



IPCC TFI Work on Short-lived Climate Forcers (SLCFs)

TFEIP 2024 Meeting

Dessau, Germany, 14-16 May 2024

Pavel Shermanau

IPCC TFI TSU

ipcc

INTERGOVERNMENTAL PANEL ON **climate change**



Mandate for IPCC Work on SLCFs

- **Decision**

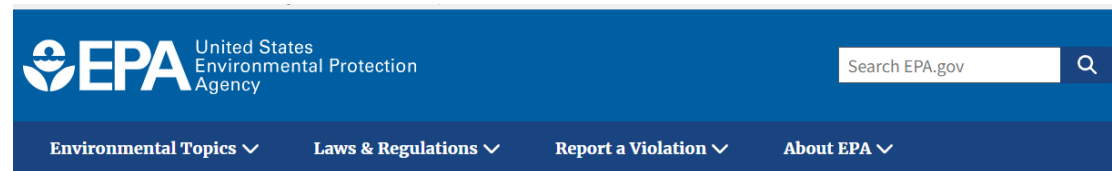
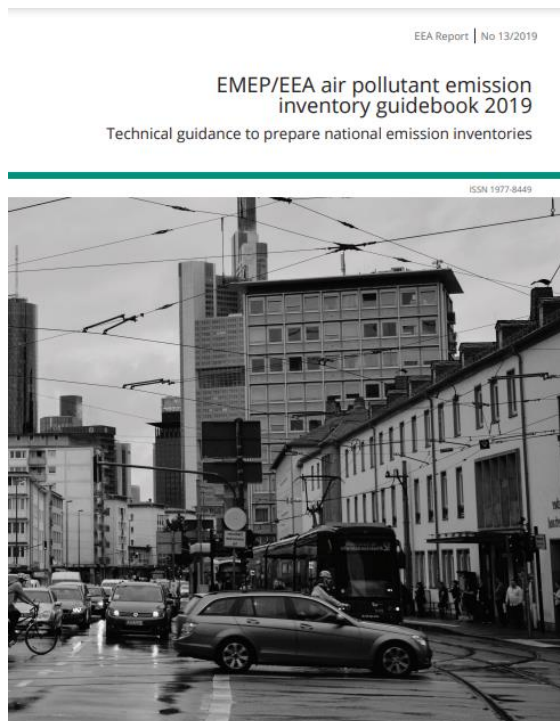
IPCC49 (May 2019, Kyoto, Japan) decided that IPCC TFI should develop a new Methodology Report on SLCFs during AR7 cycle with a preparatory work during AR6 cycle (Decision IPCC-XLIX-7).

- **Approach**

The preparatory work for the Methodology Report (including technical analysis and expert meetings) is completed as soon as possible starting in the AR6 cycle (before 2023). Followed by further methodological development in the AR7 cycle (from 2023)

Technical Analysis

- IPCC TFI TSU conducted technical analysis of the main methodological frameworks on SLCFs source categories and associated emissions:
 - EMEP/EEA Air Pollutant Emission Inventory Guidebook 2019
 - US EPA AP-42: Compilation of Air Pollutant Emissions Factors
 - UNEP Atmospheric Brown Clouds (ABC) Emission Inventory Manual
- This analysis was the basis for discussion at the Joint 1st and 2nd Expert Meeting.



Air Emissions Factors and Quantification

CONTACT US

[Air Emissions Factors and Quantification Home](#)

[Basic Information](#)

[AP-42](#)

[Emissions Estimation Tools](#)

