U.S. DEPARTMENT of ENERGY | Office of Critical Minerals and Energy Innovation

Building Technologies Office

U.S. Department of Energy BTO Residential Update

ORNL Manufactured Home Retrofits Workshop
June 17-18, 2026

Overview

Overview of the Office of Critical Minerals and Energy Innovation, its priorities and how the efforts of the Residential Building Innovation team align

DOE’s Office of Critical Minerals and Energy Innovation (CMEI)

CMEI is advancing America's critical minerals supply chains and accelerating next-generation energy technologies to strengthen our nation’s energy security and power our future.

ENABLES the American mineral, mining, and extractive industries to return to dominance and ensure a stable U.S. mineral/metal supply chain.

LEADS the world in metals, mining, materials science, magnets, batteries, and innovation through R&D at our National Lab, intergovernmental agencies, and collaboration with private-public partners.

DRIVES growth, efficiency, and innovation in U.S.-based manufacturing and the workforce education programs necessary to meet today and tomorrow’s energy and manufacturing challenges.

STEWARDS federal resources to reduce the cost of energy for everyday American’s. Enables forums and resources to share energy innovations with industry, governments, and everyday Americans.

DEVELOPS the systems and research needed for nationwide standards, certifications and validations for buildings, appliances, manufacturing, and energy efficiency.

MAINTAINS our position as global leaders of next-generation energy systems, vehicle technologies, fuels, chemicals, and other materials needed for energy production on land, seas, air, and space.

DOE’s Office of Critical Minerals and Energy Innovation (CMEI)

CMEI is advancing America's critical minerals supply chains and accelerating next-generation energy technologies to strengthen our nation’s energy security and power our future.

ENABLES the American mineral, mining, and extractive industries to return to dominance and ensure a stable U.S. mineral/metal supply chain.

LEADS the world in metals, mining, materials science, magnets, batteries, and innovation through R&D at our National Lab, intergovernmental agencies, and collaboration with private-public partners.

DRIVES growth, efficiency, and innovation in U.S.-based manufacturing and the workforce education programs necessary to meet today and tomorrow’s energy and manufacturing challenges.

STEWARDS federal resources to reduce the cost of energy for everyday American’s. Enables forums and resources to share energy innovations with industry, governments, and everyday Americans.

DEVELOPS the systems and research needed for nationwide standards, certifications and validations for buildings, appliances, manufacturing, and energy efficiency.

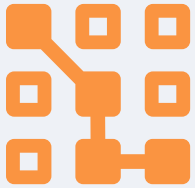
MAINTAINS our position as global leaders of next-generation energy systems, vehicle technologies, fuels, chemicals, and other materials needed for energy production on land, seas, air, and space.

CMEI Pillars

Office of Critical Minerals, Materials, and Manufacturing

Accelerates mining activities, diversifies supply chains for critical minerals and metals, expands battery and magnet research, stimulates innovation in processing and metallurgy

Office of Energy Technology



Continues to lead the world in R&D for cutting-edge energy technologies, fuels, chemicals, and hydropower

Office of Innovation, Affordability, and Consumer Choice

Exercises appliance standards and building codes authority, oversees state energy and weatherization programs, drives development and adoption of new technologies for buildings and industry

CMEI Pillars

Office of Critical Minerals, Materials, and Manufacturing

Accelerates mining activities, diversifies supply chains for critical minerals and metals, expands battery and magnet research, stimulates innovation in processing and metallurgy

Office of Energy Technology

Continues to lead the world in R&D for cutting-edge energy technologies, fuels, chemicals, and hydropower

Office of Innovation, Affordability, and Consumer Choice

Exercises appliance standards and building codes authority, oversees state energy and weatherization programs, drives development and adoption of new technologies for buildings and industry

Alignment with IACC Goals

Affordability and Consumer Choice

Ensure affordability and choice for consumers through appliance standards deregulation and transparent analysis

Buildings Innovation

Invest in technologies that reduce the cost to construct and maintain buildings in the U.S.

