
EZRA HAUSMAN CONSULTING

77 Kaposia Street
Auburndale, MA 02466
617-875-6698

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VIA ELECTRONIC MAIL

Mark D. Marini, Secretary
Department of Public Utilities
One South Station
Boston, Massachusetts 02110
dpu.efiling@mass.gov
sarah.smegal@mass.gov

RE: D.P.U. 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

Dear Secretary Marini and Hearing Officer Smegal:

My name is Ezra D. Hausman, Ph.D. and I am President of Ezra Hausman Consulting in Auburndale, Massachusetts. In this position, and in my previous position as Vice President of Synapse Energy Economics from 2005 through 2014, I have provided analysis, technical support, and expert services in the area of energy resource policy and planning for a range of public interest clients including state and federal agencies, consumer advocates, and environmental advocacy groups around the United States. Among many other projects, I coordinated the modeling team that evaluated compliance options and pathways for the Global Warming Solutions Act on behalf of the Massachusetts Department of Energy Resources in 2009 through 2011.

My education includes a Master's degree in Water Resource Engineering from Tufts University, a Master's in Applied Physics from Harvard University, and a Ph.D. in Atmospheric Chemistry from Harvard University. I have provided my full resume as an Exhibit to these comments.

While I have frequently provided expert testimony and comments on behalf of clients in regulatory proceedings, in this case I am providing comments on my own behalf as a scientist, an energy resource expert, and a Massachusetts resident and utility ratepayer.

We are in the midst of a climate emergency. The State of Massachusetts has set forth aggressive and necessary milestones to dramatically reduce greenhouse gas emissions in response to this crisis. These goals can only be met through a comprehensive reorganization of our relationship to our energy sources, and in particular to the combustion of fossil fuels. Consequently, I appreciate that the Board is undertaking this review of how gas resource and distribution planning should proceed in Massachusetts. While I have not participated in the earlier phases of this Docket, I have reviewed the voluminous record accumulated by the Department of Public Utilities (DPU), with a focus on the independent consultant reports, comments of stakeholders and the Local Distribution Companies (LDCs), the LDC Zero Enablement Plans, and responses to the reports and comments. I thank you for this opportunity to file final comments pursuant to Ms. Smegal's September 8, 2022 Memorandum.

Reducing and ultimately eliminating greenhouse gas emissions from the energy sector is an extremely challenging, generation-defining task. We must be clear-eyed and face hard truths as we make difficult choices, using the best information available. There is no room to fall back on fairy tale solutions that waste time and resources, when there is so much work to be done implementing changes based on known, workable strategies. Given this reality, I am concerned that the independent consultants in this matter, E3 and ScottMadden (Consultants), have entertained unrealistic non-solutions in their analysis, and thus allowed magical thinking to creep into the LDC's filed plans. I refer specifically to any reliance on "Renewable Natural Gas" or RNG, including hydrogen and "Synthetic Natural Gas", as a purported solution to displace natural gas for building heat in the Commonwealth.¹ Reliance on these alternative gases is illogical and counterproductive, and the analysis supporting them in this Docket is inconsistent with reality. While aspects of these concerns have been raised by other stakeholders, here I focus on this issue exclusively because of the real risk I see that policy may be made based on a dangerously false foundation.

¹ For convenience, I will refer to this set of resources as "gas alternatives" herein.

The issues I address regarding alternative gases are:

1. **Resource Availability:** The Consultants erroneously assume that a virtually unlimited demand for alternative gases can be met by the market.
2. **Cost:** The Consultants ignore basic economics in modeling the likely cost of alternative gases.
3. **Competition:** Other uses for alternative gases have much higher value than domestic pipeline gas and are much harder to displace through electrification.
4. **Environmental Impact:** alternative gases are not carbon neutral, and increased demand will lead to higher emissions and other negative environmental consequences.
5. **Impact on Ratepayers:** investing in a doomed gas-based strategy will exacerbate the costs of meeting Massachusetts' statutory decarbonization requirements.
6. **Lost Opportunity:** Ratepayer dollars should be reserved for proven, workable solutions.

