NEEP 2021 Quarterly Report
Quarter Four

Equitable Home and Building Decarbonization Leadership Network

Summit Series 2021: Resilient Low-Carbon Community Pathways

Mission: Provide a public program of opportunities and resources that inspire, inform, drive, and support community leadership and collaboration across the region to accelerate resilient, healthy, affordable, low-carbon homes and buildings that serve especially the most vulnerable.

Summit Series 2021: Resilient Low-Carbon Community Pathways
Long-Term Market Transformation Goals

By 2030:

- All Northeast states adopt 2050 carbon-neutral mandates for all homes and buildings with zero energy/carbon codes for new and renovated homes and buildings to begin by 2032.
- All Northeast states engage LMI communities to implement equitable economic development programs that improve the efficiency, resiliency, health, safety, and long-term affordability of their homes and community buildings.

Project Narrative:

NEEP's annual Summit provides a public program of opportunities and resources that inspire, inform, drive, and support community leadership and collaboration across the region to accelerate resilient, healthy, affordable, low-carbon homes and buildings that serve especially the most vulnerable.

During the fourth quarter, NEEP edited, repackaged, and distributed content related to our annual Summit. This continued campaign of *Summit Series 2021: Reimaging & Rebuilding Communities* highlighted climate stabilization and resiliency, affordability and equity, economic recovery and growth, and public health and wellbeing and supported the development and nurturing of partnerships needed to accelerate building energy efficiency across the region.

As we look forward to our *NEEP Summit 2022 – Scaling Up*, we build on what we learned in 2021 and continue to learn and apply ways to accelerate progress on existing efforts, think creatively, leverage each other's work where possible, and align efforts to catalyze regional-scale market transformation.

Progress Toward Summit Series 2021: Resilient Low-Carbon Community Pathways Outcomes	25%	50%	75%	100%
Seven Northeast and Mid-Atlantic communities develop innovative strategies, such as zoning requirements or strategic electrification plans, to reduce community-wide carbon emissions 60 percent by 2030. **Progress Toward Outcome:** In 2021, NEEP assisted Jamestown, R.I., Barrington, R.I., and Medfield, Mass. with the development of plans to decarbonize their building and housing stocks. We advised these communities on key strategies that should be incorporated into these plans – ranging from increasing awareness of options to electrify heating equipment, requiring municipal buildings to meet a certain energy standard, and more. These engagements will inform our understanding of the specific challenges that communities face and best practices that can be integrated into new resources to assist others going forward. Throughout 2021, NEEP partnered with the Urban Sustainability Directors Network (USDN) and the Urban Land Institute (ULI) on a series of workshops for communities interested in sustainable zoning initiatives. NEEP works with this group to share best practices for engaging with zoning boards and the community on sustainable zoning measures that can be implemented to address building decarbonization at the local level. NEEP presented at the first workshop in the series and has continued to provide technical assistance throughout the duration of the series. Since the start of these engagements, additional communities – primarily in Massachusetts – have approached NEEP seeking technical assistance to help advance their specific green zoning goals.				
At least two more states join NY, MA, DC, and VT with laws that require carbon emission reductions aligned with IPCC climate stabilization goals to reduce carbon emissions by at least 80% by 2050. **Progress Toward Outcome:** Rhode Island signed its climate bill, The 2021 Act on Climate (SB0078/HB5445), which will increase the state's emissions reduction targets to reduce greenhouse gas (GHG) emissions 80% by 2040 with net-zero emissions by 2050. New Hampshire introduced emissions reduction legislation (SB115/HB172) at the beginning of 2021 in both chambers, but it was not passed.				

Progress Toward Summit Series 2021: Resilient Low-Carbon Community Pathways Outcomes	25%	50%	75%	100%
Maryland introduced SB414, which increases the statewide greenhouse gas emission reduction goal to 60% of 2006 emission levels by 2030 and sets the state on a path to achieve net-zero emissions by 2045. It passed one chamber. Connecticut introduced SB882, which requires that electricity supplied to customers in the state must emit no greenhouse gases by 2040. The bill was not voted on. Although Massachusetts has strong climate commitments, the state took a big step in passing senate bill S9. The bill legislatively mandates a carbon-neutral by 2050 target with at least 85% GHG reductions. This law strengthened Massachusetts' earlier commitments and assigned benchmarks for technology to help achieve this goal.				
Increased public visibility for exciting community-led initiatives that advance healthy, efficient, resilient homes and buildings – particularly for low- and moderate- income communities and households. **Progress Toward Outcome:** During the fourth quarter of 2021, NEEP had two media stories – for a total of 17 over the year. Throughout the year, we saw increased activity over social media and high engagement during our virtual Summit Series.				

Public Policy Leadership and Best Practices

Mission: Inform state and local public policy adoption, implementation, and evaluation to achieve deep building decarbonization and reduce carbon emissions at least 40 percent by 2030.

Public Policy Leadership and Best Practices
Long-Term Market Transformation Goals

By 2025:

- All Northeast States adopt mandates to reduce carbon emissions 40% by 2030 and 80% by 2050, and implement statewide plans to reduce building-sector carbon emissions.
- At least five Northeast States adopt a suite of policies and programs that effectively engage homes and buildings to serve as flexible load and avoid costly transmission and distribution (T&D) additions.
- All Northeast States adopt ratepayer-funded, demand-side resource programs to improve total building energy performance including electrification to displace direct fossil fuel use, and achieve at least 3% of prior year energy sales.

By 2030:

- All Northeast States adopt a suite of policies and programs that effectively engage homes and buildings to serve as flexible load and avoid costly T&D additions.

Project Narrative:

In 2021, NEEP monitored policy and regulation in the energy efficiency space. We compiled the status of numerous energy-efficiency focused bills into a legislative web tracker and tracked the movement of regular and special legislative sessions. The tracker is updated weekly, and highlights are shared with NEEP's Allies network via the Allies newsletter and bi-monthly Allies webinars. In addition to tracking, NEEP consolidated and published legislative updates in bi-monthly policy tracker blog posts (February, April, June, August, October, and December). These blogs serve to highlight advances in the energy field and to identify new policies that states in the region are passing. Notable bills from this year include:

- Connecticut SB.356, which establishes a grant program for affordable housing and combines energy efficiency with health and safety;
- Maine LD226, which begins a phase out of hydrofluorocarbons;
- Rhode Island S.78, the 2021 Act on Climate, which establishes a 2050 carbon-neutral target;
- West Virginia HB.2667, which establishes a statewide benchmarking program for state buildings; and
- Massachusetts Climate Act S.9, which sets aggressive carbon goals, defines environmental justice, requires a stretch energy building code, and more.

In the second quarter, the Policy and Evaluation, Measurement, and Verification (EM&V) team began publishing a blog series titled *Turning Policy into Performance*. The blogs examine how to use metrics in EM&V to accomplish decarbonization and equity policy goals. In 2021, the blogs focused on transforming EM&V and metrics to measure equity, carbon, and market transformation goals. These blogs are released on a bi-monthly schedule (May, July, September, and November).

Throughout the year, NEEP provided technical assistance in 11 proceedings in New York, Maine, Massachusetts, Connecticut, New Jersey, and Maryland.

