STATE OF WASHINGTON

WASHINGTON STATE BUILDING CODE COUNCIL

Improving the built environment by promoting health, safety and welfare

2012 WASHINGTON STATE ENERGY CODE

LEGISLATIVE REPORT

Progress Toward Reducing Energy Consumption in Buildings

Required by ESSSB 5854, Chapter 423, Laws of 2009

December 2012

Prepared by State Building Code Council

Report to the Legislature

C. Ray Allshouse, Chair

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Executive Summary:

The Washington State Building Code Council (Council) submits this report to the legislature as required by RCW 19.27A.160, to report on the incremental 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). The Council has been provided two models for measuring incremental changes. The two models are:

1. Each code cycle; reduce target energy use by 8.75% compared to the 2006 WSEC.
2. Each code cycle; reduce target energy use by 14% compared to the previous edition of the WSEC.

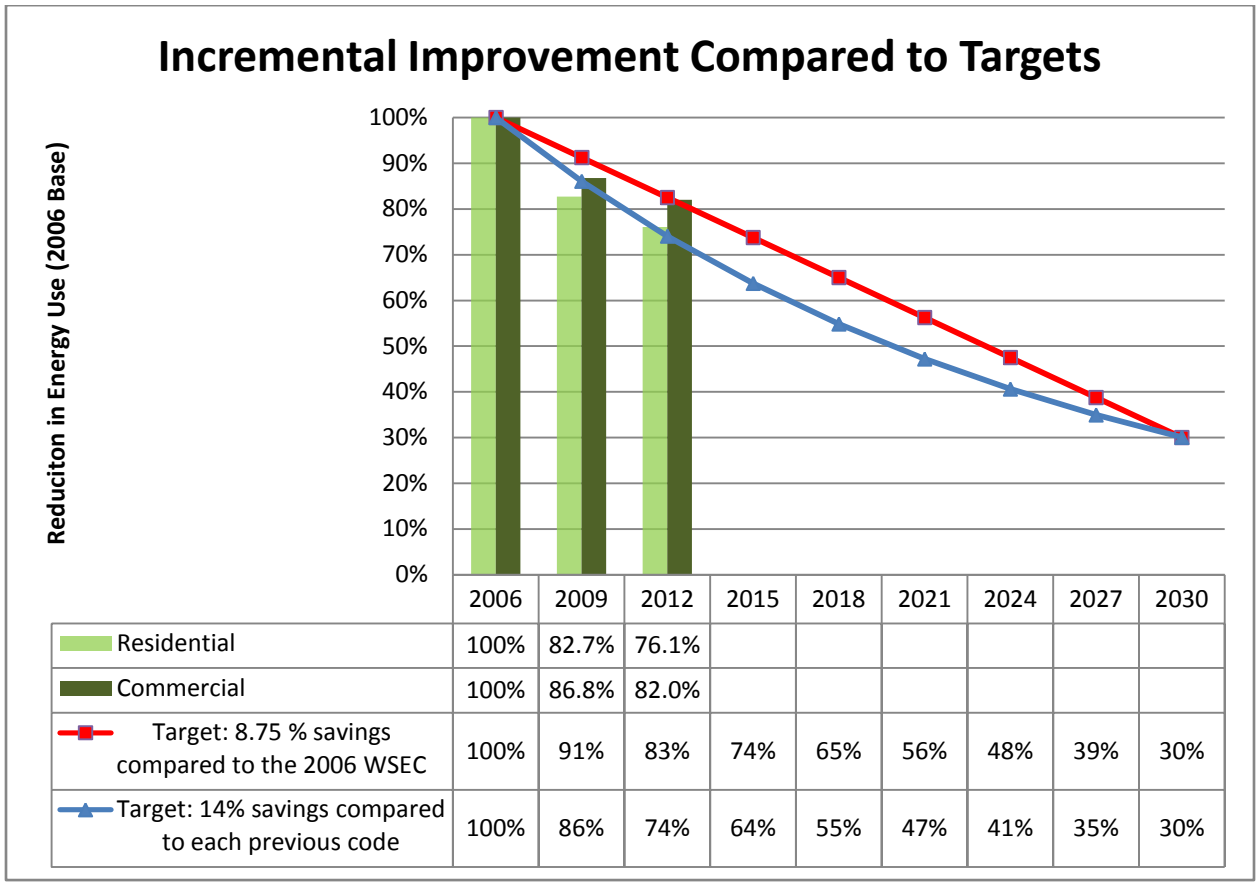
The Council has completed two incremental steps toward the goal of a 70% reduction by 2031 compared to the 2006 WSEC. The first step in 2009 was in response to the Climate Action Team recommendation of a 30 percent improvement over the 2006 WSEC (Appendix E). The 2009 Washington State Energy Code achieved a 17 percent reduction in energy consumption for residential buildings and a 13 percent reduction in energy consumption for commercial buildings.

The second step was the 2012 code adoption. In this cycle, the SBCC used the 2012 International Energy Conservation Code as the base code and added amendments. The proposed rule included amendments to maintain the 2009 levels of efficiency, and 2012 amendments to meet the energy use reduction targets. For residential buildings, the final rule achieves an additional 8 percent reduction in energy use, for a total 24 percent reduction in energy consumption over two code development cycles compared to the 2006 WSEC.

