Acadia Center
Advancing the Clean Energy Future
15 Court Square • Suite 1000
Boston, MA 02108
617.742.0054 • acadiacenter.org

April 5, 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 to both 1) The March 2024 proposed potential changes to the Clean Heat Standard (CHS) Draft Framework ("Framework) as outlined in the updates to the CHS FAQ Question 0 and 2) The March 2024 CHS Non-Residential Building Crediting Discussion Document ("Non-Residential Discussion Document")provided by the Massachusetts Department of Environmental Protection (DEP). 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, combined with the strict proposed blending limits on non-waste liquid biofuels, demonstrates that the DEP has a strong grasp of the stakes involved.

However, given the complexity of the proposed Framework and the lack of modeling and quantitative analysis provided by DEP underpinning many of the policy design elements proposed, it was challenging to fully evaluate the proposed changes to the Framework. These comments therefore represent *initial thoughts* from Acadia Center on a wide range of topics related to the proposed changes to the Framework. We look forward to working with DEP and diving in more deeply to analyzing the potential impacts of the CHS for the remainder of the year.

Overview of Initial Comments

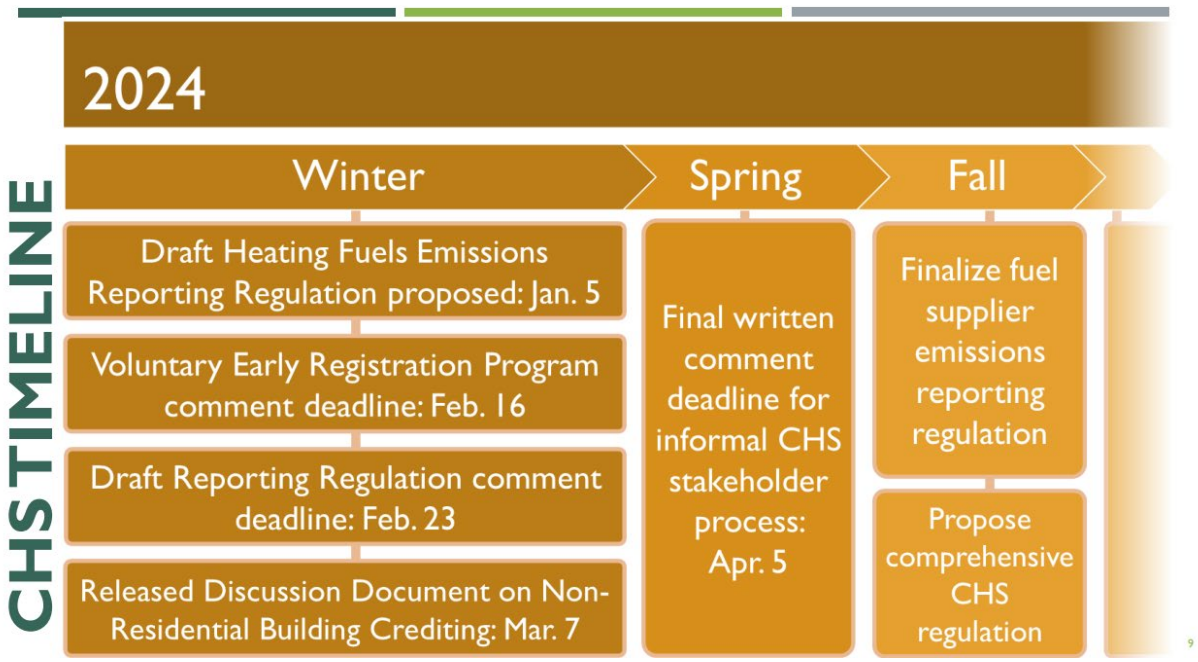
In the following sections, Acadia Center provides initial commentary and recommendations pertaining to: Stakeholder Process; Policy Design Changes proposed in the FAQ; and Hydrogen and Renewable Natural Gas in the Non-residential Building Sector. Acadia Center has also worked closely to coordinate with 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.

CHS Draft Framework Stakeholder Process

Since the beginning of the CHS program development process, when Acadia Center responded to the March 2023 MassDEP Stakeholder Discussion Document in May 2023 joint comments from environmental stakeholders, we have been stressing the need for modeling, quantitative analysis, and deep stakeholder engagement on a range of highly technical topics in order to inform sound CHS policy design. We echoed these calls for more detailed quantitative analysis and technical stakeholder engagement in our December 2023 comments in response to the release of the Framework. To date, we have still not seen modeling, quantitative analysis, and deep technical stakeholder engagement to policy design decisions within the Framework and proposed changes to the Framework.

This is highly concerning to Acadia Center given the wide range of highly complex nature and potentially wide-ranging economic impacts of the policy. Conducting and sharing technical analysis with stakeholders 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. While Acadia Center acknowledges that there is still time for this technical analysis to take place and be shared with stakeholders, the clock is ticking and sharing this analysis with stakeholders as early in the program design process as feasible will benefit the overall program design process. The most recent April 1st CHS Technical Session shared the 2024 program development timeline with stakeholders, but it's not clear what technical analysis or technical engagement with stakeholders will be taking place between the April 5th final written comment deadline for the information stakeholder process and the proposal of a comprehensive CHS regulation in the fall. In our comments below, we 1) Suggest specific areas of policy design that could benefit from rigorous modeling and quantitative analysis and 2) Repeat our suggestion that the process would benefit from the formation of a "Technical Working Group" of 8-12 technically-inclined stakeholders representing a wide variety of stakeholders.

