Climate Leaders Municipal Decarbonization Commitment and Roadmap Guidance

INTRODUCTION

The 2021 Climate Law, statewide limits on greenhouse gas (GHG) emissions were established, requiring a reduction of GHG emissions thirty three percent (33%) percent below 1990 levels in calendar year 2025 and a fifty percent (50%) percent reduction by calendar year 2030. The Executive Office of Energy and Environmental Affairs issued the *Massachusetts Clean Energy and Climate Plan for 2025 and 2030* (CECP) that establishes a framework for meeting these goals, mainly through electrifying non-electric energy uses, decarbonizing the electric grid, and maximizing the efficiency of buildings and transportation.

In accordance with M.G.L.c. 25A §10 (b) Climate Leader certification provides a framework for municipalities to pursue these goals in partnership with the Commonwealth of Massachusetts. To become certified, municipalities must:

1) Commit to eliminating on-site fossil fuel use by the municipality by 2050
2) Develop a roadmap for decarbonizing municipal operations

Municipal Decarbonization Commitment

First, a town or city must demonstrate that it has made a decarbonization commitment. There are several ways in which a municipality can demonstrate this commitment. One way would be a clean energy/climate resolution from Town Meeting or City Council that directs the community to take some sort of action. Communities that have climate action plans completed or underway also have demonstrated this commitment as are municipalities that are signatories to the 2016 Metropolitan Area Planning Council's (MAPC) Metro Mayors Coalition Climate Mitigation Commitment.

To meet this requirement, Climate Leader applicants shall submit one of the following:

- Certified minutes from the meeting in which the clean energy/climate resolution took place, along with the resolution itself
- A copy of the executive summary and a weblink from a completed climate action plan, or if the process is still underway, a brief description of what has been accomplished and a weblink to the municipality's climate action website
- An affirmation from the municipal Chief Executive Officer that the city or town remains committed to the goals articulated in the Metro Mayors Coalition Climate Mitigation Commitment.

Municipal Decarbonization Roadmap

Second, the town or city must have a Climate Leader decarbonization roadmap. The Climate Leader decarbonization roadmap should focus on eliminating the use of onsite fossil fuels by municipal buildings and vehicles, using a "Zero Over Time" approach as described in Section 2. Roadmap Elements that addresses trigger events include equipment replacement, roof replacement, change of use, substantial renovation, etc., in conjunction with evaluating electrification of heat, solar and storage opportunities. Municipalities shall ensure that GHG reductions, energy efficiency, renewable

and clean energy, and emissions reduction strategies are incorporated into any decision municipalities make with respect to equipment replacement, capital spending and master planning efforts in support of the community's goals. Municipalities with local public schools shall include school facilities and vehicles in their roadmaps; those that are part of a regional school district shall include those facilities that are included in their most recent Green Communities baseline.

The decarbonization roadmap shall include guiding principles for the following:

For existing buildings:

I. All comprehensive energy projects and building renovations where electrical, heating, ventilation, or air conditioning infrastructure are included in the project scope, shall include the following:
    a. Include as a design option an alternative to fossil fuels for thermal energy that includes low- or zero-carbon fuels or alternative electricity technologies.
    b. When such options are not practicable, projects shall ensure that steps are taken to develop and incorporate plans to facilitate the future transition to low- or zero-carbon fuels.
    c. Evaluate building envelope upgrades and implement said upgrades where technically and fiscally feasible.
    d. Establish and adhere to a low target energy use intensity for overall building or site performance.
    e. Where appropriate, design and install renewable energy and energy storage, while building the infrastructure necessary to support future renewable energy and storage installations. Electricity generated by onsite renewables offsets the use of electricity from the grid. As such, onsite renewables provide zero-emission electricity and can reduce a building's GHG emissions compared to electricity provided by the grid, until the grid is fully decarbonized. Onsite fuel combustion (propane, gas, oil) cannot be offset from the use of onsite renewable electricity generation.
    f. Maximize resilient design to protect critical infrastructure and continued operation when modeled for long-term climate impacts.

