

December 21, 2024

via email

Massachusetts Department of Environmental Protection
100 Cambridge Street Suite 900
Boston, MA 02114

Re: Stakeholder input to inform the development of a Clean Heat Standard (CHS) program

Dear Commissioner Heiple:

Acadia Center appreciates the opportunity to provide feedback on the CHS Draft Framework (Framework) provided by the Massachusetts Department of Environmental Protection (DEP) for a Clean Heat Standard. Decarbonizing the building sector equitably will be critical to achieving our Commonwealth's Net Zero Emissions requirements, and this proposal represents an essential step forward. Acadia Center applauds DEP for its bold vision and for recognizing that the challenges posed by this transition are incredibly complex. In particular, the exclusion of RNG and hydrogen from qualifying under this Framework demonstrates that the DEP has a strong grasp of the stakes involved.

However, given the complexity of the proposed Framework and the potential widespread implications of such a policy, it was challenging to fully evaluate the Framework given the relatively short time between the Framework being distributed to stakeholders and the December 21st comment deadline. These comments therefore represent *initial thoughts* from Acadia Center on a wide range of topics related to CHS design. We look forward working with DEP and diving in more deeply to analyzing the potential impacts of the CHS in early 2024.

Overview of Initial Comments

In the following sections, Acadia Center provides initial commentary and recommendations pertaining to: Stakeholder Process; Alternative Fuels; Credit Generation Quantification Approach; and Overarching Policy Design Recommendations. Acadia Center has also worked closely to coordinate with and contribute to a set of joint comments from environmental stakeholders, entitled "Joint Comments by Climate Advocates." We express our support as a signatory to those comments, and take the opportunity to further elaborate on issues and recommendations in these standalone comments, which solely reflect the input of Acadia Center.

Stakeholder Process:

More Detailed Quantitative Analysis Underlying Policy Design Decisions is Necessary for Fulsome Review

Given the highly complex nature of CHS policy design and the importance of underlying quantitative inputs and analysis that is undoubtedly influencing policy design, it would be greatly beneficial to share as much of that analysis with stakeholders as possible. This will enable stakeholders to understand and analyze the policy design and potential impacts of the policy design, which will, in turn, increase the quality and technical rigor of constructive feedback provided by stakeholders. Based on information communicated to stakeholders on the December 7, 2023 webinar, it appears that DEP is making a commitment to sharing more of the underlying quantitative analysis going forward, which Acadia Center supports and appreciates. Acadia Center highlights a number of topic areas in the comments below where additional quantitative analysis by DEP would be highly valuable to the ongoing CHS design process.

Alternative Fuels:

It is Essential That Gaseous Biofuels and Hydrogen Remain Ineligible

DEP's proposal to make gaseous biofuels (e.g., "renewable natural gas") and hydrogen ineligible under the Framework is wholeheartedly supported by Acadia Center. The ineligibility of gaseous biofuels and hydrogen under the CHS is absolutely essential for keeping the Commonwealth on the most cost-effective trajectory towards building decarbonization, as the findings from the both 2025/2030 Clean Energy and Climate Plan (CECP), 2050 CECP, and the recent Order (20-80-B) from the Department of Public Utilities (DPU) in docket 20-80 have highlighted. The Commonwealth must begin to grapple with strategic, geographically targeted decommissioning of the natural gas system, and the proposal to make gaseous biofuels and hydrogen ineligible under the CHS, combined with DPU 20-80-B, sends this message loud and clear.

Making gaseous biofuels or hydrogen eligible under the CHS would be in direct conflict with DPU 20-80-B and send a confusing, mixed signal to the local distribution companies (LDCs). Acadia Center shares the view of the DPU that the costs, limited availability, and highly questionable GHG emissions reduction benefits of RNG make it an unsuitable building decarbonization strategy for the state. Below are select quotes from DPU 20-80-B regarding RNG and hydrogen:

- "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."¹
- "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."²
- "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."³
- "... we agree with the Attorney General that RNG and hydrogen blending are new, unproven, and uncertain technologies."⁴

¹ DPU Order 20-80-B, at 1.

² *Id.*, at 67.

³ *Id.*, at 71.

⁴ *Id.*

- “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.”⁵

On the topic of the future of the gas distribution system, DPU went on to add:

- “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.”⁶
- “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.”⁷

To summarize, DPU: 1) Does not support blending of RNG or hydrogen into the gas distribution system; 2) Does not see hybrid heating via the natural gas system as a viable building decarbonization strategy; and 3) Finds that the long-term role of the gas system is providing fuel needed for niche commercial and industrial process heat applications. The only logical conclusion based on this information is that the Commonwealth needs to begin geographically targeted, strategic decommissioning of the natural gas system in order to achieve its climate targets.

Given the stances expressed by DPU on RNG, hydrogen, and the future role of the gas distribution system, Acadia Center does not see any justifiable reason why the CHS would make RNG or hydrogen eligible clean heat measures, now or at any future point in a CHS program. We applaud DEP for its initial proposal on this set of issues and urges that future program designs maintain and strengthen their stance in this regard.

On a related note, DEP specifically asked for stakeholder comments on criteria for “evaluating other actions for crediting.” The three proposed criteria are all supported by Acadia Center: 1) Lifecycle GHG emissions of fuels, 2) Availability of fuels, and 3) Local air pollution impacts.

Acadia Center would suggest a fourth evaluation criterion, ‘Consistency with Infrastructure Transition Strategy,’ which would be defined as: Does crediting of this fuel under the CHS help to minimize the future risk of stranded assets in the gas distribution system, minimize the climate risk posed by the highly uncertain levels of methane leaks from the gas distribution system and gas end-uses, and broadly align with the state’s vision for the long-term role of the gas distribution system, as expressed in the 2050 CECP and DPU Order 20-80-B?

⁵ *Id.*, at 84.

⁶ *Id.*, at 70.

⁷ *Id.*, at 55.

