

The Role of Air Emissions Inventories in SIPs

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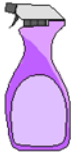














Overview

- What is an air emissions inventory?
- Types of air emission sources
- Types of air emission inventories
- Statutory and regulatory requirements
- How are emission inventories used?
- How are air emissions calculated?

What is an Air Emissions Inventory?

- A compilation of estimated emissions from sources of anthropogenic (human-made) and biogenic (natural) air pollutants emitted from various sources
 - **Criteria Air Pollutants (CAPs)**
 - Ozone precursor pollutants primarily **VOC** and **NO_x**, also **CO**
 - Particulate Matter **PM₁₀** and **PM_{2.5}** and precursor pollutants, primarily **SO₂** and **NO_x**, also **NH₃** and **VOC**
 - Lead
 - Sulfur Dioxide
 - Nitrogen Dioxide
 - Carbon Monoxide
 - **Hazardous Air Pollutants (HAPs)**

Emission Inventory Source Categories

Point						
Area						
OnRoad						
NonRoad						
Biogenic						

Types of Air Emission Inventories

- **Actual**
- **Annual**
- **Daily/Seasonal**
- **Periodic**
- **Base Year**
- **Future Projection**
- **Modeling**
- **Attainment**
- **Statewide**

Statutory Provisions (CAA) (1)

Sec. 110(a)(2)(F)(ii) Infrastructure

- Statewide criteria pollutant reporting for all states

Sec. 169 Regional Haze

- Statewide baseline inventory
- Periodic updates

Sec. 172(c)(3) NAA SIP Requirements for all CAP NAAs

- Periodic emission reports

Sec. 175A Maintenance Plans

- Attainment inventory

Sec. 182 Ozone NAAs

- 182(a)(1) Base year inventory
- 182(a)(3) Inventory every 3 years until redesignated to attainment

Statutory Provisions (CAA) (2)

Sec. 182 Ozone NAAs cont.

- 182(b)(1) Rate of Progress (ROP) 15% reduction over first 6 years
- 182(c)(2) Reasonable Further Progress (RFP) 3% reduction per year

Sec. 189 Particulate Matter NAAs

- Base year inventory required per 172(c)(3), but with an 18-month due date from the date of nonattainment designation (ozone is 2 years after designation)

Modeling Requirements

- 182(c)(2) Ozone and 189(a)(1)(B) PM attainment demos
- 169B(e)(1) Regional haze reasonable progress goal (RPG) demos

Public Hearing Requirements

- Inventories with “regulatory significance,” including periodic inventories per EPA’s 2016 draft EI guidance

Regulatory Requirements (1)

Consolidated Emissions Reporting Rule (CERR) 2002

- Consolidated different inventory reporting requirements into one place (CAA Section 182, regional haze, and NOx SIP Call)
- Established PM2.5 inventory requirements
- New requirements for area and mobile sources
- Annual and three year inventories

Air Emissions Reporting Rule (AERR) 2008 (40 CFR 51 Subpart A)

- **Replaced CERR**
- Shortened timeline for reporting
- Eliminated biogenic reporting
- Point source definition from Title V of the Clean Air Act

AERR 2015 Revisions

- Lead reporting threshold change
- Eliminated wild fire reporting
- Mobile model input requirements
- Removed seasonal reporting requirements

Regulatory Requirements (2)

- **Ozone and PM_{2.5} SIP Requirements Rules**
 - 40 CFR Part 51: Subpart Z (PM_{2.5}) and Subpart AA (2008 O₃)
 - Contains inventory, modeling and RFP requirements and references to AERR and inventory and modeling guidance documents.
- **Regional Haze Program Requirements**
 - 40 CFR Part 51 Subpart P
- **“Emissions Inventory Guidance for Implementation of Ozone and Particulate Matter National Ambient Air Quality Standards (NAAQS) and Regional Haze Regulations”** (9/29/2016 draft currently out for review and comment)

How are Air Emissions Inventories Used?

