Attachment 17

Mass. D.P.U. 20-80-B, Order on Regulatory Principles and Framework (Dec. 6, 2023)

The Commonwealth of Massachusetts

DEPARTMENT OF PUBLIC UTILITIES

D.P.U. 20-80-B December 6, 2023

Investigation by the Department of Public Utilities on its own Motion into the role of gas local distribution companies as the Commonwealth achieves its target 2050 climate goals.

ORDER ON REGULATORY PRINCIPLES AND FRAMEWORK

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SUMMARY

The Department of Public Utilities ("Department") announces a regulatory framework intended to set forth its role and that of the Massachusetts gas local distribution companies ("LDCs") in helping the Commonwealth achieve its target of net-zero greenhouse gas ("GHG") emissions by 2050. Global Warming Solutions Act, St. 2008, c. 298 ("GWSA"); Executive Office of Energy and Environmental Affairs Determination of Statewide Emissions Limit for 2050 (April 22, 2020). The Department seeks to enable the Commonwealth to move into its clean energy future while simultaneously safeguarding ratepayer interests and maintaining affordability for customers; ensuring safe, reliable, and cost-effective natural gas service; minimizing the burden on low- and moderate-income households as the transition proceeds; and facilitating a just workforce and energy infrastructure transition.

In this proceeding, the Department reviewed eight potential decarbonization "pathways" to achieving the target of a 90 percent gross reduction in GHG emissions by 2050 as compared to 1990 levels, as well as interim GHG emissions reductions targets of 50 percent by 2030 and 75 percent by 2040. The decarbonization pathways are designed to reflect different futures for the LDCs and their customers, ranging from ongoing use of the LDCs' distribution networks to 100-percent decommissioning of gas distribution infrastructure in the Commonwealth. The Department makes no findings as to a preferred pathway or technology; rather, our aim is to create and promote a regulatory framework that is flexible, protects consumers, promotes equity, and provides for fair consideration of the current and future technologies and commercial applications required to meet the Commonwealth's clean energy objectives.

The Department considered six regulatory design recommendations intended to facilitate the Commonwealth's transition: (1) support customer adoption of and conversion to electrified and decarbonized heating technologies; (2) blend renewable gas supply into gas-resource portfolios; (3) pilot and deploy innovative electrification and decarbonized technologies; (4) manage gas embedded infrastructure investments and cost recovery; (5) evaluate and enable customer affordability; and (6) develop LDC transition plans and chart future progress. The Department makes specific findings about each of these regulatory design recommendations as detailed in the Order.

As to supporting customer adoption of and conversion to electrified and decarbonized heating technologies, the Department finds that to achieve the Commonwealth's climate targets, there must be a significant increase in the use of electrified and decarbonized heating technologies. The Department and LDCs can play a pivotal role by enhancing incentives and expanding the Mass Save energy efficiency programs to facilitate customer use of heat pumps. The Department also addresses the critical need to minimize costs for customers, including through pursuit of outside funding sources, and prioritizing workforce development to enable a just transition framework for gas industry workers as well as customers.

The Department rejects the recommendation to change its current gas supply procurement policy to support the addition of renewable natural gas ("RNG") to LDC supply portfolios due to concerns regarding the costs and availability of RNG as well as its uncertain

status as zero-emissions fuel. The Department does support the option for customers to be able to purchase RNG from their LDC or a supplier at full cost to the customer.

Given the critical importance of significantly decarbonizing the heating sector, the Department considered the proposal that the LDCs pilot and deploy the following four technologies: (1) networked geothermal; (2) targeted electrification; (3) hybrid heating systems; and (4) renewable hydrogen. As detailed in the Order, the Department views networked geothermal projects as those with the most potential to reduce GHG emissions, and expresses support for targeted electrification as well.

The Department seeks to dissuade gas customer expansion and to align rate design with the Commonwealth's climate objectives. To achieve this, the Department instructs gas utilities to revise their per-customer revenue decoupling mechanism to a decoupling approach based on total revenues. Removing the incentive to add new customers aligns the LDCs' rate design with climate objectives and GHG emissions reductions targets. The Department finds it must examine the issue of depreciation, i.e., the period of time over which a capital investment is recovered, and stranded assets. As an initial step, the Department directs all LDCs to conduct a comprehensive review that includes a forecast of the potential magnitude of stranded investments, and to identify the impacts of accelerated depreciation proposals, as well as potential alternatives to accelerated depreciation.

The Department finds that consideration of non-gas pipeline alternatives ("NPAs"), defined broadly to include electrification, thermal networked systems, targeted energy efficiency and demand response, and behavior change and market transformation, is necessary to minimize investments in the gas pipeline system that may be stranded costs in the future as decarbonization measures are implemented. Going forward, the Department states that as part of future cost recovery proposals, LDCs will bear the burden of demonstrating that NPAs were adequately considered and found to be non-viable or cost prohibitive to receive full cost recovery.

The Department agrees with suggestions that the standards for investments to serve new customers be examined. The Department therefore directs the LDCs to begin reviewing existing tariffs, policies, and practices related to new service connections to determine: (1) the number of *de facto* free extension allowances; (2) whether current models and policies accurately reflect the anticipated income and timeframe over which the capital investments will be recovered; and (3) whether existing state policies are inconsistent with current practices by incentivizing new customers to join the gas distribution system and allowing LDCs to extend their systems through plant additions. Further, in reviewing future applications for new service, the Department will examine the appropriateness of the existing standard—that there be no adverse impacts on existing natural gas customers—in the context of a broader climate mandate.

The Department observes that there are numerous concerns regarding affordability for customers, including the upfront costs required for customers to convert appliances and heating systems from natural gas to electricity, and also higher rates for customers who remain on the system. Cost shifting between migrating and non-migrating customers and

between rate classes, and potential disproportionate impacts on low-income customers and customers from environmental justice populations, present equity challenges as well.

Finally, the Department finds that the clean energy transition will require coordinated planning between LDCs and electric distribution companies, monitoring progress through LDC reporting, and aligning existing Department practices with climate targets. To that end, the Department orders LDCs to submit individual Climate Compliance Plans to the Department every five years beginning in 2025, and to propose climate compliance performance metrics in their upcoming performance-based regulation filings, ensuring a proactive approach to achieving climate targets.

I. INTRODUCTION

The Department of Public Utilities ("Department") opened this inquiry on October 29, 2020, to examine the role of Massachusetts gas local distribution companies ("LDCs") in helping the Commonwealth achieve its 2050 climate targets, and to identify strategies for enabling the Commonwealth to move into its net zero greenhouse gas ("GHG") emissions energy future while simultaneously safeguarding ratepayer interests; ensuring safe, reliable, and cost-effective natural gas service; and potentially recasting the role of LDCs in the Commonwealth. Investigation by the Department of Public Utilities on its own Motion into the Role of Gas Local Distribution Companies as the Commonwealth Achieves its Target 2050 Climate Goals, D.P.U. 20-80, Vote and Order Opening Investigation at 1 (2020) ("Vote and Order"). The Department specifically sought to develop a regulatory and policy framework to guide the evolution of the gas distribution industry in the context of a clean energy transition that requires the Department to consider new policies and structures to protect ratepayers as the Commonwealth reduces its reliance on natural gas. D.P.U. 20-80, at 4. This proceeding is necessarily one step—not the first and certainly not the last—as we endeavor to chart a path forward that enables the Commonwealth to achieve its target of net zero GHG emissions by 2050. Global Warming Solutions Act, St. 2008, c. 298 ("GWSA"); Executive Office of Energy and Environmental Affairs Determination of Statewide Emissions Limit for 2050 (April 22, 2020), available at https://www.mass.gov/doc/final-signed-letter-of-determination-for-2050-emissions-limit/download (last visited November 29, 2023). The Department docketed this matter as D.P.U. 20-80.

Through this investigation, the Department has gathered a significant body of information from the LDCs and a wide range of institutional and individual stakeholders, evincing the need for an evolving, multifaceted, broadly coalitional, and responsive process as we seek to define and meet the significant challenges and potential opportunities that are presented not only by the Commonwealth's climate targets, but also by the threat and reality of the climate crisis itself. The Department acknowledges and appreciates the time, commitment, and thoughtful contributions provided by many stakeholders throughout this proceeding. In this Order, we first enunciate a set of regulatory principles that will guide our decision-making in this and future dockets. We then address in more detail the reports and analyses produced by the LDCs and their consultants, as well the comments and analyses submitted by stakeholders. Our purpose here never has been to dictate one path forward, but to gather information and identify existing and potential means within our authority to remove barriers to the clean energy transition and find ways for the Department to facilitate and accelerate pursuit of our 2050 climate targets. To that end, in this Order we identify future areas of inquiry that will be explored and note those future proceedings (including technical conferences, adjudications, and additional investigations) where we will investigate and implement the issues and principles identified herein.

In enunciating regulatory principles, our intent is that these foundational propositions will inform many of the Department's processes and proceedings through a "whole of DPU" approach, not limited to those matters such as this where climate and GHG-reduction policies explicitly are at issue, but also inform rate design and other more traditional Department

functions within our authority. We also note areas in which the Department cannot (or cannot yet) act unilaterally, observing where legislative change or other agency action is required as we seek to pursue vigorously our role in a "whole of government" response to the climate crisis. The Department is one governmental actor working toward the clean energy transition, and we anticipate necessary future legislative action, as well as implementation from the Executive Office of Energy and Environmental Affairs ("EEA"), Massachusetts Department of Energy Resources ("DOER"), Massachusetts Department of Environmental Protection ("MassDEP"), and the Massachusetts Clean Energy Center ("MassCEC"), among others. Finally, in establishing these guiding principles we take care to emphasize the role of communities, neighborhoods, and individuals within the clean energy transition, as we seek to facilitate active participation in a "whole of society" approach to electrification, decarbonization, a just and equitable workforce transition, and equitable investment in communities in pursuit of our 2050 climate targets. While the Department cannot dictate the choices of individual consumers, we can and will seek to maintain a safe, reliable, and affordable system while encouraging and facilitating the thousands of small transitions that must occur on household, neighborhood, and community levels for the Commonwealth as a whole to move into its clean energy future.

II. PROCEDURAL HISTORY

On October 29, 2020, the Department voted to open an investigation into potential policies that will enable the Commonwealth to reach its target of net zero GHG emissions by

2050 and the role of Massachusetts gas LDCs[1] in achieving that goal.[2] D.P.U. 20-80, at 1. The Department stated its intent to solicit utility and stakeholder input in this investigation, noting that EEA was (1) developing in consultation with MassDEP and DOER an evaluation of potential pathways to achieving the Commonwealth's 2050 GWSA statewide net zero emissions limit; and (2) preparing a Clean Energy and Climate Plan ("CECP")[3] for 2030. D.P.U. 20-80, at 3, citing Executive Office of Energy and Environmental Affairs Determination of Statewide Emissions Limit for 2050 (April 22, 2020); G.L. c. 21N, §§ 3, 4; Massachusetts 2050 Decarbonization Roadmap (December 2020), available at

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1 The gas LDCs subject to the Department's jurisdiction are: The Berkshire Gas Company ("Berkshire Gas"); Boston Gas Company d/b/a National Grid ("National Grid (gas)"); Eversource Gas Company of Massachusetts ("EGMA") and NSTAR Gas Company ("NSTAR Gas"), each d/b/a Eversource Energy (together, "Eversource"); Fitchburg Gas and Electric Light Company d/b/a Unitil ("Unitil"); and Liberty Utilities (New England Natural Gas Company) Corp. d/b/a Liberty ("Liberty").

2 Prior to the Department's issuance of the Order, the Attorney General of the Commonwealth of Massachusetts ("Attorney General") filed a petition ("Petition") requesting that the Department open an investigation to assess the future of the LDCs' operations and planning in light of the Commonwealth's target of net zero GHG emissions by 2050 (Attorney General Petition at 1 (June 4, 2020), citing GWSA; Executive Office of Energy and Environmental Affairs Determination of Statewide Emissions Limit for 2050 (April 22, 2020); State of the State Address (January 21, 2020)). The Attorney General's request has been incorporated into this docket.

3 EEA prepares a CECP every five years, beginning in 2010. The CECP sets forth a policy/roadmap for the Commonwealth to meet the GHG emissions limits by 2050. The Interim 2030 CECP developed by EEA was released in December 2020. The final CECP for 2025 and 2030 was released in June 2022 ("2025/2030 CECP") and can be found at https://www.mass.gov/info-details/massachusetts-clean-energy-and-climate-plan-for-2025-and-2030 (last visited November 29, 2023).

https://www.mass.gov/doc/ma-2050-decarbonization-roadmap/download (last visited November 29, 2023). The Department stated its anticipation that the 2050 Decarbonization Roadmap ("2050 Roadmap") and 2030 CECP (together, the "Roadmaps") would set forth policies affecting ratepayers, LDCs, and the gas industry as a whole. D.P.U. 20-80, at 3. The Department therefore directed the LDCs to: (1) initiate a joint request for proposals ("RFP") for an independent consultant to conduct a detailed study of each LDC and analyze the feasibility of all pathways identified in the Roadmaps, as well as any additional strategies identified by the independent consultant, to help the Commonwealth achieve its goal of net zero GHG emissions by 2050; (2) submit a report prepared by the independent consultant that integrates the individual analyses of each LDC into one, collective report containing comparisons among the LDCs; and (3) submit individual proposals to the Department that includes each LDC's recommendations and plans for helping the Commonwealth achieve its 2050 climate targets, supported by the independent consultant's report, along with all analyses and supporting data. The Vote and Order further directed that the LDCs engage in a stakeholder process to solicit feedback and advice on the independent consultant's report and the LDCs' individual proposals prior to submitting these documents to the Department. D.P.U. 20-80, at 4-5.

On November 6, 2020, the Attorney General filed a motion requesting clarification ("Motion for Clarification") of the Department's Vote and Order with respect to its directives for stakeholder participation in (1) the development of the RFP to hire an independent consultant; and (2) the Massachusetts gas LDCs' development of the report and proposals

(Attorney General Motion for Clarification at 1). The Department received several responses to the Attorney General's Motion for Clarification from interested stakeholders.[4] On February 10, 2021, the Department issued an order on the Attorney General's request. Investigation by the Department of Public Utilities on its own Motion into the Role of Gas Local Distribution Companies as the Commonwealth Achieves its Target 2050 Climate Goals, D.P.U. 20-80-A (2021).

On March 1, 2021, the Attorney General filed a notice of retention of experts and consultants in this investigation at funding not to exceed $150,000, filed pursuant to G.L. c. 12, § 11E(b) ("Notice of Retention"). On May 21, 2021, the Attorney General filed a revised notice to retain experts and consultants seeking an amended funding at an amount not to exceed $350,000 ("Revised Notice of Retention"). The Department received no comments on the Attorney General's Notice of Retention or Revised Notice of Retention[5] and on June 29, 2021, the Department issued an order approving the Attorney General's Revised

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4 The following stakeholders submitted responses to the Attorney General's Motion for Clarification: Conservation Law Foundation ("CLF"); the Sierra Club; Environmental Defense Fund ("EDF"); joint response by the gas LDCs; the Town of Hopkinton; the Gas Leaks Allies; and Mothers Out Front.

5 Pursuant to G.L. c. 12, § 11E(b), the Department must allow all full parties to a proceeding the opportunity to comment on the Attorney General's Notice of Retention. The only full party to this proceeding is the Attorney General. Nevertheless, the Attorney General served her Notice of Retention on the LDCs and the LDCs did not comment. It is unclear whether the Attorney General served her Revised Notice of Retention on the LDCs, but it was not required.

Notice of Retention. D.P.U. 20-80, Order on Attorney General's Revised Notice of Retention of Experts and Consultants (June 29, 2021).

On March 1, 2021, and September 1, 2021, and in accordance with the Department's directives, the LDCs provided status updates regarding the progress with respect to the RFP and stated that, through the RFP, the LDCs selected Energy & Environmental Economics ("E3"), with ScottMadden as subcontractor (together, "Consultants"), to be the independent consultant for the pathways analysis, and the retention of Environmental Resources Management ("ERM") to develop and facilitate the stakeholder process.

On March 18, 2022, pursuant to the Department's Vote and Order, each LDC submitted: (1) the company's individual proposals and plans for helping the Commonwealth achieve its 2050 climate targets within reports entitled "net zero enablement plan[s]" ("Net Zero Enablement Plan," or collectively, "Net Zero Enablement Plans"); and (2) a report on the technical analysis of decarbonization pathways ("Pathways Report") as well as a report on considerations and alternatives for regulatory designs to support transition plans ("Regulatory Designs Report") (collectively, the "Reports").[6] In addition, on this same date the LDCs submitted: (1) a stakeholder engagement report ("Stakeholder Engagement Report") prepared by ERM to develop and facilitate the stakeholder engagement process; (2) the gas LDCs' common regulatory framework and overview of the Net Zero Enablement

[6] The Reports were prepared by the LDCs' Consultants.

Plans ("Framework and Overview"); and (3) a proposed Net Zero Enablement Plan model tariff ("Model Tariff").

On March 23, 2022, the Department issued a Notice of Filing, Public Hearing, and Request for Comments ("Notice") along with an Order of Notice ("Order of Notice").[7] The

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[7] On February 14, 2022, the Attorney General and DOER submitted correspondence outlining procedural recommendations, including a proposed procedural schedule for this matter, for which CLF, National Consumer Law Center ("NCLC"), Low-Income Energy Affordability Network ("LEAN"), and Home Energy Efficiency Team ("HEET") expressed support. In consideration of the recommendations submitted by the Attorney General and DOER, the Department set a procedural schedule in this matter on March 24, 2022.

On March 28, 2022, CLF, Acadia Center, EDF, HEET, and Sierra Club jointly filed a motion for reconsideration of the Department's Order of Notice issued on March 23, 2022 ("Joint Motion for Reconsideration"). The Joint Motion for Reconsideration requested that the Department: (1) rescind its March 23, 2022 Order of Notice; (2) extend the procedural schedule set forth by the Department on March 24, 2022; and (3) allow for additional process in this docket, including the opportunity to intervene or otherwise obtain party status, participate in discovery, present expert testimony, and to cross-examine witnesses (Joint Motion for Reconsideration at 11-12).

On April 4, 2022, the Department received a jointly filed response by the gas LDCs ("LDCs' Response to Joint Motion for Reconsideration") objecting to the Joint Motion for Reconsideration on the grounds that (1) the Joint Motion for Reconsideration is improper and contradictory to the purposes of this proceeding and (2) the process outlined in the Department's Notice and procedural schedule is consistent with both Department precedent for similar proceedings and the Attorney General's Petition in this matter (LDCs' Response to Joint Motion for Reconsideration at 3-4).

On April 15, 2022, the Department issued a Hearing Officer Memorandum noting that pursuant to the Notice of Filing and Public Hearing issued in this matter, the deadline for submitting written comments was May 6, 2022. The Department encouraged stakeholders to submit comments identifying issues with the consultants' reports and the LDCs' individual proposals and suggestions and recommendations of alternative

Department held technical sessions on the Reports and Net Zero Enablement Plans on March 30, 2022, and April 15, 2022. On May 3, 2022, and May 5, 2022, the Department held public hearings to receive comments on the Reports and Net Zero Enablement Plans.

The Department received more than 230 initial comments from various stakeholders and members of the public ("Initial Comments"). The Department directed the gas LDCs to respond to the Initial Comments, and the LDCs submitted their response on July 29, 2022 ("LDC Joint Comments"). On September 8, 2022, the Department requested all final comments from stakeholders in response to the LDCs' Joint Comments by October 14, 2022 ("Final Comments").[8, 9]

The Department issued seven sets of common information requests to the gas LDCs, one set of information requests each to Berkshire Gas and Unitil, and two sets of information

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proposals, particularly alternative regulatory framework proposals (Hearing Officer Memorandum at 2 (April 15, 2022)). The Department stated that its goal is to develop an overall regulatory framework that will be used to guide statewide and company-specific proposals, so the Department specifically sought alternative proposals that will inform the Department's analysis on the regulatory framework. The Department further stated its intent to schedule additional technical conferences to explore regulatory framework proposals after the May 6, 2022 comment deadline (Hearing Officer Memorandum at 2 (April 15, 2022)).

8 The substance of the Initial Comments, LDC Joint Comments, and Final Comments is discussed further below in Sections V and VI.

9 DOER submitted late-filed Final Stakeholder Comments on October 17, 2022, pursuant to its request to submit its final comments one business day late. The Department herein accepts DOER's late-filed Final Stakeholder Comments.

requests each to Eversource, Liberty, and National Grid (gas). In total, the Department issued 113 information requests to the LDCs.

III. BEYOND GAS: A SUMMARY OF REGULATORY PRINCIPLES

Massachusetts has long been a national leader in adopting state policies to address climate change. Through our actions in this proceeding, we continue in that leadership role by tackling the challenging issues associated with developing a pathway for the transition in the natural gas industry that will be necessary for the Commonwealth to achieve its target of net-zero GHG emissions by 2050, as set forth in the GWSA, and to achieve the sector-specific emissions reductions established in the CECP for 2025 and 2030.[10]

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[10] In addition to the GWSA, the Commonwealth has enacted An Act Creating a Next-Generation Roadmap for Massachusetts Climate Policy, St. 2021, c. 8 ("2021 Climate Act"), and An Act Driving Clean Energy and Offshore Wind, St. 2022, c. 179 ("2022 Clean Energy Act"). The GWSA, as amended by the 2021 Climate Act and implemented by the Secretary of EEA, requires the Commonwealth to reduce GHG emissions between 10 and 25 percent from 1990 levels by 2020, at least 50 percent from 1990 levels by 2030, at least 75 percent from 1990 levels by 2040, and achieve net-zero emissions by 2050 with a gross reduction in emissions of 85 percent from 1990 levels. G.L. c. 21N § 4; Executive Office of Energy and Environmental Affairs Determination of Statewide Emissions Limit for 2050 (April 22, 2020) (setting a legally binding statewide limit of net-zero GHG emissions by 2050, defined as 85 percent below 1990 levels); State of the State Address (January 2021) (Governor commits to achieving net zero greenhouse gas emissions by 2050), available at https://archives.lib.state.ma.us/handle/2452/816469 (last visited November 29, 2023). The CECP for 2025 and 2030 set sector-specific emissions reduction targets, as mandated by the 2021 Climate Act, setting an emissions reduction target for residential heating and cooling of 29 percent by 2025 and 49 percent by 2030 and an emission reduction target for commercial and industrial heating and cooling of 35 percent by 2025 and 49 percent by 2030 (2025/2030 CECP at 23). The 2025/2030 CECP and supporting information including sublimits is available at https://www.mass.gov/info-details/massachusetts-clean-energy-and-climate-plan-for-2025-and-2030 (last visited November 29, 2023).

As we chart the path for this transition, we emphasize that nothing we do here is intended to jeopardize the rate recovery of the billions of dollars of existing investments in natural gas infrastructure by the LDCs operating within the Commonwealth. Traditional notions of the regulatory compact continue to apply to those investments and, accordingly, there generally must be some demonstration of imprudence before recovery of existing investments can be challenged. At the same time, however, it is fair to say that a different lens will be applied to gas infrastructure investments going forward. The Department will be examining more closely whether such additional investments are in the public interest, given the now-codified commitment toward achieving Commonwealth's target of achieving net-zero GHG emissions by 2050 and the urgent need to address climate change. In this "beyond gas" future, we will be exploring and implementing policies that are geared toward minimizing additional investment in pipeline and distribution mains and achieving decarbonization in the residential, commercial, and industrial sectors.

The ambitious mandates established by the Commonwealth require gas LDCs to move beyond "business as usual" in their gas system planning, whether involving proposed expansion of service to new areas or investments necessary to maintain the safety of existing natural gas infrastructure. As discussed in subsequent sections of this Order, we are acting, within our existing statutory authority, to discourage further expansion of the natural gas distribution system. We will do so by revisiting the "public interest" standard we apply in evaluating proposed expansions, by examining the line extension policies followed by LDCs that may be inconsistent with the broader public policy of achieving necessary GHG

reductions, and by encouraging consideration of zero-carbon alternatives, such as electrification and thermal networked systems, to traditional gas system capital investments.

