CAPE COD
COMMISSION

2024 REGIONAL TRANSPORTATION PLAN

Technical Appendix N: Greenhouse Gas Analysis/Air Quality Conformity Determination

FINAL JULY 2023

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GREENHOUSE GAS (GHG) ANALYSIS BAKGROUND

State policy context

The Global Warming Solutions Act (GWSA), which was signed into law in August 2008, makes Massachusetts a leader in setting aggressive and enforceable GHG reduction targets, and implementing policies and initiatives to achieve these targets. In keeping with the law, on December 29, 2010 the Massachusetts Executive Office of Energy and Environmental Affairs (EOEEA), in consultation with other state agencies and the public, released the Massachusetts Clean Energy and Climate Plan for 2020. In December 2014, DEP issued new regulations that require MPOs to quantify impacts from project investments, track, progress towards reductions, and consider impacts in the prioritization of project investments. The targets for overall statewide GHG emissions are:

- By 2020: 25 percent reduction below statewide 1990 GHG emission levels
- By 2050: 80 percent reduction below statewide 1990 GHG emission levels

The role of MPOs

The Commonwealth's MPOs are integrally involved in supporting the GHG reductions mandated under the GWSA. The MPOs are most directly involved in helping to achieve the GHG emissions reductions through the promotion of healthy transportation modes through prioritizing and programming an appropriate balance of roadway, transit, bicycle and pedestrian investments – and assisting smart growth development patterns through the creation of a balanced multi-modal transportation system. This is realized through the transportation goals and policies espoused in the 2024 Regional Transportation Plans (RTPs); the major projects planned in those RTPs; and the mix of new transportation projects that are programmed and implemented through the TIPs. GHG tracking and evaluation processes enable the MPOs to identify anticipated GHG impacts of planned and programmed projects, and also to use GHG impacts as a criterion in prioritizing transportation projects.

Project-level GHG tracking and evaluation in TIPs

It is also important to monitor and evaluate the GHG impacts of the transportation projects that are programmed in the MPOs' TIPs. The TIPs include both the larger, regionally-significant projects from the RTPs, which are reported in the Statewide GHG report, as well as smaller projects that are

not included in the RTP but that may nevertheless have impacts on GHG emissions. The primary objective of this tracking is to enable the MPOs to evaluate expected GHG impacts of different projects and to use this information as a criterion for prioritizing and programming projects.

Calculation of GHG Impacts for TIP Projects

MassDOT has adopted spreadsheets used by MPOs to determine CMAQ eligibility and that also include CO2 impacts. The data and analysis required for these calculations is available from functional design reports that are submitted for projects that would produce a measurable GHG impact.

Projects with quantified impacts

RTP PROJECTS

Major capacity expansion projects are expected to have a significant impact on GHG emissions. These projects are included in each MPO's RTPs and analyzed using either the statewide model or the Boston MPO's regional model, which reflect GHG impacts. As a result, no independent TIP calculations are required.

QUANTIFIED DECREASE IN EMISSIONS

For those projects that are expected to produce a measurable decrease in emissions, the approach for calculating these impacts is described below. These projects are categorized in the following manner:

- Quantified Decrease in Emissions from Traffic Operational Improvement - An intersection reconstruction or signalization project that is projected to reduce delay and congestion.
- Quantified Decrease in Emissions from Pedestrian and Bicycle Infrastructure - A shared-use path that enables increased walking and biking and decreases vehicle-miles traveled (VMT).
- Quantified Decrease in Emissions from New/Additional Transit Service - A bus or shuttle service that enables increased transit ridership and decreased VMT
- Quantified Decrease in Emissions from a Park and Ride Lot - A park-and-ride lot that enables increased transit ridership/ increased ridesharing and decreased VMT
- Quantified Decrease in Emissions from Bus Replacement - a bus replacement that directly reduces GHG emissions generated by service.
- Quantified Decrease in Emissions from Complete Streets Improvements - Improvements to roadway networks that include the addition of bicycle and pedestrian accommodations where none were present before.
- Quantified Decrease in Emissions from Alternative Fuel Vehicle Procurements – A vehicle procurement where alternative fuel/advanced technology vehicles replace traditional gas or diesel vehicles.

