Points of attention for LULUCF reporting under Regulation 2018/841

JRC LULUCF virtual workshop 2021

8 June 2021, Eric Arets, Jan-Peter Lesschen, Gerard Hazeu, Dana Iliescu, John Watterson

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Study for DG Climate Action

- Study on the requirements for compliance with the regulation on LULUCF and associated regulations
  - Assess consistency across the legal texts and provide improved understanding of compliance needs
  - Identify expected content to be provided in relation to compliance elements
  - Identify datasets that could be used in the comprehensive reviews at the end of the compliance period
  - Full study report available at: https://data.europa.eu/doi/10.2834/757934.

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Relevant legal texts

- LULUCF regulation 2018/841
- Effort sharing r
- Governance reg
- Delegated regu ory guidelines, initial checks,
- Implementing n processes and review informa on.

REGULATION (EU) 2018/841 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL

of 30 May 2018

REGULATION (EU) 2018/842 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL

REGULATION (EU) 2018/1999 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL

of 11 December 2018

on the Governance of the Energy Union and Climate Action, amending Regulations (EC)

COMMISSION DELEGATED REGULATION (EU) 2020/1044

of 8 May 2020

COMMISSION IMPLEMENTING REGULATION (EU) 2020/1208

of 7 August 2020

on structure, format, submission processes and review of information reported by Member States pursuant to Regulation (EU) 2018/1999 of the European Parliament and of the Council and repealing Commission Implementing Regulation (EU) No 749/2014

Reporting requirements

- Many similarities between the GHGI reporting requirements and the requirements for the accounting categories under 2018/841.
- However, there are also some inconsistencies between UNFCCC reporting and accounting requirements.
- Here we provide a couple of examples that will need attention in reporting and compliance reporting.

Carbon pools – 2018/841 – Annex I

ANNEX I

GREENHOUSE GASES AND CARBON POOLS

B. Carbon pools as referred to in Article 5(4):

(a) above-ground biomass;

(b) below-ground biomass;

(c) litter;

(d) dead wood;

(e) soil organic carbon;

(f) harvested wood products in the land accounting categories of afforested land and managed forest land.

TABLE 4.B SECTORAL BACKGROUND DATA FOR LAND USE, LAND-USE CHANGE AND FORESTRY
Cropland
(Sheet 1 of 1)

Inventory 2019
Submission 2021 v2
EUROPEAN UNION

GREENHOUSE GAS SOURCE AND SINK		ACTIVITY DATA			IMPLIED CARBON-STOCK-CHANGE FACTORS						CHANGES IN CARBON STOCK AND NET CO_2 EMISSIONS/REMOVALS						
Land-use category	Subdivision[1]	Total area[2] (kha)	Area of mineral soil (kha)	Area of organic soil (kha)	Carbon stock change in living biomass per area[3] [4]			Net carbon stock change in dead organic matter per area[4]	Net carbon stock change in soils per area[4]		**Carbon stock change in living biomass[3], [4], [6]**			**Net carbon stock change in dead organic matter[4] [7]**	Net carbon stock change in soils[4] [5] [8]		Net CO_2 emissions/ removals[4] [9]
					Gains	Losses	Net change		Mineral soils	Organic soils	**Gains**	**Losses**	**Net change**		Mineral soils	Organic soils	
					(t C/ha)						(kt C)						(kt)
B. Total Cropland		124590.58	123060.62	1529.95	0.06	-0.05	0.01	0.00	-0.04	-6.06	7374.11	-5666.92	1707.19	-201.26	-5436.15	-9265.70	48385.04
1. Cropland remaining cropland		112944.78	111685.18	1259.59	0.04	-0.03	0.01	0.00	0.02	-6.05	4529.35	-2882.07	1647.28	-29.72	2516.18	-7617.57	12774.06
2. Land converted to cropland[10]		11645.80	11375.44	270.36	0.24	-0.24	0.01	-0.01	-0.70	-6.10	2844.76	-2784.85	59.91	-171.53	-7952.33	-1648.13	35610.99
2.1 Forest land converted to cropland .		417.10	369.79	47.31	0.08	-2.80	-2.72	-0.34	-1.13	-6.58	31.70	-1168.03	-1136.33	-140.31	-419.10	-311.38	7359.42

(a) above-ground biomass;

(b) below-ground biomass;

(c) litter;

(d) dead wood;

(e) soil organic carbon;

(f) harvested wood products in the land accounting categories of afforested land and managed forest land.

