New Jersey Zero Energy Buildings Roadmap Draft

Introduction

New Jersey is one of the leading states in the country in committing to decarbonizing the built environment and achieving large-scale energy-use and greenhouse gas (GHG) emission reductions. The State of New Jersey (State) is actively working towards commitments included in the Energy Master Plan (EMP), which aims to achieve 100 percent clean energy by 2050 through energy efficiency and the use of renewable energy sources, and the Global Warming Response Act (GWRA), which aims to reduce the state's greenhouse gas emissions 80 percent by 2050.

New Jersey Decarbonization Commitments

In 1987, the State of New Jersey was required to create, and update every 10 years, an Energy Master Plan (EMP) to set a strategic vision for the state to produce 100% clean energy by 2050. In 2019, Governor Murphy, through Executive Order 28, updated the EMP, directing the New Jersey Board of Public Utilities (BPU) to develop a statewide clean energy plan and shift away from producing energy sources that contribute to climate change. It further directed the New Jersey Department of Environmental Protection (DEP) to make regulatory reforms to reduce statewide emissions and adapt to climate change.

In 2020, the DEP released the GWRA 80x50 Report to identify pathways to reduce the state's greenhouse gas emissions by 80% of 2006 levels by 2050. This report outlines how the state can achieve emission reductions by each sector, including through residential and commercial buildings. The report recommends that the state develop a building electrification roadmap to provide strategies and concrete timelines for achieving building electrification.

To reach the state's energy efficiency and GHG emission reduction goals, the New Jersey Board of Public Utilities (BPU), supported by the Rutgers Center for Green Building (Rutgers), and Northeast Energy Efficiency Partnerships (NEEP), is facilitating a New Jersey Energy Code Collaborative (ECC)[1] and development of a Zero Energy Buildings (ZEB) Roadmap (ZEB Roadmap or Roadmap). The ECC is a public stakeholder body with participants including the

[1] The NJ Energy Code Collaborative was previously referred to as the NJ Zero Energy Building Code Collaborative. The change in name is in keeping with nomenclature used in other states.

building design and construction industry, energy efficiency contractors, representatives from labor and environmental organizations, municipal (building code, administration) staff, New Jersey state agencies (BPU, DEP, Department of Community Affairs (DCA), Division of Codes and Standards), and university-based organizations (New Jersey Institute of Technology (NJIT), Sustainable Jersey). The ZEB Roadmap is intended to serve as a guiding document for the State of New Jersey, its regulatory agencies, and other interested parties in developing and adopting policies and practices to reach building decarbonization goals. As a "living" document, the Roadmap further provides for ongoing collaboration and communication, and will be improved and updated based on assessment of progress-to-goals.

The Roadmap is presented as three concurrent pathways with explicit actions and timing for implementing zero energy building strategies, primarily through the adoption/amendment of building codes. These pathways adopted together, are designed to lead New Jersey to implement zero-energy building codes for both new construction and existing buildings by 2030 or sooner.

Background

Energy Efficiency Policy in New Jersey

New Jersey has committed to numerous energy efficiency strategies, such as regulating appliance standards, requiring building energy and water benchmarking by large commercial buildings[2], expanding energy efficiency programs statewide, and maximizing the electrification of the transportation and building sectors in the New Jersey Energy Master Plan[3], to reach the goal of 100 percent clean energy by 2050. Associated statutes and board orders are listed in Appendix A, which further references energy efficiency and code compliance best practices from the Mid-Atlantic region and Northeastern states.

It is expected that additional policies will be developed by various New Jersey State agencies authorized to regulate buildings, energy efficiency, and GHG emissions, such as the DCA, BPU, and DEP. While building energy codes are the focus of the Roadmap, it is essential to note that they alone will not meet the state's clean energy goals and that additional clean energy strategies will ideally be adopted in connection with building codes. Please see the "Additional Supportive Energy Efficiency State Actions to Support Zero Energy Buildings" section on page 8 below

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[2] Board of Public Utilities | New Jersey Board of Public Utilities Approves State's Energy and Water Benchmarking Program for Large Commercial Buildings (nj.gov)

[3] Office of the Governor | Governor Murphy Unveils Energy Master Plan and Signs Executive Order Directing Sweeping Regulatory Reform to Reduce Emissions and Adapt to Climate Change (nj.gov)

The Uniform Construction Code

The State of New Jersey passed the New Jersey Uniform Construction Code Act (UCC Act) on October 7, 1975. It became effective on February 3, 1976. The UCC Act authorized the Commissioner of DCA to adopt and enforce rules and regulations related to construction codes and provided for administration and enforcement of the rules and regulations throughout the State. Regulations for the New Jersey UCC Act, UCC NJAC 5:23, went into effect on January 1, 1977, and contains the rules issued under the Act related to the administration and enforcement of construction regulations.

