



Roadmap to Zero Energy Public Buildings: Update

December 2019

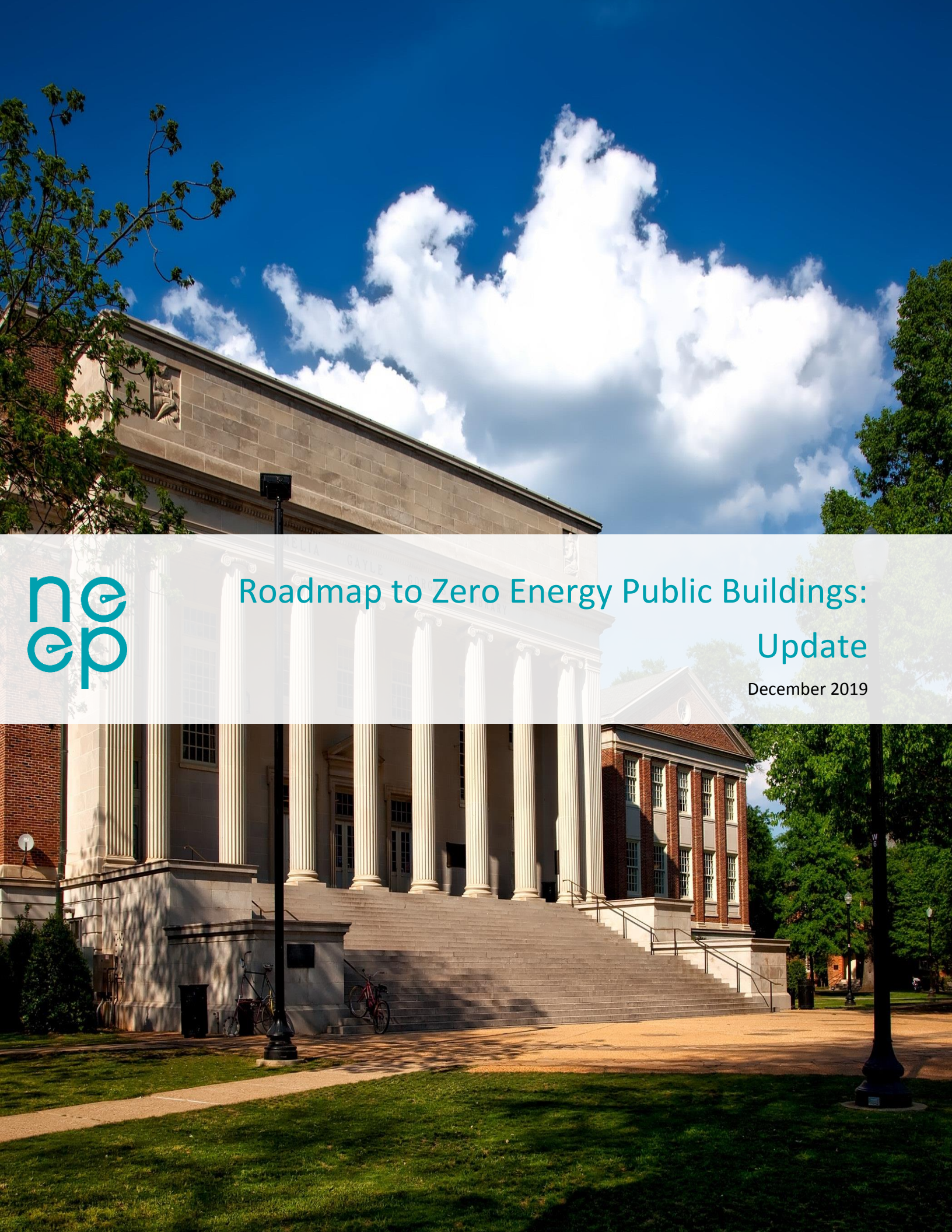




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About NEEP

Founded in 1996, NEEP is a non-profit whose goal is to assist the Northeast and Mid-Atlantic region to reduce building sector energy consumption three percent per year and carbon emissions 40 percent by 2030 (relative to 2001). Our mission is to accelerate regional collaboration to promote advanced energy efficiency and related solutions in homes, buildings, industry, and communities. We do this by fostering collaboration and innovation, developing tools, and disseminating knowledge to drive market transformation. We envision the region's homes, buildings, and communities transformed into efficient, affordable, low-carbon, resilient places to live, work and play. To learn more about NEEP, visit our website at <http://www.neep.org>.

Disclaimer: NEEP verified the data used for this white paper to the best of our ability. This paper reflects the opinion and judgments of the NEEP staff and does not necessarily reflect those of NEEP Board members, NEEP Sponsors, or project participants and funders.

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Introduction

Increasingly, states are recognizing the importance of transitioning to zero energy and carbon neutrality in order to address climate change. Nationally, the energy consumption and operations of buildings account for 40 percent of GHG emissions¹ and energy use². NEEP is committed to assisting states in our region reach their energy efficiency and carbon reduction goals. The [first roadmap published in 2012](#) provided states with policy and program pathways for reaching zero energy through measurable steps. The [2016 progress report](#) profiled each state to determine progress (if any) towards implementation of the steps outlined in the original report. Between 2012 and 2016, many states in NEEP's region made measurable progress doing things like adopting stretch codes, creating or updating statewide climate action plans, and requiring benchmarking of state or municipal-owned buildings.

In 2017, a bipartisan coalition of states formed the [United States Climate Alliance](#). They committed to upholding the 2015 Paris Agreement and meeting their share of the 2025 emissions goal. There are currently 25 states around the country that have joined the alliance. Ten of the 13 states in NEEP's region have joined:

- Connecticut
- Delaware
- Maine
- Maryland
- Massachusetts
- New Jersey
- New York
- Pennsylvania
- Rhode Island
- Vermont

In doing so, these states have affirmed their commitment to reducing carbon emissions statewide through building decarbonization and energy efficiency measures. The 2019 update of the Zero Energy Roadmap reflects state and municipal-level policy changes states have made since the original roadmap was published in 2012 and updated in 2016.

¹ EPA, Total U.S. Greenhouse Gas Emissions by Economic Sector in 2017: <https://www.epa.gov/ghgemissions/sources-greenhouse-gas-emissions>

² EIA, Share of total U.S. energy consumption by end-use sectors, 2018: <https://www.eia.gov/energyexplained/use-of-energy/>

2019 State Report Card – Current Regional Zero Energy Landscape for Public Buildings

The original 2012 Roadmap report provided five recommended steps (noted below) to unlock the market potential of zero energy construction. Public buildings, which are those that are state or municipal owned or operated, are the focus of the original report and this one. States and municipalities can use energy-efficient public buildings to “lead by example” and drive market transformations towards energy efficiency and decarbonization in the residential and commercial building sectors.

