System of
Environmental
Economic
Accounting

Guidance Note

Issue B3 – Treatment of carbon flows in the SEEA CF

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- **Human-induced flows**
- **LULUCF emissions and removals**
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The issue(s)

1. **Human-induced flows:** Can we provide a general definition for the so-called human-induced flows, i.e. flows that occur within the environment but are human-induced, and indicate how these can be accounted for in the PSUTs?
2. **LULUCF emissions and removals:** Can LULUCF related carbon emissions and carbon uptake flows be included in SEEA CF, i.e. in the air emission accounts (AEA), and if yes, how should these flows be accounted for?
3. **Extension of the description of the air emissions accounts**: Can we provide a more elaborate description of the use table for the AEA and indicate what flows should be recorded here? Can a bridge table be added to the text of the SEEA CF?

Existing measurement and research

- This issue was first addressed by ISTAT and FAO some years ago during the compilation of **SEEA AFF** and was also discussed in the London group.
- 'LULUCF and SEEA CF' presented in Pretoria, South Africa at the29th Meeting London Group (Schenau, S. (2023)) LULUCF related carbon flows and options for inclusion in the SEEA CF was discussed. → **This paper was taken as the basis for section 3.2 of this Guidance note.**
- 'Accounting for Human-induced Flows in Nature' presented in Washington at the 30th meeting of the London Group (Matthew Chambers, Nils Brown, Kaia Oras, Aldo Femia, and Sjoerd Schenau (2024)) the concept of human-induced flows for physical flow accounting was discussed. → **This paper was taken as the basis for section 3.1 of this Guidance note.**

1. Human induced flows

Human-induced flows can be defined as *physical flows that are caused directly by human activity but occur within the environment rather than flowing between the economy and the environment, and which have meaningful, policy-relevant impacts.*

Examples of human induced flows

- **Carbon Emissions and carbon uptake related to land use, land use change and forestry** (LULUCF)

- **Carbon Dioxide Removal** (CDR)

- **Secondary Fine Particle Air Pollution**

- **Transboundary flows**

Accounting for human induced flows

Supply	Industries						Human-Induced Flows in the environment		
	Agriculture	Utilities	Manufacturing	Transportation	Gov't	Households	Particle-Forming Reactions	Imports	Total
Primary PM 2.5	70	100	40	120	35	40		20	425
Secondary PM 2.5							500	50	550
SO2	0	130	60	50	0	0		15	255
NOx	0	100	60	200	50	150		70	630
NH3	350	2	2	6	5	15		160	540
VOCs	80	15	250	75	80	200		60	760

Use	Human-Induced Flows in the environment		Environment	
	Particle-Forming Reactions	Exports	Atmosphere	Total
Primary PM 2.5		42	383	425
Secondary PM 2.5		55	495	550
SO2	100	25	130	255
NOx	200	60	370	630
NH3	200	55	285	540
VOCs	300	75	385	760

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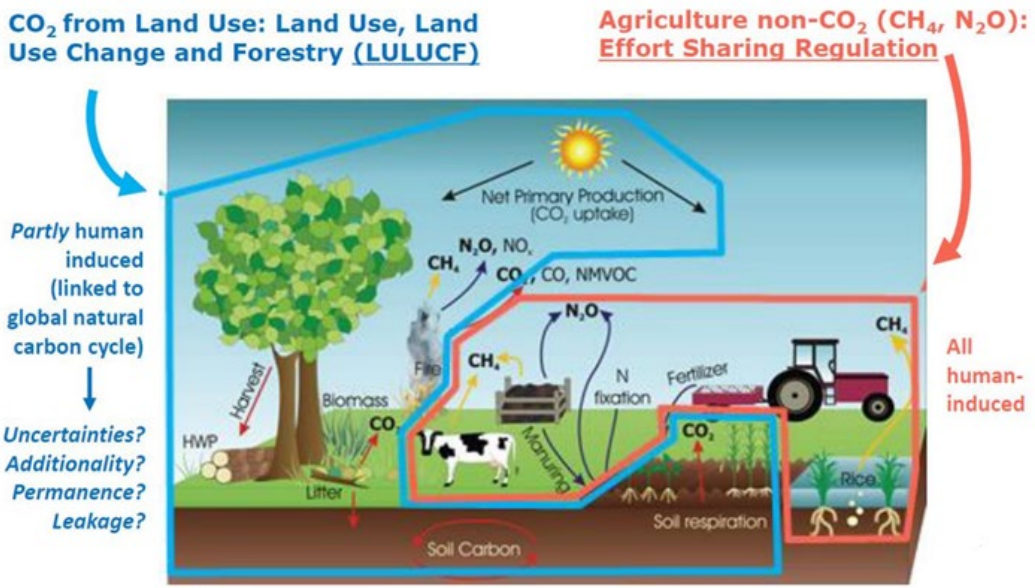
2. LULUCF emissions and removals

- Growing policy interest as the management of terrestrial ecosystems provides several climate change mitigation options
- SEEA CF *now* provides limited guidance



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Should LULUCF emissions and removals be included in the scope of the SEEA AEA ?