For new construction or substantial renovation:

II. To maximize the potential greenhouse gas emissions reductions, new construction, and substantial renovations, where possible and when cost-effective, shall include the following:
    a. Strive to achieve zero net energy, where sufficient renewable energy is generated onsite to offset the building's annualized energy consumption. Electricity generated by onsite renewables offsets the use of electricity from the grid. As such, onsite renewables provide zero-emission electricity and can reduce a building's GHG emissions compared to electricity provided by the grid, until the grid is fully decarbonized. Onsite fuel combustion (propane, gas, oil) cannot be offset from the use of onsite renewable electricity generation.
    b. Implement energy storage wherever possible, especially when paired with onsite renewables.
    c. Prioritize sites that provide access to public transportation and alternative modes of transportation.
    d. Evaluate and implement strategies to reduce embodied carbon contained in building materials.

For municipal and school fleets:

While Climate Leader communities will have adopted the Zero-Emission-Vehicle First policy and the Commonwealth will achieve increases in electric vehicle sales through the implementation of vehicle emissions standards that will require all passenger vehicle sales and most medium- and heavy-duty vehicle sales to be electric by 2035, municipal decarbonization roadmaps must include plans for replacing vehicles powered by gasoline and diesel with zero-emission vehicles upon retirement.

Suggested Emission Reduction Timeline

Targets	2027	2030	2040	2050
Reduce emissions from onsite fossil fuels in buildings	-20%	-35%	-60%	-100%
Zero emission vehicles (ZEVs) in light-duty fleet adoption	5%	20%	75%	100%
Zero emission vehicles (ZEVs) in medium-/heavy-duty fleet adoption	0%	20%	50%	100%
Energy Use Intensity reduction *(deep energy retrofits/retro commissioning)*	-20%	-25%	-25%	-30%
Total Emissions Reduction Goals (% of 2022 emissions)	**>15%**	**>35%**	**>65%**	**>95%**

The Decarbonization Roadmap shall also include the following elements:

(1) **Establish a greenhouse gas emission baseline** that includes all municipal buildings[1], school buildings, municipal and school vehicle fleets, street and traffic lighting, drinking water and wastewater treatment plants, pumping stations, and open spaces[2] owned by the municipality. The baseline should be from fiscal year 2022.

- Divisions and departments operating as Enterprise Funds under MGL Chapter 44, Section 53F ½ where such services are provided by a third-party contractor or where the sole operating and budget authority resides with a board or commission may be excluded from the municipal decarbonization roadmap. However, these operations are encouraged to become a part of and to adopt the roadmap. The exclusion does not apply to any other existing or future division or department operating as an Enterprise Fund for which the municipality has direct authority over its operation.

- The greenhouse gas emission baseline should be in tons of Metric Tons of CO_2 Equivalent (MTCO2e). There are several acceptable tools for calculating the municipal GHG baseline including:
    a. Department of Energy Resources (DOER)'s MassEnergyInsight (MEI)
    b. Energy Star Portfolio Manager
    c. ICLEI software
    d. Other tools proposed by the municipality and deemed acceptable by DOER[3]

  Note municipalities are highly encouraged to use MassEnergyInsight, which will include a Climate Leaders portal and will track emissions over time.

(2) **Develop a roadmap to eliminate the use of onsite fossil fuels by municipal operations by 2050.** DOER encourages communities to use the "Zero Over Time" approach highlighted in the Rocky Mountain Institute's Guide *Best Practices for Achieving Zero Over Time for Building Portfolios* that uses triggering events, such as the end of life of HVAC equipment, building renovation, roof replacement, projects in the community's capital improvement plan, etc. The roadmap should include interventions that reduce the use of fossil fuels onsite by utilizing the information provided above and identify when the interventions will take place. It should also set interim goals for calendar years 2030 and 2040.

For the purposes of Climate Leader certification, the roadmap does not need to include detailed energy engineering and analysis. It should be developed and used as a planning tool to inform municipalities of

[1] Waste water treatment plants are included in the set of municipal buildings eligible for inclusion.

[2] The "Open Space" category includes energy use by parking lots, parks, cemeteries, EV charging infrastructure, and athletic fields.