- Quantified Decrease in Emissions from Anti-idling Strategies – Implementation of policies such as limiting idling allowed, incorporating anti-idling technology into fleets and using LED lights on trucks for the purpose of illuminating worksites.
- Quantified Decrease in Emissions from Bike Share Projects – A new bike share project or capacity added to an existing project.
- Quantified Decrease in Emissions from Induced Travel Projects – A project that changes roadway capacity
- Quantified Decrease in Emissions from Speed Reduction Programs – Programs that reduce speed to no less than 55 miles per hour.
- Quantified Decrease in Emissions from Transit Signal Priority Projects – A project that applies this technology to a signal intersection or along a corridor that impacts bus service.
- Quantified Decrease in Emissions from Truck Stop Electrification Projects – A new truck stop electrification project or capacity added to an existing project.
- Quantified Decrease in Emissions from Other Improvement

QUANTIFIED INCREASE IN EMISSIONS

Projects expected to produce a measurable increase in emissions.

Projects with no assumed impacts

NO ASSUMED IMPACT/NEGLIGIBLE IMPACT ON EMISSIONS

Projects that do not change the capacity or use of a facility (e.g. roadway median barrier or retaining wall replacement, or a bridge rehabilitation/replacement that restores the bridge to its previous condition) are assumed to have no/negligible GHG impact.

QUALITATIVE DECREASE IN EMISSIONS

Projects expected to produce a minor decrease in emissions that cannot be calculated with any precision. Examples of such projects include roadway repaving, signage improvement, ITS improvement, or transit marketing/customer experience improvement.

QUALITATIVE INCREASE IN EMISSIONS

Projects expected to produce a minor increase in emissions that cannot be calculated with any precision.

GREENHOUSE GAS (GHG) RTP PROJECT ANALYSIS

An analysis of regional target projects was also analyzed in relation to greenhouse gas (GHG) emissions. As presented in Table A-1, it is anticipated that most of the projects will result in nominal decreases in emissions for sidewalk and/or bicycle infrastructure or other improvements.

TABLE A-1. Highway Regional Target Projects – Anticipated GHG Impacts

PROJECT	ANTICIPATED GHG IMPACT
Mashpee Corridor Improvements on Route 151 (#611986)	Quantified Decrease in Emissions from Sidewalk and Bicycle Infrastructure
Route 28 Multimodal Improvements: Various Locations	Qualitative Decrease in Emissions from Sidewalk and Bicycle Infrastructure
Provincetown, Corridor Improvements on Shank Painter Road/Route 6 (#608744)	Quantified Decrease in Emissions from Sidewalk and Bicycle Infrastructure
Rail Trail Extensions (Mid- and Upper-Cape)	Qualitative Decrease in Emissions from Bicycle Infrastructure
Route 6 Safety Improvements (Outer Cape)	Qualitative Decrease in Emissions from Sidewalk, and Bicycle Infrastructure
Rail Trail Extensions (Upper and Outer Cape)	Qualitative Decrease in Emissions from Bicycle Infrastructure
Hyannis Area Improvements	Qualitative Decrease in Emissions from Sidewalk and Bicycle Infrastructure
Route 6 Safety Improvements (Interchanges and Shoulders)	Qualitative Decrease in Emissions from Roadway Infrastructure
Rail Trail Extensions (Mid-Cape)	Qualitative Decrease in Emissions from Bicycle Infrastructure
Dennis/Yarmouth Bridge Replacement Route 28 over Bass River[1] (#612574)	Quantified Decrease in Emissions from Bicycle and Pedestrian Infrastructure
Cape Cod Canal Bridges Program[1,2] (#608020)	Qualitative Decrease in Emissions from Roadway, Sidewalk and Bicycle Infrastructure

[1] Projects funded or intended to be funded through a combination of state and federal sources outside of the regional target.

[2] Project included MassDOT modeling used to develop the "Evaluation and Reporting of Statewide Greenhouse Gas Reductions in Transportation" presented in Appendix N

EVALUATION AND REPORTING OF STATEWIDE GREENHOUSE GAS REDUCTIONS IN TRANSPORTATION MASSACHUSETTS DEPARTMENT OF TRANSPORTATION (MASSDOT) AND THE METROPOLITAN PLANNING ORGANIZATIONS (MPOS)

This section documents recent progress made by MassDOT and the MPOs in working to help achieve greenhouse gas (GHG) reduction goals as outlined in state regulations applicable to Massachusetts. This "progress report" estimates future carbon dioxide (CO_2) emissions from the transportation sector as part of meeting the GHG reduction goals established through the Commonwealth's Global Warming Solutions Act (GWSA).

GWSA Transportation Status: Future Carbon Dioxide Emissions Reductions

The Global Warming Solutions Act of 2008 requires statewide reductions in greenhouse gas (CO2) emissions of 25 percent below 1990 levels by the year 2020, and 80 percent below 1990 levels by 2050.