More Information Needed Regarding the Mechanics of How the Massachusetts Alternative Portfolio Defines and Verifies “Eligible Liquid Biofuels”

The Framework proposes that liquid biofuels eligible under the Massachusetts Alternative Portfolio Standard (APS) should be credited “based on the assumed avoidance of all emissions from combustion of an equivalent quantity of heating oil.” Firstly, making the simple assumption that these biofuels represent a 100% reduction in emissions relative to combustion of heating oil is overly simplistic. DEP suggested one of the eligibility criteria for fuels under the CHP would be “Lifecycle analysis of greenhouse gas emissions associated with producing and utilizing the fuel, including the timeframe of the assessment.” Given this proposed evaluation criterion, Acadia Center requests further information regarding the lifecycle analysis of “Eligible Liquid Biofuels” as defined under the APS to warrant the crediting of these fuels as a 100% reduction in GHG emissions. Without more evidence on this topic, Acadia cannot support crediting these fuels at the 100% level as DEP has proposed.

The APS defines “Eligible Liquid Biofuels” as “A liquid fuel that is derived from organic waste feedstocks. Organic waste feedstock shall include, but not be limited to, waste vegetable oils, waste animal fats, or grease trap waste.”⁸ While Acadia Center generally agrees with the principle of limiting liquid biofuel eligibility to liquid biofuels derived from “*true organic waste feedstocks*,” there are considerable real-world challenges to determining if a biofuel is actually derived from organic waste byproducts, compared to biomass primarily grown for the purpose of producing biofuels, commonly referred to as “energy crops.” Acadia Center is currently researching the exact mechanics as to how the APS determines if liquid biofuels are actually derived from organic waste feedstocks and looks forward to commenting in more depth on this topic in early 2024.

The exact definition of “eligible liquid biofuels” under the APS and how that definition is enforced is a matter of *significant importance* if the CHS intends to adopt both the APS definition of eligible liquid biofuels and the process by which the APS confirms biofuels incentivized under the program comply with that definition. Acadia Center urges DEP to conduct more extensive research on the details of the APS definition and verification process and present this information to stakeholders, so stakeholders have the information needed to provide informed input on this critical topic. To date, this type of information has not been provided to stakeholders. Acadia Center will weigh in with our opinion on the exact levels these fuels should be credited at under the CHS once more information is provided.

Any Liquid Biofuel That is Not Eligible Under the Massachusetts Alternative Portfolio Standard Should Not Be Eligible Under the CHS

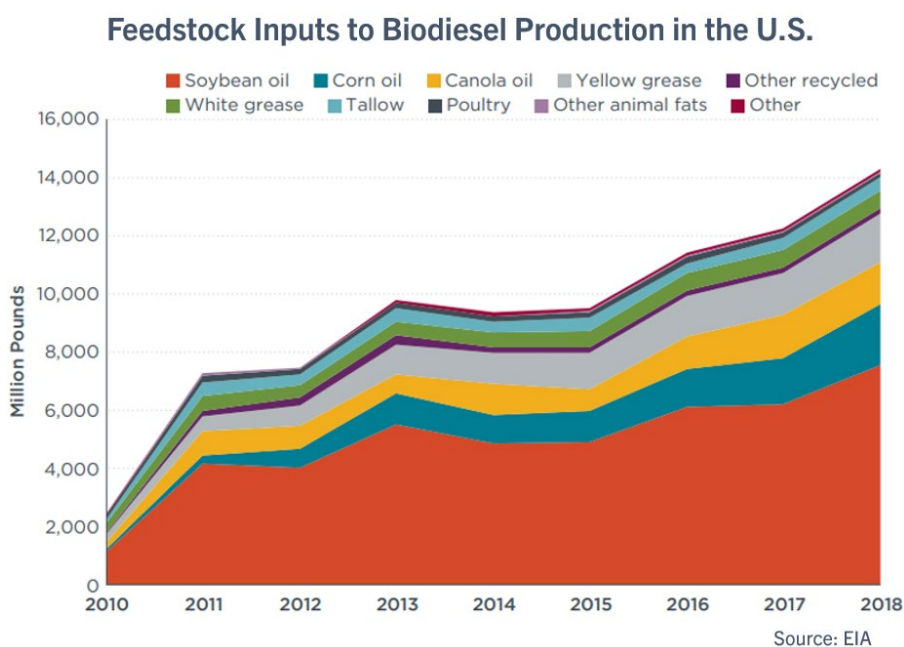
While Acadia Center is currently withholding judgment, pending more information, of the CHS eligibility of “eligible liquid biofuels” as defined under the APS, we are *strongly opposed* to granting any CHS eligibility to liquid biofuels that *only meet* the less restrictive requirements of the federal Renewable Fuel Standard (RFS). In the Framework, DEP proposes that “Eligible waste-based liquid biofuels would be credited based on the assumed avoidance of all emissions from combustion of an equivalent quantity of heating oil. Other liquid biofuels eligible for the federal Renewable Fuel Standard would receive half credit through 2030 only.” In other words, 1 gallon of RFS-eligible biofuels replacing 1 gallon of conventional heating oil would be assumed to reduce emissions associated with that fuel combustion by 50%.

⁸ <https://www.mass.gov/doc/225-cmr-16-alternative-energy-portfolio-standard-aps/download>

Firstly, DEP did not articulate which categories of RFS-eligible biofuels they are proposing to make eligible under the CHS. The RFS groups biofuels into four categories – conventional biofuels, advanced biofuels, biomass-based diesel, and cellulosic biofuels. “Conventional biofuels”, as defined under the RFS, are particularly problematic. The RFS defines these fuels as “*Any fuel derived from starch feedstocks (e.g., corn and grain sorghum). Conventional biofuels produced in plants built after 2007 must demonstrate a 20% reduction in life cycle GHG emissions.*”⁹ While corn ethanol, a fuel that is not directly relevant in this conversation, represents the majority of “conventional biofuels” produced under the RFS, some production pathways for biodiesel and “renewable diesel” under the RFS only meet this “conventional biofuels” 20% reduction in life cycle GHG emissions thresholds. In 2023, about 1.6% of all biodiesel/renewable diesel production only met this 20% threshold.¹⁰ If EPA only requires some biodiesel/renewable diesel production pathways to demonstrate a 20% reduction in life cycle GHG emissions, why would DEP propose crediting these same fuel-production pathways at a 50% emissions reduction level? Acadia Center requests more clarification on this specific point from DEP.

