs)	13.8
Annual electric savings (kWh)	–2,124
Annual gas savings (therms)	230
Annual fuel oil savings (gallons)	0.44

Outlook

The Council continues making steady progress to achieve the goal of 70 percent net annual reduction in building energy consumption by 2031. The Council is mindful that with each code cycle the cost to achieve the additional energy reduction is higher than it was for the previous code.

Background

The WSEC is based on a national model code that is less energy efficient than the WSEC, therefore, the State adoption process requires significant work prior to considering new energy saving amendment proposals. This preliminary process alone requires approximately 300 staff and volunteer hours.

Completing the code adoption process involves multiple additional steps of code development including technical advisory group review and revision, the Council's Mechanical Ventilation and Energy Standing Committee review, Council approval of proposed rules, public comments and hearings, and final action.

Transparency throughout the process is crucial requiring extensive staff support.

The public process for code development represents a major time commitment for preparation, meetings and reporting.

The energy code has historically drawn opposition due to differences in political and economic philosophies. Full consideration of these opposing perspectives has resulted in additional staff and volunteer time as well as the need, at times, for legal counsel.

The law mandates continuous improvement to energy efficiency in buildings. However, the law also states that if economic, technological, or process factors impede adoption, the Council may defer adoption, and that all measures standards or requirements must be technically feasible, commercially available and developed to yield the lowest overall cost to the building owners and occupant while meeting the energy reduction goals established under RCW 19.27A.160. Various stakeholders disagree on whether or not the new rules increasing energy efficiency in buildings are cost effective, and those who believe they are not advocate for deferral stating the economic burden and technological unknowns do not justify new regulations.

Commented [BS(1]: Let's talk about this. I like it, but let's discuss.

Commented [BK(2R1]: These are both sections I didn't change.

The Council does not operate in isolation. State law also directs the Department of Commerce to develop and implement a strategic plan for enhancing energy efficiency, which must be used to help direct the future code increases in RCW 19.27A.020, with targets for new buildings consistent with RCW 19.27A.160. While this legislation anticipates that the plan will help inform the WSEC update process, funding that would enable the anticipated level of planning and guidance from Commerce is lacking.

Commented [BS(3]: Let's talk about this. I like it, but let's discuss.

Commented [BK(4R3]: This isn't criticizing Commerce as much as the Legislature.

The Council consists of 15 voting members appointed by the Governor, four ex-officio legislators appointed by the Legislature, and one ex-officio member appointed by the chief electrical inspector. The Council provides independent analysis and objective advice to the Legislature and the Governor's Office on state building code issues.

The Council establishes the minimum building, mechanical, fire, plumbing and energy code requirements necessary to promote the health, safety and welfare of the people of the state of Washington by reviewing, developing and adopting the state building code.

The Council updates the state building codes every three years, on schedule with updated editions of the national model codes. There was a one-time extension to four years for the 2018 codes to accommodate a revision in the SBCC review process, and the implementation of the 2018 code was delayed seven months due to pandemic-related issues. The Energy Related Building Standards law (RCW 19.27A) directs the Council to update the Washington State Energy Code every three years, synchronized with the code development cycle. In each cycle, the Council must make an incremental step toward the 70 percent reduction by 2030.

Energy Code Development Process

The Council relies on a large number of volunteers to develop energy code amendments, submit proposals, participate in the technical review, and submit testimony for SBCC consideration at final adoption.

- Of 205 proposals received, 54 were not approved to move forward to the public hearing process. Of those 147 proposals, 30 were significant energy saving proposals; the remainder were editorial clarifications or minor technical changes. Of the 30 significant proposals, 4 were not adopted.
- The 30 members of the Energy Code Technical Advisory Groups each logged between 60 to 140 hours of meeting time and countless additional hours of review time over 15 months.
- The Council used a form requiring more detailed information about energy savings and cost for each proposal. See Appendix C.

