New Jersey Zero Energy Buildings Roadmap Draft

January 2025 Version

Section 1: 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. In February 2023, Governor Phil Murphy updated the state's Energy Master Plan and signed a series of Executive Orders (EOs) to serve as the foundation for a cleaner, greener, and more resilient New Jersey. In particular, EO 315 revised the state's climate targets to achieve 100% clean energy by 2035 through energy efficiency and the use of renewable energy sources. The Global Warming Response Act (GWRA), which aims to reduce the state's greenhouse gas emissions 80% by 2050, is another example of New Jersey's climate commitment.

New Jersey Decarbonization Commitments

The Energy Master Plan (EMP) law requires that EMP is created every 10 years and updated every three years. 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 energy production 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. The current EMP from 2019 has a target of 100% clean energy by 2050. The latest Executive Order 315 mandates that the 2024 EMP be updated with a target of 100% clean energy by 2035.

In 2020, the DEP released the Global Warming Response Act (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 emissions reductions in 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 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 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 (Rutgers, New Jersey Institute

[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.

of Technology (NJIT), Sustainable Jersey). The ZEB Roadmap is intended to provide recommendations to the State of New Jersey, its regulatory agencies, and other interested parties on developing 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.

Section 2: Background

Section 2A: 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 electrification of the transportation and building sectors[3] to reach the goal of 100% clean energy by 2035. 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.

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. Additional clean energy strategies will therefore need to be developed and adopted by various New Jersey State agencies such as the DCA, BPU, and DEP, who are authorized to regulate buildings, energy efficiency, and GHG emissions. For examples, please see the "Additional Supportive Energy Efficiency State Actions to Support Zero Energy Buildings" in Section 4.

Section 2B: The Uniform Construction Code (UCC)

The State of New Jersey passed the New Jersey Uniform Construction Code Act (UCC Act) on October 7, 1975. 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 comprise the rules issued under the Act related to the administration and enforcement of construction regulations.

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

[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)

[4] UCC_gen_info.pdf (nj.gov)

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 national model codes such as 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. The electrical subcode is based on model codes by the National Fire Protection Association and the National Electrical Code. The plumbing subcode is based on model codes from the International Association of Plumbing & Mechanical Officials (IAPMO) and the National Standard Plumbing Code. 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.

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. In addition to 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.

When adopting an energy code for newly constructed buildings during the state code review process, as governed under NJ Rev Stat § 52:27D-123, 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 the code is published in the New Jersey Register for public comment. Under this statute, the energy subcode must be based upon national model energy codes. Furthermore, the statute states "*In amending or supplementing the energy subcode, the commissioner shall rely upon 10-year energy price projections provided by an institution of higher education...The commissioner shall be authorized to amend the energy subcode to establish enhanced energy conservation construction requirements, the added cost of each of which may reasonably be recovered through energy conservation over a period of not more than seven years."*

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 a six-month concurrency period; the new codes became effective statewide in March 2023.[5]

Section 2C: DCA Authority to Reduce Energy Demand and to Protect Health and Safety

[5] NJ Department of Community Affairs

According to NJ Rev Stat § 52:27D-122.2, the State is encouraged to "*facilitate the new 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 be interpreted to mean the development of a stretch code or zero energy code, or incorporating such requirements applicable to new construction into the base code if they meet the 10-year cost, 7-year simple payback requirements as outlined in the NJ Rev Stat § 52:27D-123. This statute also provides other authorities to DCA; further legal analysis is needed to align the relationship between these two.

More generally, 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.*" DCA is also charged with protecting New Jersey residents' health and safety through Executive Order No. 23. This EO could be interpreted to include recommendations appearing in this roadmap, namely the adoption of a stretch code and building energy performance standards (BEPS). Both a stretch code and BEPS contain measures that protect the community and individual health and safety by improving indoor and outdoor air quality and decreasing harmful GHG emissions.

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 and emissions 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 New Jersey's clean energy infrastructure.

Section 2D: New Jersey Code Enforcement[6]

To enforce the requirements of the UCC Act, code officials in the state must be licensed by the Licensing and Education Unit within the Director's Office in the Division of Codes and Standards in DCA. Construction code enforcement agencies enforce the currently adopted UCC. DCA enforces codes for municipalities that have not established a construction code enforcement agency and for state buildings. In general, property 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.

[6] Board of Public Utilities | New Jersey Board of Public Utilities Approves State's Energy and Water Benchmarking Program for Large[6] Information for the New Jersey Code Enforcement, New Jersey Code Compliance, and State Owned Building sections of this roadmap are from the New Jersey Department of Community Affairs, Division on Codes and Standards available at:https://nj.gov/dca/codes/index.shtml/.

The following requirements also appear 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.

Section 2E: New Jersey Code Compliance

Residential building applicants have six options for complying with the code in New Jersey: submission of written calculations, compliance with New Jersey's Clean Energy Program for residential new construction, compliance with prescriptive packages, use of the RESCheck software, compliance with IECC 2021 Section R405 Total Building Performance option, or compliance with IECC 2021 Section R406 Energy Rating Index Option. Commercial building applicants have four ways of demonstrating code compliance: long hand calculations, the use of software known as COMCheck, which is available from the same site as the residential software and is listed under compliance tools, using the Energy Cost Budget Method in Chapter 11 of ASHRAE 90.1 2019, or using the Performance Rating Method in Appendix G of ASHRAE 90.1 2019. Full guidance as of May 2023 is posted in UCC Bulletin 22-1 that was issued in September 2022.