Pro

- The scope of IPCC emissions includes all **anthropogenic emissions**, i.e. ***caused by human activities***
- Anthropogenic' land-related GHG fluxes are defined as **all those occurring on 'managed land → basically, same scope as economic activities SNA/ SEEA context**
- Flows are highly policy relevant.

Contra

- Flows occurring within the environment are **out of scope** of PSUT
- IPCC guidelines for LULUCF use **a very broad interpretation for land management**
- including LULUCF related flows would **'blur' the boundary between the economy and the environment**

Option 1

- **Exclude (by convention) all land use related emissions and uptake in SEEA CF** air emission accounts.
- This would follow the argumentation that these flows (mainly) represent flows that occur within the environment and are (generally) not directly related to production or consumption activities.
- This option thus would **not change** anything in the current recording of the AEA.

Option 2

- Include LULUCF related emissions and uptake in SEEA CF air emission accounts as emissions from and uptake into the economy, following the argumentation that these flows are the direct result of economic activities.
- Need to clarify in the SEEA CF that these flows are within scope of the AEA and advise users to follow the LULUCF definitions/data.
- A key advantage would be that LULUCF data would directly concur with the corresponding data in the AEA.
- It must be stressed that only emissions/uptake related to active human management should be included.

CO_2 Emissions	Economy (ISIC sections/divisions)							
Supply	Crop and animal production, hunting and related service activities	Forestry and logging	Manufacturing	Construction	Public administration and defence; compulsory social security	Households	Environment	**Total**
Combustion	110	20	580		90	250		**1050**
Fossil fuel								
Biomass								
Non-Combustion								
Total excluding LULUCF	110	20	580		90	250		**1050**
Land Use	80	30			15		400	**525**
Forest land remaining forest land (FL)		*30*						
Other type of land use (OL)								
Land Use Change	25			35	5		45	110
Newly converted forest land (OL-FL)								
Forest land converted to other type of land use (FL-OL)								
Other lands converted in other lands (OL-OL)	*25*			*35*	*5*		*45*	**110**
Total including LULUCF	**215**	**50**	**580**	**35**	**110**	**250**	**445**	**1685**

CO_2 Removals	Economy (ISIC sections/divisions)							
Use	Crop and animal production, hunting and related service activities	Forestry and logging	Manufacturing	Construction	Public administration and defence; compulsory social security	Households	Environment	**Total**
Total excluding LULUCF							1050	**1050**
Land Use		400					125	**525**
Forest land remaining forest land (FL)		400						
Other type of land use (OL)								
Land Use Change		45					65	**110**
Newly converted forest land (OL-FL)		45						
Forest land converted to other type of land use (FL-OL)								
Other lands converted in other lands (OL-OL)								
Total including LULUCF	0	445	0	0	0	0	1240	**1685**

Net emissions	215	-395	580	35	110	250	-795	

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Option 3

- Include LULUCF related emissions and uptake in the SEEA CF air emission accounts **as human-induced flows in nature**
- This option recognizes that human activities impact terrestrial carbon sinks through land use, land-use change, and forestry, but reflects the consideration that these flows in principle occur within the environment.
- A **key difference** between the last two options is that for option 2 these are recorded as flows between the economy and the environment whereas for option 3 these are recorded as flows within the environment.

CO_2 Emissions	Economy (ISIC sections/divisions)						**Total excluding LULUCF**	Environment						**Total including LULUCF**
Supply	Crop and animal production, hunting and related service activities	Forestry and logging	Manufacturing	Construction	Public administration and defence; compulsory social security	Households		Human induced flows					Atmosphere	
								Forest land remaining forest land (FL)	*Other type of land use (OL)*	*Newly converted forest land (OL-FL)*	*Forest land converted to other type of land use (FL-OL)*	*Other lands converted in other lands (OL-OL)*		
Combustion	110	20	580		90	250	1050							1050
Fossil fuel														
Biomass														
Non-Combustion														
Land Use								30	95				400	525
Land Use Change												65	45	110
Total	**110**	**20**	**580**	**0**	**90**	**250**	1050	**30**	**95**			**65**	**445**	**1685**

CO_2 Removals	Economy (ISIC sections/divisions)						**Total excluding LULUCF**	Environment						**Total including LULUCF**
Use	Crop and animal production, hunting and related service activities	Forestry and logging	Manufacturing	Construction	Public administration and defence; compulsory social security	Households		Human induced flows					Atmosphere	
								Forest land remaining forest land (FL-FL)	*Other type of land use (OL)*	*Newly converted forest land (OL-FL)*	*Forest land converted to other type of land use (FL-OL)*	*Other lands converted in other lands (OL-OL)*		
Combustion & Non-Combustion													1050	1050
Land Use								400					125	525
Land Use Change										45			65	110
Total								**400**		**45**			**1240**	**1685**

