Final Report

Massachusetts Commission on Clean Heat

November 30, 2022

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Letter from the Secretary

For generations, Massachusetts has led the nation in taking action on environmental issues, such as protecting and expanding access to our natural resources, and more recently, addressing the impacts of climate change. The Commonwealth's residents have long held a deep appreciation of our shared environment, and since taking office in 2015, the Baker-Polito Administration has prioritized the implementation of initiatives and programs that are both effective and equitable with a focus on providing benefits to the state's residents and businesses. The Administration also made the commitment to invest $1 billion in climate spending by 2022. Through the Executive Office of Energy and Environmental Affairs and its agencies, critical funds have been utilized in a variety of meaningful priorities, such as energy savings, efficiency, and emission reduction programs and projects. Importantly, in April 2021, we reached this significant milestone.

Furthermore, in September 2021, Governor Baker signed Executive Order 596 to establish the first-in-the-nation Commission on Clean Heat. The members of this Commission are a diverse group of respected professionals and stakeholders, who have worked diligently to identify the challenges of decarbonizing building heat, understand different viewpoints in finding solutions, and develop strategies to remove barriers for addressing these challenges. The recommendations identified in this report will help inform the Commonwealth of several strategies and policies that aim to achieve deep emissions reductions from heating fuels in the state.

The Commission on Clean Heat serves as a great example of Massachusetts' forward thinking approach to reduce greenhouse gas emissions. The Baker-Polito Administration has implemented key policies, programs, and initiatives that have moved Massachusetts forward in its pursuit to achieve the state's ambitious decarbonization goals and reach Net Zero in 2050. These efforts include the development of the 2050 Decarbonization Roadmap, which is a detailed analysis of pathways to Net Zero emissions; the release of the Massachusetts Clean Energy and Climate Plan for 2025 and 2030, which provides a comprehensive and wide ranging approach to achieve the state's emission reduction goals in the near term; and ongoing support of the state's burgeoning clean energy industry, such as providing numerous grants, resources, and technical services, as well as the advancement of four commercial offshore wind projects at various stages of approval and construction that will ultimately provide enough clean energy to power approximately 1.7 million homes.

As the Commonwealth continues to pursue the decarbonization of the state, it is critical that we foster strong partnerships and lean on the expertise of Massachusetts' diverse stakeholders to ensure an affordable and equitable transition takes place.

Sincerely,

BETHANY A. CARD
Secretary of Energy and Environmental Affairs

Executive Summary of Commission on Clean Heat Recommendations

To comply with Massachusetts law and achieve net zero greenhouse gas emissions by 2050, the Commonwealth needs to rapidly scale up decarbonization efforts within the residential and commercial buildings sector. Achieving the required building sector sublimits will involve a dramatic transition and participation by a wide range of actors, including single family residential homeowners, large multifamily landlords and tenants, environmental justice populations, frontline communities, real estate developers, small business owners, large corporations, nonprofits, manufacturers, utilities, home improvement and HVAC contractors, researchers, state agency leadership and staff, lawmakers, municipal gas and electric companies, and municipal officials.

Coordinated actions will need to occur across multiple fronts: scaled-up incentive programs, new and revised regulations, public outreach and awareness campaigns, innovative climate finance, workforce development, investments in affordable housing and low-to-moderate income communities, research and development, coordinated utility planning, and more. These actions must result in a strategic redirection of both public and private funds away from fossil fuels, allowing the Commonwealth and its businesses and residents to invest in the clean heating and cooling technologies that are essential to achieving net zero in Massachusetts. There will be cost impacts across the sector, but also benefits to public health, safety, workers, the economy, and the quality of the Commonwealth's building stock. It will be particularly critical to ensure low-to-moderate income households and environmental justice populations are provided the opportunities and resources to be first in line to receive the benefits associated with clean heating and cooling technologies, without shouldering additional energy cost burdens.

Fortunately, Massachusetts has a strong foundation to build upon in navigating this transition, including public support for climate action, strong leadership, a highly skilled and adaptable workforce, a strong economy, and a clearly defined decarbonization pathway. Now, we must do the challenging but essential work of implementing additional nation-leading policies and programs by which to achieve them.

The Commission on Clean Heat is grateful for the opportunity to advise the Governor and Secretary of Energy and Environmental Affairs on ways to achieve the building sector sublimits by advancing and accelerating the adoption of clean heat across Massachusetts. In response to Executive Order Number 596: Establishing the Commission on Clean Heat, the Commission on Clean Heat offers the following recommendations reflecting the consensus of the Commission as a whole. The recommendations are presented in four sections: 1) Context, 2) Cross-Cutting Recommendations, 3) Recommendations for Regulatory Frameworks for Long-Term Greenhouse Gas Emission Reductions, and 4) Recommendations for Accelerating the Deployment of Energy Efficiency and Clean Heating Technology.

Context

Achieving a Net Zero Future

To achieve net zero by 2050 in a manner that improves equity, public health, safety, and resilience while minimizing the overall costs of the transition, the Commonwealth's building sector must undergo a dramatic transformation across new and existing buildings involving energy efficiency, weatherization, and clean heating technologies. By 2050, the vast majority of buildings will use high-efficiency electric

appliances for heating, cooling, cooking, and hot water, alongside upgrades to energy infrastructure to align with broadly electrified end uses. The general parameters of this equitable and cost-efficient net zero future should guide the Commonwealth's present and ongoing planning and investments. To that end, the Commission recommends the Commonwealth transition away from investing in infrastructure that is out of alignment with the trajectories laid out in the Massachusetts Clean Energy and Climate Plans (CECPs) and the Massachusetts 2050 Decarbonization Roadmap (the "2050 Roadmap") as soon as possible, accounting for regional constraints and risks. Investments that would support new or increased natural gas infrastructure or capacity should instead be deployed to advance measures that help support the net zero future. Investments in maintaining the safety and reliability of existing natural gas infrastructure should be made within the context of the shift toward electrification.

In addition, the Commission recognizes that there needs to be a rapid decline in the proportion of new heating equipment powered by fossil fuels. Commissioners have expressed strong opinions on whether the Commonwealth should design a clear schedule for prohibiting new fossil fuel equipment sales or installations in both new construction and existing buildings. Across these perspectives, there is consensus among Commissioners that an appropriate next step is for the Administration to actively monitor and report out on building decarbonization progress against the fossil fuel heating equipment metrics identified in the CECPs and 2050 Roadmap and integrated into the building sector sublimits. This analysis should include assessing whether the Commonwealth's programs and policies are appropriately equipped to advance necessary progress and/or whether establishing an enforceable schedule for phasing out new fossil fuel equipment in new and existing buildings may be necessary to achieve the required greenhouse gas reductions.

Constraints and Contingencies

The Commonwealth's success in decarbonizing the building sector will depend on the pace of progress within other sectors, in particular energy supply. It will be critical to expand the supply of clean energy and capability of the grid over the long-term to reduce emissions from the power sector, ensure the capacity of the system to handle the resulting load growth, and ensure the resilience of the grid in the face of increasingly frequent extreme weather events. Although it is not within the Commission's mandate to address the electric sector transition in any depth, it is critical to highlight that achieving deep emissions reductions in the building sector will depend on the continued success of investments in clean energy generation and improvements to the electricity transmission and distribution systems. Policymakers should pursue solutions and investments in the energy supply space alongside those in the buildings space with due urgency.

Cross-Cutting Recommendations

Resourcing the Transition

Currently, Mass Save® provides most of the funding for state programs related to building decarbonization through ratepayer funding. While current Mass Save incentives are significant and reasonably scoped for near-term adoption, the Commission anticipates that these incentives will not be sufficient to inspire the broad, cross-sector change needed to meet our emissions reduction requirements and equity goals in the coming decades. Additional programs, resources, and reforms, including reconstituting Mass Save under a new Building Decarbonization Clearinghouse, will be needed

to support the market transformation that is required for meeting building sector sublimits in as cost-efficient and equitable a manner as possible.

To resource the transition appropriately, efficiently, and equitably, it will be critical to:

- Implement a Clean Heat Standard to establish overall incentives at the appropriate level to meet required sublimits without adding to electric ratepayer costs.
- Avoid future investments in and strategically retire gas infrastructure to reduce total costs.
- Re-envision how ratepayer funding currently funneled through Mass Save is deployed and allocated, through new and modified program structures.
- Maximally leverage available federal dollars and appropriate private sector investments.
- Significantly increase funding for early investments in innovation, workforce development/training, consumer education, and market development as soon as possible.
- Acknowledge the need for substantial incentives over time, to send appropriate signals to consumers and suppliers.
- Provide resources to enable stakeholders who are reliant on fossil fuel to equitably transition to new opportunities that are aligned with the Commonwealth's net zero future, and to provide clear and consistent market signals around the need to adapt.
- Staff and resource programs in accordance with the scale of programming that will actually produce the pace of change required by emissions targets.
- Embed climate, public health, equity, resilience, emergency response, and other clearly definable societal impacts into upstream evaluation criteria and funding allocation decisions.

Equity

The Commission recommends the Commonwealth adopt the following core principles and practices to inform the design of all building decarbonization program and policy initiatives:

- Ensure robust community engagement and representation in decision-making: Raise community awareness of program opportunities and leverage local knowledge around community needs, interests, and best practices to improve program design and implementation.
- Focus on program implementation and outcomes: Ensure environmental justice populations and low-to-moderate income households are first "in line" for the transition to cleaner, healthier, and safer clean energy technologies.
- Deeply embed equity within program design: Include equity principles, practices, and benchmarks within upstream program frameworks, mandates, and evaluation metrics.
- Prioritize specific equity-based metrics: Focus specifically on household energy burden and health impacts.
- Utilize equity-informed program approaches: Ensure program access is as simple, quick, transparent, and seamless as possible; prioritize minority- and women-owned business enterprises; and ensure program offerings include necessary enhancements for environmental justice populations and low-to-moderate income households, and funding to address building condition barriers to implementing decarbonization measures.

Institutional Coordination and Alignment

For the transition to a decarbonized buildings sector to move at the pace and scale necessary for achieving the building sector sublimits, the Commonwealth will need to improve coordination among the actors essential to achieving building emissions reductions and increase the efficiency and impact of

its programs and investments. Achieving these goals will require reorganizing and recalibrating existing authorities, processes, and program structures to ensure the Commonwealth can implement them effectively, guide other actors, and serve end users. The Commonwealth's various decarbonization programs and policies must reinforce each other and be targeted to fill specific needs within an overall, coherent, cross-functional, and cross-agency decarbonization strategy and timeline that is aligned with the Commonwealth's vision for achieving net zero.

The Commonwealth's planning, investments, incentive programs, and regulatory frameworks must all encourage activities designed to lead to the cost-efficient, equitable net zero future the Commonwealth has defined, and will continue to refine, in its decarbonization studies and Clean Energy and Climate Plans. Broadly speaking, the Commonwealth needs to move from a "program-centric" to a "customer- and project-centric" approach in administering its various program offerings and ensure that all programs and policies are aligned towards supporting the same overarching decarbonization goals and trajectory. Residents, businesses, and contractors should not be asked to navigate multiple programs, identify those that may be relevant to their needs, and separately apply to each. Instead, building owners, residents, and developers should have a single point of contact empowered and resourced to help them seamlessly navigate and access program offerings. As part of this effort, the Commission strongly recommends that the Administration, working in conjunction with the Legislature, continue to reform Mass Save to ensure it aligns with the Commonwealth's decarbonization needs and building sector sublimits as swiftly as possible and reconstitute it under a new Building Decarbonization Clearinghouse.

Recommendations for Regulatory Frameworks for Long-Term GHG Emissions Reductions

Massachusetts Clean Heat Standard

The Governor and Secretary should direct the Massachusetts Department of Environmental Protection (MassDEP) to initiate a regulatory process to establish a Massachusetts Clean Heat Standard, with a stakeholder process to begin immediately. Designed to meet the building sector sublimits, the Clean Heat Standard can be a powerful tool for creating a new market for clean heating solutions by incentivizing obligated parties to deliver cleaner heating technology, electrify our building stock, increase building efficiency, and move away from fossil fuels. Implementation of a Clean Heat Standard should be pursued as expeditiously as possible to support meeting 2025 and 2030 building sector sublimits. MassDEP should begin a regulatory process by spring of 2023, with the objective of implementing a Massachusetts Clean Heat Standard by 2024 or as soon as feasible.

Joint Energy System Planning

The Governor and Secretary, working with the Legislature as necessary, should direct the Department of Public Utilities (DPU) and the Department of Energy Resources (DOER) to conduct statewide joint energy system planning across Massachusetts' gas and electric utilities and municipal gas and electric companies, and in conjunction with key stakeholders and communities. This joint planning is intended to ease the transition from gas to electric heating by identifying geographic priorities for investment in and/or strategic retirement of energy infrastructure; working with municipalities, residents, and businesses to identify and target necessary infrastructure investments; and developing regional or community-scale efforts to accelerate adoption of appropriate building heating technologies and

distribution systems. DPU and DOER should work with key stakeholders to pilot this work beginning immediately. The first Joint Energy System Plan should be in place by 2025.

Analysis on Phasing Out New Fossil Fuel Heating Systems

The Governor and Secretary should direct the Department of Energy Resources, the Massachusetts Department of Environmental Protection, and the Department of Public Utilities to develop and implement a structure for continual analysis and reporting on fossil fuel equipment metrics, and analyze and report out to the Secretary on the potential design and associated risks and benefits of a policy that seeks to establish an enforceable schedule for phasing out new fossil fuel heating systems in the Commonwealth. The goal is to ensure that decision-making is based in sound data and analysis and any actions to prohibit new fossil fuel equipment accounts and plans for the variety of potential risks and benefits. While Commissioners have different perspectives on the advisability of adopting an enforceable schedule or not in the near term, they strongly agree both on the value of sound data and analysis to inform effective decision-making and planning and on the need for the Administration to actively consider and resolve critical questions on the appropriateness and feasibility of a prohibition on new fossil fuel equipment as quickly as possible. Analysis and stakeholder engagement should begin in earnest in 2023. The Administration should release a public report on the progress and results of its engagement and analysis by the end of 2025 and at additional intervals as appropriate.

Electric Operating Cost Reductions

The Executive Office of Energy and Environmental Affairs (EEA) and its agencies should evaluate opportunities for addressing the operating costs barrier to the adoption of clean heating technologies, such as air-source heat pumps. This effort should include an evaluation of near-term programs or credits to help defray costs for those that face additional operating costs from electrification, particularly in low-to-moderate income households, and an evaluation of cost-reflective rate structures that can encourage conservation and reduce consumers' costs of operating electric heating systems. EEA and DOER should evaluate opportunities to reduce operating costs in the near-term and seek necessary authorizations within the next legislative funding cycle, and DPU should launch an examination of existing rate drivers as soon as possible.

Recommendations for Accelerating the Deployment of Energy Efficiency and Clean Heating Technologies

Building Decarbonization Clearinghouse

The Administration, in partnership with the Legislature, should continue to reform Mass Save to align with the Commonwealth's decarbonization needs and building sector sublimits and reconstitute it under a new Building Decarbonization Clearinghouse. The intention behind the Clearinghouse is to drive building decarbonization in the Commonwealth and serve as an umbrella for all applicable incentive programs, funding sources, and technical assistance. The Clearinghouse should become a public "one-stop shop" to support Massachusetts building owners, residents, and businesses in evaluating, selecting, and implementing building systems and projects that accelerate the reduction of greenhouse gas emissions and improve the quality of the building stock. The Clearinghouse should create a single point of contact for all building decarbonization programs and help ensure Massachusetts building programs

are administered in a manner that both advances equitable decarbonization efforts and is understandable and accessible to consumers.

The Commission also strongly suggests that the Mass Save structure is not suited to leading decarbonization efforts in the Commonwealth, and its programs cannot independently achieve the pace and scale of transformation necessary. The Administration should examine Mass Save's current authority, structure, and programs in light of the 2025/2030 and 2050 Clean Energy and Climate Plans and develop a set of legislative, regulatory, and executive recommendations for amending the program to better equip the Commonwealth to deploy ratepayer funding in support of building decarbonization and electrification, with the near-term objective of locating a reconstituted Mass Save under the Clearinghouse's umbrella. EEA, DOER, and the Massachusetts Clean Energy Center (MassCEC) should begin immediately collaborating on additional Mass Save reforms and the design of the Clearinghouse and should conduct the necessary analysis to support further legislative changes to integrate with and influence the Massachusetts' Three-Year Energy Efficiency Plans for 2025 and 2028.

Climate Bank

The Administration, in partnership with the Legislature as needed, should establish a Massachusetts Climate Bank to facilitate the provision of affordable capital in support of the clearly established goals and requirements of the Commonwealth's building decarbonization programs. A Climate Bank can help expand the scale and breadth of financing available for building decarbonization projects that align with the Commonwealth's long-term goals. There should be a rapid setup for the Climate Bank in the coming months and coordination across the change in Administrations to ensure the opportunity to access Inflation Reduction Act funding for green banks. The Climate Bank should be closely integrated with the Building Decarbonization Clearinghouse to ensure seamless program design and implementation.

Strategies for Decarbonizing the Affordable Housing Sector

The Governor and Secretary should bring together stakeholders to develop a cross-sector strategy to accelerate the decarbonization of subsidized affordable housing across the Commonwealth, and to serve as an action team to develop and deploy decarbonization-focused tax credits and incentives through the Climate Bank, Clearinghouse, and otherwise. The objective is to increase the supply of decarbonized affordable housing by bringing additional resources into the sector, and to coordinate, improve, and further align existing programs with decarbonization goals. The immediate focus could be on identifying opportunities to encourage decarbonization retrofits more effectively now and in the future, while effectively managing costs. The Governor and Secretary should direct the Executive Office of Energy and Environmental Affairs, the Executive Office of Housing and Economic Development (HED), the Clearinghouse, or other entities to convene state housing finance agencies and other key stakeholders as soon as possible.

Workforce Training and Education

The Administration should expand and support workforce development programming to address gaps in Massachusetts' decarbonization workforce. The Commonwealth should provide programs and funding support that are tailored to our state's building decarbonization needs and that span educational opportunities to attract workers of all ages. Market forces on their own may not be sufficient to incentivize the rapid labor market growth needed to meet emissions targets. The goal is to ensure that

Massachusetts has the workforce necessary to deliver its building transition and that workers are poised to benefit from the new career pathways and opportunities available as part of an equitable clean heating transition.

Research and Development

The Commission recommends conducting research, developing best practice guidance and case studies, and setting standards to fill existing knowledge gaps with respect to the decarbonization of the building sector in Massachusetts. The goal is to proactively identify and address gaps in building decarbonization feasibility, and to share data and information to advance further research and development. Research and development should build on the MassCEC's innovation, tech development, and market development work.

Public Outreach and Awareness

The Administration should implement a state-wide public outreach and awareness campaign with various targeted audiences, including landlords, architects, developers, installers, homeowners, and renters. The objective is to develop clear and concise messaging to engage diverse populations to increase awareness of Massachusetts' commitment to a building sector transition, the role of individual actors in achieving this transition, and the benefits of clean heat solutions. A successful information campaign will help to build momentum and accelerate customer adoption. Reporting success stories about adoption and usage can then drive more momentum. EEA should immediately identify existing resources, needs, and gaps for public awareness, including the scale of public outreach needed to align with decarbonization goals, how Mass Save efforts help address this need, and what level of financial resources are needed to meet these goals. By early 2023, the Administration should commit financial resources to bolster existing efforts and finance the development and launch of new efforts.

Expand Green Communities and Leading by Example

The Administration should expand the Green Communities program and DOER's Leading by Example program to effectively utilize state, municipal, and institutional (e.g., university) building stock to showcase the benefits of decarbonization measures. The goal is to leverage public building stock to reduce emissions and demonstrate the positive impact of building decarbonization measures. Program elements should include specific guidelines, additional dedicated funding to support demonstration projects, public messaging and experience-sharing, and a potential focus on school buildings.

