

## **MEPA GREENHOUSE GAS EMISSIONS POLICY AND PROTOCOL**

### **GOALS AND OBJECTIVES**

The Executive Office of Energy and Environmental Affairs (EEA) has determined that the phrase “damage to the environment” as used in the Massachusetts Environmental Policy Act (MEPA) includes the emission of greenhouse gases caused by Projects subject to MEPA review. EEA now issues the following Greenhouse Gas Emissions Policy to fulfill the statutory obligation to take all feasible measures to avoid, minimize, or mitigate damage to the environment.

The Policy requires that certain Projects undergoing review by the MEPA Office quantify the Project’s greenhouse gas (GHG) emissions and identify measures to avoid, minimize, or mitigate such emissions. In addition to quantifying Project-related GHG emissions, the Policy also requires proponents to quantify the impact of proposed mitigation in terms of emissions and energy savings. EEA recognizes that this policy will not itself avert climate change. However, this policy is part of a larger effort to focus attention on the causes of climate change and harness creative thought and technology to implement long-term solutions.

EEA also recognizes that the GHG quantification required by this policy will not result in absolutely accurate projections. The intent is not one hundred percent certainty as to the amount of GHG emissions; rather it is a reasonably accurate quantitative analysis of emissions and potential mitigation that will allow the Project proponent and reviewers to assess the overall impact of the Project as proposed and the reduction if various techniques are used to lower such emissions.

It should also be noted that this policy is not intended to create a numerical GHG emission limit or a numerical GHG emission reduction target. Rather, in keeping with MEPA’s overall purpose to evaluate alternatives that avoid, minimize and mitigate environmental impacts, the policy is intended to ensure that Project proponents and reviewers have carefully considered the GHG impact of their Projects and taken all feasible means and measures to reduce those impacts.

### **APPLICABILITY**

A Project<sup>1</sup> is subject to this policy if an Environmental Impact Report (EIR) is required for the Project, and if it falls into one or more of the following four categories:

1. The Commonwealth or a state agency is the proponent;
2. The Commonwealth or a state agency is providing financial assistance;
3. The Project is privately funded, but requires an Air Quality Permit from the Department of Environmental Protection;

---

<sup>1</sup> Capitalized terms in this policy such as Project and Permit are defined at 301 CMR 11.02.

4. The Project is privately funded, but will generate 3,000 or more new vehicle trips per day for office Projects; 6,000 or more new vehicle trips per day for mixed use Projects that are 25% or more office space; or 10,000 or more new vehicle trips per day for other Projects.<sup>2</sup>

The Policy does not create new MEPA review thresholds or new subject matter jurisdiction where it does not already exist.

#### EEA/MEPA GREENHOUSE GAS INITIATIVE TECHNICAL ADVISORY COMMITTEE

In April of 2007, the Secretary of Energy and Environmental Affairs convened a technical advisory committee (TAC) of agency officials, private air quality consultants, and other stakeholders to develop a standardized protocol for the EIR emissions analysis. The TAC reviewed existing emissions quantification protocol, evaluated energy modeling software and developed solutions for potential real-world challenges that the implementation of the Policy and Protocol might present for proponents. Staff from EEA and MEPA also met with other stakeholders from the real estate, construction and environmental community to get input on the Policy and Protocol. EEA commends the TAC for its hard work and is grateful for the insight and expertise of its members that helped to develop this Protocol.

#### EMISSIONS QUATIFICATION PROTOCOL

##### General Guidance

For a Project subject to the GHG Policy, the Secretary's Certificate on the ENF will include a scope item for the quantification of Project-related GHG emissions. The proponent is then required to quantify the potential annual GHG emissions from the proposed Project according to the GHG Quantification Protocol (the Protocol) outlined below, and report in the EIR on the results of the analysis. Emissions should be expressed in short tons (2,000 lbs) per year (tpy). The intent of this policy is to provide general guidance in the development of qualitative and quantitative GHG analysis. It is not intended to be a prescriptive policy that requires the use of specific quantification or mitigation models. The proponent is encouraged to consult with MEPA early in the design process regarding the scope and methodology for the analysis.