The following section contains three parts for each state. The first part, **Progress Towards Zero Energy Buildings**, analyzes how states progressed in relation to the five critical steps from the original report and 2016 progress report. The second part, **Actionable Next Steps**, indicates which of the five steps, if any, states still need to take. The third part, **Continuing the Momentum**, outlines how states should address the steps they still need to take and suggests how states can continue making progress towards zero energy. It is important to note that some states have enacted policies, but have yet to put actions into effect to develop zero energy buildings (ZEBs).

Seven years in, the zero energy landscape looks different. A lot has changed at the state, national, and international level in terms of building towards zero energy. At the international level, countries made a commitment to cutting emissions by signing the 2015 Paris Agreement. In the U.S., the building industry has taken serious steps to address the impact of buildings on national energy consumption and carbon emissions by responding to the demand for more high-performance and zero energy buildings. States have implemented renewable energy portfolio standards to transition their grids to renewable energy. They have also recognized that transitioning from carbon requires strategic electrification and the use of energy-efficient technologies to retrofit existing buildings. Many states now require benchmarking and retrofitting of public buildings in order to lead by example. Utilities are also working with state energy offices to offer incentives and rebates to commercial and residential utility customers on energy-efficient technologies and building improvements.

In addition to this changing landscape, there has been a major increase in energy-efficient building technologies like heat pumps, energy recovery ventilation systems, energy storage, micro grids, and other renewable energy generation upgrades. As such, it is now more important than ever for states to take major steps towards decarbonizing the grids, cutting energy consumption, and electrifying the building sector for both new and existing buildings.

Here is an update of where each state in the NEEP region currently stands in the implementation of the steps listed below:



Step 1: Develop a “Path to Highest Performance” Information Campaign

The zero energy concept exists largely in the province of technical research communities and a relatively small subset of building design and construction professionals. A comprehensive information campaign is needed to convey a consistent message to the broadest possible audience, from building professionals to the public at large.



Step 2: Promote the Continued Development of Exemplary Public Buildings

To overcome initial market resistance and promote greater development of ZEBs, each state should complete at least two new public sector ZEB projects within the next three years.



Step 3: Prioritize Measurement and Public Reporting of Building Energy Performance

The region needs to establish a standardized system for measuring and reporting building energy performance. Such a system is necessary to measure progress toward the zero energy goal. All new public buildings should, therefore, be required to obtain and disclose an asset rating, which provides information on the inherent characteristics that drive building energy consumption.



Step 4: Implement Stretch Building Energy Codes or Zero Energy Code

To lay the groundwork for broader building code changes, states should establish a performance-based stretch energy code for public buildings. Stretch codes promote better building energy performance, help bring energy efficiency into the mainstream design and construction community, and also inform future developments in the base code. The stretch code is also an important transitional tool for achieving a zero energy code. States should begin creating pathways for buildings to achieve zero energy in anticipation of their base code eventually requiring it.



Step 5: Create a Revolving Loan Fund or Similar Mechanism to Provide Capital for Energy

Lack of capital funding is perhaps the single most important financial barrier to greater investment in efficiency and renewables. For public buildings, this lack of funding is caused, in part, by the split between capital and operating budgets. An appropriate way to address this issue would be to establish state or regional revolving loan funds for efficiency investments. Such a system would align budget incentives so that capital budget managers could reap the benefits of efficiency investments.

State Report Card					
	Step 1: Information Campaign	Step 2: Exemplary Public Buildings	Step 3: Benchmarking	Step 4: Stretch Code	Step 5: Energy Efficiency Fund
CT					
DC					
DE					
MA					
MD					
ME	† ³			‡ ⁴	
NH					
NJ					
NY					
PA					
RI					
VT					
WV					

† In 2019, under new leadership Maine made a commitment to update its climate policy by setting a climate goal of carbon neutrality by 2045. In order to do so, the state will establish a climate change council to draft a statewide climate action plan. The state also directed agencies to implement energy efficiency measures to “Lead by Example”.

‡ A stretch code is in development. Implementation is slated for July 1, 2020

State Profiles

The following state profiles are designed in three parts. First, the *Progress Towards Zero Energy Buildings* section shows where considerable progress has been made in the public buildings sector. Then, the *Actionable Next Steps* section indicate what steps states have yet to accomplish or where progress has been made outside of the public buildings sector (i.e. residential). Third, the *Continuing the Momentum* section provides suggestions for how states should build on the progress it has made or fill in gaps where progress still needs to be made.

Overall, states in the region have made substantial progress by creating and disseminating resources on energy efficient buildings (Step 1), sharing success stories of energy efficient public buildings (Step 2), and establishing loan funds or other financial mechanisms for energy efficiency improvements (Step 5). In most states, progress can still be made by requiring benchmarking of all state-owned and public buildings. States can also implement more comprehensive strategies for municipalities to require benchmarking. For instance, municipal certification programs can require benchmarking as a prerequisite rather than an optional step to receive points.

A regional trend is that states are adopting current I-Codes and requiring more efficient construction practices overall. There has also been an increase in states adopting stretch codes and alternative compliance pathways for designing zero energy buildings. Once states adopt a stretch code or alternative compliance pathway, it is important that they set code cycle targets for when they expect their base code to become a zero energy code. Although not a state, Washington, D.C. has created a voluntary zero energy appendix to its base code. The appendix has been proposed to replace the base code within two code cycles. This means that residential construction would require zero energy by 2022, and commercial construction would require zero energy by 2026. Other states in NEEP’s region should follow Washington D.C.’s lead and create similar zero energy code appendices or at least establish a goal of getting to a zero energy target within a set number of code cycles.

Another regional trend is that states are addressing energy use reduction in existing buildings through strategic electrification and whole-building retrofits. States are looking for code solution to address when the code should be triggered for existing buildings to make energy upgrades. States are also tapping into market solutions. For instance, the New York State Energy Research and Development Authority (NYSERDA) launched its [RetrofitNY](#) initiative to create standardized, scalable market solutions to make affordable housing units net zero through whole-building retrofit packages. The initiative is based on the [Energiesprong](#) program in Europe, launched in the Netherlands in 2013. The goal of RetrofitNY is to mobilize the building industry and manufacturers to create innovative, cost-effective retrofit packages that aggregate demand and demonstrate consistent energy savings. If standardized, scalable market solutions are created through the RetrofitNY initiative, it could drive market transformation for strategic electrification in the whole NEEP region.

Connecticut

Progress Towards Zero Energy Buildings

Step 1 – Develop a “Path to Highest Performance” Information Campaign: In 2017, [Sustainable CT](#) was created to help municipalities take community-level action to improve the energy efficiency, resiliency, and health/wellness of their communities. Sustainable CT’s certification program annually recognizes





municipalities that have taken action and become certified at its Connecticut Conference of Municipalities Convention’s award ceremony. There is also a digestible and informative page on its website that includes webinars and newsletters that explain the value of becoming a certified community. An interactive map shows how many CT municipalities are certified and their certification level. An upcoming page will provide examples of how municipalities can achieve each action through existing success stories from municipalities that have been certified. By the numbers, [32 communities became certified](#) in 2019 and 28 percent of municipalities in CT have been certified since 2017.

