Integrated Programme for Better Air Quality in Asia (IBAQ Programme)

CITY SOLUTIONS TOOLKIT:
COMPENDIUM OF AVAILABLE EMISSION FACTORS

BACKGROUND INFORMATION

Emission factors (EF) are used for the calculation of emissions in compiling an inventory. It relates the quantity of emissions with the activity data of the emission source (EPA, 2017). This module compiled a curated list of references to aid users in determining appropriate EF values to use in inventory development.

The focus of the document is to provide the user with an index of available and well-established references on EFs. Guidelines on the applicability of EFs are also provided

COMPENDIUM OF EMISSION FACTORS

The list below provides information on major manuals and guidebooks on EFs. It must be noted that EF values are context-dependent, hence it is paramount to carefully assess the applicability of each manual or guidebook for the intended use. Short descriptions of the key features of the references and weblinks to access the resource are also provided.

1) [Guidelines for Developing Emission Inventory in East Asia (2011)](#)

This document is an integral reference for emissions inventory development in Asian countries. Most of the EFs are compiled from other guidebooks and are found to be of good use since all the EFs are presented in detail per industry and per pollutant.

2) [The Global Atmospheric Pollution Forum Air Pollutant Emission Inventory Manual Version 6.0 (2019)](#)

The manual is based on a document initially prepared for UNDP/UN DESA by the Stockholm Environment Institute and has been used in Northeast Asia. It has been modified for use for the Malé Declaration countries of South Asia and the Air Pollution Information Network for Africa (APINA).

3) [Air Quality Monitoring Project-Indian Clean Air Programme (ICAP) (2003)](#)

The reference focuses on the development of emission factors for Indian vehicle and vehicle source profiling within the context of India's integrated air quality management. Emission factors from this publication are more applicable to Asian cities with regards to transport.

[4) AP 42, Fifth Edition Compilation of Air Pollutant Emissions Factors](#)

This has been the primary compilation of EF information by the US EPA. It contains EFs and process information for more than 200 air pollution source categories. The EFs have been developed and compiled from source test data, material balance studies, and engineering estimates for stationary, point, and area sources. The latest additional EFs are available on the website link provided, together with organized per chapter links for specific source categories.

5) US EPA - AIR CHIEF

The US EPA has one of the most extensive programs to develop EFs for use in stationary and mobile sources. Most of the content, information, and updates on stationary and area source emissions are available as part of its Clearinghouse for Inventories and Emissions Factors (CHIEF) programmes (US EPA, 2017).

6) WebFIRE

WebFIRE is the US EPA's online database that contains EFs for criteria and hazardous air pollutants (HAPs) for industrial and non-industrial processes (US EPA, 2016a). This allows the user to search for the latest and most appropriate EFs for most point and area source categories, including a rating on the quality of the particular EF. Users can browse through records in the database or select specific EFs by source category, source classification code (SCC), pollutant name, CAS number, or control device. WebFIRE also contains reports submitted to the EPA such as:

- Performance Test Reports;
- Performance Evaluations: Relative Accuracy Test Audits;
- Notification of Compliance Status Reports; and
- Air Emissions Reports, such as Summary Reports and Excess Emission Reports.

7) EEA - EU EMEP/CORINAIR

The European Union's (EU) European Monitoring and Evaluation Programme/Core Inventory of Air Emissions (EMEP/CORINAIR) Emission Inventory (EEA, 2016) is similar to US EPA's guidance on air emission inventories. The European air emission inventory programme collects, manages, maintains, and publishes official annual national inventories. Emissions from some types of natural or biogenic sources are also included in CORINAIR. Users can access the 'Additional Files' list in the page and select 'Emission Factor Database'. There you will be directed to EEA's online viewer of EFs.

The most recent edition of the Guidebook was published in 2019 and provides a comprehensive guide to state-of-the-art atmospheric emissions inventory methodology (EEA, 2016). The guidebook has two key objectives:

- To provide procedures to enable users to compile emission inventories that meet quality criteria for Transparency, Consistency, Completeness, Comparability and Accuracy (TCCCA criteria); and
- To provide estimation methods and EFs for inventory compilers at various levels of sophistication.

8) Handbook of Emission Factors for Road Transport (HBEFA)

The Handbook of Emission Factors for Road Transport (HBEFA) was developed for the environmental agencies of Germany, Switzerland and Austria. The HBEFA provides EFs in g/km for the most current vehicle categories (Personal cars, Light Duty Vehicles (LDV), Heavy Duty Vehicles (HDV) and motorcycles), differentiated according to emission standards (Euro 0 to Euro VI) and different traffic constellations and vehicle distributions (HBEFA; 2017). The handbook for MS Windows computers can be ordered online. Version 4.1 is available for order at the given link.

9) MOVES

MOVES is an EF model for the Motor Vehicles Emission Simulator as the US EPA's official model for estimating emissions from passenger cars, trucks and motorcycles (US EPA, 2016b). MOBILE 6 replaced by MOVES was an EF model for estimating emissions [g/mile] of HC, CO, NO_x, CO_2, PM, and toxic air pollutants emitted by cars, trucks, and motorcycles under various conditions (US EPA, 2001). The installation process for this model is provided in the link.

10) Atmospheric Brown Clouds: Emission Inventory Manual UNEP (2013)

Recognizing the need to quantify the emissions of air pollutants that lead to the formation of haze and atmospheric brown clouds, the ABC EI Manual was developed by the Asian Institute of Technology (AIT) through the UNEP. Atmospheric brown clouds (ABC) are plumes of air pollution on a regional scale, mainly from anthropogenic activities such as biomass open burning and combustion of fossil fuels and biofuels (Clean Air Asia and UN Environment, 2019).

The ABC Manual in the provided link is used together with an Excel file where all compiled EFs from other EI manuals are built-in for ease of emissions calculation.

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