[3] Municipalities should contact their RC for guidance on approving other tools.

opportunities to switch from onsite fossil fuel use. In partnership with the Mass Save program, DOER anticipates providing support for technical assistance studies and deep energy retrofit analysis on municipal and school buildings. To prepare for roadmap development, municipalities should conduct an inventory of all its facilities. This inventory should encompass at least 80% of the municipality's total building emissions. This shall include:

- Age of building
- Square-footage of conditioned space
- Use profile
- Fuel for heating/cooling (if any)
- Age & condition of HVAC and plans for replacement (if known)
- Age & condition of building envelope
- Future plans for facility

MassEnergyInsight users can input building characteristics in their accounts by using the "blueprint" tab for each building in the municipal/school account

Municipalities should also gather information regarding capital improvement plans, fleet vehicle replacement plans, and other pertinent materials affecting its municipal and school facilities.

INSTRUCTIONS FOR CREATING A DECARBONIZATION ROADMAP

A comprehensive roadmap consists of several key components which enables a municipality to establish strategic electrification goals and develop a structure to meet those goals over a defined period of time. The outline below provides the format for the roadmap and addresses its key components.

When constructing a decarbonization roadmap, a municipality should begin with Section 3 (Municipal Emission Baseline), where an inventory of greenhouse gas emissions for their chosen facilities, that will be used during the rest of the roadmap process, is created. Once the inventory has been created, municipalities can begin to develop facility level decarbonization plans outlined in Section 4 (Decarbonization Roadmap Narrative). Section 1 (Purpose and Acknowledgements) to lay out the goals they are hoping to achieve not only through developing the roadmap but by following and updating it. The final step for a municipality is to create the executive summary outlined in Section 2. The executive summary takes information from other sections to create a high-level presentation of the municipality's trajectory towards decarbonization by 2050 and requires information from every other section to accurately complete it.

DECARONIZATION ROADMAP OUTLINE

I. PURPOSE AND ACKNOWLEDGEMENTS

The purpose of this section is to outline the contributors to this roadmap and establish that the collective municipality and the relevant stakeholders have bought into the process and steps laid out in the document. Lastly, section C (Purpose of Decarbonization Roadmap) lays out briefly the overarching goals the municipality aims to achieve through developing the decarbonization roadmap.

A. Letters from both general government and school district verifying adoption of the roadmap

- **General Government** – The municipality must provide a letter from its Chief Executive Officer of the city or town stating that it has adopted the decarbonization roadmap. The Chief Executive Officer is defined as the manager in any city having a manager and, in any town, having a city form of government, for example the Mayor in any town or city, and the Board of Selectmen in any town unless some other officer or body is

designated to perform the functions of a Chief Executive Officer under the provisions of a local charter or laws having the force of a charter. See sample letter in Appendix A.

- **Public School Districts** - For a municipality to meet this requirement, its public school district must be included in the municipality's baseline. Furthermore, the public school district must provide a letter from the Superintendent of Schools stating that is has adopted the decarbonization roadmap.
- **Districts** – Municipalities that are part of a regional school district are not required to include facilities that are owned and/or operated by the district in their baselines and roadmaps. However, given the opportunities for deep energy retrofits and electrification in school buildings, DOER strongly encourages communities to include at least a portion (e.g., the elementary school resident children attend) of the district to be part of their Climate Leaders certification application. This will allow for Climate Leader grants to be used for clean energy projects at the schools. See Appendix B of the Green Communities Criterion 3 Guidance for instructions. The regional school district must also adopt the decarbonization roadmap.

B. List of contributors that participated in the baseline and roadmap process

C. Purpose of Decarbonization Roadmap

II. EXECUTIVE SUMMARY

The purpose of this section is to summarize the results contained within the rest of the report. By providing the narrative summary and category level emissions, the executive summary creates a high level overview of the town's current emissions and lays out various reduction targets by 2027, 2030, 2040, and 2050. This section should be written at the end of the Roadmap process once all the analysis and recommendations found in later sections are finalized.

A. ***Narrative Summary of the Town*** – A narrative summary of the Town, including population and any special school accreditations, recent or planned clean energy or climate activities

B. ***Summary of Municipal Emissions*** – With respect to municipal emissions, use instructions below to create Table 1 from fiscal year 2022 (sample below). Reiterating the Table 1 contents in text is not required.