National Emissions Inventory (NEI)

- Emissions required every year for point sources
- Required every three years for remaining sources (or accept EPA estimates)
- Onroad and nonroad model inputs required (not emissions); EPA runs those models
- Annual emissions of CAPs and precursors required,
- HAPs and seasonal emissions are voluntary
- Electronic submittal to EPA's Emission Inventory System (EIS)

SIP EI Requirements for Criteria Air Pollutants (1)

Base Year and Periodic Inventories for Nonattainment Areas

- Required, regardless of classification
- Actual annual and/or seasonal emissions, based on pollutant
- May be satisfied with NEI submittal without a public hearing if
 - Approved by EPA regional office
 - Seasonal “emissions” are submitted to EIS as required for all sources including mobile (NEI only requires model inputs)
 - Does not have “regulatory significance” (base year, RFP, attainment demonstration, or maintenance plan)
 - EPA notes that this could be challenged in court as failing to follow the CAA

SIP EI Requirements for Criteria Air Pollutants (2)

Attainment Demonstration Modeling

- Areas classified as Moderate and above
- Actual annual and future projection annual emissions input into model
- Spatially and temporally allocated by the models
- Chemically speciated by the models

SIP EI Requirements for Criteria Air Pollutants (3)

Reasonable Further Progress (RFP) and Control Measure

Demonstrations

- Areas classified as Moderate and above
- Actual and future projection emissions
- Annual and/or seasonal based on pollutant
- Summarize emissions and **emission reduction benefits** from state and federal rules
- Show that progress from control measures meets RFP criteria (3% per year reduction)

SIP EI Requirements for Criteria Air Pollutants (4)

Redesignation Requests

- Base, interim, and future projection year emissions at least 10 years out (see *Maintenance Plan Guidance*, EPA 2005)
- Annual and/or seasonal, based on pollutant
- Summarize emissions and emission reduction benefits from state and federal rules
- Show that emissions are **decreasing** in the future, otherwise have to model to show that area will not exceed NAAQS in the future

Planning

- Identify largest contributing pollution sources currently and in the future
- Evaluate existing control programs
- Evaluate emission trends
- Research new control measures
- Estimate emissions reductions from control measures

Other

- Regional Haze Plans and Reports
 - Modeling
 - Base year and current year emissions
 - Show reductions from relevant sources
- EPA uses NEI for “Transport Rule “Modeling
- Administer emission-based fees for point sources
- Respond to public information requests

How are Air Emissions Calculated?

“Actual” Air Emissions:

Emissions =

Activity * Emission Factor *

(1-(Control Efficiency*Rule Effectiveness*Rule Penetration))

OR

Actual air testing

“Projected” Air Emissions:

Actual Emissions *

Growth Factor from Base Year to Future Year *

Control Factor

Actual Inventory Calculation Methods

- **Point Sources**
 - Individual facility reporting (Emissions Statement program)
- **Area Sources**
 - Estimated at state level using primary activity indicators (population, employment, fuel usage, etc..) and allocated to county using secondary activity indicators
- **Onroad, Nonroad Equipment and Aircraft**
 - Models (EPA - MOVES and NONROAD, FAA - EDMS)
- **Marine and Rail**
 - Estimated at the county or facility level

Growth Factors

- Applied to base inventory to estimate future emission projections
- Estimated using similar activity indicators as base inventory (e.g., population projections, employment projections, fuel usage projections, VMT projections)
- ERTAC model used for power plant projections

Control Factors

- Applied to inventory to estimate emission reductions from control measures
- Control Factor =
$$(1 - (\text{Control Efficiency} * \text{Rule Effectiveness} * \text{Rule Penetration}))$$

Regional Workgroups

Work with other states and USEPA through regional workgroups to develop regional emission inventories (MANE-VU, MARAMA, NESCAUM, LADCO, SESARM, CenSARA)

- Regional inventories are required for attainment demonstration and Regional Haze modeling
- Increased coordination with EPA and use of EPA inventories reduces duplication of efforts, more efficient, better inventories that match more closely across states and regions
- Increased involvement by states on reviewing EPA transport modeling inventories
- **Emission Modeling Framework (EMF)** database used by EPA and MARAMA to manage regional inventories and project future emission inventories

**Any questions or
comments?**