With respect to maintenance of the existing natural gas infrastructure, our "beyond gas" future will similarly involve close scrutiny of the extent to which additional investment is necessary, with an eye toward minimization of costs that may be stranded in the future as decarbonization measures are implemented in the natural gas industry. In particular, we will generally require the examination of non-gas pipeline alternatives ("NPAs"), defined broadly to include electrification, thermal networked systems, targeted energy efficiency and demand response, and behavior change and market transformation.[11] Going forward, LDCs will have the burden to demonstrate the consideration of NPAs as a condition of recovering additional investment in pipeline and distribution mains. As discussed in later sections of this Order, we will continue to explore opportunities for strategic and targeted decommissioning of portions of LDC service territories, through demonstration projects deploying both electrification and thermal network technologies.

As in the case of the transition to clean energy in the electricity sector, the decarbonization of the natural gas industry may result in higher costs being imposed on ratepayers. Given the urgency of addressing the climate crisis, however, we are reluctant to slow the pace at which the transition must occur due to concerns about affordability for

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[11] The comprehensive analysis of NPAs that we envision incorporates many of the elements identified in the Attorney General's proposed "investment alternatives calculator" and the "geographic marginal cost analysis" proposed by DOER, both of which are discussed later in this Order.

low- and moderate-income utility customers. Rather, the Department will address these issues in a separate proceeding, to be commenced later this year, dedicated toward examining innovative solutions to address the energy burden and affordability, such as capping energy bills by percentage of income or offering varying levels of low-income discounts, that have been implemented in other jurisdictions. We are confident that we can develop a solution—which likely will require a change in our statutory authority—that will allow us to address affordability issues in an effective manner and still enable us to achieve the necessary progress toward the Commonwealth's GHG emission reduction limits.

The transition of the natural gas industry involves other important considerations that we will need to address in a thoughtful and deliberate manner. As the Commonwealth accomplishes greater penetration of building electrification and distributed energy resources, we need to prioritize opportunities for residents of environmental justice populations[12] to benefit from moving beyond gas. This includes electrification and thermal network projects as well as workforce development and employment prospects for people historically left out

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[12] In Massachusetts, an environmental justice population is a neighborhood where one or more of the following criteria are true: (1) the annual median household income is 65 percent or less of the statewide annual median household income; (2) people of color make up 40 percent or more of the population; (3) 25 percent or more of households identify as speaking English less than "very well"; (4) people of color make up 25 percent or more of the population and the annual median household income of the municipality in which the neighborhood is located does not exceed 150 percent of the statewide annual median household income. Executive Office of Energy and Environmental Affairs Environmental Justice Policy at 4 (2021). See https://www.mass.gov/info-details/environmental-justice-populations-in-massachusetts (last visited November 29, 2023).

of the clean energy transition (e.g., women, people of color, Indigenous Peoples, veterans, people living with disabilities, immigrants, people who were formerly incarcerated). We also will work with the LDCs to encourage workforce development training and employment opportunities for gas workers and steelworkers to participate in a just transition away from fossil fuels. Thermal network projects, for example, offer attractive opportunities for workers in the gas industry to perform similar work in the installation of the infrastructure to deliver decarbonized heating and cooling solutions to residential and commercial customers.

Finally, as is apparent from the vast number of issues addressed in this Order, developing a regulatory framework to guide the transition of the natural gas industry in Massachusetts is an exceedingly complex undertaking. It involves fundamental ratemaking issues regarding the continued financial viability of LDCs and preserving their ability to raise capital on reasonable terms, as well as developing an orderly means of recovering in rates the billions of dollars in existing investment in natural gas infrastructure while maintaining the safety of the gas distribution system so long as natural gas continues to be delivered through it. It involves maintaining the affordability of energy services, and being particularly mindful to avoid burdening low- to moderate-income households that may be left behind—and potentially bearing a greater burden of the fixed costs of maintaining existing natural gas infrastructure—as more affluent households transition away from natural gas appliances. It involves recognizing the potential for the disproportionate distribution of the negative impacts associated with building, operating, and maintaining gas infrastructure. And it involves addressing the workforce issues associated with a gradual decommissioning of the existing

natural gas distribution system. As we continue to develop the regulatory framework in subsequent proceedings following the issuance of this Order, we emphasize the importance of the continued involvement of all relevant stakeholders in the process. It is important, for example, for LDCs to move beyond "business as usual" practices toward active participation in developing innovative solutions to achieving the clean energy future codified in the Commonwealth's GHG emissions reduction targets. These exceedingly complex issues can be addressed effectively only with the broad participation of all the constituencies affected by this transition. We look forward to exploring these issues collectively in future proceedings.

IV. SCOPE AND AUTHORITY

The Department has broad authority to supervise gas companies pursuant to G.L. c. 164, § 76; Massachusetts Electric Company v. Department of Public Utilities, 419 Mass. 239, 245 (1994). It is well established, however, that the Department's general supervisory authority cannot arise from a vacuum. Massachusetts Oilheat Council, Inc., D.T.E. 00-57, at 6-7 (2001) citing Massachusetts Electric Company, 419 Mass. at 246.

The Legislature has taken steps to focus the Department's regulatory mandate on GHG emissions reductions in addition to its traditional concerns of ensuring safety, security, reliability, equity, and affordability. Both the 2021 Climate Act and 2022 Clean Energy Act include changes to the Department's regulatory authority over gas companies. In the 2021 Climate Act, the Legislature added Section 1A to G.L. c. 25, which provides:

> In discharging its responsibilities under [chapter 25] and chapter 164, the department shall, with respect to itself and the entities it regulates, prioritize safety, security, reliability of service, affordability, equity and reductions in

> greenhouse gas emissions to meet statewide greenhouse gas emission limits and sublimits established pursuant to chapter 21N.

The 2021 Climate Act also revised G.L. c. 21N, § 6, to charge the Secretary of EEA with establishing programs to meet GHG emissions limits and sublimits and implement the roadmap plans established by G.L. c. 21N. In addition, the 2022 Clean Energy Act amended G.L. c. 164, § 141, which now directs the Department, in all decisions or actions regarding rate designs, to consider, among other things, the impact of such decisions or actions on the reduction of GHG emissions as mandated by G.L. c. 21N to reduce energy use.

Recent legislation has not, however, amended or repealed other statutes that govern the Department's regulation of the natural gas industry. As we note in this Order, the Department may revisit its own precedent and standards of review in certain areas, and in other areas, legislative action may be required for the Department to be able to implement change or pursue particular pathways for achieving the Commonwealth's 2050 targets. For example, G.L. c. 164, § 30, establishes Department review of an LDC's petition to expand its service territory, which the Department has evaluated under a public interest standard. An Act Relative to Gas Leaks, St. 2014, c. 149, was enacted on June 26, 2014 ("Gas Leaks Act") and codified the uniform gas leaks classifications at G.L. c. 164, § 144; gas system enhancement plans ("GSEPs") at G.L. c. 164, § 145; and required the Department to, on or before January 1, 2015, authorize gas companies "to design and offer programs to customers which increase the availability, affordability, and feasibility of natural gas service for new customers." St. 2014, c. 149, § 3. In addition, the 2022 Clean Energy Act mandates that DOER establish a demonstration project in which up to ten municipalities may adopt zoning

ordinances that restrict fossil fuel use in the construction sector. St. 2022, c. 179, § 84(b). As part of the demonstration project, DOER must collect data from the participants and submit reports to the Legislature every two years that include recommendations for the continuation or termination of the demonstration project. St. 2022, c. 179, § 84(e).

Finally and most specifically to our consideration of the Reports, Net Zero Enablement Plans, and other submissions in this proceeding, Section 77 of the 2022 Clean Energy Act provides:

> Notwithstanding any general or special law or rule, regulation or order to the contrary, the department of public utilities shall not approve any company-specific plan filed pursuant to the DPU Docket No. 20-80, Investigation by the Department of Public Utilities on its own Motion into the Role of Gas Local Distribution Companies as the Commonwealth Achieves its Target 2050 Climate Goals, prior to conducting an adjudicatory proceeding with respect to such plan.

St. 2022, c. 179, § 77. Based on this clear directive, the Department will not approve the Net Zero Enablement Plans and/or the Model Tariff submitted by the LDCs in this investigation but will identify future adjudicatory proceedings and filings where we may properly consider company-specific plans.

The Department does not cite the above statutes as obstacles to the regulatory principles articulated in this Order. Rather, we do so only to acknowledge that our authority as a regulatory agency is bound by the limits established by law. Where pathways or proposals are inconsistent with existing statutes, the Department will note where additional legislative change or authority is necessary.

V. DECARBONIZATION REPORTS

A. Pathways to Net Zero

At the direction of the Department, the LDCs retained the Consultants to perform a detailed study for each LDC, analyzing the feasibility of each decarbonization pathway identified by the Roadmaps. D.P.U. 20-80, at 3-5. In an effort to allow for meaningful comparisons among the LDCs and to ensure the consideration of all decarbonization strategies, the Department required the Consultants to identify any pathways not examined in the Roadmaps and employ consistent methods and considerations to analyze decarbonization opportunities for each individual LDC. D.P.U. 20-80, at 5. The Department instructed the Consultants to combine the individual analyses into a single, collective report presenting: (1) a quantification of the costs and actual economy-wide GHG emissions reductions involved in transitioning the natural gas system; and (2) a discussion of qualitative factors such as impacts on public safety, reliability, economic development, equity, emissions reductions, and timing for each identified pathway, among other requirements. D.P.U. 20-80, at 5-6.

To fulfill this requirement, the LDCs submitted the Pathways Report, which provides eight pathways designed to reflect different futures[13] for the LDCs and their customers

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[13] The eight pathways are not forecasts, but rather narratives that allow for the identification and comparison of the relative costs, risks, and feasibility of different futures (Pathways Report at 11, 34). The Pathways Report further notes that analyzing decarbonization pathways out to 2050 involves a multi-decade horizon that is inherently assumption-driven and uncertain across several factors, including cost, consumer behavior, technology development, deployment, and other factors (Pathways Report at 27).

(Pathways Report at 11). Each of the eight pathways achieves the Commonwealth's goals of 90 percent gross GHG emissions reductions and net-zero GHG emissions by 2050 compared to 1990 levels, as well as the interim statutory GHG emissions reduction goals of 50 percent by 2030 and 75 percent by 2040 (Pathways Report at 11, 48). Similar to the 2050 Roadmap, all pathways have approximately 4.5 million metric tons of gross economy-wide, non-energy emissions[14] remaining in 2050 (Pathways Report at 48).

The eight pathways include the deployment of seven space-heating technologies,[15] and leverage various levels of renewable fuels, energy efficiency,[16] and building electrification technologies (Pathways Report at 31, 49-57). The eight decarbonization pathways impute a range of uses and roles for the gas system over time, spanning from 100 percent decommissioning of the system to large amounts of renewable gases being supplied to high-efficiency gas appliances (Pathways Report at 11, 63-75). In parallel, the Pathways

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14 A more detailed description of GHG accounting (i.e., direct, electric sector, non-energy, and renewable fuels emission accounting methods) can be found in the Pathways Report, Appendix 1, at 21-28. Further information on common baseline economy-wide assumptions such as population growth and electrification of the transportation sector can be found in the Pathways Report, Appendix 1, at 8-9.

15 The seven identified space-heating technologies include: (1) air source heat pumps; (2) ground source heat pumps; (3) hybrid heat pumps; (4) networked geothermal; (5) standard gas furnaces; (6) high efficiency gas furnaces; and (7) gas heat pumps (Pathways Report at 31).

16 The Pathways Report states that energy efficiency is a foundational strategy to enable decarbonization of heating across all scenarios, reducing challenges associated with both electrification and decarbonized fuel-based strategies (Pathways Report at 47, 52-53, 110).

Report considers impacts on the electric system due to electrification-driven peaks and increased generation capacity (Pathways Report at 57-63).

The Pathways Report notes several key uncertainties across the pathways and develops sensitivity analyses to better capture assumptions in its modeling (Pathways Report at 34-35). Informed by a literature review,[17] the Pathways Report provides both optimistic and conservative views for the following six uncertainties: (1) incremental costs of cold-climate air source heat pumps ("cold-climate ASHPs"); (2) technical performance of cold-climate ASHPs; (3) incremental electric sector distribution system costs; (4) networked geothermal system installation costs; (5) cost and availability of renewable fuels;[18] and (6) opportunities for gas system cost avoidance (Pathways Report at 35). Additionally, the Pathways Report projects three pathways that would involve gas system departures through a geographically planned approach,[19] resulting in potential reductions in operation and maintenance expenses,

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17 The Consultants conducted a literature review of decarbonization strategies studied and implemented in the U.S. and internationally (Pathways Report at 28-29; App. 2).

18 The Pathways Report defines renewable fuels as an umbrella term for renewably produced alternatives to fossil fuels, inclusive of renewable gases in the distribution system and renewable fuels in the transportation sector (Pathways Report at 9). The Report designates the following gases as renewable and having a net–zero GHG impact according to the Massachusetts GHG Inventory: (1) biomethane produced through anaerobic digestion or gasification; (2) hydrogen produced from electrolysis powered by renewable energy; and (3) synthetic natural gas produced from renewable hydrogen and a climate-neutral source of carbon (Pathways Report at 9, 52, 110; App. 1, at 21-22). The Department does not necessarily consider biomethane, hydrogen, or synthetic natural gas to be renewable fuels.

19 The Department further discusses geographically planned approaches and customer choice topics below in Section VI.B and Section VI.D.

GSEP expenditures,[20] and capital replacement costs (Pathways Report at 68-69). The Pathways Report further explores the cost and equity implications of combining the revenue requirement for the LDCs to maintain and operate both the gas and a networked geothermal system (Pathways Report at 72-75).[21]

The Pathways Report states that three pathways were modified from the Roadmaps: (1) high electrification, in which greater than 90 percent of the building sector electrifies primarily through the adoption of cold-climate ASHPs; (2) low electrification, in which 65 percent of the building sector electrifies with cold-climate ASHPs and gas customer count declines by 40 percent compared to today; and (3) interim 2030 CECP, in which the building sector electrifies at an accelerated pace, following the goals outlined in the Interim 2030 CECP (Pathways Report at 29-31). The 100 percent gas decommissioning pathway assumes that the building and industrial sectors fully electrify by 2050, with roughly 25 percent of the building sector converting to networked geothermal (Pathways Report at 31). The targeted electrification pathway assumes that greater than 90 percent of buildings electrify, with LDC customers converting to cold-climate ASHPs in a targeted approach (Pathways Report at 31). The networked geothermal pathway considers roughly 25 percent of the building sector

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20 The Department allows LDCs to recover certain costs associated with the replacement of leak-prone pipeline infrastructure, pursuant to G.L. c. 164, § 145.

21 The Pathways Report posits that a combined rate base would exhibit increased system costs, but theoretically would mitigate costs per customer as a larger portion of the customers remain that may share in the recovery of the combined system costs (Pathways Report at 73-75).

converting to networked geothermal systems, with remaining LDC customers using renewable gas[22] (Pathways Report at 31). The hybrid electrification[23] pathway assumes that greater than 90 percent of buildings electrify through cold-climate ASHPs paired with RNG (Pathways Report at 31). Lastly, the efficient gas equipment scenario assumes that the building sector largely adopts high-efficiency gas appliances supplied by a combination of renewable gas, with the industrial sector converting to dedicated hydrogen pipelines (Pathways Report at 31). Table 1 below contains a summary of each decarbonization pathway.

Table 1: Key Narratives by Decarbonization Pathway (Pathways Report at 29-32)

Pathway	Overview
Low Electrification (inspired by 2050 Decarbonization Roadmap "Pipeline Gas")	High electrification in the transportation sector. Buildings partly electrify. Building sector electrifies 65 percent of buildings through the adoption of ASHPs. Gas customer count declines by 40 percent compared to today.
High Electrification (inspired by 2050 Decarbonization Roadmap "All Options")	High electrification in both buildings and transportation sector. Building sector electrifies more than 90 percent primarily through the adoption of ASHPs.
Interim 2030 CECP	Accelerated electrification and building shell measures based on the interim 2030 building sector target.

22 The Pathways Report defines "renewable gas" as "an umbrella term referring to renewably produced alternatives to natural gas that can be blended into the distribution pipeline system" (Pathways Report at 9, App. 1, at 15). Under this definition, renewable gases include biomethane produced through anaerobic digestion or gasification, renewable hydrogen, and synthetic natural gas ("SNG"), further defined and discussed in Section VI.C of this Order (Pathways Report at 9, App. 1, at 15).

23 The Pathways Report describes hybrid electrification as a space heating strategy that combines electric heat pumps with a gas or fuel oil backup that can be powered by renewable fuels (Pathways Report at 8).

Hybrid Electrification	Heat pumps are paired with gas or fuel oil backup to mitigate electric sector impacts. More than 90 percent of buildings electrify through ASHPs paired with renewable gas back-up (hybrid heat pumps) that supply heating in cold hours of the year.
Networked Geothermal	Part of the gas system is strategically replaced by networked geothermal systems. LDCs evolve their business model and convert +/- 25 percent of the building sector to networked geothermal systems. Remaining gas customers use renewable gas as their main source of heating by 2050.
Targeted Electrification	Part of the gas system is strategically decommissioned with customers adopting ASHPs. More than 90 percent of buildings are electrified through a combination of technologies. LDC customers converting to ASHPs do so in a "targeted" approach.
Efficient Gas Equipment	Building sector will adopt increasingly efficient gas appliances supplied by decarbonized gas. The industrial sector converts to dedicated hydrogen pipelines.
100 Percent Gas Decommissioning	Building sector and industry will fully electrify allowing for 100 percent decommissioning of the gas distribution system. Building and industrial sectors fully electrify by 2050. +/- 25 percent of the building sector converts to networked geothermal systems.

Developed with input from both LDCs and stakeholders, the eight pathways and their associated projected cumulative energy system costs (in 2020 dollars)[24] are calculated as follows: (1) high electrification, $87 billion to $111 billion; (2) low electrification, $73 billion to $95 billion; (3) interim 2030 CECP, $93 billion to $121 billion; (4) 100 percent gas decommissioning, $94 billion to $135 billion; (5) targeted electrification,

[24] The Pathways Report calculates costs on a levelized basis, including a society-wide discount factor of 3.6 percent, noting that the study does not quantitatively consider the social costs of carbon or avoided costs related to potential health or environmental damages resulting from climate change (Pathways Report, App. 1, at 62).

$73 billion to $109 billion; (6) networked geothermal, $81 billion to $124 billion; (7) hybrid electrification, $63 billion to $92 billion; and (8) efficient gas equipment, $66 billion to $105 billion (Pathways Report, App. 1, at 62-65). The Pathways Report further presents cumulative energy system costs both annually and by decade relative to a reference scenario that does not meet the Commonwealth's 2050 climate targets, delineating the following cost components: (1) demand-side capital; (2) electricity supply; (3) gas system; (4) natural gas commodity costs; (5) liquid renewable fuels commodity costs; (6) renewable gas commodity costs; and (7) networked geothermal installation costs (Pathways Report at 13-14, 26-27, 79-82; App. 1, at 62, 65-66).

Further, the Pathways Report offers an evaluation of the feasibility and level of challenge[25] expected for each pathway across the following criteria: (1) cumulative energy system costs; (2) technology readiness; (3) air quality; (4) workforce transition; (5) customer practicality; (6) near-term customer affordability; (7) long-term customer affordability; and (8) customer equity (Pathways Report at 11-12, 76-79, 84-108). The Pathways Report states that all pathways were assumed to comply with Department and industry standards for safety and reliability (Pathways Report at 11-12, 77, 87-91).

Lastly, the Pathways Report presents several low-regret strategies and commonalities across the LDCs, while highlighting the need for further research and development ("R&D")

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[25] The Pathways Report defines challenge as the magnitude of change from current industry or customers practices and/or amount of policy intervention required (Pathways Report at 76).

and key distinctions among the LDCs (Pathways Report at 109-115). In conclusion, the Pathways Report finds that all pathways imply transformational changes for the Commonwealth, the LDCs, and their customers, and that strategies that use both the gas and electric systems to deliver low-carbon heat to a portion of the buildings in Massachusetts show a lower level of challenge across a range of evaluation criteria (Pathways Report at 11, 109).

B. Stakeholder Comments Concerning the Pathways Report

Many commenters disagree with the Pathways Report's conclusion that pathways utilizing both the gas and electric systems actually would present a lower level of challenge to the Commonwealth in reaching its climate commitments. For example, the Attorney General contends that the lower overall costs reported for the hybrid electrification pathway rest on unsound and unproven assumptions, arguing that the beneficial impacts of hybrid electrification on electric system infrastructure additions could be attained by focusing on building electrification in the near term. (Attorney General Technical Comments[26] at 6-8, 19-21 (May 6, 2022)). Although DOER acknowledges significant alignment between the Pathways Report and the 2050 Roadmap, DOER calls on the Department to acknowledge that electrification is the dominant strategy specified in the 2025/2030 CECP, and to find that the LDCs' proposed plans and framework are not sufficient to achieve decarbonization (DOER

[26] The Office of the Attorney General's Initial Stakeholder Comments on Consultants' Technical Analysis of Decarbonization Pathways Report (May 6, 2022).

Comments at 6-7 (May 6, 2022) ("DOER Initial Comments"); DOER Comments at 6-8 (October 17, 2022) ("DOER Final Comments")).

Other commenters opine that electrification should not be the Commonwealth's sole decarbonization strategy, arguing that hybrid pathways are necessary for preserving optionality as renewable generation increasingly comes online (see, e.g., Associated Industries of Massachusetts ("AIM") Comments at 2 (June 17, 2022); Shell USA, Inc. Comments at 4-5 (May 6, 2022); Tufts Medicine Lowell General Hospital Comments at 1 (July 22, 2022); Lahey Hospital and Medical Center Comments at 1 (July 15, 2022); SFE Energy Massachusetts, Inc. ("SFE Energy") Comments at 3 (May 6, 2022)). Similarly, the National Fuel Cell Research Center calls for further quantification of the value of the increased reliability and resilience that could be provided by decarbonized gas and electric systems (National Fuel Cell Research Center Comments at 2 (May 6, 2022)).

Numerous commenters criticize the Pathways Report's assumptions regarding the availability, pricing, and emissions of renewable fuels (see, e.g., Attorney General Technical Comments at 8-19; Sierra Club Comments at 8-9 (May 6, 2022) ("Sierra Club Initial Comments"); Acadia Center Comments at 7-15 (May 6, 2022) ("Acadia Center Initial Comments")). The Attorney General notes that the annual volumes of RNG needed in Massachusetts by 2050 under a hybrid electrification pathway is roughly 70 trillion British thermal units ("TBtu"), whereas the total available RNG output nationwide as of 2020 was only 50 TBtu (Attorney General Technical Comments at 9). The Attorney General argues that both the exponential growth in RNG volumes and the practicality of Massachusetts

securing a population-weighted "fair share" of 3.7 percent of all RNG volumes east of the Mississippi River are unrealistic (Attorney General Technical Comments at 9-12; Attorney General Final Comments at 20-21 (October 14, 2022)). Several other commenters question the availability and market clearing price of RNG modeled under the hybrid electrification pathway (see, e.g., Sierra Club Initial Comments at 10-12; Acadia Center Initial Comments at 10-15).

Relatedly, several commenters argue that the Pathways Report repeats known flaws in Massachusetts GHG Inventory[27] accounting, questioning whether renewable fuels are truly carbon neutral when combusted, and if upstream emissions related to the extraction and transmission of fuels should be counted (see, e.g., Acadia Center Initial Comments at 4-10; Sierra Club Initial Comments at 8; LexCAN Advocacy Committee Comments at 1 (May 9, 2022)). Some commenters question the leakage rates associated with the existing gas system, demanding greater transparency regarding leakage rates and lost and unaccounted for gas volumes (see, e.g., "Interested Persons"[28] Comments at 2-4; CLF Comments at 11, 27-31

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27 Information about the Massachusetts GHG Inventory is available at https://www.mass.gov/lists/massdep-emissions-inventories (last visited November 29, 2023).

28 On October 14, 2022, individuals associated with the following organizations filed a joint set of comments as "interested persons": Greater Boston Physicians for Social Responsibility; Climate Reality Project Boston Metro Chapter; Gas Leaks Allies; Pipe Line Awareness Network for the Northeast; Fore River Residents Against the Compressor Station; Mothers Out Front; Ashland Sustainability Committee; Sierra Club; Acadia Center; Gas Transition Allies; Brookline GreenSpace Alliance; Emerald Necklace Conservancy; Elders Climate Action Massachusetts; and No Pipeline Westborough.

