Development of a Multipollutant Emission Inventory for the State of Iowa

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ABSTRACT

The objective of this pilot project is to develop a combined statewide emissions inventory covering criteria air pollutants (CAPs), toxic air pollutants (TAPs), and greenhouse gases (GHGs) at the county level. The inventory will cover a 2005 base year and is designed to be used within a data framework that is capable of projecting inventory data for use in a wide variety of policy analyses. All emission sources and sinks will be covered and data files developed in the U.S. Environmental Protection Agency's (EPA) National Emissions Inventory (NEI) Format version 3.0 (NIF3.0). The work will involve integrating Iowa's 2005 GHG inventory with existing CAP/TAP inventory data (grown to 2005, as needed). Detailed documentation of the procedures used to integrate the inventory data on a sector by sector basis will be developed for future use by Iowa, other states, and the EPA. Among the integration procedures/issues are: new source classification codes for GHG sources that do not have a direct analog in the CAP/TAP inventory structure; state to county-level allocation of GHG emissions for the nonpoint sectors; accounting for both emissions and sinks (including negative emissions) within the existing NIF data structure. The final report for the project will present results in the form of summary tables and graphs of GHG/CAP/TAP emissions, as well as lessons learned from the integration process.

INTRODUCTION

States are currently required to develop, maintain, and periodically report criteria air pollutants (CAP) and are encouraged to report Hazardous Air Pollutants (HAP) emissions to United States Environmental Protection Agency (EPA) as part of the Air Emissions Reporting Requirements Rule (AERR) (Federal Register Vol. 73, No. 243, December 17, 2008. 40 CFR Part 51 [EPA-HQ-OAR-2004-0489; FRL-87-5]. EPA uses these reported emissions data and gap-filling procedures to develop the National Emission Inventory (NEI) currently every 3 years (most current year is 2005).

HAPs are pollutants regulated under the Clean Air Act (CAA) and are a subset of toxic air pollutants (TAPs), which include other toxic species not specifically listed in the CAA but of interest to state and local agencies. In this project, the terms HAP and TAP are used interchangeably; however, the pollutants covered will be primarily HAP, since these are the pollutants that have been covered in EPA's work on the NEI or submitted by states to EPA.

Many states, including Iowa (IDNR, 2009) have also begun to develop Greenhouse Gas (GHG) inventories and forecasts to inform state and local-level climate change planning processes. In most cases, these GHG inventories have been developed using methods and structure that is consistent with EPA's national GHG inventory.

Currently, EPA's national GHG inventory is developed separately from the NEI. Not only does this create some redundancy in terms of effort at both the state and national levels, but it also hampers policy analysis in both the climate change and ambient air quality arenas. Analysts need to be able to assess the impacts to GHG emissions levels from CAP/HAP control programs and vice versa. A single system to house the necessary activity data, emissions data, control data, projection data, and other

ancillary data would reduce the overall level of effort needed for inventory development and maintenance. Another important benefit is that a combined system would assure that a common basis for emissions activity, growth, and control is being used to estimate policy impacts for ambient air quality and climate change programs. Finally, many municipalities and counties have also begun to develop and maintain GHG and sometimes other air pollutant inventories as part of their climate change mitigation programs. Availability of data that are updated on a routine basis would offer important benefits to these local mitigation efforts. Potentially, some of the inventory work conducted at the local area (metropolitan statistical area, township, county) could be integrated with future state submittals to EPA offering more accurate bottom-up emission estimates.

The purpose of this project is to generate an integrated multi-pollutant (GHG, CAP, HAP) inventory of air emissions for Iowa. The inventory developed will retain data at the county-level generally and specific facility locations for point sources, consistent with the NEI. GHGs included will be the six Kyoto Protocol gases: carbon dioxide (CO_2); methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6). The work conducted in this project will include the stationary point and nonpoint sources, onroad mobile sources, and nonroad mobile sources. An updated point source inventory will be developed by populating the inventory with GHG emission estimates based on each source's activity data.

The inventory will cover a 2005 base year and be designed to be used within a data framework that is capable of projecting inventory data for use in a wide variety of policy analyses. All pollutant sources and sinks will be covered within a data structure that is consistent with EPA's NEI. Additionally, one task requires a 2020 projection for all pollutants and will be based on a common framework that captures emission source/sink activity growth and pollutant-specific control programs.

