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**SEEA Air Emissions Accounts:  
from Central Framework to Agriculture, Forestry and Fisheries**

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**1. Introduction**

i. This note discusses the Air Emissions Accounts of the *SEEA Agriculture, Forestry and Fisheries (SEEA AFF)*, as implemented in the current draft submitted to the UNCEEA for discussion. The aim is to demonstrate consistency with the Air Emissions Accounts of the *SEEA CF*, of which they represent an application. The development of SEEA AFF-specific Air Emission Accounts is needed in order to include additional categories of land-based emissions/removals of greenhouse gases (GHG), which are relevant to SEEA because they are directly associated with economic activities in Agriculture, Forestry and Fisheries. It is shown that with such SEEA AFF extension, the SEEA Air Emissions Accounts can be usefully mapped onto the *Agriculture and Land Use, Land Use Change and Forestry (LULUCF)* reporting tables of the UN Framework Convention on Climate Change (UNFCCC), which in turn follow the Guidelines of the Intergovernmental Panel on Climate Change (IPCC) for National GHG Inventories.

ii. The air emissions accounts of the SEEA Central Framework (SEEA CF) and those of the SEEA Agriculture, Forestry and Fisheries (SEEA AFF) rely on the definitions of the IPCC Guidelines for National GHG Inventories, in terms of the basic computations of physical and bio-physical processes underlying GHG emissions. The IPCC Guidelines are at the basis of country reporting to the UN Framework Convention on Climate Change (UNFCCC), a process with international legal status for developed countries (so-called Annex I parties) already since 1992, and increasingly assuming the same legal importance for developing countries (UNFCCC non Annex I parties) since the signing of the Paris Agreement in Dec. 2015.

iii. With regards to air emissions accounts, the scope of both the SEEA and *UNFCCC/IPCC* is reporting of anthropogenic GHG emissions, i.e., emissions dependent on human activity. Reporting tables for both systems thus exclude emissions arising from natural processes, i.e., unaltered by human activity. The *SEEA* and *UNFCCC/IPCC* reporting tables have nonetheless important differences, in terms of system boundaries and statistical classifications. These are discussed in sections 2. and 3. below. Finally, a description of the *SEEA AFF* Air Emissions Accounts as a needed application of the *SEEA CF* is given in section 4.

**2. System boundaries**

iv. The air emissions accounts of the *SEEA CF* and those of the *IPCC/UNFCCC* differ in their underlying systems boundaries.

v. The air emissions account of the *SEEA CF* follows the same concepts and definitions as does the 2008 System of National Accounts (SNA), namely the residence principle. This means that the scope is to report the emissions of national

economic activities, regardless of where these activities occur.

vi. The air emission statistics compiled under *UNFCCC/IPCC* within National GHG Inventories follow, by contrast, the territorial principle. This means that their scope is to report the emissions generated within the national territory, regardless of who is causing the emissions.

vii. It is worth noting that, at regional and global level, as well as at national level for most countries, the only differences in applying either of these principles are in reporting of emissions from international shipping and transport. These emissions are a very minor component of GHG emissions at global, regional and for most countries, national level. This implies that the choice of reporting principle would generate only small and often no numerical differences in the national GHG inventories of most countries.

viii With regards to agriculture and forestry, the choice of territorial/residence principle may be less relevant, given the strong link of land-based activities, regardless of ownership, to the territory in which the land is located. A notable exception is fisheries, where the *SEEA/SNA* air emission accounts would deduct fuel purchased by foreign fishing vessels and add fuel purchased by resident vessels abroad. This is an important consideration only in small nations where fishing is a dominant activity. In most other countries, emissions from fisheries would typically represent a very minor component of national GHG emissions from agriculture, forestry and fisheries.

### 3. Classifications

ix. The air emissions accounts of the *SEEA CF* and those of the *IPCC/UNFCCC* differ in their underlying statistical classifications. Specifically, the *SEEA/SNA* follows the statistical industry classification (ISIC) and thus considers *Agriculture, Forestry and Fishing* as one economic activity (ISIC Section A), with its three divisions: *Crop and Livestock (A01)*, *Forestry (A02)*, and *Fishing (A03)*. In terms of air emissions, these industries comprise emissions stemming from processes, transport and stationary emissions, including energy use. The ISIC classification is roughly aligned with FAO's own definition of agriculture, in the sense that FAO also considers crop and livestock, forestry and fisheries activities as one sector.

x. By contrast, *UNFCCC/IPCC* does not apply ISIC. It rather distinguishes between the *Agriculture* sector on the one hand, and the *Land Use, Land Use Change and Forestry (LULUCF)* sector on the other. More attention is given to the underlying biophysical processes and specific GHG gases than on the underlying economic activity. As a result, often different GHG gases generated by the same economic activity may be reported separately under *Agriculture* (where only non- CO<sub>2</sub> gases are reported) and *LULUCF* (where mostly CO<sub>2</sub> gas is reported).