Industrial Competitiveness

Strengthen the global competitiveness of the U.S. industrial sector by reducing costs and improving product value

Reduced Energy Bills

Reduce energy bills for households, states, local governments and tribes. Provide effective and efficient oversight of financial assistance

Federal Leadership

Lead by example and accelerate investment in mission-critical Federal facilities and fleets through targeted grant funding, technical assistance and workforce training

Alignment with IACC Goals

Affordability and Consumer Choice

Ensure affordability and choice for consumers through appliance standards deregulation and transparent analysis

Buildings Innovation

Invest in technologies that reduce the cost to construct and maintain buildings in the U.S.

Industrial Competitiveness

Strengthen the global competitiveness of the U.S. industrial sector by reducing costs and improving product value

Reduced Energy Bills

Reduce energy bills for households, states, local governments and tribes. Provide effective and efficient oversight of financial assistance

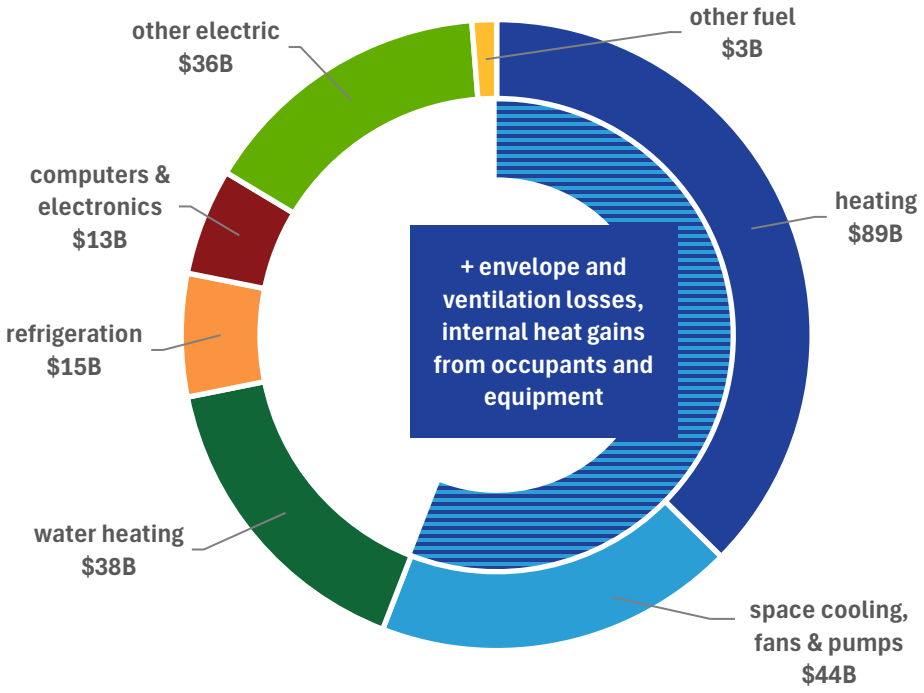
Federal Leadership

Lead by example and accelerate investment in mission-critical Federal facilities and fleets through targeted grant funding, technical assistance and workforce training

