



BUILDING TECHNOLOGY & URBAN SYSTEMS ENERGY TECHNOLOGIES AREA



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Bringing Science Solutions to the World

Our research continues, and we're proud to report we're busier than ever with new and exciting projects.

I am thrilled to share that we have been making major strides including a successful industry partnership to bring Berkeley Lab's high-performance thin-glass triple-pane windows to market and the launch of cool walls expert Ronnen Levinson's pilot credit to test integration of cool walls into Leadership in Energy and Environmental Design (LEED) ratings for buildings. Our researchers were also recently featured prominently in news stories on the future of buildings and sustainability, including Building Technology and Urban Systems (BTUS) Division Director Mary Ann Piette, who was interviewed by *The Hill*, and Staff Scientist Brett Singer, who spoke with the *Wall Street Journal* on the benefits of new induction cooktops.

— Paul Mathew, Department Head, Whole Building System Department, Acting Deputy for Research Programs, BTUS

Mary Ann Piette Featured in Discussion on Buildings and Sustainability



News organization *The Hill* recently held an event called **The Sustainability Imperative: Investing in Sustainability**. BTUS Division Director Piette was featured on one of the panel discussions, which focused on energy efficiency in buildings.

Piette made the case for filling a pipeline of building technology options that could help address climate change. Topics included why U.S. building stock is not as efficient as in some other countries; working with building owners and utilities to shift, shed and shape energy use in buildings; and partnering with industry.

Catch up on the conversation here: buildings.lbl.gov/news/article/mary-ann-piette-featured-hill

Berkeley Lab Supports Award-Winning NASA Energy Management Effort

The National Aeronautics and Space Administration (NASA) recently received a federal award for its participation in 50001 Ready, a US Department of Energy (DOE) program administered by Lawrence

NASA won a Director's Award from DOE's Federal Energy Management Program (FEMP) for its "headquarters-driven, agency-wide commitment to implementing the [50001 Ready program](#) in support of agency strategic energy management goals," according to the award citation. The FEMP Director's Award is chosen at the discretion of the agency's director to recognize distinguished individuals, organizations and/or teams for outstanding leadership and collaboration that results in benefits across the federal government.

Learn more here: buildings.lbl.gov/news/article/berkeley-lab-supports-award-winning

High-Performance Window Demonstrates Berkeley Lab-to-Market Success



After several years of a research and development relationship, one of the largest window and door replacement companies in the U.S. announced the national launch of a new high-performance glass option for select replacement windows.

Berkeley Lab has been working with Andersen Corporation and its window replacement division, Renewal by Andersen, for several years to build and test enhanced prototypes of the thin-glass triple-pane window suitable for large-scale manufacture.

Read more:

buildings.lbl.gov/news/article/high-performance-window-demonstrates

'Cool Walls' Get a Boost from U.S. Green Building Council

Cool walls (and roofs) expert Ronnen Levinson has just scored a major achievement – launching a pilot credit he wrote to test the integration of cool walls into LEED ratings for buildings.

The newly issued pilot credit means buildings that satisfy specific cool wall requirements will earn an innovation point in LEED for mitigating the urban heat island effect.



Read more:

newscenter.lbl.gov/2021/05/18/cool-walls-get-a-boost-from-u-s-green-building-council

New DOE Report Shares National Roadmap for Grid-Interactive Energy Efficient Buildings

We are pleased to announce the publication of *A National Roadmap for Grid-Interactive Efficient Buildings*, a comprehensive plan describing the value that grid-interactive efficient buildings (GEBs) can add to the power system, their technology attributes, and recommendations for addressing the top barriers to GEB adoption and deployment.

The *Roadmap* – which was developed by a team led by Berkeley Lab and The Brattle Group in collaboration with the DOE Building Technologies Office – identifies the most important barriers and outlines the key opportunities for full implementation of GEBs and associated demand flexibility.

Learn more: gebroadmap.lbl.gov

A National Roadmap for Grid-Interactive Efficient Buildings

PREPARED BY

U.S. DEPARTMENT OF
ENERGY

Office of ENERGY EFFICIENCY
& RENEWABLE ENERGY
BUILDING TECHNOLOGIES OFFICE

MAY 17, 2021

Home Energy Score Reaches a Milestone



Home Energy Score, a program that Leo Rainer of Berkeley Lab, Pacific Northwest National Laboratory and National Renewable Energy Laboratory Residential Teams collaborate on recently recorded the 150,000th Score in January 2021. Like a miles-per-gallon rating but for homes, the Score provides homeowners, buyers, and renters reliable and actionable information about a home's energy use. While the first 75,000 Scores were collected in the span of five years, the next 75,000 were completed in just three years, despite a slowdown in 2020 because of COVID – due largely to expanded support by several jurisdictions to include Home Energy Scores in residential home sales.

Read the latest:

betterbuildingsolutioncenter.energy.gov/beat-blog/after-ten-years-home-energy-score-continues-grow

Staff Scientist Brett Singer Weighs in on the Benefits of Induction Cooktops

Our indoor air quality researchers at Berkeley Lab are studying the impact of natural gas powered cooking and improperly vented heating appliances on indoor pollutant levels. They have found that gas stoves may be a significant source of nitrogen oxides (NOx), ultrafine particles and even carbon monoxide. In a recent article in the *Wall Street Journal*, Staff Scientist Brett Singer weighs in on the benefits of new induction cooktops developed to replace gas stoves.