1. RESOURCE AVAILABILITY: *THE CONSULTANTS ERRONEOUSLY ASSUME THAT A VIRTUALLY UNLIMITED DEMAND FOR ALTERNATIVE GASES CAN BE MET BY THE MARKET.*

Alternative gases are not produced from a geological source like fossil fuel, but instead are a byproduct of other economic activity, *e.g.*, agriculture or waste processing. As such, the available supply faces practical limits tied to the activities that generate such gases. A fundamental part of any successful greenhouse gas mitigation strategy must be to *reduce* the production of such gases to the extent possible by elimination of waste. The Consultants' assumptions regarding unprecedented growth in the availability of such fuels seems to imply that there would be commensurate growth in the activities that produce them in response to economic incentives. This would be disastrously counterproductive.

While there are certainly additional volumes of waste gas that could (and should) be recovered and currently are not, pushing producers to higher levels of recovery – and demanding more sources of biogenic fuels to supply pipeline gas² will also increase the marginal price for

² See Appendix 1 to Technical Report, Figure 8, showing the additional sources that would be diverted to pipeline gas under the gas-reliant scenario vs. an electrification scenario.

these gases. It is simply nonsensical to assume that the market would somehow meet an unprecedented demand for these gases in Massachusetts at a low cost, as if they were a commodity that can be produced at will in response to economic signals. In fact, increases in demand would likely drive production into areas that have negative environmental or social consequences, and ultimately contribute to *more* greenhouse gas emissions, not less. Massachusetts' policy and resource planning strategies should be geared toward minimizing the demand for *any* combustible gas. As described below, there are other, hard-to-electrify end uses that are a far more productive use of alternative gases. It would be counterproductive to foster more demand and competition for these fuels as pipeline gases, given the limited supply.

2. COST: THE CONSULTANTS IGNORE BASIC ECONOMICS IN MODELING THE LIKELY COST OF ALTERNATIVE GASES.

Other parties have commented on the illogical and unsupportable assumptions made in the Consultants' analyses that the supply curves for interchangeable forms of alternative gases will somehow bifurcate, in defiance of fundamental market economics.³ No amount of hand-waving hypotheticals about different contracting practices and durations⁴ can change the fact that over time, the market will approximate marginal cost pricing for the combined supply of all interchangeable resources.

What basic economics does tell us is that when there is an increasing demand for a product with an essentially fixed supply, the price will increase. As Massachusetts and other states pursue increasingly aggressive decarbonization strategies, any gaseous fuel with a low (or negative) carbon footprint will be in enormous and growing demand. This increasing price will have at least four negative consequences.

- First, it will drive up the price of fuel and increase the hardship on ratepayers who have been unable to electrify their living spaces. Many of them will be low-income ratepayers and renters who already experience oppressive energy burdens.

³ For example, see Sierra Club comments dated May 6, 2022, discussion on pages 9 and 10.

⁴ For example, see Joint LDC comments dated July 29, 2022, discussion on pages 26-29.

- Second, it will increase the cost of reducing or eliminating GHG emissions from other end uses that remain reliant on gaseous fuel.
- Third, it will make all other approaches to reducing fuel use (i.e., electrification) increasingly economically preferable, and contribute to the “death spiral” exodus from the gas system that has been exhaustively discussed in this process.
- Fourth, it will drive the market to seek additional sources of gas that can be added to the supply. While producers may find loopholes⁵ and claim to be providing low- or zero-carbon fuel, market pressure and the demand for more “renewable” gas will inevitably lead to higher emissions, more methane leakage, and other unsustainable impacts.

Ignoring these inevitable economic impacts would harm ratepayers under any mitigation scenario and should be of great concern to the DPU.

3. COMPETITION: OTHER USES FOR ALTERNATIVE GASES HAVE MUCH HIGHER VALUE THAN DOMESTIC PIPELINE GAS AND ARE MUCH HARDER TO DISPLACE THROUGH ELECTRIFICATION.

As numerous stakeholders have noted, heat and hot water in buildings is perhaps the *easiest* and *least costly* to electrify of all end uses of natural gas. Other, competing uses are much higher value and more difficult to replace, including certain industrial uses, aviation, and other transportation needs that will be more difficult to electrify. In addition, some amount of gas-fired electric generation is likely to be needed during a transition period to ensure reliability until renewable generating resources and storage can fully replace fossil generation.⁶ These premium uses for the limited supply of low- or zero-carbon alternative gases will have an extremely high value to society as we decarbonize and will support premium prices for the fuel. Diverting high-value fuels to low-value heating applications will quickly exhaust the potential supply of “sustainable” gases and drive up the cost of meeting the high-value applications. This would be

⁵ Analogous to the loophole by which the consultants assume that “RNG” has zero carbon emissions, which all parties know to be false but which they justified by reference to the existing Massachusetts GHG inventory approach. See LDC comments dated July 29, 2022, discussion on page 30.

