



# IMPROVING EMISSION INVENTORIES FOR EFFECTIVE AIR-QUALITY MANAGEMENT ACROSS NORTH AMERICA: A NARSTO Assessment

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## NARSTO

- A multi-stakeholder, public-private partnership of government, private sector, & academia across Canada, Mexico, & U.S.
- Carries out periodic, policy-relevant science assessments on air pollutants and air pollution issues.

## Emission Inventory Assessment

- NARSTO's PM Assessment, Ozone Assessment, and Emission Inventory Workshop indicated that an Emission Inventory Assessment could be necessary and beneficial.
  - Acknowledged that emission inventories will continue to be important in air quality management activities and decision making.
  - Acknowledged that emission inventories need improvement and that a quantum leap is needed in tools and techniques.
  - Recognized that NARSTO community needs to help bring about the needed improvement.
- Objectives:
  - To promote efficient and effective use of current inventories;
  - To set the stage for improving future emission inventories; and
  - To establish a roadmap for the future.
- Audience:
  - Decision makers, who are responsible for selecting among multiple technologies and pathways for emission-inventory research, development, and application
  - Users of emission inventories
    - Policy analysts, policy planners, and policy implementers
    - Chemical-transport modelers
    - Field-campaign designers and practitioners
    - Community interest groups
    - Planners, regulators, and implementers of international agreements
  - Developers of emission inventories
    - State-, provincial-, and local-agency developers in Canada, the US, and Mexico
    - Makers of tools to derive emissions from process information
    - Makers of tools to measure emissions
- Proposed Schedule:
  - Kickoff – 10/03 @ NARSTO EI Workshop
  - Project Planning – 5 months – 03/04
  - Prepare Draft – 6 months – 09/04
  - NARSTO & Public Peer Review – 10/04
  - Revisions – 2 months – 01/14/05
  - External Peer Review – 01/15-02/15/05
  - Revisions – 2 months – 04/11/05
  - Presentation at NARSTO Executive Assembly – 04/11/05
  - & EPA Emission Inventory Conference -- 04/12/05
  - Final Report & Presentation at AWMA Meeting – 06/22/05
- Report Outline:
  1. Introduction, background and objectives
  2. Vision for emission inventory programs
  3. Current status of North American emission inventories
  4. Tools for developing emission inventories
  5. Strengths, weaknesses, and lessons learned
  6. Evolving technology and methods
  7. Top-down assessments of emission inventories
  8. Uncertainty and sensitivity analysis
  9. Recommendations and conclusions

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## Key Findings and Recommendations

### 1. Address Priority Emission Inventory Needs

- Findings**
- Comparisons of national emission inventories with ambient measurements and other independent measures indicate that emission inventories for certain source categories and pollutants, particularly gaseous emissions from electric utilities in the United States, are well characterized and reported. Emission inventories for other source categories and pollutants are much more uncertain. Of particular concern are nonpoint sources including fugitive classes and transportation, sources of organic compounds, carbonaceous PM, ammonia, and hazardous air pollutants.
- Recommendation**
- Focus immediate measurement and development efforts on areas of greatest known uncertainty within current emission inventories. Systematically continue to improve emission inventories by applying sensitivity and uncertainty analyses and by comparing them to independent sources of measured data. Such comparisons will help identify subsequent improvement priorities.
  - Size-segregated, speciated emissions of fine particles and their precursors, including black and organic carbon emissions
  - Toxic and hazardous air pollutants
  - Emissions from onroad motor vehicles
  - Emissions from agricultural and other area sources, especially ammonia
  - Speciated, spatially and temporally resolved emissions of organic compounds from biogenic sources
  - Emissions of total VOCs and organic HAPs at petrochemical industrial facilities
  - Emissions from off-road mobile sources including farm and construction equipment aircraft and airport ground equipment, commercial marine facilities, and locomotives
  - Emissions from open biomass burning, including agricultural and forest prescribed burning, wildfires, and residential backyard burning
  - Residential wood combustion, including woodstoves and fireplaces
  - Paved and unpaved road dust

### 2. Improve Emission Inventory Speciation Estimates

- Findings**
- Contemporary air quality issues such as PM and ozone nonattainment and identification of "hot spots" of HAP concentrations require detailed information about the species being emitted from sources.
- Recommendation**
- Develop new and improve existing source speciation profiles and emission factors plus the related activity data needed to more accurately estimate speciated emissions for particulate matter and its precursors, volatile organic compounds, and air toxics.