The larger issue with the RFS eligibility criteria, is that the vast majority of biodiesel/renewable diesel produced in the U.S. (largely motivated by RFS incentives), rely on soybean oil or corn oil. In 2020, in the U.S., soybean oil accounted for 72% of all biodiesel production, while corn oil accounted for 13% of all production.¹¹ Additionally, about 42% of U.S. soybean oil production is used to produce biofuels, opposed to food, animal feed, or other industrial uses.¹² Why does this all matter? **Energy crops – including soy and corn – are extremely problematic for multiple reasons, including direct land use competition with food production and other potentially more efficient uses, and, in particular, the massive GHG emissions risk posed by indirect land use changes (ILUC).**

ILUC are the unintended consequence of the expansion of croplands for biofuels to meet increased global demand for biofuels. The U.S. is one of the world’s largest agricultural exporters and shifting land in the U.S. from agricultural food production to energy crop production can have ripple effects across the globe that cause significant GHG emissions. ILUC impacts are particularly concerning when the result is a conversion of tropical forests, which sequester a very large amount of carbon, to cropland. Trying to untangle, for instance,



⁹ <https://afdc.energy.gov/laws/RFS>

¹⁰ <https://www.epa.gov/fuels-registration-reporting-and-compliance-help/rins-generated-transactions>

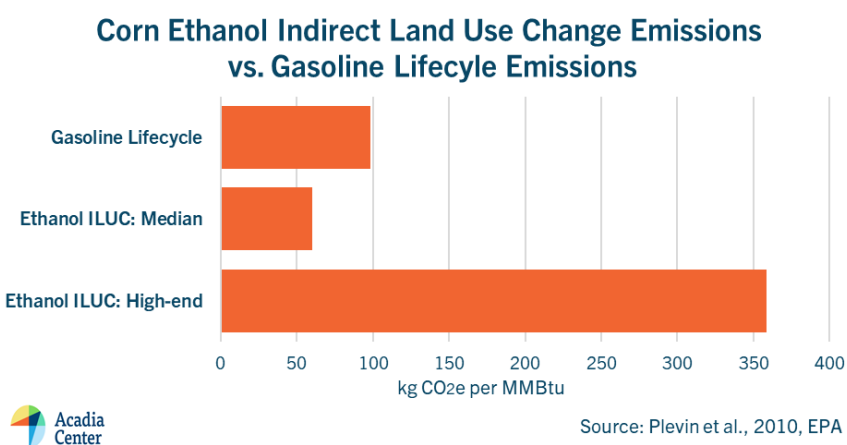
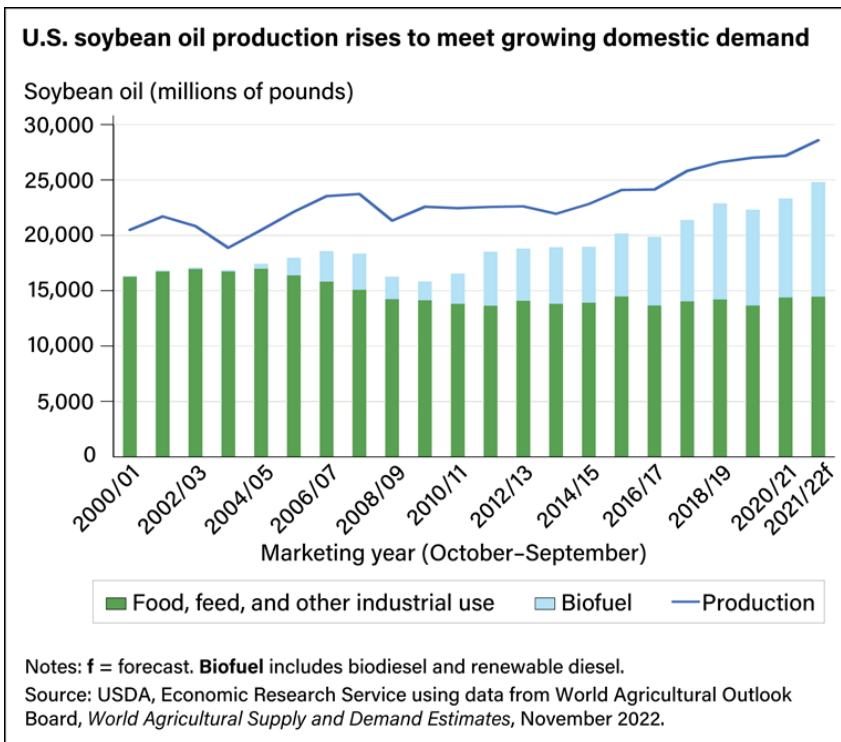
¹¹ <https://www.eia.gov/biofuels/biodiesel/production/> Table 3

¹² <https://www.epa.gov/fuels-registration-reporting-and-compliance-help/rins-generated-transactions>

whether a farmer in the United States opting to grow corn to produce biofuels instead of a food crop indirectly causes a farmer in Brazil to clear-cut forested land to grow that same food crop is extraordinarily difficult, as demonstrated by multiple studies attempting to quantify this indirect effect.

The complexities of these ripple effects result in wide ranges of uncertainty when attempting to quantify emissions from ILUC. Much of the research on this topic is focused on corn ethanol, as it is the most widely produced biofuel in the U.S., but the same general principles apply to soy oil/corn oil biodiesel production pathways. As one example, ILUC emissions associated with US corn ethanol expansion during the 2000s in one widely cited study were estimated to fall in the range of 10.5 to 358.6 kg CO₂e per million Btu (MMBtu), with a median emission factor between 58.0 and 62.2 kg CO₂e per MMBtu.¹³ To put those numbers in perspective, the median ethanol emission factor from that study is about 60% of the EPA's life cycle emission factor for conventional gasoline and **the high-end ethanol emission factor estimate**

is over 3.6 times higher than the emission factor for conventional gasoline.¹⁴ The U.S. Department of Energy's Billion-Ton Report – which is one of the most comprehensive studies calculating potential biomass supply in the United States and the associated environmental impacts – conducted analysis assessing the GHG impacts of scenarios with expanded biofuels production but did not attempt to quantify the GHG impacts of ILUC and highlighted the



¹³ <https://pubs.acs.org/doi/abs/10.1021/es101946t>

¹⁴ <https://www.epa.gov/fuels-registration-reporting-and-compliance-help/lifecycle-greenhouse-gas-results>

extreme uncertainty surround the topic.¹⁵ **To summarize, there is a *high level of risk* that biofuels derived from energy crops have no GHG emissions reduction value.**