- In New York, NEEP provided technical assistance for the development of state climate plans.
- In Massachusetts, Connecticut, and Maine, NEEP provided comments on energy efficiency plans that will start in 2022. Our guidance was grounded in our expertise on heat pump market transformation practices, ensuring equitable service and access to energy efficiency programs, and evaluation, measurement, and verification practices to achieve energy efficiency and state climate goals.
- In Maryland, NEEP is currently involved in the Future Program Working Group for the EmPOWER programs 2024-2026 cycle. In this proceeding, we provided guidance on creating uniform program offerings – including beneficial electrification in energy efficiency – and creating a new societal cost-benefit test for Maryland that includes non-energy benefits and additional benefits for equity programs.
- In Massachusetts and New Jersey, we commented on the installation and implementation of advanced metering infrastructure (AMI). NEEP's guidance drew from our Policy, EM&V, and Smart Energy Homes and Buildings program work. We are hopeful that AMI can help drive clean energy transformation and empower energy consumers.
- NEEP also commented on Connecticut's Non-Wires-Alternatives (NWA) proposal. Connecticut has identified NWAs as a key part of the state's decarbonization effort. The state has just started to draft what such a program would look like and how to measure program success.

NEEP also participated in state working groups in Maryland, Connecticut, New York, and New Jersey run by clean energy and environmental groups. In this role, we assist groups as they pursue energy efficiency policy. NEEP's unique regional lens allows us to weave best practices and proven, implementable solutions into our recommendations. We also sit on state-run working groups in Maryland and New Jersey. In Maryland, NEEP attended meetings to help formulate the cost-benefit test and portfolio design for the state's 2024 EmPOWER energy efficiency portfolio. In New Jersey, we provided guidance on workforce best practices as the state creates its first round of statewide energy efficiency programs and a complementary workforce program.

Throughout the year, NEEP integrated public policy and EM&V to provide practical and achievable policy and EM&V guidance via short reports and webinars. We created three guides and associated webinars that highlight how to implement impactful energy efficiency policies. The webinars featured groups from across the United States to provide insight into how these policies look in action. The guides and webinars are:

- Establishing a Jurisdiction-Specific Cost-Benefit Test and webinar (June 2021): Includes best practices and emerging policies for cost-benefit testing and energy efficiency portfolio design.

- Deep Energy Efficiency Retrofits Implementation Guide and webinar (August 2021): Describes how states can create statewide deep energy efficiency retrofit programs that are accessible, incorporate state energy and climate goals, and grow the clean energy workforce. The companion webinar featured the equity-focused Triangle J Partners in Home Preservation program in North Carolina and the contractor-based Zero Energy Now project in Vermont. We also published a blog on weatherization highlighting the report and webinar in October.
- Cap and Invest for Equitable Decarbonization and webinar (December 2021): Describes different cap and invest mechanisms and how to ensure these market-based mechanisms are centered on equity. The webinar featured speakers from California, Maine, and Pennsylvania.

NEEP finalized new Policy and EM&V Resource Center websites. These two integrated web resources provide a framework of EM&V and public policy best practices that work to achieve decarbonization goals. Additionally, these webpages catalogue NEEP's expertise on the subject by linking to other relevant NEEP projects, programs, and resources.

Additionally, NEEP held three Building Decarbonization Policy and Evaluation Advisory Group meetings. During these meetings, staff updated members on legislative developments around the region and new NEEP tools and resources, such as the revamped policy and EM&V webpages. The Advisory Group also provided feedback on the three implementation guides.

And lastly, in the fourth quarter, NEEP released a new year (program year 2019) of energy efficiency data in the Regional Energy Efficiency Database (REED) along with an updated REED Supporting Information document. The Master REED Spreadsheet is available by request. This year NEEP completed the first-ever REED video blog, which provides an overview of the Master REED Workbook's content and functionality. The Policy and EM&V team also introduced a new blog series, Regional Energy Data Dives, to replace the REED Renderings blog series which ran for 19 issues. These new blogs will continue to use REED as a foundation for regional energy data analyses but will incorporate new and additional data sources for a better picture of the quickly-changing policy and data environment. The first Regional Energy Data Dive uses ISO New England's 2021 Energy Forecast to examine where energy savings are coming from now that lighting measures are less prominent. The second Data Dive is a video blog that demonstrates how REED can be used to answer real-world questions.

Progress Toward Public Policy Leadership and Best Practices Outcomes	25%	50%	75%	100%
At least two more states join NY, MA, DC, and VT with laws that require carbon emission reductions aligned with IPCC climate stabilization goals to reduce carbon emissions by at least 80% by 2050.				

Progress Toward Public Policy Leadership and Best Practices Outcomes	25%	50%	75%	100%
Progress Toward Outcome: Rhode Island signed their climate bill, The 2021 Act on Climate (SB0078/HB5445), which will increase the state's targets to reduce GHG emissions 80% by 2040 with net-zero emissions by 2050. New Hampshire introduced legislation at the beginning of 2021 in both chambers (SB115/HB172), but it was not passed. Maryland introduced SB414, which increases the statewide greenhouse gas emission reduction goal to 60% of 2006 emission levels by 2030 and sets the state on a path to achieve net-zero emissions by 2045. It passed one chamber. Connecticut introduced SB882, which requires that electricity supplied to customers in the state must emit no greenhouse gases by 2040. The bill was not voted on. Although Massachusetts has strong climate commitments, the state took a big step in passing Senate Bill S9, which legislatively mandates a carbon-neutral by 2050 target with at least 85% GHG reductions. This law strengthened Massachusetts' earlier commitments and assigned benchmarks for technology to help achieve this goal.				
Program administrators in three states join MA in developing/delivering EE programs integrated with other DER (e.g. DR, storage). **Progress Toward Outcome:** In the first quarter of 2021, the New York State Department of Public Service (NY DPS) issued the second 'State of Storage' annual report announcing progress toward reaching New York's statewide energy storage goal of 3,000 megawatts (MW) by 2030, with an interim objective of deploying 1,500 MW by 2025. These programs are integrated with energy efficiency program offerings, but on their own have strengthened the market for developing and installing qualified energy storage systems in the state. In December 2021, Maryland announced a proceeding to establish a benefit cost analysis for all distributed energy resources (DERs) in the state. NEEP plans to monitor and participate in this proceeding in 2022.				

At least one other state joins NY in examining the transition from natural gas to efficient electric heating. **Progress Toward Outcome:** In February 2021, New York issued its Staff Moratorium Management Proposal and the Staff Gas System Planning Proposal. NEEP participated in the public comment process in the spring and summer. The Massachusetts Department of Public Utilities (MA DPU) has opened a formal investigation into the role of natural gas in the Commonwealth's transition toward its goal of net-zero GHG emissions by 2050 (Docket DPU 20-80). The local gas distribution companies will file proposals on or before March 1, 2022.				

Efficient and Resilient Buildings & Communities

Efficient and Resilient Communities

Mission: Assist Northeast and Mid-Atlantic communities to equitably advance home and building energy efficiency to achieve local clean energy, climate resiliency, and economic development goals.

Efficient and Resilient Communities
Long-Term Market Transformation Goals

By 2025:

- 60% of Northeast communities have reduced municipal building energy consumption by 20% or more.

By 2030:

- All Northeast states adopt 2050 carbon-neutral mandates for all homes and buildings with zero energy/carbon codes for new and renovated homes and buildings to begin by 2032.
- All Northeast states engage low- and moderate-income communities to implement equitable economic development programs that improve the efficiency, resiliency, health, safety, and long-term affordability of their homes and community buildings.