CHS Program Development Timeline as of April 1, 2024



FAQ "Question 0" Potential Changes to Draft Framework

The CHS FAQ document, which has been updated continuously over the last several months by DEP, was updated in March 2024 to include a "Question 0" that proposed a number of significant potential changes to the Framework released in November 2023. Acadia Center's response to these proposed changes is presented in the subsections below.

FAQ Question 0, Bullet 1: Proposed Changes to Emissions Reduction Standard

The first bullet in FAQ Question 0 proposes lowering the CHS emissions reduction standard from 5 MMT in 2030 to 4 MMT in 2030 to *"better accommodate the possible inclusion of water heating"* and suggests *"leaving room for residential water heating crediting within the scheme"*. The 25% reduction (5 MMT to 4 MMT) in the emissions reduction standard appears to be a reaction to the fact that approximately 25% of emissions in the building sector in the Commonwealth are estimated to come from sources other than space heating (primarily domestic water heating which makes up 23% of building sector emissions).[1] Although, it is a bit confusing as to how the 4 MMT figure was landed on.

The Non-Residential Discussion Document mentions that, for non-residential buildings, *"…emission reductions would be credited based on the full amount of emission reductions realized on site, including emission reductions resulting from weatherization measures and electrification of water heating."* In other words, as proposed, the CHS would include water heating electrification in non-residential buildings as an eligible clean heat measure but would not include water heating electrification in residential buildings as an eligible measure. To be clear, Acadia Center supports making water heating electrification an eligible measure across all buildings types, as we discussed in greater depth in our December comments. If we assume that non-space heating emissions make up 25% of total building sector emissions, some significant portion of that 25% comes from non-residential domestic hot water heating. As a result, Acadia Center would expect the proposed emission reduction standard to be higher than 4 MMT given the logic used by DEP in FAQ Question 0 bullet point 1. This is an example where seeing the underlying quantitative analysis informing policy design decisions would be beneficial to stakeholders and aid their ability to better understand the proposed changes to the Framework.

Perhaps more importantly, decreasing the annual emissions target from 5 MMT to 4 MMT was justified under the pretense of "leaving room" for residential water heating electrification, but residential water heating electrification is still proposed by DEP to be an ineligible clean heat measure under the current CHS proposal. This design decision significantly increases the risk of not reaching the overarching 2030 and 2050 building sector GHG sublimit. The proposal by DEP to not include residential water heating as an eligible clean heat measure in the Draft Framework is the source of this risk, and the proposal to lower the CHS emissions reduction target from 5 MMT to 4 MMT is essentially DEP's acknowledgement of the risk created by excluding residential water heating electrification from being an eligible measure under the program. This begs the obvious question – why not just include water heating electrification as an eligible clean heat measure under the CHS so the Commonwealth 1) Has assurance that a specific program (the CHS) is responsible for ensuring that water heating electrification occurs at the pace necessary to achieve the CECP building sector sublimit and 2) Is able to more fairly spread the cost of water heating electrification transition across all heating fuels, rather than placing the majority of the transition burden on electric rates as MassSave currently does?

DEP's rationale for this design decision seems to be based on limiting the administrative burden of the CHS. Question 23 of the FAQ states that "other (non-space heating) equipment types are not addressed to limit program complexity". Question 35 of the FAQ attempts to address this concern of not including residential water heating electrification in the CHS, stating, *"However, the CHS could still have an indirect impact on water heater emissions over time. This may occur because consumers who have made the decision to electrify their heating systems may be more likely to choose*

[1] https://www.mass.gov/doc/buildings-sector-technical-report/download, at 9

other electric appliances in the future for the simple reason that they will have gained experience and familiarity with general concept of electrification." The term "may be more likely" does not inspire a lot of confidence, particularly since no studies are cited and no quantitative analysis is provided supporting this line of thinking.

While Acadia Center acknowledges that expanding the CHS to cover residential 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. It also seems intuitive that if DEP is currently proposing to include non-residential water heating electrification as an eligible measure that this eligibility would be extended to cover residential water heating electrification. In terms of streamlining the residential water heating electrification verification process, it would be interesting, for example, for DEP to connect with the current MassSave program administrators to better understand how this verification currently works under the MassSave program and put some thought into how a similar process could be most efficiently implemented under the umbrella of the CHS. To date, it's not clear to stakeholders how much research and investigation DEP has done into this topic to assess the level of administrative burden and weigh the pros/cons of including/excluding water heating from the CHS. Given the magnitude of this policy design decision, water heating is an excellent example of a topic that could benefit from an in-depth Technical Working Group session (a concept previously proposed by Acadia Center).