xi. A notable difference between the *SEEA/SNA* and the *UNFCCC/IPCC* reporting, linked to differences in both boundaries (albeit different from the territorial/residence issue highlighted above) and classifications, occurs for fossil-fuels emissions in agriculture, forestry and fisheries, for both mobile and stationary sources, such as tractors and machinery, refrigeration and heating, transport and processing.

xii. Under *UNFCCC/IPCC*, all fossil-fuel related emissions are reported in the energy section of the National GHG Inventory. By contrast, in the *SEEA/SNA* air emission accounts, emissions caused by vehicles are allocated to the industry conducting the activity, along with heating and process emissions. Thus air emissions linked to tractor and machinery use, irrigation pumps, fishing vessels, refrigeration, etc., are reported under agriculture, forestry and fisheries in the *SEEA/SNA*. Conversely, GHG emissions linked to soil disturbance from land preparation work, such as terracing, which are reported in the agriculture sector and in the energy sector under *UNFCCC/IPCC*, may be reported under *Construction* under *SEEA/SNA*.

xiii. It is nonetheless worth noting that, except perhaps for small nations where fishing is a dominant activity, in most other countries overall emissions from energy use in agriculture represent a small fraction of the total emissions from agriculture, forestry and fisheries. This means that, as in the case of the territorial/residence principle, the choice of statistical classification would generate only small differences in the national GHG statistics of most countries.

#### **4. Application of the SEEA CF Air Emissions Accounts in the SEEA AFF**

xiv. The following considerations are made, providing links to relevant *SEEA CF* and *UNFCCC/IPCC* language and processes:

1. *SEEA AFF* tables account for air *emissions* and *removals* that are the *direct result of economic production processes* in *ISIC A, Divisions 01, 02 and 03* (*SEEA CF para 3.243* and *SEEA CF Tab. 3.7*).
2. *SEEA AFF emissions* linked to *ISIC A01* activities are those generated directly from crop and livestock production, as well as those arising from land management, including soil disturbance (*SEEA CF para 3.243*)—e.g., drainage of organic soils, tillage, etc. These are also reported to UNFCCC as non-CO<sub>2</sub> gases under IPCC sector *Agriculture*, and as CO<sub>2</sub> under IPCC sector *LULUCF*, land use categories *cropland* and *grassland*.
3. Additional *SEEA AFF emissions* linked to *ISIC A01* activities include land clearing for crop and pasture production, notably deforestation. These are also reported to UNFCCC as CO<sub>2</sub> under IPCC sector *LULUCF*, *forest land converted to other land uses*.

4. *SEEA AFF emissions* linked to *ISIC A02* activities are those generated by forestry and its management practices, including emissions associated to tree removal through fellings, as well as forest degradation. These are also reported to UNFCCC as CO<sub>2</sub> under IPCC sector *LULUCF, forest remaining forest*.
5. *SEEA AFF emissions* linked to *ISIC A01 and ISIC A02* activities furthermore include those from biomass fires on managed land, such as those associated to prescribed burning of savannahs, forest management fires, and fires associated to disturbances linked to economic activity, including deforestation and peatland fires. These emissions are also reported under IPCC. .
6. The sum *SEEA AFF emissions* linked to *ISIC A01 and ISIC A02* activities defined in para 2-5 above correspond to air emissions reported to UNFCCC under IPCC categories *Agriculture* and *LULUCF*, with the fundamental difference in UNFCCC the *LULUCF* emissions are net of CO<sub>2</sub> removals from the atmosphere—so called carbon sinks.
7. With regards to CO<sub>2</sub> removals, it is noteworthy to highlight that the only section of *National GHG Inventories* where they are currently recorded is the UNFCCC/IPCC *LULUCF* sector, sub-categories *Forest Land, Cropland* and *Grassland* (through managed accumulation of above and below ground biomass, and soil organic matter). In practice, CO<sub>2</sub> removals from the atmosphere reported to UNFCCC are typically linked to managed carbon accumulation in forest biomass, mostly in developed countries (See e.g., data in *National GHG Inventories; FAOSTAT emissions database—Land Use*).
8. *SEEA AFF* defines *removals* as carbon sequestration that is the direct result of economic activity under ISIC A. Thus *SEEA AFF* complements *SEEA CF* para 5.85, by extending the concept of accounting for carbon sequestration in forest physical asset accounts, to other physical asset accounts relevant to *SEEA AFF*, consistently with IPCC guidelines. This extension is in line with *SEEA CF* para 3.234, which states that: *Gaseous and particulate substances generated through economic activity may be captured for use in other production processes or transferred between economic units for use in production or for storage (e.g., of carbon emissions). To fully account for the flow of particular gaseous ... substances, it may be of interest to record the flows of these substances between economic units, in addition to emissions to air.* Note that full carbon accounting, which also includes natural flows, is not included in *SEEA AFF*, but rather left to the *SEEA EEA*.
9. *SEEA AFF removals* linked to *ISIC A01 and A02* activities are those generated by carbon sequestration due to specific land management