Section 2F: 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 Director of the Division of Property Management and Construction 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 schools' facilities projects 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.

Section 2G: New Jersey Rehabilitation Subcode

The UCC, as mentioned above, also includes the New Jersey Rehabilitation (Rehab) Building Subcode, a building code developed for existing buildings in New Jersey. The six categories of projects covered in the Rehab Subcode are repair, renovation, alteration, reconstruction, change of use, and additions, and each has different requirements. The Rehab Subcode is based on the principles of predictability and proportionality. It does not require that any work be done in an existing building unless the owner voluntarily initiates work. Each work category includes specific requirements, and some may trigger additional work, which is considered proportional to the voluntary work.

The current Rehab Subcode triggers some Energy Subcode requirements such as U-values of replaced windows and replacement of an entire lighting system, but it does not trigger any beneficial electrification requirements. However, the triggering mechanisms and the principle of proportionality suggest that such requirements may be proposed as amendments to the Rehab Subcode, certainly if they are already included in the Uniform Construction Code, and through other mechanisms.

For example, electrification preparedness requirements could be triggered by major renovations and/or alteration work. Similar measures have already been successfully implemented in other jurisdictions. For instance, Colorado recently developed a new Model Electric and Solar Ready Code, that applies to all residential one- and two-family dwellings and townhouses new construction, and major renovations or additions. The code requires a dedicated, appropriately phased branch circuit sized to accommodate future electric equipment or appliances to serve a comparable capacity to meet the heating load. In cases where significant work or renovation is planned for a building or part thereof, it must be brought into complete compliance with the current code to the fullest extent feasible. Gunnison County in Colorado considers major renovation or additions if the work area exceeds 50% of the building area. However, there remains flexibility to report and seek exemptions for specific code requirements that cannot be met.

The Rehab Subcode in New Jersey was developed and is updated by the State, meaning that it is not an established national model code. The Rehab Subcode may be updated administratively at any time. It was last updated on March 6, 2023, after a six-month grace period.[7]

Section 2H: 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 2035. Participants include state agencies, the energy efficiency industry, and the construction industry. The ECC met starting in 2021 to begin developing this Roadmap, during which NEEP conducted many listening sessions to gain input from New Jersey building and energy stakeholders. The comments during these sessions have influenced the development of this roadmap, with many stakeholder suggestions directly incorporated as new or edited text.

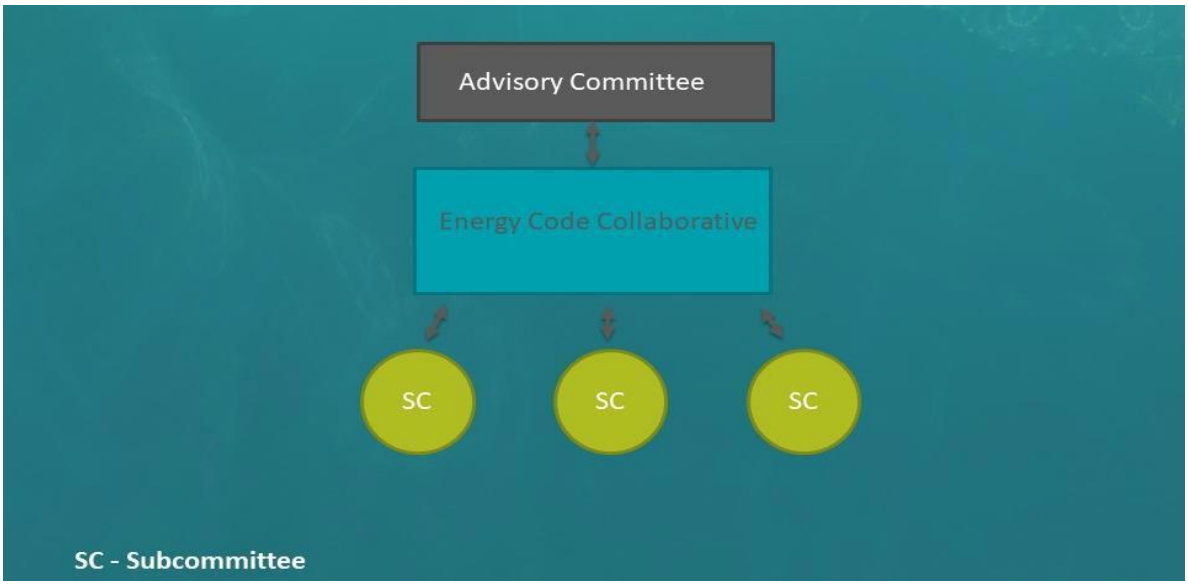
The inaugural purpose of the ECC is to "*Establish a timely and robust, stakeholder-guided process to research and develop a New Jersey Zero Energy Building Roadmap that provides options to build government and market capacities to effectively advance an increasingly more energy-efficient building energy code and improve administration, enforcement and compliance, aligned with relevant clean energy policies of the State, including the Energy Master Plan goals and recommendations*."