TABLE 4(KP-I)C. SUPPLEMENTARY BACKGROUND FOR LAND USE, LAND-USE CHANGE AND FORESTRY ACTIVITIES UNDER THE KYOTO PROTOCOL

Carbon stock changes in the harvested wood products (HWP) pool[1]

NETHERLANDS

Inventory 2019
Submission 2021 v1

ORIGIN OF WOOD		PRODUCT TYPE	Harvest[2]		PRODUCT TYPE: HWP categories[3]	PRODUCT TYPE: Subcategories[4]	PARAMETERS: Half-life[5]	PARAMETERS: Initial stock[6]	CHANGE IN CARBON: Gains[7]	CHANGE IN CARBON: Losses[7]	CHANGE IN CARBON: Net change	Net CO_2 emissions/removals
							(yrs)	(kt C)		(kt C)		(kt CO2eq)
TOTAL								2227.14	15.66	-46.02	-30.36	111.31
Article 3.3 activity	From land subject to afforestation/reforestation	Total for HWP_{AR}	IE	m3				IE	IE	IE	IE	IE
		Total for category						IE	IE	IE	IE	IE
	From land subject to Deforestation [5]	Total for HWP_D	IE	m3				IE	IE	IE	IE	IE
		Total for category						IE	IE	IE	IE	IE
Article 3.4 activity	From land subject to forest management	Total for HWP_{FM}	1504628.60	m3				2227.14	15.66	-46.02	-30.36	111.31
		Total for category						2227.14	15.66	-46.02	-30.36	111.31
		Sawnwood						1579.50	9.75	-31.07	-21.32	78.17
		Other solid						366.75	3.58	-7.23	-3.65	13.37
		Paper and paperboard						0.03	NO	-0.01	-0.01	0.03
		Wood based panels						280.85	2.33	-7.71	-5.38	19.74
Information items												
Harvest originating from deforestation events[8]			809455.72	m3								
Harvest from remaining lands[9]			NO	kt C								

Documentation box

Parties should provide detailed explanation on the land use, land-use change and forestry sector in the relevant annex of the NIR: Supplementary information on LULUCF activities under the Kyoto Protocol. Use this documentation box to provide references to relevant sections of the NIR if any additional details are needed to understand the content of this table.

Documentation box	-/2019: Al harvests not from deforestation are allocated to FM -/2019: Al harvests from D are accounted using IO

(f) harvested wood products in the land accounting categories of afforested land and managed forest land.

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Carbon pools – 2018/841 – Annex I

APPROACH B[12]

GREENHOUSE GAS SOURCE AND SINK CATEGORIES[3]	HWP in use from domestic harvest				Net emissions/ removals from HWP in use[6]
	Gains[4]	Losses[4]	Half-life[5]	Annual Change in stock (ΔC HWP IU DH)	
	(t C)		(yr)	(kt C)	(kt CO_2)
TOTAL HWP from domestic harvest (ΔC HWP IU DH)					
1. Solid wood[7]					
2. Paper and paperboard					
3. Other *(please specify)*					
HWP produced and consumed domestically (ΔC HWPdom IU DH)[13]					
Total	13054.71	-41291.66		-28.24	103.54
1. Solid wood[7]	13054.71	-41286.67		-28.23	103.52
Sawnwood	7610.82	-27431.71	35.00	-19.82	72.68
Wood panels	1862.39	-6627.92	25.00	-4.77	17.47
Other solid wood products	3581.49	-7227.04	35.00	-3.65	13.37
2. Paper and paperboard	NO	-4.99	2.00	0.00	0.02
3. Other *(please specify)*	NA	NA		NA	
HWP produced and exported (ΔC HWPexp IU DH)[13]					
Total	2605.30	-4724.60		-2.12	7.77
1. Solid wood[7]	2605.30	-4721.26		-2.12	7.76
Sawnwood	2140.11	-3637.31	35.00	-1.50	5.49
Wood panels	465.19	-1083.95	25.00	-0.62	2.27
Other solid wood products	NO	NO	35.00	NO	NO
2. Paper and paperboard	NO	-3.34	2.00	0.00	0.01
3. Other *(please specify)*	NA	NA		NA	