In the EIR, the proponent should also outline and commit to a series of mitigation measures that will help to reduce GHG emissions from the proposed Project. To demonstrate the effectiveness of the mitigation, the proponent should measure emissions reductions and energy savings from the proposed measures according to the Protocol and discuss the impact of proposed mitigation in the EIR. The MEPA Office will review the proponent's response to the

---

Note that some projects that fit within one or more of these categories will have little or no greenhouse gas emissions, and this policy shall not be applied to such projects. EEA will identify in the scoping certificate whether a project falls within this *de minimis* exception.

GHG policy requirements with technical review assistance from the Department of Environmental Protection and the Executive Office of Transportation.

For Projects subject to this Policy where the proponent is seeking a Single EIR or a Waiver, the proponent should complete the emissions quantification and analysis of proposed mitigation and submit this information in an Expanded Environmental Notification Form (EENF) in accordance with 301 11.05(7). The MEPA Office will make determinations on Single EIR and Waiver requests based partially on the adequacy of the GHG analysis.

At the current time, the analysis will focus primarily on the primary greenhouse gas, CO<sub>2</sub>. While there are other GHGs, CO<sub>2</sub> is the predominant contributor to global warming, and emissions can be calculated for CO<sub>2</sub> with readily accessible data. The analysis of other GHGs may be required for certain Projects, for example, methane emissions from landfills and wastewater treatment plants, emissions of hydrofluorocarbons and perfluorocarbons from the manufacturing, servicing and disposal of refrigeration and air conditioning equipment, and other GHG's emitted through various chemical and manufacturing processes. In these instances, MEPA and EEA will provide guidance on quantification and analysis. In addition, EEA will continue to evaluate quantification models for the other major greenhouse gases and the degree to which projects in MEPA emit these other gases in significant quantities, and may amend the policy accordingly. In the meantime, proponents whose operations can be expected to cause significant emissions of GHG's other than CO<sub>2</sub> should identify in the ENF the nature of those emissions and whether there are readily available protocols for calculating such emissions. If there are not, the proponent will still be expected to perform a qualitative analysis and identify reduction or mitigation measures. In many instances, the same strategies that will reduce CO<sub>2</sub> emissions will also reduce the other GHG's, although this will not be the case in every instance.

EEA will require analysis of both “direct” GHG emissions (*e.g.*, stack emissions from the proposed operation) and “indirect” emissions (*e.g.*, emissions from vehicles driven by employees and generating plants supplying electricity to the proposed operation). For a more detailed discussion of direct and indirect emissions, please visit the World Resources Institute/World Business Council for Sustainable Development’s Greenhouse Gas Protocol Initiative website at [www.ghgprotocol.org](http://www.ghgprotocol.org). This website provides a comprehensive discussion of direct vs. indirect emissions and a set of tools for quantifying GHG emissions.

### **Direct Emissions from Stationary Sources**

“Direct Emissions” means the emissions from on-site stationary sources of the facility itself. Stationary sources typically emit GHGs through the burning of fossil fuels for heat, hot water, steam, on-site electricity generation, and other processes. Stationary sources include, but are not limited to, boilers, heaters, furnaces, incinerators, ovens, internal combustion engines (including emergency generators), combustion turbines, and any other equipment or machinery that combusts carbon bearing fuels or waste streams. See “Calculation Tool for Direct Emissions from Stationary Combustion Sources” available at the [www.ghgprotocol.org](http://www.ghgprotocol.org) website for more information on direct emissions from stationary sources.

## *DRAFT FOR PUBLIC COMMENT*

In order to quantify direct emissions, the proponent will need to reasonably estimate fuel usage from the Project's stationary sources. For buildings, energy modeling software discussed below under the Indirect Emissions section should be used to estimate fuel usage. These should be counted and reported as direct emissions. Once fuel usage is estimated, the proponent can derive the approximate CO<sub>2</sub> emissions by using a reliable data source that contains emission factors for CO<sub>2</sub> based on fuel type. For most fuel types, the Energy Information Administration Documentation for Emissions of GHGs in the United States 2003 (May 2005) provides the appropriate factors. This document can be found at <http://www.eia.doe.gov/oiaf/1605/coefficients.html>. For fuel types not covered in this document, the proponent should use another reliable data source in consultation with the MEPA office.