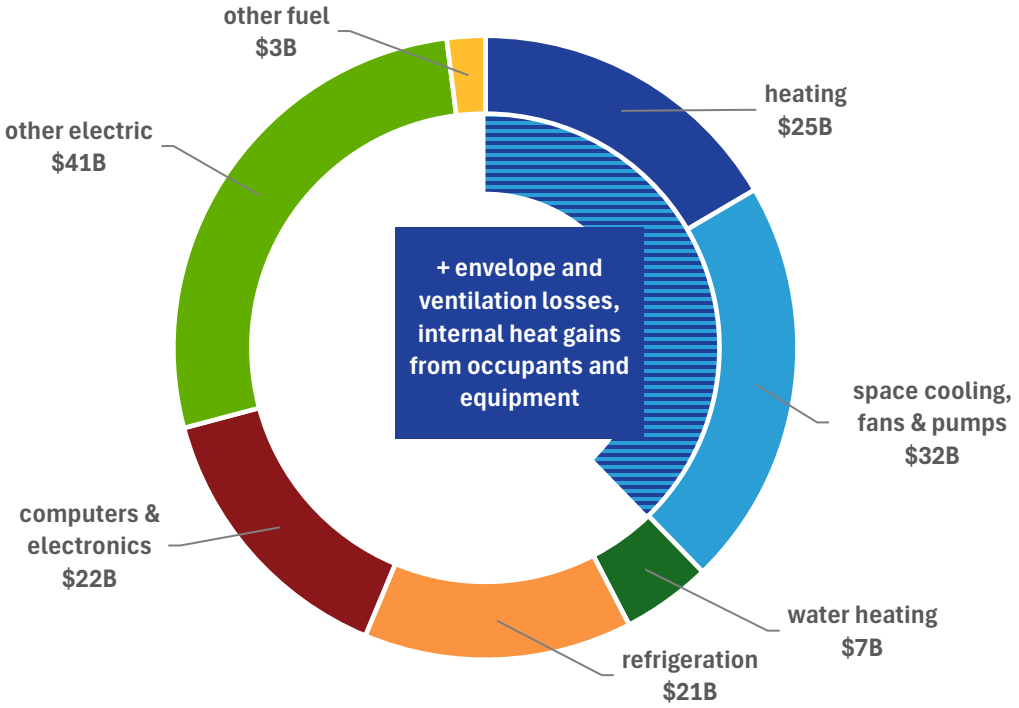
BTO Focuses on the Largest Sources of Building Energy Costs

Segmentation by End-Use Cost
2024 Energy Cost of U.S. Buildings, $389 billion

Residential, $238 billion (61% of total)

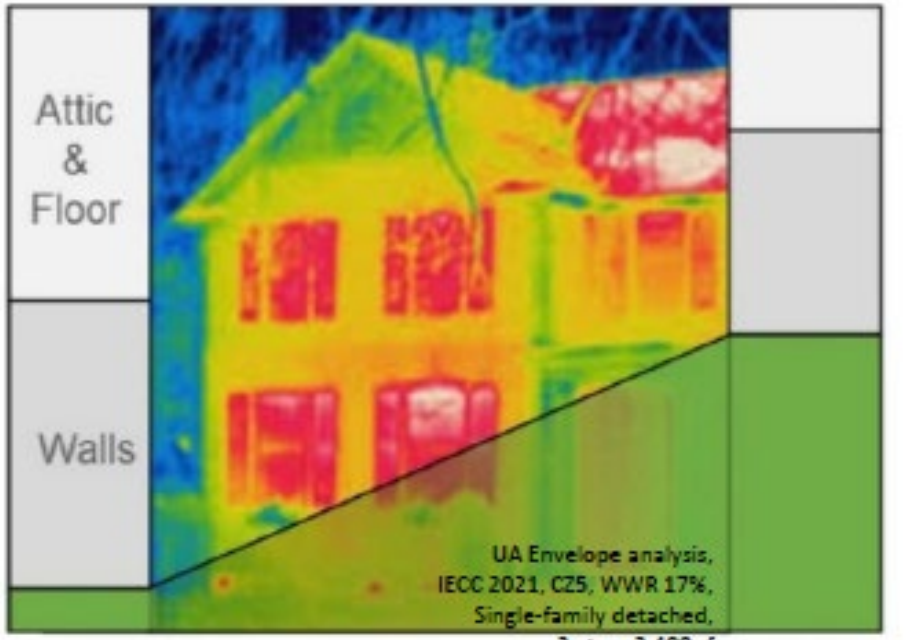


Commercial, $151 billion (39% of total)



RBI Programs

Windows



Options for reducing heat loss/gain through windows

- Thin-Triple-Pane Windows
- Storm windows
- Insulated Shades
- Exterior shading solutions

