February 20, 2020

Modeling the Washington State Energy Code - 2006 & 2018 Baseline Energy Consumption

Please note that this report has not yet been reviewed by the State Building Code Council Mechanical Ventilation and Energy Codes Standing Committee:

EXECUTIVE SUMMARY

Washington State law (RCW 19.27A.160) mandates that buildings built to the 2031 energy code use 70% less net-energy when compared to 2006-era buildings. The purpose of this study was twofold: first, it sought to establish the 2006 baseline energy use for the residential and commercial sectors and to provide a starting point for measuring our progress towards the mandated reductions. Secondly, it set out to determine how far the energy code has come in contributing to those reductions. As originally conceived, this study was designed specifically to assess changes in code stringency that contribute to the overall building sector goal of a 70% energy use reduction by 2031. Additional work may be undertaken to examine other market impacts during that period that influence overall building energy use patterns.

Different modeling software was used for each sector, but the approach remained the same. Residential and commercial prototypes, developed by the Regional Technical Forum (RTF), were sourced for the majority of the modeled buildings in this study, with a few specific building types (mid- and high-rise multifamily, outpatient healthcare, and a 5000sf single family home) added to capture more of the building sector. Statewide building trends were developed from regional building stock assessments and field studies to develop a saturation of common building types (by primary occupancy), HVAC systems, and location within the state (climate zone 5B or 4C). With prototypes developed and all weighting estimates developed, the project team then applied all prescriptive requirements from the 2006 and 2018 Washington State Energy Code (WSEC) to determine the expected energy consumption under each code cycle.

This study focused on showing the measurable energy savings purely brought by the energy code (or other required documents, such as state law) to the greatest extent possible. One such example was heating fuel sources—this study assumed the code does not affect which fuel source is chosen by builders or design teams, therefore primary heating fuel source was kept constant between the two analysis years. Beginning with the 2018 code, however, the code has begun to account for site carbon emissions as opposed to solely site energy use. While this should be accounted for in future studies, any adjustment to commonly selected heating fuel source must be informed by building surveys to document any measurable change in building trends.

Modeling results show that residential estimated energy consumption under the 2018 WSEC is approximately 61% of the 2006 WSEC (Figure 1). Commercial sector modeled energy consumption is estimated at 69% of 2006 levels. Energy savings estimates for 2009 and 2012 are sourced from previous legislative reports – no values have been provided for 2015.