(May 6, 2022) ("CLF Initial Comments"); CLF Final Comments at 4 (October 14, 2022) ("CLF Final Comments"); Acadia Center Comments at 7). Finally, several commenters call for the use of a 20-year global warming potential ("GWP") value for methane, consistent with the most recent Intergovernmental Panel on Climate Change Fifth Assessment Report (see, e.g., CLF Initial Comments at 28; Acadia Center Initial Comments at 6-7).

Additionally, numerous commenters argue that the Pathways Report fails to vigorously pursue potential gas infrastructure cost savings, such as reduced GSEP spending and more optimistic networked geothermal cost assumptions (see, e.g., Attorney General Technical Comments at 21-23; CLF Initial Comments at 12, 51-53; Sierra Club Initial Comments at 20-21). Several commenters criticize the hybrid electrification pathway as being potentially skewed toward lower system-wide costs, noting that the Pathways Report's lower level of building shell retrofits and inclusion of residential hybrid fuel oil/ASHPs does not allow for an apples-to-apples comparison across pathways (see, e.g., Acadia Center Initial Comments at 19-21; Sierra Club Initial Comments at 5). Lastly, several commenters criticize the Pathways Report's consideration of health and air quality impacts, arguing that combining indoor and outdoor air quality into a single metric masks the risk of maintaining gas appliances in homes to the health of children, the elderly, environmental justice populations, and people with underlying health conditions (see, e.g., Greater Boston Physicians for Social Responsibility Comments at 7-9 (May 2, 2022); Massachusetts Medical Society Comments at 2-3 (May 3, 2022)).

C. LDCs Response to Stakeholder Comments

The LDCs reject the notion that the Pathways Report picks a preferred pathway, arguing that other pathways compare favorably to the hybrid electrification pathway, and that differences in the application of building shells and discount rates do not impact the Pathways Report's conclusions (LDC Joint Comments at 9, 40, 45-47). The LDCs contend the finding that decarbonization pathways that "strategically use the state's gas infrastructure alongside and in support of electrification are likely to carry lower levels of challenge" is not unique to this study, and that similar findings have been identified in both the U.S. and abroad (LDC Joint Comments at 9, 42-45). The LDCs maintain that the Pathways Report is a product of a significant amount of discussion and feedback from stakeholders, and that it is imperative for the Department and key stakeholders to approve the Net Zero Enablement Plans and Model Tariff (LDC Joint Comments at 13, 96).

The LDCs argue that the Consultants' recommendations draw from common strategies identified across all pathways and that suggestions that the benefits of hybrid electrification can be captured by balancing all-electric and conventional gas heat demands are at odds with a targeted electrification strategy that substantially reduces gas infrastructure investment (LDC Joint Comments at 9, 47-49). The LDCs maintain that the Pathways Report considers the potential for substantial avoided reinvestment in gas infrastructure, including reductions in GSEP spending and detailed consideration of networked geothermal potential (LDC Joint Comments at 8, 32-37). The LDCs assert that the alternative gas infrastructure cost

comparisons provided by stakeholders are not comparable to those in the Pathways Report (LDC Joint Comments at 8, 37-38).

With respect to the availability and pricing of renewable fuels, the LDCs insist that the Pathways Report includes both optimistic and conservative ranges that are heavily derated to assess potential availability to Massachusetts and are based on the best available literature (LDC Joint Comments at 8, 19-26). The LDCs maintain that the Pathways Report's approach to pricing renewable fuels is consistent with similar industry studies in the Northeast, including the 2050 Roadmap (LDC Joint Comments at 8, 26-29). Additionally, the LDCs state that the Pathways Report's approach to emissions accounting is consistent with the Massachusetts GHG Inventory, 2050 Roadmap, and international reporting standards, and that the use of a 20-year GWP value for methane would require a reevaluation of the Commonwealth's 1990 emissions baseline (LDC Joint Comments at 9, 30, 49-53). Lastly, the LDCs argue that the Pathways Report's modeling of leakage rates is consistent with the official accounting framework used in the Massachusetts GHG Inventory and 2050 Roadmap, and that the Pathways Report sufficiently addresses qualitative health and air quality impacts (LDC Joint Comments at 9-10, 53-59).

D. Analysis and Conclusions

Consistent with the directives of the Department, the LDCs retained the Consultants to perform a detailed study for each LDC analyzing: (1) the feasibility of each decarbonization pathway identified by the Roadmaps; and (2) any pathways not examined in the Roadmaps, among other requirements. D.P.U. 20-80, at 3-5. The Department required the Consultants

to combine the individual analyses into a single, collective report presenting: (1) a quantification of the costs and actual economy-wide GHG emissions reductions involved in transitioning the natural gas system; and (2) a discussion of qualitative factors such as impacts on public safety, reliability, economic development, equity, emissions reductions, and timing, for each identified pathway. D.P.U. 20-80, at 5-6.

To fulfill these directives, the LDCs submitted the Pathways Report, which identifies and discusses eight decarbonization pathways designed to allow for the comparison of the relative costs, risks, and feasibility of different futures (Pathways Report at 11, 34). The Department commends the LDCs and their Consultants for their comprehensive effort in estimating the costs and economy-wide GHG emissions reductions[29] involved in transitioning the natural gas system. The Department fully recognizes the difficulty in assessing these multidimensional challenges and expresses its appreciation for the comprehensive Pathways Report.

DOER notes significant alignment between the Pathways Report and the 2050 Roadmap, stating that the two documents demonstrate several common assumptions and outcomes (DOER Initial Comments at 6-8). However, commenters predominantly disagree over the Pathways Report's finding that strategically using the state's gas infrastructure

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[29] For each pathway involving electrification strategies, the Consultants were directed to provide a transparent depiction of key assumptions used in the analysis and a calculation of GHG emissions reductions, inclusive of GHG emissions from generation source. D.P.U. 20-80, at 5. The Department finds that the Pathways Report appropriately addressed this request (Pathways Report at 48; App. 1, at 21-28).

alongside and in support of electrification is likely to carry lower levels of challenge, most typified by the hybrid electrification pathway (see, e.g., Attorney General Final Comments at 6-19; DOER Initial Comments at 8-10; LDC Joint Comments at 40-48). Any further attempt to quantify alternative fuels, electrification technologies, and their associated GHG emissions reductions in a generic sense, is beyond the scope of the current investigation. The Department makes no findings related to a preferred pathway or technology here, as such considerations need to be made in the context of the distinct service territories of each LDC.[30] The Commonwealth's dominant building decarbonization strategy, however, is electrification as noted in the 2025/2030 CECP.[31] Our aim is to create and promote a regulatory framework that is flexible, protects consumers, promotes equity, and provides for fair consideration of the current and future technologies and commercial applications required to meet the Commonwealth's clean energy mandates and comply with the 2025/2030 CECP.

In doing so, the Department acknowledges that there is potential for further refinement to capture more fully the intricacies and granularity needed to achieve the Commonwealth's 2050 climate targets. Ultimately, the transition toward the Commonwealth's net zero targets will be one that is driven by the willingness and ability of residential, commercial, and industrial customers to support the Commonwealth's

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30 As noted above in Section IV, the Department must review LDC-specific plans in adjudicatory proceedings before approving any individual plan. St. 2022, c. 179, § 77.

31 2025/2030 CECP at 27, available at https://www.mass.gov/doc/clean-energy-and-climate-plan-for-2025-and-2030/download (last visited November 29, 2023).

environmental goals and climate targets through investments in their homes, businesses, and transportation infrastructure. The Department seeks to expeditiously attain the GHG emissions reductions necessary to achieve these targets and will begin by more thoroughly addressing the six regulatory design recommendations below. Indeed, as we discuss in more detail in the next section, we recognize that new regulatory support strategies will be needed to minimize customer cost impacts regardless of which pathway, or combination of pathways, is pursued. After due consideration of the record, we find that the Pathways Report satisfies the Department's directives in opening this investigation in D.P.U. 20-80.

VI. REGULATORY DESIGN RECOMMENDATIONS

A. Introduction

The Consultants identify six regulatory design recommendations: (1) support customer adoption of and conversion to electrified/decarbonized heating technologies; (2) blend renewable gas supply into gas-resource portfolios; (3) pilot and deploy innovative electrification and decarbonized technologies; (4) manage gas embedded infrastructure investments and cost recovery; (5) evaluate and enable customer affordability; and (6) develop LDC transition plans and chart future progress. The Department here analyzes the merits of the various regulatory pathways proposed by the Consultants, and also uses this framework as a vehicle for identifying areas where we intend to pursue future investigation.

B. Support Customer Adoption of and Conversion to Electrified/Decarbonized Heating Technologies

1. Introduction and Summary

To meet the Commonwealth's climate targets, the decarbonization pathways will require significant levels of customer adoption of electrification and decarbonization heating technologies (Regulatory Designs Report at 19). The Regulatory Designs Report explains that certain pathways, such as high electrification, will require swift and early action to increase customer utilization (Regulatory Designs Report at 19). The Consultants recommend the following regulatory approaches to support customer use of electrification and decarbonization heating technologies: enhance and increase funding of energy efficiency programs; restructure electric and gas distribution rates; and revise customer service standards and procedures (Regulatory Designs Report at 20-24). These recommendations are discussed in detail below.

a. Energy Efficiency

To support customer adoption of electrification and decarbonization technologies identified in the pathways analysis, the Consultants recommend increasing energy efficiency program budgets, enhancing the programs to include new measures and strategies, and finding additional sources of funding (Regulatory Designs Report at 21). The Regulatory Designs Report emphasizes that the decarbonization pathways will require the deployment of new strategies and technologies (Regulatory Designs Report at 21). Since some decarbonization pathways target entire customer groups rather than individual customers to convert from natural gas to full electric service, energy efficiency programs will need to

expand to support new incentive offerings and targeted electrification of entire customer blocks (Regulatory Designs Report at 21). The Consultants recommend evaluating the potential benefits of avoiding gas system infrastructure costs as part of targeted electrification or geothermal demonstration projects in the calculation of cost-effectiveness (Regulatory Designs Report at 21). The Regulatory Designs Report further explains that other enhancements may be necessary, including customer education and awareness, adoption of decarbonization strategies and technologies, and market transformation initiatives targeted at contractors, distributors, and manufacturers (Regulatory Designs Report at 21).

In addition, the Regulatory Designs Report states that the pathways will require larger energy efficiency budgets to support the enhanced initiatives discussed above (Regulatory Designs Report at 21). Since the current energy efficiency programs already are funded by ratepayers through the energy efficiency surcharge ("EES"),[32] the Consultants recommend evaluating additional funding sources to increase budgets and better align the benefits and cost responsibilities for certain programs between gas and electric companies (Regulatory Designs Report at 21-22). Specifically, the Consultants suggest offsetting some costs through a financial transfer from electric to gas utilities under a dual energy agreement (Regulatory Designs Report at 21-22).[33] A dual energy agreement involves a benefit-sharing mechanism

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32 The EES is included in the Local Distribution Adjustment Factor ("LDAF") of a customer's bill (Regulatory Designs Report at 21).

33 The Consultants cite a "dual energy" agreement between a Canadian electric company, Hydro-Quebec, and Energir, a gas company, in which gas customers in targeted market areas are converted to electricity to operate on electric heat during

that allows for a financial transfer from the electric company to the LDC as compensation for its role in electrification (Regulatory Designs Report at 22). The Consultants claim that a financial transfer reflects the economic and reliability benefits of maintaining the gas system to support electrification for hybrid heating customers (Regulatory Designs Report at 22).

b. Restructuring of Electric and Gas Rates

To support customer adoption of electrification and decarbonization technologies identified in the pathways analysis, the Consultants recommend examining electric and gas distribution rate policies to reflect the changing demand and infrastructure requirements of electrification (Regulatory Designs Report at 22-23). For example, the pathways analysis shows that increased use of electric heating shifts peak electric demand from summer to winter and, therefore, presents an opportunity to evaluate price signals associated with electric rates to reflect changing demand (Regulatory Designs Report at 22).

For electric distribution rates, the Consultants recommend exploring: (1) the potential of time-variant rates to reflect the cost of serving electricity demands during peak periods; and (2) critical peak-pricing rates that reflect the cost of serving higher electricity demands under extreme weather conditions (Regulatory Designs Report at 22). The Consultants explain that critical peak-pricing rates could be used to reflect the substantially higher cost of electricity generation, transmission, and distribution to meet demand during extreme weather

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non-winter peak periods while operating on gas heat during winter peak periods (Regulatory Designs Report at 22).

conditions, and provide customers with an incentive to reduce electricity use during those weather conditions (Regulatory Designs Report at 22).

For gas distribution rates, the Consultants observe that the adoption of hybrid heating systems may change gas demand characteristics because these customers would be using the system only during peak winter periods (Regulatory Designs Report at 23). Because of this change, the Consultants suggest creating a rate class for customers with hybrid heating systems (Regulatory Designs Report at 23). The Consultants state that a hybrid rate class would establish rates to better reflect the costs associated with providing gas service exclusively during peak winter periods (Regulatory Designs Report at 23).

In addition to creating another rate class, the Consultants recommend changing the revenue decoupling mechanism ("RDM") (Regulatory Designs Report at 23-34). The current gas RDM is designed on a per-customer basis, which allows the LDCs to retain the incremental revenues associated with serving new gas customers to offset the incremental costs associated with those customers until distribution rates are reset (Regulatory Designs Report at 23-24). The Consultants explain that this mechanism has worked well with the historical increase in gas customers; most of the decarbonization pathways, however, anticipate a decrease in the number of gas customers over time (Regulatory Designs Report at 24). The Consultants recommend transitioning away from a revenues-per-customer approach to a reconciliation of total revenues (Regulatory Designs Report at 24). Under this approach, the LDCs would reconcile actual revenues and Department-authorized or target

revenues rather than revenues per customer, and that reconciliation would include revenue from new customers (Regulatory Designs Report at 24).

c. Customer Service Standards and Procedures

The Consultants explain that certain decarbonization pathways will require updated customer service standards and procedures to support adoption of electrification and decarbonization technologies identified in the pathways analysis (Regulatory Designs Report at 24). Geographically targeted electrification, for example, would require all customers within a specific geographic area or neighborhood to convert from gas to electric or another alternative (Regulatory Designs Report at 24). The Consultants caution that such strategies may raise concerns over customer choice, cost, the LDCs' obligation to serve, and customer service protections (Regulatory Designs Report at 24). The Consultants recommend comprehensive measures to address various issues, including enhancing customer communication and education processes, expanding customer options for gas and electric services, providing financial support for customers, and fostering stronger relationships with contractors (Regulatory Designs Report at 24-25). These recommendations are aimed at facilitating and promoting the widespread adoption of electrification and decarbonization technologies among customers (Regulatory Designs Report at 24-25).

2. Summary of Comments

a. Energy Efficiency

Commenters agreed with increasing incentives and exploring new energy efficiency strategies to better support customer adoption of electrification and decarbonization heating

technologies (see, e.g., Acadia Center Initial Comments at 21-22; OPOWER Comments at 3 (May 6, 2022)). Other commenters argue that energy efficiency incentives for gas appliances should be phased out (Sierra Club Comments at 21; CLF Initial Comments at 9). The Attorney General notes that the Department-approved 2022-2024 Three-Year Energy Efficiency Plans ("2022-2024 Three-Year Plans") include significant investments to promote the adoption of heat pumps, while also observing that the most recent plans already come with significant budget and bill impacts for customers (Attorney General Initial Comments,[34] App. C at 7). The Attorney General and Acadia Center support enhanced energy efficiency investment but encourage the LDCs to explore other funding sources beyond the EES to minimize customer bill impacts (Attorney General Initial Comments, App. C at 7; Acadia Center Initial Comments at 22-23). In addition to funding, commenters say workforce development needs further support to facilitate customer adoption (Attorney General Initial Comments at 54; Acadia Center Initial Comments at 22; HEET Comments at 7 (May 6, 2022) ("HEET Comments")). The Attorney General states that the Department should engage regularly with workforce stakeholders, through working groups or other means, to better inform the transition of gas distribution services (Attorney General Initial Comments at 54).

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[34] Regulating Uncertainty: The Office of the Attorney General's Regulatory Recommendations to Guide the Commonwealth's Gas Transition to a Net Zero Future (May 6, 2022).

The LDCs maintain that the Pathways Report does not adopt one pathway, but recommends energy efficiency as a low-regret strategy (LDC Joint Comments at 40-41). The LDCs reiterate that energy efficiency measures may decrease the impacts of electrification on the electric system and reduce demands for natural gas (LDC Joint Comments at 40-41). According to the LDCs, additional investment in energy efficiency will play a critical role in meeting the needs of an electrified economy (LDC Joint Comments at 6).

b. Rate Restructuring

Many commenters agree with the Consultants' recommendation to investigate changes to gas distribution rates and revenue decoupling (see, e.g., Attorney General Initial Comments at 38-39; Acadia Center Initial Comments at 23; and DOER Final Comments at 2). The Attorney General argues that the Department should conclude its investigation in Investigation to Review and Revise the Standard of Review and the Filing Requirements for Gas Special Contracts Filed Pursuant to G.L. c. 164, § 94, D.P.U. 18-152, and limit gas special contracts to only unique and novel public interest circumstances (Attorney General Initial Comments at 41). According to the Attorney General, gas special contracts[35] should demonstrate net benefits to customers, and that the customer's use of natural gas is no more harmful in terms of GHG and air pollutant emissions than the customer's alternative energy resource(s) (Attorney General Initial Comments at 41-43). The Attorney General also

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[35] Gas special contracts allow LDCs to provide firm transportation service to customers at individually negotiated, off-tariff distribution rates. D.P.U. 18-152, Vote and Order Opening Investigation at 1 (2018).

recommends that the Department not permit LDCs to recover costs for marketing related to promoting gas service because these costs are not aligned with the Commonwealth's decarbonization goals (Attorney General Initial Comments at 41). Furthermore, the Attorney General asserts that any modifications to the current cost recovery mechanisms should consider equity, affordability, and preservation of customer choice (Attorney General Final Comments at 4).

Commenter RMI[36] posits that a hybrid heating scenario requires that customers do three things: electrify with heat pumps, retain utility gas backup, and use that gas backup sparingly (RMI Comments at 3 (May 6, 2022) ("RMI Initial Comments")). As a result, RMI argues, crafting an effective rate design for hybrid heating customers will be challenging given that to reduce emissions and remain economically viable, a hybrid rate design must both (1) recover the costs of the gas system without encouraging customers to use gas as their primary heating fuel, and (2) avoid customer departure from the gas system (RMI Initial Comments at 3). RMI argues that as gas demand declines and non-fossil gas is substituted for fossil gas, rising gas rates will become inevitable and may lead to significant cost recovery and equity challenges under a hybrid heating rate design (RMI Initial Comments at 3).

The LDCs maintain that there is still interest in natural gas service despite the momentum toward full electrification (LDC Joint Comments at 10). The LDCs acknowledge

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[36] Formerly "Rocky Mountain Institute" (RMI Initial Comments at 1).

concerns over increasing costs but reaffirm that the Regulatory Designs Report proposes potential rate designs to align equitably the benefits[37] and cost of hybrid heating (LDC Joint Comments at 75). Specifically, the LDCs contend that rate designs, such as a new hybrid rate class and critical peak pricing, will help incentivize customers to adopt and remain on hybrid heating systems (LDC Joint Comments at 75). The LDCs explain that a combination of customer education, financial support, and supportive policy initiatives will be necessary to spur the level of conversion needed for electrification modeled in each pathway (LDC Joint Comments at 10).

Additionally, the LDCs state that the potential of financial transfers from electric to gas utilities would help reflect the economic and reliability benefits of maintaining the gas system to aid the electric system during peak weather events (LDC Joint Comments at 75). The Sierra Club, however, opposes the sharing of costs between electric and gas customers (Sierra Club Initial Comments at 19; Sierra Club Comments at 12-13 (October 14, 2022) ("Sierra Club Final Comments")). The Sierra Club argues that electric customers subsidizing the decarbonization of the gas sector would constitute an inappropriate cross-subsidization given that the electric sector already has "borne its share of decarbonization costs" (Sierra Club Initial Comments at 19; Sierra Club Final Comments at 12-13).

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37 The LDCs explain that hybrid electrification is beneficial because it allows customers to leverage their existing equipment as a backup heating system (LDC Joint Comments at 74).

The LDCs reaffirm that most of the decarbonization pathways will result in service to fewer gas customers over time (LDC Joint Comments at 90). The LDCs recommend revising the RDM from a per-customer basis reconciliation of actual and authorized revenues to a reconciliation of total revenues (LDC Joint Comments at 90, citing Regulatory Designs Report at 23-24). The LDCs agree that replacing the RDM per customer with a total revenues or revenue cap decoupling is better aligned with the Commonwealth's decarbonization goals (LDC Joint Comments at 90-91). The Attorney General likewise agrees with revising the RDM (Attorney General Initial Comments at 39).

c. Affordability and Customer Choice

Several commenters also expressed affordability concerns, particularly for low- and moderate-income ("LMI") customers. Many commenters called for the prioritization of LMI customers to ensure an equitable transition and protect them from bearing the increased energy burden associated with electrification (see, e.g., NCLC Comments at 32 (May 6, 2022) ("NCLC Initial Comments"); LEAN Comments at 2-3 (May 6, 2022) ("LEAN Initial Comments"); Sierra Club Final Comments at 12). Some commenters, such as Acadia Center, disagree with charging customers exit fees[38] to leave the gas system because it may hinder electrification affordability (see, e.g., Acadia Center Initial Comments at 24; RMI Initial Comments at 3). LEAN recommends increasing low-income discounts and offering an exemption from the bill impacts of accelerated deprecation for LMI customers (LEAN Initial

[38] An "exit fee" or "migration charge" which would be charged to customers leaving the natural gas system is defined and discussed further in Section VI.F.

Comments at 17). In sum, numerous commenters express concerns that the LDC transition plans may impose an unfair burden on LMI customers in the absence of regulatory intervention.

The Attorney General confirms that, absent regulatory reform, remaining gas customers will experience significant rate increases as other customers leave the system (Attorney General Initial Comments at 46). Many commenters agree that LMI customers are less likely to leave the gas system and, therefore, may be disproportionately impacted by higher energy bills (see, e.g., HEET Comments at 7; LEAN Initial Comments at 17). The Attorney General explains that LMI customers currently spend a higher percentage of their income on utility bills than any other income group (Attorney General Initial Comments at 48). The Attorney General recommends that the Department consider adopting a rate mechanism to protect LMI customers from high energy burdens and potential rate increases (Attorney General Initial Comments at 50). Specifically, the Attorney General states that there should be a cap on the amount an LMI customer is billed (Attorney General Initial Comments at 52). Other commenters agree that the LDCs should consider rate mechanisms to help protect LMI ratepayers from high energy burdens and potential rate increases (see, e.g., DOER Initial Comments at 15; LEAN Initial Comments at 18).

Regarding customer choice, many commenters support a full transition away from fossil fuels via electrification. A handful of commenters do not (see, e.g., Tufts Medicine Lowell General Hospital Comments at 1; Inovis Energy, Inc. Comments at 1-2 (July 13, 2022); Mass Coalition for Sustainable Energy Comments at 1 (October 6, 2022)). One

commenter noted that full electrification should be contingent on adequate renewable energy production (Shell USA, Inc. Comments at 4). Other commenters support electrification alongside geothermal and other low-carbon heating options (see, e.g., CLF Initial Comments at 12; Martin Comment at 1 (May 6, 2022)). Commenters acknowledge the LDCs' obligation to serve current gas customers but suggest revising the obligation to serve standards (see, e.g., Pipeline Awareness Network for the Northeast, Inc. ("PLAN") Comments at 4 (May 6, 2022) ("PLAN Initial Comments"); CLF Initial Comments at 21). PLAN states that the obligation to serve criteria apply only to existing customers (PLAN Comments at 5 (October 14, 2022) ("PLAN Final Comments").

