Cumulative Impact Analysis (CIA) Framework for Air Permits
Draft for Discussion - April 25, 2022

Introduction

On March 26, 2021, Governor Baker signed "An Act Creating a Next-Generation Roadmap for Massachusetts Climate Policy." The Climate Law contained a new section directing the Massachusetts Department of Environmental Protection (MassDEP) to evaluate and seek public comment on incorporating cumulative impact analyses into certain permits, and to propose regulations within 18 months requiring cumulative impact analysis in certain air permits. MassDEP has held a series of five sets of stakeholder meetings (one during the day and one during the evening) over 5 months to review the law, different approaches to cumulative impact analysis, MassDEP's air permitting process, potential environmental, health, and socioeconomic indicators, and elements of a proposed conceptual model.

The Climate Law also directed the Massachusetts Environmental Policy Act Office (MEPA) to require an environmental impact report (EIR) for all projects within MEPA jurisdiction proposed within 1- or 5-miles of environmental justice (EJ) populations. The EIR must assess whether the identified EJ populations bear an existing "unfair or inequitable environmental burden" based on the cumulative effect of "prior or current private, industrial, commercial, state, or municipal operation or project" that has damaged the environment and must additionally evaluate whether the added project impacts will cause "disproportionate adverse effects" on the identified EJ populations or increase or reduce the effects of climate change.

Cumulative Impact Analysis Concepts and Examples

Cumulative impact analysis concepts have been used in the U.S. and internationally to evaluate large infrastructure projects (e.g., highways, mines, dams). In the U.S., the National Environmental Policy Act (NEPA) requires analysis of direct, indirect, and cumulative environmental effects for these large projects. The U.S. Environmental Protection Agency (EPA) addresses cumulative risks in some of its programs. Other states also have developed cumulative impact analysis approaches and tools.

Minnesota includes cumulative impacts in air permits based on a 2008 statute that requires the Minnesota Pollution Control Agency (MPCA) to analyze and consider "cumulative levels and effects of past and current pollution" before a permit may be issued for a facility located in a geographically defined section of South Minneapolis. To implement this statute, MPCA requires a Cumulative Levels and Effects (CL&E) Analysis in the air permit that includes evaluation of environmental health data, community stressors and vulnerabilities, contributions from nearby sources, and modeling results for air toxics and criteria pollutants. To date two permits have completed CL&E analyses and received permits (local hospital and Metro Transit operation & maintenance facility). The MN program requires a CL&E in the air permit; however, the permit is still issued based on compliance with National Ambient Air Quality Standards (NAAQS) and an air toxics risk assessment. The statute does not give MPCA the authority to deny a permit nor to require reductions in emissions beyond its existing permitting authority.

New Jersey passed a 2020 EJ statute that incorporated a comparative impact approach in certain permit decisions (including "major" source air permitting and other permits issued by the NJ Department of Environmental Protection). The law provides explicit authority to deny a permit if it would cause or contribute to adverse cumulative environmental or public health stressors in the overburdened community that are higher than those borne by other communities. It does not specify a cumulative impact analytical method for air emissions specifically but specifies that a project impact that causes or contributes to identified stressors in overburdened communities that are higher than those borne by other communities can lead to denial of the permit. It should be noted that the NJ program is based on a comparison between different areas of the state and not based on a risk characterization approach (i.e., meeting acceptable thresholds for potential risks to human health).

California defines cumulative impacts as the exposures, public health or environmental effects from the combined emissions and discharges, in a geographic area, including environmental pollution from all sources, whether single or multi-media, routinely, accidentally, or otherwise released. Impacts consider "sensitive populations and socio-economic factors, where applicable and to the extent data are available." California uses its analyses and its analytic tools (i.e., CalEnviroScreen) to compare communities, allocate funding, and direct programs resources, and not currently to make permitting decisions.

MassDEP's proposed approach to cumulative impact analysis in air permitting is to use an analytical approach that will evaluate the potential impacts of an applicable proposed project's air emissions in or near Environmental Justice (EJ) populations while also considering how existing environmental, public health, and socioeconomic stressors affect community conditions.