FAQ Question 0, Bullet 2: Proposed Changes to Years of Emissions Reduction Credit Generation for Electrification Projects

The second bullet in FAQ Question 0 proposes limiting the emission reduction credit generation from heat pumps to no more than five years after initial installation/registration for any clean heat project. This is a significant departure from the original Draft Framework. The Draft Framework implied that a residential heat pump installed in, for example, 2026, would generate annual emissions reduction credits for every year a heat pump system remained operational at that home through 2050.[2] Although quantitative analysis on this topic was not provided by DEP, this potential change begs the question –how does this policy design pivot impact the total stream of credit values generated by a residential "full electrification" project in a given year? To help answer this question, Acadia Center calculated the projected total credit values (combing both the full electrification and annual emissions credit values) for a hypothetical residential non-low-income "full electrification" project in 2026 and 2030.[3]

---

[2] The topic of what would happen if, for example, a full electrification heat pump system installed in 2026 reached end of life in 2040, was subsequently replaced in 2040 and then continued to operate through 2050, was not explicitly addressed in the Draft Framework, but the overall CHS emission obligation of 25 MMT CO_2 in 2050 implied a replacement system in the scenario outlined above would continue to produce emissions avoided credits, but would not generate a second full electrification credit.

[3] While the value of the credits will vary in the open market, the below analysis assumes the credit value is equal to the value of the equivalent alternative compliance payment. For example, the "full electrification" ACP value is proposed to start at $6,000 in 2026 and escalate to $10,000 in 2030, while the annual emissions avoided ACP value is set at a static level of $190/MT CO2.

Total Credit Value Generated by Residential Non-Low-Income "Full Electrification" Projects Completed in 2026 and 2030: Original Draft Framework vs. FAQ Proposed Changes

Original Draft Framework: 2026 Residential (non-LI) "Full Electrification" Project	
Full Electrification Credit Value	$6,000
Annual Emissions Avoided (MT CO2)	5.0
Years Emissions Avoided Credits Generated	24
Emissions Avoided Credit Value ($/MT CO2)	$190
Cumulative Emissions Avoided Credit Value ($)	$22,800
Total Credit Value:	**$28,800**

Original Draft Framework: 2030 Residential (non-LI) "Full Electrification" Project	
Full Electrification Credit Value	$10,000
Annual Emissions Avoided (MT CO2)	5.0
Years Emissions Avoided Credits Generated	20
Emissions Avoided Credit Value ($/MT CO2)	$190
Cumulative Emissions Avoided Credit Value ($)	$19,000
Total Credit Value:	**$29,000**

Revised Draft Framework: 2026 Residential (non-LI) "Full Electrification" Project	
Full Electrification Credit Value	$6,000
Annual Emissions Avoided (MT CO2)	4.0
Years Emissions Avoided Credits Generated	5
Emissions Avoided Credit Value ($/MT CO2)	$190
Cumulative Emissions Avoided Credit Value ($)	$3,800
Total Credit Value:	**$9,800**

Revised Draft Framework: 2030 Residential (non-LI) "Full Electrification" Project	
Full Electrification Credit Value	$10,000
Annual Emissions Avoided (MT CO2)	4.0
Years Emissions Avoided Credits Generated	5
Emissions Avoided Credit Value ($/MT CO2)	$190
Cumulative Emissions Avoided Credit Value ($)	$3,800
Total Credit Value:	**$13,800**

% Decrease Total Credit Value	-66%

% Decrease Total Credit Value	-52%

Acadia Center

As demonstrated in the tables above, the "five-year crediting" policy design decision decreases the total value of credits generated by a non-low-income full electrification project in 2026 by 66% and decrease the value of an equivalent project in 2030 by 52%, while the credit values generated by liquid biofuel blending remains unchanged from the original Draft Framework (biodiesel is typically purchased and consumed in same year so there is no "future stream of credits" to consider unlike heat pumps). This policy design decision significantly decreases the incentive for obligated parties to meet their obligations through the actual installation of heat pumps systems, opposed to meeting the obligation through liquid biofuels or ACPs. This impact is even more pronounced for fossil fuel obligated parties under the current proposal, as discussed in more detail later in the document, but it also appears to limit the motivation for all obligated parties, including electricity sellers, to pursue actual electrification projects.

Consider the case of an electricity seller (obligated party) deciding between pursuing a full electrification project versus ACPs in 2026. In the original Draft Framework, they would face a cumulative total of $28,800 in ACPs for every full electrification project they were obligated to achieve but failed to achieve. Under the changes proposed in the "five-year crediting" change, they would only face $9,800 in ACPs for every full electrification project they failed to achieve. This both 1) Dramatically lowers the level of incentives they are willing to provide to encourage full electrification projects and 2) Dramatically increases their odds of relying on ACPs as the primary compliance pathway. **This is the exact type of critical policy design decision that requires rigorous modeling and quantitative analysis to make an informed decision – to date that analysis has not been provided by DEP and stakeholders, like Acadia Center, are left trying to piece together the implications of these policy design decisions together without analysis to digest and react to.**

The second bullet point in FAQ Question 0 goes on to state: *"The draft framework creates the expectation that every heat pump in the Commonwealth will be eligible to earn CHCs in every year until 2050. **This is not likely to be necessary to ensure ongoing use of most heat pumps** and has the potential to lead to increasing program costs in the later years of program implementation. **If future program analysis suggests that a longer time period is desirable the five-year limit could be extended**."*