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	Advantages	Disadvantages
Option 1	• No changes with respect to the SEEA 2012 needed	• No recording in SEEA of these anthropogenic flows • No recording in SEEA of these policy relevant flows
Option 2	• Inclusion of these policy relevant flows in the AEA • Recognition of these anthropogenic flows as flows to and from the economy • Consistency with IPCC • Allocation to economic activities	• Economy-environment boundary becomes less transparent (?) • Alignment with LULUCF causes possibly too wide a scope to be included • Difficulties to allocate to economic activities
Option 3	• Inclusion of these policy relevant flows in the AEA • Recording of these flows as they actually occur • No apparent change in the economy-	• Status of these human-induced flows may be unclear to user of the data • No allocation to economic activities • Emissions related to land use change not recorded as emissions from economic

3. Extension of the description of the air emissions accounts

The use table of the air emission account

- Carbon Capture and Storage (CCS)
- Carbon Capture and Utilization (CCU)
- Carbon Dioxide Removal (CDR) → includes long-term carbon sequestration in biomass

Supply	Economy				Environment			
			Industry ISIC		Human induced flows			Atmosphere
	Industry A	Industry B	39	Accumulation	Geological formations	Oceans	Eosystems	
CCS	80							
CCU	50							
CDR - DAC								40
CDR - Oceans								30
CDR - carbon sequestration								100

Use	Economy				Environment			
			Industry ISIC		Human induced flows			Atmosphere
	Industry A	Industry B	39	Accumulation	Geological formations	Oceans	Eosystems	
CCS			80	80	80			
CCU		50						
CDR - DAC			40	40	40			
CDR - Oceans						30		
CDR - carbon sequestration		100					100	

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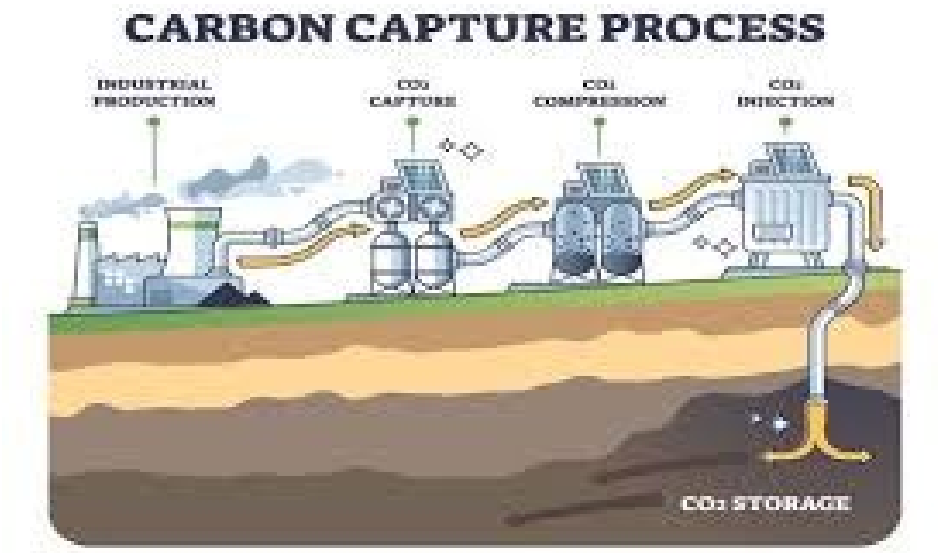
Storage of carbon underground (CCS)



Allocation in the use table:

- ISIC 39, or
- Accumulation, or
- Environment (geological formations)

3. Extension of the description of the air emissions accounts

Bridge table

1		**Total CO2 emissions by economic activities**
2		*less National residents abroad*
	2,1	- National fishing vessels operating abroad
	2,2	- Land transport
	2,3	- Water transport
	2,4	- Air transport
3		*plus Non-residents on the territory*
	3,1	+ Land transport
	3,2	+ Water transport
	3,3	+ Air transport
4		- Combustion of biomass (short cyclic CO2)
5		**Total CO2 emissions as reported to the UNFCCC**

Other considerations

- **Renaming the account** from the current 'Air Emission Accounts (AEA)' to 'Air Emissions and Removals Accounts (AERA)
- The text of the SEEA CF should further clarify that the scope of the AEA/AERA includes both **biogenic and non-biogenic carbon emissions**
- Links to SEEA EA (carbon sequestration) and the carbon stock accounts

Questions for the London Group

- **Do you agree to with the proposed definition and the proposed accounting approach for human-induced flows ?**
- **What option do you prefer with regard to the inclusion of carbon flows related to LULUCF in the SEEA CF?**

  Option 1: Exclude (by convention) all land use related emissions and uptake in SEEA CF air emission accounts.

  Option 2: Include LULUCF related emissions and uptake in SEEA CF air emission accounts as emissions from the economy and uptake into the economy.

  Option 3: Include LULUCF related emissions and uptake in the SEEA CF air emission accounts as human-induced flows in nature.

- **Do you agree with a more extensive description of a use table for the AEA and the examples identified? Are there other examples here that need to be described for the use table?**
- **Should storage of carbon underground be described as a flow within the economy of a flow to the environment ?**

THANK YOU

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