How NEEA Calculates Energy Savings from Codes

NEEA uses a four-step process to calculate the energy code savings which are included in its overall market transformation savings. The process can be expressed by the equation:

(Per Unit Savings x Number of Units x Compliance) – Naturally Occurring Baseline = Energy Savings

1. *Develop Per Unit Savings*. Each time a state adopts a new code, NEEA produces a report which estimates the amount of energy that will be saved relative to the previous code. As there are many different ways to achieve compliance under a given code, savings estimates always require simplifying assumptions about "typical" installed systems/materials or construction methods and what types of buildings or sizes of homes they are installed in. Ultimately, each report includes a single per unit savings number for commercial buildings (kWh/sf and therms/sf) or homes (kWh/home and therms/home) which represent weighted averages of the assumed installed systems/materials and building/home types. The detailed assumptions and the methodology are provided in each report. Historic reports can be found under Energy Code Support at http://neea.org/research/evaluationreports.aspx.

2. *Number of Units.* Once a per unit savings estimate has been calculated, it is multiplied by the newly constructed square footage for commercial or the number of homes for a given year. Future year units are based on forecasts from the Council, private or government sources.

3. *Compliance*. The gross savings resulting from multiplying per unit savings by number of units is then decremented to account for compliance rates which are assumed to be less than 100%. No targeted compliance studies have been done in the region for many years. We currently use 85% for residential to be consistent with a long-standing assumption used by the Council and 75% for commercial based loosely on information gathered during the most recent regional commercial new construction study which looked at buildings completed between 2002-04.

4. Naturally Occurring Baseline (NOB) is defined as what would have occurred in the absence of both NEEA and its funders while NEEA was active in the market. Obviously this is a qualitative judgment. NEEA has developed a draft estimate of NOB based on staff's qualitative assessments which is currently being reviewed internally. The estimates will then be reviewed by a third party contractor, adjusted as necessary and then presented to stakeholders for further review before the end of the year.

   (As utilities do not give incentives for meeting code, the Utility Incentives factor is always zero when calculating code savings.)

Factors one through three above provide an estimate of what NEEA calls Total Regional Savings. NEEA has organizational goals for Total Regional Savings and a second metric known as Net Market Effects which is defined as:

Total Regional Savings - Naturally Occurring Baseline – Utility Incentives = Net Market Effects

After completing the above four steps, NEEA publishes energy code savings estimates for both Total Regional Savings and for Net Market Effects. These are bundled with savings estimates from all NEEA's other initiatives and made available to the region as 'market transformation' savings. Utilities use these estimates to meet their own savings goals through whatever arrangements they have with their regulators or commissioners.

How the Council Uses Energy Codes in the Power Plan

Baselines for each measure in the 6th Plan are identified in each specific measure workbook. The generalized approach is that the Council uses the code minimum, standard practice or a mix of the two, whichever is more efficient, as the baseline for each measure. As an example, if sales data for dishwashers is available that demonstrates that a portion of the units sold are more efficient than the federal standard, the efficiency of that mix of units is used as the baseline. These efficiencies are frozen for the baseline forecast, typically a year or so before the release of the final plan for analytical pragmatism. Potential savings are then calculated over that baseline. Energy codes are directly applicable to conservation opportunities in commercial and residential sectors. Energy codes have substantially less impact on conservation in the industrial and irrigation sectors since the codes generally do not apply to process loads or equipment used in non-buildings situations.

For Washington, the 6th Plan used the 2006 Washington State Energy Code and the 2006 Seattle code as the code baseline for commercial buildings. The Seattle code was applied only to building stock within Seattle City Light service territory. Major exceptions were for HVAC equipment efficiency baselines which were set at ASHRAE 90.1 2010 levels and for lighting which is the major measure set in commercial is lighting. In this area standard practice LPD is <u>better</u> than code as documented in a NEEA market research report, *"Baseline Characteristics of the 2002-2004 Nonresidential Sector: Idaho, Montana, Oregon and Washington (08-196)"*[1]. For example in office buildings, the report indicated that more than 50% of new floor area had lighting power densities (watts/sf) below the 2006 whole-building code level of 1.03 watts/sf so this information was used to set the baseline below code.

For residential buildings covered under the residential codes[2] the baselines in the 6th Plan are included in the Model Conservation Standards analysis. The following baseline was used for all the states:

Wall = R19
Windows = u-.35
Floor = R30
Attic = R38

Note that "energy code" is not a measure in the Plan. As explained above, the energy code in place at the time the Plan is being created is used as the baseline (or a part of the baseline) for individual measures. The Plan does not assume that future codes capture any specific level of savings, but analysis by the Council conservatively estimates that energy codes contributed over 15% of all historical regional conservation acquisition.

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[1] http://neea.org/research/reportdetail.aspx?ID=594

[2] Several types of residential buildings – college dormitories, hotels/motels, high-rise multifamily – are permitted under the commercial code.