The Commonwealth's thirteen metropolitan planning organizations (MPOs) are involved in helping to achieve greenhouse gas reductions mandated under the GWSA. The MPOs work closely with the Massachusetts Department of Transportation (MassDOT) and other involved agencies to develop common transportation goals, policies, and projects that would help to reduce GHG emission levels statewide, and meet the specific requirements of the GWSA regulation – *Global Warming Solutions Act Requirements for the Transportation Sector and the Massachusetts Department of Transportation (310 CMR 60.05).* The purpose of this regulation is to assist the Commonwealth in achieving their adopted GHG emission reduction goals by:

- Requiring each MPO to evaluate and report the aggregate GHG emissions and impacts of both its Regional Transportation Plan (RTP) and Transportation Improvement Program (TIP).
- Requiring each MPO, in consultation with MassDOT, to develop and utilize procedures to prioritize and select projects in its RTP and TIP based on factors that include GHG emissions and impacts.

Meeting the requirements of this regulation is being achieved through the transportation goals and policies contained in the Federal Fiscal Year (FFY) 2024 RTPs, the major projects planned in the RTPs, and the mix of new transportation projects that are programmed and implemented through the TIPs.

The GHG evaluation and reporting processes enable the MPOs and MassDOT to identify the anticipated GHG impacts of the planned and programmed projects, and also to use GHG impacts as a criterion in prioritizing transportation projects. This approach is consistent with the greenhouse gas reduction policies of promoting healthy transportation modes through prioritizing and programming an appropriate balance of roadway, transit, bicycle and pedestrian investments; as well as supporting smart growth development patterns through the creation of a balanced multi-modal transportation system. All of the MPOs and MassDOT are working toward reducing greenhouse gases with "sustainable" transportation plans, actions, and strategies that include (but are not limited to):

- Reducing emissions from construction and operations
- Using more fuel-efficient fleets
- Implementing and expanding travel demand management programs
- Encouraging eco-driving

- Providing mitigation for development projects
- Improving pedestrian, bicycle, and public transit infrastructure and operations (healthy transportation)
- Investing in higher density, mixed use, and transit-oriented developments (smart growth)

Regional GHG Evaluation and Reporting in RTPs

MassDOT coordinated with MPOs and regional planning agency (RPA) staffs on the implementation of GHG evaluation and reporting in development of each MPO's 2016 and 2020 RTPs. This collaboration has continued in developing the MPOs' FFY 2024 RTPs and FFYs 2024-28 TIPs. Working together, MassDOT and the MPOs have attained the following milestones:

- Modeling and long-range statewide projections for GHG emissions resulting from the transportation sector, as a supplement to the FFY 2024 RTPs. Using the newly updated statewide travel demand model, GHG emissions have been estimated for 2019 (base) conditions, and for 2050 base ("no-build" including existing and committed projects) and build (action) conditions (see the chart in this section for the results of this modeling).

- All of the MPOs have addressed GHG emission reduction projections in their RTPs (including the statewide estimates in the chart that follows), along with a discussion of climate change and a statement of MPO support for reducing GHG emissions from transportation as a regional goal.

MassDOT's statewide estimates of CO_2 emissions resulting from the collective list of all recommended projects in all Massachusetts RTPs combined are presented in the table below. Emissions estimates incorporate the latest planning assumptions including updated socio-economic projections consistent with the FFY 2024 RTPs:

TABLE A-2. Massachusetts Statewide Aggregate CO2 Estimated Emissions Impacts from Transportation (all emissions in tons per summer day)

YEAR	CO_2 ACTION EMISSIONS	CO_2 BASE EMISSIONS	DIFFERENCE (ACTION – BASE)
2019	75,113.6	75,113.6	n/a
2050	53,772.5	53,781.4	-8.9

This analysis includes only those larger, regionally significant projects that are included in the statewide travel demand model. Many other types of projects that cannot be accounted for in the model (such as bicycle and pedestrian facilities, shuttle services, intersection improvements, etc.), are covered in each MPO region's RTP with either "qualitative" assessments of likely CO2 change, or actual quantitative estimates listed for each project.

As shown above, collectively, all the projects in the RTPs in the 2050 Action scenario provide a statewide reduction of over 9 tons of CO2 per day compared to the base (existing and committed projects) case.

These results demonstrate that the transportation sector is expected to continue making positive progress in contributing to the achievement of GHG reduction targets consistent with the requirements of the GWSA. MassDOT and the MPOs will continue to advocate for steps needed to accomplish the Commonwealth's long-term goals for greenhouse gas reductions.

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