The extreme uncertainty around ILUC GHG impacts is one of the reasons why many policies aiming to accelerate the adoption of biofuels have excluded the use of biofuels derived from energy crops. For example, based on Acadia Center's current understanding of the APS, soybean oil-based biodiesel is explicitly excluded from Massachusetts' Alternative Energy Portfolio Standard.¹⁶ Similarly, many net zero economy-wide modeling efforts have excluded energy crop expansion from consideration in GHG reduction pathways. **It is absolutely essential that the CHS not incentivize the production of biodiesel from energy crops due to the high level of risk posed by ILUC alone and therefore, Acadia Center recommends that the CHS strictly limit biodiesel eligibility to fuels proven to not be derived from energy crops.**

Credit Generation Quantification Approach

Emissions Avoided Credits Resulting from Full Electrification Projects Need Means of Verifying "Commitment to Limit Utilization of Remaining Combustion Equipment"

DEP is proposing the definition of a "full electrification" as 1) Installation of heat pumps capable of meeting 100% of space heating needs of a residence and 2) Removing all space heating combustion equipment or "commit to limiting utilization of remaining combustion equipment to backup or emergency use." DEP goes on to note that the "commitment approach is currently used under the Mass Save program."

The current Mass Save program approach that incentivizes whole-home heat pump installation, regardless of whether the "back up" combustion heating system is removed or left in place, is fundamentally flawed. If there are two identical homes receiving the exact same whole-home electrification incentive under the current Mass Save program, one could use their heat pumps to satisfy 0% of total winter space heating load and one could use their heat pumps to satisfy 100% of winter space heating load. There is simply no justification for incentivizing these two systems at the same level other than reduced administrative burden. However, this reduced administrative burden simply isn't worth the increased risk of these "full electrification" heating systems not being used as envisioned under the incentive design.

The CHS represents a golden opportunity to improve upon the current Mass Save system by linking real-world heat pump usage data of an individual residence to the level of emissions clean heat checks (CHCs) generated by that project over the life of the system. For example, for residential "full electrification" projects that leave a combustion heating system in place, looking at utility bill data for an individual housing unit and comparing the relative electricity consumption in historically low-use months (e.g. April, May, September, October) to consumption in months that are typically high-use for electrically heated homes (e.g. January, February) would provide a relatively simple, low-administrative-burden means of approximating the extent to which the home relies on its electric heating system (opposed to the combustion "back-up" system) during the winter heating season. This low-month/high-month electric consumption ratio could be used to adjust the level of emissions CHCs generated by the "full electrification" project. DEP already seems to be proposing a similar approach with "hybrid electrification" projects (i.e., heat pump installations that don't meet 100% of building space heating load) by stating these projects

¹⁵ <https://www.energy.gov/eere/bioenergy/2016-billion-ton-report>

¹⁶ <https://www.mass.gov/doc/ma-2050-decarbonization-roadmap/download>, at 89

would be “eligible for annual emission reduction credits based on evidence of utilization of heating, such as electricity billing records showing a winter-peaking pattern.” It makes perfect sense to apply this same logic to “full electrification” projects that retain “back-up” combustions systems.

If DEP commits to the implementation of this type of verification mechanism, Acadia Center supports residential space heating electrification projects sized to meet 100% of load that also leave a “back-up” combustion system in place as being deemed “full electrification” projects under the CHS. However, without this mechanism in place, Acadia Center is strongly opposed to these projects being credited under the “full electrification” definition.

Assumption that Each Residential “Full Electrification” Project Results in 5 MT CO₂ Annual Emissions Avoided Under-incentivizes Residential Electrification Projects with Largest GHG Reduction Potential

DEP has proposed to credit residential “full electrification” projects at an emissions reduction level of 5 MT CO₂ per year, regardless of the size of the residence or whether the residence is an apartment or single-family home. DEP explains the logic for this proposal by stating, *“Larger residences normally emit more than 5 MT per year, but providing additional credit for electrifying larger residences would not be equitable because larger residences are normally owned by higher-income individuals.”* **While Acadia Center agrees that equity considerations should be core to the design of the CHS, the other equity-enhancing policy mechanisms proposed by DEP – namely the low-income carve out and just transition fee (JTF) – are better policy vehicles for achieving the overarching equity goals of DEP.**

Both the up-front cost and emissions reduction benefits of electrifying homes varies considerably based on the square footage of the home. Acadia Center has significant concerns that full electrification projects undertaken to comply with CHS obligations would be too heavily skewed towards some of the smallest housing units in the state. This presents a significant risk of the emissions reduction standard undershooting the true level of emissions reduction needed in the residential building sector to comply with the subsector emissions limits, particularly in the early years of the CHS when there are significant levels of “low hanging, low square footage” housing stock that is financially attractive to obligated parties.

While Acadia Center acknowledges that larger residences are more likely to be owned by higher-income individuals, this is by no means a universal truth, and the 5 MT CO₂ annual emissions avoided for every housing unit assumption is a blunt instrument for addressing this concern. DEP has not provided any quantitative analysis providing more context on this topic – for example, what percent of the bottom 25% smallest square footage housing units in the Commonwealth are occupied by low-income residents? What percent of the top 25% largest square footage housing units are occupied by low-income residents? More quantitative analysis is needed to evaluate this policy design decision in any depth. This program design decision could have significant unintended consequences – for example, obligated parties targeting full electrification projects at 1,200 square foot luxury condos in, e.g., Back Bay owned by high-income individuals over 2,600 square foot single-family homes (in poor condition) owned by a multi-generational low-income family in, e.g., Fall River. In both cases, assuming the life of the heat pump system is 15 years, the value of emissions reduction CHCs generated by each project over the lifetime of the heating system would be: 15 years x 5 MT CO₂e x \$190/MT CO₂e = \$14,250.

That sends a perverse market incentive to target the Back Bay condo in the example above that Acadia Center is not comfortable with. This issue is too nuanced to be addressed by such a blunt policy mechanism.

From a program administration perspective, assuming the same level of reduction for every full electrification project is clearly easier. However, relatively simple alternatives, such as estimating emissions reduction benefit of a project using the conditioned square footage and primary heating fuel of a particular housing unit would send a much more efficient market signal to obligated parties and help to address some of the largest-emitting housing units in the near-term. DEP could also consider using funds generated via the Just Transition Fee or ACPs to provide supplemental equity protections designed to help incentivize greater uptake of retrofits in low- and moderate-income owned/occupied buildings and/or geographic areas bearing elevated environmental burdens and historic housing underinvestment.

