

ISSRC Goal: Help to Improve the Air Quality Management Process in Developing Countries

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

www.issrc.org

Key Needs in Developing Countries

- ▶ On-Road vehicles are the main source of urban emissions yet there has been no applicable emissions model or data collection process
- ▶ Only limited information available to build local capacity for an effective air quality management process
- ▶ Data (such as information to build emission inventories for modeling and policy analysis) for air quality management process not easily accessible nor set up for reliable analysis



Projects Undertaken by ISSRC

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



On-Road Vehicle Emissions Model

▶ 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 opportunities present themselves
- ▶ Reviewed in Air and Waste Management Association Journal as best overall model for estimating vehicular emissions in developing countries (February, 2009)
- ▶ In active use in many countries around the world



On-Road Data Collection Methodologies

- Designed process to collect appropriate on-road mobile source data for emissions modeling.
- Applied to date 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 discussions underway for additional cities in Turkey and Egypt (Cairo)



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 anywhere in world with an internet connection
 - ▶ Can support multiple languages
 - ▶ Can be reviewed in present stage of development at www.aqbook.org/
 - ▶ Presently completed portions used in annual Swedish training for developing countries and in China by EPB.



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 NatInstStandards 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

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Language

Referenes

Contributors

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Knowledgebase Development

- 13 general topics identified
- Information on 4 topics online
- Chapter 3 in English, Spanish, and Chinese
- Present authors: Nicole Davis (ISSRC), Kebin He (Tshinghua), James Lents (ISSRC), Mauricio Osses (ISSRC-Latin America), Michael Walsh (Consultant)
- Hope to make use of expertise at the UN, World Bank, NACAA and EPA in U.S. and other experts around the world to add to knowledgebase
- With one hour of training and a username and password, anyone can add to the 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
 - ▶ Will make available at no cost
 - ▶ Designed to be easily implementable in small office with low cost equipment and free software
 - ▶ Developing web applications to support integrated air quality management process including spatially and temporally disaggregated emission inventories, credit tracking, inspection tracking, etc.