Connecticut’s Department of Energy & Environmental Protection (DEEP) updated its [Comprehensive Energy Strategy](#) (CES) in 2017. The updated CES acknowledges progress made since the first CES was published in 2013. It also reiterates Connecticut’s climate goals and updates the state’s strategies based on progress it’s made so far.

Step 3 – Prioritize Measurement and Public Reporting of Building Energy Performance: In April 2019, Governor Lamont signed [Executive Order No. 1](#) to continue the work of CT DEEP’s Lead by Example program and set specific targets for public buildings. The [GreenerGovCT](#) initiative was created to continue benchmarking buildings and track progress of their GHG reductions. To streamline compliance and easily track data, public agencies use EnergyCAP software to benchmark their building data. Each agency has an EnergyCAP liaison that works with the agency’s facilities contact to update and cross-check data. Each state agency is also tasked with creating a Sustainability Performance Plan by January 2020 that outlines actions, milestones, and responsible parties to achieve the targets of Executive Order No. 1.

Benchmarking is one of the key actions in Sustainable CT’s municipal certification program. In order for municipalities to make measurable progress, Sustainable CT emphasizes that municipalities also lead by example by benchmarking their buildings.

In 2015, Connecticut was the first state to launch a statewide residential energy labeling program. Through Energize CT, the state developed its [Home Energy Solutions program](#) which provides discounted home energy audits, a Home Energy Score, and rebates for energy efficiency improvements to residential property owners. The goal of the program is to make this information available in the real estate market to increase awareness and the importance of high-performance homes.

Step 5 – Create a Revolving Loan Fund or Similar Mechanism to Provide Capital for Energy Investments: Public buildings and facilities have continued permission to use the [\\$15 million bond funding](#) authorized by the Connecticut Bond Commission in 2011. The funding was updated in 2015 with another \$5 million, and an additional \$2 million was added for FY2018. Projects may also seek incentives, rebates, and on-bill repayment options through utility-administered programs. A project enrolment form is located on CT DEEP’s [website](#). In May 2019, [SB927](#) passed in the state Senate. The bill will create environmental infrastructure funding within the Connecticut Green Bank to fund energy efficiency projects and retrofits. On June 5, 2019, the bill passed temporarily⁵ in the House. However, there have been no updates since.

⁵ According to the “Bill History” for the 2019 Session Year, SB927 was passed “temporarily” in the House on 6/5/19 following the bill being passed in the Senate on 5/15/19. No bill updates have been provided.

Actionable Next Steps


Step 2 – Promote the Continued Development of Exemplary Public Buildings: Energize CT continues to operate its [CT Zero Energy Challenge](#) initiative to promote the design and construction of zero energy homes in the state. No such initiative exists for public buildings. However, there is a [Success Stories](#) page for the GreenerGovCT initiative that could be expanded in the future to highlight specific public buildings that have gone above and beyond to promote energy efficiency and achieve deeper GHG reductions.

Step 4 – Implement Stretch Building Energy Code or Zero Energy Code Pathway: The state is reviewing IECC 2018 for the 2020 state building code. As of 2019, there is no stretch code, though CT DEEP has expressed interest in the implementation of one.

Continuing the Momentum:



Connecticut: Begin drafting a progressive stretch code that is more efficient than IECC 2018 and offers pathways to zero energy for commercial and residential buildings.



Sustainable CT: Continue to emphasize the importance of benchmarking and municipalities leading by example through making energy efficiency improvements to their buildings.

District of Columbia

Progress Towards Zero Energy Buildings


Step 1 – Develop a “Path to Highest Performance” Information Campaign: The Green Building Division at D.C.’s Department of Consumer and Regulatory Affairs (DCRA) published [two guides](#) created by the New Building Institute to assist in planning, design, and construction of net zero commercial and multifamily projects.



Step 2 – Promote the Continued Development of Exemplary Public Buildings: D.C. continues to promote buildings built above code through the Green Building Act. DCRA, in conjunction with the D.C. Sustainable Energy Utility (DCSEU), also started the [DC Net-Zero Energy Voluntary Program](#). The program’s goal is to provide hands-on technical assistance and resources to projects of all types to achieve net zero. The Department of General Services also completed its [Smart Roof Initiative](#) to identify and study over 250 acres of roof space to retrofit with energy efficiency measures like green roofs, solar PV, and daylighting.

Step 3 – Prioritize Measurement and Public Reporting of Building Energy Performance: The [Clean and Affordable Energy Act of 2008](#) continues to require the benchmarking of public buildings of at least 10,000 square feet. D.C.’s Department of Energy & Environment (DOEE) also created a benchmarking scorecard in 2018, and an [interactive map](#) to inventory benchmarked buildings by type is in beta production. A [Building Energy Performance Standard \(BEPS\)](#) was set forth by the Clean Energy DC Omnibus Act of 2018. BEPS will build upon the benchmarking program to achieve a 20 percent energy reduction over a five-year period for public buildings over 10,000 square feet, starting in 2021. BEPS will also include all privately-owned buildings that are at least 50,000 square feet. In 2023, buildings that are at least 25,000 square feet will be included, and by 2026, buildings that are at least 10,000 square feet will be required to comply as well.

Continuing the Momentum:



Promote and streamline the process for buildings compliance with Appendix Z. Ensure that the base code is updated on schedule and achieves zero energy within two code cycles.

Step 4 – Implement Stretch Building Energy Codes or Zero Energy Code Pathway: D.C. has a stretch code based on IgCC 2012 for certain buildings including public buildings. The District is currently reviewing IgCC 2015 as an update to its existing stretch code. The updated base code will also use Passive House standards as an alternative compliance pathway.

D.C. created an optional net zero compliance path within its Energy Conservation code called [Appendix Z](#). Once it is adopted in early 2020, the appendix will provide a comprehensive alternative pathway for buildings to achieve net zero.

Step 5 – Create a Revolving Loan Fund or Similar Mechanism to Provide Capital for Energy Investments: DOEE continues to offer financing options for commercial building upgrades and retrofits through its [PACE](#) program. In July 2018, Mayor Bowser signed the Green Finance Authority Establishment Act to establish a [DC Green Bank](#) similar to those in Connecticut and New York. The DC Green Bank will use public and private funding streams to help finance residential, small business, and commercial developers to make energy efficiency improvements and other retrofits.

Delaware

Progress Towards Zero Energy Buildings

Step 1 – Develop a “Path to Highest Performance” Information Campaign: Delaware Sustainable Energy Utility (DESEU) created the [Energize Delaware](#) initiative, which offers resources and information to assist residential, commercial, and municipal building owners in achieving energy reduction and energy efficiency improvements.