The CHS Should be Expanded to Credit Electrification of Water Heating

The Framework states that *“building sector emissions have recently been in the range of 24 MMT per year, so reductions of 1 MMT per year over the 2026-2050 time period would reduce emissions to near zero in 2050.”* On its face, this general trajectory makes sense – building sector emissions in 2021 were 23.8 MMT CO₂e, and the 2050 CECP requires that building sector emissions reach a “near zero” level of 2.0 MMT CO₂e by 2050, a 95% reduction below 1990 levels.¹⁷ However, based on the Massachusetts 2050 Decarbonization Roadmap analysis, GHG emissions from space heating only account for approximately 75% the building sector emissions¹⁸ captured in the state’s GHG Inventory. Water heating (23%) makes up the bulk of non-space heating emissions in the buildings sector. **Put in 2021 terms, this means that approximately 6.0 MMT CO₂e of the total 23.8 MMT CO₂e building sector emissions come from end-uses outside of space heating.**

Simultaneously, the FAQ document developed by DEP indicates that Framework *“focuses on space heating....other equipment types are not addressed to limit program complexity.”* This seems like a fundamental disconnect in program design – **how is the CHS intended to achieve “near zero” emissions in the building sector by 2050 if decarbonization of end-use technologies (namely water heating) that account for 25% of building sector emissions are not credit eligible under the CHS?** Acadia Center strongly urges DEP to include water heating electrification as an eligible CHC generating measure, especially considering the fact that these technologies, such as heat pump water heaters, may also pose significant emissions-reducing and grid-service benefits to the electric sector, given the time-flexible nature of their consumption. Without the inclusion of water heating, the CHS lacks the ability to achieve the 2030 and 2050 subsector emissions limits. The CHS represents the best policy tool for rapidly decarbonizing water heating in the Commonwealth – relying on Mass Save to achieve the majority of water heating electrification would put undue financial burden on the backs of electric ratepayers. The CHS is an opportunity to spread the upfront costs of the water heating electrification transition to natural gas and delivered fuels customers as well. While Acadia Center acknowledges that expanding the CHS to cover water heating will present some level of additional administrative burden on DEP – the benefits of expanding the program to cover water heating far exceed the costs of this additional administrative burden.

Overarching Policy Design Recommendations

Equity Policy Mechanisms Demonstrate Commitment to Centering Equity

Overall, Acadia Center would like to commend DEP on the equity provisions proposed in the Framework. Centering equity in the CHS is of core importance to Acadia Center. The 25% low-income full electrification

¹⁷ <https://www.mass.gov/doc/2050-clean-energy-and-climate-plan/download> Table 3-2, at 19

¹⁸ <https://www.mass.gov/doc/buildings-sector-technical-report/download>, at 9

carve out, a just transition fee representing 10% of the ACP value of all non-low-income full electrification projects, and a full electrification ACP value that is doubled for all low-income full electrification projects combine to form a policy that is clearly heavily emphasizing delivering significant benefits to low-income communities. Our primary lingering concern with this proposal is that it is not clear why the Just Transition Fee only applies to full electrification credits, and not to, for example, emissions reduction credits generated via biodiesel sales. This appears to put a disproportionate burden on full electrification projects to fund the Just Transition Fee. Acadia Center requests more information from DEP on the logic behind this policy design decision and looks forward to engaging more on this topic in 2024.

Acadia Center agrees with DEP that utilizing ACP funds and just transition fee revenues to provide additional financial support to low-income households during particularly cold winters or periods of high energy prices would be a high-value use of these fundings streams. Acadia Center looks forward to working with DEP to understand how these funds could be most effectively used to support low-income residents. As described in detail above, Acadia Center does not think that DEP's proposed assumption that all fully electrified housing units in the state (regardless of housing unit square footage) reduce 5 MT CO₂e of emissions per year is a viable mechanism for addressing equity concerns within the CHS – the carve out, just transition fee, and higher ACP for low-income electrification projects are better mechanisms to address equity.

Acadia Center Fully Supports Emissions Avoided ACP of \$190/MT CO₂e and Requests Further Quantitative Justification for the Full Electrification ACP Values

Firstly, Acadia wholeheartedly supports setting the emissions avoided ACP value at \$190 per MT CO₂e in line with the US EPA estimate, newly enshrined in a legally binding federal regulation.¹⁹ Setting the emissions avoided ACP at this value is essential to the success of the CHS.

With regard to the full electrification ACP values, it's important to set Alternative Compliance Payments (ACP) at a value that is high enough to discourage over-reliance on the ACPs as the primary compliance mechanism. After all, the ultimate goal of the CHS is to have actual electrification projects in buildings completed. The Framework proposed setting Alternative Compliance Payment (ACP) values for non-low-income full electrification projects at \$6,000 in 2026, escalating to \$10,000 by 2030, with the proposed ACP values for equivalent low-income projects being set at double that amount. It's challenging to fully evaluate the projected effectiveness of these full electrification ACP values in preventing over-reliance on ACPs without rigorous, complex quantitative analysis that Acadia Center has yet to see from DEP. We highly encourage DEP to pursue this analysis and share the results with stakeholders. The future role of Mass Save and the level of future heat pump incentives DEP anticipates under Mass Save is a large X-factor in this analysis. While Acadia Center acknowledges that DEP does not control Mass Save program design, it would be useful for stakeholders to have some idea of the level of heat pumps incentives DEP is projecting under Mass Save, and how that projection influenced the proposed value at which DEP set the full electrification ACPs.

¹⁹ <https://www.epa.gov/controlling-air-pollution-oil-and-natural-gas-operations/epas-final-rule-oil-and-natural-gas>.

Concerns that the CHS is Not Designed to Achieve 2030 CECP Building Subsector Limit

The Framework suggests an emissions reduction standard of 1 million metric tons (MMT) of CO₂e per year from 2026 – 2050. As of the 2021 Massachusetts Greenhouse Gas (GHG) Inventory, the buildings sector emits 23.82 MMT CO₂e.²⁰ While Acadia Center acknowledges that this annual reduction target of 1 MMT CO₂e sets the Commonwealth on course to achieve the overarching 2050 buildings sector GHG target outlined in the 2050 CECP, we are highly skeptical that it is aggressive enough to achieve the 2030 buildings sector sublimit of 15.0 MMT CO₂e established in the 2030 CECP, and none of the quantitative analysis provided by DEP to date has addressed our concerns on this topic.²¹ The “Compliance Calculator” Excel file²² recently posted on DEP’s CHS website indicates “total annual building sector emissions” of 20 MMT CO₂e in 2030, which is well short of the 2030 subsector target.