The ECC is next scheduled to meet in early 2025 to discuss a path forward for implementation, and subsequent meetings will occur at least quarterly to discuss the development, adoption, and implementation of Roadmap recommendations such as energy code compliance training, a statewide voluntary stretch code and updates to the Rehab Subcode. NEEP will continue to collect comments from stakeholders throughout this period as important input into the "living" Roadmap and its implementable actions.

[7] The Rehab Subcode was recently updated to include references to the 2021 IECC instead of the 2018 IECC.

Leading the ECC is the Advisory Group, which is composed of representatives of NEEP, BPU, Rutgers, NJIT, DEP, DCA, and Sustainable Jersey. The Advisory Group has developed a charter and steers the ECC to ensure that Roadmap recommendations are developed and implemented on established timelines. In addition to the Advisory Group, there are subcommittees comprised of individuals from the ECC at large.

The amendments subcommittee is tasked with developing and recommending electrification amendments to the base model code (2024 IECC, ASHRAE 90.1-2022 or 2024 International Green Construction Code (IGCC)) and Rehab Subcode to begin the electrification of new and existing buildings in the state. Other subcommittees may be formed if needed. NEEP will have primary responsibility for the convening and facilitation of the ECC. The Organizational Structure of the ECC is outlined below.



Recommendations of the New Jersey Zero Energy Building Roadmap

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. The recommendations outlined are presented for consideration as potential outcomes, not requirements, for interested parties to develop and implement. The recommendations outlined in the roadmap may require legislation, regulatory changes, and other considerations that are not outlined in the Roadmap. The Roadmap is expected to act as a "living" document that will be updated as electrification policies are researched and developed to ensure the recommendations work for the State.

Section 3: The NJZEB Roadmap

The Roadmap presents three concurrent pathways as described below:

- The New Building Base Code Path is based on the adoption of the most recent version of the IECC and ASHRAE 90.1 code[8], 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[9] stretch code to drive energy efficiency beyond base code; and
- The Existing Building Code Path focuses on improvements to the Rehab Subcode and other strategies, such as developing building performance standards, 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 recommendations outlined within the new building 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 considerations and conduct research to better inform and increase the successful implementation of a zero-energy building code. The additional energy efficiency considerations and research NEEP recommends can be found in Section 4 and Section 5. The roadmap associates each recommendation with one of the three concurrent pathways by year. It is noted that Zero Energy Appendices RC and CC of the IECC are currently adopted by the DCA as "optional."

[8] 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 a six-month concurrency period. The new codes are effective statewide as of March 2023.

[9] It is to be determined by the adopting agencies, state legislature or the governor's office how the stretch code is designed and implemented, and how it will be adopted. For example, the stretch code may be based upon a national model code and 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. More information on stretch codes can be found in Appendix B.

SECTION 3A: ROADMAP RECOMMENDATIONS TABLE

Year	New Building Base Code Path	Stretch Code Path	Existing Building Code Path
2025	The State (and any partners) design training for code officials, design professionals and other interested parties based on Rutgers statewide code compliance study results and other resources, in support of current versions of energy codes and to include a module on the IECC zero energy appendices. The State implements training for code officials based on results of the New Jersey Energy Code Compliance Report, and other resources, focusing on achieving 100% compliance with newly adopted base code. DCA works on the adoption of the 2024 IECC and ASHRAE 90.1-2022 as the new base energy code. Rutgers determines if proposed amendments meet the 10-year cost, 7-year simple payback requirements of NJ Rev Stat § 52:27D-122.2. If so, a statutory change may not be required.	NEEP and Rutgers reconvene the ECC and begin research and development of a statewide voluntary stretch code/step code based on the latest model energy codes and its appendices: IECC 2024 for Residential Buildings and ASHRAE 90.1.2022 or IGCC 2024 for Commercial Buildings. The ECC builds on an earlier suggestion to work with New Jersey municipalities to incentivize builders to use stretch code related technical provisions before adopting a statewide voluntary stretch code. Interested stakeholders such as Rutgers, NEEP, Sustainable Jersey, NJ League of Municipalities, or others could work to further develop this recommendation. The ECC develops and presents a statewide voluntary stretch code to DCA for adoption. The State adopts a voluntary state-wide stretch code of the 2024 IECC for Residential Buildings and ASHRAE 90.1 2022 or IgCC 2024 for Commercial Buildings. The State makes resources	The ECC begins research and development of a possible building energy performance standard (BEPS) pilot program. The ECC convenes an amendments subcommittee to consider inclusion of electrification provisions to the Uniform Construction Code as it applies to existing buildings and Rehab Subcode and other energy efficiency amendments to the Rehab Subcode based on IECC and/or ASRAE such as change of occupancy provisions in IECC. The State implements its energy benchmarking program for existing buildings. 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 electrification provisions for existing buildings. DCA adopts electrification provisions (i.e., electrification, energy efficiency, embodied carbon) to the Rehab Subcode at the recommendation of the UCC Advisory Board.

