

ANNEX 1

WORKSHEETS

Authors

Zoltan Somogyi (European Commission/Hungary)

Joe Mangino (USA), Stephen Ogle (USA), John Raison (Australia), and Louis Verchot (ICRAF)

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INTRODUCTION

This Annex presents worksheets to enable inventory compilers to readily implement the Tier 1 methods. Note that, in many cases, these worksheets are also applicable to Tier 2 methods, where the same equations and variables are applied together with country-specific information. Volume 1, Chapter 8 gives guidance on how to report the resulting emission and removal estimates.

Tables A1.1, A1.2, and A1.3 below provide the summary of Tier 1 worksheets available in this Volume. These worksheets are presented according to the following three broad categories in the Reporting Guidance and Tables (Volume 1, Table 8.2):

1. Worksheets for Livestock (3A)
2. Worksheets for Land (3B)
3. Worksheets for Aggregate sources and non- CO₂ emissions sources on land (3C)

Worksheets for Livestock include Enteric Fermentation and Manure Management worksheets. Worksheets for Land are grouped into six land-use categories and each group is sub-divided into three: biomass worksheets; dead organic matter worksheets; and soil worksheets (which are further divided into mineral soils and organic soils). Worksheets for aggregate sources and non-CO₂ emissions sources on land include worksheets for: 1) greenhouse emissions from Biomass Burning; 2) Liming; 3) Urea Fertilization; 4) Direct and Indirect N₂O emissions from Managed Soils and Manure Management; and 5) Rice Cultivation.

All worksheets are labelled according to:

- 1) Sector (i.e., AFOLU)
- 2) Category/subcategory (see category list in Table 8.2 of Volume 1)
- 3) Category code (also in Table 8.2); and
- 4) Sheet number

Worksheets for land-use categories contain columns for both the initial and final land-use categories. The worksheets allow further stratification using the column for subcategories for the reporting year.

When using the worksheets, care should be taken to apply the appropriate units for both the input, as well as the output values. Note that while a positive stock-change implies the stock increases, for the purpose of reporting, the signs are always positive (+) for emissions and negative (-) for removals or uptake.

Abbreviations used in the worksheets for the units of the variables are the following:

C = carbon

yr = year

ha = hectare

dm = dry mass

ag = above-ground

bg = below-ground

GHG = greenhouse gas

“-“ means dimensionless

TABLE A1.1					
TIER 1 WORKSHEETS AND ASSUMPTIONS FOR LAND-USE BASED C STOCK CHANGES					
Land-use category	Land-use subcategory	Biomass ¹ or Peat ³	Dead organic matter ²	Soils	
				Mineral	Organic
Forest Land (FL)	FL Remaining FL	Yes	0	0	Yes
	Land Converted to FL	Yes	Yes	Yes	Yes
Cropland (CL)	CL Remaining CL	Yes	0	Yes	Yes
	Land Converted to CL	Yes	Yes	Yes	Yes
Grassland (GL)	GL Remaining GL	0	0	Yes	Yes
	Land Converted to GL	Yes	Yes	Yes	Yes
Wetlands (WL)	WL Remaining WL	Yes	NA	NA	NA
	Land Converted to WL	Yes	Yes ⁵	NA	NA
Settlements (SL)	SL Remaining SL	0	0	0	Yes
	Land Converted to SL	Yes ⁴	Yes	Yes	Yes
Other Land (OL)	OL Remaining OL	NA	NA	NA	NA
	Land Converted to OL	Yes	NA	Yes	Yes

Notes:
Yes = worksheets for Tier 1 methods are available.
0 = default assumption is that emissions are zero or in equilibrium; no worksheet is needed.
NA = not applicable

¹ Includes above-ground and below-ground biomass unless specified.
² Includes dead wood and litter.
³ Peat is applicable only to Wetlands.
⁴ Includes only above-ground biomass; C stock changes from below-ground biomass is zero.
⁵ Use the worksheet for Cropland, if needed

TABLE A1.2				
TIER 1 WORKSHEETS AND ASSUMPTIONS FOR LAND-USE BASED NON- CO₂ EMISSIONS				
Land-use category	Land-use subcategory	Non-CO₂ from Fire	CH₄ emissions from rice cultivation	N₂O emissions from peat management
Forest Land (FL)	FL Remaining FL	Yes	NA	NA
	Land Converted to FL	Yes	NA	NA
Cropland (CL)	CL Remaining CL	Yes	Yes	NA
	Land Converted to CL	Yes	NA	NA
Grassland (GL)	GL Remaining GL	Yes	NA	NA
	Land Converted to GL	Yes	NA	NA
Wetlands (WL)	WL Remaining WL	NA	NA	Yes
	Land Converted to WL	Yes ¹	NA	Yes
Settlements (SL)	SL Remaining SL	NA	NA	NA
	Land Converted to SL	NA	NA	NA
Other Land (OL)	OL Remaining OL	NA	NA	NA
	Land Converted to OL	NA	NA	NA
Notes:				
Yes = worksheets for Tier 1 methods are available.				
NA = not applicable				
¹ Refer to guidance in the Forest Land, Cropland, and Grassland Chapters.				

TABLE A1.3	
TIER 1 WORKSHEETS AND ASSUMPTIONS FOR N₂O EMISSIONS FROM MANAGED SOILS, AND CO₂ EMISSIONS FROM LIME AND UREA APPLICATION	
Emissions	Worksheet
Direct N ₂ O emissions from Managed Soils	Yes
N ₂ O from atmospheric deposition of N volatilised from Managed Soils	Yes
Annual CO ₂ emissions from Liming	Yes
Annual CO ₂ emission from Urea Fertilization	Yes

Sector	Agriculture, Forestry and Other Land Use				
Category	Methane Emissions from Enteric Fermentation and Manure Management				
Category code	3A1 and 3A2				
Sheet	1 of 1				
Equation	Equation 10.19		Eq. 10.19 and 10.20	Equation 10.22	
Species/Livestock category	Number of animals	Emission factor for Enteric Fermentation	CH ₄ emissions from Enteric Fermentation	Emission factor for Manure Management	CH ₄ emissions from Manure Management
	(head)	(kg head ⁻¹ yr ⁻¹)	(Gg CH ₄ yr ⁻¹)	(kg head ⁻¹ yr ⁻¹)	(Gg CH ₄ yr ⁻¹)
T	N _(T)	EF _(T)	CH ₄ Enteric = N _(T) * EF _(T) * 10 ⁻⁶	EF _(T)	CH ₄ Manure = N _(T) * EF _(T) * 10 ⁻⁶
Dairy Cows					
Other Cattle					
Buffalo					
Sheep					
Goats					
Camels					
Horses					
Mules and Asses					
Swine					
Poultry					
Other ¹					
Total					

¹ Specify livestock categories as needed using additional lines (e.g. llamas, alpacas, reindeers, rabbits, fur-bearing animals etc.)