### 3. Improve Existing and Develop New Emission Inventory Tools

- Findings**
- Technical advances in instrumentation and computation have allowed measurements and analyses that were not previously possible; continuing development of these and other technologies is likely to further improve emission inventory measurements and analyses. Improvements in modeling and data processing capabilities provide the basis for more detailed and more accurate emission models and processors.
- Recommendation**
- Continue the development of new and existing measurement and analysis technologies to enable expanded measurements of emissions and ambient concentrations. Apply these technologies in developing emission model and processor capabilities to allow models to more closely approximate actual emissions.

### 4. Quantify and Report Uncertainty

- Findings**
- The emission inventories, processors and models of Canada, the United States, and Mexico are poorly documented for uncertainties; as a result, the reliability of the emission estimates cannot be quantified.
- Recommendation**
- Develop guidance, measures, and techniques to improve uncertainty quantification, and include measures of uncertainty (including variability) as a standard part of reported emission inventory data.

### 5. Increase Emission Inventory Compatibility and Comparability

- Findings**
- There are numerous emission inventories developed by different organizations for different purposes and covering different spatial domains. Although there have been substantial improvements in reporting national emission inventories in a mutually consistent way by categories, estimation methods, and chemical constituents, further efforts are needed to make these diverse emission inventories more comparable across organizations, purposes, and geographies and time periods.
- Recommendation**
- Define and implement standards for emission inventory structure, data documentation, and data reporting for North American emission inventories.

### 6. Improve User Accessibility

- Findings**
- The accessibility of emission inventories or emission models is presently very limited because of the sheer size of the databases, and the cumbersome manner in which the data have been reported and archived. Improved accessibility to emission data is critical to meet the diverse needs of the user community.
- Recommendation**
- Improve user accessibility to emission inventory data, documentation, and emission inventory models through the Internet or other electronic formats.

### 7. Improve Timeliness

- Findings**
- Timely and historically consistent emission inventories are crucial elements for stakeholders to assess current conditions and estimate progress in improving air quality.
- Recommendation**
- Create and support a process for preparing and reporting national emission inventory data on a yearly basis.

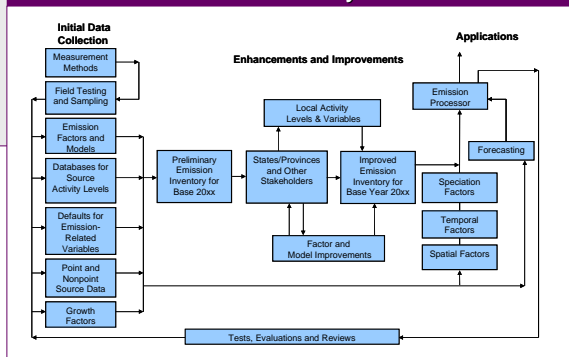
### 8. Assess and Improve Emission Projections

- Findings**
- Emission projections are critical to developing control strategies for attaining air quality standards and goals and for evaluating future year impacts associated with national rulemakings.
- Recommendation**
- Emission projection methodologies for all emission inventory sectors in North America should be evaluated to determine the accuracy of past projections and identify areas of improvement for future projections.

### Implementation of Recommendations:

- Findings**
- Emission inventory programs need significant additional resources across all stakeholders over an extended period of time to enhance tools and techniques and expertise.
- Recommendation:**
- Increase resource allocations for emission inventories in the range from double to an order of magnitude of current investments; develop detailed plans and cost estimates to implement the recommendations.

## Emission Inventory Process



## Summary

- NARSTO's Ozone and Particulate Matter Assessments and the NARSTO Emission Inventory Workshop provide significant recommendations for emission inventory enhancement.
- NARSTO Emission Inventory Assessment will provide basis to impact emission inventory activities in the future for enhanced quality, timeliness, and cost.
- Support from stakeholders is needed to make this happen!
- For more information and a copy of the current draft, reference: <http://www.cgenv.com/narsto>.

### Disclaimer:

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