⁶ This is really an economic issue – the presence of some gas-fired generation for system balancing can significantly reduce the need to “overbuild” renewables to accommodate periods of low production, until this function can be fully met with storage technologies.

detrimental to ratepayers, to Massachusetts and other states and jurisdictions as they work to decarbonize, and to the environment.

The ideal place to use renewable gases is at their source. For example, waste gases from industrial processes should be collected and combusted as close as possible to their source to provide local process energy. They can also be used in on-site generators to provide balancing and other electric grid services. The more these gases are transported and processed, the more leakage and waste will occur. Creating a lucrative market for alternative gases as pipeline fuels, as the LDCs propose, will incentivize *diversion* of such gases from efficient applications to less efficient ones. This phenomenon is well known in the biofuels industry, where such products as paper and wood wastes have been diverted away from local process heat use or recycling, towards waste-to-energy plants, in response to government incentives. Such a perverse outcome is bad for the environment and bad economics. However, it would be all but inevitable as the demand and price for alternative gases grow. Massachusetts should instead incentivize the most efficient, *localized* uses of these gases.

4. ENVIRONMENTAL IMPACT: ALTERNATIVE GASES ARE NOT CARBON NEUTRAL, AND INCREASED DEMAND WILL LEAD TO HIGHER EMISSIONS AND OTHER NEGATIVE ENVIRONMENTAL CONSEQUENCES.

Alternative gases such as RNG are extremely unlikely to be carbon neutral in terms of lifetime emissions, as acknowledged even by the independent consultants (even as they stood by this assumption in their analysis.)⁷ Leakage of methane, an extremely potent greenhouse gas,⁸ is

⁷ See “3.18.22 - Independent Consultant Report - Appendix 1 (Modeling Methodology)” page 28: “The Consultants realize that ***treating renewable fuels as carbon neutral is a simplification of the complex carbon flux associated with fuel production***. For example, fossil fuel use in feedstock production or key feedstock conversion steps can increase the embodied carbon emissions of renewable fuels. Considerations in evaluating the carbon impact of biogenic fuels include the duration of carbon sequestration over the fuel lifecycle and their respective timing of carbon release; the emissions associated with the growth, production and supply of fuels; and their jurisdictional boundaries...[a]s a result, ***treating renewable fuels as having net-zero carbon emissions may overestimate their decarbonization potential***, especially considering that emissions accounting frameworks in the Commonwealth may evolve. ***Such an overestimation increases the risk of not meeting the Commonwealth’s decarbonization goals***, especially under those economy-wide transitions that rely on high levels of renewable fuels, such as the Efficient Gas Equipment pathway.” (Emphasis added.)

⁸ The consultant used a 100-year Global Warming Potential (GWP) of approximately 25 times that of CO₂, consistent with the Massachusetts greenhouse gas inventory approach; however, I believe (and most stakeholders appear to agree) that a 20-year GWP closer to 85 times CO₂ would be more appropriate, given the proximal threat posed by climate change and the timescale of Massachusetts’ climate commitments.

inevitable as gas is processed and transported, run through services and meters, and used in household and other appliances.

Stakeholders have noted that a recent study published in the Proceedings of the National Academy of Sciences⁹ found that natural gas losses in many cities (including Boston) are several times higher than previously reported. However, there is another aspect of this study's findings that I would like to bring to the DPU's attention. The PNAS report found that the losses from the distribution system represent only 20% through 36% of natural gas losses across the cities investigated. This means that even if Massachusetts' LDCs were to eliminate 100% of distribution system losses, a near impossibility, they would still only eliminate 20% to 36% of *total* leakage of methane. This stark reality underscores the idea that even the most advanced pipeline replacements and upgrades cannot solve the problem of methane leakage to the atmosphere associated with domestic usage, whatever the source of the gas.¹⁰

As noted earlier, any *increase* in the supply of alternative gases is likely to come at the expense of various kinds of additional environmental degradation, as new sources of methane are developed that previously did not exist. Some of this methane will inevitably leak into the atmosphere, and the leakage will increase in proportion to the amount of gas transported and processed. The only way to avoid these emissions is to use any available gases as close to the source as possible, and to minimize transportation of the gas through pipelines to homes and businesses by converting building end uses to electricity.