The LDCs reiterate that customer choice will drive the acceptance of electrification but maintain that there is public support for preserving the natural gas system (LDC Joint Comments at 93-94, citing Exh. DPU-Comm 2-13, Att.). The LDCs highlight the substantial upfront costs for electrification as a barrier to conversion (LDC Joint Comments at 95, citing Pathways Report, Figure 4, at 17). The LDCs state that the Net Zero Enablement Plans contain strategies to help educate customers around their energy options (LDC Joint Comments at 94). Furthermore, the LDCs assert that achieving the levels of electrification modeled in each pathway will hinge not only on customer education, but also on supportive policy initiatives and market transformation activities that help customers overcome the upfront cost barriers to electrification (LDC Joint Comments at 94-95). The LDCs view current and future pilot projects as an opportunity to test and evaluate different market transformation approaches, including various incentive strategies to facilitate customer

implementation of electrification and decarbonization heating technologies (LDC Joint Comments at 96, citing Exh. DPU-Comm 5-6).

3. Analysis and Conclusions

a. Introduction

The Department recognizes that significant levels of customer acceptance of electrification and decarbonization technologies will be needed for the Commonwealth to achieve its climate targets. While LDCs already have begun to increase the level of customer implementation of energy efficiency and decarbonized technologies through their 2022-2024 Three-Year Plans, more will need to be done inside and outside of the energy efficiency rubric to prioritize electrification, equity, and workforce development (Regulatory Designs Report at 20). See also 2022-2024 Three-Year Energy Efficiency Plans, D.P.U. 21-120 through D.P.U. 21-129, at 42, 46-47, 51 (2022) ("2022-2024 Three-Year Plans Order"). The Consultants recommend enhancing energy efficiency programs and funding to incentivize customer participation; restructuring gas and electric distribution rates to reflect the changing demand and infrastructure requirements of electrification; and establishing new customer service standards and procedures to facilitate and promote the widespread use of electrification and decarbonization technologies among customers (Regulatory Designs Report at 20-21). Commenters offer a range of perspectives on the transition to cleaner energy sources, with a focus on mitigating the impact on customers, especially those with lower incomes, and the role of incentives, rate structures, and policy initiatives in shaping the energy landscape. We address these recommendations below.

b. Energy Efficiency

The Department recognizes the importance of programs with effective participant incentives to help facilitate increased electrification and use of decarbonization technologies. The LDCs have strategies to leverage their cost-effective energy efficiency plans and strategies to encourage electrification through heat pumps and other measures. 2022-2024 Three-Year Plans Order at 51-52. In addition, under the Green Communities Act,[39] three-year plans must achieve all cost-effective energy efficiency, pass the cost-effectiveness analysis using the total resource cost test,[40] direct 20 percent of budgets to low-income energy efficiency, minimize administrative costs, maximize competitive procurement, and be mindful of bill impacts on gas ratepayers. G.L. c. 25, § 21(b)(1). In addition, beginning with the 2025-2027 three-year energy efficiency plans, there shall be "no spending on incentives, programs or support for systems, equipment, workforce development or training as they relate to new fossil fuel equipment unless such spending is for low-income households, emergency facilities, hospitals, a backup thermal energy source for a heat pump, or hard to electrify uses, such as industrial processes." G.L. c. 25, § 21(b)(2)(xi). Further, the Department already must consider whether these plans are constructed to meet or exceed the GHG emissions reduction mandates set by the EEA Secretary pursuant to G.L. c. 21N,

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39 An Act Relative to Green Communities, Acts of 2008, chapter 69, section 11.

40 In determining cost-effectiveness, the calculation of benefits shall include the social value of GHG reductions, except in the cases of conversions from fossil fuel heating and cooling to fossil fuel heating and cooling. G.L. c. 25, § 21(b)(1).

§ 3B. Finally, the Department considers whether the proposed plans adequately prioritize safety, reliability, security, affordability, and equity. 2022-2024 Three-Year Plans Order at 84.

The 2022-2024 Three-Year Plans have made significant steps in promoting both energy efficiency and electrification through customer incentives and performance incentives. See 2022 Energy Efficiency Annual Reports, D.P.U. 23-60, Berkshire Gas Company, App. 1, at 2-3 (June 1, 2023). The Department expects the LDCs to continue expanding the scope of ambition in their three-year plans to promote reductions in overall energy usage that result in cost-effective programs, while balancing increased electrification to meet GHG emissions reduction targets.

At the same time, the Department remains concerned about customer bill increases associated with enhancing the Commonwealth's energy efficiency programs. The Regulatory Designs Report recommends minimizing the potential bill impacts of these program enhancements by using other funding sources, such as government funding, gas system exit fees, and financial transfers from electric to gas utilities (Regulatory Designs Report at 44 n.57; Exh. DPU-Comm 3-3). Since 2010, the Department has required gas three-year plans to include all other sources of funding that program administrators have pursued to help fund the energy efficiency programs.[41] Investigation by the Department of Public Utilities on

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[41] In approving an energy efficiency funding mechanism for the electric program administrators, the Department must consider the availability of other private or public funds. G.L. c. 25, § 19(a)(3)(ii).

its own Motion into Updating its Energy Efficiency Guidelines, D.P.U. 20-150-A, App. A, § 3.2.2.1 (2021), ("Guidelines"). The Department reminds program administrators that this requirement to pursue non-ratepayer sources of funding is more important now than ever, especially for residential and small-business customers who disproportionately bear the burden of higher energy efficiency surcharges as compared to other rate classes. The Department, however, declines to implement exit fees or financial transfers as viable outside funding sources to offset the cost of expanding energy efficiency budgets. As discussed in Section VI.F below, the Department is concerned that charging an additional fee to exit the gas system may disincentivize customers from fully electrifying. At the same time, in the absence of a gas exit fee, residential and small business customers who are not able to leave the system may bear even higher energy bills. The Department is open to reviewing any alternative funding sources so long as they help facilitate a safe, reliable, and equitable transition for all ratepayers.

Lastly, in response to the Attorney General's recommendation to engage with workforce stakeholders, the Department recognizes that the utility and energy contractor workforce will play an integral role in customer acceptance of electrification and decarbonization technologies. Workforce development is essential to safe and reliable gas operations and will be at the forefront of the industry transition. As required by G.L. c. 25, § 19(d), the annual workforce development program budget of $12 million is explicitly allocated from the 2022-2024 Three-Year Plans to MassCEC to grow and diversify a clean

energy equity workforce and market development program in the Commonwealth.[42] 2022-2024 Three-Year Plans Order at 42. The Department accepts that significant efforts will be required to develop strategies to train and ensure family-sustaining wages for a workforce to support the energy transition. It is critical to train current gas system workers for employment opportunities in the clean energy sector. It is also important that jobs are available in the clean energy sector to support workers who are women, people of color, Indigenous Peoples, veterans, people living with disabilities, immigrants, and people who were formerly incarcerated. A comprehensive workforce strategy requires solutions that ensure the well-being of workers and communities, create jobs, and contribute to a thriving and sustainable economy. This strategy should be viewed as part of a just transition framework.

The Department, therefore, strongly encourages the LDCs to engage with other stakeholders, including labor unions, MassCEC, and existing workforce development programs, to establish a just transition framework for gas industry workers and people who have largely been left out of the clean energy workforce to start training for jobs that support

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[42] General Laws c. 25, § 19(d), added by the 2021 Climate Act, requires the Department to annually collect and transfer not less than $12 million to MassCEC for the clean energy equity workforce and market development program established pursuant to G.L. c. 23J, § 13. MassCEC states that this funding will be used for assisting environmental justice populations to plan and develop career training programs for employment in high demand clean energy occupations, and to provide support for expansion and creation of minority- and women-owned business enterprises in business categories critical to state climate targets. Massachusetts Clean Energy Center Request for Fiscal Year 2023 Funding Pursuant to G.L. c. 25, § 19(d), D.P.U. 22-75, Letter Order at 1 (June 27, 2022).

electrification and decarbonization. The LDCs shall provide an update on this just transition framework in their future Climate Compliance Plans, which the Department details in Section VI.G below.

c. Rate Restructuring

The LDCs propose evaluating alternative rate designs to better reflect the changing demand and infrastructure requirements of electrification and agree with the recommendation to change the RDM structure (Regulatory Designs Report at 22-23). The Department supports the alignment of LDC rate designs with climate objectives and GHG reduction compliance pathways.[43] In particular, the Department agrees with the recommendation to replace the current per-customer RDM with a total revenues or revenue cap decoupling mechanism. The Department finds that a revenue cap approach, which subsequently disincentivizes LDCs to expand their gas customer base, better aligns with the policies of the Commonwealth expressed in current climate laws. The Department directs each of the LDCs to propose an RDM that implements this approach in its next rate case. The Department also encourages the LDCs to evaluate and propose alternative rate resigns and other cost recovery mechanisms that are consistent with the direction provided in this Order.

The Department acknowledges that the LDCs and Consultants identify hybrid heating systems as a low-regret strategy toward decarbonization and takes notice of the significant

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[43] When considering new rate designs, the Department is required to take into consideration the reduction of GHG emissions pursuant to the 2022 Clean Energy Act. G.L. c 164, § 141.

uptick in utilization of heat pumps under the current three-year plans.[44] As we discuss in Section VI.D, however, the Department is not persuaded that pursuit of a broad hybrid heating strategy that would necessitate maintenance of the natural gas system to support backup heating systems is a viable path forward. Given improvements in technology, the Department expects that cold-climate heat pumps generally will eliminate the need for backup heating systems. During this transition period, however, the Department accepts that customers may elect to retain their previous backup heating systems, such as gas-fired boilers, to support heat pumps, as discussed further in Section VI.D. The LDCs shall continue to track customer heat pump installations. Further, the LDCs must work with their energy contractors and vendors to provide sufficient information to customers about the capabilities of heat pumps so they may reach a more informed conclusion about the true need for backup heating systems. If the LDCs propose a new rate design for hybrid heating customers, then they must strike a balance between recovering the costs of the gas system without encouraging customers to use gas as their primary heating fuel, thereby enabling

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44 To date, three gas program administrators have filed mid-term modification requests in 2023 for additional funding partially due to a higher-than-expected demand for heat pumps (see Berkshire Gas Company, D.P.U. 23-93, Pre-Filed Testimony of Hammad Chaudhry and Jillian Winterkorn at 3-4; Liberty Utilities, D.P.U. 23-91, Pre-Filed Testimony of Kimberly Gragoo, Stephanie Terach, and Autumn R. Snyder at 6-7; Fitchburg Gas and Electric Light Company, D.P.U. 23-70, Pre-Filed Testimony of Cindy L. Carroll and Mary A. Downes at 6).

GHG emissions reductions while maintaining low operating costs to retain customers.[45] The Department will consider all other rate restructuring proposals on a case-by-case basis.

With respect to special gas contracts, we acknowledge the Attorney General's suggestion that the Department conclude its investigation in D.P.U. 18-152 and limit gas special contracts to only unique and novel public interest circumstances (Attorney General Initial Comments at 41). The Department agrees that the requirements for gas special contracts should be improved and refined, and that the ongoing investigation in D.P.U. 18-152 is the proper vehicle for the pursuit of any such changes. Given that D.P.U. 18-152 remains an open proceeding, we decline to address the specifics or potential outcomes here other than to acknowledge that a re-examination of gas special contracts is part of the portfolio of actions we are taking to facilitate the necessary transition of the natural gas industry.

Finally, we agree with the Attorney General that LDCs should not be permitted to include in rates any costs associated with marketing geared toward the promotion or expansion of gas service. As noted by the Attorney General, these costs are not aligned with the Commonwealth's decarbonization targets and any continued funding of such advertising or marketing by ratepayers is the type of "business as usual" operations of LDCs that must

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[45] In the context of hybrid heating and a hybrid heating rate design, the importance of customer retention via low operating costs is so that increasing costs do not incent those customers most able to afford full electrification to pursue that option (or delivered fuels) while leaving lower-income customers on a rate that potentially would rapidly increase to account for fewer customers supporting the system (RMI Initial Comments at 2-3). This is inconsistent with an equitable transition.

cease. Moreover, this prohibition on ratepayer funding of gas marketing extends not only to initiatives undertaken directly by LDCs, but includes indirect efforts to promote either natural gas expansion or policies geared toward promoting natural gas expansion. If and to the extent LDCs wish to continue participating in such efforts, the associated costs will be borne entirely by shareholders.

d. Affordability and Customer Choice

The pace of customer transition to alternatives to natural gas is a significant uncertainty facing gas industry sales and revenue projections. Many commenters argued for the prioritization of LMI customers to ensure an equitable transition (see, e.g., NCLC Initial Comments at 32; LEAN Final Comments at 2-3; Sierra Club Final Comments at 12). The Attorney General contends that that the Department should consider adopting a rate mechanism to protect LMI customers from high energy burdens and potential rate increases (Attorney General Initial Comments at 50).

The Department agrees that the pace of customer transition to gas alternatives will depend on a suite of available incentives, education, legislative change, and market transformation activities. Ensuring an affordable and equitable transition will be among the most potentially challenging aspects of this undertaking. A mass exodus of gas customers has the potential to shock rates to the detriment of remaining ratepayers and reduce utility revenues, jeopardizing the LDCs' continued provision of safe and reliable service to remaining customers, as well as posing a potential general safety risk to the public at large. Conversely, less competition from alternatives may result in a slower pace of transition and

delay the necessary achievement of the climate targets. The Department and LDCs will need to take steps to minimize the impacts of long-term competitive losses. The Department will address the practicality of such strategies through the remainder of this Order, including modification of line extension policies that assume long-term sales revenue, shifting revenue from traditional rate base to performance-based mechanisms that incent reduced emissions, and rate structures that protect LMI customers.

As to preserving customer choice, it is not clear that the Department has the statutory authority to prohibit the addition of new gas customers. It is the Department's long-standing policy, however, that an LDC need not serve new customers in circumstances in which the addition of new customers would raise the cost of gas service for existing firm ratepayers. Boston Gas Company, D.P.U. 88-67 (Phase I) at 282-284 (1988). An LDC must therefore first ensure that the incremental costs to expand its distribution network do not exceed the incremental revenues from such expansion to include the cost of expanding its distribution network in rates. Bay State Gas Company, D.P.U. 12-25, at 379 (2012); Boston Gas Company, D.T.E. 03-40, at 48 (2003). LDCs determine whether a main or service extension is economically feasible using a model to compare the estimated cost of the project to the estimated revenues over the expected useful life of the plant investment to ensure the internal rate of return exceeds the rate of return allowed in the Company's most recent base distribution rate case. See, e.g., NSTAR Gas Company, D.P.U. 19-120, at 456-457 (2020) (reviewing the company's main extension policy in the course of analyzing a surcharge proposal pursuant to St. 2014, c. 149, § 3); Boston Gas Company, D.P.U. 89-180, at 16-17

(1990). When an investment needed to serve a new customer does not pass the internal rate of return test, the gas company may require the customer to pay a contribution in aid of construction ("CIAC") to make up the deficit. D.P.U. 19-120, at 456-457.[46] It thus appears that there is an opportunity to revise the process of making this cost determination, reviewing tariff provisions, and current LDC practices to disincentivize further customer expansion while still preserving customer choice to the extent necessary. These changes are further discussed in Section VI.E below.

C. Blend Renewable Gas Supply Into Gas-Resource Portfolios

1. Introduction and Summary

The Regulatory Designs Report recommends that the LDCs develop a procurement strategy to add renewable gas options to their resource portfolios (Regulatory Designs Report at 25). As used by the Consultants, "renewable gas supply" is an umbrella term that refers to renewably produced alternatives to natural gas that includes biomethane produced through anaerobic digestion or gasification, renewable hydrogen, and SNG produced from renewable hydrogen and a climate-neutral source of carbon (Pathways Report at 9; Regulatory Designs Report at 6, 25). The Consultants note that blending limited amounts of renewable gases into the pipeline could result in a reduction of GHG emissions without a corresponding substantial increase in overall gas costs (Regulatory Designs Report at 25). The Consultants recommend

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[46] Property that has been contributed to a utility is not included in rate base. D.P.U. 12-25, at 380 n.220, citing Milford Water Company, D.P.U. 771, at 21 (1982); Oxford Water Company, D.P.U. 18595, at 18 (1976); Commonwealth Gas Company, D.P.U. 18545, at 2 (1976).

that the LDCs investigate the deliverability of biomethane, hydrogen, and synthetic gases from a broader range of resources and regions to clarify further their role in supporting the state's decarbonization goals and ensure that these fuels in fact can meet the requirements of the pathways (Regulatory Designs Report at 25). Finally, the Regulatory Designs Report recognizes that renewable gas does not meet the Department's least-cost standard (Regulatory Designs Report at 25). The Consultants make three specific recommendations intended to enable LDCs to incorporate renewable gas supply into the system: (1) update the forecast and supply planning standards to add renewable gas; (2) provide customers with an option to purchase renewable gas from the LDC; and (3) provide customers with an option to purchase renewable gas from third-party suppliers (Regulatory Designs Report at 25-26).

According to the Regulatory Designs Report, the Department should update its forecast and supply planning[47] standards to require a minimum level of renewable gas and

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47 Pursuant to G.L. c. 164, § 69*I*, every gas company shall file for the Department's approval a long-range forecast with respect to the gas requirements of its market area for the ensuing five-year period, consisting of the gas sendout necessary to serve projected firm customers and the available supplies necessary to meet the projected demand. Further, the Department reviews a gas company's five-year supply plan to determine whether the plan is adequate to meet projected normal-year, design-year, design-day, and cold-snap firm sendout requirements. Fitchburg Gas and Electric Light Company, D.P.U. 21-10, at 3 (2022).

Under its current standards, the Department determines if a company's projection method is reasonable based on whether the method is: (a) reviewable, that is, contains enough information to allow a full understanding of the forecast method; (b) appropriate, that is, technically suitable to the size and nature of the particular gas company; and (c) reliable, that is, provides a measure of confidence that the gas company's assumptions, judgments, and data will forecast what is most likely to

incorporate the cost of carbon in the LDCs' supply plan economic analysis (Regulatory Designs Report at 25). The Consultants posit that either a Renewable Heating Fuel Standard ("RHFS") or a Renewable Portfolio Standard ("RPS") could establish a minimum level of RNG, similar to the electric industry (Regulatory Designs Report at 25). The Consultants suggest that either the Legislature or the Department via a generic proceeding could authorize an RHFS or RPS, and that the minimum level of renewable gas could be set low initially to address concerns with availability and cost, with subsequent increases subject to these considerations (Regulatory Designs Report at 25-26). A second approach to updating the forecast and supply standards discussed by the Consultants is the addition of a cost of carbon to the supply planning economic analysis, which would provide an economic advantage to low-carbon supplies (Regulatory Designs Report at 26). As in the context of the RHFS and RPS option, the Consultants assert the cost of carbon initially could be set low to address supply availability, cost, or customer affordability considerations and then increased gradually subject to these considerations (Regulatory Designs Report at 26).

The Consultants' second recommendation for incorporating renewable gas into the system is to provide LDC customers who want to reduce their carbon emissions the option to purchase renewable gas directly from the LDC (Regulatory Designs Report at 26). In this scenario, the Department would approve a tariff through either an LDC-specific rate-setting

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occur. D.P.U. 21-10, at 3, citing Bay State Gas Company, D.T.E. 02-75, at 2 (2004); The Berkshire Gas Company, D.T.E. 02-17, at 2 (2003).

proceeding or through a generic proceeding applicable to all LDCs (Regulatory Designs Report at 26).

With respect to the third recommendation to facilitate use of renewable gas, the Regulatory Designs Report recommends that the Department provide customers with an option to purchase renewable gas from third-party suppliers via each LDC's delivery service (Regulatory Designs Report at 26). The Consultants posit that this approach may be appealing to customers, especially large commercial and industrial customers, seeking to purchase directly from a third-party supplier. The Regulatory Designs Report recognizes that a special tariff may be required to address interconnection requirements (Regulatory Designs Report at 26).

Finally, and applicable to all three design approaches discussed above, the Consultants recommend a procurement strategy that includes customer education, marketing, and incentives that promote the integration of renewable gas into the gas system. This would facilitate customer understanding of the benefits and cost implications of renewable gas and their options to incorporate it into their fuel mix (Regulatory Designs Report at 27).

2. Summary of Comments

Generally, commenters agree in their objections to the recommendations in the Regulatory Designs Report regarding renewable gas.[48] Numerous commenters raised issues

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[48] While the Pathways Report refers to "renewable gas," commenters also refer to renewable natural gas or "RNG," which along with SNG and hydrogen, may also be referred to as "decarbonized gas" (Attorney General Initial Comments at 11-12). The

and concerns related to emissions, system upgrades and related costs, and the availability of alternatives.

The Attorney General argues that the Pathways Report overstates the availability of RNG and understates RNG's costs (Attorney General Technical Comments at 8-16; Attorney General Final Comments at 20). The Attorney General asserts that there is no credible basis to assume that RNG can be made available in Massachusetts at the volumes needed to support the gas use in 2050 assumed under the hybrid electrification scenario, and further that the Consultants significantly understate the costs of obtaining RNG (Attorney General Technical Comments at 8-16). The Attorney General argues that, in developing their price projections for RNG, the Consultants developed a weighted average price for RNG instead of pricing it at the incremental price of the marginal unit of supply (Attorney General Final Comments at 21). Moreover, the Attorney General asserts that the continued use of biomethane is inconsistent with the Commonwealth's policy as set forth in EEA's 2025/2030 CECP (Attorney General Final Comments at 21-22). The Attorney General also questions the Consultants' assumption that RNG is carbon neutral (Attorney General Technical Comments at 16-19). Further, the Attorney General notes that RNG and hydrogen, although emerging, are unproven and uncertain technologies that carry significant investment risks (Attorney General Initial Comments at 32). The Attorney General therefore recommends that

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Attorney General and others assert, however, that the term "decarbonized gas" is a misnomer (Attorney General Initial Comments at 11 n.48).

the Department ensure that investments in unproven or uncertain technologies are borne entirely by utility shareholders (Attorney General Initial Comments at 32).

DOER suggests that the Department consider R&D proposals intended to increase the supply of RNG and hydrogen (DOER Initial Comments at 11). DOER also proposes that the Department disallow long-term contracts that would lock customers into high-risk and high-cost resources for long periods (DOER Initial Comments at 16). Finally, DOER proposes that the Department should require the LDCs to complete R&D projects using RNG to demonstrate emissions reductions consistent with the GWSA methodology before it approves any long-term contracts for renewable gas or hydrogen (DOER Final Comments at 15).

Acadia Center argues that the proposals involving RNG: (1) fail to account for out-of-state emissions occurring during the productions and transmission of the fuels; (2) dramatically underestimate the level of methane leaks from the natural gas systems in Massachusetts; (3) assume that biofuels are GHG-neutral; and (4) underestimate the availability and price of RNG and hydrogen (Acadia Center Initial Comments at 5-15).

Similar to Acadia Center, Sierra Club asserts that the Consultants underestimate the levels of GHG emissions from RNG and SNG, and also underestimate the availability of and clearing prices for renewable gas (Sierra Club Initial Comments at 8-11). In addition, Sierra Club argues that hydrogen is an inefficient and unfeasible strategy to decarbonize buildings (Sierra Club Initial Comments at 14-17). Finally, Sierra Club argues that even if the LDCs' treatment of biofuels as zero-GHG emitting is consistent with both the Commonwealth's

current GHG accounting methodologies and its 2050 Roadmap, that is an inadequate basis for assessing the relative merits of biofuel investments as part of a decarbonization strategy (Sierra Club Final Comments at 6-8).

CLF argues that there is insufficient evidence to support the claim that biomethane is a zero-emissions fuel over the course of its lifecycle (CLF Final Comments at 4). Regarding hydrogen, CLF argues that it is highly volatile and will have to be limited to applications and sectors that cannot be electrified (CLF Final Comments at 4). CLF contends that LDCs would have to prove that biomethane is a zero-carbon fuel before forecast and supply plan standards should be allowed to include RNG, or before customers should be given the option to purchase RNG from LDCs or from third parties (CLF Initial Comments at 14). CLF maintains that the Consultants' technical analyses around the impact of biomethane were based on assumptions not grounded in science or reality (CLF Initial Comments at 14). In addition, EDF contends that there is a good understanding of the climate and safety impacts of renewable fuels, noting that hydrogen emissions have global warming potential (EDF Comments at 6–8 (October 13, 2022) ("EDF Final Comments")).