	The New Jersey Legislature approves a statutory change that allows for more efficient alternative compliance pathways in the Energy Subcode such as DOE Zero Energy Ready Homes and Passive House. DCA considers electrification and decarbonization provisions to the 2024 IECC and ASHRAE 90.1-2022. DCA considers alternative compliance pathways (Department of Energy Zero Energy Ready Homes Program (ZERH), Passive House) to the 2024 IECC and ASHRAE 90.1-2022. The State adopts the 2024 IECC and ASHRAE 90.1-2022 with an effective date in 2026.	and training available to support the voluntary stretch code. State agencies and utilities consider incentive opportunities for the voluntary stretch code.	The State may launch a BEPS pilot program. DCA updates the Uniform Construction Code with additional electrification, renewable energy procurement provisions, and possibly requirements from the BEPS pilot program at the recommendation of the UCC Advisory Board.
2026		The State and/or the ECC update the existing statewide voluntary stretch code to the 2027 IECC for Residential Buildings and ASHRAE 90.1 2025 or 2027 IGCC for Commercial Buildings, if available, with a higher energy efficiency benchmark.	DCA updates the Rehab Subcode with additional electrification, renewable energy procurement provisions, and possibly requirements from the BEPS pilot program at the recommendation of the UCC Advisory Board. The relevant agency assesses the BEPS pilot, and BEPS is updated by the ECC, if applicable.

2027	DCA begins review of 2027 IECC and ASHRAE 90.1-2025 for adoption in 2029.	The State makes an updated stretch code available for municipalities to adopt and the ECC develops and DCA adopts a new zero-energy code that municipalities can adopt.	
2028 & Beyond	The State adopts 2027 IECC and ASHRAE 90.1-2025 in 2029. DCA begins review of 2030 IECC and ASHRAE 90.1-2028 (Fall 2030), which are expected to be zero energy codes, for adoption.		The State launches an official BEPS program statewide, if applicable.

SECTION 3B: ROADMAP RECOMMENDATIONS BY YEAR

2025

- The State (and any partners) design training for code officials, design professionals and other interested parties based on Rutgers statewide code compliance study results and other resources, in support of current versions of energy codes and to include a module on the IECC zero energy appendices.
- The State implements training for code officials based on results of the New Jersey Energy Code Compliance Report10, and other resources, focusing on achieving 100% compliance with newly adopted base code.
- DCA works on the adoption of the 2024 IECC and ASHRAE 90.1-2022 as the new base energy code.
- The New Jersey Legislature approves a statutory change that allows for more efficient alternative compliance pathways in the Energy Subcode such as DOE Zero Energy Ready Homes and Passive House.
- DCA considers electrification and decarbonization provisions to the 2024 IECC and ASHRAE 90.1-2022.
- DCA considers alternative compliance pathways (Department of Energy Zero Energy Ready Homes Program (ZERH), Passive House) to the 2024 IECC and ASHRAE 90.1-2022.
- The ECC convenes an amendments subcommittee to consider inclusion of electrification provisions to the Uniform Construction Code as it applies to existing buildings and Rehab Subcode and other energy efficiency amendments to the Rehab Subcode based on IECC and/or ASHRAE such as the change of occupancy provision in IECC.
- Rutgers determines if proposed amendments for new construction meet the 10-year cost, 7-year simple payback requirements of NJ Rev Stat § 52:27D-122.2. If so, a statutory change may not be required.
- NEEP and Rutgers reconvene the ECC and begin research and development of a statewide voluntary stretch code/step code based on the latest model energy codes and its appendices: IECC 2024 for Residential Buildings and ASHRAE 90.1 2022 or IGCC 2024 for Commercial Buildings.11
- The ECC builds on an earlier suggestion to work with New Jersey municipalities to incentivize builders to use stretch code-related technical provisions before adopting a statewide voluntary stretch code. Interested stakeholders such as Rutgers, NEEP, Sustainable Jersey, NJ League of Municipalities, or others could work to further develop this recommendation.
- The ECC develops and presents a statewide voluntary stretch code to DCA for adoption.
- 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 electrification provisions for existing buildings.

10 NJ Energy Codes Baseline Study (2022)

11 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 toward certification. These provisions will be designed to assist municipalities with eventually adopting the statewide voluntary stretch code once it is adopted by the DCA.

- The ECC begins research and development of a possible building energy performance standard (BEPS) pilot program.
- The State implements its energy benchmarking program for existing buildings.
- The State may launch a BEPS pilot program.
- The State adopts a voluntary state-wide stretch code of the 2024 IECC appendices for Residential Buildings and ASHRAE 90.1 2022 or IgCC 2024 for Commercial Buildings.
- The State adopts the 2024 IECC and ASHRAE 90.1-2022 with an effective date in 2026.
- DCA updates the Uniform Construction Code with additional electrification, renewable energy procurement provisions, and possibly requirements from the BEPS pilot program at the recommendation of the UCC Advisory Board.
- DCA adopts electrification provisions (i.e., electrification, energy efficiency, embodied carbon) to the Rehab Subcode at the recommendation of the UCC Advisory Board.
- State agencies and utilities consider incentive opportunities for the voluntary stretch code.
- The State makes resources and training available to support the voluntary stretch code.

2026

- The State and/or the ECC update the existing statewide voluntary stretch code to the 2027 IECC for Residential Buildings and ASHRAE 90.1 2025 or 2027 IGCC for Commercial Buildings with a higher energy efficiency benchmark.
- DCA updates the Rehab Subcode with additional electrification, renewable energy procurement provisions, and possibly requirements from the BEPS pilot program at the recommendation of the UCC Advisory Board.
- The relevant agency assesses the BEPS pilot, and BEPS is updated by the ECC, if applicable.