For commercial buildings, the public review draft of the 2012 WSEC represented an additional 8 percent reduction in energy consumption. Upon final adoption the Council approved several motions to relax the provisions, resulting in a final rule with a 5-6 percent reduction in energy use in commercial buildings. The total for two code development cycles is approximately an 18 percent reduction in energy consumption for commercial buildings.

The initial steps towards a 70 percent reduction in net annual energy usage have been difficult and controversial. Future reductions in energy use will be even more challenging as the WSEC requires greater energy efficiency in buildings to meet the long term goal.

Incremental Improvement Compared to Targets



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Residential	100%	82.7%	76.1%						
Commercial	100%	86.8%	82.0%						
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%

The newly adopted 2012 WSEC (WAC51-11R & WAC 51-11C) will become effective on July 1, 2013. The improvements meet the measurement model of an 8.75 percent improvement each three year cycle. However, the reduction in consumption is short of the more aggressive target of 28 percent (14 percent per code cycle), and the Climate Action Team recommendation of a 30 percent improvement over the 2006 WSEC. A number of factors contribute to the shortfall. More aggressive code provisions were not supported by some stakeholders in the construction and enforcement communities. The Council was unable to conduct the detailed economic analysis to show the validity of some of the measures, and proponents of specific measures did not submit detailed cost and benefit data. Finally, technical issues emerged during detailed analysis of the proposed rules which necessitated modification or deletion.

Federal law requires states to periodically certify that the energy code adopted in their jurisdiction meets or exceeds specific national reference standards. The Council's preliminary analysis indicates that the 2012 WSEC will exceed the federal target for the residential construction but will fall short of this federal target for commercial construction by 1 or 2 percent. However, the 2012 WSEC does represent significant progress, and the intent of the Council is to maintain the current code development cycle, with the next significant amendments to occur in 2015. Additionally, Washington State will be closer to the federal target for commercial occupancies than many of the other states that are adopting the 2012 IECC without amendments.

The 2012 WSEC marks a significant step in energy code development for Washington State. Achievements include the incorporation of the 2012 IECC, maintaining and exceeding the energy efficiency of the 2009 WSEC, maintaining the flexibility and enforceability of the 2009 WSEC, clarification of how the energy code is applied to industrial occupancies, and development code proposals to be submitted by Washington State for development of the 2015 IECC.

The Council must address a number of process, economic and technological factors to achieve the goal of 70 percent net annual reduction in building energy consumption by 2031.

Process Factors

a. The Department of Commerce published a strategic plan for enhancing energy efficiency in and reducing greenhouse gas emissions from homes, buildings and neighborhoods (Appendix I) in December 2010 as required by RCW 19.27A.150. The plan must be updated every three years. The Council requests direction on how the plan is to be applied to the process of energy code adoption, and what elements of the plan need additional input and change.

b. The Council follows an established process for review and adoption of the state building codes. The energy code has economic and technological elements that require additional review and analysis.

Economic Factors

a. The law requires both that energy use in buildings be reduced and that new energy code measures be cost-effective to building owners and tenants. The Council considers a wide range of economic data and input, and needs a consistent definition of "cost effectiveness ".

b. The energy code upgrades are intended to save energy at a cost less than construction of new energy sources. The Council needs a method to determine that the energy savings continue to be cost effective for the life of the building.

Technological Factors

a. The scope of the energy code has historically been applied to the heating, cooling, ventilating and lighting systems in a building, and to the building envelope glazing and insulation and air sealing. To reduce overall energy usage in buildings, the Council needs to determine how to regulate other energy use such as plug loads for equipment and computers.

b. The reduction in energy use in buildings is highly dependent on the operation and maintenance of the building. An efficient and effective training program is needed for building operators, and for building users and the general public. Training must also be maintained for code officials, architects, engineers, and construction workers.

c. The local building departments are responsible to enforce the energy code provisions. As the energy code is becoming increasingly more complex, enforcement also becomes more difficult. The Council needs to address the methods of enforcement.

d. The law has specific goals for reduction in energy consumption in buildings. The Council needs a method to measure and verify the impact of new energy code measures each cycle.

e. In the future the Council must address not only building construction, but also operation of the buildings for energy use. The Council will consider "outcome" based codes, where the energy use of the building is evaluated.

1. State and Federal Law on Building Energy Codes

a. Recent History of the Energy Code in Washington State

In 2008, the Climate Action Team and the Governor recommended that the Council adopt an energy code to reduce energy consumption in buildings by 30 percent compared to the 2006 WSEC (Appendix E). During the 2009 adoption year, the Council adopted revisions to the state energy code that improved the energy code by between 12 and 17 percent. Rules adopted by the Council must be adopted by December of the adoption year and cannot take effect until after the following regular legislative session. The implementation date was delayed due to economic impact concerns. The concerns included a review and objection by the legislative Joint Administrative Rules Review Committee (JARRC). The JARRC objected to the process of Council reporting on potential impact on the economy and jobs. The 2009 Washington State Energy Code became effective on January 1, 2011.