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Carbon pools - issues

- Separation between some of the carbon pools cannot be determined from the data reported in the CRF
- This potentially creates a transparency issue
- Particularly where MS use the option provided in Art 5(4) of the LULUCF regulation to exclude from accounting the changes in carbon stocks for those pools that are not a source (except above ground biomass, dead wood and HWP from MFL)
- Therefore the methodologies used to assess the carbon stock changes in the different carbon pools need to be carefully described in the NIR
- To further increase transparency and to support the review process MS would be encouraged to provide the changes in carbon stocks for AGB and BGB, and were relevant dead wood and litter, more explicitly in their NIR
- Or report on the additional values in a separate report

Reporting accounted emissions and removals

- By 15 March 2027 and 2032 MS report final GHGI data with accounting information relevant for their compliance with the LUCLUF regulation
- Format is in Annex XX to the Implementing Act 2020/1208

ANNEX XX

Reporting on accounted emissions and removals pursuant to Article 24

Table 1a: Greenhouse gas emissions and removals in the LULUCF sector as reported in the national greenhouse gas inventory (1) (2)

Part 1: LULUCF GHG emissions and removals on inventory and accounting category matching level				Net emissions and removals separately for CO_2, CH_4, N_2O ($kt\ CO_2eq$)						Net emissions and removals ($kt\ CO_2eq$) (calculated automatically)					
Greenhouse gas source and sink sub-categories	Greenhouse gas source and sink categories	LULUCF Regulation Accounting subcategory	LULUCF Regulation Accounting category	2021	2022	2023	2024	2025	Total	2021	2022	2023	2024	2025	Total
4.A.1. Forest land remaining forest land	4.A Forest land	Forest land remaining forest land	Managed forest land												
4.A.2.1 Cropland converted to forest land	4.A Forest land	Cropland converted to forest land	Afforested land												
4.A.2.2 Grassland converted to forest land	4.A Forest land	Grassland converted to forest land	Afforested land												
4.A.2.3 Wetlands converted to forest land	4.A Forest land	Wetland converted to	Afforested land												

Reporting accounted emissions and removals

- However several inconsistencies exist between the UNFCCC CRF data and the required information to be provided in the LULUCF compliance report

Part 1: LULUCF GHG emissions and removals on inventory and accounting category matching level				Net emissions and removals separately for CO_2, CH_4, N_2O ($kt\ CO_2eq$)						Net emissions and removals ($kt\ CO_2eq$) (calculated automatically)					
Greenhouse gas source and sink sub-categories	Greenhouse gas source and sink categories	LULUCF Regulation Accounting subcategory	LULUCF Regulation Accounting category	2021	2022	2023	2024	2025	Total	2021	2022	2023	2024	2025	Total
4.D.1. Wetlands remaining wetlands	4.D. Wetlands	Wetland remaining wetland	Managed wetland												
4.D.2.1.1 Forest land converted to peat extraction	4.D. Wetlands	Forest land converted to wetland	Deforested land												
4.D.2.1.2 Cropland converted to peat extraction	4.D. Wetlands	Cropland converted to wetland	Managed cropland												
4.D.2.1.3 Grassland converted to peat extraction	4.D. Wetlands	Grassland converted to wetland	Managed grassland												
4.D.2.1.4 Settlements converted to peat extraction	4.D. Wetlands	Settlement converted to wetland	Managed wetland												
4.D.2.1.5 Other land converted to peat	4.D. Wetlands	Other land converted	Managed wetland												

Reporting accounted emissions and removals

Land-use category
D. Total wetlands
1. Wetlands remaining wetlands
1.1 Peat extraction remaining peat extraction
1.2 Flooded land remaining flooded land
1.3 Other wetlands remaining other wetlands [7]
2. Land converted to wetlands[8]
2.1 Land converted to peat extraction
2.2 Land converted to flooded land
2.3 Land converted to other wetlands

nsistencies exist between the UNFC
vided in the LULUCF compliance rep

d removals on inventory and accounting category matching level

	Greenhouse gas source and sink categories	LULUCF Regulation Accounting subcategory	LULUCF Regulation Accounting category
4.D.1. Wetlands remaining wetlands	4.D. Wetlands	Wetland remaining wetland	Managed wetland
4.D.2.1.1 Forest land converted to peat extraction	4.D. Wetlands	Forest land converted to wetland	Deforested land
4.D.2.1.2 Cropland converted to peat extraction	4.D. Wetlands	Cropland converted to wetland	Managed cropland
4.D.2.1.3 Grassland converted to peat extraction	4.D. Wetlands	Grassland converted to wetland	Managed grassland
4.D.2.1.4 Settlements converted to peat extraction	4.D. Wetlands	Settlement converted to wetland	Managed wetland
4.D.2.1.5 Other land converted to peat	4.D. Wetlands	Other land converted	Managed wetland