The UCC comprises four subcodes for construction: building, electrical, fire protection, and plumbing. The UCC also contains subcodes for fuel gas installation, mechanical installations, one- and two-family dwellings, accessible (barrier-free) construction, rehabilitation of existing buildings, construction of manufactured homes, asbestos hazard abatement, radon hazard abatement, and playground safety.[4]

The Division of Codes and Standards within DCA reviews all building codes, consistent with the UCC, in coordination with the New Jersey DCA Code Advisory Board (CAB). DCA adopts the International Codes Council (ICC) suite of International Codes (I-Codes), including the International Energy Conservation Code (IECC) for new low-rise residential buildings, and the American Society of Heating, Refrigeration, and Air-Conditioning Engineers (ASHRAE) Standard 90.1 for new commercial and all other residential buildings.

During the state code review process, DCA and UCC Code Advisory Board staff provide a technical review of the energy codes and send their recommendations for approval or modification to the DCA Commissioner before being published in the New Jersey Register for public comment. According to NJ Rev Stat § 52:27D-122.2 (2013), the State is encouraged to facilitate the construction of energy-efficient buildings to reduce overall energy demand and produce energy savings. This statute also states, "it is therefore necessary and appropriate that the Commissioner of Community Affairs, in consultation with the Board of Public Utilities, adopt energy-efficiency building codes that may exceed the requirements of national model codes."

Suite of I-Codes

The I-Codes, developed by the ICC, are a family of 15 building safety codes and are the most widely accepted set of model codes in the U.S. Some of the I-Codes that are commonly adopted throughout the country include the building code, fire code, plumbing code, and the energy conservation code. The ICC uses a governmental consensus process to update the suite of I-Codes every three years. Other than the IECC from the suite of I-Codes, New Jersey adopts the International Building Code, the International Mechanical Code, the International Residential Code, and the International Fuel Gas Code.

[4] UCC_gen_info.pdf (nj.gov)

Under the UCC Act, model codes and standards publications shall not be adopted more frequently than once every three years. A revision or amendment, however, may be adopted at any time if the DCA Commissioner finds that an imminent peril exists to the public's health, safety, or welfare. An announcement in the New Jersey Register is the legal mechanism that establishes the editions of the model codes and standards that have been adopted. Amendments containing all necessary technical and editorial changes generally occur after this Register announcement. On September 6, 2022, New Jersey adopted the 2021 IECC for low-rise residential buildings and the ASHRAE 90.1-2019 standard for commercial buildings with an of six-month concurrency period, the new codes will be effective statewide in March 2023.[5]

DCA Authority to Reduce Energy Demand and to Protect Health and Safety

According to NJ Rev Stat § 52:27D-122.2 (2013), the State is encouraged to facilitate the construction of energy-efficient buildings to reduce overall energy demand and produce energy savings when incorporated into new construction from the beginning. This statute also gives the DCA Commissioner authority to adopt energy-efficient building codes that exceed the requirements of national model codes, which could mean the development of a stretch code or zero energy code. NJ Rev Stat § 52:27D-123 (2017) provides other authorities to DCA; further legal analysis is needed to align the relationship between these two statutes.

DCA is also charged with protecting New Jersey residents' health and safety through Executive Order No. 23. Actions such as the adoption of a stretch code and building energy performance standards contain measures that protect the community and individual health and safety by reducing the use of fossil fuels, decreasing harmful GHG emissions, and improving indoor and outdoor air quality. DCA's mission is "to establish and enforce health, welfare and safety standards as are necessary, for anything built, constructed or erected for use, occupancy or ornament on, above or below the surface of the earth in New Jersey." Hence, DCA not only has the authority to develop and implement energy codes, but also must implement codes to protect the health and safety of New Jersey residents.

New Jersey Rehabilitation Subcode

The UCC also includes the New Jersey Rehabilitation (Rehab) Building Subcode, a building code that applies when there is a repair, renovation, alteration, reconstruction, change of use, or addition to an existing building. Currently, the Subcode has energy provisions that apply in certain instances, but these provisions do not apply to the entire Subcode, which is why this Roadmap is recommending electrification amendments to the entire Subcode. The Rehab Subcode was developed and is updated by the State, meaning that it is not a national model

[5] NJ Department of Community Affairs

code. The Rehab Subcode may be updated administratively at any time. It was last updated on February 16, 2021, after a six month grade period.[6]

Other New Jersey State Agencies' Roles in Energy Efficiency

Although the BPU and DEP are not directly involved in the adoption of energy codes in New Jersey, their related energy efficiency programs work in parallel to energy codes and are necessary to achieve state energy and greenhouse gas emission reduction goals. The BPU is authorized to regulate the New Jersey utilities responsible for delivering natural gas, electricity, and water services across the state and to address issues of energy reform to encourage energy conservation. New Jersey's Clean Energy Program offers incentives, programs, and services to promote energy efficiency technologies to reduce emissions and energy usage from buildings. The DEP is authorized to reduce and respond to climate change and to reduce statewide pollution to protect public health. The DEP is actively working towards achieving the state's greenhouse gas emission reduction goals through expanding its clean energy infrastructure.

