Honorable Governor Murphy: May 2, 2022

The NJ 50 x 30 (50% GHG reduction by 2030) Building Electrification Team thanks you for your November 2021 Executive Order 274 stating that New Jersey's goal is to reduce GreenHouse Gas (GHG) emissions 50% from 2006 levels by 2030.

We have identified a critical gap in New Jersey's Energy Master Plan (EMP) that needs to be addressed in order to achieve the overall NJ 2030 and 2050 GHG reduction goals. The EMP states that electric cold weather heat pumps would achieve the bulk of Building Electrification (BE) and reduction in fossil fuel usage required to meet the goals in the EMP. Yet, NJ has not set specific goals for BE using high efficiency, "cold climate" heat pumps. Without specific goals and timeframe for BE, the state cannot make progress toward meeting its overall clean energy goals, nor measure it.

We are attaching for your review and consideration a position paper, "Building Electrification to Reduce GHG Emissions in New Jersey," that describes the costs and benefits of BE and includes a set of recommendations for establishing a BE program for the state. Acadia Center's recent "The Future is Electric" 2022 NJ-specific report, whose analysis generally aligns with our own results, documents the benefits of BE such as improvements to health and a wealth of new job opportunities. It also makes recommendations for how to achieve building conversion. To ensure the benefits of BE accrue to all New Jerseyans, the Acadia report emphasizes that "programs to assist low- and moderate-income households should be a high priority for New Jersey policymakers. The administration and NJBPU should direct substantial investments to assist with building weatherization of low and moderate-income households, along with widespread electric-ready measures and electric appliances."

Our attached position paper includes the following recommendations:

1. **Establish and announce publicly an initial goal of 100,000 new and retrofit residential building units electrified by 2025 and 800,000 by 2030 as steps toward the NJ EMP goal of 90% electrification by 2050.**
2. **Establish an aggressive building electrification roadmap by the end of 2022.**
3. **Establish much stronger incentives for NJ building electrification, especially for the installation of cold climate heat pumps and building weatherization for energy efficiency. Increase marketing and awareness of the programs.**
4. **Set strong building electrification residential and commercial building codes for new construction, retrofitting and remodeling. At a minimum, adopt the ICC 2021, 2024 and 2027 building energy codes with no weakening amendments.**
5. **Require state, local and county governments and agencies to electrify government buildings in the next few years and provide them funding to do so.**
6. **Ensure that the 3300 affordable housing units that Gov Murphy has proposed subsidizing are built to high efficiency standards and use all-electric heat pump technology.**

Thank you in advance for considering our recommendations. We look forward to your response and would welcome the opportunity to meet with you or members of your staff via Zoom or in person. We also would like the opportunity to discuss the recommendations with the individuals on the copy-to list or their staff members, whose involvement in the BE program will be crucial.

This letter is authorized by the NJ 50 x 30 Building Electrification Team, whose members are volunteers and involved in many other environmental organizations in the state.

Steve and Pat Miller, Co-Leaders
stevemiller@comcast.net 732-977-4370, patmiller@comcast.net 732-859-3143, 151 Borden Rd, Middletown, NJ 07748

Copy to:
Jane Cohen, Governor's Office of Climate Action and the Green Economy
Deborah Cornavaca, Deputy Chief of Staff for Outreach to Governor Murphy
Zakiya Smith Ellis, Chief Policy Advisor, Office of the Governor
President Joseph L. Fiordaliso, NJ Board of Public Utilities
Henry Gadja, Deputy Chief of Staff, NJ Board of Public Utilities
Shawn LaTourette, NJ Commissioner of Environmental Protection
Robert Long, Deputy Commissioner, Department of Consumer Affairs
Lt. Governor Sheila Y. Oliver, Commissioner, Department of Consumer Affairs
Jennifer Senick, Executive Director, Rutgers Center for Green Building
Randall Solomon, Executive Director, Sustainable Jersey

Building Electrification to Reduce GHG Emissions in New Jersey

May 2, 2022

This position paper describes the importance of immediately addressing Building Electrification (BE) as part of the solution for achieving New Jersey's overall 2030 and 2050 GreenHouse Gas (GHG) emissions reduction goals. It highlights the importance of switching to high efficiency electric heat pumps for building space and water heating and other high efficiency electric appliances. This paper describes the costs and benefits of BE and includes a set of recommendations for establishing a BE program for the state to support our GHG reduction targets.

