

ISSRC Goal: Improve the Air Quality Management Process

Provide Training, Software Tools, and Information for Better Air Quality Management programs in developing countries

www.issrc.org

Needs Identified in 2000

- ▶ On-Road vehicles are the main source of urban emissions yet there was no applicable emissions model or data collection process for on-road and off-road vehicles in developing countries
 - ▶ Only limited information was available to help developing countries create an effective air quality management process
 - ▶ Data (such as information to build emission inventories) needed for the air quality management process was not easily accessible or easily useable by air quality improvement agencies in developing countries
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Projects Undertaken by ISSRC

- ▶ **International Vehicle Emissions Model (IVE)**
 - ▶ Develop emissions model for on-road mobile sources applicable to developing countries (2000-present)
- ▶ **Air Quality Knowledgebase**
 - ▶ Provide an internet based information system on air quality management (2006-present)
- ▶ **Integrated Air Quality Management Process**
 - ▶ Develop an internet based database system that supports data collection and facilitates a comprehensive air quality management process to addresses criteria, toxic, and climate change pollutants (2008-present)



On-Road Vehicle Emissions Model Completed

▶ IVE Model

- ▶ Can be downloaded for free from ISSRC web site (www.issrc.org/IVE)
- ▶ Can be operated in five languages with more languages being added as needed
- ▶ Reviewed in Air and Waste Management Association Journal as best overall model for estimating vehicular emissions in developing countries (February, 2009)



IVE Model Interface

The screenshot displays the IVE Model 2.0 interface. At the top, there is a menu bar with 'File' and 'Language'. Below it is a title bar 'IVE Model 2.0' and a header 'International Vehicle Emissions Model' with a globe icon. The main area has four tabs: 'Calculation', 'Location' (selected), 'Fleet', and 'Base Adjustments'. Under the 'Location' tab, there is a 'Location Group' dropdown set to '- single location -'. Below this is a 'Calculate Locations' section with a list containing 'LA-4 cycle (Bag2&3 of FTP) (171)'. To the right is an 'Available Locations' list with items like 'Bin11 (171)', 'Bin12 (171)', 'Bin13', 'Bin14 (171)', 'Bin35 (171)', 'Chaim (171)', and several 'ISBASE' models (e.g., ISBASE60 (MazdaE1)). There are 'Add' and 'Remove' buttons between the lists. Below the lists are controls for 'Display Hour' (0:00...), 'Display Units' (milligrams), 'Distance/Time' (1.0 km), and 'Start-ups' (1.0). There are also buttons for 'Calculate One Hour' and 'Calculate One Day'. At the bottom, there are tabs for 'Criteria', 'Toxics', and 'Global warming'. The 'Criteria' tab is active, showing a table with columns for CO, VOC, VOC evap., NOx, SOx, and PM, each with a green checkmark. The table has rows for 'Start-up Hour', 'Running Hour', 'Total Hour', 'Start-up Day', 'Running Day', and 'Total Day', with the 'Total' rows highlighted in red.

	CO	VOC	VOC evap.	NO _x	SO _x	PM
Start-up Hour						
Running Hour						
Total Hour						
Start-up Day						
Running Day						
Total Day						

On-Road Data Collection Methodologies

- Methodologies have been developed to collect appropriate on-road mobile source data for emissions modeling.
- Methodologies are being applied in Argentina (Buenos Aires), China (Beijing, Shanghai, Tianjin, Xian), Chile (Santiago), Colombia (Bogotá, Cali), Israel (Jerusalem), India (Pune), Kazakhstan (Almaty), Mexico (Mexico City, Guadalajara, Mexicali, Monterey, Tijuana), Turkey (Istanbul).
- Work beginning in Chongqing, China and plans underway for additional cities in Turkey



AQ Knowledge Base

- ▶ Internet Encyclopedia On Air Quality Management Issues
 - ▶ Most important topics identified and outlined, some chapters drafted
 - ▶ Text upload system created to allow additions to the text from multiple persons from anywhere in world with an internet connection
 - ▶ Can support multiple languages
 - ▶ Can be reviewed in present stage of development at www.aqbook.org/read



Knowledgebase Interface

Estimating Emissions from Air Quality Sources

http://www.aqbook.org/read/index.php?page=67

MySQL Documentation AQ Book CA Online Cert Translate Spanish Dictionary Emission Inv...rk | US EPA UTSports NatInstiStandards McMaster-Carr

CHAPTER 6 ESTIMATING EMISSIONS FROM AIR QUALITY SOURCES

Estimating Emissions from Air Quality Sources

6.1 Development of an Emissions Inventory

6.1.1 Overview

6.1.1.1 Introduction

An emissions inventory is a compilation of emissions information related to the sources of one or more air quality problems in a location of interest that normally resides in some form of database structure. It should be noted that especially with respect to global warming gases, that emission sinks (i.e. negative emission sources) can also be an important consideration as well. Emission inventories are a mandatory component for the development of an effective air quality management process as discussed in Chapter 3. They are typically used to support the analysis of the air quality impacts of sources, to support trend analysis for air pollution reduction programs, and to support policy and regulatory analyses of air quality management efforts. While the bottom line for an emissions inventory is, of course, the quantification of emissions into the atmosphere, the intended uses of the inventory, such as air quality modeling and regulatory analysis, require the inclusion of additional information in the inventory other than just the emissions information. Thus, the design and development of an inventory is critical to producing an effective air quality management process. The Intergovernmental Panel on Climate Change has produced a series of documents on developing emission inventories for greenhouse gases (<http://www.ipcc.ch/index.htm>). The principles outlined in their "General Guidance and Reporting" document are applicable to most other air quality problems and provide a good deal of insight into the emissions inventory process. It is recommended as a good source of information on emission inventory development.