- *Building Additions and New Construction* - Please identify any building additions or new construction planned. **Note: DOER will not require communities to adjust for building stock changes in the Climate Leaders program. Emissions from all buildings are to be included in the emissions baseline.**
- *Total Emissions from Vehicles* – including school department
- *Street and Traffic Lights* – identify emissions from light energy usage
- *Water and Sewer* – identify emissions for water and wastewater processes and distribution as appropriate

Table 1: Summary of metric tons of CO_2 equivalent emissions for FY 2022 (MTCO2e) (Sample Data – use information from MEI's Category View Table with Category set to Category and Metric set to MTCO2e)

	MTC02e	Ownership
Buildings		
	1890	Muni
	2566	Regional School District (RSD)
Vehicles		
	2500	Muni
	500	RSD
Street/Traffic Lights	500	Muni

Water and Sewer	250	Muni
Total Emissions		
	5140	Muni
	3066	RSD

- ***Summary of Emissions Reductions Estimated by roadmap Implementation***– use sample Table 2 provided below in fill in the "XX's" with estimated category targets attributed to:
    - Electrifying heating and enhancing energy efficiency through retro commissioning, deep energy retrofits, and other measures
    - Electrifying municipal and school fleets

In accordance with the Climate Act and the CECP, emissions from electric generation will continue to decline, targeted to fifty three percent (53%) lower in calendar year 2025 over 1990 levels and seventy percent (70%) lower in calendar year 2030. Emissions resulting from municipal operations will decrease as buildings' heating sources transition from fossil fuels and vehicles are powered by a cleaner electric grid.

Table 2: Summary of Municipal Emissions Reductions

Targets	**2027**	**2030**	**2040**	**2050**
Reduce emissions from building onsite fossil fuels via electrification	-XX%	-XX%	-XX%	**-100%**
Zero emission vehicles (ZEVs) in light-duty fleet adoption (*% of fleet)*	XX%	XX%	XX%	**100%**
Zero emission vehicles (ZEVs) in medium-/heavy-duty fleet adoption *(% of fleet)*	XX%	XX%	XX%	**100%**
Energy Use Intensity reduction *(deep energy retrofits/retro commissioning)*	-XX%	-XX%	-XX%	**-30%**
Total Emissions Reduction Goals (% of 2022 emissions)	**>15%**	**>35%**	**>65%**	**>95%**

III. MUNICIPAL EMISSION BASELINE

The purpose of this section is to establish the current municipal emissions from which reductions can be applied through 2050 to achieve decarbonization. The use of an inventory tool is crucial to accurately report current emissions by facility. This section should be the first section completed by a municipality as it provides the starting point from which emission reductions and energy conservation measures can be applied.

A. ***Identification of the Inventory Tool Used*** *(preferably MassEnergyInsight).* If MassEnergyInsight is not the source of inventory data for emissions or emissions reductions referenced in Section IV. B - *Achieving Elimination of Onsite Fossil Fuel Use by 2050,* then a supplementary appendix or section should be included to detail the methodology of the tool used as well as any other assumptions.

B. ***Municipal Emission for the Baseline Year (FY 2022)***

- Insert a table reporting emissions use by facility and fuel type for FY 2022. Climate Leader applicants must ensure municipal energy data is up to date in MassEnergyInsight. All buildings, vehicles, and facilities must be included; vehicle emission data can be aggregated. Use the instructions below to create Table 3 for the baseline year of fiscal year 2022 (sample below). Reiterating the Table 3 contents in text is not required.

- For buildings that have renewable energy installations on-site and in front of the meter, generation should not be used to offset emissions for the building. While the energy generated by these installations has zero emissions, the overall goal of the Climate Leader program is to reduce emissions from on-site fossil fuels, and utilizing renewable electricity to offset fossil fuel emissions obfuscates a buildings emissions from fossil fuels.
- For buildings that have electric vehicle charging stations installed, DOER recommends the following methodology to determine the proportion of building electricity consumption that is related to the charging stations. If charging stations are only available to municipal vehicles, energy consumed should be allocated to the vehicles category. If they are open to the public, municipalities should monitor charging usage and retroactively reduce building consumption by that amount.
  - Ideally, charging stations would be allocated to their own account, which if used exclusively for municipal vehicles would be allocated to the vehicle category.
  - If the charging station is only used for municipal vehicles, but is included in the building's electricity account, the charger's usage data should be used to reallocate electricity from the building to the vehicles category.
  - If the charging station is open to the public and is included in the building's electricity account, the charger's usage data should be used to remove electricity consumption from the building. If municipal vehicles were also charged at this site, vehicle usage data should be used to estimate municipal vehicle emissions.