Step 2 – Promote the Continued Development of Exemplary Public Buildings: [The Carvel State Office Building](#) in Wilmington, DE was promoted by U.S. DOE’s Better Buildings as a case study of a public building that achieved

significant savings and energy reductions through energy conservation measures. Upgrades and improvements were made to the mechanical systems, lighting and water management.

Step 3 – Prioritize Measurement and Public Reporting of Building Energy Performance: Delaware continues to comply with [Executive Order 18](#) that established benchmarking requirements for state-owned and leased buildings. The goal is to achieve a 20 percent energy reduction by 2022 based on a 2008 baseline. Benchmarking data is tracked through the EPA’s Portfolio Manager. In 2018, a [22 percent reduction](#) had been achieved ahead of the 2022 goal of only 20 percent.

Energize Delaware also offers an [Energy Assessment Program](#) to government agencies and municipal building operators to better understand their energy usage.

Step 5 – Create a Revolving Loan Fund or Similar Mechanism to Provide Capital for Energy Investments: Through Energize Delaware, municipalities may seek funding to make energy efficiency improvements to their buildings through the [Low-Interest Commercial Loan Program](#) and the [Energy Efficiency Investment Fund](#) provided by DESEU.

Actionable Next Steps

Step 4 – Implement Stretch Building Energy Code or Zero Energy Code or Zero Energy Code Pathway: Delaware currently requires IECC 2012 and ASHRAE 90.1 2010. The adoption of IECC 2018 has been proposed, and ASHRAE 90.1 2016 is set to be adopted in September 2020. However, there has been no progress towards the adoption of a stretch code. Delaware's [Code for Energy Conservation](#) also sets the goal of all new residential construction being “zero net energy capable” by December 1, 2025, and all new commercial construction by December 1, 2030. However, no actionable steps have been taken toward establishing a zero energy code as of yet.



Continuing the Momentum:

Adopt IECC 2018 for the base code. Adopt a zero energy stretch code in order to meet the 2025 and 2030 goals outlined in Delaware’s Code of Energy Conservation.

Massachusetts

Progress Towards Zero Energy Buildings

Step 1 – Develop a “Path to Highest Performance” Information

Campaign: Many municipalities around Massachusetts have created climate action plans and information campaigns to communicate the importance of high performance buildings. The Department of Energy Resources (DOER) offered a \$3.5 million initiative called the [Pathways to Zero Net Energy Program](#) that funded feasibility, design, and construction of zero energy buildings. The DOER also provides [resources and information](#) to help municipalities and developers build zero energy buildings.



Massachusetts is also developing a MA Scorecard program that will provide homes with energy audits and a comprehensive scorecard that makes energy upgrade recommendations. Homes that follow through on the recommended upgrades will receive an updated scorecard. The program is set to be deployed in 2020.

The Massachusetts Clean Energy Center (MassCEC) also just wrapped up its [Passive House Design Challenge](#), which offered funding to up to eight projects to conduct feasibility studies, energy modeling, and incentives for residential multifamily buildings that achieved Passive House Certification. MassCEC also provides [resources](#) to local governments on energy efficiency improvements and energy infrastructure.

Step 2 – Promote the Continued Development of Exemplary Public Buildings: The Green Communities Division of DOER continues to promote [Green Communities](#) that achieve significant GHG reductions through energy efficiency improvements to their municipal buildings. Massachusetts also annually recognizes municipalities through its [Lead by Example](#) initiative. The state keeps an [inventory](#) of exemplary public buildings like the [Department of Conservation & Recreation- North Point Maintenance Facility](#) and continues to voluntarily promote the construction of zero energy buildings. There are currently five ZE buildings in the state portfolio, including the Walden Pond Visitor Center, Bristol Community College’s Sbrega Health and Science Building, and the Division of Fisheries and Wildlife Headquarters.

Step 3 – Prioritize Measurement and Public Reporting of Building Energy Performance: Massachusetts offers multiple tools to measure and report benchmarking data. The [Commonwealth Building Energy Intelligence \(CBEI\)](#) program, offered as a joint effort between the Division of Capital Asset Management and Maintenance (DCAMM) and DOER, tracks real-time energy metering in 390 state buildings. The state is also part of U.S. DOE’s Better Buildings Challenge, which is a voluntary program that requires state facilities to track and report energy use data annually. In 2019, two building performance standard bills were introduced in the House and Senate ([H2919](#) and [S2011](#)). They were modeled after D.C.’s 2018 Omnibus Act and would require municipalities to adopt or continue to enforce energy disclosure ordinances to benchmark buildings

For municipalities, the Green Communities Division of DOER developed [MassEnergy Insight](#), which is a free, web-based tool to assist cities, towns, and regional government entities benchmark and reduce energy use in their buildings, transportation, and water management systems. Boston updated its [Building Energy Reporting and Disclosure Ordinance \(BERDO\)](#) in 2019. The updated ordinance requires that residential and nonresidential buildings 35,000 square feet or larger and any parcel with multiple buildings that sum to 100,000 square feet track and report their annual energy and water consumption beginning in 2019. The updated ordinance also requires that buildings that meet listed criteria complete an energy assessment every five years. Cambridge also has a similar ordinance that the city council enacted in 2014 called the [Building Energy Use Disclosure Ordinance \(BEUDO\)](#). The ordinance was also a foundational strategy for the city’s Net Zero Action Plan.



Continuing the Momentum:

- Commit to drafting a zero energy stretch code to be adopted with the 10th edition of the base code in 2021.
- Adopt IECC 2021 into the base code.
- Commit to adopting a zero energy base code within two code cycles.
- Create pathways and offer assistance to Green Communities in order to comply with code updates.

Step 4 – Implement Stretch Building Energy Code or Zero Energy Code Pathway: Massachusetts became the first state to implement a [stretch code](#) in 2009. The stretch code was updated in 2015 and again in 2017 with the ninth edition of the base code. MA DOER has proposed a zero energy update to the stretch code to accompany the 10th edition of the base code in 2021.

Step 5 – Create a Revolving Loan Fund or Similar Mechanism to Provide Capital for Energy Investments: Division of Capital Asset Management and Maintenance (DCAMM) continues to offer funding to state facilities through the [Commonwealth Facility Fund for Energy Efficiency \(CoFFEE\)](#). State facilities may also seek financing through [Lead by Example Grants](#) to develop renewable energy projects and energy efficiency improvements.