The NJ 50 x 30 (50% GHG reduction by 2030) Building Electrification Team applauds Governor Murphy for his recent Executive Order 274 of November 2021, which states that it is the policy of the state of New Jersey to reduce GHG emissions by 50% from 2006 levels by 2030. This policy is consistent with our earlier recommendation in our letter to the Governor dated September 30, 2021.[1] This executive action is an essential early step towards accomplishing the necessary GHG reductions in New Jersey set out in the 2019 Energy Master Plan (EMP) and the Global Warming Response Act (GWRA). It is a foundational step towards the three pillars of GHG reduction stated in the EMP goals: 1) 100% clean electricity generation that will facilitate 2) electrification of the transportation sector with Electric Vehicles (EVs) and 3) electrification of the building sector with high efficiency, "cold climate" heat pumps and other high efficiency electric appliances.

Nevertheless, we have identified a substantial gap in NJ's EMP goals and strategies that needs to be addressed in order for the overall NJ GHG reduction goals to be achieved by 2030 and by 2050. Unlike the specific goals for EVs, solar, community solar, storage, OffShore Wind (OSW) and energy efficiency, NJ has no specific goals for BE. Given the important role that BE must play, NJ needs to set specific BE goals and provide the support needed for achieving them.

The basic goal of all electrification and decarbonization is to reduce GHGs. The building sector's GHG emissions (25.4 MMT,[2] 26% of total) are the second largest segment in this state and reducing them is of critical importance in achieving the 50x30 goal. Action on this segment must be prioritized. Given the highly disaggregated nature of the segment (3.6M distinct housing units and 800,000 separately-owned businesses) and the significant capital costs of replacing existing fossil fuel appliances, it will be one of the most difficult to address. Therefore, time is of the essence, and efforts to reduce GHGs in this segment must be put in place immediately.

The EMP states that cold weather heat pumps would achieve the bulk of building electrification and reduction in fossil fuel usage required to meet the goals set out in the EMP. While both the EMP and New Jersey's 2020 GWRA 80 by 50 Report (80 x 50 Report) do call for "aggressive" BE strategies and recommendations, there are no specific goals for the installation of cold climate heat pumps across the residential and commercial building sectors that are crucial for the electrification of buildings' heating and hot water. Without specific goals and timeframes for BE, the state cannot make progress toward meeting its overall clean energy goals, nor measure it.

---

1 50x30 Team 9/30/21 letter to Gov Murphy; 50x30sept30gov.pdf (smiller.org)

2 New Jersey Greenhouse Gas Inventory Mid-Cycle Update Report, February 2021, 2019 projected figures, pp. 5-6; https://www.nj.gov › MCU GHG Inventory_2021

Further, NJ has not yet published a BE roadmap, even though the 2020 GWRA report describes a BE roadmap as "...a crucial first step in facilitating a managed transition to fossil fuel-free buildings." The GWRA only calls for this "sometime between now and 2030." Given the need to make significant progress in the BE sector between now and 2030, we strongly recommend the roadmap be completed in 2022. A BE roadmap would explain to the public, industry, and government how BE, and its consequent GHG reductions and health benefits will be accomplished. Otherwise, the essential GHG reduction goals established in the 2019 EMP, the 80 x 50 Report, and Executive Orders 12 and 274 are in severe jeopardy.

Costs/Benefits of Building Electrification

The following points concerning costs vs. benefits of BE are taken directly from the NJ EMP, as documented in its Integrated Energy Plan (IEP).[3]

• [Building] electrification reduces annual costs by 50% in 2050, compared to retaining gas use in buildings, in order to meet [GWRA 80x50] emissions targets.