Table 3: Summary of metric tons of CO_2 equivalent emissions for FY 2022 (MTCO2e) by Facility and Fuel Type (Sample Data – use information from MEI's Category View Table with Category set to Fuel Type and Metric set to MTCO2e)

	Propane Emissions (MTCO2e)	**Electricity Emissions (MTCO2e)**	**Oil Emissions (MTCO2e)**	**Diesel Emissions (MTCO2e)**	**Gasoline Emissions (MTCO2e)**
Buildings					
Muni Building 1	500	1890	400		
RSD Building 2	200	2566	600		
Vehicles					
Muni Fleet		50		500	400
RSD Fleet				300	200
Street/Traffic Lights		100			
Water and Sewer		250	200		
Water and Sewer Plant		50	50		

- Non-MassEnergyInsight users can create a table that includes facility energy consumption by fuel plus emissions using the conversion formulas below. DOER encourages users to use MA EEA's 2025 electricity emissions factor for estimating electricity emissions in 2027 to create consistency across roadmaps. While DOER recognizes that some users may have municipality specific electricity emission factors, to standardize how roadmaps are estimating future emissions, users should follow the MA EEA emissions factors below.

CO2 Emissions per Unit (metric tonne, MTe)	2022	2025 (*projected*)	2030 (*projected*)	2040 (*projected*)	2050 (*projected*)
Electricity (kWh)	0.0002345	0.0002195	0.0001184	0.0000485	0.0000150
Natural Gas (therms)	0.00531	0.00531	0.00531	0.00531	0.00531
Oil Savings (gallons)	0.01015	0.01015	0.01015	0.01015	0.01015
Gasoline (gallons)	0.00886	0.00886	0.00886	0.00886	0.00886
Diesel (gallons)	0.01015	0.01015	0.01015	0.01015	0.01015
Propane (gallons)	0.00576	0.00576	0.00576	0.00576	0.00576

Source: MA EEA

IV. DECARBONIZATION ROADMAP NARRATIVE

The purpose of this section is to lay on a facility-by-facility basis what measures and steps are required to decarbonize. These steps should clearly lay out for each facility the timeline along which various decarbonization measures as well as maintenance and upkeep will occur. It should also lay out the overall goals of the community along the decarbonization path. If additional context is relevant to the facilities decarbonization path (for example, if a building has undergone a full electrification retrofit since FY 2022 the recommended measures will likely be limited to optimization of system controls and marginal EUI reductions alongside regular maintenance).

A. ***Summary*** **–**

1. *Overview of Goals for implementation to 2027 and 2030*
2. *Overview of Goals for calendar years 2040 and 2050*
3. *Identify Areas of highest emissions and greatest opportunities for impact.* MassEnergyInsight's "Buildings to Target" view is helpful in identifying these areas

B. ***Achieving Elimination of Onsite Fossil Fuel Use by 2050*** **–** Plans using the "Zero Over Time"[4] approach should identify triggering events for high-impact buildings and include appropriate clean energy actions to deploy and projected emissions reduction resulting from the intervention. It is not necessary to perform this exercise for ALL facilities at this time, but it is expected that facilities contributing to eighty percent (80%) of the municipality's aggregate emissions would be included. Municipalities that have over 35% of their municipal emissions originating from vehicles should have a municipal fleet plan.

MassEnergyInsight users will soon be able to use the platform to generate estimated emission reductions from building interventions. Municipalities may also use other tools that estimate emission reductions from efficiency measures and building electrification. Municipal emissions should be estimated through 2050 for each building based on the proposed replacements, retrofits, and ECMs outlined in the roadmap.

Municipalities should also consider behind the meter solar and battery storage as appropriate during building electrification triggering events.

[4] In addition to RMI's Guide, municipalities may find the New Building's Institute's (NBI) *Decarbonization Roadmap Guide for School Building Decision Makers* useful. The NBI website also has a wealth of tools and resources, including a link to its Getting to Zero Resource Hub

1. *Program Management Plan for Implementation, Monitoring and Oversight* – Identify the personnel responsible both for oversight of the roadmap implementation and for implementation of clean energy actions in specific departments or buildings, if applicable.