Dozens of individual and group commenters raised concerns similar to those recited above, specifically arguing against the mandated use of RNG and/or hydrogen based on issues related to supply availability, GHG emissions, safety, and cost (see, e.g., Interested Persons Comments at 2-3; Elders Climate Action Massachusetts Comments at 1-3 (May 6, 2022); Callaway Comments at 1 (May 4, 2022); Fortuin Comments at 1-2 (May 6, 2022); Phillips Comments at 1 (May 6, 2022)).

The LDCs argue that RNG and other alternative fuel sources are a necessary component of any decarbonization future and that the path to net zero does not need to be a binary decision between fuel sources and a fully electrified system (LDC Joint Comments at 60). The LDCs contend that adding RNG to the supply portfolio will produce environmental benefits, contributing to achievement of the Commonwealth's objectives, and will improve supply availability and diversity, both critical gas supply planning considerations (LDC Joint Comments at 60-61). Further, the LDCs point out that to fully electrify, a significant overbuild of renewables will be required to ensure peak demand can be met by the electric network (LDC Joint Comments at 62). The LDCs assert RNG can complement electrification by supporting the intermittent nature of renewable generation resources like solar and wind (LDC Joint Comments at 62).

Regarding the various comments expressing skepticism that RNG can be scaled to the level needed and purchased at a reasonable cost, the LDCs state that they expect the availability of RNG to continue to grow as technologies to develop RNG continue to advance (LDC Joint Comments at 63). Finally, regarding the criticism that the Consultants treat renewable gases as carbon neutral, the LDCs assert that this approach is consistent with both the official GHG accounting methodology of the Commonwealth and the 2050 Roadmap (LDC Joint Comments at 30).

3. Analysis and Conclusions

The Consultants recommend that the LDCs develop a procurement strategy to add RNG supply to the resource portfolio. The Department has been presented with three

specific means of enabling the LDCs to incorporate RNG supply into their gas system: (1) update the forecast and supply planning standards to incorporate RNG through either a RHFS/RPS or the addition of a cost of carbon; (2) provide customers with an option to purchase RNG from the LDC; and (3) provide customers with an option to purchase RNG from third-party suppliers (Regulatory Designs Report at 25-26).

Most commenters did not address directly the suggestion that the Department update the forecast and supply planning standards to incorporate RNG. Numerous comments did note, however, that RNG does not provide measurable benefits in terms of costs and emissions reductions.

Our policy regarding the LDCs' procurement of gas resources is well established. The Department first articulated its standard for commodity and capacity acquisitions in Commonwealth Gas Company, D.P.U. 94-174-A (1996), where the Department determined that to demonstrate that the proposed acquisition of a resource that provides commodity and/or incremental resources is consistent with the public interest, an LDC must show that the acquisition is (1) consistent with the company's portfolio objectives; and (2) compares favorably to the range of alternative options reasonably available to the company at the time of the acquisition or contract renegotiation. D.P.U. 94-174-A at 27. In Liberty Utilities (New England Natural Gas Company) Corp., D.P.U. 22-32-C at 36 (2022), the Department also noted that we must consider whether the proposed acquisition is consistent with the GWSA and any applicable emissions limit or sublimit set by the Secretary of EEA. G.L. c. 25, § 1A. At this time, as we discuss below, we have been presented with no evidence

convincing us to alter this gas procurement policy. On the contrary, we share the concerns raised by various stakeholders regarding costs, availability, and the treatment of renewable fuels as carbon neutral.

As the LDCs acknowledge, RNG currently does not meet the Department's least-cost supply planning standards given the higher cost of RNG relative to pipeline gas. Given this, the inclusion of RNG supplies in an LDC's resource portfolio would violate our goal of providing gas service at the lowest possible cost. Indeed, the higher cost of RNG raises customer affordability concerns as LDC rates will be higher than they otherwise would be if pipeline gas continued to be used.

We recognize that RNG and the use of hydrogen as a fuel are emerging technologies that have not yet been proven to lead to a net reduction in GHG emissions. The Consultants assume that RNG's emissions are carbon neutral under the Commonwealth's current GHG accounting framework (Regulatory Designs Report at 8 n.7). They acknowledge that if the GHG emissions accounting conventions change, however, the potential of RNG as a carbon-neutral fuel diminishes and its value in terms of decarbonization would be overstated (Pathways Report at 18 n.12). In our view, more studies are required in this area to support the claim that RNG is a zero-emissions fuel. For example, a full life-cycle analysis that considers all of the emissions profiles and captures emissions gains and losses throughout the entire production process may be necessary to determine the total carbon intensity of RNG.

Regarding the availability of RNG, we are not convinced that sufficient RNG stocks will be available to ensure the alleged potential environmental benefits. Record evidence

shows that there is significant uncertainty regarding the availability of RNG (Pathways Report, App. 1, at 16). Indeed, the Consultants note that biomass resource availability in New England is relatively low compared to other regions in the United States. New England has an estimated 0.63 dry tons of feedstocks available per person per year, whereas the average availability of feedstocks for the U.S. as a whole, is 2.47 dry tons per person per year (Pathways Report, App. 1, at 15). According to the Coalition for Renewable Natural Gas, of the 300 RNG facilities in the U.S., only eight are located in New England.[49] In the long run, RNG supply shortages may lead to higher costs. For these reasons, we have no basis in the existing record for altering our existing gas procurement policy as established in D.P.U. 94-174-A to allow for the acquisition of RNG and or the imposition of a RHFS or cost of carbon in the LDCs' supply plan economic analyses. We recognize, however, that the technology is evolving and the process to produce RNG may possibly lead to measurable benefits in the future, particularly for hard-to-electrify industrial processes. We encourage LDCs to investigate all options that will lead to a reduction in their GHG footprint, including lifecycle emissions associated with system operations, and we will review any proposals that are consistent with existing standards as well as with the Commonwealth's GWSA and the 2021 Climate Act.

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[49] See https://www.rngcoalition.com/?gad=1&gclid=Cj0KCQjwpc-oBhCGARIsAH6ote-K_4nSXK5AbiPbzM5IqeZD-AfyAg7WWyM5sfivAv_6_Q3Uvs9i4sYaAgadEALw_wcB (last visited November 29, 2023).

As the Commonwealth strives to achieve its 2050 climate targets, we envision that the long-term use of the natural gas distribution system generally will be limited to strategic circumstances where electrification is not feasible for all natural gas applications. For example, we recognize that some C&I customers require natural gas for process heat applications for which there are currently no electric-driven alternatives. It would therefore be necessary to make RNG and/or hydrogen available to this category of end-use customers.

Regarding the recommendation that gas customers be provided with the option to purchase RNG from their LDC or a third-party supplier, the Department has endeavored to develop a competitive natural gas supply market that would allow customers the broadest possible choice and provide all customers with an opportunity to share in the benefits of increased competition. See Natural Gas Unbundling, D.T.E. 98-32-B at 3, 4 (1999). We anticipate that there may be situations where customers would like to purchase RNG from their gas company or directly from a third-party supplier. We encourage LDCs to begin assessing customer interest in RNG and, if so, determine the associated demand load and begin developing educational and marketing material. While we support customer choice as it relates to RNG, we recognize that due to its nature and current technology, RNG is more expensive than conventional natural gas (Regulatory Designs Report at 25, 41). The inclusion of RNG-related costs in an LDC's supply portfolio costs—i.e., costs currently recovered under an LDC's seasonal cost of gas adjustment clause—would therefore increase the average cost of gas. To avoid any cross-subsidization issues, participation in such a program must be voluntary with all associated costs, including program administration costs,

allocated and recovered solely from the participants. As we will not authorize a mechanism that would socialize the higher commodity cost of RNG, the Department expects that customers selecting RNG, regardless of whether it was procured from the LDC or a third-party supplier, will be responsible for the costs. We expect that the LDCs will inform potential customers of the cost of RNG, its lifecycle GHG emissions, and the likely bill impacts associated with their participation. To ensure that no costs associated with such a voluntary option are assigned to non-participants, the LDCs must keep a separate accounting of RNG costs and develop a voluntary RNG opt-in sales tariff outlining the provisions for service for Department review and approval. In summary, subject to the conditions above, we will allow the option for consumers to purchase RNG from an LDC or a third-party supplier.

The Department cautions, however, that RNG and hydrogen may require system upgrades due to the density of the fuels. If the LDCs need to upgrade their systems or incur additional interconnection and metering equipment costs to make these fuels available, all of the relevant system-upgrade costs, in addition to traditional costs borne by gas ratepayers, must be assumed by those who will take RNG supply and not by all customers. In summary, all costs associated with RNG are to be borne solely by utility shareholders or program participants.

The Department may review proposals for RNG or hydrogen pilot programs, as discussed below in Section VI.D. However, we agree with the Attorney General that RNG and hydrogen blending are new, unproven, and uncertain technologies. LDCs may research

and assess these technologies, but until they prove to be a viable alternative to the business-as-usual model and support the Commonwealth's climate targets, any infrastructure costs associated with RNG and hydrogen will be the sole responsibility of the utility shareholders and not their customers.

D. Pilot and Deploy Innovative Electrification and Decarbonized Technologies

1. Introduction and Summary

The Regulatory Designs Report recommends that the LDCs pilot and deploy the following four technologies: (1) networked geothermal; (2) targeted electrification; (3) hybrid heating systems; and (4) renewable hydrogen (Regulatory Designs Report at 27-29). Further, the Regulatory Designs Report recommends that the Department develop guidance for review and approval of pilot projects and R&D programs, design additional cost recovery mechanisms, and track and report on performance metrics (Regulatory Designs Report at 29-30).

The Regulatory Designs Report explains that pilot opportunities for networked geothermal systems potentially could serve as strategic replacements for planned capital spending and be consistent with networked geothermal pilots approved for NSTAR Gas[50] and National Grid (gas);[51] however, the Regulatory Designs Report notes outstanding questions

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50 On October 30, 2020, the Department approved a networked geothermal demonstration project proposed by NSTAR Gas to evaluate the technology in a mixed-use, dense urban environment. D.P.U. 19-120, at 138-156.

51 On December 15, 2021, the Department approved a networked geothermal demonstration proposal from National Grid (gas). Boston Gas Company,

exist regarding the technical implementation, financing, and role of networked geothermal in avoiding gas infrastructure investments (Regulatory Designs Report at 27). The Regulatory Designs Report also recommends an investigation into the most optimal operation of hybrid heating systems to support both the gas and electric systems and potentially lower annual customer bills, avoid electric infrastructure costs necessary to meet heating demands, and lower GHG emissions through reliance on dispatchable winter peak generation resources (Regulatory Designs Report at 28). Finally, the Regulatory Designs Report recommends that LDCs pursue pilot opportunities to investigate the extent to which hydrogen can be added to their systems without the need for customer equipment or pipeline upgrades, engage in R&D opportunities related to the commercialization of synthetic gases, and explore certified natural gas, which may have lower upstream emission intensity (Regulatory Designs Report at 28-29).

The Regulatory Designs Report posits that an updated process for approval of pilot and R&D programs could facilitate the timely evaluation and deployment of decarbonized technologies better than a project-by-project approach (Regulatory Designs Report at 29).

D.P.U. 21-24, at 32-33 (2021). National Grid (gas) will prioritize the installation of networked geothermal systems that evaluate one or more of the following concepts: (1) the thermal performance and economics of shared loops serving a larger number of customers with more diverse load profiles than a networked geothermal project completed by its New York affiliate; (2) switching gas customers to geothermal energy as an alternative to leak-prone pipe replacement; (3) installing shared loops to manage local gas system constraints and peaks; and (4) installing shared loops to lower operating costs and GHG emissions for low-income customers and environmental justice populations. D.P.U. 21-24, at 3-4.

The Regulatory Designs Report explains that pilot and R&D programs could establish a process to track and report on performance metrics of interest, such as achievement of defined objectives; installation and service provider participation; customer education, interest and adoption experience; and role of the project in achieving decarbonization goals (Regulatory Designs Report at 30). The Regulatory Designs Report states that LDCs could recover the costs associated with additional pilots and R&D either through the local distribution adjustment clause or a new fully reconciling funding mechanism (Regulatory Designs Report at 30).

In this Order, we evaluate the potential of the four specific technologies recommended by the Consultants, both in the context of this proceeding and future potential investigations, pilot programs, and targeted deployments, and we address the regulatory framework that exists and that will evolve for the review and approval of pilot programs to examine emerging decarbonization technologies.

2. Summary of Comments

Commenters generally agree with the recommendation that the Department should streamline its review of pilot opportunities to facilitate more timely evaluation and deployment of electrification and decarbonized technologies (see, e.g., DOER Initial Comments at 16; CLF Initial Comments at 60; Acadia Center Initial Comments at 25). However, commenters disagree about which technologies, fuels, and end uses merit ratepayer-funded R&D (see, e.g., Attorney General Final Comments at 11-12; AIM Comments at 2; RMI Final Comments at 4; EDF Initial Comments at 1-3). To that end, the

Attorney General urges the Department to acknowledge the technical uncertainty of decarbonizing the building heating sector, calling for a framework that provides for fair consideration of the current and future technologies and commercial applications required to meet the Commonwealth's clean energy mandates (Attorney General Final Comments at 3-4).

Several commenters express support for the LDCs' approved networked geothermal pilots, arguing for the accelerated deployment of this technology (see, e.g., Sierra Club Final Comments at 11-12; CLF Initial Comments at 12; Climate Action Now Western Mass Comments at 2 (May 5, 2022); Mothers Out Front Massachusetts Comments at 1, 4 (May 2, 2022)). The Attorney General calls on the Department to open an investigation into the regulatory treatment of geothermal heat districts and alternative thermal technologies to examine possible regulation and ownership frameworks as the Department continues to learn about the costs, feasibility, and scalability of networked geothermal (Attorney General Initial Comments at 45-46). Similarly, HEET proposes a framework for the evolution of LDCs into thermal utilities, positing that pilots involving 100 customers or fewer could be approved by the Department within a month of filing (HEET Comments at 17, 22-32). The LDCs state that they consider networked geothermal to be a type of targeted electrification and would like the flexibility to pursue or expand their networked geothermal offerings, pending the receipt of successful pilot data (LDC Joint Comments at 67).

Numerous commenters call for R&D into other types of targeted electrification, including decommissioning of the gas system, that may demonstrate cost savings (see, e.g., CLF Initial Comments at 9, 55; DOER Final Comments at 16-17). The Attorney General

calls for the adoption of comprehensive geographic distribution system and customer mapping,[52] in addition to an investment alternatives calculator to assist in reviewing traditional gas system capital investments (Attorney General Initial Comments at 22-24, 33-35; Attorney General Final Comments at 10-11). Similarly, DOER recommends that the Department require the LDCs to complete geographic mapping and marginal cost analyses before moving forward with any additional R&D proposals so that the LDCs can use these results in determining the appropriateness of any such projects (DOER Initial Comments at 14-15; DOER Final Comments at 7-10, 19-20).

Numerous commenters object to LDCs piloting alternative fuel blends (i.e., RNG, hydrogen, SNG) into their distribution systems, raising concerns about safety, affordability, GHG emissions, and leakage (see, e.g., Attorney General Initial Comments at 11-14; Acadia Center Initial Comments at 21; Sierra Club Initial Comments at 17; Massachusetts Medical Society Comments at 1-2). Other commenters acknowledge that alternative fuels may be necessary for the Commonwealth to reach its clean energy commitments, calling for R&D in various hard-to-electrify end uses including certain industrial processes (see, e.g., CLF Initial Comments at 61; Sierra Club Initial Comments at 15; City of Boston Initial Comments[53] at 1; Medical Area Total Energy Plant Comments at 1 (July 28, 2022)). The Attorney General

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52 The Department further discusses geographically planned approaches and gas/electric coordination topics below in Section VI.D and Section VI.G.

53 Comments of the Rev. Mariama White-Hammond, Chief of Environment, Energy, and Open Space, City of Boston (May 5, 2022).

recommends that any investment in unproven technologies such as RNG and hydrogen be viewed as imprudent today with the associated costs being borne entirely by utility shareholders (Attorney General Initial Comments at 32-33). Regarding proposals for new technologies or fuels, DOER argues that the LDCs must identify "go/no go benchmarks," including when to abandon a project or program if the results show that longer-term implementation would not be cost effective for ratepayers and/or achieve net-zero emissions in the most cost-effective manner (DOER Final Comments at 12).

3. Analysis and Conclusions

a. Introduction

Demonstration projects or pilots are well-established and evaluated vehicles for the introduction of emerging technologies into the existing framework of broadly deployed programs such as energy efficiency. In Investigation by the Department of Public Utilities on its own Motion into Updating its Energy Efficiency Guidelines, D.P.U. 20-150-A, updating its energy efficiency guidelines, the Department compiled directives from recent orders that addressed the appropriate process and standard of review for approval and changes to demonstration project proposals. D.P.U. 20-150-A at 22. The Department described a demonstration project as "a relatively small, self-contained endeavor, such as a pilot, that may transition to a core initiative or program," and further clarified demonstration project

evaluation, budgetary, and cost-effectiveness considerations. D.P.U. 20-150-A at 24-25; Guidelines § 3.9.[54]

In this proceeding, numerous commenters agree that the Department should develop additional guidance for its review and approval of pilot projects and R&D programs in an effort to study and deploy innovative electrification and decarbonized technologies (see, e.g., Regulatory Designs Report at 27-30; DOER Initial Comments at 16; Attorney General Initial Comments at 24, 33). The Department strives to foster the innovation necessary to ensure the safe and reliable delivery of low-carbon energy in an equitable manner; at the same time, the Department must consider the potential customer bill impacts of any additional cost recovery mechanisms for pilots, as ratepayers in the Commonwealth already experience significant energy supply and programming costs. See, e.g., 2022-2024 Three-Year Plans Order at 220, 223. The Department maintains that pilots are valuable because they are small in scale and allow for the collection of distinct data and insights that will advance knowledge in a specific field. See, e.g., D.P.U. 21-24, at 26; Fitchburg Gas and Electric Light Company, D.P.U. 16-184, at 10-12 (2017).

The Regulatory Designs Report recommends that the LDCs pilot and deploy four specific technologies (Regulatory Designs Report at 27-29). As discussed below, the

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54 The Department defines a demonstration project as a hard-to-measure offering, including pilots, limited in term and scope designed to provide the information required to assess its potential for measurable, cost-effective savings and benefits that can be scaled to be included in programs. Guidelines § 2.3. Demonstration projects are hard-to-measure offerings initially but are anticipated to have measurable savings and benefits at scale. Guidelines § 3.9.1.1.

Department welcomes networked geothermal and other targeted electrification technologies[55] in particular as promising decarbonization strategies and will require each LDC to identify pertinent demonstration projects in each of its service territories. In contrast, the Department is uncertain about the viability of hybrid heating and hydrogen technologies and their potential as economical long-term solutions for ratepayers, for the reasons we discuss below.

b. Hybrid Heating Systems

The Regulatory Designs Report recommends investigation into the optimal operation of hybrid heating systems, in support of both the gas and electric distribution systems (Regulatory Designs Report at 28). Specifically, the Consultants recommend further investigation of certain design elements for hybrid heating systems, such as the installation of integrated controls (Regulatory Designs Report at 28).[56]

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55 The Department emphasizes that pilot projects, including those for networked geothermal and other targeted electrification technologies, funded by gas ratepayers must benefit those ratepayers and not constitute cross-subsidization. See D.P.U. 19-120, at 147-148 (networked geothermal project must be designed in a manner to provide direct benefits to ratepayers whether through participation or in a manner that will generate findings to inform the scalability of networked geothermal for its existing gas customers).

56 The Consultants note that during the 2019-2021 Three-Year Plan term, program administrators created initial integrated controls specifications and requirements to ensure that heat pumps installed to augment existing systems operate efficiently, and that additional studies were proposed in the 2022-2024 Three-Year Plan term (Regulatory Designs Report at 28). "Program Administrators" are the LDCs as well as electric distribution companies and approved municipal aggregators who develop and administer energy efficiency programs under the Green Communities Act. St. 2008, c. 169. D.P.U. 20-150-A at 1.

Several commenters express skepticism about hybrid heating systems, urging the Department to reject the hybrid electrification scenario completely (see, e.g., Attorney General Technical Comments at 3, 19, 21; Acadia Center Initial Comments at 19-21; Sierra Club Initial Comments at 5).[57] As mentioned above, the Attorney General argues that the Pathways Report's promotion of a hybrid electrification pathway rests on unsound and unproven assumptions, and that the benefits of hybrid electrification on electric infrastructure additions can be attained by focusing on building electrification in the near term (Attorney General Technical Comments at 6-21).

The LDCs maintain that hybrid electrification is a practical and relatively low-challenge strategy and opportunity to achieve the Commonwealth's decarbonization objectives (LDC Joint Comments at 70). The LDCs argue that hybrid electrification technologies: (1) reduce the need for electric system build out; (2) mitigate costs and winter peaking; and (3) provide energy security benefits as a cold-climate backup system (LDC Joint Comments at 70-75). Other commenters argue that a hybrid electrification approach to decarbonization preserves optionality and elements of customer choice as renewable generation increasingly comes online (see, e.g., AIM Comments at 2; Shell USA, Inc.

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57 As noted above, Section 77 of the 2022 Clean Energy Act explicitly prohibits the Department from approving any company-specific plan pursuant to D.P.U. 20-80 prior to conducting an adjudicatory proceeding with respect to such plan. St. 2022, c. 179, § 77. Therefore, at present, the Department will not endorse or reject any specific pathway or space heating technology.

Comments at 4-5; Tufts Medicine Lowell General Hospital Comments at 1; Lahey Hospital and Medical Center Comments at 1; SFE Energy Comments at 3).

The Department cannot reject or prohibit hybrid heating systems as an option for customers. It is, after all, the customer who chooses the type of heating system to install in the home or building. The Department shares the concerns expressed by numerous commenters, however, that a customer's retention of a gas furnace or boiler to serve exclusively as a cold-climate backup may not be necessary.[58] In the short term, hybrid heating could be used to support both the gas and electric systems and potentially lower annual customer bills, avoid electric infrastructure costs to meet heating demands, and lower GHG emissions through reliance on dispatchable winter peak generation resources (Regulatory Designs Report at 28). In the long term, however, it will be impractical to maintain the gas distribution system solely for backup furnaces in cold weather. The Department will therefore not approve the use of additional ratepayer dollars for hybrid heating system pilots and, as stated below, we expect LDCs to focus on targeted electrification and—pending the outcome of current pilots—networked geothermal projects to meet the long-term climate targets of the Commonwealth.

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[58] The Department notes that research priorities for the LDCs as Program Administrators of the 2022-2024 Energy Efficiency Plan include studying residential hybrid heat pump controls, optimization, and metering impacts, in addition to requiring integrated controls for certain residential and income-eligible applications (See D.P.U. 21-120 through D.P.U. 21-129, Exh. 1, at 77; Exh. 1, App. H at 21, 57-60).

Nevertheless, the Department must ensure that the information contractors relay to customers who are deciding between hybrid and full-electrification technologies is both informative and correct. Therefore, the Department will require the LDCs to report on hybrid heating switchover practices in their first Climate Compliance Plan filings. This first Climate Compliance Plan report must include a discussion of the technical resources provided to contractors in the Mass Save heat pump installer network such as heat pump capacity and temperature point heuristics, and address any service area specific guidance that differs from cold-climate sizing and design trainings offered by common manufacturers. The Department fully expects that the LDCs as Program Administrators will continue to explore hybrid heat pump shared benefit and incentive structures, particularly related to LMI participants.

c. Renewable Hydrogen and RNG

The Regulatory Designs Report recommends that the LDCs pursue pilot opportunities to investigate the extent to which hydrogen and RNG can be blended safely into the LDC distribution system without the need for customer equipment or pipeline upgrades (Regulatory Designs Report at 28). The Consultants further note R&D opportunities related to the commercialization of synthetic gases and recommend investigating certified natural gas which may have reduced upstream emissions from the production of gas (Regulatory Designs Report at 28-29).[59]

[59] The Department discusses synthetic and certified gas commodity above in Section VI.C.