New Jersey Code Enforcement[7]

To enforce the requirements of the UCC Act, code officials in the state must be licensed by the Licensing Section of the Bureau of Code Services with the Division of Codes and Standards in DCA. Construction code enforcement agencies having jurisdiction in certain municipalities enforce the currently adopted UCC. DCA enforces codes for municipalities that have not established a construction code enforcement agency, as well as for state buildings. In general, land owners wanting to construct a new building apply to the construction code enforcement agency for a construction permit. After completing a plan review, the agency issues a release and performs inspections. Therefore, compliance with the code is determined during the plan review and inspection process.

The following requirements are also in state regulations: 1) all permit applications shall include no less than two copies of specifications and plans drawn to scale, with sufficient clarity and detailed dimensions to show the nature and character of the work to be performed; and 2) the construction official and appropriate Subcode officials shall periodically inspect the building during construction as necessary to ensure that all work conforms with the approved plans and the requirements of the regulations.

[6] Since the Rehab Subcode is currently in the 6 month grace period and was updated prior to the adoption of the 2021 IECC, NEEP expects the Rehab Subcode to be updated to include references to the 2021 IECC instead of the 2018 IECC which it references now. Nevertheless, the ECC must ensure that the references in the Subcode are updated to the 2021 IECC moving forward.

[7] Information for the New Jersey Code Enforcement, New Jersey Code Compliance, and State Owned Building sections of this roadmap is from the U.S. Department of Energy (DOE) State Profile for New Jersey found here available at: New Jersey | Building Energy Codes Program.

New Jersey Code Compliance

Residential building applicants have four options for complying with the code in New Jersey: submission of written calculations, enrollment in the Energy Star program, compliance with prescriptive packages, or use of the RESCheck software. Commercial building applicants have two ways of showing code compliance: either long hand calculations or the use of software. Commercial software, known as COMCheck, is available from the same site as the residential software and is listed under compliance tools.

State Owned Buildings

The New Jersey standard requires that new state-owned buildings larger than 15,000 square feet constructed for the sole use of State entities achieve LEED Silver certification, a two-globe rating on the Green Building Initiative Green Globe rating system, or a comparable numeric rating from another accredited sustainable building certification program. The law is enforced by the Division of Property Management and Construction Director in the Department of the Treasury in cooperation with the New Jersey Building Authority. Also, Executive Order No. 24 requires all new school designs to incorporate LEED Version 2.0 guidelines to achieve maximum energy efficiency and environmental sustainability in school facilities.

The Executive Order also requires that the New Jersey Economic Development Authority establish a subsidiary corporation, the New Jersey Schools Construction Corporation (SCC), to be responsible for the school facilities project and the State's compliance with the new order. The SCC was subsequently replaced by the New Jersey Schools Development Authority (SDA) in 2007. The SDA mandates that all projects meet all LEED prerequisites and achieve sufficient criteria to score at least 26 points on the LEED rating scale, wherever possible. In its latest biannual report, the SDA estimates that approximately 80 percent of the 70 projects completed since Executive Order No. 24 was adopted would have achieved LEED certification had they submitted the necessary application forms.

The Energy Code Collaborative (ECC)

The ECC convenes a diverse group of stakeholders in New Jersey to discuss building code adoption and other decarbonization strategies for reaching the State's goal of 100 percent clean energy by 2050. The ECC met starting in 2021 to begin the development of this Roadmap. NEEP conducted numerous listening sessions in 2021 to gain input and insights from a variety of New Jersey building and energy stakeholders. The comments received have been integrated into this version of the Roadmap, and the Roadmap will be updated as the ECC convenes in late 2022. Appendix C summarizes the comments received by NEEP.

The ECC, which is comprised of a diverse group of building energy stakeholders in New Jersey including state agencies, the energy efficiency industry, and the construction industry, is scheduled to meet in November 2022 to discuss a path forward for implementation. The ECC will meet at least quarterly to discuss the development, adoption, and implementation of Roadmap actions such as energy code compliance training, a statewide voluntary stretch code and updates to the Rehab Subcode.

Leading the ECC is the Advisory Group, which is composed of representatives of NEEP, BPU, Rutgers, NJIT, DEP, DCA, and Sustainable Jersey. It will develop a charter and steer the direction of the ECC to ensure that Roadmap activities are developed and implemented on established timelines. In addition to the Advisory Group, there will be subcommittees comprising of individuals from the ECC at large. One subcommittee may be the amendments subcommittee, which will be tasked with developing and recommending electrification amendments to the base model code (2024 IECC, ASHRAE 90.1-2022) and Rehab Subcode to begin the electrification of new and existing buildings in the state. The amendments subcommittee membership will be determined at the first ECC meeting in October 2022. Other subcommittees may be formed if needed. NEEP will have primary responsibility for the convening and facilitation of the ECC.

The NJZEB Roadmap

The Roadmap presents three concurrent pathways as described below:

- The **Base Code Path** is based on the adoption of the most recent version of the IECC and ASHRAE 90.1 code, as per the UCC, and provides comprehensive implementation and compliance initiatives statewide;
- The **Stretch Code Path** focuses on the development and adoption of a statewide voluntary[8] stretch code to drive energy efficiency beyond base code; and
- The **Rehab Code Path** focuses on improvements to the Rehab Subcode and other strategies to drive energy efficiency and electrification improvements in existing buildings

Together, these pathways lead to New Jersey adopting zero-energy building codes for both new construction and existing buildings by 2030 or sooner. The actions outlined within the base code pathway are expected to be developed and integrated congruently with the other two pathways. NEEP recommends that the State undertake additional energy efficiency actions and conduct research to better inform and increase the successful implementation of a zero-energy building code. The additional energy efficiency actions and research NEEP recommends can be found on page 9 and 10. The roadmap is found on the following page associating each action with one of the three concurrent pathways by year.