Building Benchmarking

The Department of Energy Resources, in conjunction with the Legislature, as needed, should develop and implement a Commonwealth-wide building benchmarking and labeling program to increase transparency on building emissions profiles and encourage building retrofits that improve climate, health, and economic outcomes across Massachusetts' building stock. The goal is to increase awareness among prospective building owners, buyers, and renters on the relative emissions performance of their buildings to incentivize investments in energy efficiency and greenhouse gas reductions.

I. Introduction

Massachusetts has continued to demonstrate national leadership on climate change by setting an ambitious trajectory for building decarbonization by 2050. As required by the Global Warming Solutions Act of 2008 (GWSA) and the Act Creating a Next-Generation Roadmap for Massachusetts Climate Policy (2021 Climate Law), the Executive Office of Energy and Environmental Affairs (EEA) set sector-based sublimits for Residential and Commercial Building Sector Emissions in the Massachusetts Clean Energy and Climate Plan for 2025 and 2030 ("2025/2030 CECP"). These limits require a 28% reduction from 1990 level in 2025 and a 47% reduction from 1990 level in 2030 and represent declines in greenhouse gas (GHG) emissions associated with the use of heating fuels. For comparison, in 2020, the most recent year for which the Massachusetts Department of Environmental Protection (MassDEP) has calculated gross emissions by subsector, emissions for the residential and commercial buildings sector were 18% below 1990 levels.

To comply with Massachusetts law and achieve net zero greenhouse gas emissions by 2050, the Commonwealth needs to rapidly scale up decarbonization efforts within the residential and commercial buildings sector. Given the complexity and diversity of the Massachusetts buildings sector, a reduction of 47% by 2030 represents a dramatic and rapid transition, well beyond anything experienced in the sector to date. The Commonwealth anticipates that achieving this reduction will require an additional 500,000 residential homes and roughly 300 million square feet of commercial buildings to utilize energy-efficient electric heating by 2030. In the residential sector, this is estimated to require an average of 20,000-25,000 installations a year ahead of 2025, ramping up to 80,000 a year in the latter half of the decade, and over 100,000 per year thereafter. More than 200,000 existing residences will need to undergo building shell upgrades from 2020-2030, scaling up to an additional 1.3 million residences from 2030-2050.[1]

Additionally, current analysis shows that achieving this level of transformation will necessitate a significant reversal in the portion of heating equipment sales allocated to fossil fuel space heating versus energy-efficient electric space heating, shifting from 75% fossil fuel and 25% electric sales today, to 25% fossil fuel and 75% sales electric by 2030, and nearly 95% electric sales by 2035. Commercial sales analysis shows a similar transformation, with electric heat accounting for 35% of sales in 2025, 50% in 2030, and 75% in 2035.[2] This transformation is intended to ensure fossil-based heating systems reach the end of their useful lives and homes and businesses are no longer utilizing fossil fuels for heating in the 2040s. Reaching this level of near-term adoption of modern clean heating systems, coupled with energy efficient retrofits, will require participation by a wide range of actors, including single-family residential homeowners; large multifamily landlords and tenants; environmental justice populations; frontline communities; real estate developers; small business owners; large corporations and nonprofits;

[1] Publicly available data from the Massachusetts Clean Energy and Climate Plan for 2025 and 2030, 30 June 2022, found at www.mass.gov/info-details/massachusetts-clean-energy-and-climate-plan-for-2025-and-2030. Relevant charts are available in the Appendices to the Massachusetts Clean Energy and Climate Plan for 2025 and 2030, 30 June 2022,p. 13, Figure A.6, found at www.mass.gov/doc/appendices-to-the-clean-energy-and-climate-plan-for-2025-and-2030/download. Please check the Massachusetts Clean Energy and Climate Plan for 2050 web page, www.mass.gov/info-details/massachusetts-clean-energy-and-climate-plan-for-2050, for potential data updates and displays.

[2] Relevant charts depicting this data are available in the Appendices to the Massachusetts Clean Energy and Climate Plan for 2025 and 2030, p. 13, Figure A.6. Please check Massachusetts Clean Energy and Climate Plan for 2050 web page for potential data updates and displays.

manufacturers; utilities; home improvement and heating, ventilation, and air conditioning (HVAC) contractors; researchers; state agency leadership and staff; lawmakers; municipal gas and electric companies; and municipal officials.

Initiating and scaling up decarbonization initiatives across this range of actors will present significant political, administrative, and policymaking challenges, especially in the current context of escalating energy costs and a potential upcoming economic slowdown. Entrenched barriers to the transition include a heterogenous building stock, high housing costs, a limited workforce with experience in decarbonization design and installation, infrequent replacement cycles of building systems and equipment (and prevalence of replacement at the point of failure), existing socioeconomic and racial inequities, the upfront capital costs of energy efficient electric heating equipment and installations, the complexities of government program implementation and coordination, and the real and perceived relative costs of fossil fuels and electricity. Additionally, while climate change continues to grow as an issue of public concern, there is a critical need to improve public awareness of effective building transitions and the role individual decision-makers play in achieving our collective goals.

Overcoming these barriers and achieving our building sector sublimits will require coordinated action at a wide scale and highly accelerated pace. It will involve a large-scale, strategic recalibration and redirection of government funding and private sector resources away from fossil fuels, allowing the Commonwealth and its businesses and residents to invest in the clean heating and cooling technologies that are essential to achieving net zero in Massachusetts. Coordinated actions will need to take place across multiple fronts: scaled-up incentives programs, new and revised regulations and standards, new legislation, public outreach and awareness campaigns, innovative climate finance, workforce development, investments in affordable housing and low-to-moderate income (LMI) communities, research and development, coordinated energy system planning, and more. In a sector as complex as Massachusetts buildings, it will be critical to track progress, identify program shortcomings, and expand upon the successes of existing and future decarbonization initiatives in a process of continuous learning and review.

Remaking the building sector will involve changes that impact stakeholders across the Commonwealth in myriad ways, both positive and negative. There will be very real burdens associated with this transition, and the Commission has sought to provide guidance on ways to mitigate and appropriately distribute these burdens as part of our recommendations. Nonetheless, the scale and complexity of the efforts necessary to meet emissions goals will strain the capacities of government actors, the private sector, and the Commonwealth's workforce as they seek to innovate and adapt their programs, business models, and skills in line with the pace of change required. There will be cost impacts to building owners, industry, ratepayers, and taxpayers who must reallocate their energy dollars, pay for decarbonization measures and support the development of a right-sized, clean, smart, and resilient electric grid. These costs may be especially acute among businesses, consumers, and workers for which there are no good alternatives to the use of fossil fuels.

Alongside these burdens, however, there will be significant benefits and opportunities. There will be clear benefits to the Commonwealth and the New England region of lower greenhouse gas emissions and other pollutants to help mitigate the effects of climate change and enhance our public health. Beyond these, the Commission believes the transition to a clean heat economy presents an enormous opportunity for the Commonwealth to invest in its economy and workforce. A transition of buildings to higher efficiency and electrification has been identified as the most cost-effective decarbonization

pathway in the Commonwealth's 2050 Roadmap.[3] By supporting this transition, Massachusetts can become a national leader for the clean heat economy, hosting thousands of new, cutting-edge clean energy jobs, developing and attracting skilled workers, and enabling the development of innovative and successful local businesses. By acting aggressively now, the Commonwealth can maximize its ability to attract federal dollars through the Inflation Reduction Act (IRA) and other sources, representing unprecedented levels of potential investment. The transition presents an opportunity to significantly improve the quality of the Commonwealth's building stock through weatherization, reduce reliance on imported fossil fuels, and transition end uses to the electricity sector, which is inherently more stable.[4] It will also bring substantial health benefits through reductions in indoor air pollution and increased access to air conditioning, among other factors, resulting in a reduction of premature deaths, improved quality of life, and lower healthcare costs.[5]

Critically, the impact of the transition on LMI households and environmental justice (EJ) populations is uncertain and could vary depending on how policies and programs are designed and implemented. It will be critical to ensure LMI households and EJ populations are provided the opportunities and resources to lead in the transition and are first in line to receive the benefits of lower energy bills, better health, and improved comfort.

The costs of inaction or delay are also important to consider. These costs include more GHG emissions and the need for a faster, later, and more costly transition. If we delay implementing needed policies and programs, the scope of the net zero challenge will increase. There will be more new construction built to outdated standards that must be retrofitted, more gas infrastructure that must be paid for and then strategically retired, more challenges planning and managing costs for the necessary electricity infrastructure buildout, less time to stand up and design effective programs, and less ability for the Commonwealth to leverage its status as a climate leader to attract federal and private investments, create jobs, and build a competitive clean heat economy.

Fortunately, Massachusetts has a strong foundation to build upon in navigating this transition. The Commonwealth has long been a leader on climate action, there is public support for implementing policies and programs to address this issue, and our public and private sector leaders have consistently demonstrated their commitment to doing what is necessary. We are home to a highly skilled and adaptable workforce, our economic performance is strong, and we have developed a clear pathway for decarbonization. Now, we must do the challenging but essential work of implementing additional nation-leading policies and programs by which to achieve them.

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[3] Massachusetts 2050 Decarbonization Roadmap, Dec. 2020, found at www.mass.gov/doc/ma-2050-decarbonization-roadmap/download.

[4] Melodia, Lauren and Karlsson, Kristina, "Energy Price Stability: The Peril of Fossil Fuels and the Promise of Renewables," Roosevelt Institute Issue Brief, May 2022, found at rooseveltinstitute.org/wp-content/uploads/2022/05/RI_EnergyPriceStability_IssueBrief_202205.pdf.

[5] Massachusetts 2050 Decarbonization Roadmap: Economic and Health Impacts Report, Dec. 2020, found at www.mass.gov/doc/economics-and-health-impacts-report/download; Gillingham, Kenneth T. et al., "The climate and health benefits from intensive building energy efficiency improvements," *Science Advances*, 20 Aug. 2021, found at www.ncbi.nlm.nih.gov/pmc/articles/PMC8378816/; Tonn, Bruce et al., *Health and Household-Related Benefits Attributable to the Weatherization Assistance Program*, Oak Ridge National Laboratory, Sept. 2014, found at weatherization.ornl.gov/wp-content/uploads/pdf/WAPRetroEvalFinalReports/ORNL_TM-2014_345.pdf.

II. Clean Heat Commission Mandate and Process

A. Commission Mandate

Pursuant to Governor Baker's Executive Order Number 596: Establishing the Commission on Clean Heat (the EO), the Commission was convened in January 2022 and charged with providing a set of policy recommendations to the Governor to meet requirements of the GWSA, particularly with respect to emissions from heating fuels. The Commission was to be chaired by the Secretary of Energy and Environmental Affairs, or her designee, and include members reflecting a diversity of perspectives and backgrounds from outside stakeholders including representatives from the fields of affordable housing, energy efficiency building design and construction, healthcare, heating system design and technology, real estate and heating fuel distribution. Judy Chang, Undersecretary of Energy and Climate Solutions for Massachusetts, was designated as the Commission Chair, with responsibility for convening Commission meetings. The full Commission membership can be found in Appendix A.

The EO mandated that the Commission's policy recommendations should sustainably reduce the use of heating fuels and minimize the GHG emissions from buildings while ensuring the costs and opportunities arising from such reductions are distributed equitably. This involved the Commission developing:

- A framework for long-term greenhouse gas emission reductions from heating fuels, consistent with the findings of the Massachusetts 2050 Decarbonization Roadmap and the total emissions limits and sublimits for the Commonwealth established pursuant to the GWSA.
- Options to accelerate the deployment of energy efficiency programs and clean heating systems in new and existing buildings and transition existing distribution systems to clean energy.
- Financing mechanisms, incentives, and other regulatory options.
- Explanation of anticipated burdens and opportunities for the Commonwealth's businesses and residents.

The EO further mandated that the Commission develop these recommendations for submission to the Governor by November 30, 2022, with consideration of various benefits of the recommended policies to Massachusetts, as well as affordability, regional differences, equity, and costs.

B. Commission Process

The Commission conducted a total of 19 full Commission meetings from January to November 2022, with dozens of additional individual work group meetings held in the spring, summer, and fall. During its early meetings, the Commission worked to clarify its mandate and agreed to a set of group protocols around Commissioner responsibilities, group norms, meeting deliberations, and reaching agreement. The Commission agreed to operate by consensus, defined as "consent of all or almost all members after Commission discussion."[6]

[6] The Commission's understanding of consensus means that the specific details within each recommendation may not represent the most preferred way forward for every Commissioner. Rather, the Commission achieved consensus on the full package of recommendations within this document, taken as a whole, agreeing that all the recommendations herein should be advanced for consideration by the Administration.

The Commission further agreed to a set of principles for defining the success of its work, stating that a successful package of recommendations would:

- Achieve carbon emissions reductions from buildings sector in line with legislative mandates
- Balance tradeoffs and build consensus across divergent perspectives
- Be comprehensive and multi-pronged, using all available tools and strategies
- Be long-term, durable, resilient, and flexible, while also clear and implementable in near-term
- Be supported by and understandable for the public
- Be affordable and equitable, and account for regional differences
- Be innovative, bold, realistic, and achievable
- Demonstrate national leadership

Following these early discussions, the Commission divided its work into two phases. During the first phase, the Commission focused on developing a set of preliminary recommendations to inform the Administration's development of the 2025/2030 CECP, which was released on June 30, 2022. The vast majority of the Commission's preliminary recommendations were included in the CECP and were identified as such within the document. During the second phase of its deliberations, the Commission worked to build on its preliminary recommendations through in-depth development of key items to meet its mandates.

Work Groups

During both phases of its work, the Commission divided into work groups around key topic areas to help facilitate more in-depth discussions. In the first phase, there were four work groups focused on the following topics:

- Institutions and Financing: Recommendations to align key institutions across the Commonwealth towards meeting decarbonization goals and ensure approaches are effectively and equitably resourced.
- Public Perception and Community Engagement: Recommendations to support effective communications and community engagement to shape public perception and drive impactful and equitable solutions.
- Technology and Workforce Development: Recommendations to support the development of a supply chain and workforce capable of delivering technology solutions affordably and at scale to the Commonwealth's diverse building stock.
- Regulatory and Policy Frameworks: Recommendations to address immediate gaps in existing regulations, codes, policies, programs, and incentives and/or develop new policies or programs to rapidly scale decarbonization.

Content on these recommendations was included in the Buildings Chapter of the 2025/2030 CECP. Several of the Commission's Phase 1 recommendations, including the adoption of building codes in line with decarbonization, are already underway.

In the second phase after the release of the 2025/2030 CECP, the Commission utilized five work groups each focused on one or more specific topics that required more in-depth research or deliberation by the Commission, including:

- Work Group 1: Design of a Massachusetts Clean Heat Standard
- Work Group 2: Design of a Massachusetts Clean Heat Clearinghouse

- Work Group 3: Design of a Massachusetts Climate Bank; and strategies for advancing decarbonization within the low-to-moderate income (LMI) and affordable housing sectors
- Work Group 4: Joint electric-gas utility planning; incentive program design; workforce development; and consumer outreach and awareness
- Cross-cutting Work Group: Strategies for achieving an equitable building transition[7]

During both phases, the work groups shared suggested recommendations with the Commission that were then vetted, revised, and packaged together based on deliberations with the full group. The recommendations in this Final Report have been reviewed by the full Commission and all except one Commissioner have consented to them after extensive discussion. Accordingly, this document represents the consensus of the Commission.[8]

Building Decarbonization Task Force

The Commission was supported by an Interagency Building Decarbonization Task Force (the Task Force), consisting of subject-matter experts from across the Executive Branch including staff from the Executive Office of Housing and Economic Development, Executive Office of Energy and Environmental Affairs, Department of Energy Resources, Department of Environmental Protection, and the Massachusetts Clean Energy Center. The names and affiliations of Task Force members can be found in Appendix A.

Members of the Task Force attended Commission meetings as observers and participated at the discretion of the Chair. The Task Force supported the Commission's technical assistance and data needs by compiling existing studies and data sources, presenting on research questions identified by the Commission, developing and refining policy options for the Commission to consider, working with consultants providing technical assistance, developing straw proposals, identifying potential tradeoffs, and supporting Commission work group deliberations. Task Force members also reviewed and provided feedback on draft Commission recommendations, including draft versions of this Final Report. However, final decisions around the content and approval of this Report were the sole purview of the Commission members. Accordingly, the Report should not be construed as having been formally endorsed or adopted in full or in part by the Baker-Polito Administration or any of its executive agencies.

Facilitation Support

The Commission received support from consultants who contracted with MassCEC to provide facilitation services on behalf of the group. The facilitators served at the discretion of the Commission Chair and were responsible for ensuring that the process ran smoothly. The facilitators were also responsible for drafting, revising, and finalizing the content in this report based on input, contributions, suggested revisions, and ultimate decision-making authority of the Commission.[9]

Public, Expert, and Stakeholder Consultation

Throughout the course of its deliberations, the Commission engaged in various formal and informal consultations with members of the public, experts, and stakeholders. EEA hosted four dedicated public

[7] This work group incorporated a member from each of the other four groups to help facilitated the integration of equity recommendations into program design.
[8] One active Commissioner did not join the consensus. See Appendix A for details.
[9] Facilitation responsibilities were shared between the Consensus Building Institute and Cadmus.

information sessions about the Commission, two each on March 1 and 24, 2022, and two more public sessions focused on the 2025/2030 CECP on April 14, 2022, where the work and progress of the Commission were addressed. Updates on Commission work and progress were also provided at the 2050 CECP public hearings on October 6, 7, and 12, 2022. During these meetings, Commission Chair Undersecretary Chang shared information about the Commission and its progress and provided opportunities for public comment. After each public information session these comments were summarized and reported back to the Commission to inform its deliberations.

The Commission also invited outside technical experts to present at Commission meetings on specific areas of interest, such as the potential design of a Clean Heat Standard, key state government levers to scale up adoption of electric heating appliances, air source heat pump technology and supply chain development, and utility planning for neighborhood-scale electricity distribution system upgrades to address anticipated load growth. Commission members and work groups also engaged in their own informal consultations by reaching out to individual stakeholders and experts and bringing their insights back to Commission work groups deliberations and/or meetings with the full Commission.

III. Clean Heat Commission Recommendations

A. Overview

The following integrated set of recommendations to advance decarbonization represent the culmination of the work described above and is presented in four sections:

- **Context:** The first section provides context to frame the forthcoming recommendations, including: the Commission's perspective on the Commonwealth's net zero pathway and building decarbonization, and the critical interdependence of achieving the Commonwealth's building and electrical sector transitions simultaneously.
- **Cross-Cutting Recommendations**: The second section consists of cross-cutting recommendations from the Commission that should be considered as the Commonwealth pursues any building decarbonization policies or programs, specifically: resourcing the building decarbonization transition, considerations for advancing equity, and institutional coordination and alignment.
- **Regulatory Frameworks for Long-Term Greenhouse Gas Emissions Reductions**: Section three responds directly to the Commission's mandate in the EO by identifying recommendations for regulatory frameworks for long-term greenhouse emissions reductions, including: a Massachusetts Clean Heat Standard, joint energy system planning, an analysis on phasing out new fossil fuel systems, and electric operating cost reductions.
- **Recommendations to Accelerate Deployment:** The fourth and final section identifies recommended options to accelerate the deployment of energy efficiency programs and clean heating systems in new and existing buildings and transition existing distribution systems to clean energy, specifically: a Building Decarbonization Clearinghouse, a Massachusetts Climate Bank, strategies for decarbonizing the affordable housing sector, workforce training and education, research and development, public outreach and awareness, expanding Green Communities and Leading by Example, and building benchmarking.

Throughout Commission deliberations, Commissioners stressed that while each of these recommendations can and should stand on its own (i.e., progress should be pursued on each simultaneously and delays in implementing one should not hamper another), they are nonetheless part

of an integrated whole. The Commonwealth must pursue a suite of approaches to achieve its building sector sublimits, including but not limited to new requirements, additional incentives, and expanded technical assistance and training. No one strategy alone can create the sustainable, equitable, long-term transition that is required.