Numerous commenters express concern with potential emissions and leakage issues associated with hydrogen blending, with the Attorney General arguing for all investments in hydrogen to be viewed as imprudent, and borne entirely by shareholders (see, e.g., Attorney General Initial Comments at 32-33; EDF Initial Comments at 1-3). Other commenters note that alternative fuels such as hydrogen may be necessary for the Commonwealth to reach its clean energy commitments, calling for R&D in certain hard-to-electrify end uses such as industrial processes (see, e.g., CLF Initial Comments at 61; Sierra Club Initial Comments at 15; City of Boston Initial Comments at 1; Medical Area Total Energy Plant Comments at 1). The LDCs acknowledge that the GHG effects of leaked, non-combusted hydrogen are not well understood, and that very few studies are available on its global warming potential (LDC Joint Comments at 56, citing Pathways Report at 113).

The Department agrees that significant research is necessary before hydrogen feasibly could be injected into an LDC's distribution system. The Department notes that the states of New York, New Jersey, Maine, Rhode Island, Connecticut, and Vermont along with the Commonwealth of Massachusetts announced the submission of a proposal for a Northeast Regional Clean Hydrogen Hub[60] to the U.S. Department of Energy ("DOE") to compete for a $1.25 billion share of the $8 billion in federal hydrogen hub funding available as part of the Infrastructure Investment and Jobs Act, Pub. L. No. 117-58 (2021). In an announcement on October 13, 2023, DOE announced the first regional hydrogen hubs and the Northeast

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60 See https://www.masscec.com/press/seven-states-northeast-regional-clean-hydrogen-hub-announce-submission-362-billion-proposal (last visited November 29, 2023).

Hydrogen Hub was not selected for funding.[61] The Department is optimistic that future funding opportunities may allow for the exploration of hydrogen R&D in the region without requiring additional ratepayer funds.

The Department also acknowledges, however, that there may be certain end uses, such as high-temperature industrial processes, that require a combustible molecule of a lower GHG emissions profile. In the short term, the Department will entertain hydrogen demonstration proposals for targeted end uses. Any proposals for hydrogen or RNG pilots, however, should include cost-effectiveness screening, and in the absence of cost-effectiveness screening, an appropriate analysis must support the potential of the proposal to deliver net benefits in the future. Guidelines § 3.9. Further, hydrogen and RNG demonstration project proposals must thoroughly explain how the targeted application is "hard to decarbonize," in addition to explaining electrification alternatives and alignment with the GWSA and the 2021 Climate Act. Further, RNG and hydrogen pilot proposals must take into consideration environmental justice populations and ensure that any such projects do not contribute to a decline of indoor air quality.

d. Networked Geothermal

Networked geothermal technology connects multiple, energy-efficient ground-source heat pumps ("GSHPs") to a loop system designed to provide heating and cooling to multiple buildings in a geographic area. The Department has found that: (1) geothermal networks

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61 See https://www.energy.gov/articles/biden-harris-administration-announces-7-billion-americas-first-clean-hydrogen-hubs-driving (last visited November 29, 2023).

have the potential to significantly reduce GHG emissions; and (2) geothermal demonstration projects designed to test the effectiveness and scalability of utility-owned geothermal networks have the potential to reduce current barriers to widespread adoption in furtherance of the Commonwealth's climate policies. D.P.U. 19-120, at 139.

Several commenters express support for networked geothermal technologies and their expedited deployment (see, e.g., Attorney General Initial Comments at 45-46; DOER Final Comments at 9, 15-16). The LDCs acknowledge that they consider networked geothermal to be a type of targeted electrification and would like the flexibility to pursue or expand their networked geothermal offerings, pending the receipt of successful pilot data (LDC Joint Comments at 67).

The Department commends the LDCs for exploring an innovative technology that has the potential to reduce GHG emissions and barriers to widespread deployment of clean heating technologies in furtherance of the Commonwealth's climate laws and policies. The Department notes the substantial progress in the construction of the Commonwealth's first utility-owned networked geothermal demonstration project in Framingham, with NSTAR Gas planning for the loop to be in operation prior to the 2023 heating season. See NSTAR Gas Company, D.P.U. 23-86, Exh. EVER-ANB/NLB-1, at 11.

Regarding the Attorney General's request to open an investigation into the regulatory treatment of geothermal heat districts and alternative thermal technologies, the Department concludes that opening an investigation at this time is premature. The Department shares the optimism expressed by stakeholders concerning the operation and management of the

approved networked geothermal demonstrations, and eagerly awaits successful evaluation data concerning their costs, feasibility, and potential scalability.[62] Depending upon the results of that evaluation, the Department can be expected to move expeditiously to develop broader guidance for networked geothermal, which may require specific performance metrics and strategies to target benefits toward environmental justice populations.

e. Targeted Electrification

Several commenters support additional targeted electrification demonstration projects, in which a participant would disconnect from the gas distribution system and fully electrify space heating and appliance loads (see, e.g., CLF Initial Comments at 9; RMI Final Comments at 3). To that end, numerous commenters recommend that the LDCs complete comprehensive geographic system and customer mapping, in addition to marginal cost analyses to explore cost-effective alternatives to traditional gas investment (see, e.g., Attorney General Final Comments at 14-15; DOER Initial Comments at 14-15).[63]

The LDCs respond to this proposition by citing several factors that require evaluation before targeted electrification is undertaken on parts of their systems (LDC Joint Comments at 68). The LDCs indicate, for example, that removing gas service from certain parts of

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62 In addition, the Department has approved a settlement agreement in Eversource Energy/Bay State Gas Company, D.P.U. 20-59/19-140/19-141 at 61 (2020), that provided funding for the Attorney General and DOER to administer a geothermal microgrid pilot in the Merrimack Valley.

63 The Department further discusses comprehensive geographic distribution system and customer mapping below in Section VI.G below.

their systems may result in operational concerns regarding system pressures and flows elsewhere on their systems (LDC Joint Comments at 68). The LDCs also argue that decommissioning the gas distribution system would require greater education efforts, as removing gas service as an option for any of a customer's building needs will affect the viability of proposed targeted electrification options (LDC Joint Comments at 68). Generally, the LDCs raise concerns about the process, standards, and policies surrounding targeted electrification, while ensuring the safety and reliability of customers who choose to remain on the system (LDC Joint Comments at 68-69).

The Department is optimistic that targeted electrification through decommissioning parts of the gas system may serve as a promising approach to reaching the Commonwealth's GHG emissions targets; the Department also recognizes, however, that there are several operational constraints and unknowns as raised by the LDCs. To better understand these opportunities and constraints, the Department directs each LDC to work with the relevant electric distribution company to study the feasibility of piloting a targeted electrification project in its service territory. Each LDC, in coordination with the applicable electric distribution company, shall propose at least one demonstration project in its service territory for decommissioning an area of its system through targeted electrification. The LDC should target a portion of its system that suffers from pressure/reliability issues, leak-prone pipe, and/or that targets environmental justice populations that have borne the burden of hosting energy infrastructure. The Department expects the LDCs to engage with elected and appointed officials in the community, community-based organizations that work on energy,

environment, labor, or ending poverty, and other interested residents. The Department directs each LDC to file its project proposal by March 1, 2026, for inclusion in its 2030 Climate Compliance Plan, working with its relevant electric distribution company and Program Administrator as necessary.[64]

f. Demonstration Project Process

In reviewing a proposed demonstration project, the Department considers the: (1) reasonableness of the size, scope, and scale of the proposed project in relation to the likely benefits to be achieved; (2) adequacy of the evaluation plan; (3) extent to which there is appropriate coordination among Program Administrators; and (4) bill impacts to customers, among other things. Guidelines § 3.9.1. Demonstration projects are not required to be cost effective at the initial testing and evaluation stage; however, an evaluation report at a demonstration project's conclusion requires detailed analyses of actual project costs and benefits, in addition to projected costs and benefits were the project to be delivered as a program at scale. Guidelines §§ 3.9.1.1, 3.9.2. In absence of cost-effectiveness screening,

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64 The Department has found that, while pursuing energy and demand savings through strategic electrification, the Program Administrators must seek to reduce GHG emissions and minimize ratepayer costs. 2022-2024 Three-Year Plans Order at 84. Splitting incentives between gas and electric Program Administrators may mitigate bill impacts and produce a more equitable sharing of costs and benefits between gas and electric ratepayers. The Department notes that Program Administrators already are required to address fully how they considered a split incentive for both large traditional custom projects and large strategic electrification projects that involve offsetting natural gas consumption in its three-year energy efficiency plan, term report, and any applicable mid-term modification proposals. Liberty Utilities (New England Natural Gas Company Corp., D.P.U. 22-94, at 14 (2022).

detailed program descriptions and appropriate analysis must support the potential of a demonstration project to deliver net benefits in the future. Guidelines § 3.9.1.2.

The Department recognizes that both geothermal demonstration projects that have come before us required multiple proceedings, such as separate proposal, implementation, and cost-recovery filings, in addition to project-level evaluation studies.[65] See, e.g., Boston Gas Company, D.P.U. 20-120, Interlocutory Order on Proposed Demonstration Projects (December 11, 2020); NSTAR Gas Company, D.P.U. 21-53, Order on Phase I NSTAR Gas Company's Implementation Plan (January 4, 2022); NSTAR Gas Company, D.P.U. 22-125, Stamp Approval (December 5, 2022). Inasmuch as the Department had not reviewed a geothermal network proposal prior to 2020, however, such a proposal was considered a matter of first impression. The Department determined that these additional proceedings were therefore necessary to protect participating consumers, set the appropriate budgets, and maintain general oversight as the LDCs use ratepayer dollars to explore innovative solutions in support of Massachusetts' GHG emissions reductions targets. D.P.U. 19-120, at 138, 141, 148-149, 154; D.P.U. 21-53, at 8-9.

The Department has general supervisory authority over gas and electric companies, and must make all necessary examination and inquiries to keep itself informed as to the

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65 The Department acknowledges that multiple proceedings may serve as a barrier to meaningful engagement and participation by the public, and, to that end, the Department opened an investigation into procedures for enhancing public awareness of and participation in its proceedings. Notice of Inquiry by the Department of Public Utilities on its own Motion into Procedures for Enhancing Public Awareness of and Participation in its Proceedings, D.P.U. 21-50 (2021).

condition of the respective properties owned by such corporations, and the manner in which they are conducted with reference to the safety and convenience of the public. G.L. c. 164, § 76. The Department anticipates that the desired streamlining will occur as demonstration projects in support of the Commonwealth's GHG emissions reductions targets become more routine and as the LDCs understand what is expected of them in meeting the Department's standard of review.

Accordingly, the Department concludes that no further "streamlining" of its demonstration project review is required at this time, and that the LDCs have received sufficient guidance and cost-recovery avenues for researching and deploying innovative electrification and decarbonization technologies. The Department fully recognizes the financial and technological uncertainties that LDCs face in reaching the Commonwealth's mandated decarbonization targets; to minimize ratepayer costs, however, we continue to require that innovative technologies be rooted in cost-effectiveness and be offered in a cost-efficient manner.

Any demonstration project proposals related to innovative technologies must include detailed implementation plans and terms and conditions that are acceptable to and protective of participants. Each LDC seeking to demonstrate a new technology must propose novel objectives that will reasonably result in quantifiable GHG emissions reductions, and each LDC will be required to provide updates in its Climate Compliance Plan reports. As circumstances change, the Department may consider an alternative framework to incentivize the deployment of decarbonization technologies, as necessary.

E. Manage Gas Embedded Infrastructure Investments and Cost Recovery

1. Introduction and Summary

As discussed above in Section V.A, most of the pathways modeled predict declines in the number of LDC customers and system utilization over time (Regulatory Designs Report at 31-32). The Consultants raise two main concerns surrounding the issue of declining customers and throughput, namely the resulting higher costs for customers remaining on the natural gas system, and a mismatch between how infrastructure costs are currently recovered and the predicted system utilization (Regulatory Designs Report at 31-32). To mitigate the potential impacts associated with the recovery of embedded infrastructure costs and declining system usage, the Consultants recommend finding ways to minimize or avoid gas infrastructure investments where possible, pre-approval of non-GSEP investments, revisions to existing line extension policies, and accelerated depreciation (Regulatory Designs Report at 32-40).

a. Minimize Capital Investments

The Consultants recommend that the Department and LDCs develop a framework to examine opportunities to minimize or avoid gas infrastructure projects, while continuing to maintain safe and reliable service (Regulatory Designs Report at 32-33). The Regulatory Designs Report encourages geographically targeted electrification where possible as a way to address embedded infrastructure cost issues, as well as investigating various NPAs to replace non-cathodically protected steel, cast-iron, and wrought iron, and other aged pipe with new pipe (Regulatory Designs Report at 33). The Consultants acknowledge that these options are

not without barriers, as targeted electrification requires all customers in an area to agree to terminate gas service and switch to electric service, and there are costs associated with switching (Regulatory Designs Report at 33). NPAs discussed include energy efficiency measures, demand response solutions, electrification, and networked geothermal systems (Regulatory Designs Report at 33-34).

b. Pre-Approval

The Consultants recommend the Department establish a process to review and pre-approve LDC capital investment plans relating to non-GSEP investments (Regulatory Designs Report at 34). They suggest conducting holistic, long-term capital planning that aligns safety and reliability investments with the Commonwealth's decarbonization targets (Regulatory Designs Report at 34). The Consultants propose reviewing LDC capital plans every three years—similar to the review process for energy efficiency plans—and that the process should evaluate changes in forecasted demand driven by decarbonization goals (Regulatory Designs Report at 34).

c. Line Extensions

Another recommendation for managing the concerns around embedded infrastructure is to revise the standards associated with line extensions and investments to serve new customers (Regulatory Designs Report at 34-36). The Consultants note that currently the standard for serving new customers is that existing customers must not subsidize the cost to serve new customers, and that to the extent the incremental revenues of the customer addition are not equal to or greater than the associated costs, the difference must be paid by the

customer in the form of a CIAC (Regulatory Design Report at 36). The Consultants identify four potential changes to the current line extension policy: (1) shortening the investment payback period; (2) reducing customer revenues supporting the new investments; (3) increasing the target rate of return on the investments; and (4) requiring customers to guarantee the revenues supporting the incremental costs (Regulatory Designs Report at 36).

d. Accelerated Depreciation

Rather than the current practice of utilizing straight-line depreciation, the Consultants recommend accelerated forms of depreciation, such as the Units of Production method or implementing shorter service lives, to better align the recovery of infrastructure costs with the anticipated utilization and anticipated customer migration (Regulatory Designs Report at 37-40). The Consultants suggest that while accelerated forms of depreciation increase costs in the short term, the associated depreciation costs should remain stable compared to continued use of the straight-line method, which will result in increased future costs if system utilization declines (Regulatory Designs Report at 37-38). Accelerated deprecation is presented as not only a means of mitigating affordability and equity concerns, but also a way to mitigate concerns related to unrecovered rate base as customers leave the gas system by recovering costs in an accelerated fashion (Regulatory Designs Report at 38-39).

2. Summary of Comments

A number of commenters specifically argue that line extensions and new customer additions should cease as soon as possible, citing health concerns, the potential for stranded assets, and the ability to achieve net-zero emissions (see, e.g., McCord Comments at 3

(May 6, 2022); Muzzy Comments at 1 (May 6, 2022) ("Muzzy Comments"); PLAN Final Comments at 6; RMI Initial Comments at 12-13; Robinson Comments at 1 (May 4, 2022)). Other commenters express general concerns regarding stranded assets associated with increased capital investments, and some urge a transition away from investments in fossil fuels (see, e.g., Archbald Comments at 1 (May 6, 2022); Armstrong Comments at 1 (May 4, 2022); Boston Common Asset Management Comments at 2 (May 6, 2022); Burdick Comments at 1 (May 6, 2022); C. Rose Comments at 1 (May 4, 2022); Royce Comments at 1 (May 2, 2022)). Several commenters support implementing opportunities to minimize or avoid gas infrastructure projects generally (see, e.g., Acadia Center Initial Comments at 24); CLF Initial Comments at 9).

LEAN contends that furthering capital investments and any proposals to accelerate cost recovery will only increase financial risks and create affordability issues for low-income customers in particular (LEAN Initial Comments at 10, 18). Alternatively, the Attorney General suggests that the Department conduct a review of existing tariff provisions and line extension policies, as there is no current uniform model or costing matrix to assess the cost-benefit analysis of line extensions (Attorney General Initial Comments at 32); Attorney General Final Comments at 16). More specifically, the Attorney General states the Department should determine whether the current CIAC model is consistent with state policies and goals, reflects anticipated investment recovery, and results in mostly free extensions for new customers (Attorney General Initial Comments at 32). The LDCs acknowledge that not all utilities handle line extensions in a uniform way and do not oppose a

collaborative review of the current models or the development of a common framework as proposed by the Attorney General (LDC Joint Comments at 93).

In addition to the suggested review of CIAC models and line extension policies, the Attorney General recommends that the Department retain consultants or work with utilities to develop an "investment alternatives calculator" that would review and compare the expected costs of new gas system investments with the short- and long-term costs of alternative solutions (Attorney General Initial Comments at 33-35; Attorney General Final Comments at 11). The Attorney General contends that a properly designed investment alternatives calculator would provide a set of prescribed assumptions for the cost of carbon, a range of values for the cost of gas commodity, the cost of avoided GHG emissions, and the cost of alternative technologies (Attorney General Initial Comments at 33-34)

Regarding depreciation, Acadia Center, CLF, and others argue that accelerated depreciation is worth investigating, and DOER contends that a geographic marginal cost analysis to address decommissioning plans should be required before accelerated depreciation is allowed (see, e.g., Acadia Center Initial Comments at 24; CLF Initial Comments at 54; DOER Initial Comments at 17; RMI Initial Comments at 13). CLF also suggests that investigations into any depreciation changes should begin promptly, as any delays could increase the risk of rate shock when changes are implemented, and that depreciation rates should reflect the utilization of different assets with different lifetimes (CLF Initial Comments at 49, 53).

The Attorney General asserts that accelerated depreciation inappropriately shifts market and climate policy risk from utilities to ratepayers while increasing the cost of gas service (Attorney General Initial Comments at 35-36). She suggests it is unrealistic for utilities to continue to invest in gas infrastructure without regard to market risks and decarbonization goals, and that the Department may choose to treat future infrastructure investments differently from those made historically (Attorney General Initial Comments at 36). The Attorney General contends the Department should order LDCs to file information on the magnitude of potential stranded costs and work to establish clear cost recovery timelines or guidelines to balance the costs and responsibilities of possible stranded assets (Attorney General Initial Comments at 35-37; Attorney General Final Comments at 16). The Town of Hopkinton opposes the adoption of accelerated depreciation, arguing that it shifts cost recovery to taxpayers from the LDCs and ratepayers (Town of Hopkinton Comments at 3-4 (May 6, 2022)). The LDCs disagree with the Attorney General's assessment regarding the shifting of risks, and instead argue that accelerated depreciation addresses affordability concerns for current and future customers while maintaining a safe and reliable system (LDC Joint Comments at 86). The LDCs argue that they must continue to make investments to maintain the gas system, and that the regulatory compact entitles utilities to an opportunity to earn a reasonable return on, and a return of, their prudent investments (LDC Joint Comments at 87). The LDCs also disagree with DOER's assertion that consideration of accelerated depreciation should be delayed until the completion of a

marginal cost analysis addressing decommissioning plans, arguing that it would be subject to significant uncertainty and complexities (LDC Joint Comments at 87-88).

3. Analysis and Conclusions

a. Pre-Approval and Capital Investments

The Regulatory Designs Report recommends that the Department review and pre-approve certain future LDC capital investments as part of the reporting and planning process going forward in order to continue providing safe and reliable gas service (Regulatory Designs Report at 46). In the instant proceeding, the Department is not persuaded that pre-approval of investments is appropriate at this time. We observe that there are extensive federal and state regulations intended to ensure the safe maintenance and operation of the natural gas pipeline system, which include safety standards and mandated program improvements. The Department will not interfere with the mandates of the federal and state regulations. See, e.g., 49 C.F.R. §§ 192.907, 911, 1005, 1007; 220 CMR 101.00. The Department does, however, recognize that achieving state climate change goals necessarily requires the minimization of stranded investments to the extent possible. The Consultants recommend encouraging NPAs as alternatives to replacing aged pipes and/or installing new mains. The Attorney General argues that the Department should adopt a robust alternatives analysis or an "investment alternatives calculator" to ensure that any investments made represent the best alternative available at the time (Attorney General Initial Comments at 33; Attorney General Final Comments at 11). The Department agrees that consideration of NPAs will be an essential part of the regulatory landscape, and that

companies should begin examining opportunities to minimize investments that may contribute to future stranded costs. As described in Section III above, the recoverability of additional investment in natural gas infrastructure will require an analysis of whether such investments are consistent with state emissions reduction targets and the thorough evaluation of NPAs. As part of any future cost recovery proposals, LDCs will bear the burden of demonstrating that NPAs were adequately considered and found to be non-viable or cost prohibitive in order to receive full cost recovery.[66]

b. Line Extensions

As discussed in Section III, the Commonwealth's climate laws, which include a 2050 GHG emissions reduction mandate and interim targets, require LDCs and the Department to move beyond a "business as usual" approach to system planning and expansion. Accordingly, the Department agrees with the Consultant and commentor suggestions that the standards for investments to serve new customers be examined and revised. The Attorney General specifically recommends that the Department address the standard for line extensions, along with other ratemaking policies, as part of a gas ratemaking regulatory reform in a separate proceeding or working group (Attorney General Final

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[66] The Attorney General suggests the use of a "investment alternatives calculator" to evaluate NPAs. The Department agrees that stakeholders should have the opportunity to review not only individual NPA analysis but the underlying assumptions and inputs. The Department therefore directs that in conducting the cost-benefit analysis underlying the consideration and evaluation of NPAs, the LDCs consult with stakeholders prior to submitting an NPA analysis for Department review and adjudication.

Comments at 16). The LDCs express a willingness to develop collaboratively a common framework for evaluating new service connections and a review of existing CIAC and internal rate of return ("IRR") models (LDC Joint Comments at 92-93). The Department directs all LDCs to begin reviewing existing tariffs, policies, and practices related to new service connections to determine: (1) the number of *de facto* free extension allowances; (2) whether current models and policies accurately reflect the anticipated income and timeframe over which the capital investments will be recovered; and (3) whether existing state policies are inconsistent with current practices by incentivizing new customers to join the gas distribution system and allowing LDCs to extend their systems through plant additions.

The Department recognizes that certain statutory and legislative changes may be necessary going forward. In NSTAR Gas Company, D.P.U. 22-107 (2022), in the context of a proposed extension of natural gas service to the Town of Douglas, several parties and participants expressed concern that Section 3 of the Gas Leaks Act, which mandates that the Department review and approve proposals designed to increase the availability, affordability, and feasibility of natural gas service for new customers, is inconsistent with the Commonwealth's GHG emissions reduction targets and climate policies. D.P.U. 22-107, at 6-9, 12. Section 3 was enacted by the Legislature in 2014. D.P.U. 19-120, at 464. Prior to any approval and implementation of a program proposed under Section 3, the Department must review the company's determination that a main or service extension is economically feasible and review the gas company's CIAC policy and methodology. St. 2014, c. 149,

§ 3(a); D.P.U. 19-120, at 456. In D.P.U. 22-107, the Department found that the state's recent climate legislation neither repealed nor amended Section 3; however, we recognize the inherent conflict between the express goals of these statutes given that Section 3 encourages investments in new main and service extensions and increased use of natural gas, while climate legislation mandates a reduction in GHG emissions. See D.P.U. 19-120, at 464. For the Department to pursue fully its mandate to prioritize reductions in GHG emissions along with safety, security, reliability of service, affordability, and equity as directed by the Legislature in the 2021 Climate Act, we recommend that the Legislature repeal Section 3 of the Gas Leaks Act to eliminate any potential conflict of laws.