Maryland



Progress Towards Zero Energy Buildings

Step 1 – Develop a “Path to Highest Performance” Information

Campaign: [Maryland Clean Energy Center \(MCEC\)](#) offers resources and information on innovations and other improvements being made in energy-efficient technologies to improve building efficiency. MCEC holds an annual Clean Energy Summit that features a series of educational sessions to provide information to government entities and other stakeholders about emerging technologies and clean energy solutions. In 2019, MCEC created the [Maryland Energy Innovation Accelerator](#) to drive market transformation for energy-efficient technologies and solutions

Step 2 – Promote the Continued Development of Exemplary Public Buildings: Maryland Energy Administration (MEA) partnered with the Public School Construction Program to create the [Net Zero Energy School Initiative Grant Program](#). Through the Maryland Public Service Commission, \$9 million was approved to fund the design and construction of three net zero public schools. To date, all three schools have been completed. In 2017, the [Wilde Lake Middle School](#) was completed and was verified through commissioning that it was achieving net-zero status.

Step 3 – Prioritize Measurement and Public Reporting of Building Energy Performance: Maryland currently

benchmarks state-owned buildings through its EnergyCAP database, which interfaces with Portfolio Manager. The Department of General Services (DGS) offers [measurement and verification \(M&V\) services](#) to state agencies. Contractors must submit an M&V plan to the DSG before any energy efficiency improvements are made. In 2019, Governor Hogan issued an [executive order](#) to set a new energy efficiency goal for state-owned buildings of 10 percent energy reduction by 2029 based on the FY2018 baseline. Montgomery County also requires [benchmarking](#) of nonresidential buildings of 50,000 square feet or larger in Portfolio Manager. Benchmarked buildings are displayed publically in an [interactive map](#).



Continuing the Momentum:

Address the weakening amendments with the adoption of IECC 2018. Propose strengthening amendments for IECC 2021. Update the stretch code by either adopting IgCC 2015 or a more efficient stretch code.

Step 4 – Implement Stretch Building Energy Code or Zero Energy Code Pathway: In 2014, all state-funded buildings, including K-12 public schools and community colleges, were required to comply with the [International Green Conservation Code \(IgCC\) 2012](#). Municipalities may also adopt the IgCC; Baltimore and Montgomery County have both done so. Montgomery County also committed to reducing its carbon emissions to zero by 2035 and is seeking assistance on how to achieve this goal through codes. The state also adopted IECC 2018 with weakening amendments to the ACH 50 requirements as its commercial and residential code in March 2019. However, no updates have been made to the stretch code since 2014.

Step 5 – Create a Revolving Loan Fund or Similar Mechanism to Provide Capital for Energy Investments: Municipalities may participate in the [Maryland Smart Energy Communities \(MSEC\) Program](#) and seek grant funding for projects. In 2019, [House Bill 170](#) expanded the list of borrowers able to use the Lawton Conservation Loan Program. Local governments and state agencies may now use the [Jane E. Lawton Conservation Loan Program](#) to borrow between \$50,000-\$500,000 to identify and install energy conservation measures and make retrofits to their facilities.

Maine

Progress Towards Zero Energy Buildings

Step 1 – Develop a “Path to Highest Performance” Information Campaign: In 2019, Governor Mills signed [LD1679, “An Act To Establish the Maine Climate Change Council...”](#) into law. The goal of the bill is to establish a Climate Change Council that will draft a climate action plan and other related initiatives to help the state [achieve 45 percent GHG emissions reductions](#) by 2030 below 1990 levels and carbon neutrality by 2045. [LD1282](#) was also signed into law to establish a Task Force for a Green New Deal. In November 2019, the governor signed [Executive Order 13](#), which directs state agencies to Lead by Example by adopting energy efficiency measures and updating master plans to align with state energy goals. Throughout 2019, a suite of legislation passed that will help the state achieve realistic and ambitious energy goals and take other steps on the road to zero energy.





Step 4 – Implement Stretch Building Energy Code or Zero Energy Code Pathway: In 2019, Maine [resolved to adopt either IECC 2015 or IECC 2018](#) as its residential and commercial code by July 2020. Also, a stretch code is in development for adoption in 2020. This suite of code updates will dramatically improve building efficiency that is currently using IECC 2009.

Actionable Next Steps

Step 2 – Promote the Continued Development of Exemplary Public Buildings- *No significant progress has been made on this step since the last report.*

Step 3 – Prioritize Measurement and Public Reporting of Building Energy Performance: In 2016, the city of Portland adopted an [energy benchmarking ordinance](#) that requires municipal buildings, non-residential single or grouped buildings over 20,000 square feet, and residential building(s) that contain 50+ dwelling units to benchmark their energy and water consumption. In 2019, the city council voted to set report deadlines for all single-occupant buildings. South Portland also adopted a similar ordinance in 2017. However, benchmarking is not yet required for public buildings at the state level.

Step 5 – Create a Revolving Loan Fund or Similar Mechanism to Provide Capital for Energy Investments- *No significant progress has been made on this step since the last report.*

Continuing the Momentum:
Complete development and adopt a stretch code by 2020 that is significantly more efficient than the forthcoming base code adoption of IECC 2015 or 2018.

Follow Portland and South Portland’s lead by requiring benchmarking and disclosure of energy and water consumption of state-owned buildings. Continue to promote benchmarking in municipalities.

New Hampshire

Progress Towards Zero Energy Buildings

Step 1 – Develop a “Path to Highest Performance” Information Campaign: In 2018, New Hampshire’s Office of Strategic Initiatives revised its [10 Year State Energy Strategy](#). Part of the revision process included conducting public meetings and a comment period for stakeholder engagement.

Step 2 – Promote the Continued Development of Exemplary Public Buildings: New Hampshire continues to be a leader in the development of high-performance public schools using NE-CHPS. Some of these schools are featured on NEEP’s [website](#). In 2019, the state passed [HB 175](#) which re-institutes state aid grants for high-performance school construction and major renovation.

Step 3 – Prioritize Measurement and Public Reporting of Building Energy Performance: In 2016, [Executive Order 2016-03](#) set updated goals of reducing fossil fuel use at state-owned facilities by 30 percent by 2020, 40 percent by 2025, and 50 percent by 2030, compared to a 2005 baseline. This includes management and tracking of energy consumption in state-owned facilities. [New Hampshire Local Energy Solutions](#) also offers [benchmarking assistance](#) to municipalities trying to reduce the costs and energy of their buildings.

Step 5 – Create a Revolving Loan Fund or Similar Mechanism to Provide Capital for Energy Investments: Municipalities can borrow money through the revolving loan fund called the [Municipal Energy Reduction Fund](#)



[\(MERF\)](#). The fund allows local governments to borrow money to make energy efficiency improvements to their buildings, street lighting, water management facilities, etc. School districts are not eligible for this program. A separate program called the EnergySmart Schools Program offered up to \$500K for schools to make energy-efficient improvements. However, the website is no longer active, suggesting that program funding has run out.


In May 2019, [SB122](#) was passed in the Senate and was reported to the House. The bill will require the NH Public Utility Commission to allocate funds to school districts for energy efficiency projects. Up to \$5 million annually would be allocated to municipalities, school districts, and local government energy efficiency projects.