AP-42: Compilation of Air Emissions Factors from Stationary Sources

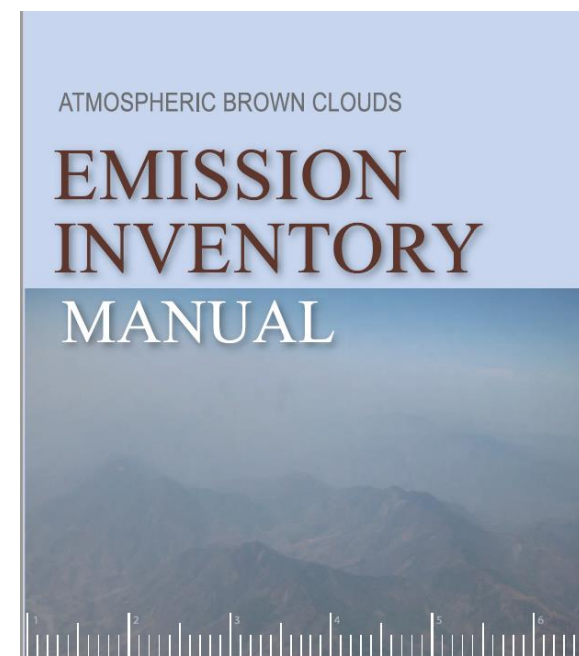
Compilation of Air Pollutant Emissions Factors from Stationary Sources (AP-42)

AP-42, *Compilation of Air Pollutant Emissions Factors from Stationary Sources*, has been published since 1972 as the primary compilation of EPA's emissions factor information. It contains emissions factors and process information for more than 200 air pollution source categories. A source

Alerts

1/12/2024 -

EPA has drafted new emission factors for AP-42 Chapter 2, Section 4 - Municipal Solid Waste Landfills. These factors can be found on the [Draft Revisions to AP-42](#)



- Part A: general guidance chapters
 - 2 Key category analysis and methodological choice 2019 [833.6 KB]
 - 3 Data collection 2019 [505.6 KB]
 - 4 Time series consistency 2019 [358.7 KB]
 - 5 Uncertainties 2019 [699.2 KB]
 - 6 Inventory management, improvement and QA QC 2019 [818.6 KB]
 - 7 Spatial mapping of emissions 2019 [996.0 KB]
 - 8 Projections 2019 [1.4 MB]
- Part B: sectoral guidance chapters
 - 1. Energy
 - 1.A Combustion
 - 1.A.1 Energy industries [2.5 MB]
 - 1.A.2 Combustion in manufacturing industries and construction [821.6 KB]
 - 1.A.3.a Aviation 2019 [1.5 MB]
 - 1.A.3.a Aviation 2 LTO emissions calculator 2019 [3.3 MB]
 - 1.A.3.a Aviation 1 Master emissions calculator 2019 [6.3 MB]
 - 1.A.3.b.i-iv Road transport 2019 [2.9 MB]
 - 1.A.3.b.i-iv Road Transport Appendix 4 Emission Factors 2019 [7.1 MB]
 - 1.A.3.b.v Gasoline evaporation 2019 [1.6 MB]
 - 1.A.3.b.vi-vii Road tyre and brake wear 2019 [497.8 KB]
 - 1.A.3.c Railways 2019 [589.7 KB]
 - 1.A.3.d Navigation (shipping) 2019 [800.7 KB]
 - 1.A.3.e.i Pipeline transport 2019 [60.0 KB]
 - 1.A.4 Small combustion 2019 [3.7 MB]
 - 1.A.4 Non road mobile machinery 2019 [1.6 MB]
 - 1.A.4 Non road mobile machinery Annex [92.1 KB]
 - 1.B Fugitive emissions from fuels

AP-42, Compilation of Air Pollutant Emissions Factors from Stationary Sources

Chapter	Title
Table of Contents	AP-42 Table of Contents (pdf) , (245.4 KB)
Introduction	AP-42 Introduction (pdf) , (287.7 KB)
Chapter 1	External Combustion Sources
Chapter 2	Solid Waste Disposal
Chapter 3	Stationary Internal Combustion Sources
Chapter 4	Evaporation Loss Sources
Chapter 5	Petroleum Industry
Chapter 6	Organic Chemical Process Industry
Chapter 7	Liquid Storage Tanks
Chapter 8	Inorganic Chemical Industry
Chapter 9	Food and Agricultural Industries
Chapter 10	Wood Products Industry

...extensive work...