Clean Heat Standard Draft Program Framework Inputs

This spreadsheet presents the source of the numbers presented in the Clean Heat Standard Draft Program Framework

Light green cells are numbers as described in the Draft Program Framework document

Dark green cells show the numbers that will be specified in the Clean Heat Standard regulation, once proposed

Assumptions	2026	2027	2028	2029	2030	2035	2040	2045	2050
Total annual electricity consumption (MWh assumed)	60,000,000	60,000,000	60,000,000	60,000,000	60,000,000	90,000,000	#####	#####	#####
Total annual building sector emissions (MT assumed)	24,000,000	23,000,000	22,000,000	21,000,000	20,000,000	15,000,000	10,000,000	5,000,000	-

In order for the 1 MMT CO₂e annual reduction from 2026-2030 to achieve the 2030 sublimit, 2025 building sector emissions (the year prior to the CHS being put into effect) would need to be at a maximum level of 20.0 MMT CO₂e, or 16% below 2021 levels. Acadia Center has not seen evidence to suggest that this 16% reduction in emissions from 2021-2025 will be achieved and is interested in obtaining more information regarding DEP’s assumptions of building sector emissions trajectory over the 2021-2025 time period and how this projection was determined. In the absence of evidence to support the 16% decline in building sector emissions in the 2021-2025 time period, Acadia Center suggests taking the conservative approach of assuming that 2025 emissions levels are similar to 2021 levels (~23.8 MMT CO₂e) for CHS policy design purposes. Taking this more conservative approach would necessitate an annual emissions reduction in building sector emissions of 1.76 MMT CO₂e per year from 2026-2030 to achieve the 2030 subsector limit.

DEP Needs to Justify Any Compliance Obligation Placed on Electricity Sellers in the Context of the Relative Cost of Electricity Compared to Fossil Fuels on a \$/Btu Basis

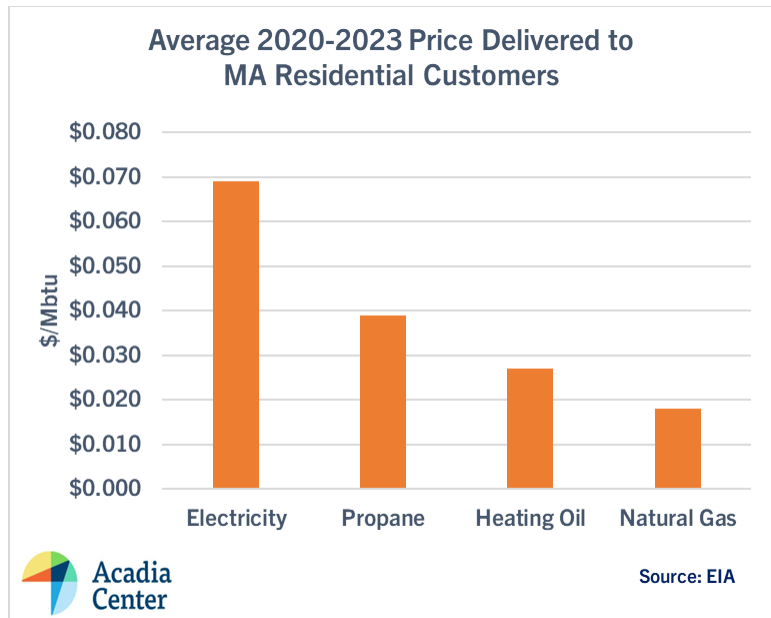
One of the core challenges facing the building electrification transition in Massachusetts is the relatively high cost of delivered electricity, on a \$/Btu basis, compared to natural gas, propane and oil. Despite air-source heat pumps (ASHPs) typically being approximately 2.75x-3x more efficient than combustion-based space heating systems, the potential annual utility bill savings from electrifying buildings is significantly hampered by the relatively high cost of electricity compared to fossil fuels.

²⁰ <https://www.mass.gov/doc/appendix-c-massachusetts-annual-greenhouse-gas-emissions-inventory-1990-2020-with-partial-2021-2022-data/download>.

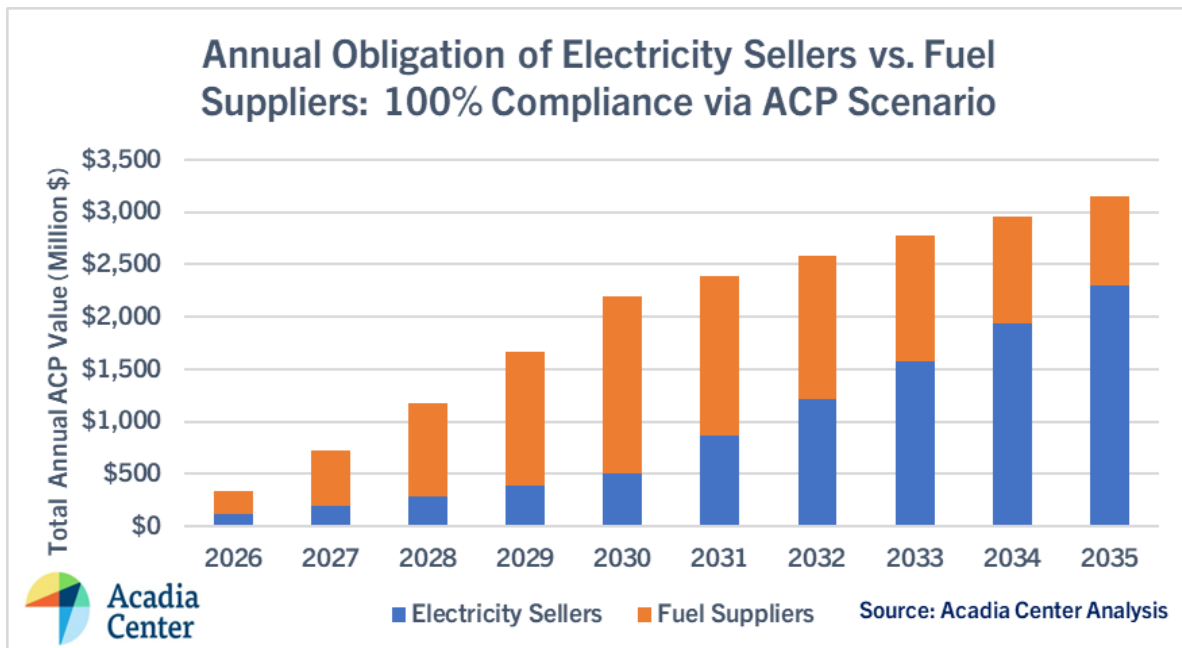
²¹ Massachusetts Clean Energy and Climate Plan for 2025 and 2030, Page 56 <https://www.mass.gov/doc/clean-energy-and-climate-plan-for-2025-and-2030/download>.