Sector		Agriculture, Forestry and Other Land Use							
Category		Manure Management: Direct N ₂ O Emissions from Manure Management Systems							
Category code		3A2							
Sheet		1 of 1							
Equation		Eq. 10.25	Equation 10.30			Equation 10.25			
Manure Management System (MMS) ¹	Species/Livestock category	Number of animals	Default N excretion rate	Typical animal mass for livestock category	Annual N excretion per head of species/livestock category ³	Fraction of total annual nitrogen excretion managed in MMS for each species/livestock category	Total nitrogen excretion for the MMS ⁴	Emission factor for direct N ₂ O-N emissions from MMS	Annual direct N ₂ O emissions from Manure Management
		(head)	[kg N (1000 kg animal) ⁻¹ day ⁻¹]	(kg)	(kg N animal ⁻¹ year ⁻¹)	(-)	(kg N yr ⁻¹)	[kg N ₂ O-N (kg N in MMS) ⁻¹]	kg N ₂ O yr ⁻¹
			Table 10.19	Tables 10A-4 to 10A-9	$N_{ex(T)} = N_{rate(T)} * TAM * 10^{-3} * 365$	Tables A4-A8	$NE_{MMS} = N_{(T)} * N_{ex(T)} * MS_{(T,S)}$	Table 10.21	$N_2O_{(mm)} = NE_{MMS} * EF_{3(S)} * 44/28$
S	T	N_(T)	N_{rate(T)}	TAM	N_{ex(T)}	MS_(T,S)	NE_{MMS}	EF_{3(S)}	N₂O_{D(mm)}
	Dairy Cows								
	Other Cattle								
	Buffalo								
	Sheep								
	Goats								
	Camels								
	Horses								
	Mules and Asses								
	Swine								
	Poultry								
	Other ²								
	Total								

¹ The calculations must be done by Manure Management System, and for each management system, the relevant species/livestock category (ies) must be selected. For the Manure Management Systems, see Table 10.18.

² Specify livestock categories as needed using additional lines (e.g. llamas, alpacas, reindeers, rabbits, fur-bearing animals etc.)

³ Country-specific values are preferred to directly enter into this column. If these are not available, use default values of N_{rate(T)} and TAM to calculate this variable.

⁴ This value will be input to worksheet in Indirect N₂O emissions from Manure Management (see category 3C6).

Sector		Agriculture, Forestry and Other Land Use						
Category		Forest Land Remaining Forest Land: Annual increase in carbon stocks in biomass (includes above-ground and below-ground biomass)						
Category code		3B1a						
Sheet		1 of 4						
Equation		Equation 2.2	Equation 2.9	Equation 2.10		Equation 2.9		
Land-use category		Subcategories for reporting year	Area of Forest Land Remaining Forest Land	Average annual above-ground biomass growth	Ratio of below-ground biomass to above-ground biomass	Average annual biomass growth above- and below-ground	Carbon fraction of dry matter	Annual increase in biomass carbon stocks due to biomass growth
Initial land use	Land use during reporting year		(ha)	(tonnes dm ha ⁻¹ yr ⁻¹)	[tonnes bg dm (tonne ag dm ⁻¹)]	(tonnes dm ha ⁻¹ yr ⁻¹)	[tonnes C (tonne dm ⁻¹)]	(tonnes C yr ⁻¹)
			National statistics or international data sources	Tables 4.9, 4.10 and 4.12	zero (0) or Table 4.4	G _{TOTAL} = GW * (1+R)	0.5 or Table 4.3	$\Delta C_G = A * G_{TOTAL} * CF$
			A	GW	R	G_{TOTAL}	CF	ΔC_G
FL	FL	(a)						
		(b)						
		(c)						
Total								

Sector		Agriculture, Forestry and Other Land Use					
Category		Forest Land Remaining Forest Land: Loss of carbon from wood removals					
Category code		3B1a					
Sheet		2 of 4					
Equation		Equation 2.2	Equation 2.12				
Land-use category		Subcategories for reporting year	Annual wood removal	Biomass conversion and expansion factor for conversion of removals in merchantable volume to total biomass removals (including bark)	Ratio of below-ground biomass to above-ground biomass	Carbon fraction of dry matter	Annual carbon loss due to biomass removals
Initial land use	Land use during reporting year		(m ³ yr ⁻¹)	[tonnes of biomass removals (m ³ of removals) ⁻¹]	[tonnes bg dm (tonne ag dm) ⁻¹]	[tonnes C (tonne dm) ⁻¹]	(tonnes C yr ⁻¹)
			National statistics or international data sources	Table 4.5	zero (0) or Table 4.4	0.5 or Table 4.3	L _{wood-removals} = H * BCEF _R * (1+R) * CF
			H	BCEF_R	R	CF	L_{wood-removals}
FL	FL	(a)					
		(b)					
		(c)					
Total							

Sector		Agriculture, Forestry and Other Land Use							
Category		Forest Land Remaining Forest Land: Loss of carbon from fuelwood removals							
Category code		3B1a							
Sheet		3 of 4							
Equation		Equation 2.2	Equation 2.13						
Land-use category		Subcategories for reporting year	Annual volume of fuelwood removal of whole trees	Biomass conversion and expansion factor for conversion of removals in merchantable volume to biomass removals (including bark)	Ratio of below-ground biomass to above-ground biomass	Annual volume of fuelwood removal as tree parts	Basic wood density	Carbon fraction of dry matter	Annual carbon loss due to fuelwood removal
Initial land use	Land use during reporting year		(m ³ yr ⁻¹)	[tonnes of biomass removals (m ³ of removals) ⁻¹]	[tonnes bg dm (tonne ag dm) ⁻¹]	(m ³ yr ⁻¹)	tonnes m ⁻³	[tonnes C (tonne dm) ⁻¹]	(tonnes C yr ⁻¹)
			FAO statistics	Table 4.5	zero (0) or Table 4.4	FAO statistics	Tables 4.13 and 4.14	0.5 or Table 4.3	$L_{\text{fuelwood}} = [FG_{\text{trees}} * BCEF_R * (1+R) + FG_{\text{part}} * D] * CF$
			FG_{trees}	BCEF_R	R	FG_{part}	D	CF	L_{fuelwood}
FL	FL	(a)							
		(b)							
		(c)							
Total									