Actionable Next Steps

Step 4 – Implement Stretch Building Energy Code or Zero Energy Code Pathway:

The state is updating its base code from IECC 2009 to IECC 2015. However, it will include weakening amendments. Also, there are no current plans to adopt a stretch code.

Continuing the Momentum:

 Draft and adopt a progressive stretch code. Update to IECC 2018 or 2021 during the next code cycle with strengthening amendments.

 Continue to promote high-performance schools and expand to other public building types to show that the state is leading by example and improving all of its state and municipal-owned buildings.

New Jersey

Progress Towards Zero Energy Buildings

Step 1 – Develop a “Path to Highest Performance” Information Campaign: New Jersey’s Clean Energy Program has a [Clean Energy Learning Center](#) that offers information and resources for participants. Educational resources are shared in a variety of formats ranging from online courses, in-field demonstrations, and comprehensive training.

[Sustainable Jersey](#) offers information resources, training, and incentives to communities that are pursuing energy efficiency programs and improvements. They also offer a municipal certification program for that steps toward increased energy efficiency and sustainability.

In 2019, the NJ [Energy Master Plan \(EMP\)](#) was updated to meet the state’s goal 100 percent clean energy by 2050 based on Governor Murphy’s Executive Order 28, which he signed in 2018.

Step 2 – Promote the Continued Development of Exemplary Public Buildings: New Jersey’s Clean Energy Program (NJCEP) shares [success stories](#) of local government buildings that have implemented energy efficiency improvements. Sustainable Jersey also offers a recognition and a certification program for [municipalities](#) and [school districts](#) that have taken steps to retrofit and reduce the energy use in buildings and schools.



Step 3 – Prioritize Measurement and Public Reporting of Building Energy Performance: NJCEP’s Local Government Energy Audit program offers free audits and benchmarking resources for state-owned facilities. Audits are [publically available](#) and display completed reports back through 2016. Audit reports include an inventory of all energy-consuming equipment, comprehensive utility bill analysis, facility benchmarking, and feasibility for solar and combined heat & power. U.S. DOE’s Home Energy Score is also used on a voluntary basis for residential property owners.

The [Clean Energy Act](#) was passed in 2018 and mandated that the NJ Board of Public Utilities require building owners and operators benchmark commercial buildings over 25,000 square feet within a five-year period.


Actionable Next Steps


Step 4 – Implement Stretch Building Energy Code or Zero Energy Code Pathway- *No significant progress has been made on this step since the last report.*

Step 5 – Create a Revolving Loan Fund or Similar Mechanism to Provide Capital for Energy Investments:

Financial incentives are offered to municipal buildings and K-12 public schools through NJCEP’s [Enhanced SmartStart Buildings program](#).

Continuing the Momentum:

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Draft and adopt a progressive stretch code for the next base code update cycle.
- 

Expand financial incentives and investments for public owned buildings to provide pathways for municipalities to make feasible improvements to their buildings and lead by example.

New York

Progress Towards Zero Energy Buildings

Step 1 – Develop a “Path to Highest Performance” Information Campaign:

New York has various initiatives and resources to help both state agencies and local governments drive energy efficiency in their buildings. Following the launch of New York’s signature energy policy, Reforming the Energy Vision (REV) in 2014, the [State Energy Plan](#) was published and set to be updated on a biennial basis in 2015. The plan was a comprehensive roadmap that coordinated state agencies to assist in deploying innovative energy solutions within state-owned and operated facilities.



In 2019, State University of New York (SUNY) published its [Clean Energy Roadmap](#) in collaboration with New York Power Authority (NYPA) and other state agencies. The roadmap outlines ambitious energy goals through leadership on zero energy buildings, retrofits of existing buildings, and development of a clean energy master plan.

Step 2 – Promote the Continued Development of Exemplary Public Buildings: As part of the state’s REV policy, the BuildSmartNY program features case studies of state buildings that have achieved significant energy


reductions. One of these featured projects is [Grand Central Station](#), which completed a multi-year retrofit to its heating and cooling system. As a result, it was able to achieve \$2.5 million in annual energy savings and reduce GHG emissions by 11,200 tons.


Step 3 – Prioritize Measurement and Public Reporting of Building Energy Performance: Governor Cuomo’s Executive order 88 (EO 88) in 2013 mandated that state-owned buildings meet a 20 percent energy usage reduction by 2020. To achieve this goal, [BuildSmartNY](#) requires state-owned facilities over 20,000 square benchmark and report energy usage data on an annual basis. The benchmarking requirements in EO 88 did not extend to local government-owned buildings. However, as part of New York’s Reforming the Energy Vision (REV), NYSERDA launched the [Clean Energy Communities](#) program in August 2016 to help local governments implement energy actions. To meet Clean Energy Communities’ requirements and receive financial incentives, local governments had to implement four out of 10 possible actions. One of the actions required benchmarking municipally-owned or operated buildings 1,000 square feet or larger.

In 2019, NYSERDA also launched the [Home Energy Rating Pilot](#). The multi-year program will improve the energy efficiency of homes with one to four units by offering Home Energy Scores and Pearl certifications in six towns and counties around the state. NYSERDA will utilize NEEP’s Home Energy Labeling Information eXchange (HELIX) platform to store home energy information from the pilot

In New York City, the state’s largest municipality, 2018’s Local Law 33 amended the Administrative Code of the City of New York and established an energy performance standard that required buildings to benchmark their energy and water consumption. In addition, municipal buildings have been benchmarking their energy usage since 2009 under [Local Law 84](#). In 2019, NYC also passed [Local Law 97](#) which establishes building energy performance standards (BEPS) and monitors building energy consumption and emissions in order to achieve a 40 percent reduction in GHG emissions for buildings by 2030.

Continuing the Momentum:

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Continue to promote and offer assistance to municipalities trying to adopt the 2020 NY stretch code. Begin work on development of an advanced efficiency stretch code.
- 

NYC continues to lead by example through establishment of building energy performance standards (BEPS) and determining best practices for BEPS. NYSERDA expands the scope of BEPS to assist other municipalities in achieving deep decarbonization.

Step 4 – Implement Stretch Building Energy Code or Zero Energy Code Pathway: NYSERDA developed the [2020 NY Stretch Code](#), which is currently available for adoption. The stretch code is roughly 11 percent more efficient than the upcoming 2020 Energy Conservation Construction Code of New York State (2020 ECCCNY). New York City and Ithaca, as well as other municipalities around the state, are set to adopt the stretch code in 2020. The state is also working on an advanced efficiency stretch code that will be the next version of the current stretch code.

Step 5 – Create a Revolving Loan Fund or Similar Mechanism to Provide Capital for Energy Investments: New York continues to maintain the New York Clean Energy Fund (CEF) as part of Reforming the Energy Vision (REV).