Overview

The CIA process for MassDEP air permits would include the following steps:

1. Conduct Pre-application Community Notice / Engagement
2. Assess Existing Community Conditions (Environmental, Health, Socioeconomic Indicators)
3. Analyze Cumulative Impacts of Existing and Added Air Pollution / Consider Non-air quality Indicators
4. File Permit Application with CIA Report / Public Notice and Informal Public Comment
5. MassDEP Review and Propose Permit Decision
6. Hold Public Comment Period
7. MassDEP issue Permit Decision

Program Review

MassDEP anticipates that the proposed regulations will include a future program review after the regulation is promulgated. Including a program review recognizes that the science of and methodologies to conduct cumulative impact analysis are under development. EPA has recently begun a 5-year research effort to develop cumulative impact analysis methods, and other state and local jurisdictions, and academic institutions also are considering how cumulative impact

analyses should be conducted and used. EPA's research effort, through its Office of Research and Development (ORD), is designed to strengthen the scientific foundation for assessing cumulative impacts. EPA ORD has published a white paper on potential research priorities to be conducted over the next five years.[1]

The current draft CIA Framework represents the first phase of regulations for incorporating CIA in air permits. MassDEP will follow national and state efforts to better develop the science and application of CIA, which will inform the program review that would lead to a second phase of regulations. The second phase of the regulations could include more detailed requirements to analyze and assess the cumulative impacts of applicable air permits.

CIA Applicability

A CIA would be required for a comprehensive plan approval (CPA) for any new facility in or near Environmental Justice (EJ) populations; specifically, within 1 mile for a non-major CPA and within 5 miles for a major CPA.

Non-major CPA thresholds:

- Process (i.e., non-combustion) emissions ≥ 10 tons per year
- Combustion units that meet fuel input thresholds (e.g., ≥ 40 mmBTU/hour natural gas boiler)
- Incinerators
- Non-emergency engines (except proposing a CIA would not be required for those restricted to 100 hours of use per year)

Major CPA thresholds:

- 50 tons nitrogen oxides / volatile organic compounds (i.e., ozone precursors)
- 100 tons Any other criteria pollutant
- 25 tons Combined hazardous air pollutants (HAPs)
- 10 tons Individual HAP

A CIA also would be required for an existing facility that has a CPA and applies for a new or modified CPA that would increase emissions above 1 ton per year (i.e., above a de minimis level).

Focus on EJ: Focusing on EJ populations acknowledges the importance of protecting EJ populations from added environmental burdens, similar to MEPA's new EJ assessment regulations.

CPAs that Increase Emissions: CPAs are required for emissions sources that pose a greater potential impact on air quality. CPAs that will increase emissions in or near EJ populations above CPA thresholds would require a CIA since these permits could have an adverse effect on these populations.

[1] https://www.epa.gov/system/files/documents/2022-01/ord-cumulative-impacts-white-paper_externalreviewdraft-_508-tagged_0.pdf

CPAs in or near EJ populations that result in emission decreases (e.g., replacing older equipment with new less polluting equipment) would not require a CIA because there would be no cumulative impacts to analyze (i.e., impacts are reduced). Excluding these CPAs would avoid creating a disincentive for beneficial projects that decrease emissions.

Modifications to existing CPAs that result in de minimis emissions increases (i.e., less than one ton per year) would not require a CIA, although MassDEP would reserve the right to require a CIA for these permits on a case-by-case basis. Per MassDEP's EJ Public Involvement Plan, CPAs that decrease emissions or have de minimis increases in emissions in or near EJ populations would require advanced EJ population notice, enhanced community engagement and public involvement to ensure the EJ population is aware of and has the opportunity to be involved in the CPA review and approval process.

CIA Steps

The steps for conducting a CIA are described below and add several new components to MassDEP's air permit review process:

- Addition of pre-application community notice and stakeholder engagement to inform CIA and permit application;
- Assessment of existing community conditions using environmental, health, and socio-economic indicators;
- Expansion of the number of air toxics evaluated (approximately double the current number of air toxics);
- Inclusion of cumulative air toxics air dispersion modeling that includes emissions from nearby permitted air sources;
- Addition of cumulative risk characterization of existing and new air toxics to quantify and evaluate risk to health;
- Addition of more detailed air dispersion modeling results to increase transparency and understanding of potential risks;
- Evaluation of significant traffic and other transportation emissions in air quality analysis;
- Description of how proposed air permit could affect the community in the context of existing environmental and health conditions and potential mitigation actions;
- Addition of notice of an informal comment opportunity on CIA / permit application that can inform MassDEP review; and
- Extension of formal public comment period from 30 to 60 days.