State and Federal Law on Building Energy Codes

The Washington State Legislature and the Governor's Office have directed the state Building Code Council to adopt energy codes. Federal Law also requires the state to meet minimum standards.

Targets set by the Climate Pollution Reduction--Energy Efficiency Act of 2009

The goal to reduce energy savings by 70 percent compared to 2006 by 2030 relates to an initiative of the American Institute of Architects (AIA). The AIA's Architecture 2030 Challenge was adopted in 2009 by the Washington State Legislature. As emphasized in testimony by Washington Environmental Council, Washington is one of nine states to adopt the Architecture 2030 initiative. According to the Architecture 2030 website, only California and Washington have adopted the 2030 challenge as mandatory for all buildings; other states have adopted Architecture 2030 for government buildings or directed that the challenge must be considered during administrative code adoption.

- Energy-Related Building Standards Law (RCW 19.27A)
- The Legislature directed the Council to reduce energy consumption in buildings, as codified in RCW 19.27A.160 **Residential and nonresidential construction — Energy consumption reduction — Council report:**

(1) Except as provided in subsection (2) of this section, residential and nonresidential construction permitted under the 2031 state energy code must achieve a 70 percent reduction in annual net energy consumption, using the adopted 2006 Washington State Energy Code as a baseline.

(2) The Council shall adopt state energy codes from 2013 through 2031 that incrementally move towards achieving the 70 percent reduction in annual net energy consumption as specified in subsection (1) of this section. The Council shall report its progress by December 31, 2012, and every three years thereafter. If the Council determines that economic, technological or process factors would significantly impede adoption of or compliance with this subsection, the Council may defer the implementation of the proposed energy code update and shall report its findings to the Legislature by December 31st of the year prior to the year in which those codes would otherwise be enacted.

The International Energy Conservation Code (IECC) is the base model energy code adopted by the State of Washington. The IECC defines buildings in terms of "commercial" and "residential."

- Residential buildings are defined as detached one and two family dwellings and multiple single family dwellings (townhouses) as well as apartment buildings three stories and less in height. This scoping is modified by the 2021 Washington State Energy code, which moves apartment buildings with interior corridor access into the commercial energy code.
- Commercial buildings are defined as all buildings other than residential buildings, and include residential apartment buildings over three stories.

RCW 19.27A.150: Strategic plan—Development and implementation.

- (1) To the extent that funding is appropriated specifically for the purposes of this section, the department of commerce shall develop and implement a strategic plan for enhancing energy efficiency in and reducing greenhouse gas emissions from homes, buildings, districts, and neighborhoods. The strategic plan must be used to help direct the future code increases in RCW 19.27A.020, with targets for new buildings consistent with RCW 19.27A.160. The strategic plan will identify barriers to achieving net zero energy use in homes and buildings and identify how to overcome these barriers in future energy code updates and through complementary policies.
- (2) The department of commerce must complete and release the strategic plan to the legislature and the council by December 31, 2010, and update the plan every three years.

Federal law influencing state code development and adoption

Federal law requires states to periodically certify that the energy code adopted in their jurisdiction meets or exceeds specific national reference standards.[1] This certification is to be submitted to the Secretary of the U.S. Department of Energy (DOE). The most recent rules require each state to report that their adopted commercial building energy code meets or exceeds American Society of Heating, Refrigerating and Air conditioning Engineers (ASHRAE) Standard 90.1-2019, and the adopted residential building energy code meets or exceeds the 2021 International Energy Conservation Code.
1-42 U.S.C 6833(b)(2)(B)(i)

State Certification

Upon publication of an affirmative determination, States are required to certify that they have reviewed the provisions of their commercial building code regarding energy efficiency, and, as necessary, updated their codes to meet or exceed the updated edition of Standard 90.1 and the IECC. Additionally, DOE provides guidance to States on submitting certification statements and requests for deadline extensions. State certifications must be submitted by July 28, 2023.