• Building heating and cooling appliance costs are lower when buildings are electrified. Total appliance costs are lower because modern heat pumps provide both heating and cooling needs, negating the need to purchase separate furnaces and air conditioners.

• Building electrification reduces total energy use. While building electrification increases electricity use, it reduces total energy needs because heat pumps are much more efficient than direct combustion of fossil fuels for heat.

• Building electrification is the most cost-effective path to achieving further emissions reductions beyond those required by the GWRA. In the Least Cost Scenario, buildings are retrofitted during stock rollover events, in which gas appliances are replaced with heat pumps at the point of an appliance's natural retirement, thus limiting stranded assets.

Further, the Acadia Center's "The Future is Electric" 2022 study (Acadia Report),[4] which is specific to NJ, includes an extensive analysis of the operating costs of electricity versus other fuels for heating in NJ, benefits such as improvements to health and a wealth of new job opportunities, and recommendations for how to achieve the building conversion. To ensure the benefits of BE accrue to all New Jerseyans, the Acadia Report emphasizes that "programs to assist low- and moderate-income households should be a high priority for New Jersey policymakers. The administration and NJ Board of Public Utilities (NJBPU) should direct substantial investments to assist with building weatherization of low and moderate-income households, along with widespread electric-ready measures and electric appliances." It is clear that BE suports the State's goals for GHG reductions as well as improving the air quality in overburdened Environmental Justice communities and must, therefore, be given priority funding, resources and political support.

We, therefore, put forth the following set of recommendations to close this gap.

---

[3] 2019 New Jersey Energy Master Plan: Pathway to 2050, pp.160-161, 2020_NJBPU_EMP.pdf

[4] The Future Is Electric: Helping New Jersey Live in Cleaner, Healthier and More Affordable Homes, Acadia Center, 2022, The Future Is Electric - Acadia Center

Recommendation 1: Establish and announce publicly an initial goal of 100,000 new and retrofit residential building units electrified[5] by 2025 and 800,000 by 2030 as steps toward the NJ EMP goal of 90% electrification by 2050.

The 2030 goal of 800,000 residential housing units – approximately 21% of the 3.6 million individual housing units in both single- and multi-family buildings – would reduce GHG emissions by approximately 2.4 MMT CO2 equivalent. This is about 10% of GHG emissions in the buildings sector (residential plus commercial), which totalled 25.4 MMT CO2 equivalent in 2019.[6] Electrification of a building should include the electrification of its heating, cooling, water heating and cooking.

The goal of 800,000 (and its emissions savings estimate) are based on the 2030 value from the EMP's Least Cost Scenario to meet the 2050 GHG emissions target. It is also consistent with the Acadia Report's recommendations. The Acadia Report states that New Jersey "should set new goals to convert all homes with costly electric resistance, oil or propane heating to electric heat pumps by 2030, as well as at least 20% of homes with fossil gas heating systems."[7] The NJ EMP indicates that "the Least Cost scenario includes electrification of 90% of thermal loads in buildings (i.e., induction cooking, water heating, and space heating) by 2050."

These values also are consistent with the 80 x 50 Report finding that 87% of the residential building sector's GHG emissions are from natural gas, 11% from oil and 2% from propane. In the commercial building sector, it is 82.5% from natural gas with the remainder from fuel oil, gasoline, and propane. The report also states that space heating is the largest end use, followed by water heating and then cooking.

The 2025 interim goal of 100,000 units electrified is much lower than an average annual number required to reach 800,000 by 2030 would dictate. The rationale for being so conservative is that none of the recommendations below for accelerating BE have yet been put into effect. This program will require years of training and promotions and experience to generate momentum before we can reach a goal of converting hundreds of thousands of buildings in a single year. We must start as soon as possible.