2027

- DCA begins review of 2027 IECC and ASHRAE 90.1-2025 for adoption in 2029.
- The State makes an updated stretch code available for municipalities to adopt and the ECC develops and DCA adopts a new zero-energy code that municipalities can adopt.

2028 and Beyond

- The State adopts 2027 IECC and ASHRAE 90.1-2025 in 2029.
- DCA begins review of 2030 IECC and ASHRAE 90.1-2028 (Fall 2030), which are expected to be zero energy codes, for adoption.
- The State launches an official BEPS program statewide, if applicable

SECTION 3C: ROADMAP RECOMMENDATIONS BY PATH

New Buildings Base Code Path

- The State (and any partners) design training for code officials, design professionals and other interested parties based on Rutgers statewide code compliance study results and other resources, in support of current versions of energy codes and to include a module on the IECC zero energy appendices.
- DCA work on adoption of the 2024 IECC and ASHRAE 90.1-2022 by end of 2025 and an effective date in 2026.
- Rutgers determines if proposed amendments meet the 10-year cost, 7-year simple payback requirements of NJ Rev Stat § 52:27D-122.2. If so, a statutory change may not be required.
- The State implements training for code officials based on results of the New Jersey Energy Code Compliance Report, and other resources, focusing on achieving 100% compliance with newly adopted base code.
- The New Jersey Legislature approves a statutory change that allows for more efficient alternative compliance pathways in the Energy Subcode such as DOE Zero Energy Ready Homes and Passive House.
- DCA considers electrification and decarbonization provisions to the 2024 IECC and ASHRAE 90.1-2022.
- DCA considers alternative compliance pathways (Department of Energy Zero Energy Ready Homes Program (ZERH), Passive House) to the 2024 IECC and ASHRAE 90.1-2022.
- The State adopts the 2024 IECC and ASHRAE 90.1-2022 with an effective date in 2026.
- DCA begins review of 2027 IECC and ASHRAE 90.1-2025 for adoption in 2029.
- The State adopts 2027 IECC and ASHRAE 90.1-2025 in 2029.
- DCA begins review of 2030 IECC and ASHRAE 90.1-2028 (Fall 2030), which are expected to be zero energy codes, for adoption.

Stretch Code Path

- NEEP and Rutgers reconvene the ECC and begin research and development of a statewide voluntary stretch code/step code based on the latest model energy codes and its appendices: IECC 2024 for Residential Buildings and ASHRAE 90.1 2022 or IGCC 2024 for Commercial Buildings.
- The ECC builds upon an earlier suggestion to work with New Jersey municipalities to incentivize builders to use stretch code related technical provisions prior to the adoption of a statewide voluntary stretch code. Interested stakeholders such as Rutgers, NEEP, Sustainable Jersey, NJ League of Municipalities, or others could work to further develop this recommendation.
- The ECC develops and presents a statewide voluntary stretch code to DCA for adoption.
- The State adopts a voluntary state-wide stretch code of the appendices of 2024 IECC for Residential Buildings and ASHRAE 90.1 2022 or IgCC 2024 for Commercial Buildings.
- The State makes resources and training available to support the voluntary stretch code.
- State agencies and utilities consider incentive opportunities for the voluntary stretch code.

- The State and/or the ECC update the existing statewide voluntary stretch code to the 2027 IECC for Residential Buildings and ASHRAE 90.1 2025 or 2027 IGCC for Commercial Buildings with a higher energy efficiency benchmark.
- The State makes an updated stretch code available for municipalities to adopt and the ECC develops and DCA adopts a new zero-energy code that municipalities can adopt.

Existing Building Code Path

- The ECC begins research and development of a possible building energy performance standard (BEPS) pilot program.
- The ECC convenes an amendments subcommittee to consider inclusion of electrification provisions to the Uniform Construction Code as it applies to existing buildings and Rehab Subcode and also other energy efficiency amendments to the Rehab Subcode based on IECC and/or ASHRAE such as the change of occupancy provision in IECC.
- DCA adopts electrification provisions (i.e., electrification, energy efficiency, embodied carbon) to the Uniform Construction Code at the recommendation of the UCC Advisory Board.
- The State implements its energy benchmarking program for existing buildings.
- 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 electrification provisions for existing buildings.
- DCA adopts electrification provisions (i.e., electrification, energy efficiency, embodied carbon) to the Rehab Subcode at the recommendation of the UCC Advisory Board.
- The State may launch a BEPS pilot program.
- DCA updates the Uniform Construction Code with additional electrification, renewable energy procurement provisions, and possibly requirements from the BEPS pilot program at the recommendation of the UCC Advisory Board.
- DCA updates the Rehab Subcode with additional electrification, renewable energy procurement provisions, and possibly requirements from the BEPS pilot program at the recommendation of the UCC Advisory Board.
- The relevant agency assesses the BEPS pilot, and BEPS is updated by the ECC, if applicable.
- The State launches an official BEPS program statewide, if applicable.

Section 4: Additional Energy Efficiency State Considerations to Support Zero Energy Buildings

In addition to the recommendations 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 considerations because they have proven successful in other states in the Northeast and Mid-Atlantic. Some of these might require additional research and consideration by the ECC and the State if they are to be fully developed and implemented along with the Roadmap recommendations, whereas others are underway.

- 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 conducts research to analyze grid impacts from building electrification and electric vehicle infrastructure.
- 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.
- In connection with the Clean Buildings Hub, 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.

