

October 21, 2022

Bethany A. Card, Secretary
Executive Office of Energy and Environmental Affairs
100 Cambridge Street, Suite 1020
Boston, MA 02114

Re: Clean Energy & Climate Plan for 2050: Limits, Sublimits, Goals, & Policies

Dear Secretary Card:

Acadia Center appreciates the opportunity to provide comments on the Clean Energy & Climate Plan (CECP) for 2050. Acadia Center is a non-profit research and advocacy organization committed to advancing the clean energy future. Our organization tackles complex problems, identifies clear recommendations for reforms, and advocates for policy changes that support a low-carbon economy across the Northeast.

Acadia Center has provided several [sets](#) of [comments](#) during the CECP process, both individually and as [part of a coalition](#). Developing comments for this specific proposal has proven difficult, as all that is available is a 23-slide presentation, with only a fraction of the slides containing new information. Acadia Center applauds the work that has been performed so far in developing the 2025 and 2030 CECP. We acknowledge that the Executive Office of Energy and Environmental Affairs (EEA) is under a strict statutory deadline of January 1st, 2023 to develop 2050 emissions limits and sublimits, as well as a comprehensive plan to achieve those limits. However, without more information on the 2050 proposal, we fear the Commonwealth's 2050 plan will suffer from less-than-optimal stakeholder involvement. One of our organization's chief complaints during the 2025 and 2030 CECP process was that modeling results were only available when the final report was released. The appendices in said CECP were also significantly less detailed than the Massachusetts 2050 Decarbonization Roadmap, limiting the ability of stakeholders to evaluate critical assumptions underpinning the modeling used to inform the 2025 and 2030 CECP policy recommendations. This process suffers from the same concerns, though even more extreme. Acadia Center offers the following comments on the currently available information and information, which we urge EEA to include in the final plan.

Massachusetts is Still Letting Flawed Assumptions Get in the Way of Impartial Analysis

Detailed modeling information is not included with the slide deck for the 2050 CECP. Therefore, we assume that the framework will be the same as the 2025 and 2030 CECP. When reviewing the conclusions of the 2025 and 2030 CECP modeling effort, which ultimately inform the report's policy recommendations, it's important to note that the modeling continues to rely on flawed, outdated assumptions that are much too favorable to natural gas and biofuels. These flawed assumptions stem from the Massachusetts Greenhouse Gas Inventory and continue to be repeated – both in the CECP modeling and the D.P.U. Docket 20-80 (Future of Gas) modeling as Acadia Center described in more detail [here](#). These problematic assumptions include:

- **Dramatically underestimating the GHG impacts of methane leaks from the gas system in Massachusetts.** A recent study from Harvard estimated that gas leaks in the Boston metro are *six times* worse than estimates from the Massachusetts Department of Environmental Protection (DEP) and U.S. Environmental Protection Agency (EPA).¹ Based on the limited information provided in the 2050 CECP presentation, it does appear that EEA has updated the natural gas leak emission accounting methodology. However, without more information on the accounting changes implemented and the overarching impacts of these accounting changes, Acadia Center still has serious concerns that the methodology is underestimating gas leaks in the Commonwealth by a significant margin.
- **Using an outdated global warming potential (GWP) value for methane and failing to consider methane emissions on the 20-year timescale that is most relevant to the state’s net zero emissions goal.** Simply switching to the most recent 20-year GWP, as New York State has done, would alone increase the estimated GHG damage from methane leaks *over three-fold*.²
- **Not accounting for out-of-state GHG emissions from the production and transmission of both fossil fuels and biofuels ultimately consumed in-state.** After updating to a 20-year GWP and accounting for out-of-state emissions, New York State found that the GHG emissions associated with using natural gas are 84% higher than the state had previously estimated.³
- **Making the blanket assumption that all biofuels (including ‘renewable natural gas’ and biodiesel) are GHG-neutral.** Ignoring lifecycle emissions associated with biofuels dramatically overestimates the potential role for these fuels as we move towards net zero emissions.⁴

The 2025 and 2030 CECP made it clear that one of the central debates in building sector decarbonization over the next decade will be around whether the Commonwealth should embrace full electrification of building heating or partial electrification of building heating via “hybrid” systems that rely on a combination of electricity and fossil fuel- or biofuel-based heating systems. Using 2025 and 2030 CECP modeling assumptions, buildings served by hybrid heating systems would generate about half of their heat from an electric air-source heat pump (ASHP) and half of their heat from a fossil fuel- or biofuel-powered boiler or furnace.