To help encourage the expeditious implementation of this report, the Commission has identified the existing agencies that are likely to lead the implementation of each recommendation and key milestones and deadlines. The Commission recognizes that implementing these recommendations will constitute a significant scope of work in a short amount of time and will present new coordination challenges as various interrelated programs are deployed. While maintaining forward momentum on all these efforts is essential, it is also critical that the programs be well designed and work together, or these efforts risk further complicating an already challenging transition.

The Commission also recognizes that these recommendations are coming at a time of transition for the Commonwealth's Executive Branch. The Commission thanks the Baker-Polito Administration for its commitment to climate action and support of the Commission's work throughout 2022. For the next Administration, the Commission wishes to emphasize that the ideas in this report reflect the consensus recommendations of a diverse, expert, and influential group of Massachusetts stakeholders after nearly a year of intense work and thoughtful deliberation. The Commission hopes that the outcomes of this work will be helpful in the years ahead and that the recommendations included here will inform important policy decisions across administrations as the Commonwealth seeks to make critical GHG emission reductions this decade and beyond.

B. Context

Achieving a Net Zero Future

Moving forward, it will be critical for the Commonwealth to continue working to specify the key parameters of a net zero future and the most cost-efficient, equitable pathway to achieving this future. Careful planning will be required to encourage changes that leverage short-term decarbonization opportunities while also facilitating long-term, cost-efficient emissions reductions to achieve net zero by 2050. Overall, the Commonwealth must immediately advance efforts to achieve significant emissions reductions in line with GWSA and Next Generation Climate Act requirements, while ensuring decarbonization measures are feasible and cost-efficient over the long term.

Building off the findings from the Commonwealth's decarbonization studies, the Commission expects that if the Commonwealth achieves net zero by 2050 in a manner that increases equity while minimizing the overall costs of the transition, then the building sector in 2050 will most likely have the following key characteristics:

- All or nearly all new buildings will have been built according to very high standards of energy efficiency and weatherization, such as Passive House, and will utilize clean heating technologies.[10]
- The vast majority of the Commonwealth's more than 2 million individual buildings that were already in existence in 2022, including LMI and affordable housing units, will have undergone

[10] Buildings within certain sectors, including life sciences and healthcare, will require special consideration when implementing decarbonization and electrification approaches. These buildings face specific challenges such as high temperature, air change, and resiliency needs, as well as industry-specific local and/or federal requirements.

significant energy efficiency and weatherization retrofits and will use high-efficiency electric appliances for heating, cooling, cooking, and hot water.

- Energy infrastructure across the state will have been upgraded to align with broadly electrified end uses, with electrical infrastructure enhanced to dynamically serve a greater and flexible load, fossil fuel infrastructure strategically decommissioned, and utility-scale clean heat distribution systems (e.g., networked geothermal districts implemented where technically and financially feasible).
- As necessary, advanced liquid biofuels and alternative clean fuels will be utilized on a limited basis for specific end uses, such as high temperature processes or thermal back-up. Any such alternative fuels or approaches will be scientifically supported to reduce GHG in both the short-term and long-term after taking life-cycle emissions into account.[11]

The Commission agrees that the general parameters of this equitable and cost-efficient net zero future should guide the Commonwealth's present and ongoing planning and investments. All the policies recommended herein should be designed to achieve a level of transformation commensurate with the trajectories laid out in the CECPs and 2050 Roadmap.

To these ends, the Commission recommends the Commonwealth transition away from investing in infrastructure that is out of alignment with these trajectories as soon as possible, accounting for regional constraints and risks. Investments should instead be deployed to advance measures that help support the net zero future, such as electricity infrastructure upgrades, transitions to networked geothermal districts where feasible, incentives for building weatherization, the adoption of electric heating appliances, and solar PV. Although it will be important to continue investing in maintaining the safety and reliability of existing natural gas infrastructure while it remains in operation, these investments should be made within the context of the shift towards electrification. The intention of the Joint Energy System Planning Recommendation below is to support the implementation of this transition.

In addition, the Commission recognizes that there needs to be a rapid decline in the proportion of new heating equipment that uses fossil fuels. Continued installation of such end-use equipment increases the scope of "change-outs" required before 2050 and, given the lifespan of these systems and the anticipated improvements in grid emissions, can delay critical emissions reductions by decades. Recommendations included in this report, such as the Clean Heat Standard and the Building Decarbonization Clearinghouse, among others, are intended to reduce emissions from all end use equipment in the near-term, while supporting and accelerating the transition away from fossil fuel heating as quickly as possible. Given the magnitude of this transition, the Commission anticipates that actors across the Commonwealth would benefit from increased clarity and visibility into the scope of the change and the timeline along which it must occur so that they can begin preparing for necessary changes. For example, understanding the changes required by 2025, 2030, and 2035 could provide important guidance to consumers on the direction of the market to inform their purchasing decisions, clarify manufacturers' potential demand for new types of equipment in the years ahead, and inform regulators about the metrics their building decarbonization programs must seek to achieve.

[11] Notwithstanding their role in the 2050 future, which will depend on multiple factors that are not fully understood at present, advanced liquid biofuels and alternative clean fuels may be included in regulatory programs in the coming years on a short-term basis, to reduce emissions in existing fossil fuel systems that have yet to reach the end of their useful life. See the Clean Heat Standard Recommendation, Appendix C, for details.

Commissioners expressed strong opinions about how to utilize such a timeline most appropriately, and specifically whether or not the Administration should implement a policy that seeks to establish an enforceable schedule for phasing out new fossil fuel heating equipment. Given the long lifespans of this type of equipment and the ambitious nature of the building sector sublimits, Commissioners have serious concerns that we are rapidly approaching a date beyond which continued installation of new fossil fuel heating systems will not only make this transition more challenging, but will risk non-achievement of our emissions limits and non-compliance with Massachusetts' climate laws — along with all the associated negative environmental, economic and health impacts of such a failure. Meanwhile, Commissioners also recognize that implementing statewide policies or regulations that restrict the installation of new fossil fuel systems by specific dates could bring significant risks if the workforce, electric grid, and supply chain are not fully prepared to meet the resulting demand, which could negatively affect our region's electricity affordability and reliability as well as create significant equity concerns. In weighing these competing concerns, all Commissioners share a deep commitment to and concern for achieving the Commonwealth's emissions reductions but have different perspectives on the wisdom and practicality of establishing and enforcing a timeline for phasing out new fossil fuel heating systems in the near term.

Some Commissioners would seek to have the Commonwealth imminently design a clear schedule for prohibiting new fossil fuel equipment sales or installations in both new construction and existing buildings, and provide clarity on when such a schedule would be enforced. To these Commissioners, it is critical to provide clarity to suppliers, workers, and consumers so that they can make sound investment decisions that account for the Commonwealth's future decarbonization pathway and drive the market towards delivering the services necessary for wide-scale electrification. Many of these Commissioners are concerned that Massachusetts is falling behind other climate leaders that have implemented such schedules and will fail to meet its emissions commitments if it does not implement a clear timeline very soon, particularly with respect to phasing out new construction with fossil fuel systems.[12] They emphasize the risks posed by inaction and highlight the benefits to public health, safety, and resilience of such a transition.

Other Commissioners anticipate that if such a policy is set before the market, workforce, and grid are fully prepared to meet the resulting demand for electric appliances, installation services, connectivity, and electricity, then these restrictions could cause significant adverse impacts on costs, grid reliability, the pace of new construction, housing affordability, consumer sentiment, economic competitiveness and, if the restrictions drive more use of fossil-based electricity, potentially even GHG emissions over the short-term. These Commissioners emphasize that there needs to be more understanding of the ramifications of such restrictions on our workforce, consumers, electric grid, and supply chain for policymakers and the Administration to make informed decisions. Some of these Commissioners would prefer to see the impact of incentive- and market-based measures, like a Clean Heat Standard, take hold before the Commonwealth simultaneously pursues stricter regulatory approaches that prohibit new installations in the near term.

Across these perspectives, there is consensus among Commissioners that an appropriate next step is for the Administration to actively monitor and report on building electrification and energy efficiency progress against the fossil fuel heating equipment metrics identified in the CECPs and 2050 Roadmap and integrated into the building sector sublimits. This analysis should be conducted as soon as possible

[12] On September 22, 2022, the California Air Resources Board (CARB) unanimously approved banning throughout California the sale of all natural gas-fired space heaters and water-heating appliances by 2030.

and updated as needed. It should include assessing whether the Commonwealth's programs and policies will achieve necessary progress and/or whether a schedule for phasing out new fossil fuel equipment in new and existing buildings may be necessary to achieve required reductions. Any evaluation of the latter must include an assessment of the potential downside risks to Commonwealth residents, businesses, and economy — as well as upstream risks to our electric grid and its GHG emissions profile — and actions that should be taken to mitigate them and ensure any such policy achieves its intended aims. The Analysis on Phasing Out New Fossil Fuel Systems Recommendation provides more detail on the Commission's recommended approach.

In the future, market and technology developments could change the parameters of a feasible, cost-efficient, and equitable net zero future, for example if there is a technological breakthrough in distributed energy resources or development of an affordable non-emitting advanced liquid biofuel or alternative clean fuel. At such a time, the Commonwealth's overall planning and investments should, of course, respond to reflect this changed reality. However, given the urgency with which we must reduce greenhouse gas emissions, the Commonwealth should not wait for a conceptual technological breakthrough in the future. The Commission recommends that the Commonwealth move forward with policies that promote or require the implementation of cost-efficient approaches and commercialized technologies available today while incorporating appropriate technology advancements as they become available, as has been done in other emitting sectors.

Constraints and Contingencies

The Commonwealth's success in decarbonizing the building sector will depend on the pace of progress within other sectors, in particular energy supply. As discussed above, achieving the 2030 sublimit and net zero by 2050 will involve transitioning the Commonwealth to predominantly electric appliances for heating, cooling, hot water, and cooking. It will therefore be critical to expand the supply of clean energy and capability of the grid over the long-term in order to reduce emissions from the power sector, ensure the capacity of the system to handle the resulting load growth, and ensure the resilience of the grid in the face of increasingly frequent extreme weather events.

It is not within the Commission's mandate to address the electric sector transition in any depth. Furthermore, the Commission strongly believes that these challenges are not a reason to delay action on building decarbonization or limit efforts to scale up the adoption of electric heating appliances. On the contrary, the recommendations below are targeted towards shifting the Commonwealth's building stock towards all-electric appliances, combined with energy efficiency, weatherization, and deep thermal load reduction at the rapid pace and robust scale necessary to achieve the Commonwealth's decarbonization mandates. These actions will significantly reduce building emissions in the near term, and the existing electrical grid has capacity to allow for immediate strides in electrification (though capacity varies by area at the distribution/substation level). Ongoing location-specific analysis and significant new investments will be needed to ensure that grid capacity remains adequate to support rapid electrification.[13] The Joint Energy System Planning Recommendation addresses elements of this issue related to the buildings sector.

[13] See the following sources for details: ISO-NE 2022-2031 Annual Forecast of Capacity, Energy, Loads, and Transmission, found at www.iso-ne.com/system-planning/system-plans-studies/celt; Goldberg, Danielle et al., *New England Electrification Load Forecast*, Synapse Energy Economics, Inc., 12 May 2020, p. 17, found at e4thefuture.org/wp-content/uploads/2020/06/New-England-Electrification-Load-Forecast.pdf ("Our projections

The Commission wishes to highlight that over the long-term, achieving deep emissions reductions in the building sector will depend on the continued success of investments in clean energy generation and improvements to the electricity transmission and distribution systems.[14] Converting the vast majority of the Commonwealth's buildings to high-efficiency electric appliances will be completely counterproductive if the Commonwealth does not significantly increase its supply of renewable energy and the capacity and resilience of the grid. Instead of a net zero future, the outcomes will include a strained power sector, continued, or expanded reliance on fossil fuel-fired power generation, and increased vulnerability to energy price volatility and extreme weather events. Policymakers should pursue solutions and investments in the energy supply space alongside those in the building space with due urgency.

C. Cross-Cutting Recommendations

This section includes cross-cutting recommendations that should be considered as the Commonwealth pursues any additional building decarbonization policies or programs, specifically: resourcing the building decarbonization transition, considerations for advancing equity, and institutional coordination and alignment.

Resourcing the Transition

To achieve the scale and pace of transition necessary to meet legally mandated emissions targets, it will be critical to resource the transition appropriately and effectively, and ensure it is pursued in as cost-efficient a manner as possible. To create the transformation called for in the CECPs, the Commission recommends that funding for building decarbonization must be:

- Reliable: Funding is stable year-over-year to create certainty in the market
- Sufficient: Funding is scaled to meet the targets included in the CECP
- Equitable: Funding is allocated in a way that does not exacerbate and, ideally, ameliorates existing economic and racial inequities.
- Affordable: Funding does not cause undue burden on ratepayers, particularly those that already face an energy burden.

Broadly speaking, there are four categories of options for sourcing financial resources for decarbonization and helping to shift/scale up private sector investment:

- Ratepayer funds: These are the primary source for energy efficiency and solar incentives today (e.g., Mass Save®).
- Payments or transfers from regulated suppliers: Programs like the Renewable Portfolio Standard or a hypothetical Clean Heat Standard can require obligated suppliers to obtain marketable credits or make Alternative Compliance Payments (ACPs) to account for their greenhouse gas emissions. Depending on the design of the program, revenue from the creation and purchasing

indicate that increased demand from heat pumps, even with aggressive progress toward climate goals, may not significantly disrupt New England's electric grid.").

[14] The Commission notes that the building sector sublimits do not include accounting for any emissions due to electricity generation precipitated by the displacement of fossil fuel heating by electricity, further underscoring the importance of clean energy generation and transmission and distribution system improvements to the Commonwealth's overall decarbonization goals.

of credits can go to consumers or suppliers in exchange for activities that reduce emissions, or to the Commonwealth to support programs.[15]

- Taxpayer funds: Currently and historically, state, and federal taxpayer funding has not been used extensively to resource decarbonization efforts in the Commonwealth. However, there are significant one-time funding opportunities that could be leveraged in the near-term including $27 billion for climate financing through the Federal Inflation Reduction Act (IRA), $8.6 billion for residential efficiency and electrification plus tax credits also through IRA, state-allocated American Rescue Plan Act (ARPA) COVID recovery funding, and An Act Investing in Future Opportunities for Resiliency, Workforce, and Revitalized Downtowns (FORWARD) legislation signed by Governor Charlie Baker in November 2022.
- Market-based funds: Consumer mandates like building codes and building emissions performance standards do not typically generate substantial revenue that can be used for state programming, but also do not involve revenue sourcing from ratepayers.[16] If there are any additional upfront costs, they are borne by consumers and developers who are required to comply with the requirements, while benefits accrue back to the consumer in the form of long-term operational cost and associated energy savings.

Currently, Mass Save provides most of the funding for state programs related to building decarbonization through ratepayer funding. The program plans to spend $1.3 billion annually from 2022-2024 with targets for energy efficiency and carbon reduction, and a broad array of offerings including home energy assessments and plans, implementation incentives for electric appliances and building envelope improvements, workforce development programs, industry engagement and training, low-income/equity programs, and traditional energy efficiency (e.g., high-efficiency fossil fuels systems, lighting, plug in appliances). This programming is expected to deliver $13 billion in total savings from 2022-2024 from reduced energy costs and greenhouse gas emissions as well as social, environmental, and health benefits. Funding for Mass Save significantly exceeds other existing statewide buildings programs: the MassCEC buildings programs, for example, are budgeting at approximately $15 million in 2023.

While current Mass Save incentives are significant and reasonably scoped for near-term adoption, the Commission strongly suggests that these incentives will not be sufficient to inspire the broad, cross-sector change needed to meet our emissions reduction requirements and equity goals in the coming decades. As the recommendations contained within this document are implemented, additional programs, resources, and reforms, including reconstituting Mass Save under a new Building Decarbonization Clearinghouse, will be needed to support the market transformation that is required for meeting building sector sublimits in as cost-efficient and equitable a manner as possible.

The Commission does not take a position on the precise mix of funding options most appropriate for scaling up decarbonization programs within the Commonwealth. The Commission does, however, offer the following general observations on what will be advisable and necessary to resource the transition appropriately, efficiently, and equitably:

[15] At least as currently designed, the Clean Heat Standard may not be a significant driver of state revenue; rather the program envisions using credits to reward actions within the market that reduce building sector emissions. The program could, however, include ACPs that can generate meaningful (though not necessarily consistent year-over-year) revenue that can be used for specific purposes.

[16] Fines for non-compliance and/or ACPs can be a source of revenue within this space, as well.

- Early investments in innovation, workforce development/training, consumer education, and market development will deliver benefits for decades to come. Funding for these measures should increase significantly in the near-term, as detailed in the recommendations below.
- Ratepayer-funded incentive programs cannot sustainably bear the full burden of funding the transition. While electric ratepayer-funded programs are a critical tool, adding to program costs can make it more difficult to incentivize customers to switch from fossil fuel to electric appliances by increasing electricity rates, at least in the short term. A Clean Heat Standard and/or other regulatory credit market-based program will be needed to establish and ramp up overall incentives at the appropriate level to meet the required emissions sublimits between now and 2050. Likewise, every effort should be made to leverage available federal dollars and appropriate private sector investments.
- To be effective, programs need to be staffed and resourced in accordance with the scale of programming that will actually produce the pace of change required by the Commonwealth's emissions targets. In designing programs and making decisions about resource allocations, the Commonwealth should work backward from these emissions targets to clarify program scope and staffing/resource needs. Implementing the Commission's recommendations will likely require a meaningful increase in agency staff to set direction and provide program oversight, and the need to recruit and hire necessary staff should be factored into program timelines.
- As discussed above in the section on Achieving a Net Zero Future, avoiding future investments in and strategically retiring gas infrastructure will be important mechanisms to reduce overall costs. Likewise, action at the point of replacement for equipment, infrastructure, and systems that use fossil fuels is critical to reducing costs and should be appropriately targeted and incentivized across programs.[17]
- It will be critical to re-envision how the significant ratepayer funding currently funneled through Mass Save is deployed and allocated, through new and modified program structures. Although Mass Save does some traditional energy efficiency work very well and recent reforms have improved the program significantly, it is limited in its capacity to pursue certain critical measures by virtue of it being run by investor-owned utilities (IOUs) and by not having building decarbonization at the center of its mandate. Given the dollars at stake, ensuring the efficient and effective deployment of ratepayer funds to maximize their impact on decarbonization should be a top priority of the Administration. This issue is addressed in depth within the Building Decarbonization Clearinghouse Recommendation below.
- By necessity, the recommendations in this report will create different costs and benefits for different players in the market, with particular risks for businesses and workers who are reliant on fossil fuel delivery and selling, installing, and servicing fossil fuel appliances. It will be critical to provide resources to enable these stakeholders to equitably transition to new opportunities that are aligned with the Commonwealth's net zero future, and to provide clear and consistent market signals around the need to adapt.
- In defining and evaluating costs and benefits for projects that contribute to carbon reductions, it will be important to evaluate projects in a way that accommodates and aligns with the Commonwealth's climate and equity commitments. Rather than requiring programs to utilize traditional cost effectiveness or cost efficiency evaluation criteria, the Commonwealth should embed climate, public health, equity, resilience, emergency response, and other clearly definable societal impacts into upstream evaluation criteria and funding allocation decisions.

[17] Massachusetts Clean Energy and Climate Plan for 2030, 30 Dec. 2020, p. 5, found at www.mass.gov/doc/interim-clean-energy-and-climate-plan-for-2030-december-30-2020/download.

Overall, the Commission anticipates that incentives for building decarbonization projects will need to be substantial in order to send appropriate signals to consumers and suppliers, and may need to stay high for some time. While costs may decrease as industries scale up, this is not guaranteed. Because labor encompasses such a significant percentage of the cost of many building decarbonization projects, technological advances in equipment and supplies that drastically lowered costs for rooftop solar, for example, may not materialize within the clean heat sector. Widespread installations of clean heat appliances will require a sophisticated workforce that will likely cost more per hour as demand increases and the supply of workers remains constrained. Eventually, the Commission expects enhanced building and product energy codes, mandates, and industry practices will make electrification and high efficiency the default, but this market transformation will take many years. This reality further underscores the need for an effective regulatory credit-based program designed to shift the market efficiently and effectively over the long-term, well-coordinated and appropriately resourced incentive programs, and effective planning and strategic decommissioning of gas infrastructure to reduce total costs.