Equipment Efficiency

Federal efficiency standards for building heating and cooling equipment must be applied. For residential and small commercial equipment this is primarily regulated by restricting the manufacture and sale of the equipment. Any minimum efficiency that is referenced in the energy code must be consistent with the minimum federal standards. For commercial energy codes this largely means adopting the minimum equipment efficiency tables listed in the most recent edition of ASHRAE Standard 90.1.

[1] Footnote 1: ASHRAE 90.1-2016 defines regulated and unregulated energy use as follows:

- ***Regulated energy use:*** energy used by building systems and components with requirements prescribed in Sections 5 through 10. This includes energy used for HVAC, lighting, service water heating, motors, transformers, vertical transportation, refrigeration equipment, computer-room cooling equipment, and other building systems, components, and processes with requirements prescribed in Sections 5 through 10.
- ***Unregulated energy use:*** energy used by building systems and components that is not regulated energy use. (See regulated energy use.)

Most Recent Washington Certification

The state certifications will be submitted to the Department of Energy by the Washington State Department of Commerce, State Energy Office. This certified that the state code in general provided greater energy efficiency than the commercial building reference standard ASHRAE 90.1 – 2013 and the residential standard, the 2015 International Energy conservation code. There were a few specific measures where Washington did not meet the federal standards.[2]

Commented [BS(5]: Are the years correct?

Commented [BK(6R5]: Not according to DOE, which says the last time we submitted anything was back in 2012, but we're quoting here from a later report that was supposedly sent….

Washington amendments to the 2021 IECC

2021 Energy Code Development

The Council relies on individuals and interest groups to submit proposals to improve the WSEC and meet the goals set by the Legislature. A complete list of proposals is posted on the Council website for both the commercial and residential energy codes[3]. The amendment proposals include information on proponents, specific code language and data on the cost and benefit where the amendment has an impact.

Number of proposals	Approved as submitted	Approved as modified	Disapproved	Withdrawn
205	**50**	**95**	**40**	**20**

Technical Advisory Group (TAG) activities

The Energy Code TAGs held 21 meetings in 2021-2022, each work session was typically 6 hours long. The TAG was composed of 30 members, plus several alternates, with 18 – 25 members typically in attendance at any one meeting, depending on the discussion topic. Proponents were invited to make a short presentation of their proposal(s), after which any TAG members can make a motion and a second to approve it. Straightforward code improvements are often approved or modified within a few minutes, while more substantial or controversial proposals were debated for hours and often extensively modified in the process. Some proposals were tabled, and the proponents and opponents asked to return with more information or compromise proposals.

As part of proposing a code change, proponents were required to provide recommended changes to the code text and to complete an updated form (See Appendix C). This form asked the proponent to provide a statement justifying the code change and provide some general

[2] Washington State Department of Commerce, 2012 Washington State Energy Code compared to National Reference Standards, July 2013. http://www.commerce.wa.gov/Documents/2012-energy-code-comparison.pdf

[3] See https://sbcc.wa.gov/about-sbcc/2021-code-proposals

information of the cost and benefits associated with the proposal. Proposals were required to show economic information, data estimating costs and benefits. Many of the adopted proposals were extensively modified during the TAG and Council processes, which would have reduced the value of the original cost/benefit analyses.

Goals for Energy Code Development

Making buildings more energy efficient has been identified as a priority by the Legislature and the Washington State Building Code Council (Council). Improved energy efficiency:

- Saves money
- Creates good local jobs
- Enhances energy security
- Reduces pollution that causes global warming
- Speeds economic recovery
- Reduces need to invest in costly new generation

The Washington State Building Code Council (Council) finds that the following provides a guide to the Goals of the Washington State Energy Code (WSEC) per RCW 19.27A for both Residential & Nonresidential Buildings:

1. **Per RCW 19.27A.020(2)(a)** The Washington state energy code shall be designed 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.
2. **The WSEC must achieve a reduction in annual net energy consumption in buildings**
   a. By 2030, the code must achieve a reduction of 70 percent compared to the 2006 Washington State Energy Code. This reduction includes both the building site energy that is regulated and typical unregulated energy use (see footnote 1 for definitions). Energy consumption for electric vehicle charging and industrial processes is not included in the building energy use reduction targets. Site renewable energy production is included towards the net annual reduction goals.
   b. Each code cycle, the Council must adopt a code requiring increasingly energy efficient homes and buildings
   c. The Council must determine and evaluate the costs and benefits of the WSEC

3. The Council must adopt more stringent energy codes

a. The Legislature finds that energy efficiency is the cheapest, quickest, and cleanest way to meet rising energy needs, confront climate change, and boost our economy

b. The Legislature promotes super-efficient, low-energy use building codes

c. The law directs the council to review the Washington state energy code every three years. Amendments adopted by the council must increase the energy efficiency of newly constructed buildings.

4. The Council must evaluate and determine the costs and the benefits

a. The Legislature finds 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

b. Any new measures, standards, or requirements adopted by the Council must be technically feasible, commercially available, and developed to yield the lowest overall cost to the building owners and occupants while meeting the energy reduction goals established under RCW 19.27A.160.

c. The Council has adopted a definition of cost-effectiveness based RCW 39.35 recommended by Department of Commerce

d. The Council is directed by RCW 19.27A.020(2)(a) to adopt rules that are designed 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 2031.

e. A guide on how to evaluate cost-effectiveness is therefore defined by the Council as a code change that has a net present savings over a 50-year life-cycle of a building utilizing the Life Cycle Cost Tool (LCCT) as developed by the Washington State Office of Financial Management (OFM). The method of the LCCT is based on the NIST Handbook 135 methodology and utilizes specific inputs as determined by the Council with guidance from the Washington State Department of Commerce. (http://www.ofm.wa.gov/budget/facilities/costanalysis.asp). The cost-effectiveness analysis shall use the average useful life years from the Appendix 7 of the BOMA Preventive Maintenance Guidebook for all building components that are evaluated (https://icap.sustainability.illinois.edu/files/projectupdate/2289/Project%20Lifespan%20Estimates.pdf). An alternate method of cost effectiveness analysis or determining average useful life years of building components may be applied.

f. If the council determines that economic, technological, or process factors would significantly impede adoption of or compliance with incremental progress towards the 70 percent reduction in annual net energy consumption, the council may defer the implementation of the proposed energy code update and shall report its findings to the Legislature by December 31st of the year prior to the year in which those codes would otherwise be enacted.

5. The Council has established rules for amendment of the WSEC

a. Residential energy code covers residential buildings including single family homes, townhouses, and some multi-family dwelling unit buildings that are 3 stories and less.

b. Commercial energy code covers all non-residential dwelling unit buildings, some multi-family dwelling unit buildings that are 3 stories and less, and all residential buildings that are 4 stories and more and all residential sleeping unit buildings regardless of the number of stories.

c. The International Energy Conservation Code is the base document for the development of the WSEC. Washington state amendments are integrated into the base document.

d. In considering amendments to the state energy code, the Council established and consulted with a technical advisory group including representatives of appropriate state agencies, local governments, general contractors, building owners and managers, design professionals, utilities, and other interested and affected parties

Life Cycle Cost Analysis of Energy Code Measures

Evaluating costs and benefits

In order to evaluate proposals to improve energy efficiency in buildings, the Council adopted the Life Cycle Cost Tool (LCCT-Appendix B) developed by the Washington State Office of Financial Management (OFM). All measures must be technically feasible, commercially available and developed to yield the lowest overall cost to the building owner and occupant while meeting the energy reduction goals established under RCW 19.27A.160, and the Council determined that a net present savings over a 50 year period meets the cost effectiveness criteria.