²² <https://www.mass.gov/info-details/massachusetts-clean-heat-standard>.

For example, based on the average price of fuels delivered to residential customers in Massachusetts from 2020-2023 on a \$/BTU basis, electricity was approximately 3.8x more expensive than natural gas. This makes the economics of building electrification challenging, even if a heat pump is operating at 275% efficiency and a gas furnace is operating at 85% efficiency over the course of a year. **One of the core goals of the CHS should be to close the \$/Btu “gap” between electricity and fossil fuels, particularly in the early years of the program (e.g., 2026-2030).** If that gap is not closed, or at least partially closed to a degree that the efficiency of heat pumps can compensate for the price gap across fuels, encouraging electrification at the scale needed to achieve the building subsector targets will be near impossible, regardless of the level of upfront incentives offered for space heating electrification. Acadia Center has not seen sufficient evidence that the CHS, as currently proposed, is designed to close this gap.



The graph below evaluates a hypothetical scenario where 100% of compliance of both the full electrification obligation and the emissions reduction obligation is met through ACPs. This is useful in attempting to assess the relative scale of the *combined obligations* on electricity sellers versus fuel suppliers.



In the 2026 – 2030 time period, the percent of the total obligation burden falling on electricity sellers, based on Acadia Center calculations, falls between 23%-35%. Post-2030, the percent of the total compliance obligation that falls on electricity sellers climbs rapidly, reaching 73% in 2035. **Rigorous, transparent quantitative analysis from DEP to justify the percent of the total compliance obligation falling on electricity sellers is essential for stakeholders to evaluate the implications of this proposed decision, and to date, this type of analysis has not been shared with stakeholders.** While Acadia Center acknowledges that, from 2026-2032, a larger share of the total obligation falls on fuel suppliers, we are highly skeptical that these fuel supplier obligations are high enough to correct for the current discrepancy between fossil fuels and electricity on a \$/Btu basis. **The near-term goal of the CHS (e.g., 2026-2030) should be to help close the price gap between electricity and fossil fuels, and the obligation burden on electricity sellers should be “back-calculated” based on this price gap analysis and designed in such a way to close the price gap.** Once the price gap is closed, the CHS can explore the topic of shifting some obligation burden onto electricity sellers, but no obligation should be placed on electricity sellers until that price gap is closed. This is an area of critical importance in the CHS design, and Acadia Center looks forward to engaging extensively with DEP on this topic and reviewing any quantitative analysis DEP produces on this topic.

Develop an Electrification Standard for the Commercial Sector

Acadia Center would like to commend DEP for the inclusion of a residential full electrification standard, in addition to the emissions reduction standard. As highlighted in the Massachusetts 2050 Decarbonization Roadmap, 2025/2030 CECP, and 20250 CECP – electrification of space heating in buildings is a central pillar of decarbonization in the building sector. Thus, the electrification standard places critical guardrails on the CHS by ensuring that residential buildings will not become overly reliant on biofuel decarbonization strategies. Decarbonization strategies that may appear attractive in the near-term, including biodiesel blending, are often in direct conflict with the most cost-effective long-term pathway to achieving the overarching target of net zero emissions by 2050. Because full electrification of buildings is a core element of the most cost-effective trajectory towards net zero emissions, as highlighted by DPU Order 20-80-B, the guardrails provided by the electrification standard are essential.

For this reason, Acadia Center feels that it is necessary for the CHS to extend some form of electrification standard to non-residential buildings. As of 2021, non-residential buildings make up 49.3% of total building sector emissions in the Commonwealth. The 2025/2030 CECP highlighted the need for “over 300 million square feet of commercial space with electric heat by 2030”²³ **The two scenarios shown to be most cost-effective in the 2050 CECP (Phased and High Electrification Scenarios) demonstrated a 257% and 276% increase in commercial electric space heating demand between 2020 and 2050, respectively. The same scenarios showed a 44% and 76% increase in commercial electric space heating demand between 2020 and 2030.**²⁴ These metrics related to projected electric space heating demand or projected square feet of non-residential square footage with electrified heat could provide a metric that a CHS non-residential building electrification standard could be tethered to.

While limited supplies of relatively low-cost biodiesel may place a “natural cap” on the level of emissions reductions that can be achieved in the non-residential building sector from biofuels, and thus encourage non-residential

²³ Massachusetts Clean Energy and Climate Plan for 2050 Page 20 <https://www.mass.gov/doc/2050-clean-energy-and-climate-plan/download>

²⁴ Massachusetts Clean Energy and Climate Plan for 2050 Workbook for Energy Modeling Results, “4. Commercial Space Heating” tab <https://www.mass.gov/media/2553881/download>

electrification to comply with the CHS emissions obligation, Acadia Center urges DEP to develop an electrification standard for the non-residential building sector. **The same logic that led DEP to propose the electrification standard in the residential sector also applies to the non-residential sector – a non-residential electrification standard would place critical guardrails on the non-residential building decarbonization strategy to ensure it does not stray too far from the cost-effective trajectories laid out in the CECF.** Without these guardrails – the CHS is exposed to the inherent risk associated with biofuel decarbonization strategies. These risks are multi-faceted:

- **Low supply and escalating costs of biofuels as competition increases:** Relatively low cost of biodiesel in the near-term does not imply relatively low cost of biodiesel in the medium- or long-term. Because feedstocks of climate-beneficial biomass feedstocks are inherently limited, as other states and other sectors of the economy (e.g. air travel, shipping, high-heat industrial) move towards decarbonization in future years, the competition for and price of alternative fuels will undoubtedly increase. Failure to rapidly electrify the non-residential building sector will expose these buildings, and the Commonwealth more broadly, to this risk.
- **Uncertainty with biofuel life-cycle GHG accounting:** There is a *high degree* of uncertainty regarding GHG accounting for biofuels. As DEP is aware, life-cycle accounting for biofuels is still an emerging field. Future improvements in life-cycle accounting and changes to formally adopted GHG accounting principles related to biofuels put strategies that rely too heavily on these fuels at risk of not actually achieving compliance with GHG reduction goals.