As currently constructed the CHS will be incentivizing both "full electric" residential heating systems (that can still retain a back-up fossil fuel heating system under the proposed definition) and "hybrid" residential heating systems that by definition retain a fossil fuel heating system. Hopefully, as Acadia Center suggested in our December comments, annual emission credits will be awarded to these projects based on electric billing data verifying the heat pumps are actually used to provide heating load during the winter. **The above quote from the FAQ suggests that, after the first five years of operation after install, it is "not likely to be necessary" to allow these systems to generate emission reduction credits to ensure that the heat pumps are actually used to provide heat in, for example, years 6 and beyond. However, it's not clear what this assumption by DEP is based on because no supporting analysis or discussion of literature reviews has been provided supporting this design decision.**

Take the case of a full electrification project completed in 2026. In the first five years of operation (2026-2031) there would be an incentive of up to $760/year (the equivalent ACP value[4]) for the customer's electricity seller to ensure the heat pump system is actually used for heating[5], but after year five that incentive would drop (and stay) at $0/year under the current DEP proposal. **In the case of a resident that has retained a back-up fossil fuel heating system, there's no incentive discouraging the resident from switching to 100% space heating reliance on that fossil heating system in years six and beyond. One could easily imagine this type of customer making a strictly financial decision based on which heating source (electricity vs. fossil fuel X) happens to be cheaper in a given winter.** This is a situation the Commonwealth should desperately be trying to avoid and is another key reason why the "five-year crediting" policy design decision is deeply flawed, particularly when the design decision is not backed up by any analysis of the relative impacts of the CHS on electricity versus fossil fuels rates.

Finally, in the quote highlighted above, DEP suggests that the program can extend the five-year crediting window down the road based on "future program analysis". It's not clear when this future analysis would be occurring, but presumably it would be associated with the proposed 2028 program review. The problem with this reactive approach is that obligated parties will be making decisions as soon as the program is launched (2026 or sooner to capitalize on Early Registration Program opportunities) on the levels of incentives they are willing to offer customers to install heat pumps and they will be basing the levels of incentives offered based on the projected future stream of emission reduction credits generated by the project. **If the policy design only provides credit generation certainty for the first five years of system operation, the obligated parties will react accordingly – they won't be banking on a policy design pivot X years in the future that increases the cumulative value of future credit flows they can expect from a project.** The number of years of emission reduction credit generation produced by heating electrification projects, the emission reduction ACP value, and the full electrification ACP value, the level of obligation on various energy suppliers, and a cap on the percentage of the total obligation that can be met via ACPs are all

[4] 4 MT CO_2 avoided per year from full electrification project multiplied by an emission reduction ACP value of $190/MT CO_2

[5] As DEP suggests later in the FAQ default ownership of electrification emission reduction credits could be assigned to electricity sellers and this would *"…create an incentive for electricity sellers to encourage heat pump usage, possibly by offering discounts or other rewards to customers that utilize their heat pumps."*

complex, intertwined policy design decisions that need to be informed by modeling and quantitative analysis that has not been presented to stakeholders to date. Together, these policy design decisions should:

- 1) Send a strong signal to obligated parties that makes compliance via electrification more financially attractive than compliance via ACPs or liquid biofuel blend.
- 2) Ensure that the annual operating costs of heat pump heating systems for customers who have installed heat pumps are lower than the annual operating costs of fossil fuel heating equipment (that may or may not still be present in the building).
- 3) Ensure there is no "backsliding" of customers from reliance on heat pumps to provide all (full electrification) or the majority (hybrid) of space heating to demand to reliance on fossil fuel back-up systems due to an "emissions avoided credit generation cliff" (e.g., at the five-year mark as currently proposed).

FAQ Question 0, Bullet 3: Proposed Changes to Delay the Emission Reduction Credit Holding Requirement for Electricity Sellers

The third bullet in FAQ Question 0 proposes delaying the start date of the emissions reduction obligation on electricity sellers from 2031 to 2035. While this is generally a step in the right direction, no supporting analysis has been provided by DEP to address Acadia Center's concerns regarding the "potential regulatory burden on electricity sellers" that could disincentivize heating electrification via increased electricity rates, as discussed in more detail below. **The proposed change does not address our primary concern that the full electrification obligation placed on electricity sellers in the early year of the program will drive up electricity rates at a level that discourages both the installation and operation of heat pumps.**

For context, given future uncertainty surrounding a number of complex variables related to the building decarbonization transition in Massachusetts, Acadia Center is primarily evaluating the Draft Framework with an eye on the policy impacts over the first 5-6 year of the program (roughly 2026-2031). From a modeling perspective, it's easier to quantify potential impacts of the CHS over the next seven years than the next 26 years. Future program reviews will allow the framework to react and respond to future market conditions that are challenging to currently project. These future market conditions could and should influence certain aspects of future program designs changes.

As an example of Acadia Center's near-term focus, we proposed in our December Comments that, at a minimum, there should be no obligation of either type(full electrification or emissions) placed on electricity sellers in the early years of the program, until the current "price gap" between natural gas heating equipment operation and heat pump operation (on a $/btu of delivered useful heat to occupants) is closed to a level that makes heats pumps a clear winner over gas heating from a consumer annual operating cost perspective. Future program reviews could explore the question of placing *some level of obligation* on electricity sellers once this price gap is closed to a sufficient level, but any obligation on electricity sellers should not be considered until that point is reached. **This specific dynamic should be a top modeling priority of DEP to inform policy design.**

The context directly above is highly relevant to the proposal to delay the start date of emissions reduction credit obligation on electricity sellers from 2031 to 2035. The analysis below, conducted by Acadia Center, explores the total

"avoided ACP value" obligation, in dollar terms, proposed to be placed on electricity sellers in the Original Draft Framework (top table) versus the proposed FAQ changes (bottom table).