The Council established an Economic Workgroup to review the proposed amendment and the economic criteria. The workgroup met twice to review the TAG recommendations. The workgroup is composed of Council members. Minutes and meeting documents for the Economic Workgroup are available on the Council website.

Some members of the workgroup expressed concern over the 50 year life cycle. For some of the measures, 50 years exceeds the expected life of the equipment. Future replacements costs and available technology are not known. The Workgroup did adopt the goals stated earlier in Section 3 of this report, with an explanation that the Life Cycle Cost Analysis would factor in equipment replacement costs and use an agreed upon set of parameters for inflation, discounts, and fuel escalation among other costs.

The methodology used to calculate the energy savings achieved through code for a large population of buildings is that used for development of the Northwest Power Plan. This method is most appropriate for documenting the costs and savings for broad application of the energy code. The NPPC model has accurately forecast energy use in the region for several decades.

In some cases, costs for measures based on estimates provided by code amendment proponents varied widely. In those cases, the Council considered a range of costs and values such as years to positive cash flow as well as net present value. Information on the Life cycle cost analysis presented during the 2021 code adoption is available on the Council website.

New Measures Bring Incremental Improvements

An initial estimate of savings under the 2021 WSEC provides some round figures based on initial proposals, TAG review and input, and public testimony.

A comparison between the 2006 code and the 2021 code was performed to provide an accurate representation of savings, and then the actual energy use of new construction should be monitored to validate the estimates. See Appendix A.

For residential buildings, defined as one and two family and town houses regulated by the International Residential Code, and apartment buildings three stories and under, the incremental improvements are on target.

For commercial buildings, which include all buildings not covered by residential, the progress is also on target. The state law directs the Council to “incrementally move toward” the 70 percent reduction in energy use. The improvement targets are based on equivalent savings in each three year cycle through 2030.

Moving toward 2031 targets for building energy savings

The code development process involves several stages over the three year cycle, all of which must engage stakeholders and be transparent:

- Preliminary process to examine national model code and align proposed updates with state mandates. The 2024 IECC, on which Washington will base the 2024 WSEC, will be published in the fall of 2023.
- Technical advisory group review and revision
- Council approval of proposed rules
- Public process, including taking public comments and holding hearings
- Final revision and action

The path to achieve the 70% energy use reduction required by 2031 (RCW 19.27A) will involve continuing and accelerating the transformation of the building industry. An analysis performed by the Northwest Energy Efficiency Alliance (NEEA) was recently published that suggests that achieving the reduction may necessitate the regulation of plug and process loads not currently regulated under the State Energy Code. See https://neea.org/resources/washington-state-commercial-energy-code-technical-roadmap. While training is not the purview of the Council, we understand that this significant transformation requires robust training to be successfully implemented. The energy code has become more complex and incorporates more testing and skill and will continue to do so as we get closer to 2031. This will need to be paired with increasingly robust funding of training for designers, contractors, trades, and other parties to implement the energy codes.

There are several new considerations that have a relationship with the energy code development:

- 2019 Clean Buildings Law. This requires audits and potential retrofits of new and existing buildings that use more energy than the average building of that type. Deep energy retrofits will fall under the energy code as will new buildings built under the new energy code that do not meet the energy use targets. Rule-making is ongoing and the state building code council should be proactive to ensure that new buildings built to code are likely to meet the energy use targets.
- 2019 Clean Energy Transformation Act. This requires electric utilities to supply Washington customers with carbon neutral electricity by 2030, with limited offsets possible. By 2045, utilities must supply Washington customers with electricity that is 100% renewable or non-emitting, with no provision for offsets. This means that the carbon emissions from Washington buildings that do not combust fossil fuels will reach zero within the reasonable lifetime of buildings built under current and future codes. RCW 19.27A.020 states that the Washington state energy code shall be designed 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." With the electricity sector required to have zero fossil fuel emissions, this means that the code council has a pathway to achieve zero fossil fuel greenhouse gas emissions homes and buildings by pursuing efficient electrification.