5. IMPACT ON RATEPAYERS: INVESTING IN A DOOMED GAS-BASED STRATEGY WILL EXACERBATE THE COSTS OF MEETING MASSACHUSETTS' STATUTORY DECARBONAZATION REQUIREMENTS.

It may be tempting, given the menu of costly choices facing the DPU and Massachusetts ratepayers, to accept the assurances of the state's LDCs that they can cost-effectively meet decarbonization goals while continuing a "business as usual" strategy of unabated (or even accelerated) investment in gas delivery infrastructure. This would be a costly mistake. For all of the reasons discussed here, among others, any further commitment of ratepayer dollars to the

⁹ Sargent, R. et al. (2021). Majority of US urban natural gas emissions unaccounted for in inventories. PNAS; Earth, Atmospheric and Planetary Sciences. <https://www.pnas.org/doi/full/10.1073/pnas.2105804118>.

¹⁰ If molecular hydrogen is added to the gas supply, it is likely to only increase leakage given its smaller molecular size. Hydrogen is also indirectly a potent greenhouse gas given its impact on the chemistry of the atmosphere.

doomed strategy of continued fuel combustion in buildings will only add to the stranded costs that will somehow have to be paid off. This is often referred to as the utility “death spiral”, as those customers who can afford to leave the gas system do, leaving fewer customers to pay off the undepreciated costs; this leads to higher rates, which causes more customers to exit, and so on. What this would actually represent is a complete breakdown of the regulatory compact: at some “tipping point”, it will become impossible for the few remaining gas customers to support the costs of the system. The inevitable result would be utility bankruptcies and expensive government bailouts, among other undesirable and disruptive outcomes. It will also lead to a delay or possibly a failure to meet Massachusetts’ climate commitments, despite the extraordinary costs.

The problem of sunk costs in an outdated distribution system is already facing us today, and the DPU and the Legislature will inevitably be faced with difficult decisions for how to allocate the undepreciated costs of infrastructure that has no place in our climate-constrained future. What the DPU must do now is prevent the problem from becoming far worse by insisting that the LDCs limit any future investment in the gas distribution system to the bare minimum required for safety. DPU policy must be designed to move beyond fossil fuels and toward electrification strategies that can actually meet the state’s climate commitments.

6. LOST OPPORTUNITY: RATEPAYER DOLLARS SHOULD BE RESERVED FOR PROVEN, WORKABLE SOLUTIONS.

Finally, I want to emphasize that there are already solutions that rely on well-established technology and prudent investments. The Commonwealth can effectively reduce greenhouse gas emissions, consistent with statutory requirements, by deploying these proven technologies, with a focus on comprehensive electrification, renewable energy, and storage. Yes, this strategy will entail high front-end capital costs, but the tradeoffs also provide numerous economic and employment benefits. The DPU and other policymakers will be challenged to find ways to ensure that this energy revolution is comprehensive, inclusive, and equitable, consistent with their responsibility to protect the welfare of all ratepayers. The DPU must also ensure that the investments required are prudent and supported by the facts, and not be swayed by convenient math based on unsupported and unsupported assumptions about alternative gases. These false assumptions led the Consultants to find the proven electrification strategies to have “higher

levels of challenge” – but it should not surprise anyone when relying on magical thinking reduces the level of “challenge”!

Massachusetts policymakers should focus on using limited resources as efficiently and prudently as possible. Any diversion of resources toward fairy tale non-solutions will only compound the problem and will be inconsistent with the DPU’s responsibility to protect the welfare of all ratepayers as we face the decarbonization challenges ahead.

Thank you for the opportunity to comment in this matter.

Respectfully,

A handwritten signature in black ink, appearing to read "Ezra D. Hausman". The signature is fluid and cursive, with a long horizontal stroke at the end.

Ezra D. Hausman, Ph.D.