Project Narrative:

NEEP's Efficient and Resilient Communities program supported local-level efforts throughout the region by providing direct technical assistance, developing resources, and conducting engagement activities. The Achieving Community Efficiency (ACE) project continued throughout the year as NEEP collaborated with partners across eight states to advance key programs in communities, such as building energy benchmarking and decarbonization planning. The shared energy manager portion of the project has been adopted in Rhode Island and Pennsylvania thus far and other states remain interested. Early in 2021, NEEP launched a revamped Community Action Planning for Energy Efficiency (CAPEE) website with new functionality including user accounts, discussion forums, and better tracking capabilities for NEEP staff. There was also a new module developed in CAPEE that provides information about community engagement strategies to ensure local plans are developed equitably with input from previously missing voices. The ACE project is on target to achieve its goal of providing guidance to at least 150 communities over the course of three years.

In the fourth quarter, NEEP published a report to assess the current landscape of school construction programs in the region with a focus on zero energy. The report, Advancing Zero Energy Schools: Trends & Considerations for

State School Construction Programs, provides guidance to entities that are involved in the development or administration of statewide school construction and renovation programs. The report includes profiles that detail each state's programs and offers a set of recommendations for moving these programs closer to funding zero energy projects. In addition to state-run programs, the report also details information related to utility programs, green bank programs, and other offerings that pertain to energy usage in schools. NEEP solicited input for the report from a variety of public- and private-sector stakeholders that are involved in school construction.

In the second quarter, NEEP collaborated with the Massachusetts School Building Authority on an all-day program focused on helping communities throughout the Commonwealth pursue zero energy school projects. NEEP helped shape the agenda for the workshop, which was attended by over 150 participants. Additionally, the team presented to the group on resources such as the Massachusetts Zero Energy Schools Toolkit. This engagement led to working more closely with two new school districts in the state. Additional partnerships with New Buildings Institute (NBI) on schools and the Urban Sustainability Directors Network (USDN) on green zoning enabled us to share our thought leadership with others from around the region on these topics.

Progress Toward Efficient and Resilient Communities Outcomes	25%	50%	75%	100%
Two additional states in the region join MA, NY, PA, and CT to support community-focused initiatives with state-level resources to advance clean energy, increase equitable access to energy efficiency programs and projects, and deliver workforce development opportunities. **Progress Toward Outcome:** Through the ACE Project, NEEP worked with Pennsylvania and Rhode Island on their shared energy manager programs. In both states, financing for these projects has been provided by the state, allowing communities to benefit from hiring an energy manager without the cost. In both instances, participating communities have had energy audits completed and are now at various stages of project implementation. In addition, NEEP continued to engage other stakeholders on this topic through the ACE Project Advisory Committee, which convened three times throughout the year to discuss additional opportunities for states to support their communities. In West Virginia, although not a formal program, NEEP collaborated with the state and another non-profit partner to engage communities and advance local-level efforts. These engagements primarily focused on benchmarking but will incorporate more holistic energy planning in the future.				

Progress Toward Efficient and Resilient Communities Outcomes	25%	50%	75%	100%
Seven Northeast and Mid-Atlantic communities develop innovative strategies, such as zoning requirements or strategic electrification plans, to reduce community-wide carbon emissions 60 percent by 2030. **Progress Toward Outcome:** NEEP assisted Jamestown, R.I., Barrington, R.I., and Medfield, Mass. with the development of plans to decarbonize their building and housing stocks. We advised these communities on key strategies to incorporate into these plans – ranging from increasing awareness of options to electrify heating equipment, to requiring municipal buildings to meet a certain energy standard, and more. These engagements help NEEP to understand the specific challenges these communities face and the best practices that can be integrated into new resources to assist others going forward. Throughout 2021, NEEP partnered with USDN and ULI on a series of workshops for communities interested in sustainable zoning initiatives. NEEP worked with this group to share best practices for working with zoning boards and the community on sustainable zoning measures that can be implemented to address building decarbonization at the local level. We presented at the first workshop in the series and provided technical assistance throughout the duration of the series. Since the start of these engagements, additional communities – primarily in Massachusetts – have approached NEEP seeking additional technical assistance to advance their green zoning goals.				
States and communities lead by example by increasing the number of zero energy public buildings in operation by 10 across at least 5 states. **Progress Toward Outcome:** NEEP embarked upon an effort to begin tracking communities in the region that are making commitments to carbon reduction goals. Our vision is that all municipalities in the region have such goals listed in the Communities Commitments Tracker. The data will be used to track progress toward goals, as well as to create a network of small- to mid-sized communities that are interested in energy efficiency at the local level. This network can be utilized in many different ways to advance local-level efforts including peer-to-peer learning exchange and as a dissemination channel for new resources. Additionally, NEEP engaged with several communities throughout the year regarding zero energy building projects. While these projects are in a variety of phases, many				

Progress Toward Efficient and Resilient Communities Outcomes	25%	50%	75%	100%
are moving forward with zero-energy goals. The team engaged with communities in Massachusetts including Watertown on their two new schools, Medfield on the early stages of their proposed school, and Concord, which is planning to use NEEP's EZ code as a pathway toward achieving zero energy. Continued collaboration with the Connecticut Energy Network led to an engagement with the town of Norwalk about their zero energy school project, which will continue into 2022. Lastly, NEEP updated all of our state-specific schools webpages to reflect the many new projects that have achieved various building certifications, including some of those that have obtained zero energy performance.				

Building Energy Codes and Appliance Standards

Mission: Assist states and communities to adopt and implement building energy codes, and support appliance efficiency standards aligned with public policy goals for climate stabilization and resiliency, clean affordable energy, public health and safety, and equitable economic development.

Building Energy Codes and Appliance Standards
Long-Term Market Transformation Goals

By 2025:

- All Northeast states have a zero energy/carbon code adoption roadmap with timelines.
- State appliance standards are adopted or updated to obtain all cost effective energy and carbon savings.

By 2030:

- All Northeast and Mid-Atlantic states adopt 2050 carbon-neutral mandates for all homes and buildings.
- All Northeast and Mid-Atlantic states adopt zero energy/carbon codes for new and renovated homes and buildings with an effective date of 2032.

Project Narrative:

Building Energy Codes

2021 was an important year for code adoption, not only in the NEEP region but nationally. The International Code Council (ICC) published its 2021 Codes for state adoption. The ICC also changed its development process for the International Energy Conservation Code (IECC) from a governmental to a standards process for future codes. The

full scope of how this will affect the energy code remains to be seen, but it will likely have an impact on code adoption moving forward.

While many states in the country are at least two code cycles behind, six states in NEEP's region began the process for 2021 adoption including Massachusetts, Vermont, New York, Connecticut, New Jersey, and the District of Columbia. However, other states were also looking at the 2021 Codes for local adoption. For instance, Maine adopted the 2021 Codes as its voluntary stretch code and local jurisdictions in Maine, such as Portland, are already taking steps toward adoption. Overall, every state in the region made progress toward adoption of either the 2021 or 2018 ICC Codes aside from West Virginia, which voted to move from the 2009 to the 2015 ICC Codes. The NEEP region also excelled in the adoption of appliance standards in 2021 with four states (Maine, R.I., N.J., and Mass.) adopting standards. NEEP launched the Supplemental Appliance Standards Database (SASD) to assist states in the implementation of state standards.

To support regional code adoptions in 2021, NEEP successfully convened regional and state code collaboratives, provided direct technical assistance to states, and facilitated webinars. We also published many new resources about codes, appliance standards, electrification, equitable building decarbonization, and many other topics.