TABLE OF CONTENTS

Chapter Title	Page
Table of Contents	vi
List of Abbreviations	x
List of Figures	xii
List of Tables	xiii
Units and Conversions	xv
1. Introduction	1
2. ABCs Inventory Methods and Coverage	3
2.1. Emission Inventory Characteristics	3
2.2. Emission Inventory Development Approaches	4
2.3. Emission Estimation Methods	4
2.4. Data Collection	5
2.5. Pollutants	6
2.5.1. Particulate Matter (PM)	6
2.5.2. Sulfur Dioxide (SO ₂)	8
2.5.3. Carbon Dioxide (CO ₂)	8
2.5.4. Nitrogen Oxides(NO _x)	8
2.5.5. Ammonia (NH ₃)	8
2.5.6. Carbon Monoxide (CO)	9
2.5.7. Non Methane Volatile Organic Compound (NMVOC)	9
2.5.8. Methane (CH ₄)	10
2.6. Sources and Sectors	10
2.6.1. Chapters	10
2.6.2. Large Point Sources (LPS)	12
2.6.3. Area Sources	13
2.6.4. Mobile Sources	13
2.7. Temporal Emission Distribution	13
2.8. Spatial Emission Distribution	14
3. Combustion in Energy Industry and Energy Using Sectors	15
3.1. Energy Industry	15
3.1.1. Overview	15
3.1.2. Emission Estimation Method	15
3.1.3. Data on Activity Levels	16
3.1.4. Emission Factors	17
3.1.5. Temporal and Spatial Distribution	26
3.1.6. Summary	27
3.2. Manufacturing and Construction	27
3.2.1. Overview	27
3.2.2. Emission Estimation Method	28
3.2.3. Data on Activity Levels	28
3.2.4. Emission Factors	29
3.2.5. Temporal and Spatial Distribution	29
3.2.6. Summary	32

Technical analysis tables

IPCC code	Category	SLCFs	IPCC Method	Alternative methodology	Available EFs/ Parameters	Globally applicable?	Gaps (if any)	Comments
A	B	C	D	E	F	G	H	I
2B Chemical Industry								
2B1	Ammonia production	NOx, NH3, CO, NMVOC, SOx	Yes, with modification, the method is slightly different: fuel and carbon content (IPCC-CO2) per output of ammonia vs. EF of SLCF per output of ammonia		EMEP/EEA, UNEP, US AP-42, REAS, MEP China	Yes		D: In the 2006 IPCC Guidelines, in the case of ammonia production no distinction is made between fuel and feedstock emissions with all emissions accounted for in the IPPU Sector. The method for CO2 and SLCFs is slightly different: input of fuel and its carbon content (IPCC-CO2) by output of ammonia vs. EF of SLCF by output of ammonia (SLCF). F: EMEP/EEA – NOx, CO, NH3, NMVOC - Tier2, Tier 2 - technology specific UNEP – NOx, CO, NH3, SOx, NMVOC US AP-42 – NH3, SO2, CO, NMVOC REAS – NH3 MEP China – NMVOC
2B2	Nitric Acid production	NOx, NH3	Yes		EMEP/EEA, UNEP, US AP-42	Yes		F: EMEP/EEA – NOx. UNEP – NOx and NH3 US AP-42 – NOx
2B3	Adipic Acid production	NOx, CO, NMVOC	Yes		EMEP/EEA, UNEP, US AP-42	Yes		F: EMEP/EEA – NOx, CO UNEP and US AP-42 – NOx, CO, NMVOC

✓ **Excerpt from IPPU table**

Joint 1st and 2nd IPCC Expert Meeting on SLCFs

- The Joint 1st and 2nd Expert Meeting was held in October 2021 in online format
- Working on the technical documents, the expert meeting successfully achieved its goals:
 - A complete list of SLCF source categories and associated SLCF species for all sectors – Energy, IPPU, AFOLU and Waste
 - List of knowledge gaps in all sectors
- All outcomes (categories list, gaps list, BOGs discussion and conclusions, presentations and tables for each sector) are part of the meeting report published at the IPCC TFI website:
https://www.ipcc-nggip.iges.or.jp/public/mtdocs/2110_SLCF.html

✓ ***The category list is intended to form the future sectoral outline for Chapters/ Volumes of Methodology Report on SLCFs***

