Utility Savings Estimation

OLGA LIVINGSTON
PACIFIC NORTHWEST NATIONAL LABORATORY

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The objective is to develop a generic tool that estimates potential energy savings from increased compliance with energy codes.

The tool is intended for utilities, who can populate a generic computational algorithm with their own utility-specific assumptions, where applicable (for example, new construction projections or floor space growth).

The basic methodology is the same as that used for the U.S. Department of Energy Building Energy Codes Program to assess national benefits\(^1\).

1. For the methodology, see PNNL’s published report:
Methodology Overview

Reference Year

Energy Savings from Code to Code

Applicable Floor Space

Nominal Savings

Alternative Scenario

Accelerated Adoption ➔ Increased Compliance

Base Case

Baseline Adoption ➔ Baseline Compliance

Projected Savings

Base Case Savings

Impact from Increased Compliance
Prespecified Inputs

- 2010 is suggested as the reference year

- Code-to-code savings grouped by end use and fuel
  - Pacific Northwest National Laboratory conducted extensive simulations to compare code-to-code savings for various versions of residential and commercial energy codes.

  - Simulation results are the same set as utilized in the U.S. DOE determination process, as well as in state-by-state cost-effectiveness analysis.

  - Savings for future code editions will be developed as part of the U.S. DOE Building Energy Codes Program effort.
The estimator is prepopulated with residential and commercial construction projections by state to drive the estimation.

Residential construction permit data by county and place is available from the United States Census Bureau [http://censtats.census.gov/bldg/bldgprmt.shtml](http://censtats.census.gov/bldg/bldgprmt.shtml).

Commercial construction information is available from McGraw-Hill Construction Dodge data.

Users can further refine the assumptions to reflect distinct construction trends within different segments of the utility coverage area.
Code Adoption

- Tracked historical code adoption and effective code data by state.

- Performed analysis of jurisdictional adoption for home-rule states, which included contacting code officials at the municipal and county levels to verify the energy code versions in effect.

- Divided the states into five adoption categories based on historical adoption patterns, their respective regulatory review cycles and recent legislative activity related to energy codes.
Code adoption scenarios also consider implicit adoption when states do not explicitly adopt an energy code but building practices are nevertheless changing under influence from within the state or surrounding states:
- utilities and regional energy efficiency organizations (REEOs) running programs across states
- construction contractors and architect firms with operations in multiple states

Future code adoption is projected based on observed differences in:
- historical adoption lags across different code versions
- current code cycles across various states.
Code Compliance

Two aspects of energy code compliance:

- compliance in legal terms, which is defined as meeting all of the provisions of the code
- compliance in energy terms, which accounts for energy savings in buildings that only partially meet the requirements of the new energy code.
## Code Compliance (cont.)

### Time dimension - initial compliance vs. compliance in 10 years

<table>
<thead>
<tr>
<th></th>
<th>Initially compliant buildings</th>
<th>Initially non-compliant buildings</th>
<th>Weighted compliance, initial (energy terms)</th>
<th>Compliant buildings after 10 years</th>
<th>Non-compliant buildings after 10 years</th>
<th>Weighted compliance, after 10 years (energy terms)</th>
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<tbody>
<tr>
<td><strong>IECC - XXXX</strong></td>
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<tr>
<td><strong>Base Case</strong></td>
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<tr>
<td>Compliance in legal terms</td>
<td>30%</td>
<td>70%</td>
<td></td>
<td>50%</td>
<td>50%</td>
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<tr>
<td>Compliance in energy terms (fraction)</td>
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<td>0.20</td>
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<td>1.00</td>
<td>0.20</td>
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<td><strong>Alternative Scenario</strong></td>
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<tr>
<td>Compliance in legal terms</td>
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<td>35%</td>
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<td>80%</td>
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<tr>
<td>Compliance in energy terms (fraction)</td>
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<td>0.50</td>
<td>83%</td>
<td>1.00</td>
<td>0.50</td>
<td>90%</td>
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</tbody>
</table>
Methodology Summary

- **Step 1:** Select base (or reference) year.
- **Step 2:** Develop savings estimates from code changes.
- **Step 3:** Determine applicable floor space subject to code.

Adjust nominal energy savings by:
- **Step 4:** Code adoption levels (base case and alternative scenarios)
- **Step 5:** Code compliance levels (base case and alternative scenarios)

- **Step 6:** Compute code savings scenarios by segment and aggregate to the utility/program coverage area.

**Savings from Increased Compliance** = Alternative Scenario – Base Case
Conclusion

► Utility Savings Estimator is a straightforward framework to analyze savings from increased compliance.

► Common definitions of compliance and estimation methodology enable comparison across different segments of the utility coverage area.

► Common framework and definitions also allow comparison of results across different players and programs targeting energy code compliance or code adoption.

► In turn, utility-level studies based on a common model will provide a more sound foundation for national codes benefits analysis.
PEER REVIEWERS WANTED

If you or your agency are interested in providing peer review, please contact

Olga Livingston
Pacific Northwest National Laboratory

Olga.Livingston@pnnl.gov
(509) 372-6546