In the fourth quarter, NEEP published various resources, including briefs on energy burden, cannabis and codes, embodied carbon, and systemic barriers to code adoption. We also convened several webinars (DOE/PNNL Equity & Codes), and code collaboratives (Massachusetts, Maine, Pennsylvania, New Hampshire, New Jersey, and a regional codes working group). NEEP provided code adoption and compliance technical assistance and code recommendations to Connecticut, Massachusetts, West Virginia, New York, Rhode Island, Delaware, New Hampshire, and Pennsylvania. Progress toward the deliverables required under the DOE RVI/Offsite Construction grant was made by completing a brief on Remote Virtual Inspections. The SASD had a soft launch, with a formal launch planned for January 2022; support materials for states seeking to adopt, implement, and enforce standards will also be finalized in January 2022. NEEP also provided technical assistance for the adoption and implementation of appliance standards in Maine and Massachusetts.

The following energy codes resources were published:

- **Addressing Energy Burdens:** This brief discusses what energy burden is and how it affects low-income households and marginalized communities. It examines the technical aspects of buildings and homes that affect energy burden such as lack of insulation, air sealing, and electrical issues. Recommendations are made for how utility, state, and federal weatherization programs can better address energy burden for households and communities.
- **Cannabis and Energy Codes**: This brief provides information and solutions to the barriers states face when adopting new building energy codes. Newer versions of building energy codes are essential for states to adopt because they reduce carbon emissions from the building sector, save consumers money, and provide healthy, more resilient buildings. The brief examines the ongoing systemic barriers to the

adoption process – such as costs, stakeholder resistance, and state adoption processes – and gives recommendations for how to overcome these challenges.

- **Systemic Barriers to Code Adoption**: This brief provides insight into how much energy an indoor cannabis operation uses; some of the challenges of regulating horticulture lighting and other necessary growing equipment from a building codes perspective; how some states are increasing cannabis operations energy efficiency; and recommendations on how states can decrease the energy use of indoor grow facilities using building codes and standards.

DOE RVI/Offsite Grant

Prefabricated Construction: Guidance, Technical Assistance, and Virtual Inspections: 2021 saw the completion of Budget Period 1 for this U.S. DOE-funded project, with the publication of two briefs, a webinar, as well as surveys, interviews with industry professionals, and other independent research.

Remote Virtual Inspections (RVI): Challenges and Opportunities: This brief, co-written with the Midwest Energy Efficiency Alliance (MEEA) and supported by the U.S. DOE Office of Energy Efficiency and Renewable Energy (EERE), explores the growth and challenges of Remote Virtual Inspections. Inadequate resources to support code enforcement and shortages of building code inspectors create a challenge to keep up with the demand for building construction inspections. The COVID-19 pandemic exacerbated these challenges, but also presented an unexpected opportunity to research the potential for RVI as a possible solution to these challenges.

Single-Family Off-Site Construction: This brief, co-written with MEEA and supported by EERE, focuses on single-family off-site construction. In order for states and communities to reach their climate goals, buildings must make their way to net-zero. This goal can be targeted through increased energy efficiency, and one way to achieve this is through off-site construction. The topics studied include modular, panelized, and precut methods. There are benefits to off-site construction, but there are many barriers as well. This brief examines why off-site construction has not taken on a larger share of the residential single-home market, and ways to increase the use of off-site construction in the U.S.

Webinar, October 4, 2021 – Offsite Residential Construction: Where has it been, and where is it going? This webinar was produced in collaboration with MEEA, the National Institute of Building Sciences (NIBS), the International Code Council (ICC), and the Modular Building Institute (MBI). Panelists from NIBS, ICC, MBI, and the Advanced Building Construction Collaborative presented and responded to moderator and audience questions.

State Focus

In ***Massachusetts***, a stretch code working group was convened to coordinate efforts around the municipal opt-in stretch code being developed by the Massachusetts Department of Energy Resources (MA DOER). The working group discussed code and legislative updates related to energy codes and building decarbonization. The group also developed talking points and resources to support communications for municipalities and stakeholders in support of zero energy code adoption. NEEP provided technical assistance to municipalities (Lexington and

Brookline) pursuing building electrification initiatives and electric vehicle (EV) infrastructure and will be assisting the Rocky Mountain Institute (RMI) in planning for its Building Electrification Accelerator.

The Energy-Zero Code Version 2.0, released in April 2021, is a revised version of the original May 2020 EZ Code proposal for commercial buildings. NEEP organized the development and management of this code. The creation of the Massachusetts Energy-Zero Code (MA E-Z Code) was a consensus-based process, drawing from professionals with extensive experience with zero energy and high performance buildings in Massachusetts and the region, review of precedent zero energy codes and standards, and feedback from municipal and regulatory representatives. In addition to offering a prescriptive compliance path, the E-Z Code addresses the electrification of buildings – a critical strategy to reaching carbon neutrality. The E-Z Code modifies IECC 2021 Appendix CC: Zero Energy Commercial Building Provisions to limit renewable energy sources to those that meet 'additionality,' ensuring that the renewable energy will have a net positive effect on GHG emissions.

In ***New Jersey,*** NEEP is working with the Rutgers Center for Green Building to convene a code collaborative comprised of diverse stakeholders from the building and energy efficiency sector. NEEP used input from the collaborative to develop a draft roadmap to support code adoption, building decarbonization, and help put the state on a path to reach a zero-energy base code. New Jersey is also pursuing adoption of the IECC 2021 and considering the zero energy appendices for commercial and residential construction. The final roadmap is expected by the first quarter of 2022. NEEP supported development of the roadmap by facilitating sessions with key stakeholder groups to gather feedback about the roadmap's recommendations.

In ***Rhode Island,*** NEEP provided written technical assistance toward adopting the 2018 IECC without weakening amendments.

In ***Pennsylvania***, NEEP provided technical assistance on several issues, including adoption of the state's version of the 2018 IECC, adoption of appliance standards, potential development of a compliance field study, and discussion of building resiliency and how codes can make buildings more resilient.

In ***Connecticut***, NEEP provided guidance and comments on adopting the IECC 2021 code, and encouraged the state not to adopt weakening amendments.

In ***Delaware***, NEEP provided technical assistance toward the state's implementation of a residential code compliance field study. NEEP shared experiences, lessons learned, and documents from the Connecticut field study we coordinated in 2019, as well as from states that participated in U.S. DOE's field study pilot.

In ***Maine,*** the state adopted the 2015 IECC and the 2021 IECC as the state's stretch code. NEEP continues to work with the state and the NEEP Maine Code Collaborative to assist municipalities in adopting the stretch code.

In ***New Hampshire***, NEEP provided technical assistance on several issues, including adopting the state's version of the 2018 IECC, reconvening the New Hampshire Code Collaborative, provisions of the 2021 IECC, and the state's adoption of appliance standards.

Appliance Standards

Legislative action on appliance standards bills was active throughout 2021. The New Jersey Legislature passed appliance standards that are now waiting to be signed by the Governor. NEEP will continue to provide technical assistance to Rhode Island, Maine, the District of Columbia, and Massachusetts to implement their respective bills. Additionally, we continued to support New York, Connecticut, and Maryland in adoption of appliance standards.

NEEP, in coordination with Appliance Standards Awareness Project (ASAP), the US Climate Alliance, and Environment America, hosted an annual Appliance Standards webinar in the fall, which focused on state planning for 2022 standards adoption and federal appliance standard policies. The webinar also included sessions on challenges to adopting appliance standards and implementation strategies for states. NEEP will continue coordinating calls with ASAP and the US Climate Alliance to discuss 2022 appliance standards adoption across the U.S.

NEEP participated in numerous federal standards meetings as U.S. DOE issued requests for comments of new standards and test procedures. We signed onto a letter supporting new standards and test procedures to be implemented nationally, and will continue to track federal standards and disseminate information to the states as applicable.