CHS Obligation on Electricity Sellers: Original Draft Framework

	2026	2027	2028	2029	2030	2031	2032	2033	2034	First 6 Years: (2026-2031)	First 9 Years: (2026-2034)
Full Elec Obligation ($M)	$120	$193	$280	$383	$500	$575	$650	$725	$800	$2,050	$4,225
Emissions Obligation ($M)	$0	$0	$0	$0	$0	$285	$570	$855	$1,140	$285	$2,850
Total Obligation ($M)	$120	$193	$280	$383	$500	$860	$1,220	$1,580	$1,940	$2,335	$7,075

CHS Obligation on Electricity Sellers: Proposed FAQ Changes

	2026	2027	2028	2029	2030	2031	2032	2033	2034	First 6 Years: (2026-2031)	First 9 Years: (2026-2034)
Full Elec Obligation ($M)	$120	$193	$280	$383	$500	$575	$650	$725	$800	$2,050	$4,225
Emissions Obligation ($M)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Obligation ($M)	$120	$193	$280	$383	$500	$575	$650	$725	$800	$2,050	$4,225
									% Change Total Obligation:	-12%	-40%

Acadia Center

As the top table demonstrates, in the original Draft Framework, the majority of the "obligation burden" placed on electricity sellers in the first six years and first nine years of the program came via the full electrification obligation. For example, in the first six years, this cumulative full electrification obligation ($2.1 billion) made up 88% of the total electricity seller obligation, and in the first 9 years the full electrification obligation made up $4.2 billion/60% of the total electricity seller obligation.

The bottom table demonstrates that pushing back the electricity seller emission obligation from 2031 to 2035 does nothing to alleviate the cumulative $2.1 billion full electrification obligation in the first six years of the CHS and only reduces the total obligation in the first six years (combined full electrification + emission reduction) burden on electricity sellers by 12% (from $2.3B to $2.1B). The impacts of pushing back the electricity sellers emission reduction obligation is more pronounced when the analysis is extended to the first 9 years of the program – it reduces the total obligation by 40% - but the core concern remains: How will placing this $2.1 billion obligation burden on electricity sellers in the first six years of the CHS impact electricity rates, and, in turn, the relative operating costs of heat pump versus fossil fuel (and in particular natural gas) heating systems? This is an absolutely essential research topic that requires rigorous quantitative analysis to accurately inform policy design – to date, DEP has not provided any quantitative analysis on this topic. Acadia Center has been calling for this type of analysis since the Draft Framework was released in November 2023 and, to date, we have seen no analysis on this topic nor have we been giving a clear indication of when or if this analysis will take place. If DEP acknowledges the need for and is planning on conducting this type of analysis in the coming months, it would be extremely valuable to clearly communicate this plan to concerned stakeholders.

In summary, the burden is on DEP to project, using rigorous modeling and quantitative analysis, what the currently proposed obligation on electricity sellers will do the annual operating cost of heat pumps relative to fossil fuel heating equipment. All modeling and quantitative contains uncertainty – this is okay. It's better to analyze these complex dynamics acknowledging the underlying levels of uncertainty across a set of variables than to not model the complex dynamic at all.

Given the information that has currently been provided to stakeholders, and preliminary analysis by Acadia Center, we are extremely concerned that the current proposed obligation on electricity sellers is too high to close the gas versus electricity annual operating heating equipment cost gap to the level necessary to instill consumer confidence in gas to electric heating conversions.

FAQ Question 0, Bullet 5: Eliminating Emission Reduction Credits for Non-waste Biodiesel Blends Above 20%

The fifth bullet in FAQ Question 0 proposes to *"…not allow emission reduction credit for renewable diesel or biodiesel blends above B20 unless they are derived from waste feedstocks."* **Overall, Acadia Center views this proposed change to the Framework as an extremely strong step in the right direction but urges DEP to go further by fully eliminating any crediting for any renewable diesel/biodiesel product that is not derived from waste feedstocks.** The topic of crediting non-waste liquid biofuels was discussed extensively in Acadia Center's December Comments and all our concerns regarding non-waste liquid biofuels articulated in those comments hold true. Primarily, based on review of existing literature (as discussed in detail in our previous comments), **Acadia Center is skeptical that liquid biofuels produced from energy crops provide any climate benefit. DEP has not provided any research or analysis to dissuade us from this opinion.**

Furthermore, as described in our December comments, Acadia Center withholds judgement on the eligibility of "eligible liquid biofuels" as defined under the Alternative Portfolio Standard. While the definition appears reassuring on paper - "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."[6] – the devil is often in the details when differentiating between waste-derived and energy crop biofuels. **For this reason, in our December comments, Acadia Center requested that DEP provide more information on the APS definition of "eligible liquid biofuels" and the verification process used to verify that fuels meet these criteria under the APS. Despite this request, to date, DEP has provided no additional information on this topic and has not held any technical stakeholder meetings focused on this critical topic. Further investigation by DEP and deeper engagement with stakeholders on this topic remains a priority for Acadia Center.**