[8] It is to be determined by the adopting agencies, state legislature or the governor's office how the stretch code is implemented and whether it will be required or voluntary. For example, the stretch code may be adopted statewide for voluntary use by builders and designers. However, the stretch code may be incentivized for use by the State, utilities, or municipalities or required to be used in the case of state-financed projects such as schools or affordable housing.

Year	Base Code Path	Stretch Code Path	Rehab Code Path
2022		NEEP and Rutgers reconvene the ECC to begin research and development of a statewide voluntary stretch code/step code based on model energy codes. Sustainable Jersey, with the assistance of the ECC and Rutgers, offers points towards certification of stretch code-related technical provisions for municipalities before a statewide voluntary stretch code is adopted by DCA	The ECC begins research and development of a possible building energy performance standard (BEPS) pilot program. The ECC convenes an amendments subcommittee and begins development of electrification amendments to the Rehab Subcode.
2023	The State designs and implements training for municipal officials, code officials, design professionals, and other interested parties on the 2021 IECC, ASHRAE 90.1-2019, 2021 zero energy appendices, and Rehab Subcode electrification amendments. The State designs training for code officials based on Rutgers statewide code compliance study results. DCA begins review of the 2024 IECC and ASHRAE 90.1-2022 (Fall 2023) for adoption in 2026 and an	The ECC develops and presents a statewide voluntary stretch code to DCA for adoption with an implementation date in early 2024. Sustainable Jersey, with assistance from the ECC and Rutgers, continues to promote points towards certification for stretch-code related technical provisions for municipalities before the statewide voluntary stretch code is effective.	DCA adopts electrification amendments (i.e. electrification, energy efficiency, embodied carbon) to the Rehab Subcode. The State implements an energy benchmarking program that the BPU is currently developing and possibly a greenhouse gas emissions metrics for existing buildings.

	effective date in 2027, or sooner The State explores avenues to increase participation by environmental justice and overburdened communities in the code development and adoption process by focusing on language accessibility and code resources about affordable housing and retrofits.		
2024	The State implements training for code officials based on results of the New Jersey Enegy Code Compliance Report, focusing on achieving 100% compliance with adopted base code. DCA begins review of the 2024 IECC and ASHRAE 90.1-2022 for adoption as the new base energy code.	A voluntary state-wide stretch code is available for adoption by municipalities.	The ECC BEPS pilot program may be launched.
2025	DCA considers electrification and decarbonization amendments to the 2024 IECC and ASHRAE 90.1-2022. DCA considers alternative compliance pathways (DOE ZERH, Passive	Resources and training are made available to support the voluntary stretch code. State agencies and utilities consider incentive opportunities for the voluntary stretch code.	DCA updates the Rehab Subcode with additional electrification, renewable energy procurement provisions, and possibly requirements from the BEPS pilot program.

	House) to the 2024 IECC and ASHRAE 90.1-2022.		
2026	2024 IECC and ASHRAE 90.1-2022 are adopted with an effective date in 2027.	The State and/or the ECC update the existing statewide voluntary stretch code with a higher energy efficiency benchmark.	BEPS pilot is assessed and BEPS is updated by the ECC, if applicable
2027	DCA begins review of 2027 IECC and ASHRAE 90.1 for adoption in 2029.	An updated stretch code is available for municipalities to adopt and the ECC develops and DCA adopts a new zero-energy code that municipalities can adopt.	
2028 & Beyond	2027 IECC and ASHRAE 90.1 become effective in the state in 2029. DCA begins review of 2030 IECC and ASHRAE 90.1 (Fall 2030), which are expected to be zero energy codes, for adoption		The State launches an official BEPS program statewide, if applicable.

ROADMAP ACTIONS BY YEAR

2022

- NEEP and Rutgers reconvene the New Jersey Energy Code Collaborative (ECC) to begin research and development of a statewide voluntary stretch code/step code based upon model energy codes.

- Sustainable Jersey, with the assistance of the ECC and Rutgers, offers points towards certification of stretch code-related technical provisions for municipalities before a statewide voluntary stretch code is adopted by DCA.[9]
- The ECC begins research and development of a possible Building Energy Performance Standards (BEPS) Pilot program.
- The ECC convenes an amendments subcommittee and begins development of electrification amendments to the existing New Jersey Rehabilitation (Rehab) Subcode.