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

The 2009 Washington State Legislature adopted specific energy consumption reduction targets to be achieved through adoption of improved energy codes. (ESSSB 5854, Chapter 423, Laws of 2009). This act, the Climate Pollution Reduction--Energy Efficiency Act, coincides with the 2012 Council code adoption cycle, in which the adopted rules are effective in 2013. The Council determined that the 2009 energy code improvements were not preempted by the process established in ESSSB 5854, but instead were compatible with the long-term goal of a 70 percent reduction in energy consumption in buildings and the Governor's request for a 30 percent improvement in the 2009 code based on the Climate Action Team recommendation.

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.

c. Energy-Related Building Standards Law (RCW 19.27A)

The Washington State Legislature finds that energy efficiency is the cheapest, quickest, and cleanest way to meet rising energy needs, confront climate change, and boost our economy.[1]

The Council code development process was established with specific requirements and definitions in the Energy-related Building Standards law originally passed in 1990 (RCW 19.27A). The provisions of this law set the goals for increasing energy efficiency.

- Main Goals of WSEC for both Residential & Nonresidential
  - Residential and nonresidential construction permitted under the 2031 state energy code **must achieve** a 70 percent reduction in annual net energy consumption (RCW 19.27A.160)
  - 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 (RCW 19.27A.160)
  - 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)
  - 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 (RCW 19.27A.020); and
  - Allow space heating equipment efficiency to offset or substitute for building envelope thermal performance(RCW 19.27A.020)
  - The State Building Code Council shall evaluate and consider adoption of the international energy conservation code in Washington State in place of the existing state energy code. (RCW 19.27A.020)
- All rules must be adopted by the Council by December and are not effective until after the following regular legislative session (RCW 19.27A.025& .045). The traditional effective date is July 1 in the year following adoption.
- This definition applies to RCW 19.27A.130 through 19.27A.190 and 19.27A.020 unless the context clearly requires otherwise: (4) "Cost-effectiveness" means that a project or resource is forecast: (a) To be reliable and available within the time it is needed; and (b) To meet or reduce the power demand of the intended consumers at an estimated incremental system cost no greater than that of the least-cost similarly reliable and available alternative project or resource, or any combination thereof.
- WSEC related to residential buildings
  - WSEC for residential buildings shall be the maximum and minimum energy code for residential buildings in each city, town, and county (RCW 19.27A.015)

- The Council must maintain the WSEC for residential structures. The Council shall review the Washington State Energy Code every three years. The Council may amend any provisions of the Washington state energy code to increase the energy efficiency of newly constructed residential buildings. (RCW 19.27A.045)
- "Multi-family residential building" means common wall residential buildings that consist of four or fewer units, that do not exceed two stories in height, that are less than five thousand square feet in area, and that have a one-hour fire-resistive occupancy separation between units (RCW 19.27.015 (3))
- 2012 IECC Residential Code Scope & Definition:
  - **R101.2 Scope.** This code applies to *residential buildings* and the buildings' sites and associated systems and equipment.
  - **R101.3 Intent.** This code shall regulate the design and construction of buildings for the effective use and conservation of energy over the useful life of each building. This code is intended to provide flexibility to permit the use of innovative approaches and techniques to achieve this objective. This code is not intended to abridge safety, health or environmental requirements contained in other applicable codes or ordinances.
  - **Residential Building.** For this code, includes detached one- and two-family dwellings and multiple single-family dwellings (townhouses) as well as Group R-2, R-3 and R-4 buildings three stories or less in height above grade plane.

- WSEC related to non-residential buildings
  - WSEC for non-residential buildings shall be the minimum energy code for nonresidential buildings enforced by each city, town, and county (RCW 19.27A.015)
  - The Council may amend the WSEC requirements for new nonresidential buildings provided:
    - Such amendments increase the energy efficiency of typical newly constructed nonresidential buildings; and
    - Any new measures, standards, or requirements adopted must be technically feasible, commercially available, and cost-effective to building owners and tenants (RCW 19.27A.025)
  - In considering amendments to the state energy code for nonresidential buildings, the State Building Code Council shall establish and consult with a technical advisory committee including representatives of appropriate state agencies, local governments, general contractors, building owners and managers, design professionals, utilities, and other interested and affected parties (RCW 19.27A.025)
  - 2012 IECC Commercial Code Scope & Definition:
    - **C101.2 Scope.** This code applies to *commercial buildings* and the buildings sites and associated systems and equipment.

- **C101.3 Intent.** This code shall regulate the design and construction of buildings for the effective use and conservation of energy over the useful life of each building. This code is intended to provide flexibility to permit the use of innovative approaches and techniques to achieve this objective. This code is not intended to abridge safety, health or environmental requirements contained in other applicable codes or ordinances.
- **Commercial Building (definition)**. For this code, all buildings that are not included in the definition of "Residential buildings."