3rd IPCC Expert Meeting on SLCFs

- The 3rd Expert Meeting further considered issues identified at the Joint 1st and 2nd Meeting and discussed cross-cutting issues in relation to the inventory of SLCFs emissions taking into account the assessments in the IPCC WGI and WGIII contributions to AR6
- It was held in April 2022 in online format
- The discussion was focused on three main topics:
 - Definitions of SLCF species and methods of their identification/quantification
 - General inventory issues (Data Collection, Key Category Analysis, Uncertainty Analysis, Verification, etc.)
 - Refined Category and Gaps' lists

✓ **Possible issues for Volume 1 of Methodology Report on SLCFs – General Issues**

The meeting report was published on the IPCC TFI website:

https://www.ipcc-nggip.iges.or.jp/public/mtdocs/2204_SLCF_EM3.html

Meeting Reports



2018 05 29


Expert Meeting on Short-Lived Climate Forcers (SLCF)

Meeting Report

28-31 May 2018, Geneva, Switzerland

Task Force on National Greenhouse Gas Inventories (TFI) /
Working Group I (WGI)

ipcc
INTERGOVERNMENTAL PANEL ON climate change






Joint 1st and 2nd IPCC Expert Meeting on Short-lived Climate Forcers

Report of IPCC Expert Meeting
11 – 22 October 2021, Virtual Meeting

Task Force on National Greenhouse Gas Inventories

ipcc
INTERGOVERNMENTAL PANEL ON climate change





Third IPCC Expert Meeting on Short-lived Climate Forcers

Report of IPCC Expert Meeting
11 – 15 April 2022, Virtual Meeting

Task Force on National Greenhouse Gas Inventories

ipcc
INTERGOVERNMENTAL PANEL ON climate change



https://www.ipcc-nggip.iges.or.jp/public/mtdocs/1805_Geneva.html

https://www.ipcc-nggip.iges.or.jp/public/mtdocs/2110_SLCF.html

https://www.ipcc-nggip.iges.or.jp/public/mtdocs/2204_SLCF_EM3.html

Scoping Meeting

- The Scoping Meeting Methodology report on SLCFs was held on 26-28 February 2024 in Brisbane, Australia.
- The aim of the Scoping Meeting was to decide on the title and format of the Methodology report and to produce the following documents:
 - Terms of Reference (ToR)
 - Table of Contents (ToC)
 - Instructions to Experts and Authors
 - Workplan
- The Scoping Meeting report can be found on the IPCC-TFI website: <https://www.ipcc-nggip.iges.or.jp>

Scoping Meeting

The Scoping Meeting agreed on the following:

- **The title:**

2027 Supplement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Short-lived Climate Forcers (2027 Supplement on SLCFs)

- **The format:**

The format should be in line with the IPCC guidelines.

Terms of Reference (excerpt)

○ Scope

Methodology Report will provide guidance on SLCF emissions which are:

- Anthropogenic
- Direct (not including secondary human-induced substances)
- National
- Annual
- Reported in mass units for each individual emitted species.

○ Species

- Species covered by Methodology Report will be NO_x, CO, NMVOCs, SO₂, NH₃, BC, OC and H₂.

Reporting of PM_{2.5} as ancillary information would also be requested for transparency, because either BC and OC can be estimated as a fraction of PM_{2.5} emissions or as a verification of direct measurements of BC/OC emissions

- Methane and halogenated species will not be covered since these are already addressed by the IPCC Guidelines

○ Approach

The authors will ensure consistency with categories and build on the methodological guidance within the 2006 IPCC Guidelines, Wetlands Supplement and 2019 Refinement.

ipcc

INTERGOVERNMENTAL PANEL ON climate change



Table of Contents (1)

The 2027 Supplement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Short-lived Climate Forcers (2027 Supplement on SLCFs)

- Overview
- Volume 1. General Guidance
 - Introduction
 - Approaches to Data Collection
 - Uncertainties
 - Methodological Choice and Identification of Key Categories
 - Timeseries consistency
 - QA/QC and Verification
 - Reporting guidance and Tables

Table of Contents (2)

- **Volume 2. Energy Sector**

- Introduction
- Stationary combustion
- Mobile combustion
- Fugitive Emissions
- Other

- **Volume 3. IPPU Sector**

- Introduction
- Mineral Industry
- Chemical Industry
- Metal Industry
- Non-Energy products from fuels and Solvent Use
- Other