While the level and scale of the necessary investments are significant, the Commission does not believe they will be demonstrably different from other large statewide investments in our future health and prosperity.[18] Smart decisions and policymaking now can allow the Commonwealth to re-prioritize and re-allocate investments into a future that meets our climate and equity commitments in the near and longer term.

Equity Considerations

Within this section, the Commission has identified principles of policy and program design that should be applied across all existing and future building decarbonization initiatives to ensure the equitable distribution of costs and opportunities arising from GHG reductions in buildings. The Commission has also identified program-specific equity recommendations detailed in the next two sections, which reflect how the more general recommendations in this section could be implemented in practice.

Core principles and practices

The Commission recommends the Commonwealth adopt the following core principles and practices to inform the design of all building decarbonization program and policy initiatives:

Ensure robust community engagement and representation in decision-making: The Commonwealth should incorporate robust engagement and consultation with LMI, EJ, and Black, Indigenous, People of Color (BIPOC) population members, community-based organizations, and frontline community groups within each stage of program design, development, implementation, and evaluation. Effective engagement and consultation will raise community awareness of program opportunities, and leverage local knowledge around community needs, interests, and best practices to improve program design and implementation. To facilitate effective engagement, programs should use simple, accessible language when interacting with the public and regularly undertake the translation and interpretation of all meetings, events, presentations, materials, and resources in at least the five most common languages of each subregion of the Commonwealth.

[18] Cost model results from the 2050 Roadmap illustrate that the total cost across society by 2050 is similar to the total of a non-compliant "reference case." In general, the transition relies on shifting spending, from annual costs to import fossils to local investments in renewable energy, energy efficient equipment, and new infrastructure. Economic and Health Impacts Report: A Technical Report of the Massachusetts 2050 Decarbonization Roadmap Study, Dec. 2020, p. 6, found at www.mass.gov/doc/economics-and-health-impacts-report/download.

Likewise, the Commonwealth should ensure direct representation of BIPOC, EJ, and LMI population members in program decision-making to ensure these decisions reflect community perspectives and are seen as legitimate. Depending on the program, direct representation could take different forms such as membership with voting rights on advisory committees, boards, or work groups.

To enable effective engagement and participation, the Commonwealth should identify opportunities to provide compensation to BIPOC, EJ, and LMI population members and groups for their time and expertise devoted to supporting effective programs, when appropriate and to the extent permitted by relevant laws and regulations. Without appropriate compensation, front line community members and groups often lack the resources to participate effectively in consultative and decision-making processes, reducing the quality and legitimacy of outcomes.

Focus on program implementation and outcomes: In general, the Commonwealth should ensure implementation of concrete, effective measures in BIPOC, EJ populations, and LMI households. Programs should prioritize EJ and LMI households and populations so that they are first "in line" for the transition to cleaner, healthier, and safer clean energy technologies. Programs should track and be held accountable for achieving equitable outcomes, not merely for considering equity issues in the program design process. For example, programs could track the number of buildings transitioned, decarbonization measures implemented, and benefits accessed within these communities or households, and ensure progress is on par with or ahead of the rest of the Commonwealth.

Deeply embed equity within program design: With respect to program design, the Commonwealth should embed equity principles, practices, and benchmarks within program frameworks, mandates, and evaluation metrics. The purpose is to ensure these principles, practices, and benchmarks become deeply embedded within programs, not revisited anew each time an unforeseen issue arises.

Prioritize specific equity-based metrics: At least two metrics should be prioritized across all programs: household energy burden and health impacts. With respect to household energy burden, the Commonwealth should ensure that the overall package of decarbonization incentives, financing, rate design programs and policies do not increase ongoing operating costs for participating LMI households as compared to a reasonable, agreed-upon baseline. The Commission notes that heat pump installations on their own (absent pairing with energy efficiency and weatherization measures) do not consistently pass this threshold requirement under current market conditions. These issues will need to be addressed through a combination of measures, as outlined in the specific recommendations below. In addition, over the long-term as the Commonwealth transitions to a predominantly electrified buildings sector, natural gas rates could go up significantly as fewer households support the system's fixed infrastructure costs. The Commonwealth, utilities, and municipal gas and electric companies should ensure LMI households are adequately prioritized and incentivized to transition to electric heating technologies, so that moving forward they do not disproportionately bear these remaining gas infrastructure costs. The Commonwealth should also avoid future investments in gas pipeline infrastructure that will disproportionately burden LMI households.

With respect to health impacts, the Commonwealth should ensure that the health benefits from reducing exposure to air pollutants are factored into decision-making and incorporated into cost-benefit calculations across all major decarbonization programs. Because LMI, EJ and BIPOC populations suffer disproportionate negative health impacts from air pollutants, including these impacts in program

decision-making metrics and evaluation criteria will help support measures that benefit LMI, EJ and BIPOC populations.

Utilize equity-informed program approaches: Program design goals like coordinating and streamlining programs across agencies, and making it as simple, quick, transparent, and seamless as possible for customers to access programs, are critical for advancing equity. LMI, BIPOC, and EJ populations disproportionately encounter economic stressors that limit the time and resources they can devote to accessing and navigating programs. Conversely, measures that make these programs more accessible and user-friendly will significantly benefit users across the board.

The Commission recommends that the Commonwealth's hiring and procurement processes for contractors should prioritize minority- and women-owned business enterprises (MWBEs) as well as other disadvantaged businesses, contractors, vendors, and developers, in alignment with guidance from the state's Director of Environmental Justice. Programs should consider heavily weighting diversity and inclusion in the scoring of bids for projects (a practice pioneered by the Massachusetts Port Authority and known the "Massport Model") and/or breaking up large contracts into smaller ones that might be more accessible to MWBEs.

The Commission further recommends that programs utilize a variety of general tools to advance the equitable impact of program offerings. These include, for example, appropriately scaled and means-tested subsidies above baseline programmatic offerings, LMI carve-outs, and packaging of electrification with other decarbonization measures (such as weatherization, renewable energy resources, and battery storage) to reduce households' energy cost burden over time. The Commission further recommends that programs provide funding to address building condition barriers to implementing decarbonization measures (e.g., roof improvements, basement water and hazardous material mitigation, and electrical service upgrades) to comprehensively serve LMI housing stock where many homes have deferred maintenance issues.[19] More specific recommended practices are detailed within the individual recommendations below.

Institutional Coordination and Alignment

The Commission recognizes that achieving the building emissions reductions necessitated by the Next Generation Climate Act and identified in the CECPs is a monumental undertaking that will require concerted action by all sectors of society. To successfully drive this transition at the pace and scale necessary, the Commonwealth will need to improve coordination among essential actors and increase the efficiency and impact of programs and investments. Achieving these goals will require reorganizing and recalibrating existing authorities, processes, and program structures to ensure the Commonwealth can implement them effectively, guide other actors, and serve end users.

To that end, the Commonwealth's various decarbonization programs and policies must reinforce each other and be targeted to fill specific needs within an overall, coherent, cross-functional, and cross-agency decarbonization strategy and timeline. The Commonwealth's planning, investments, incentive programs, and regulatory frameworks must all encourage activities designed to lead to the cost-efficient, equitable net zero future the Commonwealth has defined and will continue to refine in its

[19] The need for these measures should be balanced against considerations of overall program costs, attention to whether upgrades are necessary for and lead directly to implementation of decarbonization measures, and attention to whether benefits accrue to LMI tenants or their landlords in renter-occupied housing units.

decarbonization studies and CECPs. Ensuring a high degree of coordination and alignment will be particularly important as significant federal funding, and program opportunities are made available through recent federal legislation. The Commonwealth must be able to move swiftly and nimbly to access and distribute resources and coordinate with other states in the region to create economies of scale where appropriate. Meanwhile, the Commonwealth must also be able to effectively coordinate with the 351 cities and towns across Massachusetts that must implement necessary changes in their jurisdictions.

As discussed in more detail in the Building Decarbonization Clearinghouse Recommendation, the Commonwealth should move from a "program-centric" to a "customer- and project-centric" approach in how it administers its various program offerings. In other words, residents, businesses, and contractors should not be asked to navigate multiple programs, identify those that may be relevant to their needs, and separately apply to each. Such a system can create stakeholder confusion and inaction. Building owners, residents, and developers should have a single point of contact empowered and resourced to help them seamlessly navigate and access program offerings. The Commonwealth should provide similar support to contractors so that they are empowered to leverage their customer relationships to efficiently assist energy consumers who would prefer not to navigate the programs themselves.

To achieve these objectives, it will be necessary to thoroughly re-envision the Commonwealth's existing programs driving building decarbonization. As part of this effort, the Commission strongly recommends the Administration, working in collaboration with the Legislature, continue to reform Mass Save to ensure it aligns with the Commonwealth's decarbonization needs and building sector sublimits as swiftly as possible, and reconstitute it under a new umbrella entity responsible for coordinating all applicable incentive programs, funding sources, and technical assistance — the Building Decarbonization Clearinghouse. The Commission further recommends that the Administration carefully analyze what other internal coordination functions, entities, or teams are necessary to help align the Commonwealth's various building decarbonization initiatives, enable the cost-efficient and equitable use of funds, ensure a "customer- and project-centric" orientation across programs, monitor and track progress toward the building sector sublimits, and develop and implement new initiatives, as needed. This analysis should weigh the benefits and drawbacks of creating new or additional layers of government bureaucracy, particularly on the ability of the Commonwealth to efficiently deliver streamlined services and implement initiatives as swiftly as possible.

D. Recommendations for Regulatory Frameworks for Long-Term GHG Emissions Reductions

This section identifies recommendations for regulatory frameworks for long-term greenhouse emissions reductions as required by the EO, specifically: a Massachusetts Clean Heat Standard, joint energy system planning, new fossil fuel systems phase-out analysis, and electric operating cost reductions. In this section and the following section, the Commission provides a short description of each individual recommendation, its objectives, context about the recommendation, key program elements, and implementation steps. In some cases, more detailed descriptions of the context and/or key program elements are in Appendix C.

Recommendation: Massachusetts Clean Heat Standard

To achieve emissions reductions from heating fuels and meet the 2050 and interim requirements of the GWSA and Next Generation Climate Act, the Commission recommends the Governor and Secretary direct the MassDEP to initiate a regulatory process to establish a Massachusetts Clean Heat Standard (CHS), with a stakeholder process to begin immediately.

Objective

Designed to meet the building sector sublimits, the CHS can be a powerful tool for creating a new market for clean heating solutions by incentivizing obligated parties to deliver cleaner heating technology, electrify our building stock, increase building efficiency, and move away from fossil fuels.

Context

The 2025/2030 CECP sets building sector sublimits in line with requirements for overall GHG emission reductions called for in the Next Generation Climate Act and tasks MassDEP with developing a "high-level program to meet the emissions limit for residential, commercial, and industrial heating." EEA and its agencies, as well as other jurisdictions, have previously implemented successful energy and environmental "standards" that use marketable credits to support and document the use of clean energy technologies and reduce GHGs in line with statutory requirements. The common element that defines these standards is that they require energy suppliers to demonstrate the deployment of specified types and quantities of clean energy by implementing clean energy solutions themselves or by purchasing credits from those who have implemented such solutions. The Commission believes that a Clean Heat Standard structured in this way is a critical tool for accelerating projects that decrease building emissions through electrification and significant thermal load reduction. The CHS will minimize transition costs to homeowners by leveraging the power of market competition and will appropriately share the costs of the transition widely across all customers in the Commonwealth.

Key Program Elements

- To support the decarbonization of the Commonwealth's building stock, the CHS's long-term objective must be to promote electrification of the thermal sector, in alignment with the 2050 Roadmap findings and 2025/2030 CECP policies, and in conjunction with significant thermal load reduction.
- Obligated parties of the CHS should be suppliers of energy to building heating systems, including utilities, wholesale liquid fuel and propane suppliers, and retailers as necessary to ensure all fuel delivered to Massachusetts is covered under the standard. MassDEP, in consultation with DOER, should evaluate the impacts, benefits, and drawbacks of including electric utilities as obligated parties along with fuels suppliers from the outset of the standard. Credits should be made available for strategies that reduce GHG emissions, with a strong preference towards pursuing electrification. The Commission recommends that MassDEP utilize full life cycle analysis to evaluate all potentially eligible credit-generating activities and seek to maximize the stringency of the standard to ensure the Commonwealth is achieving all feasible emissions reductions across heating and fuel types, particularly in the near-term as existing fossil fuel equipment is utilized before the end of its useful life.
- Consistent with decarbonization goals and building on recent legislation amending Mass Save, the installation of new fossil fuel equipment and services should not be supported under the CHS. Similarly, electrification should be prioritized in buildings that have already undergone or will simultaneously pursue significant thermal load reductions to maximize long-term GHG reductions and ensure proper sizing and operation of electric heating equipment.
- The CHS must be designed to include and protect LMI and EJ populations from the outset. To achieve this objective, the Commission recommends requiring obligated parties to include a

specified percentage of credits generated in LMI and EJ populations and households in their annual compliance filings.
- The CHS must be viewed as part of an integrated portfolio of policies driving all feasible electrification and energy efficiency, and not as a stand-alone solution. The CHS must work harmoniously with existing programs (e.g., Clean Energy Standard, Renewable Portfolio Standard, Solar programs), as well the Building Decarbonization Clearinghouse, Climate Bank, and Building Benchmarking programs.

Additional program design considerations can be found in Appendix C.

Implementation Steps

Implementation of a CHS should be pursued as expeditiously as possible to support meeting 2025 and 2030 building sector sublimits, and the associated trajectory of necessary equipment installations and other decarbonization measures in the 2025/2030 CECP, while allowing enough time for detailed program design. Incorporating feedback from a stakeholder process initiated as soon as possible, MassDEP should begin a regulatory process no later than spring of 2023, with the objective of implementing a Massachusetts Clean Heat Standard by 2024 or as soon as feasible.

Recommendation: Joint Energy System Planning

In order to accelerate and ensure the longevity of the Commonwealth's electrification transition, the Commission recommends the Governor and Secretary — working with the Legislature as necessary — direct the DPU and DOER to lead statewide joint energy system planning across Massachusetts' gas and electric utilities and municipal gas and electric companies, and in conjunction with key stakeholders and communities.

Objective

- Ease the transition from gas to electric heating by identifying geographic priorities for targeted investments in electrification and electric system capacity and the strategic retirement and reduction of the natural gas system.
- Work with municipalities, residents, and businesses to identify and target potential needed infrastructure investments and develop regional or community-scale efforts to accelerate adoption of appropriate building heating technologies, thermal load reduction strategies, and electric distribution systems.

Context

The Commonwealth's long-term building decarbonization strategy requires transitioning customers from existing pipeline gas infrastructure to electric infrastructure and, where appropriate given technical and financial feasibility, networked geothermal districts. The Commission recognizes that effective planning and coordination between electric and gas utilities will be important for implementing this transition successfully. Given the timelines for planning, permitting, and constructing energy infrastructure, beginning this work in tandem with scaling up the deployment of clean heating systems across Massachusetts is essential for the Commonwealth to meet building sector sublimits both now and in the future. The planning process should include mapping geographies where the accelerated deployment of clean heating technologies can enable strategic retirement of gas infrastructure, redirecting funding for additional and existing fossil fuel equipment to decarbonized solutions. In addition, this type of planning should identify areas where there may be electric system capacity

constraints in the long term so that near-term preventative action can be taken to ensure adequate electric supply and associated infrastructure can be built, or to help customers pursue additional thermal load reduction or temporary alternative technologies prior to the buildout of the electric system.

Key Program Elements:

- The Joint Energy System Plan should lay out implementation strategies for accelerating electrification and strategically retiring and reducing the natural system.
- To ensure this is an equitable and inclusive process that serves the needs of Massachusetts' communities, residents, and businesses, impacted stakeholders should be primary contributors. DPU and DOER should work with gas and electric utilities, municipal gas and electric companies, and the communities and customers they engage while developing and implementing the Joint Energy System Plan.
- The Joint Energy System Plan development process should examine existing characteristics of electric and gas infrastructure, the Commonwealth's building stock, and community demographics to identify priority geographies to target for accelerated adoption of heat pumps and strategic retirement of gas infrastructure.
- The resulting plan should include spatial data that provides clear guidance to policymakers, developers, regional planners, and community members of anticipated infrastructure transitions, including existing substation capacity and constraints, areas prioritized for accelerated electrification and strategic gas retirement, and new energy infrastructure projects (e.g., district geothermal). The Plan should also address how to continue serving hard to electrify customer bases and ensure resiliency of energy supply.

Additional program design considerations can be found in Appendix C.

Implementation Steps

Near-Term

- DOER and DPU should work with joint gas and electric utilities that operate overlapping systems, municipal gas and electric companies, and the communities they serve, to pilot this work beginning immediately and report on barriers and needed regulatory/legislative actions to ease statewide planning by 2024.
- Informed by this pilot, DOER and DPU should provide recommendations to the Secretary for advancing statewide joint energy system planning, including any legislative changes needed to facilitate this planning.
- The first Joint Energy System Plan should be in place by 2025.

Recommendation: Analysis on Phasing Out New Fossil Fuel Systems

The Commission recommends that the Governor and Secretary direct DOER, MassDEP, and the DPU (working in conjunction with other agencies, as needed) to: 1) develop and implement a structure for continual analysis and reporting on fossil fuel equipment metrics; and 2) analyze and report to the Secretary on the potential design and associated risks and benefits of a schedule for phasing out new

fossil fuel heating systems in the Commonwealth, in accordance with the implementation timeline described below.[20]

Objective

Ensure that decision-making is based in sound data and analysis and any actions to prohibit new fossil fuel equipment accounts and plans for the variety of potential risks and benefits.

Context

The Commonwealth has demonstrated significant leadership in analyzing the necessary trajectory for transitioning from fossil fuel equipment to clean heating technologies and achieving building sector sublimits that puts Massachusetts on a path to net zero emissions by 2050. This data should not only inform the development, implementation, and monitoring of policies but also be shared transparently with residents, businesses, institutions, and government officials making decisions about the continued use of fossil fuel equipment. While the ten-town community pilot authorized under H. 5060 will provide the Commonwealth with important data on the impact of restricting new fossil fuel hookups in new buildings, the results of that pilot are years away and only cover a small portion of the fossil fuel equipment transition that must occur. The Commission anticipates that, given the scope of that transition, the timeline for achieving significant emissions reductions, and the suite of new building policies anticipated at the state and federal level, it will be essential to conduct additional analysis in the near-term in an iterative and transparent fashion.

Among the ways this type of analysis can benefit decision-makers in the Commonwealth, the Commission anticipates it will be essential to choosing if and how to implement future restrictions on new fossil fuel equipment in Massachusetts. Specifically, there are critical potential benefits and risks associated with a setting a policy that seeks to establish an enforceable a schedule for phasing out new fossil fuel heating system — or not — and a variety of options that could be pursued that are not fully understood at present. On the one hand, establishing and ultimately enforcing such a schedule could provide market and consumer clarity and help spur the changes in planning, supply chain management, consumer choices, and investments necessary to transform our buildings in time to meet our requirements. On the other hand, an excessively aggressive or poorly planned schedule could negatively impact grid reliability, new construction, consumer sentiment, and costs for electricity, labor, and equipment, and could disparately burden specific geographies and communities. There is also a question of what progress other policies and programs can achieve without the addition of such a restriction and whether, if they are lagging behind their intended aims, adjusting those policies and programs might be a better use of the state's regulatory authority than instituting a schedule.

While Commissioners have different perspectives on the advisability of adopting a schedule or not in the near term, they strongly agree both on the value of sound data and analysis to inform effective decision-making and planning and on the need for the Administration to actively consider and resolve critical questions on the appropriateness and feasibility of a new fossil fuel equipment prohibition as quickly as possible.

[20] This recommendation focuses on phasing out fossil fuel systems within buildings. For the Commission's recommendations on the timely and strategic decommissioning of natural gas infrastructure, please see the Joint Energy Systems Planning Recommendation above.