Sector		Agriculture, Forestry and Other Land Use						
Category		Forest Land Remaining Forest Land: Loss of carbon from disturbance						
Category code		3B1a						
Sheet		4 of 4						
Equation		Equation 2.2	Equation 2.14				Equation 2.11	
Land-use category		Subcategories for reporting year	Area affected by disturbances	Average above-ground biomass of areas affected	Ratio of below-ground biomass to above-ground biomass	Carbon fraction of dry matter	Annual other losses of carbon	Annual decrease in carbon stocks due to biomass loss
Initial land use	Land use during reporting year		(ha yr ⁻¹)	(tonnes dm ha ⁻¹)	[tonnes bg dm (tonne ag dm) ⁻¹]	[tonnes C (tonne dm) ⁻¹]	(tonnes C yr ⁻¹)	(tonnes C yr ⁻¹)
			National statistics or international data sources	Table 4.9	zero (0) or Table 4.4	0.5 or Table 4.3	$L_{\text{disturbances}} = A * B_w * (1+R) * CF * fd$	$\Delta C_L = L_{\text{wood-removals}} + L_{\text{fuelwood}} + L_{\text{disturbances}}$
			A_{disturbance}	B_w	R	CF	L_{disturbances}	ΔC_L
FL	FL	(a)						
		(b)						
		(c)						
Total								

Note: fd = fraction of biomass lost in disturbance; a stand-replacing disturbance will kill all (fd = 1) biomass while an insect disturbance may only remove a portion (e.g. fd = 0.3) of the average biomass C density.

Sector		Agriculture, Forestry and Other Land Use			
Category		Forest Land Remaining Forest Land (FL-FL): Annual carbon loss from drained organic soils			
Category code		3B1a			
Sheet		1 of 1			
Equation		Equation 2.2	Equation 2.26		
Land-use category		Subcategories for reporting year	Land area of drained organic soil (ha)	Emission factor for climate type (tonnes C ha ⁻¹ yr ⁻¹)	Annual carbon loss from drained organic soils (tonnes C yr ⁻¹)
Initial land use	Land use during reporting year			Table 4.6	$L_{Organic} = A * EF$
			A	EF	L_{Organic}
FL	FL	(a)			
		(b)			
		(c)			
Total					

Sector		Agriculture, Forestry and Other Land Use						
Category		Land Converted to Forest Land: Annual increase in carbon stocks in biomass (includes above- and below-ground biomass)						
Category code		3B1b						
Sheet		1 of 4						
Equation		Equation 2.2	Equation 2.9	Equation 2.10		Equation 2.9		
Land-use category		Subcategories for reporting year	Area of land Converted to Forest Land	Average annual above-ground biomass growth	Ratio of below-ground biomass to above-ground biomass	Average annual biomass growth above and below-ground	Carbon fraction of dry matter	Annual increase in biomass carbon stocks due to biomass growth
Initial land use ¹	Land use during reporting year		(ha)	(tonnes dm ha ⁻¹ yr ⁻¹)	[tonnes bg dm (tonne ag dm) ⁻¹]	(tonnes dm ha ⁻¹ yr ⁻¹)	[tonnes C (tonne dm) ⁻¹]	(tonnes C yr ⁻¹)
			National statistics or international data sources	Tables 4.9, 4.10 and 4.12	zero (0) or Table 4.4	$G_{TOTAL} = G_W * (1+R)$	0.5 or Table 4.3	$\Delta C_G = A * G_{TOTAL} * CF$
			A	G_W	R	G_{TOTAL}	CF	ΔC_G
CL	FL	(a)						
		(b)						
Sub-total								
GL	FL	(a)						
		(b)						
Sub-total								
WL	FL	(a)						
		(b)						
Sub-total								
SL	FL	(a)						
		(b)						
Sub-total								
OL	FL	(a)						
		(b)						
Sub-total								
Total								

¹ If data by initial land use are not available, use only "non-FL" in this column.

Sector		Agriculture, Forestry and Other Land Use					
Category		Land Converted to Forest Land: Loss of carbon from wood removals ¹					
Category code		3B1b					
Sheet		2 of 4					
Equation		Equation 2.2	Equation 2.12				
Land-use category		Subcategories for reporting year	Annual wood removal	Biomass conversion and expansion factor for conversion of removals in merchantable volume to total biomass removals (including bark)	Ratio of below-ground biomass to above-ground biomass	Carbon fraction of dry matter	Annual carbon loss due to biomass removals
Initial land use ²	Land use during reporting year		(m ³ yr ⁻¹)	[tonnes of biomass removals (m ³ of removals) ⁻¹]	[tonnes bg dm (tonne ag dm) ⁻¹]	[tonnes C (tonne dm) ⁻¹]	(tonnes C yr ⁻¹)
			National statistics or international data sources	Table 4.5	zero (0) or Table 4.4	0.5 or Table 4.3	$L_{\text{wood-removals}} = H * BCEF_R * (1+R) * CF$
			H	BCEF _R	R	CF	L _{wood-removals}
CL	FL	(a)					
		(b)					
Sub-total							
GL	FL	(a)					
		(b)					
Sub-total							
WL	FL	(a)					
		(b)					
Sub-total							
SL	FL	(a)					
		(b)					
Sub-total							
OL	FL	(a)					
		(b)					
Sub-total							
Total							

¹ This worksheet is to be used if the assumption is that losses are not zero. See Chapter 4.3.1.1.

² If data by initial land use are not available, use only "non-FL" in this column.