FAQ Question 0, Bullet 6: Efforts to Align the CHS with Mass Save

The sixth bullet in FAQ Question 0 focuses on integration between the CHS and Mass Save, but several of the statements are vague and it's challenging as a stakeholder to interpret what they mean. The first potential change to the draft framework is *"Refining the full electrification crediting process for residents with access to Mass Save incentives."* It's not clear what this "refining" would entail, and it would be helpful if more details could be provided to stakeholders. The second statement of "Calibrating program stringency, ACP levels, and detailed requirements for full electrification with reference to the three-year plan process" is also vague. The general concept makes sense – Mass Save and the CHS are obviously highly intertwined and there should be close coordination between both programs to understand, for example, the projected combined impacts of both programs on the rates of different heating fuels and how incentive signals can be designed across the programs to achieve the overarching building decarbonization goals of the Commonwealth.

[6] https://www.mass.gov/doc/225-cmr-16-alternative-energy-portfolio-standard-aps/download

There is also a key question of program administration – how can program administration be streamlined across the CHS and Mass Save to minimizes administrative burden and make, for example, the verification process of installed measures as smooth as possible? Could DEP form some sort of administrative partnership with Mass Save and what would this look like? In the current CHS Framework, the is currently "measure overlap" between the two programs in the following categories: 1) Residential space heating electrification, 2) Non-residential space heating electrification, 3) Non-residential domestic water heating electrification, and 4) Non-residential insulation and weatherization for non-residential buildings that retain some level of fossil fuel heating system). How will incentive signals across the two programs be coordinated to ensure the most efficient use of ratepayer funds? Acadia Center doesn't have all the answers on this front, but we are hopeful that these are the types of questions DEP is currently investigating.

To date, it's not clear to stakeholders what level of coordination between the two programs is taking place - this is extremely concerning, particularly given that the Mass Save 2025-2027 draft Three-Year-Plan was just released on April 1st. Assuming the CHS launches in early 2026 (and CHS Early Action Crediting is available in 2025), there will be significant overlap from a timing perspective of the CHS and the Mass Save 2025-2027 Three-Year-Plan. Acadia Center urges DEP to coordinate more closely with DOER to ensure complimentary design of the two programs and share information regarding the details of this coordination process with DOER. Coordination with Mass Save would be an excellent topic for Technical Working Group sessions.

FAQ Question 0, Bullet 5: Eliminating Emission Reduction Credits for Non-waste Biodiesel Blends Above 20%

The fifth bullet in FAQ Question 0 proposes to, *"Consider assigning default ownership of emission reduction credits from operation of heat pumps to electricity suppliers instead of homeowners."* A major concern Acadia has had since the release of the original Framework is the percentage of overall obligations (both full electrification and emission reduction) on fossil fuel obligated parties would be met via the actual installation of electrification projects versus biodiesel and alternative compliance payments. This comes down to incentive signals for fossil fuel obligated parties – is it more cost-effective from a business bottom line perspective to purchase ACPs or actually install heat pumps? Imagine, for example, a fuel oil delivery company that has recently pivoted to installing heat pumps as a result of the CHS program (Company A).

If Company A installs a full electrification project in 2026, they capture one full electrification credit. This credit holds an "avoided ACP value" of $6,000. The full electrification credit also generates a future stream of emission reduction credits. Under the original Framework, these emission reduction credits would have provided $22,800[7] in terms of future streams of emission reduction credits. Under the changes outlined in the FAQ, the value of these future emission reduction credit streams decreases to $3,800.[8] **In either case, the core problem from the perspective of Company A is that they don't capture any of the value from the future emission reduction credits generated by the electrification project they completed. Their two paths to complying with their emission reduction obligation are 1) Buy ACPs or 2) Blend biodiesel. Additionally, in the case of a hybrid heat pumps system installed by Company A, they capture no credit value at all (there is no full electrification credit generated by the project and the electricity seller captures the future streams of emission avoided credits associated with operating the heat pumps).**

---

[7] 24 years of operation from 2026-2050 x 5/MT CO2/year per full electrification project x $190/MT CO2 = $22,800

[8] 5 years of operation from 2026-2030 x 4 MT/CO2/year per full electrification project x $190/MT CO2 = $3,800

The "CHS compliance motivation" for Company A to complete full electrification projects ($6,000 if avoided ACP value) and hybrid electrification projects ($0 in avoided ACP) appears to Acadia Center to be significantly too low, in the case of full electrification projects, or nonexistent in the case of hybrid electrification projects. This is a core policy design concern. DEP needs to conduct modeling and quantitative analysis to "game out" these complex dynamics to assess the likelihood that fossil fuel obligated parties will meet 100% (or close to 100%) of their obligation via some combination of ACPs and liquid biofuel blending given the current policy design and alternative policy designs. If these scenarios unfold where 100% of their obligation is met via some combination of ACPs and liquid biofuel blending, what are the big-picture implications for the building electrification movement in the Commonwealth? Would the Commonwealth even have enough time to "course correct" the policy and stay on track for the target level of heat pump installations envisioned by the CECP? How can this type of scenario be safeguarded against with more sound policy design?