2023

- The ECC develops and presents a statewide voluntary stretch code to DCA for adoption with an implementation date in early 2024.
- The ECC develops and presents electrification amendments to the Rehab Subcode for adoption with an effective date in 2023.
- The State designs and implements training for municipal officials, code officials, design professionals, and other interested parties on new codes in the state including the: 2021 IECC, ASHRAE 90.1-2019, 2021 zero energy appendices, and rehab Subcode electrification amendments.
- Sustainable Jersey, with assistance from the ECC and Rutgers, continues to promote points towards certification for stretch-code related technical provisions for municipalities before the statewide voluntary stretch code is effective.
- The State designs training for code officials based on the recently completed statewide code compliance study results[10].
- DCA begins reviews of 2024 IECC and ASHRAE 90.1-2022 (Fall 2023) for adoption in 2026 and an effective date in 2027.
- The State explores avenues to increase participation by environmental justice and overburdened communities in the code development and adoption process by focusing on language accessibility and code resources about affordable housing and retrofits.

2024

- The State implements training for code officials based on results of the NJ Energy Codes Baseline Study (2022), focusing on achieving 100 percent compliance with adopted base code.
- The BEPS pilot program may be launched.
- DCA begins the review of the 2024 IECC and ASHRAE 90.1-2022 for adoption as the new base energy code in 2026.
- A statewide voluntary stretch code is available for adoption by municipalities.

[9] Municipalities in New Jersey have already expressed interest wanting to adopt stretch code-related provisions before the state has adopted a statewide voluntary stretch code. Sustainable Jersey, in collaboration with the ECC and Rutgers, will develop these provisions that municipalities can adopt to receive points towards certification. These provisions will be designed to assist municipalities with eventually adopting the statewide voluntary stretch code one it is adopted by the DCA.

[10] Rutgers New Jersey Energy Code Compliance Report_Final_clean.pdf (njcleanenergy.com)

2025

- DCA considers electrification and decarbonization amendments to the 2024 IECC and ASHRAE 90.1-2022.
- DCA considers alternative compliance pathways (DOE ZERH, Passive House) to the 2024 IECC and ASHRAE 90.1-2022.
- DCA updates the Rehab Subcode with additional electrification, renewable energy provisions, and possible requirements from the BEPS pilot program.
- Resources and training are made available to support the voluntary stretch code.
- State agencies and utilities consider incentive opportunities for the voluntary stretch code.
- DCA updates the Rehab Subcode with additional electrification, renewable energy procurement provisions, and possibly requirements from the BEPS pilot program, if applicable

2026

- 2024 IECC and ASHRAE 90.1-2022 are adopted with an effective date in 2027.
- If applicable, the State and/or the ECC assesses and updates the BEPS pilot.
- The State and/or ECC updates the existing stretch code with a higher energy efficiency benchmark.

2027

- DCA begins the review of the 2027 IECC and ASHRAE 90.1 for adoption in 2029.
- An updated stretch code is available for municipalities to adopt and the ECC develops and DCA adopts a new zero-energy code that municipalities can adopt.

2028 and Beyond

- 2027 IECC and ASHRAE 90.1 become effective in the State in 2029.
- DCA begins review of the 2030 IECC and ASHRAE 90.1 (Fall 2030), which are expected to be zero energy codes, for adoption.
- If applicable, the State launches a BEPS program statewide.

ROADMAP ACTIONS BY PATH

Base Code Path

- The State (DCA, BPU, DEP, and others as needed) coordinates to develop a timeline that establishes a detailed plan to reach a zero-energy code for new construction and existing buildings by 2030 or sooner. This timeline will follow the new iterations of the International Energy Conservation Code (IECC) and the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) model codes as they are expected to be zero energy codes by 2030 for new construction.

- The State expands and implements statewide energy code training opportunities for IECC and ASHRAE model codes as they are adopted for building stakeholders other than code officials, such as architects, engineers, contractors, and energy advocates.
- The State explores avenues to increase participation by environmental justice and overburdened communities in the code development and adoption process by focusing on language accessibility and code resources about affordable housing and retrofits.
- The State supports local implementation of electronic permitting/virtual inspection capacity for increased code compliance.
- DCA considers alternative compliance pathways (DOE ZERH, Passive House) to the 2024 IECC and ASHRAE 90.1-2022.
- Credentialed third-party implementation/verification/testing[11].
- The ECC convenes an amendments subcommittee to develop electrification amendments to the Rehab Subcode that will be presented to DCA for adoption.

Stretch Code Path

- The State directs the ECC to develop and promulgate a statewide voluntary stretch energy code based on the next iteration(s) of the model codes.[12]
- The ECC develops a maintainable timeline for the State to update the statewide voluntary stretch code as needed and a plan for the State to adopt a zero-energy stretch code for municipalities.
- Sustainable Jersey, with the assistance of the ECC and Rutgers, offers points towards certification of stretch code-related technical provisions for municipalities before the DCA adopts a statewide voluntary stretch code.
- The State develops and implements incentive programs and provides technical assistance to municipalities and/or other entities that are interested in adopting the statewide voluntary stretch code.

Rehab Code Path

- The ECC convenes an amendments subcommittee and begins development of electrification amendments to the existing Rehab Subcode, including an amendment to update the language in the Subcode to reflect existing energy code provisions to be required for the entire Subcode.
- The ECC begins research and development of a BEPS pilot program for implementation.
- DCA adopts electrification amendments and possible BEPS mandates to the Rehab Subcode.
- The State develops and implements a greenhouse gas emissions (GHG) metric for existing buildings that could assist in the development of BEPS bythe ECC..