As it stands, the 2050 CECP modeling is biased in favor of hybrid heating and against full electrification because of the flawed assumptions described above. Hybrid heating pathways looks a lot better when you’re underestimating gas leaks and assuming combustion of biofuels results in zero GHG emissions. As such, the findings of the CECP that

¹ Sargent et al., 2021 “Majority of US Urban Natural Gas Emissions Unaccounted for in Inventories.”

<https://www.pnas.org/doi/10.1073/pnas.2105804118>

² The IPCC 4th Assessment Report 100-year GWP for methane of 25 used in the CECP analysis is over 3.36 times lower than the more appropriate IPCC 4th Assessment Report 20-year GWP for methane of 84.

³ New York State Department of Environment Conservation 2021 Statewide GHG Emissions Report, Appendix A, Table A1, page 17. https://www.dec.ny.gov/docs/administration_pdf/ghgsumrpt21.pdf

⁴ Emily Grubert, 2021. “At Scale, Renewable Natural Gas Systems Could be Climate Intensive: The Influence of Methane Feedstock and Leakage Rates.” <https://iopscience.iop.org/article/10.1088/1748-9326/ab9335>

hybrid heating as a first-choice option would be a reasonable pathway for the Commonwealth must be taken with a large grain of salt.

The 2050 CECP slide deck notes that the methodology for natural gas distribution and service emission accounting has recently been changed by the EPA.⁵ The Non-Energy & Industrial Sector slide lists the natural gas delivery sublimit for 2030 as 0.4 MMTCO₂e.⁶ It also notes that the new accounting methodology places the “2030 emission values” at 0.7 MMTCO₂e.⁷ The 2050 target is then listed as 0.5 MMTCO₂e.⁸ This section is exceptionally confusing and raises several questions. Does “2030 values are now estimated at 0.7 MMTCO₂e” mean that the projected “business as usual” emissions from the gas distribution system in 2030 are 0.7 MMTCO₂e or does it mean that the new 2030 natural gas delivery sublimit is 0.7 MMTCO₂e? If 0.7 MMTCO₂e is the new 2030 sublimit, why is 0.4 MMTCO₂e still listed on the slide as the 2030 sublimit? If the 2030 sublimit target is in fact 0.4 MMTCO₂e, as it’s presented on the slide, why is the 2050 sublimit of 0.5 MMTCO₂e *higher* than the 2030 sublimit? Based on the information presented, Acadia Center is struggling to understand why the 2050 gas leaks sublimit would be less aggressive than the 2030 sublimit.

It should be noted that a policy recommendation in the available 2050 CECP information is “to consider whether changes are needed to the inventory conventions/guiding principles for greenhouse gas emission accounting methodologies for biobased and synthetic fuel combustion emissions.”⁹ While this change would be welcome, it would come after this report is completed and undermine the proposed policies that rely on the fuels in question. Additionally, these potential changes do not address wide-scale problems with the Massachusetts GHG Inventory, such as the undercount of methane leaks. The accounting errors that Acadia Center identifies above must be made before the issuance of final policy recommendations for these concepts to be taken seriously.

The Buildings Policy Recommendations Are Based Upon Flawed Information and Lack Critical Details

The 2025 and 2030 CECP examined six clean heat scenarios: Reference, Clean Fuels, Hybrid, Phased, High Electrification, and Full Electrification. The 2025 and 2030 CECP recommends the Commonwealth embrace the “Phased” scenario, which involves the “[r]apid adoption of both partial- and whole-home heat pump systems but allows for hybrid fossil-fuel and electric heat pump systems in the 2020s and then whole home retrofits thereafter.”¹⁰ The Commonwealth opted for this approach because it believed the scenario “presents both long-term and near-term benefits over other building decarbonization approaches analyzed.”

⁵ 2050 CECP Presentation Slides, at 7. <https://www.mass.gov/doc/2050-cecppublic-hearingpresentationenglish/download>.

⁶ *Id.*, at 12.