Land-use category
D. Total wetlands
1. Wetlands remaining wetlands
1.1 Peat extraction remaining peat extraction
1.2 Flooded land remaining flooded land
1.3 Other wetlands remaining other wetlands [7]
2. Land converted to wetlands[8]
2.1 Land converted to peat extraction
2.2 Land converted to flooded land
4.D.2.2.1 Forest land converted to flooded land
4.D.2.2.2 Cropland converted to flooded land
4.D.2.2.3 Grassland converted to flooded land
4.D.2.2.4 Settlements converted to flooded land
4.D.2.2.5 Other land converted to flooded land
2.3 Land converted to other wetlands
4.D.2.3.1 Forest land converted to other wetlands
4.D.2.3.2 Cropland converted to other wetlands
4.D.2.3.3 Grassland converted to other wetlands
4.D.2.3.4 Settlements converted to other wetlands
4.D.2.3.5 Other land converted to other wetlands

Reporting accounted emissions and removals

- Similar inconsistencies occur in the reporting of CH4 and N2O emissions for land conversions where in the CRF tables all land converted to categories are included in an aggregated category, but for which different accounting rules apply (CRF Tables 4(II), 4(III), 4(V))

TABLE 4(III) SECTORAL BACK… IANGE AND FORESTRY — Inventory 2019
Direct nitrous oxide (N_2O) emission… ociated with loss/gain of soil organic matter — Submission 2021 v2
resulting from change of land use or… — EUROPEAN UNION
(Sheet 1 of 1)

GREENHOUSE GAS SOURCE AND SINK C… / Land-use category[2]	…ATA	IMPLIED EMISSION FACTORS: N_2O–N emissions per area[4] (kg N_2O–N/ha)	EMISSIONS: N_2O (kt)
Total all land-use categories	125521.56	0.18	36.33
A. Forest land	63881.64	0.02	1.68
1. Forest land remaining forest land	60126.20	0.00	0.04
2. Lands converted to forest land[5]	3755.44	0.28	1.64
B. Cropland[2]	10589.19	0.83	13.73
2. Lands converted to cropland[5]	10589.19	0.83	13.73
C. Grasslands	30487.74	0.02	1.11
1. Grasslands remaining grasslands	23479.04	0.01	0.46
2. Lands converted to grasslands[5]	7008.70	0.06	0.66
D. Wetlands	2886.64	0.06	0.29
1. Wetlands remaining wetlands	2374.66	0.00	0.00
2. Lands converted to wetlands[5]	511.99	0.36	0.29
E. Settlements	17294.26	0.57	15.54
1. Settlements remaining settlements	10651.54	0.03	0.52
2. Lands converted to settlements[5]	6642.72	1.44	15.02
F. Other land	382.09	6.61	3.97

GREENHOUSE GAS SOURCE AND SINK CATEGORIES
Land-use category[2]
Total all land-use categories
….
….
D. Wetlands
1. Wetlands remaining wetlands
2. Lands converted to wetlands[5]
4.D.2.1 Forest land converted to wetlands
4.D.2.2 Cropland converted to wetlands
4.D.2.3 Grassland converted to wetlands
4.D.2.4 Settlements converted to wetlands
4.D.2.5 Other land converted to wetlands
E. Settlements
1. Settlements remaining settlements
2. Lands converted to settlements[5]
4.E.2.1 Forest land converted to settlements
4.E.2.2 Cropland converted to settlements
4.E.2.3 Grassland converted to settlements
4.E.2.4 Wetlands converted to settlements
4.E.2.5 Other land converted to settlements

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Reporting accounted emissions and removals

- Concluding: Potentially inconsistencies exist between the aggregation levels of reported emissions and removals in the NIR and CRF and the requirements for reporting of accounted emissions and removals
- Again this may create transparency issues as the compliance review is based on the information provided in the NIR and CRF
- In most cases this can be solved by (manually) introducing additional sub-categories in the CRF reporter and improved descriptions in the NIR. No need to wait to do this until reporting of accounted emissions and removals is due
- Alternatively an additional table with the required information could be added in an annex to the NIR that only goes to the EU

Methodologies for monitoring and reporting in the LULUCF sector

- Annex V of the Governance Regulation (2018/1999)

Part 3

Methodologies for monitoring and reporting in the LULUCF sector

Geographically explicit land-use conversion data in accordance with the 2006 IPCC Guidelines for national GHG inventories.