Once the proponent quantifies the emissions, the proponent should discuss measures to lower the emissions. The Appendix to this Policy contains a list of suggested measures to reduce direct emissions from stationary sources.

### **Indirect Emissions from Energy Consumption**

A Project also indirectly causes GHG emissions when it consumes electricity generated through the combustion of fossil fuels. Therefore, the proponent will be required to quantify the GHG emissions derived from the purchase and consumption of electricity, heat (steam, hot water, etc.) or cooling provided from off-site sources such as the electrical utility or district heating or cooling systems. Typically, energy will be consumed for operating appliances or equipment and for heating and cooling a building.

The proponent should use energy modeling software to quantify projected energy usage. Energy modeling uses computer-based tools to simulate the energy use of a building throughout a year of operation. The TAC has reviewed the following energy modeling software for ease of use and usefulness of results for MEPA review: EQUEST, Energy-10, Visual DOE, and DOE2. All of these modeling tools are appropriate for the intended use. However, EEA does not require the use of a specific model; proponents are free to use other comparable energy modeling software to achieve the required results. The model should estimate both fuel usage and electrical usage.

No model will predict the energy use of a building with one hundred percent accuracy, as there are many uncontrollable variables. For example, the building may not be built exactly as drawn; the occupants of the building may use the building differently than predicted; or the climate may vary from that which was modeled. The value of the model is its ability to compare alternative mitigation strategies and show the resulting differences in energy use.

The EIR should state which energy modeling tool was used for the analysis and present the data that were used to model energy use in the proposed building. A typical set of modeling inputs might include the following: Project size and configuration; type of heating, ventilation and cooling systems; amount of glazing; and potential types of usage and hours of operation.

The proponent should then multiply total purchased electricity usage by an emissions factor that calculates the CO<sub>2</sub> emitted through the generation of electricity. The proponent

should use the ISO-New England Marginal Emissions Report, which provides CO<sub>2</sub> emission factors expressed as pounds of CO<sub>2</sub> per megawatt hour for a variety of stationary combustion sources. The ISO-NE Marginal Emissions Report for 2004 is available at:

[http://www.iso-ne.com/genrtion\\_resrcs/reports/emission/2004\\_mea\\_report.pdf](http://www.iso-ne.com/genrtion_resrcs/reports/emission/2004_mea_report.pdf). The 2005 report is undergoing final committee review at ISO-NE and should be available mid-summer 2007. Proponents should use the most current available data.<sup>3</sup>

The proponent may, but is not required to, compare the calculated energy (electricity, heating or cooling from offsite suppliers and on-site fuel) usage (an indicator of emissions) to an “average” New England building of the same category and size using the Energy Star Target Finder, available at:

[http://www.energystar.gov/index.cfm?c=new\\_bldg\\_design.bus\\_target\\_finder](http://www.energystar.gov/index.cfm?c=new_bldg_design.bus_target_finder).

Energy Star has data indicating the typical energy consumption of buildings in New England by size and type. By providing the Project zip code, building type and some simple facility characteristics, the Energy Star Target Finder can produce an Energy Performance Rating, and the energy use intensity for design Btu per square foot per year for the proposed building. The Energy Star Target Finder also provides “total annual source energy (kBtu)” and “total annual site energy (kBtu).” The proponent may compare its building’s total energy usage (direct and indirect) derived from the energy modeling exercise to a building of the same type and size that is the Energy Star median (i.e., that has an Energy Performance Rating of 50). In order to make a meaningful comparison, it will be necessary to convert the “site energy” annual values to fuel usage (assumed to be natural gas in Energy Star) and electrical energy (kwh/yr).<sup>4</sup>

The proponent will be required to evaluate design changes that will reduce energy consumption and GHG emissions beyond those proposed for the Project’s original design. The Appendix to this Policy contains a partial and by no means exclusive list of measures to reduce GHG emissions from energy consumption. Most energy modeling software will allow the proponent to “rank” energy efficiency strategies based on annual energy savings in MBtu. The exercise will help the proponent to invest in design strategies that will have the greatest effect on energy use.