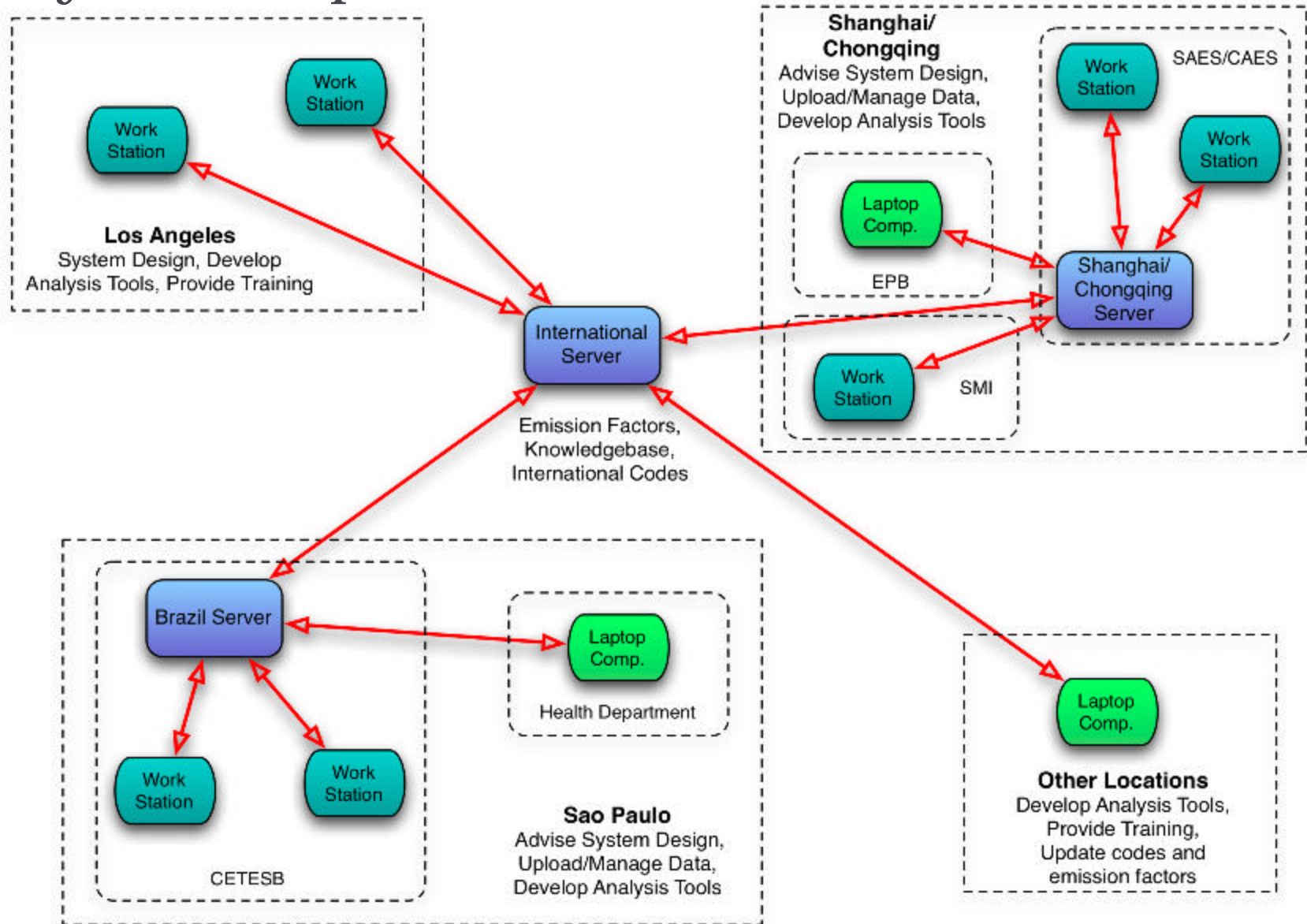


Database Concept

- ▶ Operate/Manage from anywhere in world with internet access
- ▶ Security to protect sensitive portions of database and restrict access to certain source types based on user type
- ▶ Allows measured emissions or estimated emissions
- ▶ Make emission projections
- ▶ Handle water and solid waste emissions, materials throughput information, employment, and equipment cost
- ▶ Operable with missing data
- ▶ Support source inspections
- ▶ Support emission credit information and trading



System Operation



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
- ▶ At this point:
 - ▶ Getting generic data entered into database
 - ▶ Working on local Mexico City, Guadalajara, and Sao Paulo data to move into database to demonstrate system
 - ▶ Data related to Shanghai and Chongqing to follow



Possible Next Steps—IVE Model

▶ Ongoing Issues:

- ▶ Update Emission Factors (keep data consistent with MOVES and other mobile models)
- ▶ Answer questions from users

▶ Special Projects:

- ▶ Add help menu to Fleet page
- ▶ Create Fleet Projector
- ▶ Survey IVE users to identify potential improvements
- ▶ Develop user's manual in Chinese to go with English and Spanish user's manual
- ▶ Develop model and user's manuals in other languages as needed
- ▶ Carry out further activity and emissions testing projects as needed
- ▶ Add black carbon to climate change pollutants



Possible Next Steps—IVE-Non-Road

- ▶ Develop new model based on IVE architecture and same type user interface to simplify learning curve or adapt IVE to make off-road calculations
- ▶ Offer software in same languages as present IVE On-Road model (if separate model)
- ▶ Modify User's Manual to include Non-Road and Translate user's manual into three languages (Chinese, English, Spanish)



Possible Next Steps--Knowledgebase

- ▶ Add and Update topics as needed
- ▶ Find persons at UN, World Bank, NACAA, and EPA to help improve/add sections
- ▶ Create a review committee
- ▶ Hold training sessions on adding information
- ▶ Translate all sections of the book into Chinese, English, and Spanish
- ▶ Improve web interface
- ▶ Set up annual air quality management training program for developing countries



Possible Next Steps--Database

- ▶ Identify and Generate additional web interfaces
- ▶ Develop users manual in English/Spanish/Chinese
- ▶ Hold training sessions
- ▶ Add other languages when needed



Summary

- ▶ On-road mobile emissions model in place and available free with English and Spanish user's manuals
- ▶ Created a free website to house information on air quality management (sections presently available on collecting 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 support processing of air quality management related data with interfaces in Chinese, English, Portuguese, and Spanish.