The \$5 billion fund is a 10-year commitment from 2016-2025 to finance and invest in zero energy initiatives including reduction of greenhouse gas emissions, increasing statewide energy efficiency and renewable energy generation, and driving private investment in clean energy. Funding for the CEF is provided through ratepayer bill charges that are already in place. During the 10 years, ratepayer funding has been replaced by private sector market investment. For more information on this initiative and updates on the status of the CEF, please [click here](#).

Pennsylvania

Progress Towards Zero Energy Buildings



Step 1 – Develop a “Path to Highest Performance” Information

Campaign: In January 2018, Governor Wolf signed [Executive Order 2019-](#)

[01](#). Among other things, the executive order establishes Pennsylvania’s

first statewide carbon reduction goal of reducing energy consumption by three percent every year (21 percent by 2025 compared to 2017 levels), set benchmarking requirements for state-owned buildings, and establish the [GreenGov Council](#). The council will facilitate the implementation of environmentally sustainable practices into government policy, planning, operations, procurement, and regulatory functions through resources and other information.

The Pennsylvania Municipal League (PML) offers the [Sustainable Pennsylvania Community Certification](#), which is a voluntary certification program designed to give recognition to and help municipalities achieve their sustainability goals. The program provides municipalities with online resources and a performance platform to recognize them as they implement energy efficiency policies and practices.

Step 2 – Promote the Continued Development of Exemplary Public Buildings: Following Executive Order 2019-01 and the establishment of the GreenGov Council, PA began to demonstrate how it was achieving results by featuring case studies of high-performance state buildings like the [State Correctional Institution \(SCI\) - Dallas, Luzerne County](#). The facility underwent a \$20 million renovation to its heating, lighting, and water management systems, which resulted in \$2.7 million in annual savings and significant annual carbon reductions.

Step 3 – Prioritize Measurement and Public Reporting of Building Energy Performance: Executive Order 2019-01 established benchmarking for state-owned buildings over 20,000 square feet. In 2018, Pittsburgh passed an [ordinance](#) requiring that all non-residential buildings 50,000 square feet or greater be benchmarked.

Philadelphia also has an [Energy Benchmarking and Disclosure Law](#) (Philadelphia Code section 9-3402) that requires large commercial and multifamily buildings 50,000 square feet or larger to report their energy and water usage to the city. Pittsburgh has a similar benchmarking program.

Step 5 – Create a Revolving Loan Fund or Similar Mechanism to Provide Capital for Energy Investments: The Pennsylvania [Green Energy Loan Fund](#) offers to finance existing buildings and new construction projects that result in a 25 percent reduction in energy consumption. These loans are available for all buildings – with the exception of single-family residential homes – and generally offer low-interest rates for terms that are consistent with the expected life of the improvements, usually up to 15 years. Loans can also be used for on-site

renewable energy systems and on-site combined heat and power systems when combined with more significant efficiency retrofits.

In 2018, Governor Wolf signed Senate Bill 234, which established Pennsylvania’s Property Assessed Clean Energy (PACE) program. The program is a financing mechanism that enables low-cost, long-term funding for energy efficiency, renewable energy, and water conservation upgrades to commercial or industrial properties. The bill also allows local governments to participate in the program.

Actionable Next Steps

Step 4 – Implement Stretch Building Energy Code or Zero Energy Code Pathway: IECC 2015 was adopted with amendments to both the commercial and residential codes in 2018. No formal stretch code has been adopted. However, state-owned or operated buildings constructed after the effective date of Executive Order 2019-01 must be 10 percent more efficient than ASHRAE 90.1 2016.

Rhode Island

Progress Towards Zero Energy Buildings

Step 1 – Develop a “Path to Highest Performance” Information Campaign: In 2015, National Grid in Rhode Island led the Rhode Island Zero Energy Building Taskforce to create a roadmap aimed at accelerating the state’s zero energy building construction market. The task force engaged a diverse group of stakeholders that developed and issued a [report](#) outlining a 20-year roadmap for zero energy buildings to contribute to the state’s goal of reducing greenhouse gas emissions by 45 percent by 2035. The roadmap has informed the state’s policymakers, utilities, and builders, and has provided a roadmap for municipalities to set their own energy efficiency and zero energy goals.



Rhode Island Office of Energy Resources (RI OER) also offers [information](#) to state and quasi-state agencies about how to reduce their energy consumption and cost.


Step 2 – Promote the Continued Development of Exemplary Public Buildings: Rhode Island continues to operate the Lead by Example program that was established in 2015 for state facilities. Beginning in 2017 and every year since, RI OER [recognizes](#) state government agencies, quasi-public agencies, municipalities, and state colleges and universities for their renewable energy and energy efficiency achievements. In 2019, [Lead by Example Awards](#) were given to state, municipal, and school recipients for energy efficiency improvements they made to lighting, heating/cooling systems, and other building retrofits

Step 3 – Prioritize Measurement and Public Reporting of Building Energy Performance: In 2015, the [Rhode Island Public Energy Partnership \(RIPEP\)](#) project concluded. Over the three-year U.S. DOE-funded grant period, the state established energy data baseline inventories for all public facilities, including 546 municipal buildings, 331 schools, and approximately 900 state facilities, for a total of about 1,777 facilities. The funding led to over

100 facilities receiving energy efficiency improvements and an average of 20 percent energy reduction. Rhode Island Office of Energy Resources (RI OER) also posts state energy usage [data](#) annually.

On the residential side, National Grid also conducted a pilot in 2018 to provide 150 homes with home energy scores as a part of their energy audits. National Grid and RI OER are utilizing NEEP’s Home Energy Residential Information eXchange (HELIX) as the database to store home energy ratings from the pilot.

Step 4 – Implement Stretch Building Energy Code or Zero Energy Code Pathway: In 2018, Rhode Island published the state’s first voluntary [stretch code](#) based on IgCC 2015. While the stretch code is voluntary and more of a standard rather than enforceable code, the stretch code can be used as a compliance pathway for Rhode Island’s [Green Building Act](#) (RIGL §37-24). The Green Building Act requires that new construction over 5,000 square feet or renovation projects over 10,000 square feet built by public agencies meet LEED Certified or equivalent standards. New residential construction may also meet or exceed the requirements for the U.S. DOE Zero Energy Ready Home (ZERH) program in order to comply with the stretch code as well.



Continuing the Momentum:
Transition from a voluntary standard to an enforceable stretch code in order to drive energy efficiency in the commercial and residential building sectors.

Step 5 – Create a Revolving Loan Fund or Similar Mechanism to Provide Capital for Energy Investments: [The Efficient Buildings Fund \(EBF\)](#) is a revolving, low-interest loan fund that allows state agencies to borrow for energy efficiency and renewable energy projects where the annual energy savings achieved from the energy efficiency improvements exceed the annual debt service. RI EBF is administered jointly by the [Rhode Island Infrastructure Bank \(RIIB\)](#) and RI OER. RIIB also provides low-cost financing to municipalities for making energy efficiency improvements and retrofits.