An important change in the definitions of residential and commercial buildings is that the IECC limits application of the "residential" code to single family homes and multi-family buildings of three stories or less. Taller multi-family buildings are governed by the "commercial" sector of the code. The Council is considering whether this distinction permits individual jurisdictions to modify the energy code for multi-family buildings taller than three stories.

d. 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.[2] This certification is to be submitted to the Secretary of the U.S. Department of Energy. The most recent rules require each state to report that their adopted commercial building energy code meets or exceeds ASHRAE Standard 90.1-2010. For residential buildings, the state must certify that the energy code meets or exceeds the 2012 International Energy Conservation Code. Both certifications are due July 20, 2013.[3]

Commercial Key Dates:

- July 20, 2013 – State Certification report filed demonstrating that the state energy code meets or exceeds ASHRAE 90.1-2007 (or both ASHRAE 90.1-2007 and ASHRAE 90.1-2010)
- October 18, 2013 – State Certification report filed demonstrating that the state energy code meets or exceeds ASHRAE 90.1-2010

The Council's preliminary analysis indicates that the 2012 state energy code will fall short of this federal target for commercial construction by 1 or 2 percent. This is largely due to the fact that conformance to the 2010 edition of ASHRAE 90.1 produces buildings that are 18.5 percent more efficient than were required by the 2007 edition, a significant leap. The IECC itself does not meet this standard, so the large number of states that adopt the IECC without amendments will have a shortfall that is larger. It is a significant achievement to enact a code that comes this close to this year's federal target.

Residential Key Date:

- May 17, 2014 – State Certification report filed demonstrating that the state energy code meets or exceeds 2012 IECC

64904 Federal Register / Vol. 76, No. 202 / Wednesday, October 19, 2011 / Notices
The quantitative analysis for Commercial Buildings built under ASHRAE Standard 90.1-2010 as determined by the United States Department of Energy (DOE) published that "DOE has determined that the quantitative analysis of the energy consumption of buildings built to Standard 90.1–2010, as compared with buildings built to Standard 90.1–2007, indicates national source energy savings of approximately 18.2 percent of commercial building energy consumption. Additionally, DOE has determined site energy savings are estimated to be approximately 18.5 percent.

29322 Federal Register / Vol. 77, No. 96 / Thursday, May 17, 2012 / Notices
The Department of Energy (DOE or Department) has determined that the 2012 edition of the International Code Council (ICC) International Energy Conservation Code (IECC) (2012 IECC or 2012 edition) would achieve greater energy efficiency in low-rise residential buildings than the 2009 IECC.

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 all commercial energy codes this largely means adopting the minimum equipment efficiency tables listed in the most recent edition of ASHRAE Standard 90.1.[4]

2. Transition to the 2012 International Energy Conservation Code

a. Process of transition from 2009 WSEC to 2012 IECC

For more than 20 years, Washington State has developed and adopted a unique state energy code. As part of the 2009 ESSSB 5854 "The State Building Code Council shall evaluate and consider adoption of the international energy conservation code in Washington State in place of the existing state energy code." In 2011, per direction from the Legislature, the Council chose to use the International Energy Conservation Code (IECC) as the base document for the 2012 energy code development cycle. The IECC is published by the International Code Council (ICC), which also publishes the building, mechanical and fire codes adopted by the State.

As a base document the 2012 IECC provides a good standard for energy savings, but there are unique features in the 2009 WSEC that contribute additional energy savings beyond that achieved by the IECC. To adopt the 2012 IECC without incorporating elements of the 2009 WSEC would have resulted higher energy use in new buildings than are allowed under the existing code. In addition, the WSEC incorporates specific requirements of Washington RCW 19.27A that are not included in the IECC. To recognize the existing state standards for energy efficiency in the 2009 WSEC, the Council chose to begin the energy code development process by creating a base code document that combined the features of the 2009 WSEC and the 2012 IECC. The overall goal was to amend the 2012 IECC to meet the stringency of the 2009 WSEC as required for nonresidential buildings by RCW 19.27A.025 ("(a) Such amendments increase the energy efficiency of typical newly constructed nonresidential buildings") and for residential buildings by RCW 19.27A.045 ("the council may amend any provisions of the Washington State Energy Code to increase the energy efficiency of newly constructed residential buildings"). This document was called the Reference Draft IECC/WSEC and is also commonly referred to as the mash-up.

In the fall of 2011, the first edition of the Reference Draft was developed by Council staff[5]. The Council then assigned review of the Reference Draft to the Technical Advisory Group (TAG) for the energy code. In a series of meetings from November to February, the TAG developed the final base document to be considered during the 2012 code development cycle. At its February 24, 2012 meeting, the Council adopted the Feb 23 edition of the Reference Draft for use as the base document for code change proposals this year. The motion carried unanimously.[6]

b. 2012 Energy Code Development

In 2012 the Council initiated code adoption process for the suite of building codes. This included the energy code. Using the Feb 23 edition of the Reference Draft as a base document, the public was invited to propose changes to the code. At the closing date of March 21, 2012, the Council had received 171 proposals for changes to the energy code.

Based on the Reference Draft and proposals received, the Council developed a draft energy code document to be moved into formal rulemaking. While the Council

considered a number of the code changes directly, much of the work was assigned to the TAG for consideration.

Of the proposals received, the majority were addressed directly by the TAG, while others of a more editorial or policy-oriented nature were addressed directly by the Mechanical/Ventilation/Energy Committee (MVE) and the Council. Several proposals related to an "outcome" based energy code were tabled to be reviewed in 2013 during development of the "aspirational code."

The Energy Code TAG held 11 meetings to consider code change proposals. Each of these meetings ranged from 4 to 7 hours in length. The meetings were organized by topic, such that commercial building envelope issues were considered at one meeting, mechanical issues at the next, lighting issues at the next, and so on. In addition to the TAG members, a number of other experts and stakeholders attended and contributed to the meetings. Each proposed amendment was discussed by the TAG and many were extensively modified as a result of the discussions. Approximately half of the proposed amendments were eventually incorporated into the new code.