⁷ *Id.*

⁸ *Id.*

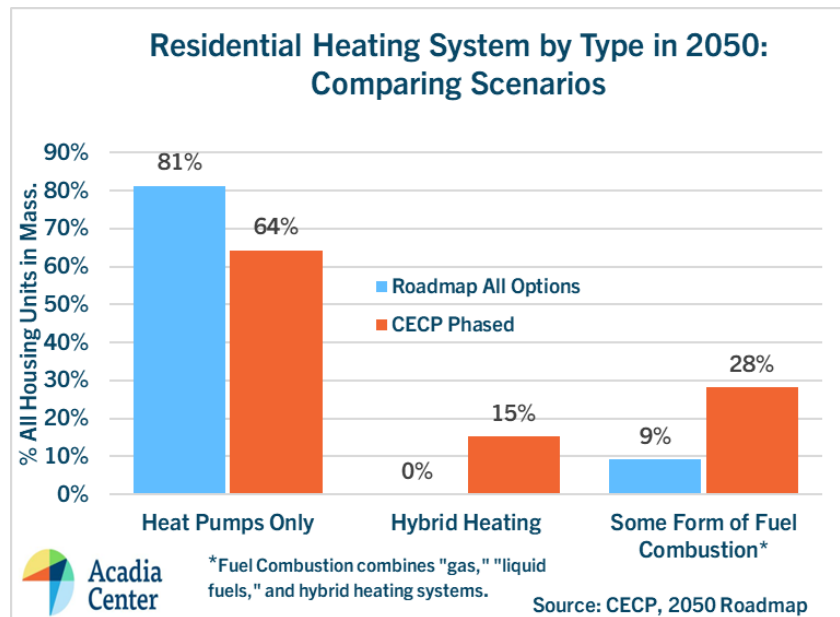
⁹ *Id.*, at 15.

¹⁰ CECP for 2025 and 2030, at 26.

The 2050 CECP slide deck makes no mention of what scenario it is utilizing. Therefore, Acadia Center is assuming that the Commonwealth is continuing to recommend the “Phased” scenario and have the outputs from this scenario inform policy recommendations. As we outline below, this approach is flawed.

The CECP is Less Ambitious than the Massachusetts Roadmap When It Comes to Full Electrification of Buildings by 2050

One of the main narratives of the 2025 and 2030 CECP report is that the “Phased” Scenario, which emphasizes deployment of hybrid heating systems over the next eight years, and beyond, is the best path for the Commonwealth. By 2050, the CECP Phased Scenario calls for about 64% of Massachusetts homes to rely solely on heat pumps for space heating by 2030, 15% to rely on hybrid heating systems, and a combined 13% of homes to rely strictly on “gas” or “liquid fuels” heating systems.¹¹ In summary, under the CECP Phased Scenario, about 28% of homes in 2050 still rely on some type of fuel combustion to provide space heating.



This is a significant departure from the most cost-effective “All Options” Scenario in the Massachusetts 2050 Decarbonization Roadmap (“Roadmap”), which calls for about 81% of homes in the Commonwealth to rely solely on heat pumps for space heating by 2050, with only about 9% of homes combusting any type of fuel for space heating by 2050.¹² In other words, the CECP’s Phased Scenario, in comparison to the Roadmap’s All Options Scenario, envisions about 20% fewer homes heated solely by heat pumps in 2050 and about 3 times more homes combusting some type of fuel to provide space heating in 2050.

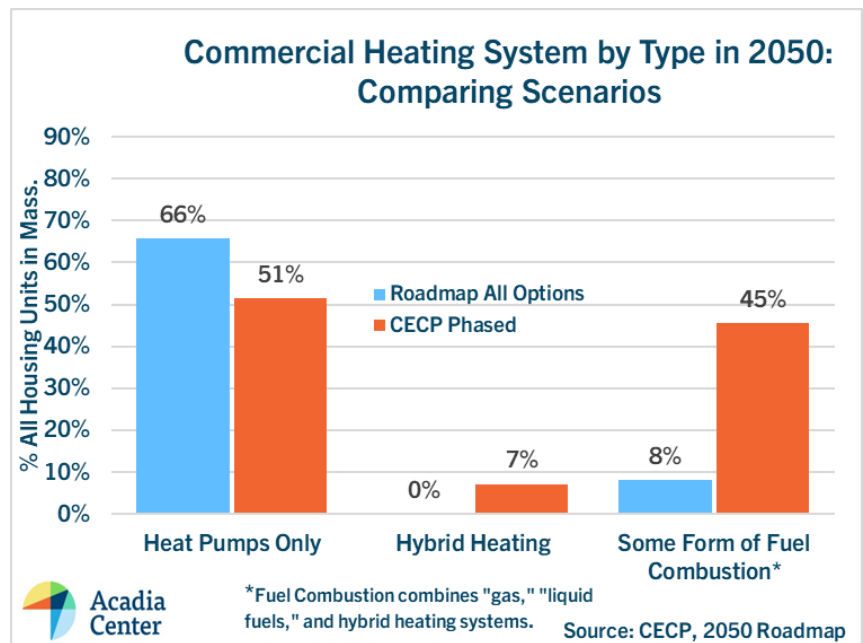
¹¹ See Figure A.6 on page 13 of CECP for 2025 and 2030 Appendix A: Technical Pathways Modeling. Note: Percentages estimated by Acadia Center based on precise graph measurements. Exact numbers not provided in CECP. This note applies to all footnotes below referencing CECP or Roadmap percentages. Additionally, the graphs in the CECP do not specify what type of “gas” or “liquid fuels” they are referring to – they could be referring to fossil fuels, biofuels, or some mix of the two.