Section 5: 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 recommendations in this Roadmap will ensure successful implementation. This research would require additional consideration 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.

Section 6: Future Considerations

While the ZEB Roadmap reflects the ongoing focus to achieve energy efficiency and decarbonization goals, the ECC should consider several additional actions to further align the state's policies and codes with its climate objectives.

1. To ensure a continued alignment with the state's climate goals, future discussions within the ECC could explore the potential need for legislative changes to the energy code update process. These updates may include a more holistic cost-effectiveness test, incorporating a comprehensive evaluation of costs and benefits, including those related to greenhouse gas emissions, health-harming air pollutants, and demand during peak periods. Additionally, ECC could explore alignment with the state climate pollution reduction goals.
2. As technologies evolve, future conversations within the ECC could incorporate discussions about grid-interactive efficient buildings (GEBs), emphasizing the integration of features such as distributed energy resources (DERs) and demand flexibility capabilities into building energy codes.
3. The ECC could consider addressing hazard readiness within the context of the ZEB Roadmap, including indoor air quality from indoor combustion products and outdoor air pollution, including smog or wildfire pollutants.
4. Building upon existing efforts to involve interested municipalities in ECC meetings will help in the alignment of goals and capabilities. Additionally, the ECC could discuss joint efforts with municipalities in funding applications for the development, adoption, and implementation of voluntary stretch codes, acknowledging the potential resource requirements at the municipal level for successful adoption.

5. Continue to ensure that updates to the new construction energy subcodes are adopted into the NJ Rehab subcode as appropriate. This will help to ensure that both new and existing buildings adhere to the latest energy efficiency standards.

These considerations, while not immediately actionable, are critical aspects for the ongoing evolution of the New Jersey building energy code framework and can be explored further in subsequent discussions within the ECC.

APPENDIX A

Relevant State Policy Encouraging Zero Energy Buildings in New Jersey

1. Governor Murphy's February 2023 Executive Orders relating to Combatting Climate Change

- EO 315:
  Paragraph 1: "It is the policy of the State to advance clean energy market mechanisms and other programs in order to provide for 100 percent of the electricity sold in the State to be derived from clean sources of electricity by January 1, 2035."

  Paragraph 2: "In the 2024 EMP, the BPU shall make updates to the State's roadmap to 100 percent clean energy that is consistent with the policy set forth in Paragraph 1, and shall provide specific proposals to be implemented both in the short-term and longer-term to achieve this goal"
- EO 316
  Paragraph 1: "It is the policy of the State to advance the electrification of commercial and residential buildings with the goal that, by December 31, 2030, 400,000 additional dwelling units and 20,000 additional commercial spaces and/or public facilities statewide will be electrified, and an additional 10 percent of residential units serving households earning less than 80 percent of area median income will be made ready for electrification through the completion of necessary electrical system repairs and upgrades. For purposes of this Order, "electrification" shall be defined as the retrofitting or construction of a building with electric space heating and cooling and electric water heating systems. For purposes of this Order, a "dwelling unit" shall include a single-family home, an individual dwelling unit in a two-family dwelling, or an individual dwelling unit in a multiple-unit dwelling."

  Paragraph 2: "The OCAGE, informed by the Clean Buildings Working Group, shall develop and release by March 2024, a strategic roadmap to building decarbonization, which shall include recommendations for policy, legislative, regulatory, workforce development, and funding strategies to achieve the goal for building electrification described in Paragraph 1; and create cleaner, greener buildings that support and benefit New Jersey families and workers."
  Paragraph 4: "The DCA, in consultation with the New Jersey Energy Code Collaborative, the OCAGE, and the BPU, shall develop guidance for builders to facilitate achievement of the objectives described in Paragraph 1 of this Order, which shall include voluntary enhanced building standards consistent with applicable law that builders may choose to utilize."
- EO 317
  Paragraph 1: "The BPU shall immediately initiate a proceeding to formally engage with stakeholders concerning development of natural gas utility plans that reduce emissions from the natural gas sector to levels that are consistent with achieving the State's 50 percent reduction in greenhouse gas emissions below 2006 levels by 2030, as directed in Executive Order No. 274 (2021); and within 18 months, develop recommendations for how the natural gas industry can best meet these goals, considering cost and support for well-paying jobs, including union jobs, necessary to deliver on these goals."

2. 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 sectors 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.

3. 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.

4. **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:*** 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 the staff's recommendations for future Advisory Groups or Advisory Councils to assist in future efforts, as necessary.

5. 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.

6. 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
7. 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.

8. **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 released a stretch code based on the IECC 2021 with Massachusetts amendments plus Stretch Code amendments in December 2022. It was automatically adopted by all Green Communities (approximately 300). The state also released a Specialized Opt-In Code based on the based on the IECC 2021 plus MA amendments plus Stretch Code amendments plus Specialized Opt-In amendments in December 2022. This is a more stringent code that has been adopted by 18 municipalities as of May 24, 2023.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. Vermont is in the process of adopting their 2023 Residential and Commercial Building Energy Standards, which include a significantly strengthened version of the 2021 IECC, and will also include updates to their stretch code.

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. NYSERDA is currently working on developing the NYStretch Energy Code 2023 for both residential and commercial buildings. The new code will make changes to certain provisions in the 2021 IECC and ASHRAE 90.1-2019 and adds additional energy-saving and clean energy provisions.