The TAG Members are appointed by the Council to represent specific interest groups. The Council identified interest groups to achieve the necessary representation and balance for the TAG. The Council reviewed the list of interest groups in several public meetings, took comments on the groups being considered to achieve an appropriate balance, and established 24 interest groups to be represented in the energy code development process.

Energy Code Technical Advisory Group membership categories:
Code Practitioners (8) Codes Consultant, Architect, Trade Association, Illumination Engineer, Mechanical Engineer, Electrical Engineer, Building Commissioning Association, Energy Analyst

Enforcement (3) Building Official, Cities and Counties (west and east)

General Interest (5) Government Energy Policy, Federal Programs, General Public, Educator, Historic Building Programs

Producers (8) Utilities 3 (public, private, Nat. GAS), Home Builder, Manufacturer/Supplier, Building Trades, Commercial Builders, Construction Executive

A complete list of TAG members is in Appendix F.

As part of proposing a code change, proponents were asked to provide recommended changes to the text and to complete a simple form (See Appendix G). This form asked the proponent to provide a statement justifying the code change and provide some general information of the cost and benefits associated with the proposal. Most proposals provided only minimally responsive economic information, as this requires some expertise to calculate. In addition, 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.

3. Energy Savings Goals for Each Code Development Cycle

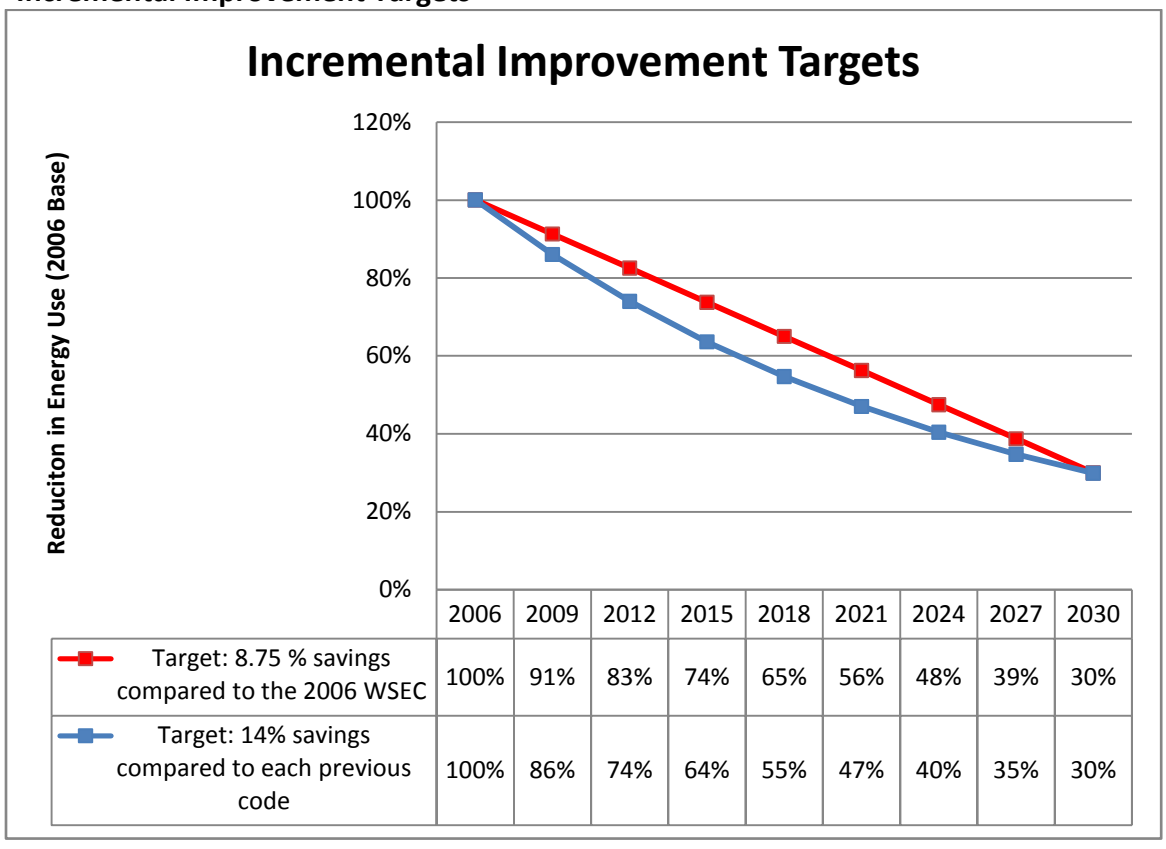
The following provides a discussion of the energy code outcomes required to meet the targets set by the Legislature in 2009. RCW 19.27A.160 (2) states that, "The Council shall adopt state energy codes from 2013 through 2031 that incrementally move towards achieving the 70 percent reduction in annual net energy consumption…".

The Council has been provided two models for measuring incremental changes. The two models are:

1. Each code cycle; reduce target energy use by 8.75% compared to the 2006 WSEC
2. Each code cycle; reduce target energy use by 14% compared to the previous edition of the WSEC.