Sector		Agriculture, Forestry and Other Land Use							
Category		Land Converted to Forest Land: Loss of carbon from fuelwood removals ¹							
Category code		3B1b							
Sheet		3 of 4							
Equation		Equation 2.2	Equation 2.13						
Land-use category		Subcategories for reporting year	Annual volume of fuelwood removal of whole trees	Biomass conversion and expansion factor for conversion of removals in merchantable volume to biomass removals (including bark)	Ratio of below-ground biomass to above-ground biomass	Annual volume of fuelwood removal as tree parts	Basic wood density	Carbon fraction of dry matter	Annual carbon loss due to fuelwood removal
Initial land use ²	Land use during reporting year		(m ³ yr ⁻¹)	[tonnes of biomass removal (m ³ of removals) ⁻¹]	[tonnes bg dm (tonne ag dm) ⁻¹]	(m ³ yr ⁻¹)	tonnes m ⁻³	[tonnes C (tonne dm) ⁻¹]	(tonnes C yr ⁻¹)
			FAO statistics	Table 4.5	zero (0) or Table 4.4	FAO statistics	Tables 4.13 and 4.14	0.5 or Table 4.3	$L_{fuelwood} = [FG_{trees} * BCEF_R * (1+R) + FG_{part} * D] * CF$
			FG_{trees}	BCEF_R	R	FG_{parts}	D	CF	L_{fuelwood}
CL	FL	(a)							
		(b)							
Sub-total									
GL	FL	(a)							
		(b)							
Sub-total									
WL	FL	(a)							
		(b)							
Sub-total									
SL	FL	(a)							
		(b)							
Sub-total									
OL	FL	(a)							
		(b)							
Sub-total									
Total									

¹ This worksheet is to be used if the assumption is that losses are not zero. See Chapter 4, Section 4.3.1.1.

² If data by initial land use are not available, use only "non-FL" in this column.

Sector		Agriculture, Forestry and Other Land Use						
Category		Land Converted to Forest Land: Loss of carbon from disturbance ¹						
Category code		3B1b						
Sheet		4 of 4						
Equation		Equation 2.2	Equation 2.14				Equation 2.7	
Land-use category		Subcategories for reporting year	Area affected by disturbances	Average above-ground biomass of areas affected	Ratio of below-ground biomass to above-ground biomass	Carbon fraction of dry matter	Annual other losses of carbon	Annual decrease in carbon stocks due to biomass loss
Initial land use ²	Land use during reporting year		(ha yr ⁻¹)	(tonnes dm ha ⁻¹)	[tonnes bg dm (tonne ag dm) ⁻¹]	[tonnes C (tonne dm) ⁻¹]	(tonnes C yr ⁻¹)	[tonnes C (tonne dm) ⁻¹]
			National statistics or international data sources	Tables 4.7 and 4.8	zero (0) or Table 4.4	0.5 or Table 4.3	$L_{\text{disturbances}} = A_{\text{disturbances}} * B_w * (1+R) * CF * fd$	$\Delta C_L = L_{\text{wood-removals}} + L_{\text{fuelwood}} + L_{\text{disturbances}}$
			$A_{\text{disturbances}}$	B_w	R	CF	$L_{\text{disturbances}}$	ΔC_L
CL	FL	(a)						
		(b)						
Sub-total								
GL	FL	(a)						
		(b)						
Sub-total								
WL	FL	(a)						
		(b)						
Sub-total								
SL	FL	(a)						
		(b)						
Sub-total								
OL	FL	(a)						
		(b)						
Sub-total								
Total								

¹ This worksheet is to be used if the assumption is that losses are not zero. See Chapter 4.3.1.1.

² If data by initial land use are not available, use only "non-FL" in this column. Note: fd = fraction of biomass lost in disturbance

Sector		Agriculture, Forestry and Other Land Use					
Category		Land Converted to Forest Land: Annual change in carbon stocks in dead organic matter due to land conversion					
Category code		3B1b					
Sheet		1 of 1					
Equation		Equation 2.2	Equation 2.23				
Land-use category		Subcategories for reporting year	Area undergoing conversion from old to new land-use category (ha)	Dead wood/litter stock, under the new land-use category (tonnes C ha ⁻¹)	Dead wood/litter stock, under the old land-use category (tonnes C ha ⁻¹)	Time period of the transition from old to new land-use category (yr)	Annual change in carbon stocks in dead wood/litter (tonnes C yr ⁻¹)
Initial land use ¹	Land use during reporting year		National statistics or international data sources	Table 2.2 for litter, or national statistics	default value is zero (0)	default value is 20	$\Delta C_{DOM} = A * (C_n - C_o) / T$
			A	C _n	C _o	T	ΔC_{DOM}
CL	FL	(a)				20	
		(b)				20	
Sub-total							
GL	FL	(a)				20	
		(b)				20	
Sub-total							
WL	FL	(a)				20	
		(b)				20	
Sub-total							
SL	FL	(a)				20	
		(b)				20	
Sub-total							
OL	FL	(a)				20	
		(b)				20	
Sub-total							
Total							

¹ If data by initial land use are not available, use only "non-FL" in this column.

Sector		Agriculture, Forestry and Other Land Use										
Category		Land Converted to Forest Land: Annual change in carbon stocks in mineral soils										
Category code		3B1b										
Sheet		1 of 2										
Equation		Equation 2.25, Formulation B in Box 2.1 of Section 2.3.3.1										
Land-use category		Subcategories of unique climate, soil, land-use change and management combinations	Area for land-use change by climate and soil combination	Reference carbon stock for the climate and soil combination	Time dependence of stock change factors (D) or number of years over a single inventory time period (T)	Stock change factor for land-use system in the last year of an inventory time period	Stock change factor for management regime in last year of an inventory period	Stock change factor for C input in the last year of the inventory period	Stock change factor for land-use system at the beginning of the inventory time period	Stock change factor for management regime at the beginning of the inventory time period	Stock change factor for C input at the beginning of the inventory time period	Annual change in carbon stocks in mineral soils
Initial land use ¹	Land use during reporting year		(ha)	(tonnes C ha ⁻¹)	(yr)	(-)	(-)	(-)	(-)	(-)	(-)	(tonnes C yr ⁻¹)
				Table 2.3; Section 2.3.3.1	(default is 20 yr; if T>D then use the value of T)	See Chap. 4, Sec. 4.3.3	See Chap. 4, Sec. 4.3.3	See Chap. 4, Sec. 4.3.3	See Chap. 4, Sec. 4.3.3	See Chap. 4, Sec. 4.3.3	See Chap. 4, Sec. 4.3.3	$\Delta C_{\text{Mineral}}$ as in Eq. 2.25
			$A_{(0)}$	SOC_{ref}	D	$F_{LU(0)}$	$F_{MG(0)}$	$F_{I(0)}$	$F_{LU(0-T)}$	$F_{MG(0-T)}$	$F_{I(0-T)}$	$\Delta C_{\text{Mineral}}$
CL	FL	(a)			20							
		(b)			20							
Sub-total												
GL	FL	(a)			20							
		(b)			20							
Sub-total												
WL	FL	(a)			20							
		(b)			20							
Sub-total												
SL	FL	(a)			20							
		(b)			20							
Sub-total												
OL	FL	(a)			20							
		(b)			20							
Sub-total												
Total												

¹ If data by initial land use are not available, use only "non-FL" in this column.