practices, including forest re-growth cycles, afforestation, cropland and grassland land set-asides, etc. These are also reported to UNFCCC as CO<sub>2</sub> under IPCC sector *LULUCF*, land use categories *cropland*, *grassland* and *forestland*, as well as land use change categories *land converted to other land uses*.

10. On the other hand, CO<sub>2</sub> removals linked to carbon capture or embodiment *by the environment*, for example, carbon capture in forests and soils that cannot be linked to economic activity, are not recorded in *SEEA AFF (SEEA CF 3.242)*, under the interpretation that *embodiment by the environment* in the *SEEA CF* refers to natural processes that are beyond the control of the economic activity being accounted for. This is consistent with UNFCCC/IPCC language, where carbon sequestration linked to natural processes, including CO<sub>2</sub> fertilization and nitrogen deposition, are excluded from accounting.

xv. It is recognized that the interpretation of *SEEA CF para 3.234* provided in para 8-10 above is possibly at the edge of current *SEEA* understanding and applications, but that nonetheless it is warranted by the unique role of *ISIC A* activities in carbon sequestration, generating both *emissions* and *removals* linked to the economy. The proposed mapping ensures appropriate accounting of carbon fluxes within *SEEA AFF*, striving for consistency with the *SEEA CF* as well as alignment with relevant and well-established UNFCCC/IPCC and FAO processes.

### **Questions for the UNCEEA**

Based on the considerations made in this document:

1. Do the Air Emissions Accounts of the *SEEA AFF* represent a correct and useful application of the *SEEA CF*?
2. Is the proposed mapping between *SEEA/SNA* and UNFCCC/IPCC a useful contribution towards better reconciliation of *SEEA Air Emission Accounts* and UNFCCC reporting tables?

## References

- System of Environmental-Economic Accounting 2012 – Central Framework (SEEA CF), 2014. United Nations, European Union, Food and Agriculture Organization of the United Nations, International Monetary Fund, Organization for Economic Co-operation and Development, The World Bank. United Nations, New York. 378 pp. Available online at: <http://unstats.un.org/unsd/envaccounting/seeaRev/SEEA CF Final en.pdf>
- SEEA Agriculture, Forestry and Fisheries (SEEA AFF), Draft document presented to the Forty-seventh session 8 – 11 March 2016, Item 3(e) of the provisional agenda Environmental-economic accounting. Available online at: <http://unstats.un.org/unsd/statcom/47th-session/documents/BG-2016-8-SEEA-Agriculture-E.pdf>
- System of National Accounts 2008. United Nations, European Commission, International Monetary Fund, Organisation for Economic Co-operation and Development, World Bank. New York, 2009.
- 2006 IPCC Guidelines for National Greenhouse Gas Inventories. Intergovernmental Panel on Climate Change. Available online at: <http://www.ipcc-nggip.iges.or.jp/public/2006gl/>
- IPCC, 2003. Good Practice Guidance for Land Use, Land-Use Change and Forestry. Edited by Penman J., Gytarsky M., Hiraishi T., Krug T., Kruger D., Pipatti R., Buendia L., Miwa K., Ngara T., Tanabe K., and Wagner F. Intergovernmental Panel on Climate Change. Published by the Institute for Global Environmental Strategies (IGES) for the IPCC, Japan. Available online at: <http://www.ipcc-nggip.iges.or.jp/public/gpglulucf/gpglulucf.html>
- Tubiello F.N., Salvatore M., Cóndor Golec R.D., Ferrara A., Rossi S., Biancalani R., Federici S., Jacobs H., Flammini A., 2014. FAO, 2014. Agriculture, Forestry and Other Land Use Emissions by Sources and Removals by Sinks – 1990-2011 Analysis. FAO Statistics Division, Working Paper Series ESS/14-02. Food and Agriculture Organization of the United Nations, Rome, Italy. Available online at: <http://www.fao.org/docrep/019/i3671e/i3671e.pdf>
- FAO, 2016. FAOSTAT Emissions Database. Emissions – Agriculture. Available online at: [http://faostat3.fao.org/download/G1/\\*/E](http://faostat3.fao.org/download/G1/*/E)
- FAO, 2016. FAOSTAT Emissions Database. Emissions – Land Use. Available online at: [http://faostat3.fao.org/download/G2/\\*/E](http://faostat3.fao.org/download/G2/*/E)