Reduce costs, improve ease of installation & understanding of benefits

Insulated Siding

Vision: Going beyond adding insulation to siding

1) R-10/inch insulation that is moisture and fire-resistant (Currently at R-7 and climbing)

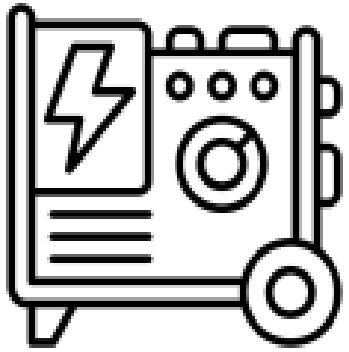
2) Coatings that convert insulation into siding

3) ½" and ¾" products that do not require new trim

4) Faster installation than current standard practice

To prepare for this future, we need to better air seal the sheating/moisture resistant barrier. (This is a best practice for all re-siding projects).

Right sizing electric panels



Understanding the peak electric use of homes/apartments, comparing it to electric service = available capacity to add new loads

What we've learned:

-100amp service is sufficient for vast majority of homes

-National Electric Code now has an approved approach to look at actual peak electric usage to determine available capacity

Published a guide on strategies to decrease electric service in new homes

Supporting development of lower-power appliances:

-120v ovens, HPWHs, lower nameplate ratings for everything

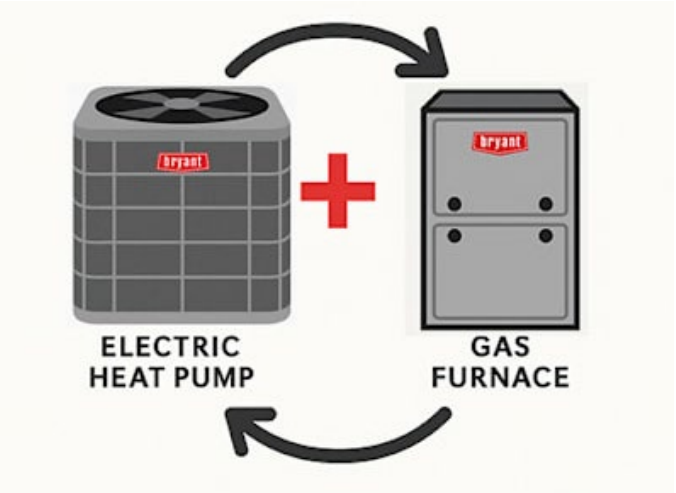
HVAC Retrofits

All-Electric Homes

- Electric Furnace --> Heat Pump

Gas & Electric Homes

- AC --> Heat Pump
- Control Improvements

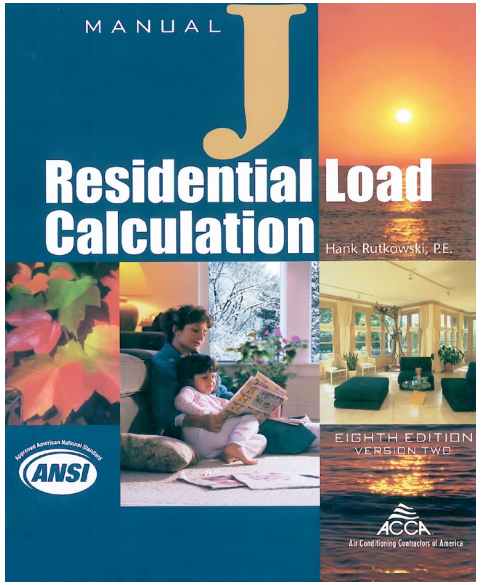


Quality Installation

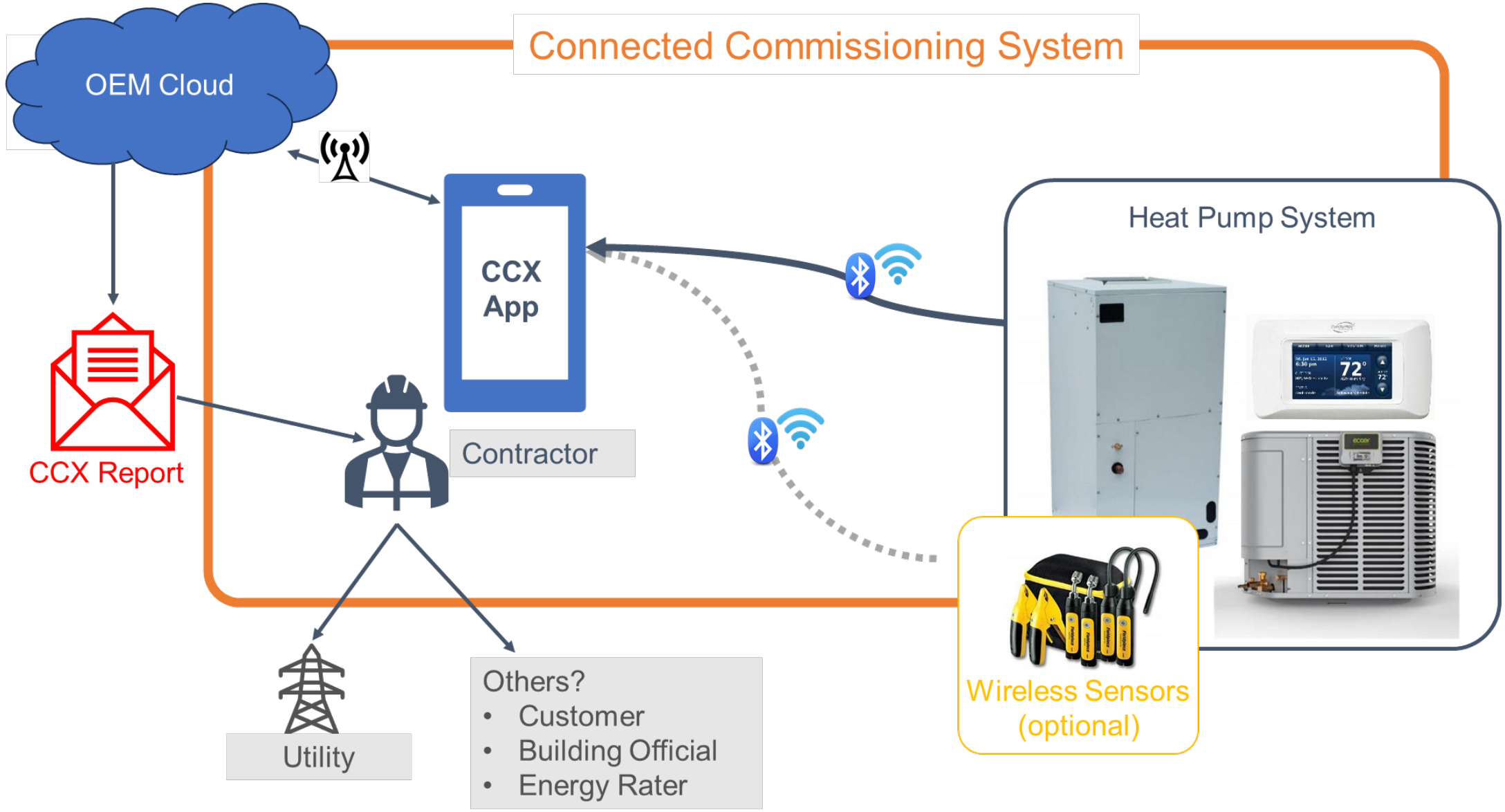
Selection: Providing more insight into what equipment is optimized for a given situation. [ResStock study coming this summer]

Sizing: New tools to simplify/speed the sizing process, training on the importance of proper sizing