2. *Update Roadmap every 3 years* – Recognizing the rapid development of clean energy technologies and the ever-changing needs of municipalities, communities seeking to remain certified as a Climate Leader shall update their roadmaps after three years.

APPENDIX A – Sample Letters from Both General Government and School District Verifying Adoption of the roadmap

General Government – The general government must provide a letter from the Chief Executive Officer of the city or town stating that it has adopted the municipal decarbonization roadmap. The Chief Executive Officer is defined as the manager in any city having a manager and, in any town, having a city form of government, the Mayor in any other city, and the Board of Selectmen in any other town unless some other officer or body is designated to perform the functions of a Chief Executive Officer under the provisions of a local charter or laws having the force of a charter.

On Town/City Letterhead

September 15, 20xx

To Whom It May Concern:

Please be advised that on September 12, 20xx, the Select board of the Town met at a duly noticed and regularly scheduled meeting and voted to adopt[5] the decarbonization roadmap of the Green Communities Division's Climate Leaders Application for Certification. The Select board was given copies of the plan for review prior to the meeting.

The Select board voted unanimously to adopt the plan and the minutes of that meeting include the vote.

Sincerely,

[signature]

Select board Members and/or Chair, Mayor or Town Manager

On School District Letterhead

September 15, 20xx

To Whom It May Concern:

Please be advised that the town/city/regional school district adopts the decarbonization roadmap as part of the city/town's Green Communities Division's Application for Climate Leaders Certification.

Sincerely,

[signature]

School Superintendent

[5] The verbs "approve," "committed," or "adopt" are acceptable to indicate town/city and school board adoption of the roadmap. The verbs "endorse", or "support" are NOT sufficient indications of town/city and school board adoption.

Appendix B – [TOWN/CITY NAME] Guiding Principles for Municipal Decarbonization

The purpose of including this appendix as part of the decarbonization roadmap is to lay out core principles to be followed on a consistent basis that align with the specific planned actions for each facility. Example principles are provided below for three categories: existing buildings, new construction or substantial renovations, and municipal and school fleets.

For existing buildings:

I. All comprehensive energy projects and building renovations where electrical, heating, cooking, ventilation, or air conditioning infrastructure are included in the project scope, shall include the following:
    a. Evaluate building envelope upgrades and implement said upgrades where technically and fiscally feasible.
    b. Utilize electric options for thermal energy equipment where technically and fiscally feasible.
    c. Establish and adhere to a low target energy use intensity for overall building or site performance.
    d. Where appropriate, design and install renewable energy and energy storage solutions; while simultaneously building the infrastructure necessary to support future renewable energy and storage installations, with the goal of sufficient renewable energy generation onsite to offset the building's annualized electric energy consumption.
    e. Maximize resilient design to protect critical infrastructure and continued operation when modeled for long-term climate impacts.
    f. Plan for existing and future demand for electric vehicle charging. This should include installing charging stations and installing the framework for future growth.

For new construction or substantial renovation:

II. To maximize the potential greenhouse gas emissions reductions, new construction, and substantial renovations, shall include the following:
    a. Strive to achieve zero net energy, where sufficient renewable energy is generated onsite to offset the building's annualized electric energy consumption.
    b. Implement energy storage wherever possible, especially when paired with onsite renewables.
    c. Evaluate and implement strategies to reduce embodied carbon contained in building materials.
    d. Prioritize sites that provide access to public transportation and alternative modes of transportation.
    e. Plan for existing and future demand for electric vehicle charging. This should include installing charging stations and installing the framework for future growth.

For municipal and school fleets:

III. While Climate Leader communities will have adopted the Zero-Emission-Vehicle First policy and the Commonwealth will achieve increases in electric vehicle sales through the implementation of vehicle emissions standards that will require all passenger vehicle sales and most medium- and heavy-duty vehicle sales to be electric by 2035, municipal decarbonization roadmaps must include plans for replacing vehicles powered by gasoline and diesel with zero-emission vehicles upon retirement. Communities should also invest where feasible technically and fiscally in electric vehicle charging infrastructure at key locations around the town, such as municipal buildings, parking lots, and public spaces.