Sector		Agriculture, Forestry and Other Land Use			
Category		Land Converted to Forest Land: Annual change in carbon stocks in organic soils			
Category code		3B1b			
Sheet		2 of 2			
Equation		Equation 2.2	Equation 2.26		
Land-use category		Subcategories for reporting year	Area of organic soils on converted land (ha)	Emission factor for climate type (tonnes C ha ⁻¹ yr ⁻¹)	Annual carbon loss from organic soils (tonnes C yr ⁻¹)
Initial land use ¹	Land use during reporting year			Table 4.6	L_{Organic} = A * EF
			A	EF	L_{Organic}
CL	FL	(a)			
		(b)			
Sub-total					
GL	FL	(a)			
		(b)			
Sub-total					
WL	FL	(a)			
		(b)			
Sub-total					
SL	FL	(a)			
		(b)			
Sub-total					
OL	FL	(a)			
		(b)			
Sub-total					
Total					
¹ If data by initial land use are not available, use only "non-FL" in this column.					

Sector		Agriculture, Forestry and Other Land Use				
Category		Cropland Remaining Cropland: Annual change in carbon stocks in biomass				
Category code		3B2a				
Sheet		1 of 1				
Equation		Equation 2.2	Equation 2.7 ¹			
Land-use category		Subcategories for reporting year	Annual area of Cropland with perennial woody biomass	Annual growth rate of perennial woody biomass	Annual carbon stock in biomass removed (removal or harvest)	Annual change in carbon stocks in biomass
Initial land use	Land use during reporting year		(ha)	(tonnes C ha ⁻¹ yr ⁻¹)	(tonnes C ha ⁻¹ yr ⁻¹)	(tonnes C yr ⁻¹)
				National estimates, or Table 5.1	National estimates, or Table 5.1	$\Delta C_B = A * (\Delta C_G - \Delta C_L)$
			A	ΔC_G	ΔC_L	ΔC_B
CL	CL	(a)				
		(b)				
		(c)				
Total						

¹ Multiplying per ha values from Table 5.1 is required here according to text in Section 5.2.1.

Sector		Agriculture, Forestry and Other Land Use									
Category		Cropland Remaining Cropland: Annual change in carbon stocks in mineral soils									
Category code		3B2a									
Sheet		1 of 2									
Equation		Equation 2.2	Equation 2.25, Formulation A in Box 2.1 of Section 2.3.3.1								
Land-use category		Subcategories for reporting year	Area in the last year of an inventory period	Area at the beginning of an inventory period	Reference carbon stock in the last year of an inventory period	Reference carbon stock at the beginning of an inventory period	Time dependence of stock change factors (D) or number of years over a single inventory time period (T)	Stock change factor for land-use system or sub-system	Stock change factor for management regime	Stock change factor for input of organic matter	Annual change in carbon stocks in mineral soils
Initial land use	Land use during reporting year		(ha)	(ha)	(tonnes C ha ⁻¹)	(tonnes C ha ⁻¹)	(yr)	(-)	(-)	(-)	(tonnes C yr ⁻¹)
					Table 2.3	Table 2.3	(default is 20 yr; if T>D then use the value of T)	Table 5.5	Table 5.5	Table 5.5	$\Delta C_{\text{Mineral}}$ as in Equation 2.25
			A₍₀₎	A_(0-T)	SOC_{ref(0)}	SOC_{ref(T-0)}	D	F_{LU}	F_{MG}	F_I	$\Delta C_{\text{Mineral}}$
CL	CL	(a)				20					
		(b)				20					
		(c)				20					
Total											

Sector		Agriculture, Forestry and Other Land Use			
Category		Cropland Remaining Cropland: Annual change in carbon stocks in organic soils			
Category code		3B2a			
Sheet		2 of 2			
Equation		Equation 2.2	Equation 2.26		
Land-use category		Subcategories for reporting year	Land area of cultivated organic soil	Emission factor for climate type	Annual carbon loss from cultivated organic soils
Initial land use	Land use during reporting year		(ha)	(tonnes C ha ⁻¹ yr ⁻¹)	(tonnes C yr ⁻¹)
				Table 5.6	L_{Organic} = A * EF
			A	EF	L_{Organic}
CL	CL	(a)			
		(b)			
		(c)			
Total					

Sector		Agriculture, Forestry and Other Land Use						
Category		Land Converted to Cropland: Annual change in carbon stocks in biomass						
Category code		3B2b						
Sheet		1 of 1						
Equation		Equation 2.2	Equation 2.16			Equation 2.15, 2.16		
Land-use category		Subcategories for reporting year	Annual area of Land Converted to Cropland	Biomass stocks before the conversion	Carbon fraction of dry matter	Annual biomass carbon growth	Annual loss of biomass carbon	Annual change in carbon stocks in biomass
Initial land use ¹	Land use during reporting year		(ha)	(tonnes dm ha ⁻¹)	[tonnes C (tonne dm ⁻¹) ⁻¹]	(tonnes C ha ⁻¹ yr ⁻¹)	(tonnes C ha ⁻¹ yr ⁻¹)	(tonnes C yr ⁻¹)
				Table 5.8	0.5	Table 5.9	National estimates, or Table 5.1	$\Delta C_B = \Delta C_G + ((0 - B_{BEFORE}) * \Delta A_{TO_OTHER}) * CF - \Delta C_L$
			ΔA_{TO_OTHER}	B_{BEFORE}	CF	ΔC_G	ΔC_L	ΔC_B
FL	CL	(a)			0.5			
		(b)			0.5			
Sub-total								
GL	CL	(a)			0.5			
		(b)			0.5			
Sub-total								
WL	CL	(a)			0.5			
		(b)			0.5			
Sub-total								
SL	CL	(a)			0.5			
		(b)			0.5			
Sub-total								
OL	CL	(a)			0.5			
		(b)			0.5			
Sub-total								
Total								

¹ If data by initial land use are not available, use only "non-CL" in this column.