Installation/commissioning: New tools and technology to simply/speed proper installation and automate commissioning and provide guidance on resolving any issues



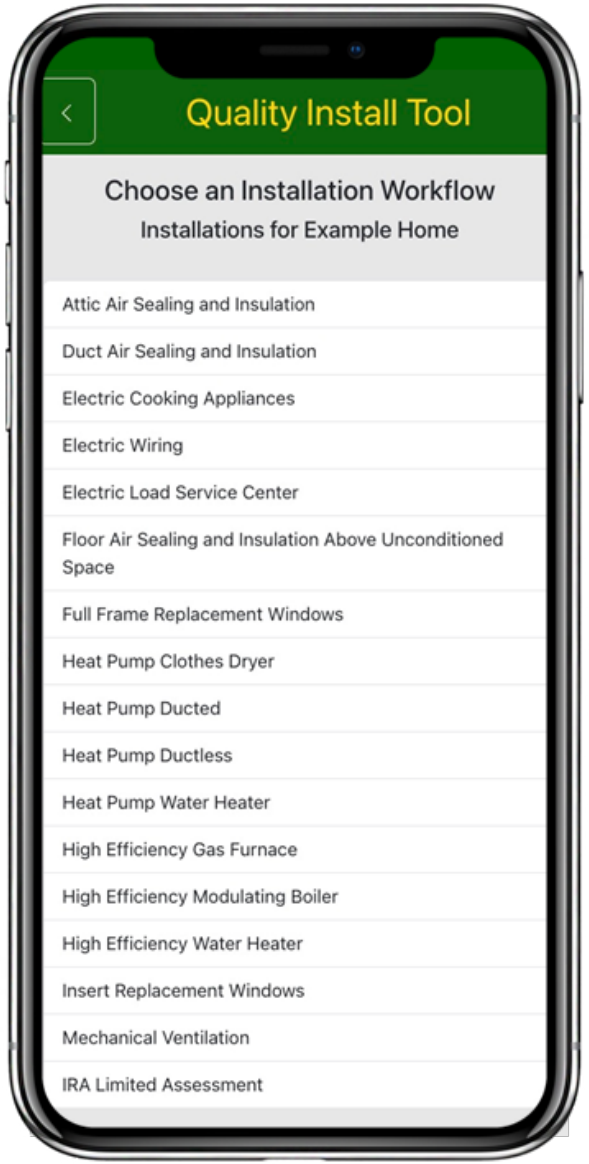
Connected Commissioning System



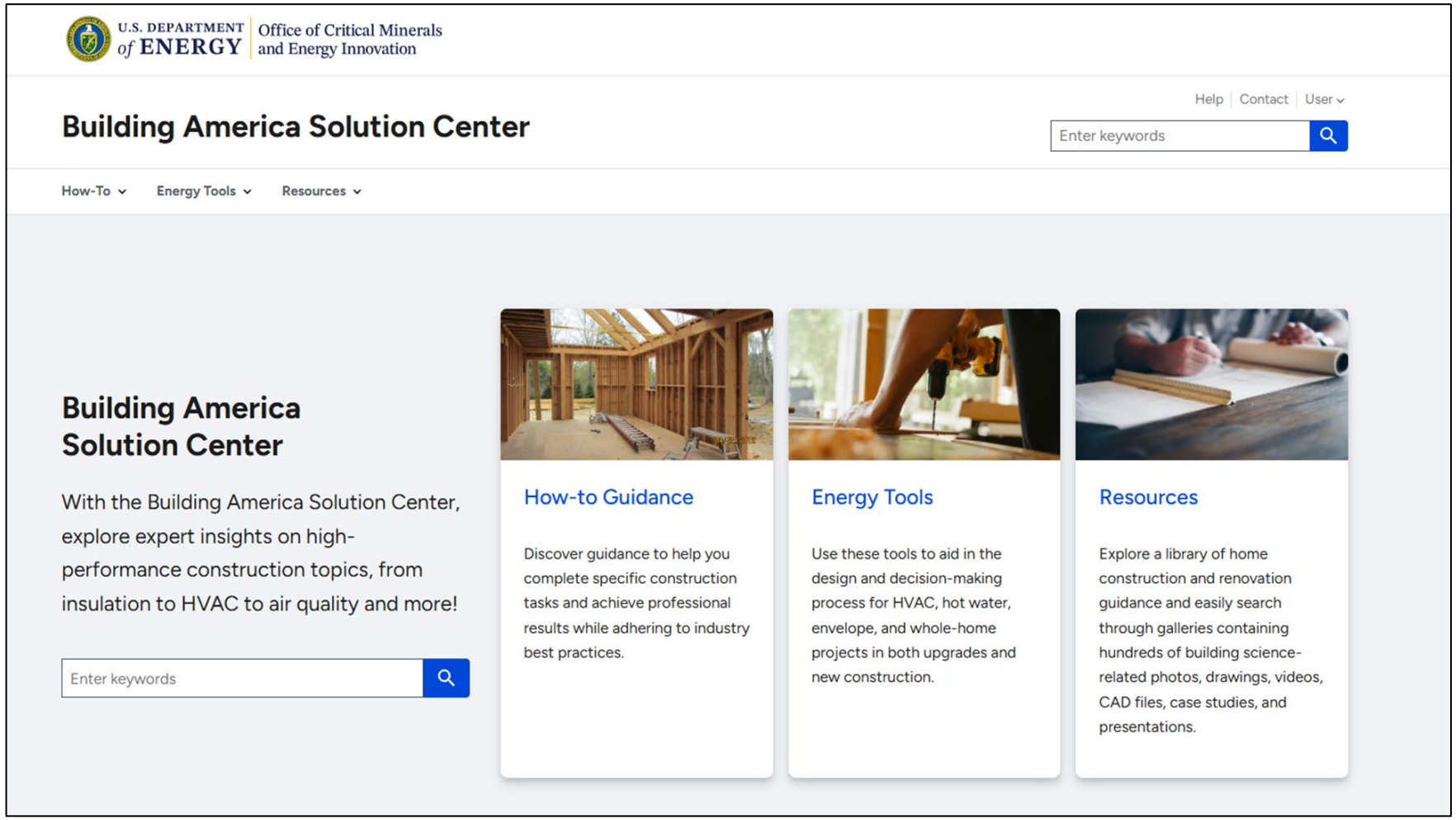
HVAC Tools/Resources

High-Performance HVAC Decision Tool

Quality Installation Tool



Building America Solution Center



Reducing Consumer Costs through Utility Incentives

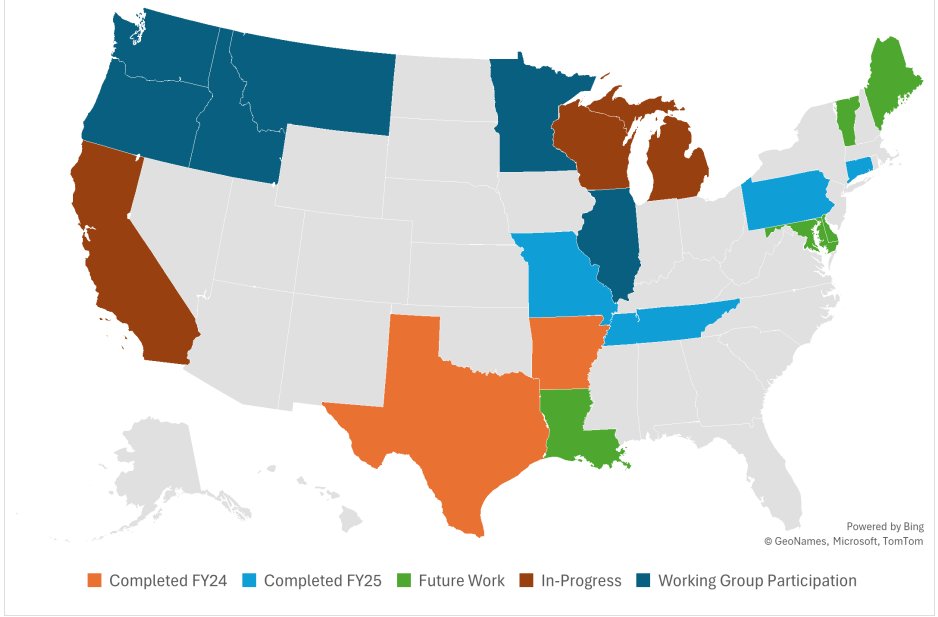
Energy Utilities Support

Goal: Increase electric and natural gas utilities' adoption of rebates and incentives for energy efficiency and demand response programs that reduce customer energy bills and reduce the costs of energy efficient technologies

Activities Include:

- ✓ Technical Resource Manual support, including 148 measures across 20 TRM programs reviewed in FY25 and FY26
- ✓ New measure developed for secondary windows and high efficiency window solutions and recommended to the CA, CT, MI, MO, TVA, and WI TRM programs with additional modeling and services provided to WI (partnered with LBNL) and MI TRMs
- ✓ Collaborated with the Partnership for Advanced Window Solutions *(PAWS)* to help utilities and TRMs incorporate advanced window measures into their programs.
- ✓ Supported measures provide **5-20%** installation cost reduction on average to homeowners across all regions
