

The ResStock analysis tool is helping states, municipalities, utilities, and manufacturers identify which home improvements save the most energy and money.

Across the country there's a vast diversity in the age, size, construction practices, installed equipment, appliances, and resident behavior of the housing stock, not to mention the range of climates. These variations have hindered the accuracy of predicting savings for existing homes.

Applications



ResStock analysis can be used to answer questions for a variety of applications:

Cities & States

- How much energy can be saved through cost-effective home improvements?
- How can buildings contribute to energy or emissions targets?

Manufacturers

- How does market size for my technology vary regionally?
- How should my company prioritize R&D investments?

Utility Companies & Programs

- How can energy-efficiency improvements be targeted for specific customer segments to improve cost-effectiveness?
- Which segments of the housing stock are the best targets for relieving grid congestion through load flexibility?

ResStock – Targeting Energy and Cost Savings for U.S. Homes

Researchers at the National Renewable Energy Laboratory (NREL) developed ResStock. It's a versatile tool that takes a new approach to large-scale residential energy analysis by combining:

- Large public and private data sources
- Statistical sampling
- Detailed subhourly building simulations
- High-performance computing.

This combination achieves unprecedented granularity and most importantly accuracy—in modeling the diversity of the single-family housing stock.

With NREL's Peregrine supercomputer, the ResStock team has run more than 20 million simulations using a statistical model of housing stock characteristics. With this data, researchers have uncovered \$49 billion in potential annual utility bill savings through cost-effective energy efficiency improvements. Detailed information on the technical and economic potential of residential energy efficiency improvements and packages is available for 48 U.S. states. Policymakers, program designers, and manufacturers can use these results to identify improvements with the highest potential for cost-effective savings in a particular state or region, as well as to help identify customer segments for targeted marketing and deployment.

The ResStock software is offered at no cost, leveraging the U.S. Department of Energy's (DOE's) open-source building energy modeling ecosystem of OpenStudio[®] and EnergyPlus[™].

The ability to run on distributed cloud computing means a supercomputer isn't required to reap the benefits. Partnerships with industry to adapt ResStock for specific utility, manufacturer, state, and local applications are under development.



ResStock is helping states, municipalities, utilities, and manufacturers identify which home improvements save the most energy and money. Photo by Dennis Schroeder, NREL 45438

Identifying Solutions



Working with the Bonneville Power Administration, NREL developed a version of ResStock specific to the Pacific Northwest region that they can use to optimize how energy efficiency improvements are incentivized, and how they tie into the electricity generation and distribution strategy for the region.



Radiant Labs, a software company, has built a suite of analytics tools for Boulder, Colorado, that leverages the ResStock analysis capabilities. A targeting platform

Key Research Results

National-Scale Analysis

A comprehensive set of maps, tables, and figures showing the technical and economic potential of 50+ residential energy efficiency improvements and packages for 48 states with the potential to save \$49 billion annually.

Open, Accessible, and Accurate

Open-source software capabilities for modeling the U.S. housing stock with a high granularity across climate zones, ages, fuel types, construction practices, and occupant behavior. can be used to identify ideal candidates for deep home energy improvements, while a dashboard provides homeowners with the economic narrative for pursuing a deep energy reduction strategy.

TE-VDRIL

NREL is partnering with Tendril, which provides customer engagement and connected home energy management solutions for utility companies. NREL is building and validating ResStock load modeling capabilities so Tendril can estimate the potential for reducing peak demand in different utility service territories.

Contact

Reach out to the NREL team to learn how ResStock can benefit your organization.

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Resources

Electric End-Use Energy Efficiency Potential in the U.S. Single-Family Housing Stock. NREL/TP-5500-65667. National Renewable Energy Laboratory (NREL), 2016. http://www.nrel.gov/docs/ fy17osti/65667.pdf

Learn more at the ResStock Analysis Tool website: https://www.nrel.gov/ buildings/resstock.html.

Acknowledgments

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Details on the technical and economic potential of residential energy efficiency improvements and packages are available for 48 U.S. states. Photo by Dennis Schroeder, NREL 45446



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