Figure 1 provides a graph considering the application of the two approaches to "incremental" reductions in energy use. Assuming code upgrades continue to occur on a three year cycle, there will be 8 new editions of the energy code developed by the council between 2006 and 2031.

Figure 1
"Incremental Improvement Targets"



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Model 1 asks for an equal absolute change each code cycle. This provides a slow and steady pace for the early code cycles, but constitutes proportionately larger changes to the code in later code cycles. The primary consideration is that this model will have the least impact on

near term construction, both in first cost and energy savings. The obligation however is shifted to future years.

Model 2 asks for larger absolute changes in the early code cycles and declining absolute change late in the process, so that each change is proportionate to the previous code. Because more savings happen early in the process, it will provide greater impact on a larger population of buildings. Model 2 also recognizes that in 2006 a productive set of energy savings measures were in practice and available to be included in code in 2009 and 2012. As the process progresses it is anticipated it will become more difficult to identify and implement large incremental improvements in absolute energy use reductions. This approach recognizes that it will be increasingly challenging to meet the final incremental targets.

4. Analysis of 2012 Energy Code Changes

a. Outline of Energy Savings Analysis

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.

Energy use of buildings is estimated using computer simulations of building energy use. To account for the wide range of building configurations and end uses, energy simulations are conducted for multiple prototype buildings developed to represent the broad population of buildings, systems, and climate zones. Each prototype represents a fraction of the new building population, and the energy savings documented for each prototype is weighted based on the fraction of the building population the prototype represents. The weighted savings for all the prototypes are summed to arrive at the population-weighted savings estimate. First cost may also be applied and distributed during this process.

The Council used analysis presented by expert consultants to estimate incremental progress. The analysis was provided during the 2009 and 2012 code development cycles and captures the estimated code savings using the 2006 WSEC as the baseline. These savings are then compiled together with the baseline to arrive at a single percentage improvement across the entire sector.

Commercial and residential sectors are considered separately (Figure 2).

Figure 2
Incremental Improvement Compared to Targets

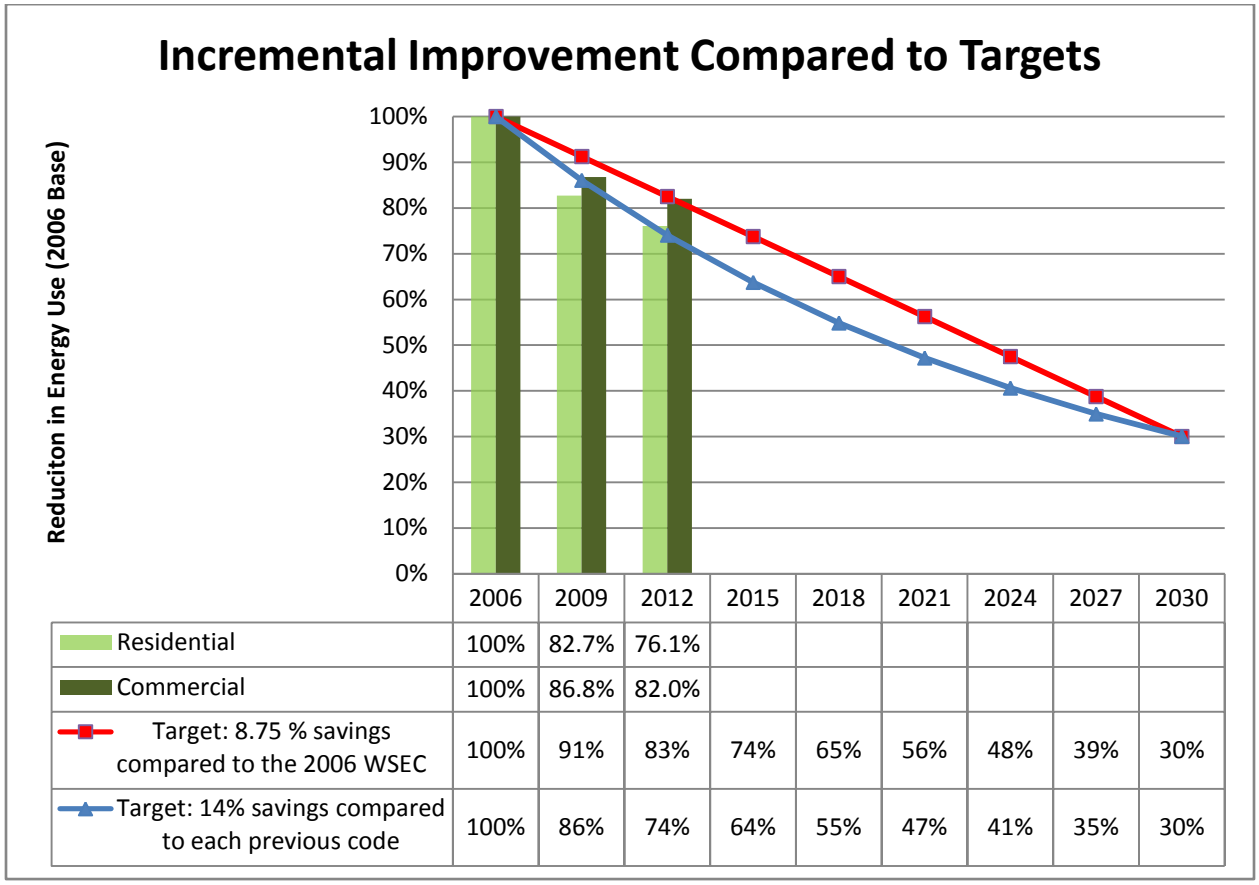

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Figure 2 provides a summary of estimated achievement to date.

b. Cost and Savings Analysis

The following analyses have been received by the Council. The Council used these reports in the final adoption process and for documenting the targeted legislative goals.