- ✓ Researching non-energy benefit values that can increase the cost effectiveness and incentives of utilitie

Impact on TRM Programs



Supported Stakeholders

TVA
focus on energy® Partnering with Wisconsin utilities
nep Northeast Energy Efficiency Partnerships
Ameren MISSOURI
COMMERCE DEPARTMENT
PUBLIC UTILITY COMMISSION OF TEXAS
energize CONNECTICUT
MPSC MICHIGAN PUBLIC SERVICE COMMISSION

Energy Skilled

Energy Skilled recognizes training programs that include the **core competencies** identified by DOE as necessary for high quality work in a specific job scope.

The platform provides **open-source content** that allows educators to quickly update curricula and add credibility to their programs.

Workers can access quality training on the latest cost-saving building technologies and perform better work.

Consumers can more easily find qualified workers.

Improved installation means **lower costs** for consumers.

Energy Skilled: Progress to Date

86
Energy Skilled-recognized programs

65%
Of recognized programs created or updated curricula to meet Energy Skilled criteria

21K
Individuals at 4,500+ businesses hold Energy Skilled-recognized credentials

4
New recognition categories launched in April 2026

New Construction

Overview

The United States needs to scale new building and home construction: It is currently short approximately 6 million homes, and estimates suggest nearly 60 billion square feet of new commercial floorspace will be built by 2050.

Leveraging advances in manufacturing to move to an industrialized, factory-made approach for new buildings and components can lower construction costs up to 20% and reduce time up to 50%.

Major Barriers

- Builders are risk averse to investing in new technologies and practices
- High cost until reach economies of scale
- Regulatory, financial, and public perception barriers to off-site vs. on-site construction

WHAT DOES BTO'S NEW CONSTRUCTION INCLUDE?

- **Industrialized practices**
  Manufacturing buildings or building components in factories, then transporting them to the build site
- **Scaling up**
  Designing replicable building designs and processes that enable rapid production of buildings and interchangeable building components
- **Building and building component durability**
  Developing new materials to improve survivability against disasters and reduce insurance costs

Industry Input

- Develop methods that **reduce construction time and therefore cost**
- Innovate **technologies and materials** that improve performance and durability and reduce energy use
- Lower-cost high-performance **windows**

R&D Priorities

- Leverage cost saving technologies from all buildings R&D areas
- Support development and demonstration of technologies that help to scale up modular and offsite production and lower cost and time to build a building
- Use factory-based processes to integrate and demonstrate new designs and technologies for cost savings