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. Since Maine is in the process of adopting the 2021 IECC as their base code, they are looking into updating their stretch code to become a strengthened version of the 2021 IECC.

Maryland: Maryland recently updated their stretch code and adopted the 2021 IGCC and added efficiency measures in its energy efficiency section. This provision applies as of May 29, 2023. The previous stretch code only applied 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. When the latest version of the stretch code was adopted however, it did correspond to the base code update. The state of Maryland adopted the IgCC, but local jurisdictions can also choose to adopt this stretch code locally.

APPENDIX C

Common Roadmap Acronyms

Acronym	***Full Name***
ANSI	American National Standards Institute
ASHRAE	American Society of Heating Refrigerating and Air Conditioning Engineers
BEPS	Building Energy Performance Standards
BPU	New Jersey Board of Public Utilities
CAB	New Jersey Department of Community Affairs Code Advisory Board
DCA	New Jersey Department of Community Affairs
DEP	New Jersey Department of Environmental Protection
DOE	United States Department of Energy
ECC	New Jersey Energy Code Collaborative
EMP	Governor Murphy's Energy Master Plan
EO	Executive Order
GHG	Greenhouse Gas
GWRA	New Jersey Global Warming Response Act
HERS	Home Energy Rating System
ICC	International Code Council
I-Codes	Suite of International Codes
IECC	International Energy Conservation Code
IgCC	International Green Construction Code

LMI	Low to Moderate Income
MLS	Multiple Listing Service
NEEP	Northeast Energy Efficiency Partnerships
NJ	New Jersey
NJIT	New Jersey Institute of Technology
OCAGE	New Jersey Office of Climate Action and the Green Economy
Rehab Subcode	New Jersey Building Rehabilitation Subcode
RESNET	Residential Energy Services Network
Rutgers	Rutgers Center for Green Building
SCC	New Jersey Schools Construction Corporation
SDA	New Jersey Schools Development Authority
UCC	New Jersey Uniform Construction Code
ZEB	Zero Energy Building
ZERH	United States Department of Energy Zero Energy Ready Homes Program

APPENDIX D

Regional Building Performance Standards Examples:

New York City: Local Law 97 was included in the Climate Mobilization Act, passed by the City Council in April 2019 as part of the Mayor's New York City (NYC) Green New Deal. Under this law, most buildings over 25,000 square feet will be required to meet new energy efficiency and greenhouse gas emissions limits by 2024, with stricter limits coming into effect in 2030. Limits will be established every five years through 2050, but only the first two are currently set. Period 1 covers 2024-2029 and is designed to impact the top 20% of emitters. Period 2 runs 2030-2034 and is designed to impact the top 75% of emitters. The goal is to reduce the emissions produced by the city's largest buildings by 40 percent by 2030 and 80 percent by 2050. The law also established the Local Law 97 Advisory Board and Climate Working Groups to advise the city on how best to meet these aggressive sustainability goals.

Local Law 97 is estimated to cover 11,800 buildings in the city including buildings that exceed 25,000 gross square feet, two or more buildings on the same tax lot that together exceed 50,000 square feet, and two or more buildings owned by a condominium association that are governed by the same board of managers and that together exceed 50,000 square feet. Compliance is based on the number of metric tons of carbon dioxide equivalent (CO_2e) per square foot of building space. To comply, the buildings covered by Local Law 97 will be required to file a report with the NYC Department of Buildings by May 1, 2025, detailing their annual greenhouse gas emissions and then by May 1 of every year after. The report must be certified by a registered design professional. Additionally, starting in 2025, an owner of a covered building who submits a report indicating that their building exceeded its annual building emissions limit will be liable for a civil penalty of $268/metric ton of CO_2 equivalent emitted over the limit. Based on a recommendation from the Local Law 97 Advisory Board, the law encourages load shifting by implementing the Time of Use emission rates. The law outlines methods to invest equitably and limit localized pollution in historically marginalized communities and requires that two seats on the BPS advisory board be reserved for members representing historically marginalized communities.

NYC conducted a research project exploring the possibility of establishing a carbon market where buildings surpassing their energy efficiency targets could trade carbon credits with underperforming buildings.

Boston: In 2021 the City of Boston adopted the second iteration of the Building Energy Reporting and Disclosure Ordinance (BERDO 2.0). BERDO 2.0 gives the City authority to set emissions targets and reporting requirements for buildings greater than or equal to 20,000 gross square feet (GSF), establish an Emissions Review Board with community representation to increase accountability and transparency, and establish an environmental justice Buildings Emissions Investment Fund. BERDO 2.0's aim is to reduce building emissions 50% by 2030[1] and become net zero by 2050[2] in alignment with city goals. The Ordinance is estimated to cover 5,927 buildings in the city including non-residential buildings that are 20,000 square feet or larger (excluding parking), residential buildings that have 15 or more units, any parcel with multiple buildings that add up to have at least 20,000 square feet (excluding parking) or have 15 or more residential units,[3] and buildings owned by the City of Boston and Boston Housing Authority. Compliance is measured based on kilograms of carbon dioxide equivalent (CO_2e)

per square foot, and enforcement begins in 2025 for already-covered buildings and in 2030 for newly covered buildings. To comply, BERDO 2.0 requires building owners to annually report emissions by May 15 of each year.