Sector		Agriculture, Forestry and Other Land Use					
Category		Land Converted to Cropland: Annual change in carbon stocks in dead organic matter due to land conversion ¹					
Category code		3B2b					
Sheet		1 of 1					
Equation		Equation 2.2	Equation 2.23				
Land-use category		Subcategories for reporting year	Area undergoing conversion from old to new land-use category (ha)	Dead wood/litter stock under the old land-use category (tonnes C ha ⁻¹)	Dead wood/litter stock under the new land-use category (tonnes C ha ⁻¹)	Time period of the transition from old to new land-use category (yr)	Annual change in carbon stocks in dead wood/litter (tonnes C yr ⁻¹)
Initial land use ²	Land use during reporting year		National statistics or international data sources	Table 2.2 for litter, or national statistics	default value is zero (0)	default value is 1	$\Delta C_{DOM} = A_{on} * (C_n - C_o) / T_{on}$
			A_{on}	C_o	C_n	T_{on}	ΔC_{DOM}
FL	CL	(a)			0	1	
		(b)			0	1	
Sub-total							
GL	CL	(a)			0	1	
		(b)			0	1	
Sub-total							
WL	CL	(a)			0	1	
		(b)			0	1	
Sub-total							
SL	CL	(a)			0	1	
		(b)			0	1	
Sub-total							
OL	CL	(a)			0	1	
		(b)			0	1	
Sub-total							
Total							

¹ Use separate worksheets to separately estimate carbon stock changes in deadwood and in litter.

² If data by initial land use are not available, use only "non-CL" in this column.

Sector		Agriculture, Forestry and Other Land Use										
Category		Land Converted to Cropland: Annual change in carbon stocks in mineral soils										
Category code		3B2b										
Sheet		1 of 2										
Equation		Eq. 2.2	Equation 2.25, Formulation B in Box 2.1 of Section 2.3.3.1									
Land-use category		Subcategories of unique climate, soil, land-use change and management combinations	Area for land-use change by climate and soil combination	Reference carbon stock for the climate/soil combination	Time dependence of stock change factors (D) or number of years over a single inventory time period (T)	Stock change factor for land-use system in the last year of an inventory time period	Stock change factor for management regime in last year of an inventory period	Stock change factor for C input in the last year of the inventory period	Stock change factor for land-use system at the beginning of the inventory time period	Stock change factor for management regime at the beginning of the inventory time period	Stock change factor for C input at the beginning of the inventory time period	Annual change in carbon stocks in mineral soils
Initial land use ¹	Land use during reporting year		(ha)	(tonnes C ha ⁻¹)	(yr)	(-)	(-)	(-)	(-)	(-)	(-)	(tonnes C yr ⁻¹)
				Table 2.3; Chap 2, Sec. 2.3.3.1	(default is 20 yr; if T>D then use the value of T)	Table 5.10	Table 5.10	Table 5.10	Table 5.5	Table 5.5	Table 5.5	$\Delta C_{\text{Mineral}}$ as in Equation 2.25
			A₍₀₎	SOC_{ref}	D	F_{LU(0)}	F_{MG(0)}	F_{I(0)}	F_{LU(0-T)}	F_{MG(0-T)}	F_{I(0-T)}	$\Delta C_{\text{Mineral}}$
FL	CL	(a)			20							
		(b)			20							
Sub-total												
GL	CL	(a)			20							
		(b)			20							
Sub-total												
WL	CL	(a)			20							
		(b)			20							
Sub-total												
SL	CL	(a)			20							
		(b)			20							
Sub-total												
OL	CL	(a)			20							
		(b)			20							
Sub-total												
Total												

¹ If data by initial land use are not available, use only "non-CL" in this column.

Sector		Agriculture, Forestry and Other Land Use			
Category		Land Converted to Cropland: Annual change in carbon stocks in organic soils			
Category code		3B2b			
Sheet		2 of 2			
Equation		Equation 2.2	Equation 2.26		
Land-use category		Subcategories for reporting year	Land area of cultivated organic soil	Emission factor for climate type	Annual carbon loss from cultivated organic soils
Initial land use ¹	Land use during reporting year		(ha)	(tonnes C ha ⁻¹ yr ⁻¹)	(tonnes C yr ⁻¹)
			Table 5.6		$L_{\text{Organic}} = A * EF$
			A	EF	L_{Organic}
FL	CL	(a)			
		(b)			
Sub-total					
GL	CL	(a)			
		(b)			
Sub-total					
WL	CL	(a)			
		(b)			
Sub-total					
SL	CL	(a)			
		(b)			
Sub-total					
OL	CL	(a)			
		(b)			
Sub-total					
Total					

¹ If data by initial land use are not available, use only "non-CL" in this column.

Sector		Agriculture, Forestry and Other Land Use											
Category		Grassland Remaining Grassland: Annual change in carbon stocks in mineral soils											
Category code		3B3a											
Sheet		1 of 2											
Equation		Equation 2.2		Equation 2.25									
Land-use category		Subcategories of unique climate, soil, and management combinations	Area in the last year of an inventory period	Area at the beginning of an inventory period	Reference carbon stock for Climate/Soil Combination	Stock change factor for land-use system or sub-system	Stock change factor for management regime	Stock change factor for C input	Carbon stock in last year of an inventory period	Carbon stock at the beginning of an inventory period	Time dependence of stock change factors (D) or number of years over a single inventory time period (T)	Annual change in carbon stocks in mineral soils	
Initial land use	Land use during reporting year		(ha)	(ha)	(tonnes C ha ⁻¹)	(-)	(-)	(-)	tonnes C	tonnes C	(yr)	(tonnes C yr ⁻¹)	
					Table 2.3, Chap. 2, Sec. 2.3.3.1	Table 6.2	Table 6.2	Table 6.2			(default is 20 yr; if T>D then use the value of T)	$\Delta C_{\text{Mineral}}$ as in Equation 2.25	
			A₍₀₎	A_(0-T)	SOC_{ref}	F_{LU}	F_{MG}	F_I	SOC₀	SOC_{0-T}	D	$\Delta C_{\text{Mineral}}$	
GL	GL	(a)											
		(b)											
		(c)											
		(d)											
		(e)											
		(f)											
		(g)											
		(h)											
Total											20		

Note: This worksheet is designed for computations using Formulation A in Box 2.1 of Section 2.3.3.1