EEA recognizes that some Project proponents may not be at an advanced level of design planning at the time of filing an EIR, and therefore may have to make numerous assumptions about energy use. However, based on input from private sector representatives and consultants, the Protocol allows for the quantification of emissions even when a proposed building is at a relatively conceptual level. In addition, EEA understands that many Project proponents are attempting to model energy consumption fairly early in the process, as it is a key driver of various design decisions. For those that are not, EEA believes that this policy will require more

---

<sup>3</sup> The ISO New England Report provides emissions factors for “average” and “marginal” emissions. The proponent should use the emissions factors for average emissions.

<sup>4</sup> To convert the Energy Star results, multiply total annual **site** energy (kBtu) from the Energy Star results for 50% target by the assumed % natural gas (e.g. 40%) provided in the note on the results page. Divide this by a factor of 1,000 kBtu/MMBTU to arrive at MMBTU/yr of fuel usage. To estimate electricity usage from the Energy Star results, multiply total annual **site** energy (kBtu) by the assumed % electricity (e.g. 60%) provided in the note. Multiply this by a factor of 0.3013 kwh/kBTU to arrive at kwh/yr. Compare this fuel usage and electricity consumption to the energy model output.

up-front thinking about the energy consumption of a Project, and that this advances public policy. In addition, it is likely that the time and financial resources devoted up front to reducing energy consumption will have a beneficial long term payback.

### **Indirect Emissions from Transportation**

Projects also generate GHG emissions indirectly through traffic generation and associated fuel combustion. Therefore, the policy also requires proponents to model the indirect emissions from transportation, including travel by employees, vendors, customers, and others. The analysis of indirect emissions from transportation is required for all projects within Category 4 of the Applicability section. The analysis of indirect transportation emissions is required for projects within Categories 1, 2 and 3 of the Applicability section if the project also exceeds the following transportation thresholds identified in the MEPA regulations: 301 CMR 11.03 (6)(b)(13) Generation of 2,000 or more New Average Daily Trips (ADT) on roadways providing access to a single location; (6)(b)(14) Generation of 2,000 or more New ADT on roadways providing access to a single location; and (6)(b)(15) Construction of 300 or more New parking spaces at a single location. All other projects should provide a qualitative analysis of transportation related emissions.

The following steps should be taken to calculate a baseline for transportation-related emissions from proposed Projects:

Estimate projected net new trips within the study area identified for the “mesoscale” analysis (the analysis which is required to identify Project-related increases in volatile organic compounds (VOCs) and nitrogen oxides (NO<sub>x</sub>) and used to demonstrate the consistency of the Project with the Massachusetts State Implementation Plan (SIP)). Net new trips should be expressed in daily vehicle miles of travel (VMT) for weekday and weekend conditions. This estimate should be consistent with the trip generation analysis included in the Project’s traffic study. The analysis should provide a breakdown of customer, employee and truck trips.

2. Calculate annual VMT for the Project’s net new trips. Calculate VMT for employee, customer and truck trips separately.

$$(260 \times \text{weekday VMT}) + (105 \times \text{weekend-day VMT}) = \text{annual VMT}$$

3. Multiply annual VMT (miles/year) by the appropriate EPA MOBILE 6.2 CO<sub>2</sub> emission factor<sup>5</sup> (grams/mile) and divide by 907,185 grams/ton to obtain annual CO<sub>2</sub> emissions (tons/year).

---

<sup>5</sup> MOBILE6.2 provides emission factors by vehicle type, ranging from 368.5 grams/mile for light-duty gasoline vehicles up to 1,633.1 grams/mile for the heaviest diesel trucks. These emission factors can be used for generating detailed trip by vehicle type data. If calculating total vehicle trips for a typical Project, the analysis should use the MOBILE6.2 average emission rate of 550.4 grams/mile, which is based on the most recent fleet mix by type for Massachusetts identified by MassDEP.