1. Conduct Pre-application Community Notice / Engagement

At least 60 days prior to filing a CPA application subject to CIA, the applicant would be required to provide notice of the project to MassDEP, the MassDEP EJ Director, the affected EJ population, and local officials, and to seek input on the project. The applicant also would be required to meet with MassDEP on the planned community engagement and the schedule for conducting the CIA. This pre-application requirement would be similar to MEPA's new pre-filing EJ community engagement. MassDEP would develop guidance for how to conduct community engagement, including distribution to the community of a fact sheet about the

proposed project and how the applicant can actively engage with the affected EJ populations (similar to MEPA requirement).

2. Assess Existing Community Conditions (Environmental, Health, Socioeconomic Indicators)

The applicant would be required to assess existing community conditions by gathering data on a list of air quality, environmental, health, and socioeconomic indicators specified in the regulation and/or guidance. The list of indicators is shown in Table 1 below.

The applicant would incorporate concerns raised by the EJ population into the community assessment. The community assessment would describe the conditions and burdens faced by the affected communities to ensure greater public awareness of the community conditions. The information in the community assessment, combined with community engagement, could result in an applicant modifying their project and/or proposing mitigation actions. The community assessment would include indicator data tables and maps showing indicators in relation to the project location and surrounding communities. These data would be accompanied by an overall narrative.

Table 1 Proposed List of Indicators

Pollution Burden	Population Characteristics (i.e., Vulnerabilities)
Air Quality Indicators (EJScreen)[1] • PM2.5 • Ozone • Diesel PM • Air Toxics Cancer Risk • Air Toxics Respiratory Hazard Index • Traffic Volume and Proximity **Regulated Site Proximity (MDPH EJ Tool/EJScreen)** • Air permitted sites • Solid waste facilities • Large quantity hazardous waste generators • Large quantity toxics users • Toxics Release Inventory sites • Hazardous waste treatment, storage, and disposal facilities • Wastewater Treatment Plants • Energy generation and supply • Large fuel depots • Ports, airports, rail infrastructure **Climate Indicators (RMAT)** • Impervious surfaces* • Tree canopy*	**Health Indicators[2] (MDPH EJ Tool)** • Asthma – pediatric emergency department visits • Heart attack (myocardial infarction) – hospitalizations • Elevated blood lead – elevated BLLs for ages 9-47 months • Low birth weight – full term singleton births <2500 g • Elementary school asthma prevalence* • Low life expectancy – Average life expectancy* (EJScreen) **Socioeconomic Indicators (MDPH EJ Tool)** • Poverty/low-income • Community of Color • English language isolation • Unemployment* (EJScreen) • Young (< 5 years old)* (EJScreen) • Older (>65 years old)* (EJScreen) • Renter occupied housing* (EJScreen) **Sensitive Receptor Locations (MDPH EJ Tool)** • School (k-12) • Child/Day care and pre-schools • Long-term care residences • Public housing* (EJScreen) • Prisons* (EJScreen)

[1]Data source

[2]Health indicators include the four vulnerable health indicators used in the 2021 EJ Policy to identify EJ Vulnerable Health populations

*Under consideration

3. Analyze Cumulative Impacts of Existing and Added Air Pollution and Consider Existing Impacts of Environmental Burdens

Conduct Air Quality Analysis – The applicant would be required to analyze cumulative impacts of existing and added air pollution through air dispersion modeling and evaluation of significant local traffic/transportation emissions.