Sector		Agriculture, Forestry and Other Land Use			
Category		Grassland Remaining Grassland: Annual change in carbon stocks in organic soils			
Category code		3B3a			
Sheet		2 of 2			
Equation		Equation 2.2	Equation 2.26		
Land-use category		Subcategories for reporting year	Land area of cultivated organic soil	Emission factor for climate type	Annual carbon loss from cultivated organic soils
Initial land use	Land use during reporting year		(ha)	(tonnes C ha ⁻¹ yr ⁻¹)	(tonnes C yr ⁻¹)
				Table 6.3	L_{Organic} = A * EF
			A	EF	L_{Organic}
GL	GL	(a)			
		(b)			
		(c)			
Total					

Sector		Agriculture, Forestry and Other Land Use								
Category		Land Converted to Grassland: Annual change in carbon stocks in biomass								
Category code		3B3b								
Sheet		1 of 1								
Equation		Equation 2.2	Equation 2.16				Equation 2.15, 2.16			
Land-use category		Subcategories for reporting year	Type of vegetation ²	Annual area of Land Converted to Grassland	Biomass stocks after the conversion	Biomass stocks before the conversion	Carbon fraction of dry matter	Annual biomass carbon growth	Annual loss of biomass carbon	Annual change in carbon stocks in biomass
Initial land use ¹	Land use during reporting year			(ha)	(tonnes dm ha ⁻¹)	(tonnes dm ha ⁻¹)	[tonnes C (tonne dm) ⁻¹]	(tonnes C ha ⁻¹ yr ⁻¹)	(tonnes C ha ⁻¹ yr ⁻¹)	(tonnes C yr ⁻¹)
					0, or Table 6.4	(see section 6.3.1.2)	0,47 (for herbaceous vegetation); 0,5 or Table 4.3 (for woody vegetation)	Table 5.9	National estimates, or Table 5.1	$\Delta C_B = \Delta C_G + ((B_{AFTER} - B_{BEFORE}) * \Delta A_{TO_OTHER}) * CF - \Delta C_L$
				ΔA_{TO_OTHERS}	B_{AFTER}	B_{BEFORE}	CF	ΔC_G	ΔC_L	ΔC_B
[non-GL]	GL	(a)	Herbaceous							
			Woody							
		Sub-total								
		(b)	Herbaceous							
			Woody							
		Sub-total								
Total										

¹ If data by initial land use are not available, use only "non-GL" in this column. Otherwise use separate blocks by initial land use.

² Within each subcategory (a), (b) etc., calculations are to be made separately for herbaceous and wood vegetation.

Sector		Agriculture, Forestry and Other Land Use						
Category		Land Converted to Grassland: Annual change in carbon stocks in dead organic matter due to land conversion						
Category code		3B3b						
Sheet		1 of 1						
Equation		Equation 2.2		Equation 2.23				
Land-use category		Subcategories for reporting year	Type of vegetation ²	Area undergoing conversion from old to new land-use category (ha yr ⁻¹)	Dead wood/litter stock under the old land-use category (tonnes C ha ⁻¹)	Dead wood/litter stock under the new land-use category (tonnes C ha ⁻¹)	Time period of the transition from old to new land-use category (yr)	Annual change in carbon stocks in dead wood/litter (tonnes C yr ⁻¹)
Initial land use ¹	Land use during reporting year			National statistics or international data sources	Table 2.2 for litter, or national statistics	default value is zero (0)	default value is 1	$\Delta C_{DOM} = A_{on} * (C_n - C_o) / T_{on}$
				A_{on}	C_o	C_n	T_{on}	ΔC_{DOM}
[non-GL]	GL	(a)	Deadwood				1	
			Litter				1	
		Sub-total						
		(b)	Deadwood				1	
			Litter				1	
		Sub-total						
Total								

¹ If data by initial land use are not available, use only "non-GL" in this column. Otherwise use separate blocks by initial land use.

² Within each subcategory (a), (b) etc., calculations are to be made separately for deadwood and litter.

Sector		Agriculture, Forestry and Other Land Use										
Category		Land Converted to Grassland: Annual change in carbon stocks in mineral soils										
Category code		3B3b										
Sheet		1 of 2										
Equation		Equation 2.25, Formulation B in Box 2.1 of Section 2.3.3.1										
Land-use category		Equation 2.2	Area for land-use change by climate and soil combination	Reference carbon stock for the climate and soil combination	Time dependence of stock change factors (D) or number of years over a single inventory time period (T)	Stock change factor for land-use system in the last year of an inventory time period	Stock change factor for management regime in last year of an inventory period	Stock change factor for C input in the last year of the inventory period	Stock change factor for land-use system at the beginning of inventory time period	Stock change factor for management regime at the beginning of the inventory time period	Stock change factor for C input at the beginning of the inventory time period	Annual change in carbon stocks in mineral soils
Initial land use ¹	Land use during reporting year	Subcategories of unique climate, soil, land-use change and management combinations	(ha)	(tonnes C ha ⁻¹)	(yr)	(-)	(-)	(-)	(-)	(-)	(-)	(tonnes C yr ⁻¹)
				Table 2.3; Chap. 2, Sec. 2.3.3.1	(default is 20 yr; if T>D then use the value of T)	Table 6.2	Table 6.2	Table 6.2	Table 5.5 (Cropland); 1 for other uses	Table 5.5 (Cropland); 1 for other uses	Table 5.5 (Cropland); 1 for other uses	$\Delta C_{\text{Mineral}}$ as in Equation 2.25
			A₍₀₎	SOC_{ref}	D	F_{LU(0)}	F_{MG(0)}	F_{I(0)}	F_{LU(0-T)}	F_{MG(0-T)}	F_{I(0-T)}	$\Delta C_{\text{Mineral}}$
FL	GL	(a)			20							
		(b)			20							
Sub-total												
CL	GL	(a)			20							
		(b)			20							
Sub-total												
WL	GL	(a)			20							
		(b)			20							
Sub-total												
SL	GL	(a)			20							
		(b)			20							
Sub-total												
OL	GL	(a)			20							
		(b)			20							
Sub-total												
Total												

¹ If data by initial land use are not available, use only "non-GL" in this column.