With respect to line extensions and applications specifically pursuant to G.L. c. 164, Section 30,[67] the Department determines whether a proposal is reasonable. As discussed in D.P.U. 22-107, we have found this includes the overarching consideration of the public interest, defined generally as requiring that there be no adverse impacts on existing natural gas customers. D.P.U. 22-107, at 3-4. In reviewing future applications, the Department will examine the public interest in the context of our broader climate mandates. In doing so,

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[67] The Department reviews petitions for authorization to expand a gas distribution company's service territory pursuant to G.L. c. 164, § 30, which states:

> The [D]epartment may, after notice and a public hearing, authorize a gas or electric company to carry on its business in any town in the commonwealth other than the town named in its agreement of association or charter, subject to sections eighty-six to eighty-eight, inclusive, and it may purchase, hold and convey real and personal estate in such other town necessary for carrying on its business therein.

we note that Section 30 does not require that the Department grant petitions in those circumstances where such a grant would not adversely impact existing customers. See D.P.U. 22-107, at 4. We also note that in D.P.U. 22-107, the Department found that the company had demonstrated that an alternative electrification approach was economically unviable, and that the expansion of services into the Town of Douglas was reasonable and consistent with the public interest. D.P.U. 22-107, at 15. While Section 30 does not expressly require a company to evaluate alternatives to expanding its gas system, going forward the Department will take the evaluation of alternatives into consideration along with any impact on achieving the state's climate targets. D.P.U. 22-107, at 15. Finally, although the adjudication of a specific standard of review is outside the scope of this proceeding, the Department anticipates that its consideration of a petition pursuant to Section 30 will presume a requirement of consistency with an LDC's Climate Compliance Plan, as discussed in Section VI.G.

c. Accelerated Depreciation

There is general consensus among the LDCs and stakeholders that the issue of depreciation and stranded assets must be examined. While stakeholders differ as to the exact approach to deal with the issue, the Department agrees that the matter is important and must be investigated. As an initial step, the Department directs all LDCs to conduct a comprehensive review that includes a forecast of the potential magnitude of stranded investments. As part of this review, the LDCs must identify the impacts of accelerated depreciation proposals and identify potential alternatives to accelerated depreciation.

The Consultants and LDCs specifically reference the "Units of Production" method of accelerated depreciation as a way of aligning cost recovery of capital investments with system utilization, noting that it is a method recognized by the National Association of Regulatory Utility Commissioners ("NARUC"), as well as the option of implementing shorter asset service lives (Regulatory Designs Report at 38). The Department notes there are various options to consider with respect to accelerated depreciation, and the LDCs should not limit their review to any one method such as the Units of Production method, as each has its own inherent benefits and limitations (see, e.g., Regulatory Designs Report at 38; NARUC Depreciation Manual at 52-53; 57-61). Accelerated depreciation methods currently are not used for regulatory purposes, with the straight-line method primarily utilized in utility depreciation studies (NARUC Depreciation Manual at 61). The Department previously has recognized, however, that there is a fundamental transition underway in the gas industry in Massachusetts, and further investigation of cost recovery of existing infrastructure investment is required. The goal of the review should be not only assessing the magnitude of stranded costs, but also to investigate ways to address cost recovery while balancing ratepayer and shareholder risk going forward in a way that adequately reflects system costs, shareholder awareness of risk, and realistic expectations of the future, while addressing customer affordability and equity concerns.

F. Evaluate and Enable Customer Affordability

1. Introduction and Summary

The fifth regulatory recommendation focuses on evaluating and enabling customer affordability as customers transition away from reliance on the gas system to decarbonized technologies. The Consultants caution that each of the identified decarbonization pathways raise cost considerations for customers as well as associated equity challenges, which will require regulatory and policy interventions to mitigate impacts on customers (Regulatory Designs Report at 40). In particular, the Consultants explain that given the magnitude of potential cost impacts, and the rate and equity implications associated with progress toward electrification, there is a need to expand the scope of the current cost recovery mechanisms for LDCs (Regulatory Designs Report at 41). The Consultants therefore recommend a specific set of regulatory designs and policy changes to address these concerns, which we discuss below (Pathways Report at 100-108; Regulatory Designs Report at 40-45).

a. Cost and Equity Implications of the Pathways

The Consultants highlight that the upfront costs required for customers to convert appliances and heating systems from natural gas to electricity are a significant barrier for customers to migrate off the gas system (Pathways Report at 105-106). The Consultants further state that when a growing number of customers transition off the gas system, customers who remain on the system will experience increasing energy costs that they must absorb (Regulatory Designs Report at 40; Pathways Report at 106). Absent regulatory changes, the Consultants conclude the remaining customers will see higher rates due to

varying increases in commodity or delivery costs[68] (Regulatory Designs Report at 41). The Consultants maintain that by 2050, some of the higher electrification pathways may result in unrealistic costs imposed on customers from $30,000 to more than $70,000 per customer per year (Pathways Report at 107). Pathways with more moderate levels of electrification result in less significant cost shifting, yet still yield costs per customer expected to be 40 percent to 50 percent above the reference case by 2050 (Pathways Report at 107).

In addition to affordability challenges, the pathways present equity challenges, including cost shifting between migrating and non-migrating customers and between rate classes, and potential disproportionate impacts on low-income customers and customers designated as environmental justice populations (Regulatory Designs Report at 40; Pathways Report at 106). The Consultants explain that customers who are unable to fund the high upfront costs of switching to decarbonized technology (especially non-migrating customers who qualify for low income-rates and those who are designated as environmental justice populations) or otherwise face challenges in adopting clean technologies (i.e., the hard-to-electrify commercial sector) are more likely to remain stranded on the gas system and shoulder the growing costs (Pathways Report at 29, 106-109). The Consultants state that

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68 According to the Consultants' projections, certain pathways that allow for higher continued gas system utilization (i.e., "Efficient Gas Equipment" and "Low Electrification") will experience increased commodity cost of renewable gas in the system, while others that allow for lower gas system utilization (i.e., "High Electrification") will see increases in delivery costs due to customers departing the gas system and leaving behind uncollected embedded gas infrastructure costs to be recovered over fewer customers and/or therms (Pathways Report at 101; Regulatory Designs Report at 41).

low-income customers remaining on the gas system likely will spend an increasingly higher share of their income on energy, from approximately seven percent to more than 15 percent in 2050 (Pathways Report at 101-102).

In addition, the Consultants caution that the pathways present various equity considerations with respect to existing infrastructure retirements, new energy infrastructure construction, and the decommissioning of LDC infrastructure, including municipal tax base impacts, service interruptions and road closures associated with prolonged and significant electric industry or alternative technology construction, and decommissioning of LDC infrastructure (Pathways Report at 108). The Consultants explain that policies will need to address and mitigate, to the extent possible, impacts on environmental justice and low-income populations associated with siting and construction of energy infrastructure as well as potential decommissioning of any LDC facilities. The Consultants state that these mitigation policies are particularly important for environmental justice populations, which generally are concentrated in communities already hosting energy infrastructure (Pathways Report at 108).

b. Recommended Regulatory and Policy Interventions

The Consultants propose to address affordability and equity concerns through a set of specific regulatory design recommendations, which focus on understanding and minimizing the impacts of decarbonization on customers (Regulatory Designs Report at 42). These regulatory design recommendations include identifying and quantifying transition costs, evaluating the impacts of transition costs on customers, and exploring alternative cost recovery mechanisms and securitization as methods for mitigating affordability issues

(Regulatory Designs Report at 42, 45). In addition, the Consultants suggest that policy interventions such as targeted incentives aimed at promoting a more equitable transition to clean technologies are warranted (Regulatory Designs Report at 20, Pathways Report at 108). Ultimately, the Consultants conclude that the magnitude and pace of electrification associated with a particular pathway will impact LDCs and the Department's ability to develop and implement regulatory policies that mitigate potential cost shifts and associated equity issues (Pathways Report at 108).

First, the Consultants recommend developing a framework to identity and quantify transition costs (i.e., uncollected costs from customers who have departed the gas system, costs associated with design and implementation of the regulatory reforms,[69] workforce transition costs, and costs associated with restructuring or realignment of gas supply portfolios) (Regulatory Designs Report at 42). The next step should be to evaluate the impact of those transition costs on customers under the various pathways (Regulatory Designs Report at 42).[70]

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69 These proposed regulatory reforms include geographically targeted electrification, non-pipeline solutions, coordinated planning efforts between electric and gas utilities, and accelerated depreciation (Regulatory Designs Report at 42).

70 The Consultants explain that under some pathways, such as 100 percent gas decommissioning, the transition costs grow quickly and have a substantial impact on customer rates much earlier in the decarbonization pathway, while under other pathways, such as hybrid electrification, the transition costs grow more slowly and have a substantial impact on rates later in the decarbonization pathway (Regulatory Designs Report at 42).

The Consultants next recommend mitigating transition costs by evaluating alternative approaches to cost recovery, such as charging customers leaving the gas system an exit fee or migration fee ("migration charge"),[71] and a statewide recovery mechanism through electric surcharges ("transition charge") (Regulatory Designs Report at 42). The first approach suggests a migration charge for customers leaving the gas system to cover costs that were incurred to serve them but not collected (Regulatory Designs Report at 42-43).[72] According to the Consultants, this would minimize the cost shift to customers remaining on the system as well as minimizing the potential for non-recovery of embedded costs (Regulatory Designs Report at 43). The second approach of charging transition charges seeks to align the benefits of decarbonization with the transition costs through sharing the transition costs more broadly with those who benefit from the transition (Regulatory Designs Report at 43). The Consultants acknowledge that the mechanism underlying this approach requires considerable review and evaluation, including its implications on LDC customers and, more broadly, on those who would pay for the transition costs, but they suggest that the process could start with establishing a fund and continue with attempts to identify other funding sources (Regulatory Designs Report at 43). The Consultants assert that the substantial transition costs

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71 The Consultants refer to this fee as a "migration fee," while some commenters refer to the charge as an "exit fee." The Department uses the term migration charge, which has the same meaning as migration fee and exit fee, and references the terms used by commenters when summarizing comments.

72 The Consultants posit that this option likely would require legislative approval given the charge would be based on LDC costs charged to non-LDC customers (Regulatory Designs Report at 42).

associated with each pathway require a cost recovery mechanism consistent with the scope and scale of such costs (Regulatory Designs Report at 42).

The Consultants' final recommendation is to evaluate the use of securitization as a method to finance transition costs and lower a utility's borrowing costs, which, in turn, decreases the amount customers will have to repay, and allows both parties to benefit directly from the bond market (Regulatory Designs Report at 45).[73] The Consultants acknowledge that securitization poses the challenge of requiring a secure revenue stream, whereas the revenue stream under the decarbonization pathways is subject to significant uncertainty (Regulatory Designs Report at 45). The Consultants suggest that a possible, albeit untested, solution to this uncertainty would be through charges on both gas and electric bills (Regulatory Designs Report at 45).

In addition to the above set of regulatory design recommendations, the Consultants introduce a few policy interventions they claim are needed to address affordability and regulatory concerns. First, to address the burden of upfront capital costs of appliances, as well as the costs associated with decarbonization in the building sector (e.g., implementing building shell retrofits), the Consultants suggest that expanded policies aimed at providing additional customer incentives should be established (Pathways Report at 102, 106-107; App. 1, at 57).

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[73] The Consultants state that securitization has been used in the utility industry to finance the recovery of extraordinary costs (e.g., wildfire mitigation costs in California, coal plant decommissioning costs in New Mexico, and storm costs in Texas), serving to minimize the impacts on customer rates (Regulatory Designs Report at 45).

Next, the Consultants suggest that a means of mitigating the unintended consequences of inequitable cost shifting is to provide incremental incentives to low-income and environmental justice populations to promote decarbonization (Pathways Report at 108). In addition, the Consultants suggest that incentives designed to benefit both landlords and renters would help address the current misalignment of interests between these parties, especially for pathways with higher levels of customer transitions (Pathways Report at 108). Further, the Consultants caution that the pathways present various equity issues related to both existing infrastructure retirements and new energy infrastructure construction, including municipal tax base impacts, service interruptions and road closures associated with prolonged and significant electric industry or alternative technology construction, and decommissioning of gas infrastructure (Pathways Report at 108). Importantly, environmental justice populations are generally over-represented in communities already hosting energy infrastructure (e.g., LDC on-system LNG and propane assets). Given that each pathway has a significant level of energy infrastructure construction, the Consultants suggest that policies will need to specifically address and mitigate the disproportionate impacts on environmental justice and low-income populations associated with siting and constructing energy infrastructure as well as the decommissioning any LDC facilities (Pathways Report at 108).

2. Summary of Comments

Several commentors expressed affordability concerns, particularly for LMI customers (see, e.g., Attorney General Initial Comments at 50; DOER Initial Comments at 15; LEAN Initial Comments at 18; NCLC Initial Comments at 32; HEET Comments at 7). Several

stakeholders call for the prioritization of LMI customers to ensure an equitable transition and protect those customers from bearing the increased energy burden associated with electrification (see, e.g., NCLC Initial Comments at 32; LEAN Final Comments at 2-3; Sierra Club Final Comments at 12). Stakeholders generally agree that LMI customers are less likely to leave the gas system and, therefore, may be disproportionately impacted by higher energy bills (see, e.g., Acadia Center Initial Comments at 22; LEAN Initial Comments at 17). To that end, several commentors suggest that the LDCs should consider rate mechanisms to help protect LMI ratepayers from high energy burdens and potential rate increases (see, e.g., Attorney General Initial Comments at 52; DOER Initial Comments at 15; LEAN Initial Comments at 18).

The Attorney General argues that the current gas regulatory framework does not protect LMI customers and customers in environmental justice populations from the increasingly high energy burdens that will disproportionately impact these customers as more ratepayers leave the gas system in the transition to a net-zero future (Attorney General Initial Comments at 46-47, 52; Attorney General Final Comments at 3-4). The Attorney General asserts that the high upfront investment required to transition to alternatives, such as heat pumps, creates inequities for LMI customers as these households often lack savings, disposable income, and access to credit, which prevents them from affording clean energy alternatives (Attorney General Initial Comments at 47-48). The Attorney General adds that likewise renters may be poorly positioned to participate in and benefit from the energy transition as renters often are responsible for heating bills yet have no control over the

heating system and a landlord may not be motivated to make necessary upfront investments (Attorney General Initial Comments at 48; Attorney General Final Comments at 3-4). The Attorney General further observes there is a disproportionate impact to health and safety experienced in certain communities (e.g., due to pollution or the siting of energy infrastructure), including environmental justice populations (Attorney General Initial Comments at 50).

The Attorney General argues that protection for LMI ratepayers must be directionally consistent with reducing dependence on natural gas and should minimize the risk that customers unable to migrate end up with a disproportionate share of transition, embedded, or stranded costs (Attorney General Initial Comments at 52). To this end, the Attorney General recommends that the Department consider adopting a rate mechanism to protect LMI ratepayers from high energy burdens and from potential rate increases related to climate investments by both the gas and electric distribution companies, such as implementing a cap on the amount an LMI ratepayer is billed (Attorney General Initial Comments at 52). The Attorney General further recommends that the Department provide targeted support to LMI customers and customers in environmental justice populations when programs are designed to facilitate opportunities for residents to access cleaner energy alternatives (Attorney General Initial Comments at 52; Attorney General Final Comments at 17).

Several commenters disagree with implementing a migration charge as suggested by the Consultants (see, e.g., Acadia Center Initial Comments at 24-25; RMI Initial Comments at 3; Sierra Club Initial Comments at 18-19; CLF Final Comments at 6). Acadia Center

agrees that customer affordability issues should be addressed through a Department investigation of various cost recovery options, but does not believe exit fees are the appropriate approach (Acadia Initial Comments at 24-25).

Sierra Club argues that a migration charge is unfair and undermines the Commonwealth's GHG emissions reduction goals by contradicting incentives to leave the gas system (Sierra Club Initial Comments at 18-19). Sierra Club further contends that this approach fails to account for system costs to which customers contributed but from which they did not benefit (e.g., system expansions and system upgrades to deal with growing demand in certain geographic areas), and questions whether customers would be compensated for those excess contributions when they leave the gas system as well (Sierra Club Initial Comments at 19). Sierra Club also argues that electric ratepayers should not be burdened with gas system transition costs (Sierra Club Initial Comments at 19). Sierra Club suggests that this approach would make the cost of electrification relatively more expensive and would affect not only the customer economics of electrifying from gas, but also of electrifying fuel oil and propane use (Sierra Club Initial Comments at 19).

According to Sierra Club, the best way to minimize low-income energy burdens is to fully electrify low-income housing as part of a high electrification strategy given that the Pathways Report shows that energy burdens of low-income customers would be lowest for those who fully electrify (Sierra Club Initial Comments at 22; Sierra Club Final Comments at 12). Sierra Club states that while it is important to implement policies such as low-income rates to mitigate impacts on those low-income customers left on the gas system, the priority

should be implementing policies and funding programs to support low-income electrification to ensure low-income customers are not left behind in the transition to clean energy (Sierra Club Initial Comments at 22; Sierra Club Final Comments at 12). LEAN also supports protection of low-income customers from rate increases under the pathways and advocates for an increase to low-income discounts (LEAN Initial Comments at 17; LEAN Final Comments at 2-3).

CLF also argues against imposing a migration charge or transition fee on customers leaving the gas system (CLF Final Comments at 6). CLF contends that doing so would essentially serve as a penalty for transitioning to decarbonized technologies (CLF Final Comments at 6). Further, according to CLF, such a framework would ensure that only those who can afford to pay the fee will be able to make the choice to use clean energy options, leaving the most vulnerable residents who are unable to afford the costs to transition to clean energy stranded on an increasingly high-cost gas system (CLF Final Comments at 6). In addition, CLF submitted a "Scoping a Future of Gas Study," which recommends that utility analyses must account for the differences between customer classes and reflect the impact of each scenario on customers in each category, including low-income ratepayers, moderate-income ratepayers, and renters within the residential class, as well as different types of commercial buildings and industrial consumption (CLF Initial Comments at 38). CLF suggests that LDCs must track the rate and bill impacts of each energy transition scenario on customers with reduced ability to make infrastructure choices in their homes, such as LMI households and renters, and find ways to mitigate the effects of any inequitable

outcomes (CLF Initial Comments at 38). The analyses for customer affordability must compare overall costs associated with the use of gas as a "bridge" fuel versus direct transition to electricity (CLF Initial Comments at 39). CLF recommends that LDCs also should consider that customers might switch from pipeline gas to delivered fuels if pipeline service becomes uneconomic, and include recommendations to mitigate any negative effects resulting from such choices (CLF Initial Comments at 39).

DOER agrees with the Consultants that it is necessary to protect customers, particularly low-income customers and those in environmental justice populations, from rate shocks by evaluating decarbonization-specific rate structures (DOER Initial Comments at 9, 11). DOER argues that the Department should require the LDCs to conduct a geographic marginal cost analysis to identify where transitioning to cleaner technologies provides significant benefits, which includes recommendations for mechanisms (e.g., new rate structure proposals for future tariff proceedings or for future legislative or regulatory action) to help protect low-income residents (DOER Initial Comments at 15). DOER asserts that LDCs must balance affordability concerns for customers against continuing to make necessary investments in the gas system to ensure safety and reliability (DOER Final Comments at 19).

The LDCs indicate support for the Commonwealth's climate goals and contend that customer choice should be at the center of any strategy to meet those goals as individual decisions about when and how to adopt electrification and efficiency measures will affect the nature, scale, and magnitude of electric and gas system transformations (LDC Joint

Comments at 93-94, citing Pathways Report at 15). The LDCs support the hybrid electrification pathway because it results in lower energy system costs, providing an incentive for customers to adopt hybrid heating systems (LDC Joint Comments at 75). The LDCs support the Consultants' suggestions for potential rate designs, such as a new hybrid heating rate class and critical peak pricing, to incentivize customers to adopt or remain on hybrid heating systems (LDC Joint Comments at 75). To ensure customer equity, LDCs are considering potential financial transfers from electric utilities to gas utilities as an approach to fund transition costs (LDC Joint Comments at 75). The LDCs assert this arrangement recognizes the multiple benefits of maintaining gas system functionality, including better utilization of the electrical system, avoidance of significant electrical system upgrade costs, and the maintenance of an alternative energy source in the event of blackouts (LDC Joint Comments at 75). The LDCs argue that achieving the levels of electrification modeled in each pathway will require significant customer education efforts, as well as development of supportive policy initiatives and market transformation activities that help customers overcome the upfront cost barriers to electrification (LDC Joint Comments at 94-95).

3. Analysis and Conclusions

a. Introduction and Summary

In opening this investigation, the Department sought to examine strategies to enable the Commonwealth to move into its net zero GHG emissions energy future while simultaneously safeguarding ratepayer interests. As detailed by the Consultants and LDCs and reinforced by several stakeholder comments, customers are expected to see considerable

impacts through the affordability and equity implications of the transition to clean energy alternatives. Namely, customers will face challenges with respect to the upfront costs necessary to invest in clean technologies, rate increases for a declining number of customers remaining on the gas system, and resultant equity impacts, especially for LMI ratepayers and environmental justice populations.

In discharging our responsibilities under G.L. c. 25, the Department must prioritize affordability and equity in addition to safety, security, reliability of service, and reductions in GHG emissions to meet statewide emissions limits and sublimits. G.L. c. 25, § 1A. As electrification efforts expand, ensuring affordability and equity is of particular importance to avoid overburdening customers financially, particularly those who already bear higher burdens in terms of not only costs but other cumulative impacts. The Department acknowledges that the ability to meet these goals will depend on a variety of factors, including the magnitude and pace of customer transition, and legislative and regulatory changes. The Department remains committed to ensuring that its future regulatory policies are aimed at addressing barriers to expeditious customer transition to decarbonized energy options, while mitigating challenges with affordability and equity.

Throughout this proceeding, numerous stakeholders and individuals raised concerns regarding the ability of customers to afford the costs of the transition away from gas, as well the potential inequitable impacts to customers, especially those most vulnerable. The Consultants, as well as several stakeholders, propose a host of solutions to address these issues. Upon examination of the challenges and proposed strategies related to affordability

identified during this proceeding, the Department has determined that further investigation is necessary and herein sets forth several areas for future evaluation that will focus on informing the strategies and any necessary regulatory changes to balance affordability and equity with the need to transition into a clean energy future as quickly and aggressively as is practicable. We discuss these areas of future investigation below.

b. Transition Costs

With respect to transition cost considerations, the Department recognizes that the increasing number of gas customers leaving the gas system likely will result in higher rates for those customers remaining on the system. The Department shares commenters' concerns regarding barriers preventing LMI customers from transitioning away from gas, while those same customers would bear a disproportionate energy burden by remaining on the gas system. We agree that new regulatory support and strategies will be needed to minimize the negative implications of this potential cost shifting and to maximize affordability.

The Department supports the Consultants' suggestion that an appropriate starting point is the development of a framework to identify transition costs and quantify these costs to understand the full scope of the cost impacts associated with the various decarbonization strategies, and then to evaluate the impact of those costs on ratepayers. The Department envisions that this framework should, at minimum, include identifying and quantifying the following transition costs: (1) uncollected costs from customers who have departed the gas system; (2) costs associated with design and implementation of regulatory reforms, including geographically targeted electrification, NPAs, coordinated planning efforts between electric

and gas utilities, and accelerated depreciation; (3) workforce transition and training costs; and (4) costs associated with restructuring or realigning of gas supply portfolios (Regulatory Designs Report at 42).

Once quantified, the impact of transition costs on ratepayers, particularly LMI customers and environmental justice populations, should be evaluated fully. Importantly, this evaluation should encompass a broad range of considerations, including but not limited to: (1) bill impacts by customer class (short and long term as well as percentage of cost increase relative to household income); (2) GHG emissions reductions; (3) public health and safety; and (4) equity[74] under the various pathways. The Department is interested in DOER's recommendation that the LDCs conduct a geographic marginal cost analysis to identify where transitioning to cleaner technologies provides significant benefits, including potential mechanisms (e.g., new rate structure proposals for future tariff proceedings or for future legislative or regulatory action) to help protect LMI ratepayers. As discussed in Section VI.E above, the Department favors a robust alternatives analysis, and we see a geographical marginal cost analysis to be a potentially valuable and informative part of that process. As suggested by the Attorney General, the Department will prioritize consideration

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[74] In this context, evaluation of equity considerations should include impacts on LMI customers, environmental justice populations, renters, and people of color, both in terms of energy burden and energy-related health and safety impacts. An equity analysis should consider the disproportionate and inequitable distribution of burdens and benefits that currently exist as well as future projections.

of any impacts that result in disproportionate and inequitable distribution of burdens and benefits when making any future regulatory decisions.

c. Alternative Cost Recovery

The Department agrees that we should evaluate and consider alternative cost recovery mechanisms. The Consultants suggest implementing migration and transition charges, along with financing transition costs through securitization, as potential cost recovery mechanisms to alleviate the increasing burdens on customers as more and more leave the gas system. Several commenters express support for types of mechanisms that help mitigate cost and equity impacts to customers, but also argue that implementing the Consultants' proposed mechanisms is inappropriate.