Other governments are actively rolling ahead with strong BE measures. For example, in January 2022, New York announced a plan to achieve 1 million electrified homes and 1 million climate-friendly electrification-ready homes by 2030.[8] Massachusetts has an aggressive program for conversion to heat pumps.[9] Minnesota promotes cold climate heat pumps.[10] To reduce its dependence on natural gas, the

---

[5] For this purpose, building electrification is defined to be the use of "cold climate" air source heat pumps (or ground source heat pumps) for space heating, replacing fossil fuel sources including natural gas, propane, and oil heating. This includes conversion of existing resistance electric heating, in both existing and new construction, and the use of heat pump electric water heaters (if installation is technically feasible), heat pump electric dryers, and electric cooktops/stoves.

[6] New Jersey Greenhouse Gas Inventory Mid-Cycle Update Report, February 2021, 2019 projected figures, pp. 5-6; https://www.nj.gov › MCU GHG Inventory 2021

[7] The Future Is Electric - Acadia Center

[8] Governor Hochul Announces Plan to Achieve 2 Million Climate-Friendly Homes By 2030 - NYSERDA

[9] https://www.masssave.com/en/saving/residential-rebates/heat-pump

[10] https://www.mnpower.com/ProgramsRebates/AirSourceHeatPumps

European Union seeks to add 10 million additional heat pump units over the next 5 years for a total of 30 million by 2030.[11]

It is clear that some interim goals need to be established, with reasonable timeframes for implementation, as steps toward the longer-term goal.

Recommendation 2: Establish an aggressive building electrification roadmap by the end of 2022.

As previously stated, there is currently no roadmap to get to New Jersey's 2050 BE goals. Establishing a roadmap with interim goals for 2030 that spell out what must be achieved year by year, and by whom, will be critical to achieving the 2050 goals. This includes the path to net zero energy codes for both new and existing buildings by 2027 at the latest. The roadmap could also cover relevant clean energy and electric vehicle goals. The roadmap also needs to provide mechanisms for tracking and enforcement.

Two steps that are not directly related to BE but are required to achieve maximum GHG reductions and should be included in the roadmap are the following:

- **Move aggressively to achieve 100% clean electricity by 2035.**[12]

  Achieving 100% clean electricity is clearly an essential step on the path to a carbon free future. While it is separate from BE and transportation electrification, it is integral to these goals.

  In June 2021, the NJBPU staff issued "Alternative Resource Adequacy Structures for New Jersey," which stated that policies can be put in place to reach 92% clean energy by 2030 (Figure 15, page 49).[13] Hence, 100% clean energy by 2035 ought to be achievable if the right policies are put in place. A thorough 100% clean electricity roadmap should demonstrate a year by year plan to achieve 100% clean electricity by a target year such as 2040. An early step (for which no public information nor date is currently available) is the committed closure by 2030 of the two remaining dirty coal electric plants in NJ (serving Atlantic City).

- **Require a 30-year Integrated Distribution Plan to ensure sufficient electric grid distribution and reliability through 2050.**

  The NJBPU must require that the Integrated Distribution Plan (IDP) from each state electric utility together ensure sufficient electricity, distribution networks, reliability, and storage needed to support the wave of electric vehicles and building electrification expected in the coming years.

Recommendation 3: Establish much stronger incentives for NJ building electrification, especially for the installation of cold climate heat pumps and building weatherization for energy efficiency. Increase marketing and awareness of the programs.

To accelerate the transition to cleaner options, New Jersey needs to require and provide increased funding for the Electric Distribution Companies (EDCs) to immediately implement increased incentives for cold climate heat pump heating systems and hot water heat pumps. Typically this funding has come from the societal benefits fund managed by the NJBPU. To increase the effectiveness of incentive programs,

---

[11] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM%3A2022%3A108%3AFIN

[12] President Biden's goal of "carbon pollution-free power sector by 2035": https://www.whitehouse.gov/briefing-room/statements-releases/2021/04/22/fact-sheet-president-biden-sets-2030-greenhouse-gas-pollution-reduction-target-aimed-at-creating-good-paying-union-jobs-and-securing-u-s-leadership-on-clean-energy-technologies/