The results of this project will have the following benefits:

- Provide EPA, states, and local agencies with an understanding of the approaches and data sources needed to integrate CAP/HAP/GHG inventories at the county to state and national levels;
- Provide an understanding of the benefits of developing and maintaining an integrated multipollutant inventory (lower costs, consistent underlying data, fuller understanding of policy benefits/disbenefits);
- Provide Iowa and its counties with inventory data for use in climate change and air quality planning (as mentioned above many counties and municipalities in the U.S. are currently developing their own climate change mitigation plans). If the proposed integration methods are adopted by the State, the data could be routinely updated, saving the counties and municipalities significant effort in developing their own inventories/updates.

DEVELOP INVENTORY PREPARATION PLAN

Pechan will prepare a detailed Inventory Preparation Plan (IPP). The IPP will cover both the 2005 base year inventory preparation and 2020 projection.

The IPP will outline in detail the integrated CAP/HAP inventory structure using the existing EPA NEI format (NIF 3.0) data structure (EPA, 2009). The IPP will present information at the sector/subsector level (e.g., Agricultural/crop cultivation). For stationary source sectors, both point and nonpoint sources will be described along with any activity data correction procedures needed to derive nonpoint activity data. Each section of the IPP will provide a brief overview of each of the GHG emission alongside the applicable CAP/HAP emissions; the proposed source classification codes (SCCs) to be used (including new SCCs, if applicable); GHG/CAP/HAP activity data and emission estimation methods/data sources; point source correction methods; spatial allocation methods (state-level GHG to county-level GHG); and growth and control factors to be applied for the development of the 2005 base year inventory and the 2020 projection.

A Category III Quality Assurance Project Plan (QAPP), which complies with the EPA requirements for quality assurance will be included as an appendix to the IPP. Much of what is typically included in a QAPP covering source classification, source coverage, data sources, and allocation

methods will be included in sector-level material prepared for the IPP. For the QAPP, Pechan plans to focus on assuring that the activity data used to generate CAP/HAP emissions is equivalent to that used for GHG emissions. Secondly, there will be a need to identify instances where the changes in methods have lead to differences in the activity data and/or emissions that were originally presented in IA's GHG Inventory & Forecast or NEI emissions data.

Pechan plans to use the IPP as a primary source of documentation for the project (e.g., an appendix to the Final Report). After review and approval from the EPA on the IPP, Pechan will complete work to develop the 2005 inventory data files.

ACQUIRE DATA AND DEVELOP INVENTORY DATA FILES

Pechan will acquire 2005 point source CAP/HAP data from the NEI (EPA, 2009), which will be supplemented with data from the Iowa Department of Natural Resources (IDNR). Since the point source data files are populated with accurate throughput (activity) data needed to add emission estimates for GHGs, these data will be used directly to populate the point source inventory with GHG estimates (i.e., CO_2, CH_4 and N_2O). Pechan will also acquire IDNR's 2002 nonpoint data and use the methods prescribed in the IPP to develop the 2005 base year nonpoint inventory (the inventory methods will actually have already been reviewed as part of the IPP development). Pechan will also acquire the GHG inventory and forecast data for IA (1990-2020) based on work previously done by the firm in collaboration with the Center for Climate Strategies (CCS, 2009).

Following the methods prescribed in the IPP, Pechan will develop the 2005 base-year inventory in NIF 3.0 format.

DEVELOP 2020 MULTIPOLLUTANT (GHG, CAP, HAP) EMISSION PROJECTIONS

Consistent with the methods presented in the IPP, Pechan will develop a set of NIF and Emission Inventory System Bridge format files covering a 2020 projection of the 2005 base year multipollutant inventory. The growth and control factors will be developed, as needed, and documented. The growth factors will come from primarily from the IA GHG forecast, while the control factors will come from the Central Regional Air Planning Association (CENRAP) regional haze planning work, as well as those made available to Pechan by EPA. The CENRAP projection is for calendar year 2018. The projection will be considered a business as usual (BAU) projection, which captures the effects of existing control/ mitigation programs (i.e. not the recent GHG mitigation recommendations from the IA Climate Change Advisory Council final report).

REFERENCES

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KEY WORDS

Greenhouse Gas, Criteria Air Pollutant, Hazardous Air Pollutant, Toxic Air Pollutant, emissions inventory, forecast