Acadia Center has not done the level of modeling and analysis to propose an optimal policy solution to this complex issue, but one could envision any number of policy design changes that could increase the motivation of fossil fuel obligated parties to install heat pumps: 1) Increase the full electrification credit value, 2) Create a "hybrid electrification credit value", 3) Give them a pathway to owning a portion of the emission reduction credits generated by the electrification projects they install, 4) Establish caps on the level of their obligations that can be met via ACPs or liquid biofuel blending. These are just some ideas in the universe of potential solutions – this topic requires significantly more research and analysis on the part of DEP to flesh out.

The fifth bullet in the FAQ goes on to state, *"The draft framework suggests that information in monthly electric bills may be used to verify reliance on heat pumps for heating. Because electricity sellers already have access to this information and have experience with crediting programs, assigning credits to electricity sellers could greatly simplify program administration."* As discussed in greater detail in our December Comments, Acadia Center supports the concept of awarding emission reduction credits from electrification projects based on an electric bill review process that ensures these heat pumps are actually being used to provide a substantial (in the case of hybrid) or all (in the case of full electrification) space heating to a home over the duration of the heating season. While we acknowledge that electricity sellers are obviously the best positioned at the current time to verify monthly changes in electricity consumption at an individual residential meter level, that alone should not be used as justification for assigning electricity sellers default ownership of all emission reduction credits generated by the operation of heat pumps. For example, one could envision a scenario where electricity sellers verify compliance, but emission reduction credits are assigned to either the customer or the company who completed installation of the heat pump project. One could also envision a scenario where electricity sellers are required to share electricity consumption data with a program administrator and that program administrator mints the credits and assigns them to the relevant parties. Ultimately, there are two completely separate questions that shouldn't be intertwined:

1) What is the optimal way to verify operation of heat pumps and generate emission reduction credits associated with that operation?

2) What is the optimal way to assign emission reduction credits (electricity sellers, customers, heat pump installer) to rapidly deploy heat pumps at scale, minimize the costs of the program, and send the right "market signal" to obligated parties to minimize their reliance on ACPs and biodiesel for compliance?

Question 2 is not an easy question to answer – rigorous modeling and scenario analysis is required to answer this question, and, to date, DEP has not demonstrated this type of analysis to stakeholders. The concept of electricity

sellers being assigned default ownership of emission reduction credits generated by heat pump operation and this dynamic creating *"…an incentive for electricity sellers to encourage heat pump usage, possibly by offering discounts or other rewards to customers that utilize their heat pumps"* is an interesting topic for future research and analysis. It seems more intuitive to assign default ownership of the credits to the homeowners that have both 1) Installed heat pumps and 2) Demonstrated use of those systems via electricity bills. One could imagine a process by which these customers either sell the credits into a marketplace or sell them directly to the electricity seller – the funds generated by this sale could help offset both the installation and ongoing operational cost borne by the customer. D

Acadia Center has several concerns with assigning default ownership of emission reduction credits generated by heat pump operation to electricity sellers. Firstly, we are extremely concerned about what this proposal does to the motivation of fossil fuel obligated parties to actually install heat pumps, as discussed directly above. Secondly, we are concerned what percent of the emission reduction credit value will be "captured" by electricity sellers, rather than returned to heat pump customers in the form of reduced rates, etc. This risk is present in all cases, but is particularly troublesome for residential customers that install whole-home heat pump systems and remove all fossil fuel heating equipment - it wouldn't be necessary for electricity sellers to provide incentives to encourage heat pump use – these customers have no other option than relying 100% on their heat pump system to provide space heating. In these scenarios, would the electricity seller "capture" 100% of the emission reduction credit value? It's not clear what motivation electricity sellers would have to share some of the credit value with fully electric customers who don't retain a fossil fuel back-up system.

As laid out above -these interwoven policy dynamics are incredibly complicated. Modeling and quantitative analysis on these various scenarios needs to be provided by DEP before we can provide a more nuanced, detailed proposal on how to best design this specific aspect of the program. DEP should investigate multiple policy design scenarios and quantify the financial motivation of various obligated parties under different scenarios that, for example, explore the impacts of changes to default ownership of emission reduction credits generated by heat pump operation.

Crediting for Non-residential Buildings Stakeholder Discussion Document

Hydrogen and Renewable Natural Gas

The Crediting for Non-residential Buildings Stakeholder Discussion Document mentions that, *"In addition, MassDEP is considering whether to allow crediting for reductions in emissions from fossil fuel combustion resulting from the substitution of renewable natural gas and hydrogen produced using renewable electricity, as long as they are not blended with fossil fuels."*

The Framework stated that, *"The draft framework limits crediting to electricity and liquid biofuels at program startup."* Thus, the proposal to consider the substitution of RNG and hydrogen represents a fairly significant departure from the original Framework. Given that, it seems odd that DEP only mentioned this topic in a couple short sentences and didn't provide further information or analysis of the pros and cons of continuing to exclude these fuels versus including these fuels as eligible clean heat measures.

Referring to these fuels as "non-pipeline clean fuels" is also a bit confusing because both of these gaseous fuels are ultimately transported (whether it be short or long distances) via pipes. Acadia Center assumes that DEP is using the term to imply that these fuels would not be injected into the existing natural gas distribution system, but clarification

on this topic would be useful to stakeholders. The text stating, "…as long as they are not blended with fossil fuels" seems to confirm this, but one could envision, for example, particular branches of the gas distribution system that are 100% RNG or, for example, an isolated 100% hydrogen gas delivery system serving multiple industrial customers in an industrial park.