[13] NJ BPU RA Investigation (Final).pdf

the state may choose to transfer responsibility for these programs centrally to the NJBPU. While the four EDCs currently offer financial rebates for BE, they are not large enough to make installing heat pumps cost effective for consumers.[14] [15] [16]

Energy efficiency and weatherization upgrades are crucial for the effectiveness of electric heat pumps and need to be a required element of the programs and also be incentivized more strongly. The EMP's Goal 3.1 includes provisions that these programs be made available statewide in a consistent manner, that there be increased marketing, education and awareness, and that equitable clean energy financing mechanisms be provided that enable greater penetration of clean energy for all customers. We also recommend that the incentives be funneled automatically through vendors so that consumers are not tasked with having the knowledge or submitting paperwork.

These incentives must also factor in additional associated costs, such as the need for upgrades of electrical panels or ductwork, energy efficiency and weatherization upgrades. Incentives should also subsidize a portion of the higher operating costs of electricity in some areas.

New Jersey also needs to remove its substantial incentives for the installation of residential GHG emitting equipment.[17] There is an urgent need to drive consumer choice toward BE now in order to avoid installing more gas appliances that will have to be replaced to meet our GHG goals. The current incentives send mixed messages and may fail to make heat pumps more cost effective than dirty alternatives.

Large incentives for heat pumps have worked in other states in the northeast. For example, according to the Acadia Report, Maine offers a $1,200 rebate for heat pump installation plus a bonus of $1,200 for low-income customers, and as a result has installed over 100,000 heat pumps in the last seven years, reaching more than 4% of the housing stock each year. New Jersey is far behind other states in incentives and rebates offered and heat pump installations achieved.

Importantly, the NJBPU needs to make the utility Energy Efficiency (EE) filing a more open and public process as opposed to the standard adjudicatory process followed in rate cases. While such an adjudicatory proceeding is appropriate when determining overall rate, reliability or resiliency issues, EE filings should not be limited to just Rate Counsel and large energy users that can afford the legal representation required in proceedings. This significantly limits the ability of organizations that have an expertise in EE from providing input and skews the outcome of the final decision of the filing.

The NJBPU should make public monthly data from all the utilities on the progress of their EE programs, including all natural gas rebates/incentives and building electrification rebates/incentives for heat pumps. Currently, there is no data being shared on the performance of the utilities and their EE programs.

---

[14] A private HVAC quote obtained for mini-split "cold climate" heat pump installation (well-known name brand) is much greater than the small New Jersey incentives indicated for 2022. It is estimated the NJ incentives are less than 15-20% of an anecdotal lowest job cost, excluding other potential expenses such as electrical panel upgrades and/or ductwork.

[15] https://residential.energysavenj.com/jersey-central/products/

[16] https://homeenergy.pseg.com/heatingandcooling

[17] For example, New Jersey Natural Gas offers a $750 rebate for installing GHG emitting gas furnace equipment as of 3/20/22.

Finally, the marketing and education of BE programs needs to include accurate information to counter public dis- and misinformation about the costs and benefits of BE. At present, there seems to be little knowledge or education about the benefits of heat pumps or BE among the public at large or even among most HVAC industry personnel.

It is vital to the success of "zero energy ready" and "net zero" programs for new construction, gut rehab or utility replacement that NJ provides an educational website for both the public at large and HVAC personnel. It is important for a homeowner to understand the advantages of electrification and new technologies such as heat pumps and for HVAC personnel to provide the appropriate equipment options. A customer friendly website would provide clear documentation with concise and useful links covering all essential elements such as the variety of heat pumps available, comparative advantages, financing sources, and incentives. This documentation would be particularly useful in the case that NJ A1440 becomes law without strengthening amendments because in its present form the Bill currently leaves "zero energy ready" as an option and not a legal mandate (See sections 3, 4). It currently does not state a date with any legal mandates, although this may evolve as the electrification codes for extant homes is clarified and sufficiently detailed (See section 7.5). Therefore, the website needs to be a compelling educational tool. Maine's website is an example of a thorough and user friendly site: https://www.efficiencymaine.com/about-heat-pumps/. Another example is New York City's https://comptroller.nyc.gov/services/for-the-public/nyc-climate-dashboard/overview/. In its present form, NJ A1440 assigns the task of creating and maintaining a website to the Department of Community Affairs.