The NEEP region also excelled in the adoption of appliance standards in 2021 with four states (Maine, R.I., N.J., and Mass.) adopting standards. NEEP launched the Supplemental Appliance Standards Database (SASD) to assist states in the implementation of state standards. Massachusetts became the first state to require manufacturers selling products meeting the state's standards to utilize the SASD.

Progress Toward Building Energy Codes and Appliance Standards Outcomes	25%	50%	75%	100%
Three additional Northeast and Mid-Atlantic States adopt zero energy stretch codes (DE, MA, NY). **Progress Toward Outcome:** NEEP released the Massachusetts Commercial Energy-Zero Code (E-Z Code) Version 2.0 in April 2021, and proposed it to the state for their consideration. The MA E-Z Code was developed as an update to the existing Massachusetts Stretch Energy Code (780 CMR 9th Edition, Appendix AA). We also began work on the Massachusetts Residential Energy-Zero Code.				

Progress Toward Building Energy Codes and Appliance Standards Outcomes	25%	50%	75%	100%
Maine adopted the 2021 IECC, which includes the zero energy appendices; both Portland and South Portland adopted the zero energy appendices.				
Four additional Northeast and Mid-Atlantic States adopt stretch codes (CT, DE, ME, NJ). **Progress Toward Outcome:** Connecticut is currently researching development of their first stretch code. Maine adopted the 2021 IECC as their stretch code effective July 1, 2021 and Portland and South Portland have implemented it. New Jersey has not adopted a stretch code, but NEEP has made recommendations for stretch code adoption in a roadmap developed for the state to reach a zero energy code. Both New York and Vermont have started the process of updating their stretch codes.				
Municipalities in four states (MD, WV, NH, CT) adopt zero energy building codes. **Progress Toward Outcome:** NEEP began conversations with Delaware and New Castle County regarding statewide and county adoption of a zero energy building code. Portland and South Portland, Maine have both adopted the zero energy appendices of the 2021 IECC.				
Five Northeast and Mid-Atlantic States (NH, VT, RI, PA, NJ) establish pathways to quantify statewide code compliance baseline levels to inform code compliance initiatives. **Progress Toward Outcome:** NEEP provided technical assistance to Delaware and New Jersey, who are both in the process of a statewide compliance study.				
At least seven Northeast and Mid-Atlantic States (NY, MA, RI, CT, DC, ME, PA) adopt new state appliance standards in 2021. **Progress Toward Outcome:** Maine, Massachusetts, New Jersey, and Rhode Island passed appliance standards bills and are currently developing their state implementation and enforcement plans. These states adopted standards in 2021, but only Massachusetts has implemented them. In Executive Order 21-3, the Governor of Connecticut required the state to pass appliance standards in 2022. NEEP will continue to assist New York, Maryland, and Pennsylvania in the adoption of appliance standards in 2022.				

Low-Carbon Retrofit Solutions

Mission: Ensuring equitable access to low-carbon retrofit solutions to improve the energy efficiency of homes and buildings.

Low-Carbon Retrofit Solutions
Long-Term Market Transformation Goals

By 2025:

- Building energy labels or ratings are populated in all real estate listings across the Northeast.

By 2030:

- 30 percent of existing homes and building are retrofitted to reduce carbon emissions 50 percent.

Project Narrative:

Due to a variety of historical barriers set deep in our social and energy systems, many policies, programs, and products aimed at building decarbonization are not adequately serving those most in need of energy and cost savings. NEEP's StoryMap and Brief, Recognizing Energy Inequities for Building Decarbonization and Near-Term Solutions for Centering Energy Equity, identifies barriers to, and solutions for, creating a foundation for equitable building decarbonization focused on the residential sector. The StoryMap describes energy insecurities faced by historically marginalized or excluded communities across the Northeast and Mid-Atlantic region, while identifying barriers to the equitable integration of low-carbon building retrofit solutions into our communities. It identifies pathways toward a more equitable application of energy efficiency solutions so that we can achieve healthy, affordable, and sustainable buildings for all residents of our region by sharing scalable best practices from communities and groups tackling energy inequities. These resources aim to help energy efficiency policy- and decision-makers to make more equitable, inclusive decisions and to begin to share decision-making power with the communities they serve.

In the development of these resources, NEEP conducted a literature review of existing resources as well as held interviews with key stakeholders, including energy policy decision-makers, program administrators, and community advocates. Reports reviewed for this research include climate action plans, energy efficiency program plans, equity and health reports, and more. We conducted interviews with twenty stakeholders from diverse backgrounds and focus areas across the region to help identify barriers to, and solutions for, equitable building decarbonization. In addition, we solicited input from six external reviewers on the final drafts.

While telling a story of the landscape of energy inequities across the NEEP region, the StoryMap identifies redlining and segregation, aging housing stock, and income inequalities as root causes of energy inequities. It also describes practices that exacerbate existing inequities such as traditional utility rate structure and program design, the landlord-tenant split incentive issue, the treatment of manufactured housing, high costs and ineffective financing

mechanisms for clean energy investments, weatherization program limitations, and workforce inequalities. The brief provides guidance for centering equity in building decarbonization efforts and includes recommendations including establishing equity committees; moving along the Spectrum of Community Engagement to Ownership; conducting racial equity or health impact assessments; measuring equity and implementing equity metrics in cost-benefit analyses and EM&V processes; using restorative justice principles; retrofitting homes for health and efficiency; and implementing anti-displacement policies. The brief references many additional resources for further reading on equitable energy solutions. Taken together, the StoryMap and brief describe the energy inequities faced by historically marginalized communities and present solutions for making more equitable energy policy decisions.

HELIX/Energy Estimator

Throughout 2021, the Home Energy Labeling Information eXchange (HELIX) team made great strides, increasing the data available in HELIX for our region as well as advancing our work with Multiple Listing Services (MLSs). As HELIX continues to update datasets and execute new data sharing agreements, it adds more value to the real estate market through increased transparency and data availability as well as to our HELIX subscribers (states, communities, utilities, etc.). As states across the region work on initiatives such as residential energy labeling, the HELIX database can help track residential program implementation and assist utilities in attributing energy savings to program expenditures for installed energy efficiency measures and solar photovoltaic (PV) installations. This data can also help inform program management and future program planning. In 2021, the HELIX team met with a handful of communities including Keene, N.H., Princeton, N.J., Newton, Mass., Winchester, Mass., and Portland, Maine to discuss opportunities for home energy labeling programs and energy disclosure ordinances. In addition to regional community discussions, the HELIX team provides technical assistance and support to the state of Vermont and its capital city, Montpelier, on their voluntary and mandatory home energy labeling initiatives, respectively. The Vermont Home Energy Profile website is live and available to all Vermont residents as a voluntary resource. Residential energy labeling provides transparency for homeowners and drives consumer action by highlighting potential cost savings of energy efficiency measures. With the mission of accelerating regional collaboration to promote advanced efficiency solutions in homes, HELIX and Energy Estimator provide the mechanisms to inform, educate, and recommend efficiency improvements.