The proponent should propose potential measures to lower emissions from each source. The Appendix to this policy contains a partial, non-exclusive list of measures to avoid, minimize and mitigate Project-related transportation emissions.

### **Other Sources of GHG Emissions**

For most projects, modeling GHG emissions from stationary sources, energy consumption, and transportation will encompass the relevant sources of emissions. However, some projects will have sources of emissions not explicitly covered by these three categories (e.g., a landfill that emits methane). On a case by case basis, EEA may require modeling of GHG emissions from sources other than the three categories covered by this policy. EEA will advise the proponent of this requirement in the EIR scoping certificate.

### **Total GHG Emissions & Mitigation**

The proponent should tally the GHG emissions from the three sources (stationary, energy consumption, and transportation) and report the total. Proponents should also calculate and include in the EIR the reduction in GHG emissions from proposed mitigation measures for stationary sources, energy consumption, and transportation. The Energy Modeling software should be used to measure the impact of mitigation alternatives on direct and indirect emissions from buildings and energy use. With regard to evaluating the impact of transportation mitigation, recent research indicates that an accurate range of reductions associated with TDM measures can be identified. Two models are recommended for generating reasonable estimates of trip reductions associated with TDM programs. These include the US Environmental Protection Agency (EPA) COMMUTER model and the Work Trip Reduction Model. In addition, Congestion Mitigation and Air Quality (CMAQ) worksheets, available from the Executive Office of Transportation (EOT), can be used for calculating the benefits of specific transit measures, multi-use paths and commuter parking facilities.

The proponent should compare total baseline GHG emissions to the total were the proponent to implement the alternatives discussed in each section. The proponent should explain which alternatives were rejected, and the reasons for the rejection. The alternatives analysis should clearly demonstrate consistency with the objectives of MEPA review, one of which is to document the means by which the proponent plans to avoid, minimize or mitigate damage to the environment to the maximum extent feasible. The proponent should fully explain any trade-offs inherent in the evaluation of GHG reduction measures, such as increased impacts on some resources to avoid impacts to other resources.<sup>6</sup>

As with any other environmental impact that MEPA considers, if the Project changes after the issuance of a Certificate on a Final EIR such that there is a significant increase in GHG emissions, the proponent will be required to file a Notice of Project Change pursuant to 301 CMR 11.10.

---

<sup>6</sup> On a case by case basis, EEA may allow Projects that incorporate exceptional mitigation measures to avoid modeling of alternative mitigation measures.

## **OFFSETS**

EEA recognizes that in certain circumstances, it may not be feasible to implement all of the alternatives described in the EIR. While it is MEPA's policy to encourage proponents to avoid or minimize GHG emissions on-site, EEA will also be receptive to proposals to mitigate such emissions through off-site measures when avoidance or minimization strategies are not feasible. Such measures could include, but are not limited to: the purchase of renewable energy for onsite use, the purchase of GHG reduction credits, or the support of initiatives in the State or municipal Climate Action Plans. EEA will seek the assistance of other agencies to determine whether such offsets are real, additional, verifiable, permanent, and enforceable in accordance with state law and policy. If offsets are proposed, the proponent should endeavor to select offsets which have local or regional benefits.

## **OPT-OUT PROVISION**

EEA will consider on a case-by-case basis allowing proponents that commit in advance to exceptional measures to opt out of the quantification analysis. The rationale for the opt-out is that if a proponent commits to such extraordinary measures, there is less reason for quantification and exploration of alternatives. A proponent seeking to opt out should present the request in the ENF and MEPA will respond to the request in the scoping certificate on the Draft EIR.

## **SECTION 61 FINDINGS**

As appropriate, the greenhouse gas emission commitments set forth in the Project's EIR shall be enforceable through Section 61 findings. The Section 61 findings shall be incorporated into state agency land transfers, financial assistance documents, and/or Permits as appropriate for the Project in question.