Recommendation 4: Set strong building electrification residential and commercial building codes for new construction, retrofitting and remodeling. At a minimum, adopt the ICC 2021, 2024 and 2027 building energy codes with no weakening amendments.

As they are updated, building codes need to be strengthened to support net zero energy goals for both new and existing buildings. The EMP Goal 3.3.1 states, "Advocate for net zero carbon buildings in new construction in the upcoming 2024 International Code Council (ICC) code change hearings." It explains that "NJ Department of Community Affairs (NJDCA) adopts updated ICC building codes into the state's Uniform Construction Code (UCC) on a 3-year cycle. To the extent that the ICC remains aggressive in establishing building codes to tighten the thermal envelope of new construction, and assuming NJDCA successfully adopts the ICC codes in full, NJ will naturally adopt the established international codes for every 3-year cycle." The EMP goes on to give the example of California, which recently mandated net zero carbon buildings in which the property is built to the most efficient standards, offsets some or all of its energy demand (e.g., with solar), and connects to a clean power grid for the rest of its energy. The supposition is that this will drive industry trends in several states, including NJ.

The Acadia Report, likewise, calls for the following: "By 2027, adopt a zero-energy building code for new and existing buildings using a public stakeholder process." The Acadia Report also recommends that before that date, statewide stretch codes be modeled to call for better energy efficiency, electrification, and renewable energy interconnection that municipalities could adopt. These might be considered pilot applications of the more stringent code provisions. As a first step, the NJDCA should allow municipalities to adopt BE and green building codes, including zero energy building codes. The process with specific steps for strengthening the building codes needs to be included in the BE roadmap.

We strongly recommend that the UCC require net zero energy-ready in the 2024 code and net zero energy in the 2027 code for all new construction, retrofits and significant remodeling.

Recommendation 5: Require state, local and county governments and agencies to electrify government buildings in the next few years and provide them funding to do so.

State and local government entities need to lead by example in order to achieve the State's objectives and provide leadership to the rest of the population. Therefore, we call for a strong NJ statewide program of aid to state and local government agencies to electrify their buildings, specifically by deploying cold climate or other highly efficient heat pumps for heating and hot water throughout the state.

This might start with pilot programs but needs to quickly ramp up to full scale statewide implementation.

Recommendation 6: Ensure that the 3300 affordable housing units that Gov Murphy has proposed subsidizing are built to high efficiency standards and use all-electric heat pump technology.

Gov Murphy's proposed budget would subsidize the construction of 3300 new affordable housing units using $305 million of COVID rescue funds. These should be built to all-electric, Zero Energy Building specifications to eliminate the need for conversion later and avoid stranded assets, consistent with the EMP's Goal 3.3.4, "Build state-funded projects and buildings to a high performance standard."

Clean, electric appliances improve air quality and safety in our communities, lower energy bills, use local clean energy resources, and help mitigate the worst impacts of climate change. The health benefits of electric appliances over those powered by gas are substantial. Fossil fuel combustion in buildings is a significant contributor to both indoor and outdoor air pollution and adverse health outcomes in New Jersey, particularly in low-income communities and communities of color. This would be a very cost-effective way to demonstrate leadership in BE.

This approach also leverages the EMP Objective 4.1.2, "Partner with private industry to establish electrified building demonstration projects." If this were paired with increased incentives as per our Recommendation 3, undertaking the projects would be attractive and compelling for developers.

Fully electrifying these new affordable housing units can showcase NJ's commitment to its climate mitigation goals, and be a proof-of-concept that building electrification using the latest technology is possible while providing energy cost savings to residents.

This Position Paper is authorized by the NJ 50 x 30 (50% GHG reduction by 2030) Building Electrification Team.

Steve and Pat Miller, Co-Leaders, stevemiller@comcast.net patmiller@comcast.net