Boston partnered with One Square World, a third-party consultant, and collaborated with community-based organizations to conduct extensive outreach and gather feedback in developing this ordinance. Additionally, the Ordinance establishes the Equitable Emissions Investment Fund, which will collect any related payments and penalties made to BERDO and invest them in local building carbon abatement projects, prioritizing projects that benefit environmental justice communities and populations disproportionately affected by air pollution.

Philadelphia: The Building Energy Performance Program, also referred to as "Building Tune-ups," was passed in 2019 through the Building Energy Performance Policy, aiming to achieve efficient energy use in the largest non-residential buildings in Philadelphia. A building tune-up is a review of energy systems, controls, and maintenance practices, along with minor tweaks to achieve an efficient state of performance as outlined in the policy. On average, these tweaks could result in 10– 15% annual energy savings for a building. The targeted buildings are nonresidential buildings with at least 50,000 square feet of indoor floor space. To comply, buildings have three options. Buildings may conduct a "tune-up" of existing building systems, certify high performance, or receive an exemption. The city projects that this policy will cut carbon pollution in Philadelphia by nearly 200,000 metric tons and that an estimated 250 to 600 new jobs will be created across the region in the first six years of program implementation.

Washington D.C.: The Building Energy Performance Standards (BEPS) Program was created in Title III of the Clean Energy DC Omnibus Amendment Act of 2018. BEPS was created to drive energy performance in existing buildings to help meet the energy and climate goals of the Sustainable DC plan, to reduce greenhouse gas emissions and energy consumption to 50% by 2032, and to reach carbon neutrality by 2050. The Department of Energy and Environment (DOEE) is required to establish new standards every six years, creating BEPS Periods. The first set of BEPS standards were established in 2021:

- Beginning 2021: All privately-owned buildings at least 50,000 square feet; All District-owned or District instrumentality-owned buildings at least 10,000 square feet;
- Beginning 2023: All privately-owned buildings with at least 25,000 square feet;
- Beginning 2026: All privately-owned buildings at least 10,000 square feet.

DOEE and building owners measure whether a building meets BEPS through the Energy Benchmarking program. Buildings that do not meet the standards for a BEPS Period will be placed in a five-year Compliance Cycle. The building owner will have until the end of the cycle for the building to meet energy performance requirements following one of the compliance pathways. The BEPS Program utilizes multiple metrics to evaluate energy performance. First, it uses EPA's 1-100 ENERGY STAR Score as an initial assessment to identify which buildings need improvements, and then uses the Site Energy Use Intensity (Site EUI) as the metric for measuring improvements. Additionally, the BEPS Program offers a prescriptive pathway, allowing building owners to choose between meeting the ENERGY STAR score or EUI requirements or completing a checklist of measures that are estimated to reduce the EUI. DOEE is exploring the possibility of implementing an exemption criterion for qualifying affordable housing buildings to delay compliance with the building energy performance requirements

for more than three years. Additionally, the Affordable Housing Retrofit Accelerator provides technical support and financial assistance to affordable housing to ensure their compliance with the BEPS program.

Montgomery County: On April 19, 2022, the Montgomery County Council voted unanimously to pass Bill 16-21, the new Building Energy Performance Standard (BEPS) Law. BEPS builds on the County's existing Building Energy Benchmarking Law which requires owners of certain buildings to report annual energy use to Montgomery County's Department of Environmental Protection (DEP) each year. Under the BEPS, buildings are categorized based on property type, and each category is assigned a long-term final performance standard according to the site energy use intensity (EUI) metric, measured in kBtu per gross square feet per year. The standard also mandates that buildings meet interim standards every four years, calculated using a straight-line trajectory from the building's baseline performance to the final standard. In addition, Montgomery County is accepting renewable energy credits that properties pursue as an allowance toward the BEPS target.

To ensure compliance, building owners must submit annual energy use data via the ENERGY STAR Portfolio Manager. Buildings that meet or exceed the net site energy use intensity target are considered in compliance with the standards. In cases where a building struggles to meet the performance standards due to economic infeasibility or other uncontrollable circumstances, the county allows for the submission of a Building Performance Improvement Plan. However, compliance with the actions and timelines outlined in the plan is mandatory for owners to remain in compliance with the BEPS.

Montgomery County has extended the scope of the BEPS to cover a wide range of buildings, including affordable housing structures, small businesses, houses of worship, and non-profit organizations. The DEP is actively exploring additional technical assistance and support for these under-resourced sectors to ensure they can meet the standards set by the BEPS. To support the implementation of the BEPS, Montgomery County has taken steps to provide financial assistance and incentives. The county has allocated a portion of its fuel-energy tax revenue to its Green Bank, with a focus on financing building energy improvements. A designated percentage of these funds is dedicated to supporting affordable housing upgrades and upgrades in Equity Emphasis Areas. Additionally, Montgomery County offers a Green Buildings Property Tax Credit for both new and existing buildings. This incentive program rewards buildings that demonstrate improved energy performance in the ENERGY STAR Portfolio Manager and grants additional credits for achieving recognized green building certifications. Notably, buildings located in Equity Emphasis Areas receive an additional 10% credit, and an up-to-100% deduction in property taxes as a credit granted against the county taxes owed for two years.