[11] Assembly Bill No. 4850, which the New Jersey legislature passed in 2020, was eventually vetoed by the Governor because of concerns about granting private entities the ability to conduct inspections for those who pay a premium. The bill has been reintroduced as Assembly Bill No. 573 in the 2022-2023 legislative session.

[12] The Commissioner of the DCA currently has the authority to develop and create a statewide voluntary stretch code, but legislation could also be passed that would direct the DCA or other state agencies to develop and implement a voluntary stretch code. Both options can lead to the development of a voluntary stretch code. NEEP, however, plans on working with the ECC to develop a stretch code that will be presented to DCA and the state for adoption in 2024, so this roadmap focuses on that path.

- The State provides resources and technical assistance to municipalities that choose to adopt the possible BEPS, which may be developed by the ECC.

Additional Energy Efficiency State Actions to Support Zero Energy Buildings

In addition to the actions outlined in this Roadmap, other actions are necessary for the State to reach building decarbonization goals and a zero-energy base code by 2030 or sooner. NEEP recommends these additional supportive energy efficiency actions because they have proven successful in other states in the Northeast and Mid-Atlantic. They would require additional research and action by the ECC and the State if they are to be fully developed and implemented along with the Roadmap actions.

- Rutgers performs regular updates to the New Jersey Green Building Manual and, in collaboration with State agencies, develops strategies for how to expand its usage around the state.
- The State identifies ways to coordinate state financing initiatives for building decarbonization.
- The State provides additional energy efficiency and electrification funding for low-to-moderate income (LMI) communities.
- The State works with the real estate industry to create home energy labels for residential/multifamily properties and reporting mechanisms for Multiple Listing Service (MLS) databases. Home energy labels can populate home listings in MLS databases with energy efficiency features of the home (Residential Energy Services Network (RESNET), Home Energy Rating System (HERS) Index, certifications, high-performance appliances, solar photovoltaic, etc.) and demonstrate how the modeled home compares to the average conventional home.
- The State improves reporting of energy efficiency features during the home appraisal process using the existing American National Standards Institute (ANSI) standard and other strategies.
- The State expands upon "lead by example" initiatives for state-owned/financed buildings.
- The State expands utility incentives for whole-building performance, building electrification technology, and weatherization, and also updates the existing incentive structure to prioritize gradual phase-out of fossil fuels, focusing on propane and heating oil first.
- The State develops and improves energy efficiency-focused workforce training programs by creating better pathways to recruit new code enforcement professionals.
- The State establishes a Clean Buildings Hub, per EMP Strategy 7, to develop workforce training, awareness, and education for builders, architects, contractors, engineers, real estate professionals, and code enforcers on the most efficient construction and retrofitting building techniques.
- The State conducts research to analyze grid impacts from building electrification and electric vehicle infrastructure.

Additional Research to Ensure Successful ZEB implementation

NEEP recommends that the State conduct additional research on the topics listed below. Undertaking this research in conjunction with the actions in this Roadmap will ensure successful implementation. This research would require additional action by the ECC and the State.

- Conduct a lifecycle cost analysis of zero energy buildings.
- Develop resources on the importance of appliance standards for codes.
- Research the use of new high-efficiency technologies (such as inverter-based heat pumps (ductless mini-splits, etc.), induction cooktops, smart thermostats, etc.) and produce consumer-facing resources.

APPENDIX A

Relevant State Policy Encouraging Zero Energy Buildings in New Jersey

1. **New Jersey Department of Environmental Protection (DEP) Global Warming Response Act 80x50 Report – Buildings Chapter**

   To achieve New Jersey's 80x50 goal, the building sector must phase out reliance on fossil fuels and aggressively pursue electrification of heating, cooling, and appliances. At least 90 percent of the residential and commercial sector must be electrified to meet the state's clean energy and climate goals. To achieve the 80x50 Greenhouse Gas (GHG) reduction target, the State should prioritize creation of a building electrification roadmap paired with incentives that initially target buildings currently relying on propane and heating oil for space and water heating and inefficient electric resistance baseboard heating.

2. **Governor Murphy's 2019 Energy Master Plan – New Construction and Building Energy Codes** (overview see Gov. Murphy Unveils Energy Master Plan and Signs Executive Order – *1/27/2020)*

- Energy Master Plan Section - GOAL 3.3: STRENGTHEN BUILDING AND ENERGY CODES AND APPLIANCE STANDARD (begins page 76)
  - **3.3.1** Advocate for net zero carbon buildings in new construction in the upcoming 2024 International Code Council code change hearings.
  - **3.3.2** Establish transparent benchmarking and energy labeling.
  - **3.3.3** Establish mechanisms to increase building efficiency in existing buildings.
  - **3.3.4** Build state-funded projects and buildings to a high-performance standard.
  - **3.3.5** Improve energy efficiency in and retrofit state buildings to, a high-performance standard.
  - **3.3.6** Increase compliance of mandated building and energy codes
  - **3.3.7** Adopt more stringent appliance standards.