Key Program Elements

- DOER, MassDEP, and DPU should develop and implement a structure for tracking progress on fossil fuel equipment reduction metrics and reporting out on the results of the analysis recommended below.
- Beginning in earnest in 2023, and continuing in subsequent years as needed, these agencies should build on and refine existing analysis to report out on the potential benefits and risks of, and potential options for, establishing an enforceable phase out schedule for new fossil fuel heating systems. This analysis should include assessment of:
    - The role and need for a schedule within the broader portfolio of existing and upcoming building decarbonization policies and programs.
    - The potential impact setting a schedule could have on achieving or accelerating the decarbonization trajectory necessary to meet mandatory emissions sublimits.
    - The technical feasibility of phasing-out new interconnections to the gas system, new construction with fossil fuels, and replacement appliances, with consideration for various building types, geographies, and uses.
    - The cost impacts for businesses and consumers in the Commonwealth, including savings from avoiding the need for future retrofits and additional burdens imposed by the transition, as well as ways to mitigate cost burdens (particularly for EJ populations, low-income households, and industries and communities that lack viable clean heating alternatives).
    - The development of the market and supply chain for electric heating appliances and installation.
    - The capacity of the electric grid to handle additional load growth and progress reducing GHG emissions from the grid.
    - Early lessons learned from the ten-community pilot study allowing cities and towns to restrict fossil fuel infrastructure in new buildings (to the extent knowable within this timeframe and without delaying the agencies' analysis).
    - Existing contractual obligations for fossil fuel hookups and potential penalties.
    - The phase out schedules that have been set by other leading jurisdictions, as well as their applicability in Massachusetts.
    - The Commonwealth's leadership position on building decarbonization, as well as opportunities for collaboration.
- The resulting reporting and analysis should seek to include:
    - Findings of and/or progress on the analysis articulated above.
    - Recommendation for whether to implement a phase out schedule for new heating equipment using fossil fuels, new construction with fossil fuel-based heating systems, and/or replacement heating systems.
    - If a schedule is advised, what it should be and how to ensure it is equitable and cost-efficient.
    - If a schedule is not advised, what other policies are anticipated to drive sufficient progress toward sublimits and/or what barriers need to be addressed to overcome major implementation risks of a schedule before proceeding.
    - Any necessary legislative, regulatory, or executive actions needed to improve compliance with the building sector sublimits in light of this analysis.
    - If additional analysis is needed to gather more data or resolve remaining questions for particular types of equipment, the reporting should detail that analysis and the associated timeline for completing it by 2025, and thereafter as necessary.

- The Administration should be as transparent as possible throughout this process, communicating at appropriate intervals with the Legislature, key stakeholders, and communities. Active stakeholder engagement should be conducted to ensure the Administration is utilizing the best available information and incorporating diverse perspectives into the analysis. This process should also be coordinated with public outreach and education campaigns to help inform and prepare consumers for any resulting changes and the associated impacts on consumer choice and costs.

Implementation Steps

- DOER, MassDEP, and DPU develop and implement a structure for tracking progress on fossil fuel equipment reduction metrics and reporting out on the results of the analysis recommended above.
- Beginning in earnest in 2023, and continuing in subsequent years as needed, DOER, MassDEP, and DPU, and other agencies, as applicable, conduct analysis and stakeholder engagement as described above.
- By the end of 2025, and at additional intervals as appropriate, the Administration releases a public report on the progress and results of this engagement and analysis, providing recommendations, and (as needed) articulating any additional research scopes to be completed.
- The Administration may engage with the Massachusetts Legislature, as appropriate, to develop legislation or regulations to implement any recommended phase out schedule and/or other measures and support any additional analysis or coordination that is necessary.

Recommendation: Electric Operating Cost Reductions

The Commission recommends EEA and its agencies evaluate opportunities for addressing the operating costs barrier to adoption of clean heating technologies, such as air-source heat pumps. This effort should include an evaluation of near-term programs or credits to help defray costs for those that face additional operating costs from electrification, particularly in LMI households, and an evaluation of cost-reflective rate structures that can encourage conservation and reduce consumers' costs of operating electric heating systems.[21]

Objectives

To develop and evaluate electricity rate structure options that can help reduce the costs of operating electric heat pumps, while also ensuring equitable access to heat pump conversions in the near-term.

Context

Despite the significant decarbonization benefits presented by switching from fossil fuel heating to clean heating technologies, the current electricity rate structure yields higher operating costs for electric heating when compared with using natural gas-based heating systems. This operating cost issue represents a barrier to electrification generally in the marketplace, as well as a very specific threat to the economic well-being of LMI households if not properly mitigated. To effectively incentivize users to electrify building heat and address equity issues associated with potential operating cost increases from electrification, the Commonwealth should evaluate approaches to help consumers mitigate costs in both the near- and intermediate-term. These efforts are critical not just for the buildings sector, but also for transportation, where the shift towards electric vehicles represents another important

[21] These structures should not seek to use rates to add subsidies, but rather pursue electric cost reductions, particularly during peak usage times, that reduce rates overall.

component of the Commonwealth's pathway to net zero. Measures must account for challenges and opportunities within both sectors.

One way to reduce the overall cost of electricity is to reduce consumption, particularly during system peaks that drive the need for additional infrastructure investments (thereby increasing costs for electricity supply, transmission, and distribution). Designing a cost-reflective electric rate structure with time-of-use rates can incentivize for electric customers to reduce their electricity costs. Overall, the objective should include exploring options that can price in consumption levels (perhaps using tiered rates or time-of-use rates), encourage efficiency, and appropriately reflect users' impacts on system costs. The Commission recognizes that an electricity rate redesign based on the cost of service can be an elaborate process. This is particularly true because changing the rate structure from an existing one to a new one inevitably would yield an increase in energy bills for some customers and a decrease for others relative to the status quo. However, a well-designed electricity rate can send price signals that align with the goal of reducing the cost of electricity to all consumers and thereby improve the economics of electrification of building heat. The Commission does not take a position on the best rate structure to pursue. Instead, it suggests that it is important for EEA and its agencies to analyze the options available, and the implications associated with designing and offering certain electric rates to customers who adopt electric heat pumps. If an optimal option is available such that the benefits of adopting a new electric rate design significantly outweigh the potential negative effects, the DPU, working with the electric distribution utilities, should design and offer such beneficial rates.

Given the elaborate nature of redesigning electric rates, the Commission recommends the Commonwealth investigate and consider additional measures to provide electric operating cost relief to consumers pursuing electrification that would have an impact in the near-term. A potential opportunity worthy of strong consideration is utilizing state and federal funding to offer a monthly electric bill credits for customers who could face increased operating costs when switching to high performance, clean electric heat. The need for relief is particularly critical for LMI households and affordable housing developments, where concerns about operating costs can prevent electrification projects from being funded or implemented, threatening these communities' ability to take part in the electrification transition and its associated benefits. If we keep to the status quo, LMI households may feel the impact of higher energy costs from all sides. If they transition, they will be affected by existing high electricity costs. If they do not transition, they will be affected both by high electric rates and by rising gas rates, because of their standard household electricity use and their continued reliance on inefficient gas or oil heating systems. The Commission urges the Commonwealth to develop ways to defray operating cost increases while a more long-term solution is pursued via electricity rate redesign.

Key Program Elements:

- EEA should pursue opportunities to defray electric operating cost increases in the near-term and incentivize expanded adoption of heat pump technology, particularly for LMI households. This should include evaluating whether DOER can utilize state and federal funding to offer a monthly electric bill credits for customers who could face increased operating costs when switching to high performance, clean electric heat.
- Simultaneously, DPU should initiate an evaluation of the current electricity rate structure and alternative rate design options to identify opportunities that can better align energy prices with the cost of service and equity goals. Such an evaluation should aim to provide recommendations on:
    - Opportunities to drive down overall costs through innovative practices like demand management and flexible load;

- Opportunities to redesign/restructure current rates and offerings to more accurately reflect the cost of service, including those with clean heating technologies;
- Approaches to minimize additional cost burdens on low-income customers; and
- Best practices from other jurisdictions that could inform the efforts in Massachusetts.

Implementation Steps:

- As soon as possible, EEA and DOER should evaluate opportunities to reduce operating costs in the near-term, including assessing the feasibility of a state- or federally-funded monthly electric bill credit program (using federal IRA funding and/or other sources). The Administration should seek necessary authorizations within the next legislative funding cycle.
- DPU should launch an examination of existing rate drivers as soon as possible and provide recommendations on opportunities to reduce system-wide costs through rates that reflect the true costs of service and reduce cost barriers to the adoption of efficient electric heating technologies.

E. Recommendations for Accelerating the Deployment of Energy Efficiency and Clean Heating Technologies

As mandated by the EO, this section identifies recommended options to accelerate the deployment of energy efficiency programs and clean heating systems in new and existing buildings and transition existing distribution systems to clean energy, specifically: a Building Decarbonization Clearinghouse, a Massachusetts Climate Bank, workforce training and education, research and development, public outreach and awareness, expanding Green Communities and Leading by Example, and building benchmarking.

Recommendation: Building Decarbonization Clearinghouse

The Commission recommends the Administration, in partnership with the Legislature, continue to reform Mass Save to align with the Commonwealth's decarbonization needs and building sector sublimits, and reconstitute it under a new Building Decarbonization Clearinghouse. The intention behind the Clearinghouse is to drive building decarbonization in the Commonwealth and serve as an umbrella for all applicable incentive programs, funding sources, and technical assistance. The goal should be to create a public "one-stop shop" to support Massachusetts building owners, residents, and businesses in evaluating, selecting, and implementing building systems and projects that accelerate the reduction of greenhouse gas emissions and improve the quality of the building stock.

Objective

Continue to reform Mass Save, while also establishing a Clearinghouse that creates a single point of contact for all building decarbonization programs. The Clearinghouse should help ensure Massachusetts building programs are administered in a manner that both advances equitable decarbonization efforts and is understandable and accessible to consumers. Reforms to Mass Save must ensure that the program, originally designed to advance cost-effective energy efficiency in 2008, is aligned with the Commonwealth's updated building decarbonization objectives. The Clearinghouse, under which Mass Save should ultimately sit, will "connect the dots" between Massachusetts' programs, helping contractors, residents, commercial and industrial building owners, and other businesses assess possible building interventions, understand and access benefits, optimize project sequencing, and leverage funding resources in a more straightforward and streamlined manner than is possible today.

Context

Massachusetts has nation-leading building programs that have been extremely successful in achieving the objectives for which they were originally designed. As noted above, Mass Save is currently the largest, providing the majority of funding for state programs related to building energy efficiency and GHG reductions. As the Commonwealth has transitioned from focusing on traditional energy efficiency to advancing electrification and decarbonization, legislative changes have supported better alignment of Mass Save programs by allowing electrification and fuel switching measures, setting GHG emissions reduction requirements to align with climate requirements, incorporating social cost of carbon into cost-effectiveness metrics, and removing the majority of fossil fuel incentives from the program in 2025. The Commission celebrates these successes and the recent changes to program priorities but recognizes that further amendments are needed to fully align the Mass Save framework with the CECPs.

Historically, Mass Save has done some things extremely well while struggling in particular domains. The program benefits from the knowledge, experience, capabilities, and close customer relationships of its utility Program Administrators and has been largely successful in driving the adoption of energy efficiency and weatherization measures. The program has been less successful to date in driving decarbonization measures beyond energy efficiency and weatherization, including the adoption of efficient electric heating appliances.

There are a number of potential reasons for this challenge. First and foremost, Mass Save has traditionally focused on energy reduction. Until recently, there have been statutory restrictions limiting the program's ability to implement decarbonization strategies such as electrification, and these restrictions continue to limit the program's capacity to couple efficiency and electrification effectively with renewables. Additionally, there is an inherent conflict of interest within the program — which is likely to become more challenging moving forward — whereby investor-owned gas utilities are being asked to implement decarbonization measures that are designed to reduce their revenue base by switching customers to efficient electric appliances. There are also challenges related to the program's funding structure, which adds to electric rates in ways that may disincentivize fuel switching. The program has also experienced longstanding issues reaching LMI households, EJ populations, and households with language barriers.

While recent legislation has addressed some of the issues with Mass Save's authority and mandate, the Commission anticipates that issues related to effective and efficient program implementation will persist. These issues should be tracked, evaluated, and potentially remedied through further changes to program administration as well as legislative authorities and mandates moving forward. Overall, the Commission strongly suggests that the Mass Save structure is not suited to leading decarbonization efforts in the Commonwealth, and its programs cannot independently achieve the pace and scale of transformation necessary.

Currently, incentives, technical assistance, and strategic planning related to buildings are administered across multiple programs and agencies. The result is a "program-centric," not "customer- or project-centric" experience for building owners, landlords, developers, and contractors. This current organization makes pursuing a comprehensive retrofit or new development in line with the Commonwealth's building decarbonization trajectory more challenging, particularly for those who lack the time, resources, or expertise to identify and navigate multiple programs with related but different aims (e.g., Mass Save and the Solar Massachusetts Renewable Target or SMART program). Achieving the building sector sublimits in the CECP will require action on the part of individual building owners at a

largely unprecedented pace and scale. It is paramount, therefore, that the Commonwealth reorganize the way it offers technical and financial support. Such support should be offered in as streamlined a manner as possible to all actors engaged in making decisions about buildings, including building owners, developers, residents, and the contractors and consultants that support them.

Key Program Elements

- The Administration should examine Mass Save's current authority, structure, and programs in light of the 2025/2030 and 2050 CECPs and develop a set of legislative, regulatory, and executive recommendations for amending the program to better equip the Commonwealth to deploy ratepayer funding in support of building decarbonization and electrification, with the near-term objective of locating a reconstituted Mass Save under the Clearinghouse's umbrella.
- The Building Decarbonization Clearinghouse's mission will be to engage and support "customers" (inclusive of building owners, developers, residents, contractors, and consultants) in the effort of decarbonizing the building stock. It will serve as the key Administration point of contact and information for customers seeking to implement measures in buildings, in order to seamlessly connect them to the suite of building decarbonization programs available to Commonwealth residents and businesses under a single umbrella.
- The Clearinghouse should coordinate among all Commonwealth building decarbonization services and funding providers (including Mass Save, the Climate Bank, EEA, DOER, MassDEP, and MassCEC) across energy efficiency, renewable energy, electrification, and energy storage programs, services, and funds. Programs included under the Clearinghouse umbrella should include existing programs such as Mass Save, SMART, the Alternative Portfolio Standard (APS), MassCEC rebate programs, and the Renewable Portfolio Standard (RPS). As noted in the Joint Energy System Planning Recommendation, the Commission recommends the Commonwealth establish a new program to incentivize early retirement, ahead of equipment failure. Such a program should also be under the Clearinghouse umbrella.
- The Clearinghouse should be independent from IOUs and any other obligated parties under the Clean Heat Standard.
- Both the Clearinghouse and the programs under its umbrella should have funding from sources that are as reliable, dedicated, and regular as possible, and that can be generated in a manner that accounts for and does not exacerbate existing unequal energy cost burdens. The Administration should consider how to utilize available funding streams and bonding authority across the Commonwealth most effectively within the Clearinghouse's structure.
- Contractors and other customer-facing experts must be effectively trained and resourced to help economically stressed LMI customers navigate programs and seamlessly access appropriate incentives. To help ensure the cohort of contractors is demographically representative of the communities they serve, the Clearinghouse should prioritize MWBEs in the procurement process, conduct dedicated outreach and capacity building to contractors from LMI and EJ populations, and support workforce development opportunities for new contracting businesses within EJ populations. In developing implementation timelines, the Clearinghouse should prioritize pilot projects and targeted outreach efforts that put EJ and LMI populations at the front of the line for implementation.

Additional program design considerations can be found in Appendix C.

Implementation Steps

EEA, DOER, and MassCEC should begin immediately collaborating on additional Mass Save reforms and the design of the Clearinghouse, ensuring that each informs the other. Reforms should be sequenced over two phases.

Phase 1

- Map all statutory authority, programs, and funding sources related to building decarbonization across all Commonwealth agencies and programs, including Mass Save. Assess ways to improve program implementation in accordance with the recommendations above.
- Based on this map, begin to coordinate access to programs through a Clearinghouse "one-stop-shop" by 2024.
- Also based on this map, file any necessary legislation to improve operation and implementation of building decarbonization programs (including Mass Save) under a Clearinghouse umbrella moving forward as soon as possible; align the timeline to integrate with and influence the processes for developing the Massachusetts' Three-Year Energy Efficiency Plans for 2025 and 2028.
- Throughout this process, engage the public, seeking input on the appropriate structure of the Clearinghouse to best serve Massachusetts residents, businesses, and contractors.

Phase 2

- Implement the new constituted Building Decarbonization Clearinghouse with its expanded legislative authority.
- Develop and implement a staffing plan consistent with building decarbonization objectives and hire or procure necessary staff resources to support the Clearinghouse as it is established and as it grows.
- Utilize the experience of the Clearinghouse in helping customers access available programs, support, financing, and incentives in its first year to establish a report, documenting recommendations for program changes to streamline access for residents and business, increase equity, and drive deeper decarbonization aligned with Massachusetts emissions limits and sublimits.

Recommendation: Climate Bank

The Administration, in partnership with the Legislature as needed, should establish a Massachusetts Climate Bank to facilitate the provision of affordable capital in support of the clearly established goals and requirements of the Commonwealth's building decarbonization programs.[22] Climate Bank finance strategies could include a mix of wholesale lending products (providing capital to intermediaries with direct relationships to building owners), credit enhancement and project de-risking, soft supports including project aggregation and coordination with building owner technical assistance providers (through the Building Decarbonization Clearinghouse or otherwise), and potentially retail lending (making loans directly to building owners). While a Massachusetts Climate Bank will likely initially focus on finance challenges in the buildings sector, the bank may also tackle finance challenges related to the Commonwealth's broader climate efforts.

[22] Broadly speaking, Climate/Green Banks are mission-driven institutions that use innovative financing to accelerate the transition to a decarbonized and/or resilient economy.

Objective

Help expand the scale and breadth of financing available for building decarbonization projects that are aligned with the state's long-term goals. Leverage significant federal funding to be made available for green banks through the Inflation Reduction Act.

Context

A Massachusetts Climate Bank would serve a critical strategic role in advancing the Commonwealth's decarbonization objectives. Traditional private sector lenders are not yet willing to invest in building decarbonization projects at a sufficient scale and breadth or offer sufficiently favorable financing terms to support the number and size of projects needed to achieve the Commonwealth's building decarbonization goals. Because many building decarbonization projects do not reduce operating costs (due in large part to current electric and gas rates), traditional methods of underwriting savings on the operating side often are not relevant. A Climate Bank can help address these issues by leveraging various tools not available to the private sector to de-risk investments and otherwise facilitate the deployment of private capital into building decarbonization projects. These tools include, but would not be limited to, credit enhancements like loan loss reserves[23] or interest-rate buy-downs, measures to standardize and streamline the financing process for both lenders and borrowers, providing capital that is risk tolerant and at reduced rates, and measures to aggregate projects to achieve scale and/or lower risk through diversification.

To be effective, these tools would need to combine with measures to reduce operating costs and ensure projects generate financeable savings over time, like reformed electric rates, as well as new/reformed regulatory requirements. Some of these tools may generate some revenue, but others may have a net negative return for the Climate Bank itself even as they help unlock significant private capital. A Climate Bank may also directly offer its own financing products to consumers, particularly for underserved market segments. However, this approach can still focus on leveraging and enabling other capital sources.

Key Program Elements

- There should be a rapid set up for the Climate Bank in the coming months and coordination across the change in Administrations to ensure the opportunity to leverage significant federal funding to be made available through the Inflation Reduction Act.
- The Climate Bank should be a quasi-public or non-profit entity that is shielded from a counterproductive focus on short-term profits and can connect seamlessly with state-funded programming and technical support through the Clearinghouse and elsewhere.
- There should be sufficient initial capitalization for the bank to cover multiple years of operating expenses and lending enhancements at the scale needed to achieve the pace of decarbonization in the 2050 Roadmap.
- There should be close coordination between the bank and the Commonwealth's decarbonization incentives and technical assistance programs to align program offerings and enable a "customer centric" approach. In particular, the Climate Bank should be closely integrated with the Building Decarbonization Clearinghouse to ensure seamless program design and implementation.
- The bank should pay careful attention to avoiding increased operating costs and debt burdens for LMI households and EJ populations.

