Smart Energy Homes and Buildings

MISSION

Enabling building sector decarbonization by transforming homes and buildings to be efficient and flexible grid assets.

For nearly three decades demand-response policy and programs in Northeast and Mid-Atlantic states have successfully engaged home and building end-uses to reduce electricity demand duriing peak use periods. Since the 1990's many states and utilities have deferred costly transmission and distribution system upgrades through demand-side resource programs that reduce peak electric demand. In addition, the inclusion of energy efficiency and demand response in ISO-New England, NYISO and PJM forward capacity market solicitations has helped to maintain electric grid system reliability at the lowest cost.

LONG-TERM MARKET TRANSFORMATION GOALS

By 2025:

- 50 percent of Northeast homes and buildings are "energy smart" with either two "energy smart" systems or smart building management systems able to respond to grid service needs.

By 2030:

- 90 percent of Northeast homes and buildings are "energy smart" (as defined above).

Today, the evolving practice of "smart energy" homes and buildings as flexible electric grid assets is poised for growth across the region to meet new needs. The evolution of smart sensors, smart grid technology, grid-connected home and building power generation (e.g., rooftop PV), and battery and thermal energy storage systems coupled with deep energy efficiency and smart controls enable "smart energy" homes and buildings to respond individually and collectively to electric grid needs while meeting customer needs. At the same time, the need for load flexibility to meet evolving grid needs (e.g., energy, capacity, contingency reserves, ramping, frequency regulation, voltage support) is increasingly urgent as the rapid growth of renewable energy, electric vehicles, and space heating electrification to reduce greenhouse gas emissions present multiple challenges for affordable, reliable, high-quality electric service. NEEP's The Smart Energy Home: Driving Residential Building Decarbonization report, and Grid-Interactive Efficient Buildings (GEBs) Tri-Region Status Report lay out several opportunities to accelerate smart energy homes and buildings across the region to meet these challenges.

In 2021 NEEP's Smart Homes and Buildings Initiative will continue to assist Northeast and Mid-Atlantic states to advance smart energy homes and buildings as a component of state building decarbonization strategies with a focus on policy and program initiatives that speed smart energy home and building technology adoption and benefits.

Regional Trends and Leaders:

- Since 2018 U.S. DOE has been managing the Grid-Interactive Efficient Buildings (GEBs) Initiative. The initiative focuses on enabling a future where buildings continuously manage loads and DERs to better serve the needs of building owners and occupants, electric utility systems, and regional grids. NEEP, and many other organizations, contributed to a series of research reports to support the initiative.
- Many Home Energy Management System (HEMS), as well as major home appliance manufacturers, now equip new products (HVAC, water heaters, and plug loads/appliances) with smart controls to serve customer needs while responding to a variety of potential grid load management signals.
- Utilities are increasingly offering a range of programs focused on reducing peak electric demand. Programs like National Grid's Connected Solutions program engages residential and commercial customers with opportunities to provide peak demand management services.

Regional Trends and Leaders Continued

- In 2020, Massachusetts implemented the first-in-the-nation Clean Peak Standard (CPS), designed to provide incentives to clean energy technologies that can supply electricity or reduce demand during seasonal peak demand periods. The CPS creates a requirement for all electricity suppliers to purchase a certain amount of Clean Peak Energy Certificates (CPECs) each year based on a specified percentage of the amount of electricity that they supply.

2021 Project Outcomes

1. Utilities in five states in the region design or launch demonstration pilots that explore the abilities of homes and buildings to serve as flexible grid resources.
2. Six states in the region enact policies or programs that support the deployment, or engagement, of smart energy homes to provide grid services.
3. Six utilities/energy efficiency programs in the region identify the highest priority grid services to be enabled by smart energy homes and buildings (i.e. demand response, responsiveness to time-of-use signals, load shifting, off peak usage, frequency regulation etc.).

2021 Strategies and Deliverables

Stakeholder Engagement: NEEP will engage diverse stakeholders - industry, efficiency programs, state and local government, national labs, U.S. DOE, U.S EPA and advocates - to develop and advance long-term regional market transformation strategies to speed the market introduction and adoption of smart energy home and building technologies that facilitate building decarbonization.

- Quarterly Smart Energy Homes Working Group (in partnership with the Building Performance Association)
- Quarterly Smart Energy Buildings Working Group
- Regional Workshop: Smart Energy Homes and Buildings
- Invited presentations and briefings on decarbonization and the role of smart energy homes and buildings

2021 Strategies and Deliverables Continued

Tracking and Analysis: NEEP will continue to track and report on relevant smart energy homes and buildings technologies trends and policy and program activity, pilots and technology demonstrations across the region, including the role of such devices to optimize energy performance, enable grid services and support efficiency program evaluation, measurement and verification.

- **New!** Smart Energy Homes and Buildings Program and Policy Matrix

Tools and Guidelines: NEEP will provide and develop new strategies and tools as well as provide technical assistance to programs and industry to advance the market adoption of smart energy homes and buildings technologies and programs.

- Regional Smart Homes and Buildings Website Resource Center
- **New!** Smart Home and Buildings Policy, Program and Technology Exemplars

Research and Reports: NEEP will develop a new best practice brief while maintaining access to existing reports with support for their use across the region:

- **New!** Smart Energy Homes and Buildings Regional Trends Brief

National/Regional Collaboration: NEEP will track, contribute to, and help disseminate relevant research, policies, programs and initiatives, and attend related conferences and events regionally and nationally to build market momentum to overcome identified market, technology and policy barriers.

- Monitor, communicate, present, and coordinate with national and regional organizations (e.g., Regional Energy Efficiency Organizations, U.S. DOE, U.S. EPA, Building Performance Association, NBI, SEPA, ACEEE, CEE, E-Source, advocacy organizations, etc.)

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