2009 Washington State Energy Code: Analysis of Code Changes Adopted by the Washington State Building Code Council, Chuck Murray, Washington State Department of Commerce/Energy Policy Division, David Baylon, Ecotope

Commercial Sector Savings Analysis: Adopted 2009 Washington State Energy Code, Ecotope, Inc. David Baylon, Ecotope, Inc. Mike Kennedy

Residential WSEC 2012 Energy and Cost Analysis, a memo: September 6, 2012 To: Chuck Murray, Washington State Department of Commerce, and David Cohan, Northwest Energy Efficiency Alliance; From: Ben Larson and David Baylon, Ecotope Inc.

Cost and Savings Analysis of the Proposed 2012 Washington State Energy Code, submitted to the Washington State Building Code Council by the Northwest Energy Efficiency Alliance based on work by: Mike D. Kennedy, Inc., Ecotope, Inc. and NEEA staff.

Life Cycle Cost Methodology Report from Chuck Murray, Department of Commerce/Energy Policy Division.

5. Progress Toward Incremental 2012 Target

This report estimates the incremental improvement in the energy code, with adoption of the Washington State amendments to the 2012 IECC. The Council adopted the 2012 IECC with state amendments in WAC 51-11R and WAC 51-11C by unanimous vote on November 30, 2012, effective July 1, 2013.

The Council has completed two incremental steps toward the goal of a 70% reduction by 2031 compared to the 2006 WSEC. The first step in 2009 was in response to the Climate Action Team recommendation of a 30 percent improvement over the 2006 WSEC (Appendix E). The 2009 Washington State Energy Code achieved a 17 percent reduction in energy consumption for residential buildings and a 13 percent reduction in energy consumption for commercial buildings.

The second step was the 2012 code adoption cycle. In this cycle, the Council used the 2012 IECC as the base code and added amendments. The proposed rule included amendments to maintain the 2009 levels of efficiency, plus 2012 amendments to meet the energy use reduction targets. For residential buildings, the final rule achieves an additional 8 percent reduction in energy use, for a total 24 percent reduction in energy consumption over two cycles compared to the 2006 WSEC.

For commercial buildings, the public review draft represented an additional 8 percent reduction in energy consumption. Upon final adoption the Council approved several motions to relax the provisions, resulting in a final rule with a 5-6 percent reduction in energy use in commercial buildings. The total for two code development cycles is about an 18 percent reduction in energy consumption.

The studies the SBCC used to estimate the energy use (App. A-D) are based on prototype buildings developed to represent the anticipated new building stock in the state. The building types are weighted together proportional to the total amount of construction in each building type across the entire state. The savings results for each prototype are weighted together based on the square footage of each building type.

a. Factors Contributing to Shortfall

The process of converting from the old WSEC format and content to the amended version of the IECC was challenging and time-consuming for a process that relies largely on volunteer time from the TAG members, Council and stakeholders. In addition, concerns from stakeholders based on the lingering effects of the economic recession resulted in less aggressive new rules than might otherwise have been implemented. Consumer energy costs vary widely across the state, making it difficult to adopt energy code measures that are cost effective for most building projects without adversely impacting a minority of building projects. Finally, proof of cost-effectiveness is difficult to provide for new requirements that are not already common building practice.

b. Recommendations on Estimating Target

To continue substantial energy use reductions into future code cycles, it is likely that the code will have to shift to a performance-based or outcome-based format, rather than the current prescriptive list of individual requirements. This would require documentation of actual energy performance for new buildings, but would free design and construction teams to achieve that performance in the manner that they find most economical and desirable.

6. Potential Future Code Changes for Additional Energy Use Reductions

a. Economic constraints

There is always an initial cost associated with code changes, because design and construction teams as well as manufacturers and vendors are all required to change their customary means of doing business. These initial effects disappear over the course of several years as the new requirements become routine. There is usually some permanent cost increase as well; R-38 insulation will always cost more than R-19 insulation. The impact on the overall project cost of a new building is modest, but there is concern that even a small incremental increase in construction cost could discourage new investment. The overall cost to occupy a more energy-efficient building is lower over the life of the building, but lenders have been slow to recognize and account for such advantages.

b. Technological constraints

As evidenced by recent projects in Washington State and elsewhere that have achieved very high performance within typical construction budgets, technology already exists to do much better than our current code minimum. However, such projects depend on an integrated design and construction process that does not lend itself well to prescriptive code requirements. As mentioned elsewhere in this report, a shift to a performance-based code may be necessary in the future to achieve higher performance.

c. Review of built examples of high-performance buildings

A number of stand-out buildings have been completed or are in process within Washington State. In comparison with typical code-compliant new office buildings that operate at an EUI (Energy Use Index, expressed in units of kBtu/SF/year) of 45–70, a few of these include:

- Offices of Rice Fergus Miller in Bremerton, built in an abandoned Sears distribution facility, and currently operating at an EUI of 19.
- Federal Center South, a large Corps of Engineers office facility in Seattle, estimated to operate at an EUI between 21 and 26, with the upper limit being a contractual obligation on the part of the design/build team.
- The Bullitt Foundation, a 5-story commercial building in Seattle constructed at a higher cost than standard office buildings, will operate at zero net energy.
- Stone 34, a market-rate commercial office building in Seattle, is anticipated to operate at an EUI below 30.

d. Role of an "Aspirational Code"

The Department of Commerce published a strategic plan for enhancing energy efficiency in and reducing greenhouse gas emissions from homes, buildings and neighborhoods (Appendix I) in December 2010 as required by RCW 19.27A.150. One recommendation in the strategy is that the Council considers development of an aspirational code. Work will begin on the aspirational code in early 2013. It is intended to provide an optional higher performance level for owners or developers. It may also serve as a practical testing ground for new ideas that could be considered for the next code cycle.

7. Council Process Improvements and 2013 Workplan

The process of energy code development needs improvement to address concerns of the construction community. New code provisions require an investment and businesses need accurate economic information to support the process. Estimates of energy savings need to be validated with actual use. Additional funding to support objective analyses of proposed changes for future code cycles is critical. As noted above, the burden of switching to an entirely new code format compressed the time available for public review of proposals. In future code cycles, a full month of review time at each stage in the code development process would be optimal.

The Council was unable to conduct detailed economic analysis to show the validity of some of the measures, and proponents of specific measures did not submit detailed cost and benefit data. Future cycles should follow Council submittal requirements and bylaws adopted during the 2012 process:

> "When reviewing proposed amendments to the codes, Technical Advisory Groups shall use a standardized, accepted methodology to consider economic impact on small businesses, housing affordability, construction costs, life-cycle costs, and the cost of code enforcement and shall report those findings to the Workgroup on Economic Impact"

2013 Workplan for the Washington State Building Code Council, Mechanical Ventilation and Energy Committee, Energy Code TAG, and Green TAG

- Submit code proposals for 2015 IECC by January 3, 2013
- Evaluate compliance with federal law
- Review 2012 Energy Code Development Process and establish procedures for Energy Code adoption in 2015
- Develop Aspirational Energy Code for Washington State
- Review tabled 2012 Energy Code Proposals including Outcome based energy code compliance
- Review Green building standards

Appendices:

A---Cost and Savings Analysis of the proposed commercial 2012 Washington State Energy Code (https://fortress.wa.gov/ga/apps/sbcc/File.ashx?cid=2481)

B---Comparison of 2009 WSEC and 2012 IECC (with amendments)--Multi-Family sector (https://fortress.wa.gov/ga/apps/sbcc/File.ashx?cid=2482)

C---Residential WSEC 2012 Energy and Cost Analysis (https://fortress.wa.gov/ga/apps/sbcc/File.ashx?cid=2483)

D---Life Cycle Cost Analysis Methodology Summary from Department of Commerce (https://fortress.wa.gov/ga/apps/sbcc/File.ashx?cid=2492)

E---November 2008 Climate Action Team Final Recommendations (https://fortress.wa.gov/ga/apps/sbcc/File.ashx?cid=2480)

F---Energy Code Technical Advisory Group (https://fortress.wa.gov/ga/apps/sbcc/File.ashx?cid=2486)

G---Washington State Building Code Council Application for Review of a Proposed Statewide Amendment to the Washington State Building Code (https://fortress.wa.gov/ga/apps/sbcc/File.ashx?cid=2487)

H--- Residential and Commercial Electricity and Natural Gas Utility Rate Summary for Washington State (https://fortress.wa.gov/ga/apps/SBCC/File.ashx?cid=2490)

I ---Strategic Plan for Enhancing Energy Efficiency and Reducing Greenhouse Gas Emissions from Homes, Buildings, Districts and Neighborhoods (http://www.commerce.wa.gov/Documents/EO-2011-Strategic-Plan-for-Buildings.pdf)

Footnotes

1- 19.27A.130 Finding — 2009 c 423. 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. More than thirty percent of Washington's greenhouse gas emissions come from energy use in buildings. 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. Washington can spur its economy and assert its regional and national clean energy leadership by putting efficiency first. Washington can accomplish this by: Promoting super efficient, low-energy use building codes; requiring disclosure of buildings' energy use to prospective buyers; making public buildings models of energy efficiency; financing energy saving upgrades to existing buildings; and reducing utility bills for low-income households.

2- 42 U.S.C 6833(b)(2)(B)(i)

3- http://www.energycodes.gov/regulations/determinations

4- http://www1.eere.energy.gov/buildings/appliance_standards/commercial/ashrae_products_docs_meeting.html

5- Council Web Site, DRAFT 2012 IECC/WSEC Resource Documents, https://fortress.wa.gov/ga/apps/sbcc/Page.aspx?nid=116

6- Council Web Site, Council minutes, February 24, 2012 http://fortress.wa.gov/ga/apps/sbcc/File.ashx?cid=1906