[23] Loan loss reserves are a credit enhancement approach commonly used by state and local governments to provide partial risk coverage to lenders, whereby the reserve will cover a prespecified amount of loan losses.

Additional context and program design considerations can be found in Appendix C.

Implementation Steps:

Immediate:

- The Administration should leverage existing efforts, including MassCEC's partnership effort with the City of Boston on climate bank feasibility, to best position the Commonwealth for an application to pursue Inflation Reduction Act funding.
- The Governor and Secretary should immediately direct relevant agencies to implement measures to ensure stability of the Inflation Reduction Act application process during the upcoming Administration change.

Medium-term:

- The Administration should direct the responsible parties and/or consultants to continue monitoring details and specifics related to Climate Bank financing gaps, needs, opportunities, and business planning. Goals should include: ensuring a targeted, relevant, and sustainable entity and programs that build off existing lending initiatives by MassCEC and Mass Development; incorporating findings from the recent MassCEC/City of Boston study; and accounting for key issues the MassCEC/City of Boston study does not fully address (e.g. the diversity of Massachusetts building stock, challenges in the single-family residential sector).
- After the initial phase of rapidly standing up the Climate Bank and accessing IRA funding, the Administration — in partnership with the Legislature as needed — should initiate a process to determine the appropriate long-term institutional design and home for the new entity to ensure effective integration and coordination with state-funded programming and technical support through the Clearinghouse and elsewhere.

Recommendation: Strategies for Decarbonizing the Affordable Housing Sector

The Governor and Secretary should bring together stakeholders to develop a cross-sector strategy to accelerate the decarbonization of subsidized affordable housing across the Commonwealth, and to serve as an action team to develop and deploy decarbonization-focused tax credits and incentives through the Climate Bank, Clearinghouse, and otherwise.

Objectives

Increase the supply of decarbonized affordable housing by bringing additional resources into the sector. Coordinate, improve, and further align existing programs with decarbonization goals. The immediate focus could be on identifying opportunities to encourage decarbonization retrofits more effectively now and in the future, while effectively managing costs.

Context

There are significant opportunities to advance the Commonwealth's building decarbonization goals by focusing immediate attention and resources on the affordable housing sector. Overall, subsidized housing constitutes more than 10% of the Commonwealth's total residential units.[24] The multifamily affordable housing sector includes a cohort of developers and owners, located across the Commonwealth, that are accustomed to working through public private partnerships. Among these

[24] Massachusetts Subsidized Housing Inventory as of December 21, 2020, found at www.mass.gov/doc/subsidized-housing-inventory/download.

stakeholders and the relevant federal and state agencies, there are existing networks and frameworks in place that can be leveraged towards achieving decarbonization and equity goals.

Building new affordable housing using very high standards of energy efficiency and all-electric appliances saves money in the long run both by reducing operational costs to residents and by eliminating the need for future, expensive renovations. Recently, the Commonwealth has made significant strides advancing energy efficiency and decarbonization measures that lower total housing costs in new affordable multifamily housing developments. The Commonwealth should build on these recent advances in new construction by continuing to integrate decarbonization measures into affordable housing program standards and criteria while keeping a careful eye on cost margins.

At the same time, the Commonwealth still faces a significant gap in available subsidies and effective program design with respect to decarbonized retrofits of affordable housing developments. Because the main opportunity for increased support at present is in the decarbonization retrofits space, the Commission recommends that this should be a primary area of focus moving forward.

Key Program Elements

The Commission recommends that the Clearinghouse (or other coordinating entity) should work with state housing finance agencies, municipal agencies, Massachusetts Association for Community Action (MASSCAP) Community Action Agencies (CAAs or CAP Agencies), and other affordable housing stakeholders to improve coordination and alignment across the agencies' decarbonization programs and identify and implement specific action steps. Specific measures and strategies should be discussed and adopted through dialogue with the agencies, but should include a focus on the following three priority areas:

1. Continue to lead on new construction and identify opportunities for improvement: The stakeholder group should identify and advance opportunities to leverage existing tax credits and other programs to promote energy efficient and electrified new construction, for example by ensuring the Qualified Action Plan (QAP) selection criteria continue to incorporate appropriate standards to achieve building decarbonization goals, and that Mass Save continues to effectively implement its multifamily new construction program.
2. Develop and implement dedicated measures to support decarbonization in substantial rehabilitations: These efforts should seek to: a) improve the efficiency and effectiveness of the Mass Save low income retrofit program through coordinating comprehensive program interventions with project refinancing processes, and b) identifying and deploying additional resources to support substantial rehabilitations, including new programs focused squarely on incentivizing decarbonization retrofits.
3. Develop and implement a framework for effectively supporting single family retrofits: The stakeholder group should work with the Clearinghouse and Climate Bank to identify specific incentives and financing measures to support decarbonized retrofits for smaller and single-family affordable housing developments.

Additional context and program design considerations can be found in Appendix C.

Implementation Steps:

Near term:

- The Governor and Secretary should direct EEA and HED, the Clearinghouse, or another entity or entities to convene state housing finance agencies and other key stakeholders as soon as

possible, with the shared goal of furthering alignment of the Commonwealth's affordable housing programs with its decarbonization goals and timeline.

Recommendation: Workforce Training and Education

The Commission recommends the Administration expand and support workforce development programming to address existing gaps in Massachusetts' decarbonization workforce. The Administration should evaluate and build upon existing opportunities to ensure it provides programs and funding support tailored to the Commonwealth's building decarbonization needs and that span educational opportunities to attract workers of all ages.

Objective

Ensure that Massachusetts has the workforce necessary to deliver its building transition and that Commonwealth workers and businesses are poised to benefit from the new career pathways and opportunities available as part of an equitable clean heating transition.

Context

As noted in the 2025/2030 CECP, Massachusetts' building sector is "large and diverse, with over two million individual buildings spanning a wide range of construction types, occupancy needs, ownership, and equipment."[25] To effectively meet the building sector sublimits, Massachusetts will need a skilled workforce capable of implementing appropriate clean heating and cooling technologies, as well as accompanying building systems, at a significant scale. Overall, Massachusetts' clean energy sectors are projected to add 29,500 new jobs between 2019 and 2030, and the Buildings sector will require one of the greatest employment increases, needing to add 7,100 construction laborers, carpenters, electricians, plumbers, pipefitters, HVAC technicians, and other related jobs by 2030.[26] Market forces on their own may not be sufficient to incentivize the rapid labor market growth that will be needed to meet emissions targets. Existing supply gaps, low unemployment, and an inadequate supply of trainers all present challenges to meeting this need.

Conversely, Massachusetts' robust existing education and workforce systems, both of which have benefited from strategic investments in career and technical training, position the Commonwealth to become a hub for educational programs that support workforce development within these occupations. By identifying and scaling existing quality programs, integrating relevant clean energy technologies into aligned training programs, establishing new programs to serve environmental justice populations that still have limited access, and expanding utilization of incumbent worker upskilling opportunities, Massachusetts can develop more local talent pipelines and attract the migration of skilled workers, supporting economic growth across the state.

Key Program Elements

- To create a robust pipeline of building trade professionals, the Commonwealth should work with partners to develop curricula aligned to employer needs and designed for multiple delivery options (including hybrid learning), offer training and technical assistance, and provide mentorship and funding opportunities to current and future workers of all ages and demographics and across geographies.

[25] Massachusetts Clean Energy and Climate Plan for 2025 and 2030, p. 46.
[26] Id., p. 104.

- Workforce training programs should comprehensively cover the key skills needed by those involved in deploying clean heating and building decarbonization measures, be packaged in a manner that ensures trainees can deliver complementary technical recommendations and services (e.g., weatherizing in advance of heat pump installation), and include wraparound training services for skills needed to enter the workforce.
- To ensure the quality of work, the Commission recommends requiring training and continuing education for building trades professionals, in particular HVAC and solar contractors (similar to Contractor Supervisor Licensing), and recommends the Administration consider requiring certification or licensing of these trades, particularly for contractors who will be referred customers by the Clearinghouse.
- Trainings should be provided to create career pathways for all, particularly for populations that are commonly underrepresented in trades and disproportionally burdened by energy costs and the impacts of climate change. The Administration should partner with community colleges and other institutions that already engage these populations (e.g., MassHire Workforce System), and build upon successful trade initiatives to increase the proportion of women and minority union members.

Additional program design considerations can be found in Appendix C.

Implementation Steps:

- Conduct a Massachusetts Clean Energy Workforce Needs Assessment, i.e., a thorough and expeditious assessment of existing Commonwealth workforce training programs to inform a foundational understanding of which programs work well and should be replicated/expanded and which programs require intervention and redesign.
- Integrate the findings from the Massachusetts Clean Energy Workforce Needs Assessment, plus work of the Workforce Skills Cabinet and the seven regional workforce planning teams, with implementation of the Joint Energy System Planning and Building Decarbonization Clearinghouse recommendations, defined above.
- Utilize ARPA funding and Equity Workforce Funding administered by MassCEC to offer high-priority training opportunities in the near-term, while developing more employer-aligned curricula and identifying additional funding sources necessary to scale the workforce in line with decarbonization needs.
- Leverage existing and planned technical training opportunities such as those through the Career Technical Initiative, Community College training programs, and Job Corps sites, as well as early-stage workforce development programming through Commonwealth Corporation, to expand access to workforce development across the Commonwealth.
- Ensure coordination with key stakeholders (organized labor, clean energy employer consortiums, environmental justice advocates) so that training efforts are well-aligned to employer needs and designed to combat pressing barriers.
- Align statewide efforts for early career awareness and increased pre-apprenticeship and mentoring programs, such as through the Massachusetts Department of Elementary and Secondary Education's My Career and Academic Plan (MyCAP) and Connecting Activities, as well as coordination with Massachusetts STEM Advisory Council and the Massachusetts Manufacturing Extension Partnership (MassMEP) to make sure that efforts from crossover sectors include specific clean energy career opportunities.
- Monitor program outcomes for trainees to assess if additional investment is yielding strong placements, retention, and economic advancement or if new approaches are needed.

Recommendation: Research and Development

The Commission recommends the Administration conduct research, develop best practice guidance and case studies, and set standards to fill existing knowledge gaps with respect to decarbonization of the building sector in Massachusetts.

Objective

Proactively identify and address gaps in building decarbonization feasibility. Share data and information to advance further research and development.

Context

Decarbonizing Massachusetts' building stock is a decades-long endeavor and, over time, new opportunities and barriers that the Commonwealth cannot foresee today will develop. While the Commonwealth must begin acting now based on the best information available, it is also important to continue to support investment in research and development that can accelerate our ability to achieve necessary emissions reductions in as cost-effective and equitable a manner as possible. Fortunately, Massachusetts is a climate leader and a hub of innovation. Investments made here stand to benefit not only our Commonwealth, but also other communities across the country and around the world.

Key Program Elements:

The Commonwealth should conduct and share research on:

- Best practices for implementing decarbonization solutions for all sectors in a cost-efficient and scalable manner, including technical strategies, financing solutions, and portfolio management practices.
- Current barriers, opportunities, and key decision points for commercial and residential properties.
- Complementary technologies that improve heat pump performance and cost-effectiveness when installed together.
- Alternative clean heating solutions for situations in which cold climate heat pumps are not viable, including in industrial process heat applications.
- Ways to improve access to clean heating technologies in Massachusetts at scale.
- Technology pilots and state-wide granular resource assessments of potential solutions.
- Market evolutions as new programs scale and/or new technologies become available, in order to make continuous improvements.
- Continued assessment of the GHG emissions impacts of renewable fuels.
- Embodied carbon of new construction and best practices for mitigating associated emissions.

Whenever possible, data should be made available (while respecting privacy considerations) to support further research and development by other partners.

Implementation Steps:

Research and development should build on MassCEC's innovation, technology development, and market development work. The Administration should:

- Develop a plan and timeline within the next twelve months to make data about the natural gas and electric systems and energy consumption patterns in buildings available for research and analysis to spur innovation around leveraging this data for building decarbonization, while protecting consumer privacy and data security.

- Support data analysis related to joint energy systems planning efforts and develop mechanisms to share the outcomes of the analysis in an easy-to-access way for broader consumption.

Recommendation: Public Outreach and Awareness

The Commission recommends the Administration implement a professionally developed, state-wide public outreach and awareness campaign with various targeted audiences, including landlords, architects, developers, installers, homeowners, and renters.

Objective

Develop clear and concise messaging to engage diverse populations to increase awareness of Massachusetts' commitment to a building sector transition, the role of individual actors in achieving this transition, and the benefits of clean heat solutions. A successful information campaign will help to build momentum and accelerate customer adoption. A campaign that also reports success stories about adoption and usage can then drive more momentum.

Context

There are numerous decision-makers in the building sector that need to take action to achieve the Commonwealth's transition. Some of these actions will need to happen voluntarily, and even when the Commonwealth does require a specific solution (via regulation, code, etc.) it is important that Massachusetts residents understand the rationale behind any new requirement. Therefore, Massachusetts must provide clear, concise, and compelling information on the anticipated building transition and the role individuals can play in achieving it. A trusted campaign can also help preempt or address any confusion or misinformation in the market that could stall progress.

Current consumer concerns around rising energy costs highlight the political risks of implementing statewide decarbonization measures, such as a Clean Heat Standard, that will increase the relative costs to consumers of fossil fuels and fossil fuel-powered appliances. Over the long-term, these measures will be durable and successful only if consumers have a clear understanding of the rationale, benefits, and specific opportunities for their households and communities to take advantage of program benefits.

Key Program Elements

- EEA should immediately engage a marketing team to implement a state-wide public outreach and awareness campaign with various targeted audiences (landlords, architects, developers, installers, owners/renters, etc.).
- The team should develop clear and concise messaging that will engage and educate different users with different knowledge levels and provide resources for building owners, residents, and contractors on how to plan for and engage in a decarbonization transition. This work should build on and expand the scale of MassCEC's Clean Energy Lives Here campaign to ensure it reaches sufficient consumers to support a broad scale of decarbonization, including through utilization in the Green Communities program. Efforts should include making people aware of and guiding them to easily accessible educational resources.
- The team should build momentum by highlighting local success stories (including in the ten communities piloting fossil fuel-free new construction and renovation, per H. 5060) through community engagement, local media, and social media; conducting webinars to share the lessons learned; and tapping into key stakeholders to provide consistent messaging and ground up education, campaigning, and support.

- The timing and focus of the campaign should be carefully coordinated with other recommendations, such as those related to the Clean Heat Standard and Clearinghouse, to ensure programs are able to successfully serve the public interest that the campaign generates.
- Outreach programming for LMI households and EJ populations should be designed and implemented in collaboration with trusted community stakeholders and organizations (e.g., churches and other faith-based communities, community health centers, early childhood education centers, and public schools). In the design phase, implementing agencies should ask these community organizations for their expertise on activities and approaches that are likely to generate community and household buy-in for decarbonization projects, while taking care that such consultation does not delay implementation. In the implementation phase, implementing agencies should consider enrolling these community organizations directly in supporting community outreach activities. In both phases, community organizations should be appropriately compensated for their time and expertise. Implementing agencies should consider using designated liaisons to help community organizations with reporting, service delivery, and other requirements.

Implementation Steps

- EEA should immediately coordinate with MassCEC and DOER to identify existing resources, needs, and gaps for raising public awareness, including the scale of public outreach needed to align with decarbonization goals, how Mass Save efforts help address this need, and what level of financial resources are needed to meet these goals.
- In early 2023, the Administration should commit financial resources to bolster existing efforts and finance the development and launch of new efforts.
- EEA should conduct ongoing coordination of different entities and efforts related to public outreach.
- EEA should ensure ongoing assessment of public awareness, impact of public outreach efforts, and any ongoing public needs and gaps in awareness to meet decarbonization goals.

Recommendation: Expand Green Communities and Leading by Example

Expand the Green Communities program and DOER's Leading by Example (LBE) program to effectively utilize state, municipal, and institutional (e.g., university) building stock to showcase the benefits of decarbonization measures.

Objectives

Leverage public building stock to reduce emissions and demonstrate the positive impact of building decarbonization measures.

Context

The vast majority of the Commonwealth's decarbonization initiatives involve the difficult and imperfect work of incentivizing behavior changes among various private actors, from homeowners to developers, business owners, and workers. The Commonwealth's LBE program is a notable exception. It involves direct collaboration with state agencies and public colleges and universities to advance clean energy and sustainable building practices that reduce the environmental impacts of state government operations. Likewise, the Green Communities program provides an opportunity for municipalities to obtain grant funding for energy efficiency and renewable energy projects. Scaled-up versions of these programs would provide invaluable opportunities for the Commonwealth to demonstrate the positive impact of

building decarbonization measures, socialize residents to new and improved building practices, and inspire private actors to follow suit. There may be additional opportunities to work with the Massachusetts School Building Authority (MSBA), the Massachusetts Division of Capital Asset Management and Maintenance (DCAMM) and other state entities to combine incentives with appropriate building standards and certification measures.

Key Program Elements

- In collaboration with MSBA and DCAMM, implement specific guidelines and additional dedicated funding to support demonstration of building decarbonization measures in buildings that belong to the state or utilize state grant money (including state-supported affordable housing developments and public school projects) for new construction or substantial renovation.
- Maximize opportunities for public messaging and experience-sharing by showcasing best practices through a portfolio of examples and case studies. For example, in partnership with regional planning agencies and other key partners, DOER's Green Communities Division could work with select municipalities of various sizes, help guide them through a building decarbonization planning and implementation process, and publicize practical lessons learned around challenges and opportunities. The outcome of these efforts could help motivate other municipalities and provide templates for how to plan and execute municipal decarbonization efforts.
- Consider focusing the expanded programs on school buildings, given their longevity and the exposure they provide for children and families.

Implementation Steps

- Ensure that state new construction and major renovation projects meet the Massachusetts LEED Plus 2.0 Standard from Executive Order 594 that requires efficient electric or renewable thermal heating, and that these projects strive to achieve zero net energy.
- When planning for, designing, and deploying projects that affect energy use at existing state or municipal facilities, implement strategies to substantially reduce and ultimately eliminate emissions from onsite fossil fuels to the greatest extent possible.
- Incorporate new and expanded measures within the Green Communities program to encourage cities/towns to align municipal-owned building stock with statewide climate requirements.
- Establish a central repository for state and municipal building decarbonization case studies.
- Identify all funding sources for school building retrofits and new construction (e.g., MSBA, Massachusetts Department of Elementary and Secondary Education, Green Communities, Mass Save) and align the funding requirements with climate and GHG goals.

Recommendation: Building Benchmarking

The Commission recommends DOER, in conjunction with the Legislature, as needed, develop and implement a Commonwealth-wide building benchmarking and labeling program to increase transparency on building emissions profiles and encourage building retrofits that improve climate, health, and economic outcomes across Massachusetts' building stock.

Objective

Increase awareness among prospective building owners, buyers, and renters of the relative emissions performance of their buildings to incentivize investments in energy efficiency and GHG reductions.

Context

Section 40 of the Act Driving Clean Energy and Offshore Wind (H. 5060) requires that electric, gas, and steam distribution companies and building owners report to DOER the total amounts of electricity, natural gas, and steam used during the previous calendar year in buildings over 20,000 square feet of gross floor area. It further requires DOER to report this energy use information on a building-specific basis on their website. Additionally, DOER, working in conjunction with Mass Save, has developed a voluntary program based on the findings of home energy assessments. These resources have the potential to increase transparency for building owners, buyers, and renters about the relative emissions performance of buildings, clarifying potential differences in cost burdens for heating and cooling otherwise comparable spaces, and increasing awareness generally of the role individual buildings play in meeting the Commonwealth's sublimits over time. These efforts should be used as building blocks for a Commonwealth-wide labeling program to further increase transparency on retrofit needs, enable buyers and renters to make more informed decisions, create market demand for high performing properties, and incentivize owners to invest in building systems and interventions that decrease emissions and improve their relative score.