Read the article here:

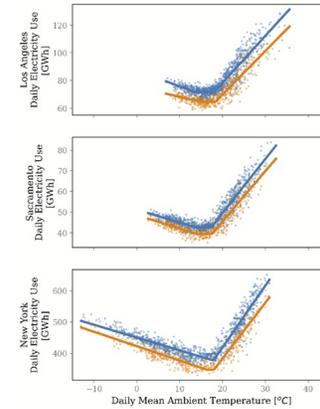
wsj.com/articles/why-new-induction-cooktops-are-safer-and-faster-than-gas-or-electric

Featured Publications

Predicting City-Scale Daily Electricity Consumption Using Data-Driven Models

A recent article, led by Zhe Wang with co-authors of Tianzhen Hong, Han Li and Mary Ann Piette, on using data-driven approaches to predict city-scale daily electricity use was published in *Advances in Applied Energy*. Seven data-driven models were tested and successfully predicted electricity use for three metropolitan areas in Sacramento, Los Angeles, and New York. The lightGBM (Light Gradient Boosting Machine) model provides the most accurate results. These models show weather-sensitive components account for 30%–50% of the daily electricity use. Every degree Celsius ambient air temperature increase

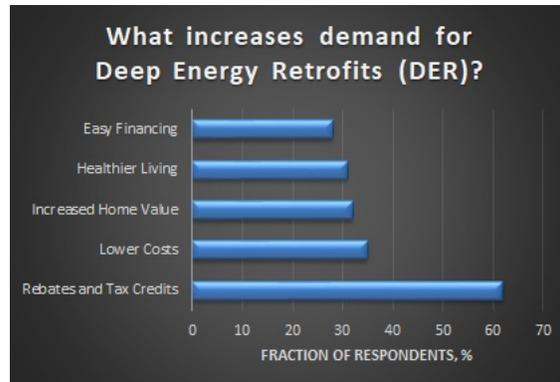
in summer leads to about 5% (4.7% in Los Angeles, 6.2% in Sacramento, and 5.1% in New York) more daily electricity usage. The prediction models can inform electric grid operation and utility resource planning especially during extreme weather events.



Wang, Z., Hong, T., Li, H., Piette, M.A. **Predicting City-Scale Daily Electricity Consumption Using Data-Driven Models.** *Advances in Applied Energy*, Volume 2, 100025, 2021.

buildings.lbl.gov/publications/predicting-city-scale-daily

DOE Deep Energy Retrofit Cost Survey



Home electrification is key in reducing CO₂ emissions and Berkeley has identified key barriers to widespread adoption, such as high costs associated with unnecessary code complexity, lack of consumer demand or a trained workforce, and addressing issues with possible bill increases and carbon content of electricity. The survey also identified paths to progress including code simplification, identifying indoor air quality and health improvements, and innovative financing options.

Chan, W.R., Less, B.D. and Walker, I.S. 2021. **DOE Deep Energy Retrofit Cost Survey.** *Published January 2021.*
buildings.lbl.gov/publications/doe-deep-energy-retrofit-cost-survey

Other Recent Publications

Less, B.D., Walker, I.S. and Casquero-Modrego, N. **Emerging Pathways to Upgrade the US Housing Stock: A Review of the Home Energy Upgrade Literature.** *Published February 2021.*
<https://buildings.lbl.gov/publications/emerging-pathways-upgrade-us-housing>

Satchwell, A., Piette, M.A., Khandekar, A., Granderson, J., Mims Frick, N. et al. **A National Roadmap for Grid-Interactive Efficient Buildings.** *Published May 21, 2021.*
eta-publications.lbl.gov/publications/national-roadmap-grid-interactive

Wei, M., Lee, S.H., Hong, T. et al. **Approaches to cost-effective near-net zero energy new homes with time-of-use value of energy and battery storage.** *Advances in Applied Energy 2.* May 2021.
buildings.lbl.gov/publications/approaches-cost-effective-near-net-0

Mathew, P.A., Sanchez, L., Lee, S.H., and Walter, T. **Assessing the Energy Resilience of Office Buildings: Development and Testing of a Simplified Metric for Real Estate Stakeholders.** *Building Vol.11(3) No.96.* 2021.
buildings.lbl.gov/publications/assessing-energy-resilience-office

Li, H., Wang, Z., Hong, T., Parker, A. and Neukomm, M. **Characterizing patterns and variability of building electric load profiles in time and frequency domains.** *Applied Energy 291.* 2021.
buildings.lbl.gov/publications/characterizing-patterns-and-0

Li, H., Hou, J., Hong, T., Ding, Y., and Nord, N. **Energy, economic, and environmental analysis of integration of thermal energy storage into district heating systems using waste heat from data centres.** *Energy 219.* 2021.
buildings.lbl.gov/publications/energy-economic-and-environmental

See more:
buildings.lbl.gov/publications

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See also: Department of Energy [Building Technologies Office](#)

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Lawrence Berkeley National Lab (Berkeley Lab) is located in the Berkeley Hills near UC Berkeley and conducts scientific research on behalf of the United States Department of Energy (DOE). It is managed and operated by the University of California (UC). The Laboratory overlooks the University of California, Berkeley.

Berkeley Lab addresses the world's most urgent scientific challenges by advancing sustainable energy, protecting human health, creating new materials, and revealing the origin and fate of the universe. Founded in 1931, Berkeley Lab's scientific expertise has been recognized with 13 Nobel prizes. The University of California manages Berkeley Lab for the U.S. Department of Energy's Office of Science. For more information, visit www.lbl.gov.

DOE's Office of Science is the single largest supporter of basic research in the physical sciences in the United States, and is working to address some of the most pressing challenges of our time. For more information, see science.energy.gov.