¹² See Figure 3 on page 12 of Massachusetts 2050 Decarbonization Roadmap Building Sectors Report.

In 2050, the CECP Phased Scenario even calls for *new sales* of residential heating systems that combust fuels. In 2050, approximately 16% of *newly sold* residential heating systems are hybrid, 3% solely rely on “gas”, and 2% solely rely on “liquid fuels”.¹³

The CECP Phased Scenario is also much less bullish on long-term full electrification of commercial buildings when compared to the Roadmap All Options Scenario.

The CECP Phased Scenario calls for about 51% of Massachusetts commercial buildings to rely solely on heat pumps for space heating by 2050, 7% to rely on a hybrid heating system, and a combined 38% to rely strictly on “gas” or “liquid fuels” heating systems.¹⁴ In other words, about 45% of commercial buildings in 2050 still rely on some type of fuel combustion to provide space heating.



This is in stark contrast to the Roadmap’s All Options Scenario, which calls for about 66% of commercial buildings in the Commonwealth to rely solely on heat pumps for space heating by 2050, with only 8% relying on any form of fuel combustion to provide space heating.¹⁵ In other words, the CECP’s Phased Scenario, in comparison to the Roadmap’s All Options Scenario, envisions about 22% less commercial buildings heated solely by heat pumps in 2050 and about 5.6 times as many commercial buildings combusting some form of fuel to provide space heating in 2050. In the Phased Scenario, about 75% of commercial space heating final energy demand is still provided via the combustion of “pipeline gas” or “liquid fuels”,¹⁶ compared to about 15% in the Roadmap All Options Scenario.¹⁷

If the 2050 CECP is truly embracing the Phased Scenario as the preferred pathway forward and building policy recommendations around this scenario, EEA should address, in detail, why it has chosen to embark on a pathway that is such stark contrast to the Roadmap’s All Options scenario, which was determined to be the most cost-effective

¹³ See Figure A.6 on page 13 of CECP for 2025 and 2030 Appendix A: Technical Pathways Modeling.

¹⁴ See Figure A.7 on page 14 of CECP for 2025 and 2030 Appendix A: Technical Pathways Modeling.

¹⁵ See Figure 4 on page 13 of Massachusetts 2050 Decarbonization Roadmap Building Sectors Report.

¹⁶ See Figure A.6 on page 13 of CECP for 2025 and 2030 Appendix A: Technical Pathways Modeling.

¹⁷ See Figure 4 on page 13 of Massachusetts 2050 Decarbonization Roadmap Building Sectors Report.

pathway to 2050 decarbonization in the Commonwealth less than two years ago. This detailed explanation simply has not been provided to date.

If the Commonwealth Pursues a Clean Heat Standard, It Should Be Based upon Sound Modeling

A critical component of the Commonwealth's effort to decarbonize buildings is the creation of a Clean Heat Standard. Acadia Center believes that a well-designed Clean Heat Standard could serve as an incredibly effective tool in this effort. However, some elements surrounding the current discussion give our organization pause. In a report prepared for EEA, the Regulatory Assistance Project noted that the Low Carbon Fuel Standard relies primarily on Argonne National Lab's GREET model to compare life cycle emissions.¹⁸ The report notes that systems like GREET could be used to help assign life cycle emissions for a Clean Heat Standard here in Massachusetts.¹⁹ Acadia Center has major concerns about the GREET model, particularly as it relates to underestimating the life cycle GHG impacts of biofuels, and will follow up with specifics at a later date. Our organization cautions EEA to develop a system that utilizes proper methane accounting to ensure the success of the Clean Heat Standard. Further, a Clean Heat Standard alone is not a panacea. It must be paired with comprehensive planning, including the organized transition of the Commonwealth's natural gas system.

Transportation Policy is Too Short on Detail and Focuses Too Heavily on Electric Vehicles

The transition from gas vehicles to electric vehicles is a critical policy shift that will help support the Commonwealth's decarbonized transportation future. However, far too often this policy tool is prioritized at the expense of other options for addressing GHG emissions in the transportation sector. The available information from the 2050 CECP appears to repeat this mistake, with the majority of policy proposals designed to develop the necessary infrastructure for electric vehicle adoption. Mode-shifting, such as switching from a personal vehicle to public transit, a bike or e-bike, or walking, is given short shrift.