With the lasting effects of the COVID-19 pandemic, which halted the energy efficiency workforce and on-site work for efficiency programs, virtual audits became a staple in many energy efficiency programs to keep the efficiency workforce moving forward. Throughout the year, NEEP gave many presentations, demos, and shared Energy Estimator resources to help push along virtual audits within our region. To further drive virtual audits in the marketplace the New York State Energy Research and Development Authority (NYSERDA), launched the Remote/Virtual Audit Challenge to scale up virtual audits through engagement with contractors and homeowners. NEEP, along with our subcontractors ClearlyEnergy and Signetron, were awarded a contract to develop a two-part solution, Remotely, that uses the Energy Estimator tool and Signetron's custom iPhone app. As of the end of 2021, the project team had convened the kick-off meeting for the Remotely Pilot Advisory Committee that will help

guide and inform project efforts with market experts and players. The project team is currently wrapping up final revisions of the two tools and plans to test the solution on a pilot group of three to five homes in January 2022 – with hopes to launch the pilot early in the year. Furthermore, the project team has developed a home energy contractor marketing plan and customer engagement plan that are being reviewed by advisory committee members, and has created contractor and customer training materials (e.g., step-by-step guides, tutorials videos, one-pagers).

In addition to home energy labeling initiatives, an important connection to make is with the real estate market. As states and communities design policies and programs to encourage energy efficiency in homes, one challenge is lack of homeowner awareness and information on a home's energy performance. The value of energy efficiency and renewable features are not recognized in appraisal or purchase price as this type of information is essentially "invisible" and most homeowners and real estate professionals are not well versed in home energy performance. By connecting HELIX with local MLSs, we can reduce this gap in the market. Lastly, the HELIX team worked closely with our HELIX PV Auto-Population (PVAP) Advisory Committee, which consists of state energy offices, utilities, MLSs, real estate professionals, and other related stakeholders. Over the years, the HELIX PVAP Advisory Committee has played a critical role in shaping project success through feedback and stakeholder insights. Through effective engagement, NEEP has a greater understanding on market and tool barriers, and what needs to be considered for greater HELIX adoption amongst MLSs. For example, we were able to create three different pathways for HELIX integration into MLSs, which helped overcome technological barriers, e.g., outdated infrastructure. The team met in December 2021 to discuss project efforts, share lessons learned, and discuss opportunities moving forward and next steps. To date, NEREN MLS and Garden State MLS have integrated HELIX. FBS, creators of FlexMLS, have tested HELIX and are ready for HELIX integration for their suite of MLS clients. FBS clients include Cape Cod and the Islands, Berkshires MLS, Maine Listings, Monmouth Ocean Regional REALTORS, and more.

BEAM

NEEP's Building Energy Analysis Manager (BEAM) project made great strides over the course of 2021, moving from a prototype platform to a fully functional tool that is being used by multiple jurisdictions. This progress required increasing awareness, stakeholder engagement, and creating technical support guides.

NEEP hosted four BEAM Advisory Committee meetings including stakeholders from across the country such as the Southwest Energy Efficiency Project (SWEEP), MEEA, and the cities of Reno, Nev. and Denver, Colo. These meetings offered stakeholders an opportunity to learn about benchmarking and building performance standards from their peers, as well as guide the development of BEAM and building performance standards (BPS) resources. The Advisory Committee identified a building owner portal as an important feature of BEAM; this was the first feature we worked on when Phase 2 of the project began, accompanied by a building owner portal user manual. NEEP also hosted two public webinars focused on building performance standards that raised awareness for the tool. The first was an interview-style event with a member of the Washington, D.C. Building Energy Performance

Standard (BEPS) program. The second was on BPS performance and incorporated strategic energy management (SEM), another NEEP project area. The interview with Washington D.C. was also converted into a written exemplar.

NEEP and ClearlyEnergy onboarded Washington, D.C. as BEAM's first official user and also began this process with Cambridge, Mass. To expand our outreach and support, we collaborated with SWEEP and MEEA who will be the lead support providers for cities and states in their regions. Likely the next two cities to be onboarded will be Reno, Nev. and Ann Arbor, Mich. NEEP began development of training materials for our sister regional energy efficiency organizations (REEOs) to aid in the onboarding and marketing processes.

BEAM is not only for use in large cities; we are also in discussions with Lexington, Mass., a suburb of Boston. The town is interested in how BEAM can reduce the number of resources needed to run their benchmarking efforts. Understanding the necessary resource commitment will play a large role in whether or not benchmarking is passed in 2022. BEAM can also be used for jurisdictions bigger than cities such as counties, states, or regions, and we are in discussions with New Jersey, Maryland, and West Virginia.

TEP

Throughout 2021, NEEP's Total Energy Pathways (TEP) project continued to build of its success and grow beyond the Zero Energy Now program in Vermont. NEEP convened a TEP Advisory Committee meeting in May 2021 to present the revamped TEP program model and materials to key program stakeholders. The intention of this kick-off meeting was to elicit interest in collaboration on launching TEP-like programs in other states to help make greater strides toward state efficiency and clean energy goals.

Anecdotal evidence cited by some customers through the Zero Energy Now/TEP program was that they were troubled by the qualification needed to participate in the program. To remediate this issue, the project team developed a streamlined program pathway with prescriptive requirements to be offered alongside the custom, modeled approach to facilitate more participation. Language around the two distinct pathways, particularly around incentives and procedures, was uploaded on the Zero Energy Now website.

To support New York State in developing a large-scale pilot initiative, NYSERDA asked NEEP to lead a new working group for the Stacked Energy & Electrification Pilot (SEEP). The goal of the SEEP working group was to develop a framework to serve as a reference document, allowing program managers and administrators to consult the sections that address the most pertinent topics, giving recommendations, and asking key questions to consider. The framework will provide a comprehensive range of information tailored specifically to the needs of single-family homes in New York, with an emphasis on the most effective way to scale retrofit projects across the region.

Lastly, NEEP was awarded a U.S. DOE contract with the goal of growing the workforce, diversifying the field, and increasing industry competitiveness. The project will focus on two pathways to prepare the workforce: 1) on-

demand training tools to bring new individuals and contractor businesses into the industry; and 2) creating a TEP Certificate that will certify and train an increased number of TEP-certified professionals.

Key TEP resources developed include:

- Total Energy Pathways Web Resource Center; and
- Residential Retrofit Program Matrix.

Progress Toward Low-Carbon Retrofit Solutions Outcomes	25%	50%	75	100%
Thirty Vermont homes enroll in the Zero Energy Now/Total Energy Pathways program and undergo comprehensive energy retrofits to reduce energy use by >60 percent. **Progress Toward Outcome:** Currently, there are 13 Vermont homes enrolled in the ZEN/TEP program, and we have identified 11 additional homes as promising for enrollment.				
Two Northeast states and two cities adopt and implement policies to use home energy labeling and/or benchmarking as a strategy to improve energy efficiency of existing homes and buildings. **Progress Toward Outcome:** Montpelier, Vermont passed its Home Energy Information Ordinance and the state of Vermont approved a voluntary statewide labeling program early in 2021. NEEP provided technical assistance and support to the state by developing resources, holding trainings for realtors and residents, and compiling research on home energy labels and solar PV value in the real estate market and the process in the NEREN MLS system. NEEP is partnering with sister REEO SEEA to deliver labeling technical assistance to the state of South Carolina to increase the impact of energy efficiency policies beyond our region. We also provided labeling technical assistance to communities in the following states throughout 2021: Connecticut, New Hampshire, Maine, New Jersey, and Massachusetts. Lastly, NEEP provided comments to Connecticut and New Jersey to support adoption of benchmarking programs.				