Vermont

Progress Towards Zero Energy Buildings

Step 1 – Develop a “Path to Highest Performance” Information Campaign: Vermont’s Department of Public Service (DPS) keeps an updated [database](#) of recently published reports and publications that provide information on progress towards meeting the state’s various energy goals. Vermont set a transformative goal for all new construction to be net zero by 2030. Efficiency Vermont (EVT) is leading the state towards its zero energy goals. EVT provides technical assistance and financial incentives to help Vermont households and businesses reduce their energy use and costs with energy-efficient buildings, equipment, and lighting. EVT developed a [Triennial Plan 2018-2020](#) to provide state stakeholders with an overview of its strategy through 2020. EVT commissioned a [Net Zero Energy Feasibility Study](#) in 2015 that examined the energy and financial implications of building to zero energy ready and zero energy standards compared to code. The study has been used to inform policy and set realistic targets for achieving Vermont’s zero energy buildings by 2030 goal. EVT also has a [certification program](#) for residential



new construction. The program provides assistance for residential projects to meet or exceed the energy code, access to incentives, and performance testing.

The Energy Action Network in collaboration between the Vermont Sustainable Jobs Fund, EVT and Vermont Energy Investment Corporation (VEIC), and others developed the [Vermont Energy Atlas](#). The atlas is a comprehensive resource that tracks, visualizes, and analyzes renewable energy and energy efficiency projects in an interactive dashboard. It also offers information and resources for communities to make improvements and become more sustainable.




Step 2 – Promote the Continued Development of Exemplary Public Buildings: Vermont still follows the 2016 Comprehensive Energy Plan, which includes a State Agency Energy Plan that demonstrates its commitment to energy efficiency and overall energy usage reduction in state government operations. Funding and project support for efficiency projects is available through the State Energy Management Program. Technical assistance is available to state agencies through the Department of Buildings and General Services and Efficiency Vermont. State government operations have already made significant improvements since

The State Agency Energy Plan was published six years ago. Efficiency improvements made during this time include lighting upgrades, building controls improvements, and weatherization enhancements, amongst others. New funding mechanisms have been developed, and agencies are using Energy Star Portfolio Manager to catalog energy usage and benchmark them against similar buildings across the country.

Step 3 – Prioritize Measurement and Public Reporting of Building Energy Performance: [The 2016 State Agency Energy Plan](#), part of the [Comprehensive 2016 State Energy Plan](#), encourages all Vermont state agencies to track and benchmark state-owned and operated building energy use with Portfolio Manager. The Vermont Department of Buildings and General Services (BGS) estimates that the state has captured 70 percent of these buildings in various state agency portfolio manager accounts.

In 2013, Vermont passed Act 89 which – among other things – mandated that the Department of Public Service convene working groups to develop an [energy rating and disclosure program](#). Following public hearing and reporting from working groups, Vermont piloted a voluntary residential energy label. In 2019, Montpelier voted to amend its charter in order to develop a mandatory [energy efficiency disclosure ordinance](#) for single-family residential properties. The ordinance would require that homeowners disclose energy information at the time of listing using a residential energy label. The label will be based on the one that was developed for the state pilot program and will utilize HELIX to store and generate residential energy information for the labels.

Continuing the Momentum:

- 
Update and adopt a new stretch code. Offer code pathways for buildings achieving zero energy.
- 
Consider updating the 2016 Comprehensive Energy Plan and State Energy plan to ensure that the state continues to make progress and is hitting its energy reduction targets.
- 
Efficiency Vermont: Encourage other municipalities to follow Montpelier’s lead and adopt an energy efficiency disclosure ordinance.

Step 4 – Implement Stretch Building Energy Code or Zero Energy Code Pathway: Vermont has a stretch code that is voluntary for municipalities but mandatory for projects covered under [Act 250](#). A stretch code for residential buildings went into effect in 2015. The commercial stretch code “guideline” went into effect in 2016. Also in that year, South Burlington adopted both stretch codes and incorporated them for all commercial projects in its jurisdiction. An updated stretch code is being developed for 2020 along with the adoption of IECC 2018 with strengthening amendments.

Step 5 – Create a Revolving Loan Fund or Similar Mechanism to Provide Capital for Energy Investments: In June 2019, the Clean Energy Development Fund (CEDF) at the Vermont Department of Public Service published the [Vermont Clean Energy Finance Report, Report #2: For Local Government](#). The report presents different funding opportunities for municipalities and local governments to make energy efficiency improvements and retrofits. The [Vermont Municipal Bond Bank](#) (VMBB) offers loans programs for construction and renovation of town and school buildings. The [State Revolving Fund](#) (SRF), co-managed by VMBB and the Department of Environmental Conservation, provides loans and grants to municipalities for wastewater and storm water system improvements. Montpelier also launched the [Net Zero Revolving Loan Fund](#) in 2016 to finance energy efficiency and renewable energy investments to help the city reach its net-zero by 2030 goal.

West Virginia

Progress Towards Zero Energy Buildings

Step 1 – Develop a “Path to Highest Performance” Information Campaign:



The West Virginia Office of Energy has published five-year [state energy plans](#) since 2008. The 2018-2022 plan is currently being reviewed. The energy plan provides analysis and makes policy recommendations to guide the state in achieving energy efficiency improvements.



Step 3 – Prioritize Measurement and Public Reporting of Building Energy Performance: In 2018, West Virginia received a three-year \$300,000 U.S. DOE-SEP grant to create a [statewide benchmarking initiative](#) of all state-

owned buildings. The benchmarking initiative will primarily focus on public K-12 schools with the goal of benchmarking all 700 public schools in the state. To date, 290-300 schools have been benchmarked. Another goal of the program is to develop a benchmarking and disclosure policy and conduct outreach and training to local governments on benchmarking. The initiative will also recognize top-performing schools and provide toolkits to participating schools to promote continued success.

Continuing the Momentum:

- 
Update the base code to IECC 2015 or 2018 and adopt a progressive stretch code.
- 
Continue the U.S. DOE-SEP benchmarking program to collect and track energy consumption data in K-12 schools. Expand benchmarking to other state-owned buildings and encourage municipalities to benchmark their buildings.



Actionable Next Steps

Step 2 – Promote the Continued Development of Exemplary Public Buildings- *No significant progress has been made on this step since the last report.*

Step 4 – Implement Stretch Building Energy Code or Zero Energy Code Pathway- *No significant progress has been made on this step since the last report.*

Step 5 – Create a Revolving Loan Fund or Similar Mechanism to Provide Capital for Energy Investments- *No significant progress has been made on this step since the last report.*