Tier 1 methodology in accordance with the 2006 IPCC guidelines for national GHG inventories.

For emissions and removals for a carbon pool that accounts for at least 25-30 % of emissions or removals in a source or sink category which is prioritised within a Member State's national inventory system because its estimate has a significant influence on a country's total inventory of GHGs in terms of the absolute level of emissions and removals, the trend in emissions and removals, or the uncertainty in emissions and removals in the land-use categories, at least Tier 2 methodology in accordance with the 2006 IPCC guidelines for national GHG inventories.

Member States are encouraged to apply Tier 3 methodology, in accordance with the 2006 IPCC guidelines for national GHG inventories.

Geographically explicit LU information

- The GR requires Approach 3 for representing land in line with the 2006 IPCC guidelines (Ch. 3 Vol. 4) Re
- Reporting of GHGIs for the first compliance period (2021-2025) start from 2023. Consistent and robust land use change time series in line with Approach 3 are required latest for the 2023 submission.
- Approach three is characterised by spatially explicit observations of land-use categories and land-use conversions. It enables tracking of conversions of individual land unit over time
- It enables the use of GIS to link information of land use with other spatially explicit datasets, like soil mapping or management practices, which may further support use of higher Tier methods
- *While the requirements remained the same, the 2019 refinements provide much more detailed guidance. So recommended to also check the 2019 refinement on this!!*

Geographically explicit LU information

- Examples of different data inputs and methods to derive land-use classes for the three approaches identified in the IPCC guidelines (Source: Table 3.6a in Chapter 3 of IPCC 2019)

Method	Approach 1	Approach 2	Approach 3
Sample- based methods	• Single sample • Temporary sample units	• Samples collected from permanent units but changes only tracked across two consecutive sample periods.	• Permanent and consistent georeferenced ground plots. • Continuous and consistent samples using remote sensing data.
Survey-based methods	• Single census at one point in time • Repeat census but without reference to previous censuses.	• General surveys between two periods. • National census data that can refer a past period.	• Specific survey designs that identify activities through time for each land unit within a known region.
Wall-to- Wall methods	• Single map • Inconsistent maps developed at different times.	• Inconsistent maps through time combined with Approach 2-type samples (e.g. using maps as stratifications). • Maps developed using consistent methods changes tracked across two consecutive maps only not tracked through a time-series of maps.	• Tracking pixels / land units using time-series consistent data.

Geographically explicit LU information

- Time series consistency is an important element of Approach 3
- Consistent time series do not mean that all data need to be from the same source or obtained with the same remote sensing products and that in most cases it indeed will be necessary to combine data sources
- Specifications need to be the same/similar
- Also data from the same source may not result in consistent time series, if for instance the specifications of the data source change over time (eg. resolution; Landsat)
- *See Chapter 3.3.4 in IPCC (2019) on combining multiple data source to obtain further guidance. Also the Global Forest Observations Initiative provides methods and guidance for integrating information from different sources (GFOI 2020). Annex 3A.2.4 of IPCC (2019) provides good practices for ensuring time series consistency, with reference to techniques on time series consistency from Chapter 5 of Volume 1 of the 2019 refinements of the 2006 IPCC guidelines. For instance overlap techniques from Chapter 5, Volume 1 of the guidelines can be used in cases where new higher resolution sensor data become available in more recent years.*

On Tier levels

- Annex V, part 3 of the GR defines Tier 1 methodologies in accordance with the 2006 IPCC guidelines as the minimum requirement for the GHGI
- In contrast Art 5(4) of the LULUCF regulation allows to exclude from accounting the changes in carbon stocks for those pools that are not a source (except above ground biomass, dead wood and HWP from MFL)
- Potentially this results in inconsistencies between the GHGI and reporting of accounted emissions and removals in the compliance report
    - Explain differences in an additional Annex to the NIR or in an adapted format in for the compliance report, explaining and justifying the difference
    - Do not use the option to exclude pools that are not a source