In general, a good emissions inventory meets the following guidelines. These guidelines were adapted from, "2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 1" (<http://www.ipcc.ch/index.htm>).

Transparency: There is sufficient and clear documentation such that individuals or groups other than the inventory compilers can understand how the inventory was compiled.

Completeness: Estimates are reported for all relevant categories of sources and sinks, and gases.

Consistency: Estimates for different inventory years, gases, and categories are made in such a way that differences in the results reflect real differences in emissions.

Comparability: The inventory is reported in a way that allows it to be compared with other similar inventories.

Accuracy: The inventory contains neither over- nor under-estimates so far as can be judged.

A properly developed emissions inventory will: identify the sources of emissions that are creating the air pollution problems of interest, will allow the projection of the impacts of emission control scenarios, will support air quality modeling where needed, and will facilitate

Table of Contents

Language

Referenes

Contributors

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Knowledgebase Development

- 13 topics identified for knowledgebase
- Information on 4 topics online
- Chapter 3 in English, Spanish, and Chinese to demonstrate multi-language capability
- Present authors: Nicole Davis, Kebin He, James Lents, Mauricio Osses, Michael Walsh
- 2 day class taught annually in Sweden using Chapter 3 and 6 of knowledgebase
- Hope to make use of expertise at NACAA and EPA in U.S. and other experts around the world to add to knowledgebase



Environmental Database System

- ▶ **Database system to support integrated air quality management** (Urban Air Quality, Regional Air Quality, Global Air Quality)
 - ▶ Presently designed to operate in Chinese, English, Portuguese, and Spanish
 - ▶ To be available at no cost
 - ▶ Designed to be easily implementable in office with low cost components
 - ▶ Developing web applications to support an integrated air quality management process using the new database design including spatially and temporally disaggregated emission inventories, credit tracking, inspection tracking, etc.



Database Development and Testing

- ▶ **For initial development, working with**
 - ▶ Mexico EPA (SEMARNAT), Mexico DF, and Mexico INE
 - ▶ Sao Paulo EPA (CETESB) and Institute of Energy and Environment (IEMA) in Brazil
 - ▶ Shanghai Environmental Academy and Chongqing Air Pollution Control Agency in China
- ▶ **Most generic data entered into database, presently working on local Mexico City and Guadalajara and Sao Paulo data to move into database to demonstrate system. Data related to Shanghai and Chongqing to follow**



Example Interfaces Presently Available

- ▶ Gridded Data Input Interface
- ▶ Emission Factor Finder
- ▶ IPCC Web Interface
- ▶ Many others under development



Emission Factor Interface

The image displays two browser windows side-by-side. The left window, titled 'EmissionFactorFind', shows the 'EMISSION FACTOR FIND' interface. It includes the ISSRC logo, a search form for SCCx Code, and a list of emission factors for the code E10300101NOx100. The right window, titled 'SCCx Code Finder', shows the 'SCCx CODE FINDER' interface with a list of source sets and a search result for E10300101NOx100.

EmissionFactorFind

International Sustainable System Research Center
www.issrc.org

EMISSION FACTOR FIND

SCCx Code: [help](#)

Insert a SSCx Code to obtain the emission factors, if you don't know it click on help.

The emission factors for the SSCx Code: E10300101NOx100 are

- CalFactor1: 0.00900001 kg/kg
- CalFactor2: kg/kg
- CalFactor3: kg/kg
- CalFactor4: kg/kg
- CalFactor5: kg/kg

SCCx Code Finder

SCCx CODE FINDER

- Set 1: **Point Source**
- Set 2: **External Combustion Boilers**
- Set 3: **Commercial/Institutional**
- Set 4: **Anthracite Coal**
- Set 5: **Pulverized Coal**
- Set 6: **EPA webfire emission factors version**
- Set 7: **UNCONTROLLED**
- Set 8: **Nitrogen Oxides (NOx)**

Result: **E10300101NOx100**

Remaining Possibilities: 1

Conclusion

- ▶ Have on-road mobile emissions model in place and available free with English and Spanish users manuals
 - ▶ Working toward an off-road mobile emissions model with similar user interface
 - ▶ Created a free website to house information on air quality management with sections presently available on collecting appropriate information to build on-road mobile source emission inventory, AQM concepts, inventory development, air quality standards, modeling.
 - ▶ Developing free internet database system to house and allow processing of air quality management related data with interfaces in Chinese, English, Portuguese, and Spanish.
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