Should DEP choose to pursue a non-residential electrification standard, it may also be prudent to factor in the existence of known local-level policies driving electrification in non-residential buildings, particularly the City of Boston's Building Emissions Reduction and Disclosure Ordinance (BERDO) – so as to harmonize the programmatic interventions and avoid double-paying for any emissions reductions.

The CHS Needs Policy Guardrails on Wood Combustion for Space Heating

The Framework is proposing to regulate electricity, natural gas, heating oil, and propane. There is one notable space heating fuel missing from the regulation – wood. It is critical that the CHS address wood combustion for space heating at some level. **Implementation of the Framework as it currently stands would immediately make combustion of wood for space heating a more attractive financial proposition for homeowners. Obligated parties would pass through some level of costs to electricity, natural gas, propane, and heating oil consumers, raising the relative costs of those fuels on a \$/Btu basis, but the regulation would have no direct impact on the price of wood.** Acadia Center sees this as a major flaw in the policy and would not be surprised by a dramatic spike in wood combustion in the years following implementation of the CHS as currently designed. This potential spike would have significant negative consequences both from a GHG emissions perspective (any life-cycle benefits of wood combustion for space heating are highly variable with large degrees of uncertainty) and a criteria air pollutant/indoor air quality perspective. **While we acknowledge the difficulty in regulating wood combustion, and do not have detailed proposal on how to do so at the moment, we strongly urge DEP to put thought into potential policy guardrails preventing a wood combustion spike. We look forward to collaborating with DEP on this topic.**

Make Early Action Full Electrification Projects Eligible for Generation of Future Emissions Credits

The Voluntary Clean Heat Standard Early Registration Program document developed by DEP mentions that “Credits associated with the ongoing operation of a heating system are not included in the early action program, although projects that qualify in the early action program may receive administrative benefits in generating credits associated with operation of a clean heat system once a Clean Heat Standard is established.” **Acadia Center strongly urges that DEP develop Early Registration guidance that makes it clear that Early Registration full electrification projects will definitely generate emissions avoided CHCs once the program officially kicks off in 2026, assuming they meet the compliance requirements demonstrating the system is actually operating in its intended capacity in, for example, 2026 – 2032.** This will send a strong market signal encouraging the deployment of full electrification projects prior to official launch of the CHS in 2030, and this strong market signal will likely be necessary to actually achieve the 2030 buildings subsector emissions target of 15.0 MMT CO₂e established in the CECF.

As currently proposed, a large portion of the “avoided ACP” value to obligated parties of full electrification projects is in the credits generated from future streams of emissions avoided credits. Let’s take, for example, a non-low-income full electrification project that occurs in 2026, and let’s assume that system operates for 15 years. The avoided full electrification ACP value is \$6,000, but the future streams of avoided emissions ACP total \$14,250, combining to a total “avoided ACP” value of \$20,250. **In other words, 70% of the avoided ACP value to obligated parties of that full electrification product is coming from the future emissions avoided credits.** If early action full electrification projects don’t have at least partial, post-2026 access to the future emissions avoided credit generation value, that will serve a very strong disincentive against obligated parties pursuing those projects pre-2026.

Hybrid Electrification Credits Should Have “Cold Climate Heat Pump” Eligibility Requirement

The proposed Early Registration Program highlights the importance of a full electrification eligibility requirement that ASHPs “meet Cold Climate Air Source Heat Pump Specification Version 4.0 published by Northeast Energy Efficiency Partnerships effective January 1, 2023, or any version thereafter.” Acadia Center wholeheartedly agrees with this requirement, but this eligibility requirement should be extended to hybrid electrification projects – both in a scenario where hybrid electrification projects are considered eligible in Early Registration or in a scenario where these systems are only eligible for credit generation once the CHS officially kicks off in 2026. The December 7th webinar mentioned hybrid electrification projects would still be eligible for the hybrid electrification credit if “non-cold climate heat pumps” were installed. It’s critical that all heat pumps installed in New England be cold climate heat pumps – the marginal cost difference on installing cold vs. non-cold climate heat pumps is minimal, and the deployment of cold climate ASHPs will better position these hybrid buildings for 1) Eventual full electrification and/or 2) More flexibility in future adjustments to the “switch over” temperature of the hybrid system. Greater future flexibility to lower this switch over temperature, for example from 30F to 5F, comes with a multitude of potential benefits including reducing utility bill costs to consumers and reducing GHG emissions.

Some Cap on ACPs is Needed to Ensure Electrification Projects Completed in Near-term

The Framework proposes that “Compliance through alternative compliance payments (ACPs) would also be allowed without limit....” Acadia Center does not see the rationale in putting *no limit* on ACPs and would like more information from DEP on the rationale behind this decision. Why not place some cap on the level of ACPs obligated parties can purchase to ensure that some minimum level of building space heating electrification projects actually get completed? **Acadia Center highly recommends that DEP look into this topic in more detail and propose some**

limit (and the quantitative justification for that limit) to stakeholders. Acadia Center looks forward to engaging with DEP on this topic in more depth in 2024.

Conclusion

In summary, Acadia Center appreciates the opportunity to comment in the early stages of this important CHS program design. We commend DEP on several key elements of the proposed Framework, including with respect to the ineligibility of gaseous biofuels and hydrogen blending as well as the strong equity provisions put forward. Despite this, we do raise a number of outstanding questions and concerns regarding other program elements and design proposals, and sharing greater quantitative analysis will help stakeholders provide more detailed commentary on these elements in question and on the program in its entirety. Thank you in advance for the consideration and review of our input, and we look forward to engaging further with DEP in the months ahead to refine the Framework and move toward implementation. If you have any questions or concerns, please do not hesitate to reach out.

Sincerely,

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