Three additional states (e.g. NJ, MD, ME) use HELIX to support home energy labeling policies and programs at the state and local level. **Progress Toward Outcome:** NEEP engaged with a handful of states and communities on home energy labeling policies and the potential for using HELIX and/or the Energy Estimator, including N.H., Maine, Mass., Conn., Md., N.J., and S.C. In recent discussions with South Carolina, the state showed interest in using HELIX to support a labeling program.				
Two cities adopt building performance standards as a strategy to improve energy efficiency of existing homes and buildings. **Progress Toward Outcome:** Boston, Mass. and Denver, Colo. passed building performance standards. Although Denver is outside of the NEEP region, they have been involved in the BEAM project from the beginning.				
Three states (MA, NY, RI) enact existing building retrofit initiatives to drive ongoing decarbonization of all existing homes and buildings toward growing an equitable retrofit economy. **Progress Toward Outcome:** NEEP provided technical assistance to N.Y., Del., Mass., and Philadelphia, Penn. who are all interested in following the TEP model. NYSERDA selected NEEP to champion a working group tasked with creating an off-the-shelf program framework for a comprehensive, bundled energy retrofit project. The working group will follow other regional models, such as that of ZEN/TEP. Lastly, Massachusetts has a building performance standard bill working its way through the legislature. Companion bill H.3366/S.2232, known as The Better Buildings Act, has passed favorably out of the senate committee. NEEP supported this effort through development of talking points with the Better Buildings Coalition.				

Heating Electrification Market Transformation

Mission: Accelerating market adoption of high performance heat pumps for residential and commercial space heating and cooling.

Heating Electrification Market Transformation
Long-Term Market Transformation Goals

By 2025:

- 10 percent of Northeast homes and buildings use high performance heat pumps for space and water heating.

By 2030:

- 40 percent of Northeast homes and buildings use high performance heat pumps for space and water heating.

Project Narrative:

Despite anticipated challenges due to COVID-19, regional activity in the heat pump market was vibrant throughout 2021. States and utilities made significant strides in implementing heat pump programs to help meet their decarbonization and energy savings goals; contractors hit hardest by the pandemic received support from utilities and state energy offices; advocates made significant progress in pushing the most ambitious energy legislation in recent history; and industry members further demonstrated the effectiveness of heat pumps in residential and commercial settings. Regional programs have reported surpassing their 2021 air-source heat pump (ASHP) installation targets, a trend that provides an optimistic outlook toward meeting NEEP's 2025 and 2030 long-term market transformation goals. Variable refrigerant flow (VRF) programs saw an increased potential for incentives on existing equipment and expansion of eligible equipment, and found that market actors have been able to focus more effort on leveraging programs, despite the many setbacks posed by the pandemic.

NEEP held its annual Heating Electrification Market Transformation Workshop virtually in the fourth quarter, hosting 330-plus attendees from the Northeast, Northwest, Midwest, and Canada, with four sessions composed of esteemed panelists. The annual event is a unique opportunity for stakeholders in the region and beyond to come together to discuss market transformation of the heating sector.

New programs inside and outside the region have leveraged best practices from NEEP's installer and consumer resources and have adopted the NEEP cold-climate air-source heat pump (ccASHP) specification and product list, which now houses over 30,000 cold-climate systems from over 100 industry-leading brands – up from 8,500 products at the start of 2021. The product list is widely recognized as an important resource for promoting the

highest performing ASHPs. We also moved forward new proposals for ASHPs and VRFs and finalized a new specification for packaged terminal heat pumps.

Lastly, we began a project to develop a new installer sizing tool, which we expect to be completed in the first quarter of 2022. The new tool will provide another simple aid to ensure successful system sizing and selection.

Progress Toward Heating Electrification Market Transformation Outcomes	25%	50%	75%	100%
Twenty percent increase in annual sales of high performance heat pump systems across the NEEP region. **Progress Toward Outcome:** Sales data for 2021 heat pumps will not be available until the second quarter of 2022. However, NYSERDA data has demonstrated a trend of growing ASHP sales in the Northeast from 2013-2020, with 2020 data showing a twenty percent increase in sales from 2019, primarily among ductless systems with a slight increase in the ducted market. NEEP is optimistic that 2021 sales numbers will further make evident this positive market trend.				
Five new programs join the twenty others already using NEEP's ccASHP product list. **Progress Toward Outcome:** Twenty-six programs inside and outside of the NEEP region now reference the ccASHP specification/product list – Mass. Clean Energy Center (MassCEC), Mass. Alternative Energy Portfolio Standard, Efficiency Vermont, National Grid - RI, PSEG Long Island, Con Edison, Central Hudson, Orange & Rockland, NYSEG, Rochester G&E, National Grid - NY, the Minnesota ASHP Collaborative, Holy Cross Energy, Northwest Energy Efficiency Alliance, Efficiency Nova Scotia, Energy Transition Québec, Hydro Quebec, efficiencyPEI, Wabash Valley Power Alliance (Power Moves), Central Iowa Power Cooperative, ENERGY STAR, Xcel Energy Colorado, Natural Resources Canada (NRCan), the Government of Yukon, Upper Peninsula Power Company (UPPCO), and Colorado Springs Utilities.				
NEEP's heat pump consumer and installer guides are used or referenced by ten programs in the region. **Progress Toward Outcome:** Content from NEEP's ASHP Buying Guide is referenced by MassCEC's Clean Energy Lives Here campaign, the CT Green Bank's Smart-E Loan heat pump webpage, PSEG Long Island's heat pump marketing materials, NYSERDA, and the Rocky Mountain Institute. The breadth of heat pump information in the consumer buying guide has proved relevant to groups in different regions.				

Progress Toward Heating Electrification Market Transformation Outcomes	25%	50%	75%	100%
NYSERDA uses NEEP's installer guides for their in-field monitoring pilot, in addition to MassCEC, Mass Save, Efficiency Vermont, and Xcel Energy, who link to the guides on their websites. Furthermore, NEEA and the Minnesota Air Source Heat Pump Collaborative have leveraged content from NEEP's installer guides to produce training modules and guides tailored to their own jurisdictions. Xcel Energy Colorado has also utilized content from NEEP's installer guides for their program brochures.				
Initiative participants report significant progress in implementing the Regional ASHP Market Transformation Strategy and Regional VRF Market Transformation Strategy. **Progress Toward Outcome:** NEEP's ASHP and VRF Market Transformation Progress Report reflects only "noticeable" progress or less across seven main market strategy areas. While the results from the progress report are helpful in refining focus for 2022 efforts, this fell short of the desired "significant" progress. The impacts of COVID-19 across the market were a likely factor in the decrease of perceived progress made in 2021.				

Smart Energy Homes and Buildings

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

Smart Energy Homes and Buildings
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).

Project Narrative:

Throughout 2021, NEEP continued to accelerate the adoption of smart energy homes and building, policies, programs, and technologies. We hosted quarterly Home Energy Management Systems (HEMS) Working Group meetings and developed a new Smart Energy Buildings Working Group, which have both helped to bring together

market experts and players to advance this work across the region and nationally. NEEP understands that the collective efforts of varied key stakeholders will help drive adoption of smart energy homes and buildings.

To further advance the NEEP region in modernizing grids, increasing interoperability, and expanding integrated systems for resiliency, it is key for homes and buildings to evolve in tandem to keep up with the evolving grid. To support this effort, NEEP hosted a Smart Energy Homes and Buildings Workshop in August 2021, featuring speakers and attendees from a variety of stakeholder groups, including federal program representatives, energy efficiency program administrators, implementation experts, research and development professionals, manufacturers, and facility managers. Featured sessions explored approaches for electrifying the region's heating and cooling sector while also guaranteeing quality and comfort for occupants.