Key Program Elements:

- This program should build upon DOER's and the U.S. Department of Energy's existing building score card research and programs to design and roll out a Commonwealth-wide labeling program for buildings under 20,000 square feet (i.e., those not identified under H. 5060) by 2025. For larger building types identified under H. 5060, the program should collect sufficient data from the start of the reporting program, which takes effect on July 1, 2024, pursuant the legislation, before releasing building scores or labels. A recommended five-year data collection timeline would result in scores for these larger buildings by 2029.
- DOER should assess the frequency of updates required for different use types. Home scorecards should then be updated on a rolling basis and revised automatically whenever a Commonwealth program is utilized (i.e., through Mass Save or the Clearinghouse, or every 10-12 years, whichever occurs first). It may be more appropriate for multifamily and commercial buildings to be revised more frequently, given the rate of turnover and use changes in those buildings.
- Once labels are established and verified, the Commonwealth should work with municipalities, real estate organizations, and/or multiple listing services to have data disclosed to customers as a matter of course at point of listing.
- As part of the design process, DOER should consider:
    - Necessary staffing and resources
    - Additional stakeholders impacted
    - Additional data to be collected
    - Additional parties responsible for data collection
    - Disclosure processes
    - Reporting infrastructure
    - The communication strategy
    - The appropriate role for utilities
    - Cost burden mitigation, if needed, for LMI households and EJ populations
- Development of a labeling system should make it easier for consumers to understand the emissions profile and necessary interventions of a building prior to purchasing or renting a property, which will ideally level the playing field during transactions for those less well-versed in the Commonwealth's climate policies or building systems or design. However, this type of transparency could have the potential to disproportionately impact businesses, homeowners, and renters with limited means for addressing structural deficiencies in their buildings/units

once scores are established. It is essential, therefore, that any labeling program be developed with input from LMI households and EJ populations and integrated with the LMI and EJ services offered through the Clearinghouse and other Commonwealth programs, to support necessary building upgrades in a manner that does not create an undue burden through new costs or displacement. Specifically, identified interventions in buildings that receive lower than average scores, particularly those in EJ populations or LMI housing, should be prioritized for Commonwealth incentives programs, Climate Bank funding, and Clean Heat Standard credits.

Implementation Steps:

- DOER should design and launch a Commonwealth-wide labeling program by 2025, with scores for larger buildings to be released as sufficient data becomes available and no later than 2029.

IV. Conclusion and Next Steps

The Commission is grateful for the opportunity to provide the Administration with this comprehensive and ambitious package of recommendations. Advancing and implementing these recommendations will require enormous work by Administration officials and agency staff. The Commission does not envy the work in front of them and applauds the dedication and professionalism many have displayed by supporting our work through the Interagency Building Decarbonization Task Force.

The Commission wants to emphasize that this report has been developed through extensive and detailed deliberations over a period of eleven months among Commissioners representing a wide range of perspectives and interests. The fact that the Commission achieved consensus on such an ambitious package of recommendations should not be taken lightly. We believe our recommendations package, despite (or perhaps because of) its ambition, has the potential to engender broad support among the multiple stakeholder groups we need to reach and influence if we are to be successful, just as it received consensus support within our group. We also recognize that these recommendations have been developed at a particular moment in time, and that circumstances may change moving forward requiring the recommendations to evolve. We hope and expect the recommendations will receive careful review by the Baker-Polito Administration and serve as a practical guide for the incoming Healey-Driscoll Administration as it takes on the mantle of this critical and challenging work. We look forward to seeing these recommendations implemented with all due urgency and continuing to support this transition through our own work, leveraging our very different roles and capacities across the sector.

Appendix A: Commission on Clean Heat, Interagency Building Decarbonization Task Force, and Facilitation Team Members

A. Commission on Clean Heat Members

The Commission on Clean Heat has agreed by consensus to provide these recommendations to the Governor in fulfillment of the Commission's obligations under Executive Order 596 Establishing the Commission on Clean Heat. The following members of the Commission joined in the consensus:

Chair: Judy Chang, Executive Office of Energy and Environmental Affairs
William Akley, Eversource
Lauren Baumann, New Ecology, Inc.
Kenan Bigby, Trinity Financial
Harry Brett, Plumbers and Gas Fitters UA Local 12
Andrew Brown, The HYM Investment Group
Emerson Clauss III, Home Builders and Remodelers Association of Massachusetts
Rebecca Davis, Massachusetts Competitive Partnership
Eric Dubin, Mitsubishi Electric Trane HVAC
Madeline Fraser Cook, Local Initiatives Support Corporation
Eugenia Gibbons, Independent Consultant
Dharik Mallapragada, Massachusetts Institute of Technology Energy Initiative
Cameron Peterson, Metropolitan Area Planning Council
Robert Rio, Associated Industries of Massachusetts
Kimberly Robinson, Pioneer Valley Planning Commission
Dorothy Savarese, Cape Cod Five
Tamara Small, NAIOP Massachusetts
Richard Sullivan, Economic Development Council of Western Massachusetts
Charles Uglietto, Cubby Oil & Energy
Dennis Villanueva, Mass General Brigham
Jolette Westbrook, Environmental Defense Fund

The following Commissioner did not join the consensus:

Michael Duclos, HeatSmart Alliance

Alexander Bross, formerly MassHousing, departed the Commission in June 2022 due to circumstances unrelated to his service on the Commission, and was therefore not part of the final consensus building process that led to the contents of the report.

B. Interagency Building Decarbonization Task Force Members

Sarah Basham, Executive Office of Energy and Environmental Affairs
Shevie Brown, Department of Energy Resources
Nicole Cooper, Executive Office of Energy and Environmental Affairs
Jonathan Cosco, Executive Office of Housing and Economic Development
Ian Finlayson, Department of Energy Resources

Meg Howard, Massachusetts Clean Energy Center
Emily Lamb, Department of Environmental Protection
Nina Mascarenhas, Department of Energy Resources
Maggie McCarey, Department of Energy Resources
Peter McPhee, Massachusetts Clean Energy Center
Samantha Meserve, Department of Energy Resources
Benjamin Miller, Executive Office of Energy and Environmental Affairs
Melissa Mittelman, Executive Office of Energy and Environmental Affairs
Galen Nelson, Massachusetts Clean Energy Center
William Space, Department of Environmental Protection
Ashley Stolba, Executive Office of Housing and Economic Development

C. Facilitation Team Members

Toby Berkman, Consensus Building Institute
Liz Hanson, Cadmus Group
Stacie Smith, Consensus Building Institute
Neil Veilleux, Cadmus Group

Appendix B: List of Acronyms and Abbreviations

2021 Climate Law: An Act Creating a Next-Generation Roadmap for Massachusetts Climate Policy
2025/2030 CECP: Massachusetts Clean Energy and Climate Plan for 2025 and 2030
2050 Roadmap: Massachusetts 2050 Decarbonization Roadmap
ACP: Alternative Compliance Payment
APS: Alternative Portfolio Standard
ARPA: American Rescue Plan Act
BIPOC: Black, Indigenous, and people of color
CAA: Community Action Agency
CAP Agency: Massachusetts Association for Community Action Agency
CECP: Massachusetts Clean Energy and Climate Plan
CES: Clean Energy Standard
CHS: Massachusetts Clean Heat Standard
DCAMM: Massachusetts Division of Capital Asset Management and Maintenance
DHCD: Massachusetts Department of Housing and Community Development
DOER: Massachusetts Department of Energy Resources
DPU: Massachusetts Department of Public Utilities
EEA: Massachusetts Executive Office of Energy and Environmental Affairs
EJ: Environmental Justice
EO: Executive Order
EV: electric vehicle
FORWARD: An Act Investing in Future Opportunities for Resiliency, Workforce, and Revitalized Downtowns
GHG: greenhouse gas
GWSA: Global Warming Solutions Act of 2008
H. 5060: An Act Driving Clean Energy and Offshore Wind
HEARTWAP: Heating System Repair and Replacement Program
HED: Massachusetts Executive Office of Housing and Economic Development
HERS: Home Energy Rating System
HUD: U.S. Department of Housing and Urban Development
HVAC: heating, ventilation, and air conditioning
IOU: investor-owned utility
IRA: Inflation Reduction Act
LEED: Leadership in Energy and Environmental Design
LMI: low-to-moderate income
MASSCAP: Massachusetts Association for Community Action
MassCEC: Massachusetts Clean Energy Center
MassDEP: Massachusetts Department of Environmental Protection
MassHousing: Massachusetts Housing Finance Agency
MassMEP: Massachusetts Manufacturing Extension Partnership
MSBA: Massachusetts School Building Authority
MyCAP: My Career and Academic Plan
PACE: property assessed clean energy
PV: photovoltaic
QAP: qualified allocation plan
RPS: Renewable Portfolio Standard

SMART: Solar Massachusetts Renewable Target program
STEM: Science, Technology, Engineering, and Math
Task Force: Interagency Building Decarbonization Task Force
WAP: Low-Income Weatherization Assistance Program

Appendix C: Additional Context and Program Design Considerations

A. Clean Heat Standard

To support the decarbonization of the Commonwealth's building stock, the CHS's long-term objective must be to promote electrification of the thermal sector, in alignment with the 2050 Roadmap findings and 2025/2030 CECP policies. To achieve this outcome and reduce emissions during the transition, the Commission recommends the following key program elements:

Obligated Parties: Obligated parties of the CHS should be suppliers of energy to building heating systems, including utilities, wholesale liquid fuel and propane suppliers, and retailers as necessary to ensure all fuel delivered to Massachusetts is covered under the standard. MassDEP should evaluate whether to include electric utilities as obligated parties along with fuels suppliers from the outset of the standard, paying particular attention to cost impacts on electric consumers. If not included at outset, inclusion of electric utilities should be reconsidered in outer years to continue meeting the program's objectives as the consumption of fossil fuels decreases.

Credit Creation: Credits should be made available for strategies that reduce GHG emissions, with a strong preference towards pursuing electrification. Because addressing structural deficiencies in building envelopes is essential for long-term success of building decarbonization, credit generation should be made available for weatherization and energy efficiency, as well as extremely energy efficient new construction to standards such as Passive House. Crediting must ensure progress toward electrification of the building sector, accelerating progress as soon as possible and setting a clear schedule toward full decarbonization by 2050.

Zero or, potentially, very low carbon fuels may represent an interim opportunity to reduce emissions in existing fossil fuel systems that have yet to reach the end of their useful life and may be included only after a rigorous scientific assessment of their full life cycle GHG emissions, including leakage assessments. However, these fuels are not a long-term solution for most of Massachusetts' building stock, so MassDEP should ensure that credit generation for such fuels does not slow adoption of electric heating technologies by rewarding investments in new or existing fossil fuel infrastructure such as boilers and pipelines.

The Commission recommends that MassDEP adopt a carbon intensity scoring system for each activity that would qualify for Clean Heat Credits that is transparent, universally accepted and possibly tailored to Massachusetts' particular strategies. The scoring system should utilize the full life cycle analysis of all fuel sources. MassDEP should evaluate how to address life cycle assessment for electricity, as well as the methodology for doing so, given the required decarbonization of the electric grid under existing standards such as RPS and the Clean Energy Standard (CES), as well as how the Massachusetts' GHG inventory methodology and the building sector sublimit methodology account for building and electric emissions.[27] It is particularly important that the carbon intensity calculations for various types of

[27] Massachusetts' GHG inventory counts GHG emissions for electricity in the power sector. Given this, it will be important for MassDEP to determine the appropriate way to evaluate and consider the GHG impacts in the power sector of additional electricity demanded by electric heating technologies, including with regard to seasonal variation and the impact of heating demand on the electric grid during winter months.

advanced biofuels available in the market today reflect their true impact based on a science-based, full life cycle analysis. New technologies and solutions for reducing GHGs should be evaluated and qualified for the program as quickly as possible to prevent a lag in the implementation of new technologies.[28] The CHS should use reasonable proxies for emissions reductions, as done by Mass Save. Consistent with decarbonization goals and building on recent legislation amending Mass Save, installation of new fossil fuel equipment and services should not be supported under the CHS. For simplicity of design and to maintain flexibility at the outset of the program, carve outs and credit enhancement should generally be avoided. However, the program design process may need to assess the pace of adoption of electrification relative to the Commonwealth's stated decarbonization trajectory to determine if the standard's stringency alone can achieve its intended electrification outcomes. MassDEP should therefore evaluate whether to include a carve out or other mechanism to advance electrification as part of the initial program design.

Regular program reviews should be used to evaluate progress on deployment of clean heating technologies, update crediting to reflect the latest science on lifecycle emissions, and consider any use cases that may be emerging as exceptions to the general rule that electrification is the most feasible and least cost strategy for permanently eliminating emissions in buildings. Program reviews should be transparent and resulting changes should be implemented in a manner that creates as little disruption to the market as possible.

Finally, the Commission expects that the CHS will include an Alternative Compliance Payment. MassDEP should carefully assess the appropriate ACP price to ensure creation of credits is preferable, while also ensuring the cost-burden of ACPs does not unduly burden businesses and ratepayers.

Integration with Other Programs: The CHS must be viewed as part of an integrated portfolio of policies driving all feasible electrification and energy efficiency, and not as a stand-alone solution. The Clean Heat Standard must work harmoniously with existing programs such as the Alternative Portfolio Standard (APS), Clean Energy Standard (CES), the Renewable Portfolio Standard (RPS), and Solar programs among others. We believe it is highly unlikely the program could be designed in a manner that sets a price that will compel consumers to convert from fossil fuels to electric heating without other incentives, requirements, or motivation. The Clean Heat Standard must work in conjunction with the Building Decarbonization Clearinghouse and Climate Bank to ensure the seamless integration of all available incentives, as well as a clearly articulated path forward for those that want to participate. Given that the APS was designed to incentivize combined heat and power, which it is now phasing out, and it is weak incentive for heat pump technology, we further recommend that the state consider eliminating the APS program and using the new Clean Heat Standard as a more effective program to reduce GHG emissions and support electrification in the thermal sector.

Equity: The CHS must be designed to include and protect LMI and EJ populations from the outset. To achieve this objective, the Commission recommends that the CHS require that a percentage of annual credits be generated in LMI and EJ populations and households. Additionally, DOER, in consultation with DEP, should develop an ongoing monitoring, reporting, and corrective action system to ensure compliance with this requirement and identify and mitigate any unintended consequences, such as adding to the energy burden of these consumers. Finally, assistance programs for these consumers

[28] The accounting methodology for heat pumps should consider refrigerant leakage, and program design within the Clean Heat Standard and elsewhere should consider approaches for tracking, analyzing, and remediating refrigerant leakage.

(including those served by municipal gas and electric companies) should be developed and implemented to defray excess costs resulting from this standard that are passed on to customers. Funds generated through alternative compliance payments should be invested in ways that help ensure that additional clean heat technology and assistance are made available in LMI and EJ populations.

Stakeholder Engagement: The Commission recognizes that the Clean Heat Standard may present implementation challenges, including unintended market consequences. To minimize the impacts of these risks and maximize the standard's effectiveness at delivering the results mandated by law, the program design process should include engagement with key stakeholders likely to be impacted by the standard. This should include LMI and EJ representatives, weatherization experts, HVAC suppliers and installers, supply chain management experts, retail energy providers, and gas and electric utility representatives, among others.

B. Joint Energy System Planning

Analysis: The Joint Energy System Plan development should examine existing characteristics of electric and gas infrastructure, the Commonwealth's building stock, and community demographics to identify priority geographies to target for accelerated adoption of heat pumps and strategic retirement of gas infrastructure. Among other data, analysis should include information such as electric substation capacity, age and maintenance of gas infrastructure, networked geothermal district feasibility and, to the extent feasible and with proper consumer protections, housing characteristics (i.e., age of home, type of existing heating systems) and an overlay of areas with a high proportion of LMI households or small commercial and industrial building stock, as well as EJ populations. Analysis should also include an assessment of the differential barriers and burdens aced by energy service companies and communities in different areas of the Commonwealth.

Plan Components: The resulting plan should include spatial data that provides clear guidance to policy makers, developers, regional planners, and community members of anticipated infrastructure transitions, including existing substation capacity and constraints, areas prioritized for accelerated electrification and strategic gas retirement/system reduction, and new energy infrastructure projects (e.g., district geothermal).

Supporting Programs: To support implementation of the Joint Energy System Plan, the Commission recommends the Administration evaluate opportunities to accelerate wide-scale adoption of clean heating technologies, particularly in targeted geographic areas. This should include creation of a Strategic Retirement Program that conducts outreach to consumers with fossil fueled heating and water heating systems that exceed a certain age and supports them in transitioning to clean heating technologies ahead of system failure.

Stakeholder Engagement: The Commission recommends that the DPU and DOER engage communities and stakeholders as key contributors throughout the development and implementation of the Joint Energy System Plan. This should include collaboration with an advisory committee of select key stakeholders (e.g., municipal representatives, building owners and residents, hard to electrify commercial and industrial customers, LMI households, and EJ populations). The Administration, utilities, and committees should regularly report publicly on details and progress and the final plan should be made publicly available. Particular care should be taken to conduct education and engagement with trusted partners in communities that are directly impacted by the plan (e.g., those in which

infrastructure upgrades will occur in the near-term). As implementation gets underway, DOER should be charged with reporting on key metrics (e.g., financial impacts, environmental impacts, resourcing and supply chain, equity impacts), sharing lessons learned, and making recommendations to adjust the plan as required. DOER should use key metrics collected from the ten-town pilot experience, per H. 5060, to inform this effort without delaying the overall analysis.

C. Building Decarbonization Clearinghouse

Mass Save Reforms: The Administration should examine Mass Save's current configuration, including funding mechanisms, outreach measures, administration, and program delivery in light of the 2025/2030 CECP and develop a set of legislative, regulatory, and executive recommendations for amending the program and reconstituting it under a Building Decarbonization Clearinghouse to better equip the Commonwealth to deploy ratepayer funding in support of building decarbonization and electrification. As part of this evaluation, the Administration should consider how best to re-envision the role for Mass Save within a broader portfolio of building decarbonization programs, as well as the appropriate role of natural gas and electric utilities in program administration and/or implementation, if any. For example, it may be appropriate for Mass Save to continue implementing in-home weatherization and pre-weatherization initiatives as it does today, but the Administration might consider enabling the Clearinghouse to oversee the implementation of building decarbonization audits that identify and prioritize a wider range of program measures under its umbrella (e.g., weatherization, solar installation, heat pump adoption) replacing the need for an individual Mass Save audit. Should such a change be pursued, funding should be re-allocated to support the Clearinghouse to implement this function.

Clearinghouse Role: Beginning in 2023, MassCEC and DOER should set up a "Phase 1" Clearinghouse to serve as a one-stop-shop umbrella through which businesses and consumers can access existing building decarbonization programs through a single point of contact. Simultaneously, the Administration should pursue the legislative, regulatory, and executive changes necessary to formally establish the Massachusetts Building Decarbonization Clearinghouse and reconstitute Mass Save under its umbrella.

The Massachusetts Building Decarbonization Clearinghouse's mission will be to engage and support "customers" (inclusive of building owners, developers, residents, contractors, and consultants) in the effort of decarbonizing the building stock. The role of the Clearinghouse will be to serve as the key Administration point of contact and information for customers seeking to implement measures in buildings, in order to seamlessly connect them to the suite of building decarbonization programs available to Commonwealth residents and businesses. The Clearinghouse should prioritize customer engagement by providing dedicated liaisons and on-going engagement to ensure support throughout implementation of measures to transition buildings, including increasing energy efficiency, electrifying heating when and where feasible, and encouraging solar where economically beneficial. This could include supporting customers by providing clear and trusted information as they get started, creating plans for sequencing appropriate measures, accessing programs and benefits through a single contact, advising on ways to move as expeditiously, strategically, and cost-efficiently as possible, and conducting routine follow up to continue engaging customers in implementing identified measures. The Administration should also consider creating a Clearinghouse Ombudsman that can help customers resolve potential issues with accessing or utilizing programs under its umbrella. The Clearinghouse should prioritize support in historically underserved communities through liaisons that are local and speak the language of the population they are serving. The Clearinghouse will also be responsible for

ensuring that technical assistance is provided readily and equitably at the level needed by each customer.