- Conduct cumulative criteria pollutant air dispersion modeling (for pollutants above SILs[2])
    - Include emissions from facility
    - Include emissions from nearby permitted air sources
    - Include background data from MassDEP air monitoring
    - Compare to National Ambient Air Quality Standards (NAAQS)[3] or lower standards for certain EJ populations based on existing conditions to be determined
- Conduct cumulative risk characterization of air toxics. Air toxics modeling could include the following:
    - Air toxics dispersion modeling:
        - emissions from facility
        - emissions from nearby permitted air sources
    - Characterize total risk of the facility emissions plus nearby permitted air sources
        - initial screening risk characterization for combined toxics to ensure below cumulative risk management criteria (less than 10 in 1 million excess lifetime cancer risk and Hazard Index of 1) or lower risk management criteria for certain EJ populations based on existing conditions to be determined
        - if screening risk characterization does not meet risk management criteria, conduct more detailed risk characterization to ensure risk management criteria are met
- Conduct evaluation of significant local traffic/transportation emissions which could include:
    - U.S. Department of Transportation traffic volume and proximity
    - National modeled concentrations of traffic/transportation emissions

    On-going research is needed for methods and approaches for community-level evaluation of traffic / transportation emissions

[2] Used in air dispersion modeling of criteria pollutants, a Significant Impact Level (SIL) is a pollutant-specific ambient air concentration level set by the U.S. Environmental Protection Agency that denotes a significant impact. If the highest modeled concentration of an emitted pollutant is less than its SIL, the pollutant is considered de minimis and is assumed to comply with national ambient air quality standards for that pollutant and does not require further modeling analysis.

[3] EPA sets NAAQS for six principal pollutants, known has "criteria pollutants," which include ozone, particulate matter, carbon monoxide, nitrogen dioxide, sulfur dioxide, and lead. The NAAQS are set to protect human health, including sensitive subpopulations (e.g., children), and the environment.

- Display modeling results to graphically show concentrations of pollutants at specific distances from the facility (to increase transparency and understanding of modeling results)

Note that the regulations could include screening criteria to determine the level of analysis required in the CIA for more limited emission impacts (for example, if only one non-toxic VOC will be emitted, a full cumulative risk characterization may not be required). This would need to be supported by information justifying screening criteria.

Describe the Impacts of the Proposed Project in Relation to Other Community Conditions – The applicant would describe how the proposed project could affect the community in the context of the existing community conditions. The applicant would describe the potential cumulative impacts of the emissions on the existing conditions in the community based on the indicators in Table 1. This would be a qualitative analysis. There will be on-going research and outreach to the academic/scientific community on whether there are ways to relate air quality indicators to health indicators. If a project was required to undertake MEPA review, the applicant would be required to consider any relevant analyses or findings made during the MEPA review process, including any findings of disproportionate adverse effect. At a minimum, evaluation of the existing community conditions would bring important information to the attention of the permit applicant, MassDEP, and the community and will provide the opportunity for mitigation by the applicant.

4. Develop CIA report and CPA Application

The applicant would develop a CIA report that documents the community discussions, air quality analysis and evaluation of community existing conditions and describes how the CPA application addresses and mitigates cumulative impacts. This could include project design features, pollution controls, and other mitigation incorporated into the CPA application and permit conditions. The CIA also could document any community host agreements and/or mitigation commitments the applicant has made to address community impacts.

5. File Permit Application with CIA Report / Public Notice with Informal Comment

After conducting the CIA, the applicant would submit the CPA application with the CIA report to MassDEP. The applicant (or MassDEP) would notify the community that the application and CIA is available for review and that the public may submit comments or questions to MassDEP. This would be an informal comment opportunity similar to the current comment opportunity offered under MassDEP's air permit EJ public involvement process where the EJ population is notified of a permit application and can submit comments or raise concerns to MassDEP while MassDEP reviews the application.

6. MassDEP Review and Proposed Permit Decision

MassDEP would review the CPA application and CIA, including any comments submitted by the public, and issue a proposed decision. How MassDEP issues proposed decisions, including a

proposed application denial, depends on resolution of several issues related to the extent a CIA can provide scientifically and legally defensible information used in the permit decision.

7. Public Comment Period

MassDEP would hold a 60-day formal public comment period. This is longer than the current 30-day comment period requirement given the added CIA that the public would review.

8. MassDEP Permit Decision

MassDEP would issue a Permit Decision to approve, approve with conditions, or deny, the plan approval. This decision would be subject to appeal.