Higher tiers for significant pools of key sources

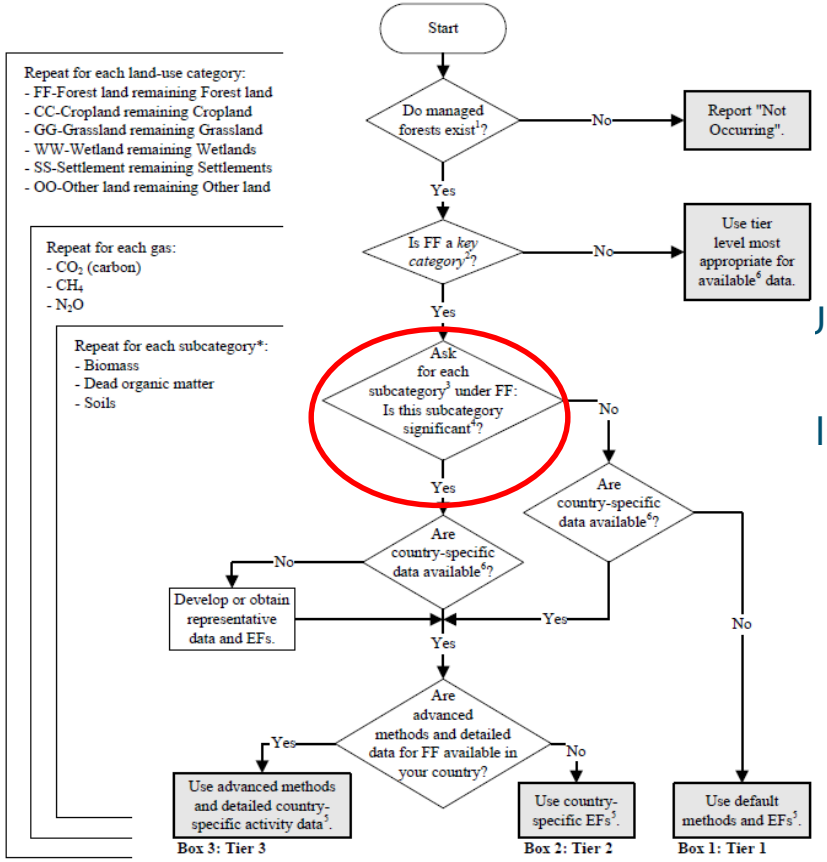
- *For emissions and removals for a carbon pool that accounts for **at least 25-30 % of emissions or removals in a source or sink category which is prioritised** within a Member State's national inventory system because its estimate has a significant influence on a country's total inventory of greenhouse gases in terms of the absolute level of emissions and removals, the trend in emissions and removals, or the uncertainty in emissions and removals in the land-use categories, **at least Tier 2 methodology in accordance with the 2006 IPCC Guidelines for National Greenhouse Gas Inventories**"*
- MS are encouraged to apply Tier 3

Higher tiers for significant pools of key sources

- Concept of significant pools is from the 2003 IPCC GPG for LULUCF, but in the 2006 IPCC guidelines this concept is not defined anymore
- Nevertheless higher tiers are also required for significant pools in the current GHGI

Higher tiers key sources

- Concept of signific JLUCF, but in the 2006 IPCC guidelines th
- Nevertheless high ls in the current GHGI



Note:
1: The use of 20 years, as a threshold, is consistent with the defaults contained in IPCC Guidelines. Countries may use different periods where appropriate to national circumstances (see Chapter 2).
2: See Volume 1 Chapter 4, "Methodological Choice and Identification of Key Categories" (noting section 4.1.2 on limited resources), for discussion of *key categories* and use of decision trees.
3: See Table 1.2 for the characterisation of subcategories.
4: A subcategory is significant if it accounts for 25-30% of emissions/removals for the overall category.
5: See Box 1.1 for definition of Tier levels.
6: Data availability refers to both data needed for developing country-specific emission factors and data on land use and management practices (activity data).
* If a country reports harvested wood products (HWP) as a separate pool, it should be treated as a subcategory.

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Higher tiers – tier 3

- For those carbon pools for which Member States still use Tier 1 methods and data, the Member State will need to show that it is part of a land use category that is not a key source, or if the category is a key source or sink that the specific carbon pool is not significantly contributing to the emissions or removals of the category.
- Results of the key category analyses should be presented in the NIR and CRF (Table 7), as currently is already required by the UNFCCC.
- If a carbon pool's contribution to a key source is not considered to be significant, this should be justified transparently in the NIR chapter on LULUCF.

- Tier 3 methodologies and emission factors will improve the representation of national circumstances, improve the link between biomass and soil carbon dynamics and reduces the uncertainty of GHG estimates.
- Moreover Tier 3 methodologies are better able to reflect the mitigation effects of policies and measures implemented by Member States

Thank you!

More information:

eric.arets@wur.nl