## **EFFECTIVE DATE**

This policy will be published in draft form in the July 11, 2007 Environmental Monitor. Public comments shall be received until Friday, August 10, 2007. Comments may be submitted electronically to [briony.angus@state.ma.us](mailto:briony.angus@state.ma.us), via fax to 617-626-1181, or by mail to: MEPA Office, 100 Cambridge Street, 9<sup>th</sup> Floor, Boston, MA 02114. Please reference the EEA Greenhouse Gas Protocol in the header of your comments. EEA will issue a final version of the Policy and Protocol after the close of comments on the Draft. Once the final version is published, EEA will begin including GHG quantification in the scoping certificates for all Projects that are subject to the Policy whose ENFs are filed after the effective date of publication of the final policy. EEA and MEPA will periodically revisit and review the policy as necessary.



## APPENDIX – SUGGESTED MITIGATION MEASURES

### Siting and Site Design

- Develop Project consistent with Commonwealth of Massachusetts Sustainable Development Principles to integrate transportation and land use ([http://www.mass.gov/Agov3/docs/smart\\_growth/patrick-principles.pdf](http://www.mass.gov/Agov3/docs/smart_growth/patrick-principles.pdf))
- Provide permanent protection for open space on the Project site
- Conserve and restore natural areas on-site
- Minimize building footprint
- Design Project to support alternative transportation to site including transit, walking and bicycling
- Use Low Impact Development for Stormwater Design
- Design water efficient landscaping
- Minimize energy use through building orientation

### Building Design and Operation

- Construct green roofs
- Use high-albedo roofing materials
- Install high-efficiency HVAC systems
- Eliminate or reduce use of refrigerants in HVAC systems
- Reduce energy demand using peak shaving or load shifting strategies
- Maximize interior daylighting through floor plates, increased building perimeter and use of skylights, celestories and light wells
- Incorporate window glazing to balance and optimize daylighting, heat loss and solar heat gain performance
- Incorporate super insulation to minimize heat loss
- Incorporate motion sensors and lighting and climate control
- Use efficient, directed exterior lighting
- Incorporate on-site renewable energy sources into project including solar, wind, geothermal, low-impact hydro, biomass and bio-gas strategies
- Incorporate combined heat and power (CHP) technologies
- Use water conserving fixtures that exceed building code requirements
- Re-use gray water and/or collect and re-use rainwater
- Provide for storage and collection of recyclables (including paper, corrugated cardboard, glass, plastic and metals) in building design
- Re-use building materials and products
- Use building materials with recycled content
- Use building materials that are extracted and/or manufactured within the region
- Use rapidly renewable building materials
- Use wood that is certified in accordance with the Forestry Stewardship Council's Principles and Criteria
- Use low-VOC adhesives, sealants, paints, carpets and wood
- Conduct 3<sup>rd</sup> party building commissioning to ensure energy performance
- Track energy performance of building and develop strategy to maintain efficiency

- Provide construction and design guidelines to facilitate sustainable design for build-out by tenants

## **Transportation**

Locate new buildings in or near areas designated for transit-oriented development (TOD) and, where possible, incorporate TOD principles in employee and customer activity patterns

Purchase alternative fuel and/or fuel efficient vehicles for fleet

Join or form a Transportation Management Association

Provide new transit service or support extension/expansion of existing transit (buses, trains, shuttles, water transportation)

Support expansion of parking at Park-n-Ride Lots and/or transit stations

Develop or support multi-use paths to and through site

Size parking capacity to meet, but not exceed, local parking requirements and, where possible, seek reductions in parking supply through special permits or waivers

Pursue opportunities to minimize parking supply through shared parking or banked parking

Develop a parking management program to minimize parking requirements such as parking cash-out, parking charges, preferential carpool or vanpool parking, limiting parking available to employees

Develop and implement a Marketing/Information Program that includes posting and distribution of ridesharing/transit information

Subsidize transit passes

Use of pre-tax dollars for non-single occupancy vehicle (sov) commuting costs

Reduce employee trips during peak periods through alternative work schedules, telecommuting and/or flex-time

Provide a guaranteed ride home program

Provide on-site amenities such as banks, dry cleaning, food service, childcare

Provide bicycle storage and showers/changing rooms

Roadway Improvements to improve traffic flow

Traffic Signalization and coordination to improve traffic flow and support pedestrian and bicycle safety