3. **New Jersey Board of Public Utilities (BPU) Energy Efficiency Order – June 10, 2020**

- **Page 14** – BPU to lead New Construction Programs – Residential, Commercial, Multifamily, and for Energy Codes & Standards with the Department of Community Affairs.
  - *"Energy codes and standards in collaboration with the New Jersey Department of Community Affairs"*

- **Page 37** – Formation of Energy Codes & Standards Subcommittee (see all committees pp. 35-37).
  - *"Energy Codes and Standards Subcommittee:* Staff proposes to form an energy codes and standards subcommittee within the EM&V working group that seeks to identify opportunities for greater energy efficiency via building energy code strategies and to quantify the energy savings that could result from updates to energy codes. In addition, staff recommends that the Board procure an energy code compliance baseline study and review and adopt as appropriate recommendations arising from the study."

- **Page 18-19** - Energy codes and standards to be considered in utility-specific energy performance goals for their programs.
    - *"Energy Use Reduction Targets:* In order to comply with the energy use reduction requirements of the CEA and to guide the development of EE programs, Staff recommends that the Board establish overall annual utility territory specific energy use reduction targets. Staff further recommends that the Board establish separate utility and State targets that represent a breakdown in the overall utility-specific target based on the program administrator. State targets in each utility territory will represent the energy use reductions to be achieved by programs administered or sponsored by the State, including State programs, state building codes, and state appliance efficiency standards".
    - "Staff recommends that, in calculating net energy use reductions and assessing compliance with QPIs, utilities be permitted to apply energy savings from any other EE or PDR programs in their territory, as well as any other programs that reduce electricity or natural gas by customers and can reasonably be quantified based on accepted standards, except those savings attributable to State-led EE or PDR programs (including state building energy codes and state appliance efficiency standards) and any other State-sponsored EE or PDR programs. Savings attributable to State-led or State-sponsored EE or PDR programs will not apply to utility program energy use reduction targets because these targets have been reduced by the amount that the State commits to achieving. Similarly, utilities will not receive incentives or penalties based on the performance of the programs that they are not responsible for administering and do not receive incentives or penalties based on the performance of State-administered programs or initiatives".

- **Page 42** – Board Directive to establish Stakeholder Groups
    - Stakeholder Groups**:** The Board directs staff to take the necessary steps to ensure that the EEAG includes: (1) a Workforce Development Working Group, (2) an Equity Working Group, including Comfort Partners and Multifamily Subcommittees, (3) an EM&V Working Group, including an Energy Codes and Standards Subcommittee; and (4) a Marketing Working Group, as recommended by Staff. The Board also welcomes staff's recommendations for future Advisory Groups or Advisory Councils to assist in future efforts, as necessary.

4. **New Jersey 2018 Clean Energy Act** – *see: Assembly Bill 3723*

- Within five years of enactment, benchmarking is required by all owners and operators of commercial buildings over 25,000 ft^2 using Portfolio Manager.

5. **State Uniform Construction Code Act (P.L. 1975, c.217, as amended)**

- https://www.nj.gov/dca/divisions/codes/publications/pdf_ucc/UCC_gen_info.pdf
- https://www.state.nj.us/dca/divisions/codes/publications/pdf_licensing/co_comment.pdf

6. NJHMFA- 2020 QAP Green Requirements

- The New Jersey Housing and Mortgage Finance Agency set new requirements in 2020 for Energy Star alternative paths for rehab projects and tax credits for projects to do energy benchmarking.

7. Green Building Manual v2 2019

- The New Jersey Green Building Manual (NJGBM) is a resource tailored for New Jersey that provides economic and environmental best practices across the spectrum of green building categories including energy, emissions, water, waste, siting, transportation, and human health. The manual comprises of commercial and residential sections with best practices strategies applicable to new and existing buildings.

APPENDIX B

Other Relevant Resources

- Are Stretch Codes a Barrier to Affordable Housing in New Jersey?
- Massachusetts is Ready for Net Zero.
- Helping New Jersey State Agencies and Departments Align Their Actions with GHG Reduction Mandates and Environmental Justice Principals.

Regional Stretch Energy Code Examples:

Massachusetts: The state is currently reviewing zero energy codes for its next stretch code update in 2022. Recently enacted legislation in the state requires the development and promulgation of a zero-energy municipal opt-in stretch code that municipalities may voluntarily opt into in addition to a regular stretch code.

The state administers the Green Communities Program, which includes the nation's first stretch code to be adopted statewide. Communities must meet five criteria – solar or renewable generation zoning, expedited permitting for zoning, 20 percent reduction in energy use over 5 years, purchasing hybrid or electric vehicles for all state department vehicles, and reducing the life cycle cost of buildings – at which point communities receive grants to pursue additional energy efficiency measures. Massachusetts also allows for energy code savings attribution for compliance.

Vermont: Vermont's 2020 Residential and Commercial Building Energy Standards include a significantly strengthened residential and commercial version of the 2018 International Energy Conservation Code (IECC) as its residential stretch code (section R407). Vermont revised the 2018 IECC to be more efficient and provide more flexibility for its stretch code. Each project must achieve a minimum number of points by choosing various energy reduction options.