The Clearinghouse should coordinate among all Commonwealth building decarbonization services and funding providers (including Mass Save, the Climate Bank, EEA, DOER, MassDEP, and MassCEC) across energy efficiency, renewable energy, electrification, and energy storage programs, services, and funds. The Clearinghouse should be tasked with making recommendations on programmatic design elements that can increase the utilization of existing programs, improve the alignment of programs with decarbonization goals, and improve the customer experience of the Clearinghouse and its offerings. Additionally, when designing new programs, agencies should consult with the Clearinghouse to ensure compatibility with program administration under the Clearinghouse's umbrella. Additional Clearinghouse coordination responsibilities should include conducting ongoing assessment of progress against building decarbonization and equitable implementation metrics; recommending program modifications or new strategies to prioritize clean heat solutions for the highest potential consumers, regions, and intervention spaces based on program adoption and identified barriers; and supporting continued policy and program innovation. These activities should be integrated and aligned with other ongoing activities in the building decarbonization space, including Joint Utility Planning and development of future Clean Energy and Climate Plans. The Commission recommends the Clearinghouse be independent from investor-owned utilities (IOUs) and any other obligated parties under the Clean Heat Standard. Externally, the Clearinghouse should collaborate with IOUs; municipal light plants; local, state, and federal agencies; the Climate Bank; regional planning agencies; cities and towns; industry; contractors; community-based organizations; representatives from EJ and LMI populations; and other relevant stakeholders and end users. This should include conducting outreach to help increase customer adoption of building decarbonization measures. In designing the Clearinghouse to achieve this role, the Administration should consider the most effective way to structure the Clearinghouse and administer the programs under its umbrella, including the ways in which existing Executive Offices or agencies and/or independent third-party models should be deployed.

Service Offerings: Programs included under the Clearinghouse umbrella should include existing programs such as Mass Save, SMART, APS, MassCEC rebate programs, and RPS, as well as information on federal tax credits, electric utility programs, clean electricity purchasing, and community solar. The Clearinghouse will act as a liaison between the customer and these existing programs. Additionally, the Clearinghouse may make recommendations for program changes or develop its own complementary programs. These programs may support weatherization, energy efficiency measures, deep energy retrofits, pre-weatherization and pre-electrification barrier mitigation, cold climate heat pumps, solar PV, solar thermal, other non-emitting renewable energy technology, EV deployment infrastructure, and clean energy connected devices, in order to fill any identified gaps in the existing programs. Consistent with decarbonization goals and building on recent legislation amending Mass Save, installation of new fossil fuel equipment and services should not be funded or supported through the Clearinghouse. Other efficiency measures and electrification-ready strategies should be considered in buildings currently operating with fossil fuel systems. Any property receiving such measures should be prioritized for continual Clearinghouse support to ensure fossil fuel systems are retired and replaced at or before the end of their useful life and before failure. As referenced under the Joint Energy System Planning recommendations, the Commission recommends that a new program be created to incentivize early retirements. This program should also be housed under the Clearinghouse.

Funding: The Clearinghouse and the programs under its umbrella should have funding from sources that are as reliable, dedicated, regular, and apolitical as possible, generated in a manner that accounts for and does not exacerbate existing unequal energy cost burdens. The Commission recommends a funding review be conducted of all existing programs, as well as existing bonding authority and any potential new federal sources of funding based on recent legislation. As noted above, if it is determined that allocating existing funding sources to the Clearinghouse would increase efficiency of utilization or impact of measures (e.g., decarbonization audits), the Administration should pursue legislative changes that enable such funding to be repurposed through the Clearinghouse. The Commission anticipates the Clearinghouse will leverage the Climate Bank and other federal and state funds and programs.

Success of the Clearinghouse will depend on it being staffed effectively to provide both the technical expertise and capacity needed to support the anticipated portfolio of customers. The Commission recommends the Administration conduct an expedient staffing analysis based on the pace and scale of building system conversions and retrofits required to meet the targets in the 2025/2030 CECP and 2050 Roadmap and allocate budget for operations accordingly.

Incentive Design: Incentives can influence consumer behavior to support the implementation of decarbonization at scale, but only when they are effectively designed to influence purchase decision-making toward more energy efficient and low carbon choices. The efficacy of a program will depend on the scale of the incentive, the simplicity of participation, and the program's ability to leverage the existing motivations of consumers, contractors, and distributors. To help ensure any incentive programs developed as a result of the Commission's recommendations are effectively designed, the Commission has developed a set of desired design features based on lessons learned navigating previous programs, including:

- Simple: The program is easy to explain to and be used by all participants. It pays the incentives quickly and accessibly to the user.
- Significant: The program significantly closes the incremental cost between replacement in kind vs. switching to a clean heating technology.
- Collaborative: Program design includes impacted parties to ensure usability.
- Consistent: The program treats clean heating technologies on a level playing-field, allowing customer and contractor to make the best choice for their individual context.
- Long-lasting: The program is put in place for a period of time long enough to create confidence in it and influence the market.
- Appropriately Targeted: The program's desired outcome is aligned with the selected intervention point (i.e., upstream to manufacturers, midstream to distributors and retailers, and downstream to building and homeowners).

Equity: To support an equitable transition, the Clearinghouse must ensure access by communities historically underserved by existing programs. Contractors and other customer-facing experts must be effectively trained and resourced to help economically stressed LMI customers navigate programs and seamlessly access appropriate incentives. To help ensure the cohort of contractors is demographically representative of the communities they serve, the Clearinghouse should prioritize MWBEs in the procurement process, conduct dedicated outreach and capacity building to contractors from LMI and EJ populations and support workforce development opportunities for new contracting businesses within EJ populations.

In developing implementation timelines, the Clearinghouse should prioritize pilot projects and targeted outreach efforts that put EJ and LMI populations at the front of the line for implementation. One element of this approach should include outreach to MWBEs and community organizations — in particular those involved in implementing Clearinghouse projects and consumer outreach activities — about pursuing decarbonization upgrades within their own buildings. Such efforts could yield significant benefits by socializing these businesses and organizations to the Clearinghouse customer experience, and by providing visible demonstrations of project benefits within target communities. Additionally, the Clearinghouse's approach could involve efforts to partner with and improve the residential weatherization programs run by Community Action Agencies/Programs (CAP Agencies), including the Low-Income Weatherization Assistance Program (WAP) and the Heating System Repair and Replacement Program (HEARTWAP), so they are more focused on and resourced for decarbonization.

To make program offerings as accessible as possible, the Clearinghouse should strive to identify and limit barriers and burdens specific to LMI households and EJ populations (e.g., income verification). In order to provide effective support to customers for whom English is not their first language, the Clearinghouse should translate all materials and resources into at least the five most common languages of each subregion of the Commonwealth and ensure technical assistance consultations are available for individual customers in their native language.

As described in more detail in the section on decarbonizing the affordable housing sector, the Clearinghouse should coordinate with state housing finance agencies and other affordable housing stakeholders to improve alignment across the agencies' decarbonization programs and identify and implement specific action steps. Coordination should include measures to ensure program interventions for retrofitting existing affordable housing developments are deployed on a timeline that coincides with project refinancing, when there is the greatest opportunity for implementation at scale.

D. Climate Bank

Additional Details on Context

One of the central challenges of supporting building decarbonization through a Climate Bank is the reality that under present market conditions, cost savings from deep efficiency improvements and electrifying buildings are usually insufficient to motivate private lender financing. The long-term operational savings that accrue to property owners cannot always be captured by the developer who bears the initial cost of construction. While Climate Banks have proven effective at de-risking investments with a compelling positive internal rate of return like "low hanging fruit" energy efficiency, solar PV, and basic weatherization, they have not yet been widely used to support the deployment of whole building electrification and deep energy-efficiency at scale. It will be important for the Climate Bank to have sufficient capitalization and flexibility to seek out innovative financing approaches, utilize appropriate evaluation criteria, and potentially forego returns on investment to address this challenge.

Furthermore, these current market realities suggest that the overall success of the Massachusetts Climate Bank is likely to be highly dependent on advancing the Commission's other recommendations, including scaling up incentive programs and developing effective enabling standards, regulations, and utility pricing that lower the relative installation and operating costs of electric heating appliances. Especially in the short-term as the market for clean heat appliances matures, the Commission expects that financing will play an important though limited role in advancing building decarbonization measures overall, and the role of the Climate Bank may include packaging and/or mobilizing incentives from other

sources. In the longer term, the Commission expects market maturation, economies of scale, and changing fuel costs to mitigate the need for such extensive incentives.

Additional Details on Key Program Elements

Rapid Set Up: Massachusetts has an immediate opportunity to leverage significant federal funding from the Inflation Reduction Act (IRA). The legislation includes a $27 billion Greenhouse Gas Reduction Fund that will support competitive grants to national and local Climate Banks for direct or indirect investments in low and zero emissions projects. A Massachusetts Climate Bank could be highly competitive applying for grants through this fund given the relative scale and track record of the Commonwealth's decarbonization investments. MassCEC is collaborating with stakeholders and other state agencies to position Massachusetts for a successful federal application. In light of this immediate opportunity, the Commission urgently recommends that a state Climate Bank be provided with the necessary authorizations to access Inflation Reduction Act funding. Given the likely timeline, it will be critical to coordinate activities across the change in Administrations.

Structure: The Climate Bank should be a quasi-public or non-profit entity with capital and operating funds supported by federal and state resources as well as philanthropy. Although Commissioners have suggested various potential short- and long-term institutional arrangements for the Climate Bank (such as creating an entirely new institution, embedding it within MassCEC, embedding it within the newly established Clean Heat Clearinghouse, or partnering with a community development financial institution), the Commission does not take a position on which of the above structures is most appropriate or where the entity should be housed. Commissioners have emphasized that it could be helpful to incorporate the Climate Bank into the mandates of an existing institution, such as MassCEC, to limit the bureaucratic overhead of starting a new agency or institution from scratch. They have also strongly emphasized the importance of closely connecting the Climate Bank to the Building Decarbonization Clearinghouse to ensure programmatic alignment and effective service delivery to customers and have highlighted the need for effective management. The Commission advises against establishing a private, for-profit entity, which would limit the Bank's capacity to deliver the kinds of enhancements to private sector funding highlighted above. Overall, the Bank's structure and design should shield it from a counterproductive focus on short-term profits and enable it to connect seamlessly with state-funded programming and technical support through the Clearinghouse and elsewhere.

Capitalization: The Climate Bank should have sufficient initial capitalization to cover multiple years of operating expenses and lending enhancements at the scale needed to achieve the pace of decarbonization in the 2050 Roadmap, likely in the range of $1 billion. Depending on the types of lending products the bank offers, it may not generate a profit and may need ongoing capital to sustain its operations. It will be important for the Administration to plan for ensuring the bank's long-term sustainability.

Institutional Coordination and Accessibility: The Climate Bank should coordinate closely with the Commonwealth's decarbonization incentives and technical assistance programs (in particular the Building Decarbonization Clearinghouse) to align program offerings and enable the "customer-centric" approach described above. Coordination around program offerings should involve the development of coherent market segment-specific strategies and timelines involving different mixes of subsidies and financing approaches for a continuum of project types, from multifamily commercial and industrial to single-family residential, and market to affordable and low-to-moderate income. A "customer-centric" approach should involve Climate Bank staff administering the Commonwealth's financing-related

programs in a way that is transparent and seamless to customers. The goal is to ensure customer-facing staff and contractors connected to the Clearinghouse and elsewhere can effectively describe the full suite of financing options during customer interactions (commonly known as "kitchen table finance"), and seamlessly connect customers to relevant programs.

Equity: In accordance with the Commission's overarching recommendations on equity, discussed above, the Climate Bank should ensure its programs do not contribute to increased operating costs for LMI households and EJ populations, for example by creating an unsustainable debt burden within households that already struggle to pay for key services. For this reason, a thoughtful approach to LMI finance support is required, potentially including reduced interest rates and incorporated incentives. As discussed above, the Climate Bank should coordinate with consumer-facing entities (such as the Clearinghouse) to ensure financing options are easily accessible and communicated clearly by front-line staff to households from all backgrounds.

E. Strategies for Decarbonizing the Affordable Housing Sector

Additional Details on Context

Recent successes suggest that under the right circumstances and when paired with effective agency coordination, sound program design, and adequate funding, decarbonization and affordable housing goals can be mutually reinforcing. The Massachusetts Department of Housing and Community Development (DHCD) awards low-income housing tax credits on a competitive basis, in accordance with an annual qualified allocation plan (QAP). Recent QAPs have given scoring priority to projects whose sponsors incorporate green, sustainable, and climate resilient elements into their design, including Passive House certification. As a result, projects subsidized with the low-income housing tax credit include some of the most energy-efficient multi-family buildings yet constructed in Massachusetts. In addition, Mass Save has adopted an incentive framework centered around Passive House for multifamily residential buildings, together with an all-electric incentive for 1–4-unit new homes. There are now more than 50 multifamily affordable housing developments committed to building according to the Passive House standard, part of the 168 projects consisting of 10,818 units enrolled in the Mass Save Passive House multifamily new construction program.[29]

From 2015-2016, EEA, DOER, HED, DHCD and other stakeholders came together to develop approaches for increasing access to clean energy in affordable housing. The Commission recommends building on that previous work by focusing on identifying specific programming, funding, financing tools, technical assistance, and other measures to address existing buildings as soon as possible.

Additional Details on Key Program Elements

Specific measures advanced through the cross-sector strategy should include the following:

1. Continue to lead on new construction and identify opportunities for improvement: The stakeholder group should identify and advance opportunities to leverage existing tax credits and other programs to promote energy efficient and electrified new construction, for example by ensuring the QAP selection criteria continue to incorporate appropriate standards to achieve building decarbonization goals, and that Mass Save continues to effectively implement its multifamily new construction program. The group

[29] Massachusetts Energy Efficiency Program Administrators Quarterly Report: Second Quarter, 2022, 19 Aug. 2022, p. 12, found at ma-eeac.org/wp-content/uploads/Quarterly-Report-of-the-PAs-2022-Q2-Rev.-8-25.pdf.

should evaluate evolving costs of production and discuss how to address them, for example through revising per unit cost caps or offering exceptions to these caps to developers who pursue especially aggressive decarbonized building approaches. For such an effort to be successful, it will be critical to acknowledge and navigate tensions between total development costs and decarbonization goals and bring in additional resources to support decarbonization. The group should identify opportunities to maximize outside resources that could be made available to support new production, for example renewable energy credits in the Inflation Reduction Act and other funding sources.

2. Develop and implement dedicated measures to support decarbonization in substantial rehabilitations: These efforts should have two goals. The first is to improve the efficiency and effectiveness of the Mass Save low income retrofit program through improved coordination. Currently, program interventions are not sufficiently coordinated with comprehensive project rehabilitations, which typically occur when projects seek refinancing (roughly every 10-15 years). Refinancing events provide a unique and time-sensitive opportunity to advance decarbonization measures more broadly and at a lower total cost than pursuing them through individual installations. Accordingly, the agencies (through the Clearinghouse or otherwise) should develop a robust suite of program interventions (including funding, financing, education, and technical assistance) and coordinate across agencies to ensure these interventions are deployed on a timeline that coincides with project refinancing processes, with plenty of advance notice to provide education and technical assistance to project managers and other stakeholders as needed.

Second, an effective suite of measures to target substantial rehabilitations will require additional resources. The Commission has concerns about the decarbonization of state-subsidized affordable housing being paid for using tax credits and other state funding sources intended to subsidize housing production. Massachusetts faces an affordable housing crisis alongside the climate crisis, and resources to mitigate the latter problem should not cannibalize those needed to support programs addressing the former. Accordingly, the Commission recommends working with the Administration and Legislature to develop new programs focused squarely on decarbonizing affordable housing, with a focus on substantial rehabilitations.[30] Potential resources to be explored should include:

- New tax credits
- An increase in private activity bonds available for decarbonized affordable housing retrofits
- Expanded renewable energy credits under the IRA
- An expansion of the property assessed clean energy (PACE) program[31]
- More resources for DHCD-administered affordable housing subsidies that can be utilized for decarbonization (without reducing resources for new construction)
- IRA funding for HUD's Green and Resilient Retrofit program
- ARPA dollars

3. Develop and implement a framework for effectively supporting single family retrofits: The stakeholder group should work with the Clearinghouse and Climate Bank to support decarbonized retrofits for smaller and single-family affordable housing developments. Key opportunities could include:

[30] This strategy could extend beyond just tax credits designed to support affordable housing projects, and include other, related programs such as the Historic Rehabilitation Tax Credit. In each case, efforts should be made to identify opportunities for maximizing carbon reduction impact consistent with the goals of the program.
[31] Though limited in their use at present for multifamily residential developments, PACE could be attractive in a higher interest rate environment. DOER could revisit guidelines for PACE to make them as flexible and usable as possible.

- Partnership with MassHousing to facilitate refinances utilizing competitive rates to increase availability of capital
- Fannie Mae and Freddie Mac green-incentivized financing
- New financing products developed through the Climate Bank

In addition to these efforts, the Clearinghouse and Climate Bank should develop specific strategies to appropriately incentivize decarbonization of naturally occurring affordable housing. These initiatives are described in greater detail in the recommendations related to Clearinghouse and Climate Bank.

F. Workforce Training and Education

To create a robust pipeline of building trade professionals, the Commonwealth should work with partners to develop curricula aligned to employer-needs and designed for multiple delivery options (including hybrid learning), offer training and technical assistance, and provide mentorship and funding opportunities. This should include connecting with current and future workers of all ages and demographics and across geographies. Opportunities should be accessible through all state education and training institutions and include programs with high schools and vocational-technical schools (that engage both parents and students), unions, trade schools, associations, and veterans' groups, and include a focus on programs serving environmental justice populations. Training opportunities should be made available during the school and workday, as well as on nights and weekends to accommodate a variety of students. While attracting workers from all these backgrounds is important, there should be a strong focus on high schools where young adults are deciding on a career and educational next steps, to ensure they are aware of opportunities in the trades, and especially in the energy sectors.

Workforce training programs should comprehensively cover the key skills needed by those involved in deploying clean heating and building decarbonization measures, be packaged in a manner that ensures trainees can deliver complementary technical recommendations and services (e.g., weatherizing in advance of heat pump installation), and include wraparound training services for skills needed to enter the workforce. This includes programming that provides both technical learning and practical application of:

- HVAC — heat pump and mini-split technologies and installation, including drilling and servicing resources
- Solar installation and service
- Wind technology
- Exterior envelope weatherization (windows, doors, vapor barriers, flashing tapes/systems)
- HERS rating

To ensure the quality of work, the Commission recommends requiring training and continuing education for building trades professionals, in particular, HVAC and solar contractors (similar to Contractor Supervisor Licensing), and recommends the Administration consider requiring certification or licensing of these trades, particularly for contractors who will be referred customers by the Clearinghouse. Any new licensing requirement should be considered carefully and implemented in a manner that does not create an additional barrier to developing a robust and diverse building decarbonization workforce but instead ensures the quality of work that will result in GHG emissions reductions and strong customer satisfaction. Measures to ease the implementation of new requirements could include allowing additional apprentices per mentor, grandfathering in existing workers, allowing a grace period for certification and licensure, and paying trainees. Any fees collected from these credentials should be

utilized to support training programs. This could include wages for days in training and scholarships to cover costs for BIPOC professionals or companies in EJ populations participating in trainings.

Finally, it is paramount that this training be provided in a manner that creates career pathways for all, in particular for populations commonly underrepresented in trades and disproportionally burdened by energy costs and the impacts of climate change. The Commonwealth should seek to partner with community colleges and other institutions that already engage these populations (e.g., MassHire Workforce System), and build upon successful trade initiatives to increase the proportion of women and minority union members. Pre-apprenticeship programs, for example, have a strong track record of bolstering diverse candidates in the trades and registered apprenticeship programs allow workers to be employed while learning and have dedicated funding to support employer costs.