While the Department acknowledges the potential benefits of implementing a migration charge or exit fee for migrating off the gas system—such as reducing the costs that will shift to the remaining gas customers and minimizing the potential for non-recovery of embedded costs—the potential burdens and impacts on those customers and their decision to adopt clean alternatives remain unknown and untested. The Department is concerned that charging a fee to exit the gas system may disincentivize some customers from pursuing electrification. Similarly, while the Department acknowledges the potential benefit that securitization methods could yield (i.e., in terms of lowering borrowing costs and reducing customer rate shocks), the full scope of the impacts on customers and the gas and electric

systems remains to be seen.[75] For these reasons, the Department declines to adopt the proposed alternative cost recovery mechanisms at this time and we will examine other cost recovery mechanisms in a future investigation.

Lastly, the Department agrees with several commenters that there is a need to adopt a rate mechanism aimed at protecting LMI customers from high energy burdens and potential rate increases as they transition from gas to electricity. As mentioned in Section VI.B above, the Green Communities Act directs that 20 percent of three-year energy efficiency plan budgets be allocated to low-income energy efficiency. G.L. c. 25, § 21(b)(1). We determine that there should be additional policies and programs to support low-income electrification to ensure low-income customers are not left behind in the transition to clean energy and, in fact, benefit in the near-term from electrification opportunities. The Department encourages the LDCs to work with the Energy Efficiency Advisory Council, including LEAN, to explore strategies to better reach underserved populations and hard-to-reach customers, including renters and landlords, LMI customers, and environmental justice populations. The Department also previously directed the LDCs to weatherize prior to or as part of an electrification project to ensure that overall energy consumption will decrease, while minimizing ratepayer bill impacts, particularly for LMI customers, for purposes of acquiring all cost-effective energy efficiency under the Green Communities Act. 2022-2024

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[75] The Department notes that while G.L. c. 164, §1H, provides that the Department shall approve an electric company's securitization plan that maximizes rate affordability to ratepayers, the statute does not explicitly apply to LDCs.

Three-Year Plans Order at 107-108. An enhanced incentive structure that includes weatherization for low-income and environmental justice population customers in addition to incentives for heat pump conversions will ensure a reduction in energy consumption and minimize bill impacts. The LDCs should encourage, through education and enhanced incentives, proper weatherization of all customer homes in advance of heat pump installation. LDCs should also ensure that contractors properly size heat pumps prior to installation. Failing to do so potentially increases energy costs for customers. 2022-2024 Three-Year Plans Order at 107-108.

Further, we acknowledge the Recommendations of the Climate Chief, Melissa Hoffer, developed pursuant to Executive Order No. 604, §3(b), which recommends that the Department "prioritize any rate reform necessary to ensure that electric bills will be affordable for all households, particularly those with low and moderate incomes."[76] As noted in Section III above, the Department will investigate this issue further as we evaluate methods to ensure affordability and equity in light of higher energy burdens on LMI customers.

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[76] Hoffer, Melissa, Office of Climate Innovation and Resilience, "Recommendations of the Climate Chief pursuant to Section 3(b) of Executive Order No. 604," pages 40-43 (October 23, 2023), available at: https://www.mass.gov/doc/recommendations-of-the-climate-chief-october-25-2023/download (last visited November 29, 2023).

G. Develop LDC Transition Plans and Chart Future Progress

1. Introduction and Summary

The sixth regulatory recommendation includes developing transition plans and evaluating progress toward the Commonwealth's climate targets. The Consultants state that the transition toward achieving climate targets will require (1) periodic reporting and (2) an iterative planning process that reflects lessons learned and new developments (Regulatory Designs Report at 46). The Consultants identify the following reporting and planning processes for inclusion in the new LDC transition plans:

1) Evaluation of LDC transition plan progress toward achievement of climate goals and addressing challenges;

2) Review and pre-approval of future LDC capital investments with a focus on necessary gas system replacements and identification of strategic opportunities to avoid new gas infrastructure through electrification and alternative options;

3) Establish a framework to review and optimize cross-coordination planning between gas and electric utilities;

4) Establish a framework for review and approval of cost recovery mechanisms for LDC capital investments and pilot projects;

5) Evaluation of customer affordability metrics;

6) Evaluation of key initiative data such as number of renewable natural gas customers, GHG emissions calculations, rates and bill impacts, and impacts on environmental justice populations with each plan filing; and

7) Incorporation of performance metrics and incentives to align LDCs' financial incentives with the goals of the Commonwealth (Regulatory Designs Report at 46-47).

Each LDC filed a Net Zero Enablement Plan, an initial transition plan for meeting the Commonwealth's 2050 goals (Framework and Overview at 17). The LDC Net Zero

Enablement Plans are designed to continue energy efficiency efforts consistent with the three-year energy efficiency plans, and to advance decarbonization and the Consultants' recommended regulatory designs in the short term. (Framework and Overview at 17). Included in the LDC transition plans is a proposed Model Tariff that would allow the LDCs to recover costs associated with their respective Net Zero Enablement Plans (Framework and Overview at 18-19). The LDCs seek Department approval of a framework for future iterations of the Net Zero Enablement Reports and the Model Tariff (Framework and Overview at 18-19). Each LDC proposes to file a Net Zero Enablement Plan on a three-year cycle, to align with the three-year energy efficiency cycle, using a five-year and ten-year planning horizon (Framework and Overview at 18). The Consultants note that GSEP capital investments would not be included in the transition plans because there is a process in place for Department review and approval for such expenditures (Regulatory Designs Report at 46). The LDCs propose that the Department review their initial and future three-year transition plans pursuant to the following standard of review: "The LDC's transition portfolio is reasonably designed to contribute to the reduction of GHG emissions to meet net-zero emissions by 2050, without compromising the safety, reliability and affordability of service offered to current customers" (Framework and Overview at 18).

2. Summary of Comments

a. Comprehensive and Coordinated Planning

Most commenters agree that comprehensive planning is needed to guide future investments and meet decarbonization objectives. The Attorney General recommends that the

Department take several steps to support LDC comprehensive planning such as: (1) requiring LDCs to file a comprehensive geographic distribution system mapping report; (2) implementing an investment alternatives calculator;[77] (3) mandating an alternatives analysis for approval of LDC proposals for alternative sources of methane or combustible gas; (4) directing LDCs to file plans that demonstrate the achievement of required GHG emissions reductions; and (5) reviewing LDC forecast and supply planning to better align GHG emissions reduction requirements (Attorney General Final Comments at 10-13). The Attorney General explains that without a full map of the gas system, the regulatory framework would continue to perpetuate piecemeal planning and siloed decision making which may impact the cost-effective achievement of net zero emissions by 2050 (Attorney General Final Comments at 10). The Attorney General maintains that such a map could help identify areas that are best suited for targeted electrification (Attorney General Final Comments at 14). DOER also supports requiring LDCs to submit a geographic distribution system map (DOER Final Comments at 10).

In addition, commenters agree that coordinated planning between gas and electric distribution system companies is necessary. The Attorney General recommends that the Department require electric distribution company participation in gas system investment proceedings (Attorney General Final Comments at 15). The Attorney General contends that the Department cannot adequately evaluate any proposed investment without joint electric and

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[77] We address the suggestion of an investment alternatives calculator in Section VI.E.

gas planning (Attorney General Final Comments at 15). Other commenters such as Acadia Center and CLF oppose having LDCs lead the transition plans (Acadia Center Final Comments at 2; and CLF Final Comments at 7). Acadia Center and CLF argue that the LDCs have a financial interest in maintaining the gas system, which creates a conflict of interest in leading the transition plans (Acadia Center Final Comments at 2; CLF Final Comments at 7). CLF avers that LDCs should be treated as stakeholder participants in the "future of gas," while Acadia Center recommends implementing an independent planning authority to lead coordinated planning (CLF Final Comments at 7; Acadia Center Final Comments at 1; Acadia Center Initial Comments at 27-28). Public commenters conveyed support for developing transition plans, but many expressed concerns with the proposal that the LDCs lead the transition.

The LDCs disagree with Acadia Center's recommendation to create a third-party planning authority to oversee the transition plans (LDC Joint Comments at 78). The LDCs argue that creating a new third-party planning authority would conflict with prior Department precedent and the rights and obligations conferred upon utility companies by law and statute (LDC Joint Comments at 78). In particular, the LDCs posit that the Department has long deferred to the judgment and expertise of regulated utility companies when it comes to operating and maintaining their systems (LDC Joint Comments at 80, citing Boston Gas Company and Colonial Gas Company, D.P.U. 13-78, at 13 (2014)). Moreover, the LDCs maintain that it is appropriate for utilities to develop their own investment plans because they bear the responsibility of maintaining a safe and reliable service that is compliant with all

federal and state regulatory and statutory requirements (LDCs Joint Comments at 81). Regarding specific analytical constructs for evaluating potential gas network investments proposed by the Attorney General and DOER (e.g., investment alternatives calculator or geographic mapping and marginal cost analysis), the LDCs argue such tools would reduce network planning to consideration of selected quantifiable parameters and, therefore, would be unable to capture the broad range of considerations that are required to make coordinated investment decisions (LDC Joint Comments at 82, citing Exh. DPU-Comm 7-2).

b. Limiting Incentives for Gas System Growth

Several commenters propose recommendations regarding GSEPs. The Attorney General asserts that the Department should consider climate objectives as part of GSEP review and require LDCs to demonstrate that the proposed investment is the least-cost alternative to improve safety and reduce leaks (Attorney General Initial Comments at 30). Additionally, the Attorney General proposes that the Department form a working group to make recommendations for potential changes to GSEPs (Attorney General Attorney General Initial Comments at 44). Similarly, DOER contends that LDCs should be required to address how specific GSEP investments correlate with a parallel geographical marginal cost analysis (DOER Final Comments at 18). DOER, Sierra Club, and CLF agree with revising the current GSEP process so investments in gas infrastructure can be minimized to the greatest extent practicable (DOER Final Comments at 17; CLF Initial Comments at 8; Sierra Club Initial Comments at 20). Several commenters echoed the importance of minimizing further gas system investments (see, e.g., HEET Comments at 8; LEAN Initial Comments at 10-11;

Muzzey Comments at 1). Commenters cited concerns regarding stranded assets and perpetuating the use of fossil fuel gas through gas system investments (see, e.g., RMI Initial Comments at 11; Werlin Comments at 1 (May 6, 2022); Lipke Comments at 1 (May 6, 2022)). Other commenters called for the end of both gas line extensions and the addition of new gas customers to the system (see, e.g., HEET Comments at 33; McCord Comments at 3; PLAN Initial Comments at 4).

The LDCs reiterate that the proposed transition plans exclude GSEP-related investments because there already is a process in place for Department gas system review and approval (LDCs Joint Comments at 81, citing Regulatory Designs Report at 46). The LDCs maintain that their respective GSEPs are consistent with the Gas Leaks Act and note that the Department consistently has found that the replacement of aging infrastructure under GSEPs achieves the goals of improvements in public safety, infrastructure reliability, and the reduction of lost and unaccounted for ("LAUF") natural gas. (LDC Joint Comments at 85, citing Fitchburg Gas and Electric Light Company, D.P.U. 20-GSEP-01, at 9 (2021)). Additionally, the LDCs note that they already are required to show that their respective GSEPs reduce emissions through annual filings with MassDEP (LDC Joint Comments at 85). The LDCs do not object to evaluating possible modifications to GSEPs as part of a working group provided they have adequate representation (LDC Joint Comments at 85).

Other recommendations are intended to further disincentivize gas system growth. For example, the Attorney General avers that LDCs should no longer be permitted to recover costs for marketing related to promoting gas service (Attorney General Initial Comments

at 41). The Attorney General argues that these costs are not aligned with the Commonwealth's decarbonization goals and therefore expansion advertising should no longer be funded by ratepayers (Attorney General Initial Comments at 41). Similarly, the Sierra Club argues that incentives for gas appliances should be phased out (Sierra Club Initial Comments at 21). The Attorney General makes an additional recommendation to revise existing performance-based ratemaking ("PBR") mechanisms to establish incentives and disincentives designed around the gas utilities' progress in compliance with the Climate Act mandates (Attorney General Initial Comments at 40-41). The Attorney General states the Department should consider directing each LDC to submit revised PBR plans instead of waiting for the LDC to file its next base rate case (Attorney General Initial Comments at 40-41).

The LDCs disagree with the Attorney General's recommendation to revise the PBR mechanism (LDC Joint Comments at 88). The LDCs explain that PBR generates a level of revenue for a company to run its business, similar to an annual allowance to cover business operations, which enables the company to make system investments and attain operational and capital efficiencies (LDC Joint Comments at 89). According to the LDCs, these efficiencies create savings which are passed on to customers (LDC Joint Comments at 89). Additionally, the LDCs maintain that the existing PBR framework is not inherently inconsistent with progress toward decarbonization (LDC Joint Comments at 89). The LDCs argue that it is not necessary to revise the existing PBR because a new framework that aligns

incentives with decarbonization still would apply with or without the current PBR framework (LDC Joint Comments at 89).

c. Net Zero Enablement Plans

Many commenters request that the Department reject the LDCs' individual Net Zero Enablement Plans and associated Model Tariff (see, e.g., Sierra Club Final Comments at 4; NCLC Initial Comments at 20; CLF Final Comments at 6). Some commenters express concerns that the proposed Net Zero Enablement Plans are biased, inaccurate, profit-driven, and ineffective to adequately transform energy use (Donaldson Comments at 1 (May 6, 2022); NCLC Initial Comments at 14-16; Sierra Club Final Comments at 13-14). In addition, other commenters contend that the Model Tariff is premature and that it is unfair for utilities to offer a product, such as RNG, as a tariffed utility service (see, e.g., Attorney General Initial Comments, App. C at 3-4; SFE Energy Comments at 3-4 (May 6, 2022)). The Attorney General criticizes the Net Zero Enablement Plans, contending that the LDCs are resisting change by seeking to maintain gas infrastructure (Attorney General Initial Comments, App. C at 2). The Attorney General proposes that the Department open a planning docket for the purpose of ensuring LDC compliance with climate mandates before considering the proposed Net Zero Enablement Plans (Attorney General Initial Comments, App. C at 3).

DOER recommends that the Department require the LDCs to develop more detailed three-year plans that propose decarbonization regulatory actions, evaluation of previous metrics, and recommendations for future plans (DOER Initial Comments at 13). DOER

proposes that the Net Zero Enablement Plans should include the following: (1) a geographic mapping and marginal cost analysis to demonstrate the interaction of multiple strategies; (2) a demonstration of cost considerations; (3) enhanced proposals for regulatory actions to support decarbonization; and (4) metrics as a tool to evaluate successful strategies (DOER Initial Comments at 14). The LDCs maintain that each proposed Net Zero Enablement Plan pursues a portfolio of the various decarbonization pathways analyzed by the Consultants in an effort to meet the Commonwealth's targets while maintaining safety and reliability (LDC Joint Comments at 17). The LDCs request that the Department review and approve the individual Net Zero Enablement Plans and Model Tariff (LDC Joint Comments at 17).

3. Analysis and Conclusions

a. Introduction

The LDCs developed individual transition plans that articulate their role in supporting the Commonwealth's achievement of its climate mandates. The LDCs specifically propose to implement transition plans that include: (1) joint gas and electric planning; (2) periodic reporting; and (3) a Model Tariff to facilitate recovery of costs associated with the Net Zero Enablement Plans (Regulatory Designs Report at 46-47). The LDCs maintain that it is appropriate for utilities to develop their own transition plans and oppose recommendations to implement an investment alternatives calculator or geographic mapping report (LDC Joint Comments at 81-82). As we have stated from the beginning of this investigation, rather than selecting a single pathway for decarbonization, the Department will focus on creating a regulatory planning framework that is flexible, protects customers, and considers a suite of

electrification and decarbonization technologies to facilitate the transition. Here we identify certain strategies and processes that will allow the Department and stakeholders to collect and evaluate information, establish common metrics and assumptions, and refine reporting review procedures to maintain and accelerate momentum toward achievement of the Commonwealth's climate targets. Consistent with our "whole of DPU" approach, these will include LDC reporting requirements, utilization of existing working groups and other forums, convening of technical conferences and additional working groups as necessary, and further investigation and adjudicatory proceedings within the Department.

b. Comprehensive and Coordinated Planning

The LDCs propose to establish a process for coordinated planning between gas and electric utilities (Regulatory Designs Report at 46). The Department agrees that coordinated and comprehensive planning between electric and gas utilities is needed to facilitate the energy transition. Gas and electric infrastructure planning will be necessary as consumers transition from using fossil fuel-based heating systems to electric heat pumps. We note that going forward, evaluation of any proposed investments will have to take place in the context of joint electric and gas system planning. The Department emphasizes that joint electric and gas utility planning must occur in a broad stakeholder context so that the LDCs and electric distribution companies exclusively are not defining the process and outcome. The LDCs and electric distribution companies should consult with stakeholders regarding such a joint planning process that, while it is not Department led, may lead to proposals for Department

review. We will continue to monitor and define these processes in future proceedings, as necessary.

Next, the Department addresses the practicality of requiring a comprehensive map of the gas distribution network. The Attorney General asserts that a map of all gas system infrastructure will better enable the Department to evaluate proposed gas system investment and alternatives (Attorney General Initial Comments at 23-24). The Department in Section III and Section VI.E above expressed its support of a robust alternatives analysis, for the first time mandating that LDCs must include and demonstrate analysis of alternatives as a prerequisite for cost recovery of infrastructure investments. As to the requirement of a gas system infrastructure map, the Department seeks to balance the need for comprehensive and useable information with the nature of the extensive critical energy infrastructure information ("CEII") inherent in such an undertaking, which is required by public records law to be protected from public disclosure.[78] We therefore decline to order public filing of such mapping with the Department in a Climate Compliance Plan or otherwise. We will, however, explore appropriate means of facilitating such information sharing without compromising CEII.

The Department finds that it would be inappropriate to issue any further directives that could impact potential changes to GSEPs here. The 2022 Clean Energy Act required the Department to convene a stakeholder working group to develop recommendations and

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[78] G.L. c. 66, § 6A(e); G.L. c. 4, § 7(26)(n).

legislative changes to align the gas system with statewide emissions limits, as well as encourage the development of geothermal systems. St. 2022, c. 179, § 68. The GSEP working group has met several times since its initial meeting in April 2023.[79] Each of the LDCs, as well as many of the parties to this proceeding, is participating in the GSEP working group process, and most of the topics raised by the Attorney General and other stakeholders are being explored in that forum. The GSEP working group is expected to produce its findings and recommendations to the Legislature by the end of the year.

c. Climate Compliance Plans

The Department appreciates the LDCs' efforts to design the initial Net Zero Enablement Plans. As a threshold matter, Section 77 of the 2022 Clean Energy Act dictates that the Department shall not approve any company-specific plan in this investigation prior to conducting an adjudicatory proceeding with respect to such plan. St. 2022, c. 179, § 77. Therefore, while the LDCs' Net Zero Enablement Plans lay out the companies' strategies to achieve compliance with climate objectives mandates,[80] which may inform the regulatory framework we seek to establish here, we cannot approve such a plan or a Model Tariff

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79 See https://www.mass.gov/info-details/gseps-pursuant-to-2014-gas-leaks-act (last visited November 29, 2023).

80 The LDCs explain that certain pathways evaluated in the Net Zero Enablement Plans, such as efficient gas equipment installation, may build on the three-year plan activities by offering additional incentives, complementary measures, or implementation practices that further advance efficient gas equipment installations, but that do not fall within the parameters of the Department's precedent for cost-effectiveness applicable to energy efficiency sectors, programs, or core initiatives (Exh. DPU-Comm 1-11).

without full adjudication. This proceeding is an investigation and not an adjudicatory proceeding. Consistent with the legislative directive, the Department will review and approve company-specific plans in subsequent adjudicatory proceedings.

To that end, the Department directs each LDC to file individual Climate Compliance Plans every five years, with the first such Plan being due on or before April 1, 2025.[81] Each Climate Compliance Plan should expand on previous Net Zero Enablement Plans by demonstrating how each LDC proposes to: (1) contribute to the prescribed GHG emissions reduction sublimits set by EEA for both Scope 1[82] and Scope 3[83] emissions; (2) satisfy customer demand safely, reliably, affordably, and equitably using known and market-ready technology available at the time of the filing; (3) use pilot or demonstration projects to assist

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81 Subsequent Climate Compliance Plans would be due in 2030, 2035, and 2040. The plans should include a five- and ten-year planning horizon.

82 The U.S. Environmental Protection Agency ("EPA") defines Scope 1 emissions as "direct greenhouse emissions that occur from sources that are controlled or owned by an organization." Scope 1 and Scope 2 Inventory Guidance, available at https://www.epa.gov/climateleadership/scope-1-and-scope-2-inventory-guidance (last visited November 29, 2023).

83 The EPA defines Scope 3 emissions as emissions that "result of activities from assets not owned or controlled by the reporting organization, but that the organization indirectly impacts in its value chain." Scope 3 Inventory Guidance, available at https://www.epa.gov/climateleadership/scope-3-inventory-guidance (last visited November 29, 2023).

in identifying investment alternatives; (4) incorporate the evaluation of previous metrics[84]; and (5) implement recommendations for future plans.

Each electric distribution company operating in an LDC's service area will be required to participate in the Climate Compliance Plan gas planning process.[85] Each Climate Compliance Plan should detail the total investment required and should also include a description of at least one alternative method to meet the required emissions reductions, providing the estimated costs for the considered alternative, and a demonstration that the proposed plan is superior to the alternative. To track compliance with the Commonwealth's interim emissions reduction deadlines, each LDC will be required to file an informational Climate Act Compliance Term Report Filing nine months after each interim deadline (i.e., 2025, 2030, 2035, 2040) indicating whether or not the LDC achieved the required emissions reductions.

d. Climate Compliance Incentives

The LDCs state that the planning and evaluation process could be used to design performance metrics and incentives to align the LDCs' financial incentives with the Commonwealth's goals (Regulatory Designs Report at 47). A PBR mechanism can provide such an incentive for an LDC to take actions aligned with the Commonwealth's climate

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84 Evaluation of previous metrics would not be applicable to the first Climate Compliance Plan filed.

85 The Climate Compliance Plans should also include customer, stakeholder, and community input where practicable.

policy and mandates to reduce its sales of methane gas through a series of measures to encourage gas efficiency, demand response, and electrification, as well as reducing LDC system and customer emissions of methane and carbon dioxide. In recent Orders, the Department has approved a PBR framework for LDCs, recognizing that there is a fundamental evolution taking place in the natural gas local distribution industry in Massachusetts.[86] Currently, the Department requires a utility seeking approval of an incentive proposal like PBR to "demonstrate that its approach is more likely than current regulation to advance the Department's traditional goals of safe, reliable, and least-cost energy service and to promote the objectives of economic efficiency, cost control, lower rates and reduced administrative burden in regulation."[87] To better align gas PBRs with the Commonwealth's long-term future of the gas system in a net-zero 2050 economy, the Department finds that it should amend the existing PBR framework to establish incentives and disincentives reflecting the gas utilities' progress toward compliance with the Climate Act mandates, and achievement of their approved Climate Compliance Plans. Accordingly, the Department directs the LDCs to propose climate compliance performance metrics in their next PBR filings.

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86 See, e.g., NSTAR Gas Company, D.P.U. 19-120, at 56; Boston Gas Company, D.P.U. 20-120, at 66-67 (2021).

87 See NSTAR Gas Company, D.P.U. 19-120, at 59.

VII. CONCLUSION

The Department herein has set forth a regulatory strategy for pursuing an energy future that begins to move the Commonwealth beyond gas and toward its climate objectives. As we have detailed, this will include new reporting and analysis requirements, utilization of existing working groups and other forums, convening of technical conferences and additional working groups as necessary, and further investigation and adjudicatory proceedings within the Department. Going forward, the Department will seek to facilitate a safe, orderly, and equitable transition for the LDCs and their customers through these processes while pursuing the Commonwealth's 2050 GHG emissions reductions mandate and interim targets.

VIII. ORDER

Accordingly, after due consideration, it is

ORDERED: That the Massachusetts gas local distribution companies shall comply with the directives contained in this Order.

By Order of the Department,

James M. Van Nostrand, Chair

Cecile M. Fraser, Commissioner

Staci Rubin, Commissioner