- **Volume 4. AFOLU Sector**

- Introduction
- Generic methodologies
- Consistent representation of land
- Emissions from Livestock and Manure Management
- Land use categories
- Managed soil
- Other

- **Volume 5. Waste Sector**

- Introduction
- Solid Waste Disposal
- Biological Treatment of Solid Waste
- Incineration and Open Burning of Waste
- Wastewater Treatment and Discharge
- Other

Future IPCC TFI Activities on SLCFs

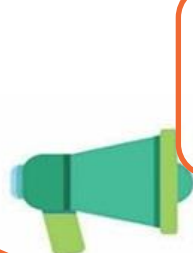
- **IPCC-61 Session on 26 July-2 August 2024 in Sofia, Bulgaria**

IPCC Plenary needs to approve the outline of the Methodology report on SLCFs

- **IPCC TFI Call for Authors**

After IPCC-61 the IPCC Secretariat will send a call for nomination of authors for the Methodology report on SLCFs to the IPCC Focal Points and Observer Organisation

Scoping meeting to produce Table of Contents, Terms of Reference, Workplan



Scoping

The outline is drafted and developed by experts nominated by governments and observer organizations

TFB proposes ToC, ToR, WP to IPCC61



Approval of Outline

The Panel then approves the outline

IPCC61 approves the proposal



Nomination of authors

Governments and observer organizations nominate experts as authors

Call for Nominations of Authors



Government and Expert Review - 2nd Order Draft

LAM3 (SOD)



Expert Review - 1st Order Draft

LAM1 (ZOD)
LAM2 (FOD)



Selection of authors

Selection of Authors. Preparation for Lead Author Meeting (LAM1)

LAM4 (FD)

Authors prepare the Second Order Draft (SOD) which is reviewed by experts and Governments



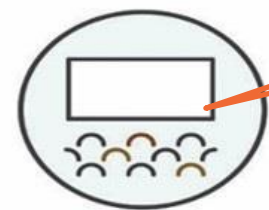
Final Draft (FD) Report

Authors prepare the First Order Draft (FOD) which is reviewed by experts



Government review of the FD

TFB selects authors



Approval & acceptance of report

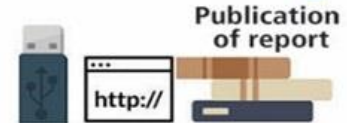
IPCCXX approves the report

Authors prepare the Final Draft (FD) which is sent to Governments before approval

Governments review the FD in preparation for its approval

Adoption of the Overview Chapter (section by section) and acceptance of Methodology Report

It takes around 3-4 years (2024-2027)



Production Cycle of Methodology Report

Other IPCC TFI Activities

- IPCC Expert Meeting on Carbon Dioxide Removal Technologies, 1-3 July 2024, Vienna, Austria
- IPCC Scoping Meeting on Carbon Dioxide Removal Technologies – TBD (September-October 2024)
- IPCC Expert Meeting on reconciling anthropogenic land use GHG estimates, 9-11 July 2024, Ispra, Italy
- **Emission Factor Database (EFDB)**

Terms of Reference of EFDB will be reconsidered by the EFDB Management Group. After that the EFDB activities including meetings and nomination of the Editorial Board members will be decided

- **IPCC Inventory Software**

The main work is currently focused on interoperability between the IPCC Inventory Software and the UNFCCC reporting tools. It is scheduled to be completed by the UNFCCC SB-60 in June 2024. The demonstration workshop is planned for the last week of August 2024 in Baku, Azerbaijan.

Summary

- IPCC preparatory work on SLCFs was carried out in consultation with the TFEIP, some experts of the TFEIP participated in the IPCC Expert Meetings on SLCFs
- The category list of SLCF source categories is consistent with the EMEP/EEA Guidebook
- TFEIP experts are invited to be authors of the IPCC Methodology report on SLCFs. The call for nomination is to be expected in the second half of 2024



Thank you

<https://www.ipcc-nggip.iges.or.jp/index.html>

<https://www.ipcc-nggip.iges.or.jp/meeting/meeting.html>

ipcc

INTERGOVERNMENTAL PANEL ON climate change