Acadia Center is strongly opposed to the former example – a branch of the gas distribution system that is 100% RNG and technically not "blended with fossil fuels". In the case of hydrogen, Acadia Center acknowledges that the fuel may an important, niche decarbonization role to play in the building sector, particularly for certain industrial processes that are extremely technically challenging to electrify. However, the Inflation Reduction Act's (IRA's) Clean Hydrogen Production (45V) is already set to provide an extremely generous 10-year tax credit of up to $3 per kilogram of hydrogen produced[9] and it's not clear if additional state-level incentives (via a program like the CHS) would actually be needed to encourage investments in the infrastructure needed to support the limited appropriate use cases of hydrogen in the building sector in the state. **This is another topic that DEP should perform quantitative analysis on – what is the market signal/level of incentives provided by the IRA for hydrogen as a decarbonization strategy for certain industrial buildings and are additional state incentives actually justified?**

RNG is a broad term, and it refers to many different fuel production pathways, all of which have different lifecycle emissions associated with them. When analyzing the GHG impacts of RNG, it's important to consider the two general categories of RNG: 1) RNG derived from "intentionally produced" methane and 2) RNG derived from "waste methane". An example of "intentionally produced methane" is converting agricultural residues (e.g. corn stalks remaining after harvest) to methane through a process known as gasification, and an example of "waste methane" is methane released by a landfill as organic material decays. Intentionally produced methane should have absolutely no role in the building decarbonization strategy of the Commonwealth, even if it is not blended into the gas distribution system. As Dr. Emily Grubert, a professor of Environmental Engineering at Georgia Tech, points out in her research, we know that RNG systems leak methane, just like natural gas systems, only potentially at even higher rates. **When we *intentionally* produce methane, *any* methane leaks along the RNG supply chain result in a net increase in GHG emissions.**[10] In other words, if our goal is to minimize GHG emissions, we shouldn't be intentionally producing *any* methane that we know will leak.

For RNG produced using "waste methane", claims of GHG-neutrality are based on a flawed comparison against the worst possible alternative – that is, allowing methane released from sites like landfills to go directly into the atmosphere. That is unlikely to occur in a setting where GHG emissions are regulated, however, as the best option from a GHG perspective, by a wide margin, is to capture the biogas and combust it in a combined heat and power facility that produces both electricity and useful heat. This on-site combustion efficiently converts methane to CO_2 (a far less potent GHG), while simultaneously avoiding downstream methane emissions associated with upgrading, transporting, and distributing RNG. It also has the critical benefit of serving as a "firm" electricity generation resource to complement a future grid with a high penetration of intermittent renewable electricity resources.

---

[9] https://www.federalregister.gov/documents/2023/12/26/2023-28359/section-45v-credit-for-production-of-clean-hydrogen-section-48a15-election-to-treat-clean-hydrogen

[10] Emily Grubert 2020 Environ. Res. Lett. 15 084041 https://iopscience.iop.org/article/10.1088/1748-9326/ab9335

If combined heat and power at a particular site is not a viable option, even just burning the methane on site (a process known as flaring) is better from a GHG perspective than RNG production because it avoids downstream methane leaks along the RNG supply chain, as research by Dr. Grubert highlights.[11] For RNG produced form waste methane to actually be beneficial from a GHG perspective, leak rates along the supply chain would need to be about 1%, but we know they're much higher than that – typically ranging from 2.8% to 4.8% but observed to be as high as 15.8%.[12]

RNG is upgraded biogas. There is no scenario in which Acadia Center would support including RNG as a clean heat measure under the CHS for the reasons outlined above. There are certain *niche scenarios* where Acadia Center would potentially consider the inclusion of true waste biogas that is not intentionally produced methane. For example, you can imagine capturing biogas from a closed landfill, combusting it on site in a CHP plant and delivering the waste heat from the CHP plant to a nearby warehouse facility to reduce that warehouse's reliance on fossil fuel combustion for space heating. However, like hydrogen, the IRA already offers significant incentives for many anerobic digestion projects, including the Investment Tax Credit (ITC) and the energy production tax credit (PTC). These incentives are significant – for example, the ITC allows taxpaying entities to deduct a percentage of the cost of biogas production equipment from their federal taxes, up to 50% or more.[13] Like hydrogen, it's not clear if additional state-level incentives (via a program like the CHS) would actually be needed to encourage investments in the infrastructure needed to support the limited appropriate use cases of biogas in the building sector in the state. **This is another topic that DEP should perform quantitative analysis on – what is the market signal/level of incentives provided by the IRA for biogas investments as a decarbonization strategy for certain buildings adjacent to sources of waste biogas (landfills, wastewater treatment plants, food compositing facilities) and are additional state incentives actually justified?**

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, the relatively strict limits on non-waste liquid biofuels, 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,

Ben Butterworth
Director: Climate, Energy & Equity Analysis
bbutterworth@acadiacenter.org
617-742-0054 ext.111

---

[11] Ibid.

[12] Ibid.

[13] https://www.biocycle.net/the-ira-revolutionizes-ad-tax-credits/