To highlight smart energy homes in our region, NEEP developed a Smart Energy Homes case study – An Historic Feat: The Barden Seidman Residence. The smart home has continued to mature, increasing the ability to make homes positive contributors to the grid, rather than negative drains. Through the use of grid-connected solutions, the region can further reduce energy use and mitigate climate change. When consumers understand their energy usage, they can take action to improve both energy efficiency and reduce carbon emissions. The case study features an historic retrofit farm house originally built in the 1850's and details the homeowner's retrofit journey.

One of NEEP's biggest priorities this year was creating a snapshot of the policy and program landscape for smart energy homes and buildings. Trackers were created for smart energy homes and buildings broken down by policy and residential and commercial programs. The trackers contain legislation, regulation, and programs that pertain to various smart energy homes and buildings topics, such as advanced meter infrastructure, state carbon reduction commitments, electrification studies and pilots, demand reduction policy, and more.

In October 2021, the U.S. DOE announced that they will invest $61 million for smart homes and buildings through its Connected Communities funding opportunity announcement. This effort will help expand a network of grid-interactive efficient buildings (GEBs) across the region and beyond. Interoperability and adequate buildings communications systems were two high-priority topics for stakeholders – "ways to overcome these issues while deploying smart energy homes and building system technologies" was a topic that was heavily researched, analyzed, and discussed. Please refer to NEEP's Smart Energy Homes and Buildings: Residential and Commercial Trends blog for more information.

Progress Toward Smart Energy Homes and Buildings Outcomes	25%	50%	75%	100%
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.				

Progress Toward Smart Energy Homes and Buildings Outcomes	25%	50%	75%	100%
Progress Toward Outcome: Several states in the NEEP region launched demonstration pilots in 2021. In New York, the New York Power Authority (NYPA) announced the signing of an agreement for their new battery storage pilot. This will allow for the demonstration of a 100kW/1MWh Zinc-Air Battery Energy Storage System in Buffalo to facilitate the wider use of renewable resources. Maine announced a 15MW pilot program to put storage into critical care facilities. Connecticut established a nine-year statewide Electric Storage Program for residential, commercial, and industrial customers, the specifics of which are still being discussed in Docket No. 17-12-03RE03. Additionally, through the Maryland Energy Storage Pilot Program, Delmarva Power is launching a new residential battery storage program in the Elk Neck community that will provide automatic backup power for participating customers during extreme weather events, and enhance reliability in the area by supporting the local energy grid.				
Six states in the region enact policies or programs that support the deployment, or engagement, of smart energy homes to provide grid services. **Progress Toward Outcome:** In 2021 a number of EV infrastructure bills that support the installation of EV charging stations in residential, commercial, and public buildings were signed into public law. Maine and New Hampshire passed bills (bill LD1733 and bill SB131, respectively), and New York introduced one (bill A03179). According to a resolution from the Massachusetts Energy Efficiency Advisory Council, the new draft of the state's three-year energy efficiency plan must make greater progress to accelerate the deployment of renewable space and water heating systems such as heat pumps. And earlier in 2021, Rhode Island and Massachusetts passed large climate bills that support the deployment of Smart Energy Homes and Buildings Grid Services (bill S0078 and bill S9, respectively). Lastly, Maine signed legislation in June 2021 that makes it the ninth state to have adopted a deployment target for energy storage.				
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.). **Progress Toward Outcome:** Late in 2021, Massachusetts and New Jersey issued requests for comment on advanced meter infrastructure (AMI), for which NEEP drafted letters of support. All utilities and energy efficiency programs in the region				

Progress Toward Smart Energy Homes and Buildings Outcomes	25%	50%	75%	100%
have deployed grid-interactive services. Based on information collected in NEEP's Smart Energy Homes and Buildings Program Tracker, services such as demand response, rate design, and smart thermostats seem to be a high priority. New Hampshire Bill SB131, which expands EV charging infrastructure, also provides guidelines from which the N.H. Public Service Commission can design special EV charging rates. Even more notably, in New Hampshire, bill HB376 was introduced which would establish a committee to study the application of micro grids within the state.				

Strategic Energy Management

Mission: Accelerating adoption of Strategic Energy Management to continuously improve building and industrial facility energy efficiency, productivity, health, comfort and safety, while reducing costs and carbon emissions.

Strategic Energy Management
Long-Term Market Transformation Goals

By 2025:

- All Northeast states have policies and programs to support adoption of SEM in the commercial and industrial sectors.

By 2030:

- All Northeast states adopt 2050 carbon neutral mandates for all homes and buildings with zero energy/carbon codes for new and renovated homes and buildings to begin by 2032.

Project Narrative:

2021 marked a turning point in NEEP's strategic energy management (SEM) work. We engaged with key stakeholders to discuss opportunities to impact policy as levers to wide-scale SEM adoption. NEEP released a brief, Six Strategies to Accelerate the Adoption of SEM in the Northeast, which explored policy solutions to encourage SEM adoption as a complement to programmatic solutions. The brief was the culmination of a year's worth of research guided by the Regional SEM Market Transformation Research and Strategy Committee. While NEEP will continue to encourage SEM program adoption by the industrial, commercial, and municipal sectors in the Northeast, our 2022 work will focus on developing these policy mechanisms.

Over the course of the year NEEP produced two blogs and two case studies to promote SEM adoption. The first blog explored the untapped potential SEM has to contribute to decarbonization goals. The second was solution

driven and summarized the six strategies reported on in the brief. These strategies were intended to look beyond the traditional models of SEM delivery for opportunities to spur greater adoption. Two informative case studies highlighted the beneficial impact SEM can have on an organization and that energy savings can be found even in industries where high energy usage is the norm. The case studies highlighted a manufacturing company and a hospital – two very different building types – to raise awareness of the effectiveness and availability of SEM programs.

NEEP hosted a public webinar that featured SEM as a companion program to BPS, one of the six strategies discussed in the brief. Additionally, NEEP keeps up-to-date with new SEM strategies, tools, and technical assistance programs that advance the market adoption of SEM, and shares related resources on our SEM webpage.

Progress Toward Strategic Energy Management Outcomes	25%	50%	75%	100%
All active SEM programs report increased customer participation in their SEM offerings compared to 2020. **Progress Toward Outcome:** Programs have reported increased customer participation since pivoting to online SEM offerings (which many term SEM Lite), while others have returned to business-as-usual since the onset of COVID-19. A program evaluator from Connecticut recently completed a best practices study and an SEM evaluation, with many of the recommendations being incorporated into the state's programs. Vermont reported that they are developing an SEM "Direct" service for direct engagement with individual customers who are uninterested or unable to participate in a cohort model. They are looking for ways to help prepare customers for 50001 Ready energy management systems. In New York, their SEM On Demand program has seen increased program activity; eight applications were received and more are expected. Connecticut recently secured a U.S DOE grant to conduct an ISO 50001 Ready Navigator cohort. They are currently in the process of prospecting manufacturers to participate.				
At least two additional energy efficiency program administrators offer Strategic Energy Management in their program offerings. **Progress Toward Outcome:** The District of Columbia Sustainable Energy Utility (DC SEU) started two SEM cohorts, and Pennsylvania secured a U.S. DOE grant to conduct an ISO 50001 Ready Navigator cohort.				

Progress Toward Strategic Energy Management Outcomes	25%	50%	75%	100%
A state or utility adopts one of the recommendations in the Regional Market Transformation Strategy for SEM. **Progress Toward Outcome:** Due to staffing limitations, the report Six Strategies to Accelerate the Adoption of SEM in the Northeast was not released until the end of 2021, leaving no time for a state or utility to adopt its recommendations. Washington, D.C. has adopted a building performance standard and their new SEM schools cohort is aligned with the reduction goals of the standard.				