New York: The state provides a stretch code option to municipalities called the NYStretch Energy Code. The code was developed by NYSERDA and the current version (NYStretch 2020) provides savings of roughly 11% over the 2020 Energy Conservation Construction Code of New York State (2020 ECCCNYS). NYStretch is updated in conjunction with the ECCCNYS and NYSERDA provides resources and guidance to local governments looking to adopt the stretch code.

Rhode Island: Rhode Island uses the U.S. Department of Energy's Zero Energy Ready Homes (ZERHs) program for residential construction and the ICC's International Green Construction Code (IgCC) for commercial construction. Specific state-financed construction is required to use the IgCC. Rhode Island also allows for energy code savings attribution for compliance. DOE's ZERH program comes with supporting resources, training, and guidance already available.

District of Columbia: Washington D.C. uses Appendix Z for commercial buildings, which takes a whole-building EUI performance approach to reach zero energy for new commercial buildings. Appendix Z's focuses on tight envelopes, low loads, and renewable energy, which makes it a simple and high-performing option for commercial buildings.

Maine: Maine has adopted the 2021 IECC as a voluntary stretch code for municipalities. The state is also planning training and adoption guidance for local governments interested in adopting the stretch code.

Maryland: Maryland adopted the 2012 IgCC and added efficiency measures in its energy efficiency section. This provision applies only to state-owned buildings, but its design allows them to not have to update the stretch code whenever the base code is updated since it merely requires performance-based compliance on whatever base code is effective. The state of Maryland adopted the IgCC, but local jurisdictions can also choose to adopt this stretch code locally.

APPENDIX C

Summary of Listening NEEP Session Comments

NEEP conducted numerous listening sessions on the roadmap to gain input and insights from a variety of New Jersey building energy code stakeholders. The comments received are summarized in this section for the consideration in the state deciding which roadmap actions to take. Below is a list of the comments received:

- Options to reach zero energy buildings in the state
- Some stakeholders believed that limiting this roadmap to three concurrent paths limited the options available to New Jersey to reach a zero energy building code by 2030. They wanted to ensure that the state considers future actions are they become known to reach zero energy buildings instead of just relying on the finalized roadmap.
- **Response:** We consider the NJ ZEB Roadmap to be a "living" document. It may be updated at any time.
- Grid impacts research
- Many stakeholders expressed concern about the grid impacts research should be conducted before any other actions suggested in the roadmap begin because electrification measures will increase the load on the existing electrical grid. Specifically, concerns were raised that not having data from a grid impact analysis in New Jersey could cause significant implementation problems as the state adopts the 2021 IECC and future model code iterations. Others, however, point out that studies in different areas, including in Washington D.C. and New York, have concluded that the existing grids there can withstand an increased load, so a New Jersey study is expected to yield similar results.
- **Response**: We suggest that interested parties read the following reports: PJM Regional Transmission Expansion Plan (RTEP) Report, The Reliability in PJM: Today and Tomorrow Report, and the ISO New England-Annual 10-Year Forcast Report. These reports detail the energy demand, peak seasonal loads and grid capacity of the PJM, which covers New Jersey, and ISO Systems, which covers New England. These reports describe the addition of distributed energy resources and loads from electrification, and also detail the systems' plans and projections for grid reliability accounting for building electrification.
- Stretch codes
- There were numerous comments from stakeholders both in support of a statewide voluntary stretch energy code as well as against it. The arguments for and against a stretch code will be outlined separately below
- **Comments in support of a stretch code**. Advocates for a New Jersey stretch code commented that in other states in the region, such as Massachusetts, stretch codes are popular with towns and consumers because they save consumers money on their energy usage and allow municipalities to move closer to achieving their climate goals. They also point out that any policies created using this roadmap can be designed to reduce the higher upfront costs of building a new home to a stretch code to consumers. Finally, under the current uniform construction code, builders can build more efficient homes than those using the base energy code by building homes using methodologies such as Passive House, so builders will be able to adapt to building to a stretch energy codes if a municipality decides to adopt it.
- **Comments against a stretch code.** Stakeholders expressed concern about increase costs for builders and homeowners if municipalities decide to adopt a future stretch code. They also stated concerns that allowing municipalities to adopt and implement a stretch code will increase "home rule"

authority. There were also concerns about how a voluntary stretch code could be adopted by municipalities if it is not addressed in the state's Uniform Construction Code (UCC).

- Retrofitting existing buildings using the Rehab Code
- While stakeholders understood that the roadmap outlines a Rehab Code path, which focuses on existing buildings, there were some concerns that the roadmap focuses too much on new construction on not enough on retrofitting existing buildings. Stakeholders also wanted to note that old processes in the rehab code encouraged homeowners to limit improvements in order to not trigger new code requirements, and the changes proposed need to encourage stakeholders to make improvements using the newest base energy code.

All Roadmap Comments Received Can be Found Here: New Jersey Zero Energy Roadmap Draft_Review Copy - Google Docs and here: 22-1 ZEB advocate comments shared.docx - Google Docs