

Emission boundary and bridge tables for emissions

Ole Gravgård
Statistics Denmark
ogp@dst.dk

Defining the air emissions in SEEA

- There seems to be a need to clarify/supplement the description of air emission accounts in SEEA 2003, since it includes little specific information on the definition, delimitation and exact accounting rules for air emissions
- For both accountants and users it is important to describe which emissions should be included in the accounts
- Approach: Start from the principles and general SEEA boundaries. Then look at the practical possibilities for implementing the accounts
- Once the definitions and delimitations have been fixed there is a need to establish bridge tables between the accounts and the emission inventories, e.g. IPCC based inventories

Some boundary and accounting issues

1. Residence/territory

2. Burning of biomass

- a) Fuel wood, etc.
- b) Forest fires, burning of grassland, etc. controlled
- c) Forest fires, burning of grassland, wildfires due to economic activities, but unintended

3. Gross vs. net emissions

- a) Before *or* after treatment in the economy ?
- b) Actual releases (primary air pollution) *or* after chemical reactions in air (secondary air pollution)?

4. Accumulation of emissions in the economy

- a) Carbon capture and storage (CCS)
 - Storage in geological formation
 - Storage in the sea, seabed
- b) Increases in C stocks in cultivated living biomass and soils

5. Emissions from accumulations in the economy

- a) Emissions released from capital equipment (refrigerators, air conditioners, fire extinguishers, etc.)
- b) Emissions released from consumer durables (refrigerators, air conditioners, foams)
- c) Emissions released from controlled land fills
- d) Leakages/emissions from controlled storages of CO₂
- e) Emissions from cultivated forests, e.g. VOC emissions

6. Natural emissions

- a) Sulphur, etc. from volcanic activities
- b) Emissions from non-cultivated forests, etc. e.g. VOC emissions
- c) Natural wildfires
- d) Transboundary flows (flows in the air)

7. Others

- a) Transpiration and evaporation from humans
- b) Enteric fermentation, livestock

1. Residence/territory principle

Principle: Include all emissions from residents

Seems by now to be a well-described issue, although estimations of international transport emissions is not always easy.

No need for further action

2. Burning of biomass

a) Fuel wood, etc.

Principle: Include in SEEA as emissions from industries and households

b) Controlled forest fires, burning of grassland, etc.

Principle: Include as emissions from agriculture and forestry

c) Forest fires, burning of grassland, wildfires due to economic activities, but unintended

Should this be included? Is it possible to find data?

IPCC guidelines: Include fires on managed lands and unmanaged land if related to change of land into managed land

3. Gross vs. net emissions

a) Before or after treatment in the economy ?

Principle: After, if the abatement takes place within the establishment, otherwise before (?)

External treatment is not common, but operations of emissions abatement equipment are sometimes outsourced to other companies

b) Actual releases (primary air pollution) or after chemical reactions in air (secondary air pollution)?

Principle: Actual releases (primary air pollution)

Secondary air pollutants are formed in the air when chemical reactions change the primary air pollutants into other types of air pollutants. The formation of ground level ozone from NO_x and VOC's

IPCC guidelines: report some secondary air emissions

4. Accumulation of emissions in the economy

a) Carbon capture and storage (CCS)

Principle:

Included (i.e. recording a reduction of net emissions), if human control over storage (some geological formations)

Excluded, if not controlled (Storage in the sea, seabed)

b) Increases in C stocks in cultivated living biomass and soils

Principle:

Included. However, perhaps not if harvest approach is applied (?)

Is a distinction between cultivated and non-cultivated possible?

IPCC guidelines: Accounting for C stock changes if related to managed land (or change in land use)

5. Emissions from accumulation in the economy

a) Emissions released from capital equipment
(refrigerators, air conditioners, fire extinguishers, etc. insulation materials)

Included, but should it be as emissions from the capital category or from current activities?

b) Emissions released from consumer durables
(refrigerators, air conditioners, foams)

Included, but to what point of time should the emissions be allocated?

(Time of consumption expenditure or time of actual emissions?) - and how?

5. Emissions from accumulations in the economy (continued)

c) Emissions released from controlled land fills

Included, but unclear whether it should be as emissions from the capital category or from current land fill activities?

d) Leakages/emissions from controlled storages of CO₂

Included as emissions from the capital category

e) Emissions from cultivated forests (e.g. VOC emissions)

Included, but unclear whether it should be as emissions from forestry's current activities or from the capital category?

IPCC guidelines: emissions from managed land are included

6. Natural emissions

a) Sulphur, etc. from volcanic activities

Excluded

b) Non-cultivated forests, etc. (e.g. VOC emissions)

Excluded

c) Natural wildfires

Excluded

d) Transboundary flows (flows in the air)

Included as memo item ?

7. Others

a) Transpiration and evaporation from humans

Excluded

b) Enteric fermentation, livestock.

Included

Bridge to the emissions inventories, IPCC, etc.

- Bridge tables are necessary, and should be part of SEEA
- The final layout depends on what we decide on the issues above

Example of bridge table

	SEEA emissions, total	Less residents in ROW			Plus non-residents on the territory			Biomass burning and Land use and land use change			+ - Other adjustments and statistical discrepancies ²⁾	Emissions inventory, total ³⁾	=	
		- Total	- Land trans- port	- Water trans- port	- Air trans- port	+ Total	+ Land trans- port	+ Water trans- port	+ Air trans- port	+ - Total				- biomass burning
Carbon dioxide (CO ₂)	113 994	-43 509	-	-41 709	-1 799	100	100		-12 210	-11 335	- 875	- 665	57 710	1000 tonnes
Methane (CH ₄)	268 935	-1 045	-	-1 011	- 34	-			- 2		- 2	- 21	267 867	tonnes
Dinitrogen oxide (N ₂ O)	23 508	-2 683	-	-2 620	- 63	-			- 1		- 1	- 20	20 804	tonnes
Nitrous oxides (NO _x)	1 366 951	-1 114 424	-	-1 106 788	-7 636	200	200					-9 861	242 866	tonnes
Carbon monoxide (CO)	549 815	-109 374	-	-107 968	-1 406	1 000	1 000					-2 188	439 253	tonnes
Non-methane volatile organic compounds (NMVOC)	110 259	-33 056	-	-32 726	- 330	186	186					- 331	77 058	tonnes
Sulfur dioxide (SO ₂)	566 979	-505 114	-	-505 057	- 57	200	200					-4 502	57 563	tonnes
Ammonia (NH ₃)	89 818	-	-	-	-	-	-					- 17	89 801	tonnes

1) LULUCF - Land Use, Land Use Change and Forestry;

The bridge item include net emissions (emissions - removals) from changes in forest and other woody biomass stocks; forest and grassland conversion; abandonment of managed lands; and CO₂ emissions and removals from soil.

2) Includes adjustments for embassies, military bases, etc.

3) Includes the net emissions from LULUCF (Land use, and Land Use Change and forestry)

Note: Here it is assumed that SEEA does not include any emissions from the IPCC category LULUCF (land use and land use changes, forestry)