A reduction in vehicles-miles-traveled (VMT) must be an explicit part of any transportation future for the Commonwealth. Mode-shifting (combined with smart, transit-oriented housing policy) is one of the most straightforward methods to reduce VMT. While public transit expansion can be costly (though certainly worth the investment), other options, like increasing walkability or bikeability, often simply require creativity. The 2050 CECP currently proposes to stabilize driving levels through residents having access to alternatives to personal vehicles for transportation. This proposal is in line with the 2025 and 2030 CECP, which proposed 2025 and 2030 VMT per household targets of 20.8 million and 20.4 million, respectively.²⁰ Said figures are a modest reduction from the 2015 historical figure of 21.0 million.²¹ Many stakeholders, including Acadia Center, raised concerns that these targets were

¹⁸ Appendices to the Clean Energy and Climate Plan for 2025 and 2030, at 46. <https://www.mass.gov/doc/appendices-to-the-clean-energy-and-climate-plan-for-2025-and-2030/download>.

¹⁹ Id, at 51.

²⁰ Id, at 158.

²¹ Id.

too conservative and urged the Commonwealth to focus on stronger targets. However, given the relatively short time period and the time that transportation transformation can take, EEA's conservative estimates are understandable. To carry the stabilization policy forward to 2050 shows a startling lack of vision. Between now and 2050 Massachusetts can and must do as much as possible to reduce VMT.

Mode-shifting must be an explicit policy priority for the Commonwealth, and the 2050 CECP must embrace it. Embracing a strategy that explicitly pursues mode-shifting will not only help meet our Commonwealth's greenhouse gas requirements, but also improve the quality of life in Massachusetts by reducing congestion, improving public health, reducing road fatalities, and, if done properly, lowering costs for consumers. It also should be noted that direct reductions in VMT through mode-shifting will ease the strain on the electric grid as we move toward an electrified transportation system. Currently, the only policies relative to mode-shifting listed in the 2050 CECP are to extend a current policy of "[p]rioritiz[ing] multimodal transportation infrastructure."²² This vague proposal is insufficient, as it reflects an extension of the status quo. Ensuring that residents have safe, reliable, and affordable access to different modes of transportation is the most direct way to dramatically bring down VMT.

Key Targets & Metrics for 2050 Lack Precise Data

One of the most important components of the 2050 CECP slide deck is the "Key Targets & Metrics" section. As the name implies, this section is meant to outline the milestones by which the Commonwealth will judge success in each of the sectors. The 2025 and 2030 CECP section includes specific targets. For example, the transportation sector is targeting 200,000 passenger EVs on the road and 15,000 public charging stations by 2025.²³ The buildings sector aims for deep weatherization in 20% of the building stock by 2030 and electric heating in around one million residences by 2030.²⁴ Though additional details are needed with these targets, such as the type of charger and expected locations, they at least provide a specific figure.

The 2050 metrics and targets are significantly less precise. In fact, it is difficult to even call them metrics. Instead, they include vague statements of goals like "[s]ufficient public EV charging infrastructure in place" and "[m]ajority of buildings will be low-emitting."²⁵ Without additional detail, these targets are nearly impossible to evaluate. This lack of specificity raises unanswered questions for the Key Targets & Metrics in each of the sectors, including the following:

- What does "sufficient public EV charging infrastructure in place" mean? How much public EV charging is needed? What level of charging speed? Where?
- What percentage or range of percentages of all passenger vehicles on the road are expected to be electric?

²² CECP slide deck, at 9.

²³ Id.

²⁴ Id, at 10.

²⁵ Id, at 9, 10.

- What does “majority of all buildings are heated and cooled by electric heat pumps” mean? Is that closer to 51% or 99%? Are these buildings hybrid or all-electric?
- How is “low-emitting” defined?
- How much renewable natural gas or hydrogen will be utilized for home heating? How much geothermal will be utilized for home heating?
- What is the emissions target for natural and working lands? It is currently blank.
- What specific actions will be taken to implement new regional transmission and wholesale marketing reforms aimed at 2031?

Acadia Center appreciates the opportunity to submit these comments. We hope to continue to work together to develop a 2050 Clean Energy and Climate Plan that is as strong as possible. If you have any questions or concerns, please do not hesitate to reach out.

Sincerely,

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