Sector		Agriculture, Forestry and Other Land Use			
Category		Land Converted to Grassland: Annual change in carbon stocks in organic soils			
Category code		3B3b			
Sheet		2 of 2			
Equation		Equation 2.2	Equation 2.26		
Land-use category		Subcategories for reporting year	Land area of cultivated organic soil	Emission factor for climate type	Annual carbon loss from cultivated organic soils
Initial land use ¹	Land use during reporting year		(ha)	(tonnes C ha ⁻¹ yr ⁻¹)	(tonnes C yr ⁻¹)
			Table 6.3		$L_{\text{Organic}} = A * EF$
			A	EF	L_{Organic}
FL	GL	(a)			
		(b)			
Sub-total					
CL	GL	(a)			
		(b)			
Sub-total					
WL	GL	(a)			
		(b)			
Sub-total					
SL	GL	(a)			
		(b)			
Sub-total					
OL	GL	(a)			
		(b)			
Sub-total					
Total					

¹ If data by initial land use are not available, use only "non-GL" in this column.

Sector		Agriculture, Forestry and Other Land Use					
Category		Wetlands Remaining Wetlands: CO₂-C emissions from managed peatlands					
Category code		3B4ai					
Sheet		1 of 3					
Equation		Eq. 2.2	Equation 7.4				
Land-use category		Subcategories for reporting year	Area of nutrient rich peat soils managed for peat extraction (all production phases)	Emission factors for CO ₂ -C from nutrient rich peat soils managed for peat extraction	Area of nutrient poor peat soils managed for peat extraction (all production phases)	Emission factors for CO ₂ -C from nutrient poor peat soils managed for peat extraction	CO ₂ -C emissions from managed peatlands
Initial land use	Land use during reporting year		(ha)	(tonnes C ha ⁻¹ yr ⁻¹)	(ha)	(tonnes C ha ⁻¹ yr ⁻¹)	Gg C yr ⁻¹
				Table 7.4		Table 7.4	$CO_2-C_{WW\ PeatSoil} = (A_{PeatRich} * EF_{PeatRich} + A_{PeatPoor} * EF_{PeatPoor}) * 10^{-3}$
			A_{PeatRich}	EF_{CO₂PeatRich}	A_{PeatPoor}	EF_{CO₂PeatPoor}	CO₂-C_{WW PeatSoil}
WL _{Peat}	WL _{Peat}	(a)					
		(b)					
		(c)					
Total							

Sector		Agriculture, Forestry and Other Land Use						
Category		Wetlands Remaining Wetlands: CO ₂ -C emissions from managed peatlands						
Category code		3B4ai						
Sheet		2 of 3						
Equation		Eq. 2.2	Equation 2.16				Equation 7.4	
Land-use category		Subcategories for reporting year	Annual area of Land Converted to Wetlands	Biomass stocks after the conversion	Biomass stocks before the conversion	Carbon fraction of dry matter	Emissions from change in C stocks in biomass due to vegetation clearing	On-site CO ₂ -C emissions from peat deposit
Initial land use ¹	Land use during reporting year		(ha)	(tonnes dm ha ⁻¹)	(tonnes dm ha ⁻¹)	[tonnes C (tonne dm) ⁻¹]	Gg C yr ⁻¹	Gg C yr ⁻¹
					Table 4.7	0.5 or Table 4.3	$\Delta C_{WW\text{peatB}} = \{\Delta A_{\text{TO_OTHERS}} * (B_{\text{AFTER}} - B_{\text{BEFORE}}) * CF\} / 1000$	$\text{CO}_2\text{-C}_{\text{WW Peat-on-site}} = \text{CO}_2\text{-C}_{\text{WW PeatSoil}} + \Delta C_{\text{WWpeatB}}$
			$\Delta A_{\text{TO_OTHERS}}$	B_{AFTER}	B_{BEFORE}	CF	$\Delta C_{\text{WWpeatB}}$	$\text{CO}_2\text{-C}_{\text{WW Peat-on-site}}$
non-WL _{peat}	WL _{Peat}	(a)						
		(b)						
		(c)						
Total								

¹ If data by initial land use are not available, use only "non-WLpeat" in this column.

Sector		Agriculture, Forestry and Other Land Use					
Category		Wetlands Remaining Wetlands: CO ₂ -C emissions from managed peatlands					
Category code		3B4ai					
Sheet		3 of 3					
Equation		Eq. 2.2	Equation 7.5		Equations 7.3	Equations 7.2	
Land-use category		Subcategories for reporting year	Air-dry weight of extracted peat ¹	Carbon fraction of air-dry peat by weight ¹	Off-site emissions from peat removed for horticultural use	CO ₂ -C emissions from managed peatlands	CO ₂ emissions from land undergoing peat extraction
Initial land use	Land use during reporting year		(tonnes yr ⁻¹)	[tonnes C (tonne peat) ⁻¹]	Gg C yr ⁻¹	Gg C yr ⁻¹	(Gg CO ₂ yr ⁻¹)
				Table 7.5	$CO_2-C_{WW\text{peat}_{off-site}} = (Wt_{dry\text{peat}} * C_{fraction_{wt_{peat}}}) / 1000$	$CO_2-C_{WW\text{peat}} = CO_2-C_{WW\text{peat}_{on-site}} + CO_2-C_{WW\text{peat}_{off-site}}$	$CO_2\text{ WW}_{peat} = CO_2-C_{WW\text{peat}} * 44/12$
			Wt_{dry_peat}	Cfraction_{wt_peat}	CO₂-C_{WW_peat}_{Off-site}	CO₂-C_{WW_peat}	CO₂WW_{peat}
WL _{Peat}	WL _{Peat}	(a)					
		(b)					
		(c)					
Total							

¹ Countries may choose to report peat production either in weight units (Wt_{dry_peat}), or volumetric units (Vol_{dry_peat}), and use the appropriate carbon fraction (Cfraction_{wt_peat}, or Cfraction_{vol_peat}), respectively. The symbols in the equation to calculate the CO₂-C emissions should be adjusted accordingly.

Sector		Agriculture, Forestry and Other Land Use			
Category		Wetlands Remaining Wetlands: N ₂ O Emissions from peatlands during peat extraction			
Category code		3B4ai			
Sheet		1 of 1			
Equation		Eq. 2.2	Equation 7.7		
Land-use category		Subcategories for reporting year	Area of nutrient rich peat soils managed for peat extraction, including abandoned areas in which drainage is still present	Emission factor for drained nutrient-rich Wetlands organic soils	Direct N ₂ O emissions from peatlands managed for peat extraction
Initial land use	Land use during reporting year		(ha)	(kg N ₂ O-N ha ⁻¹ yr ⁻¹)	(Gg N ₂ O yr ⁻¹)
				Table 7.6	$N_{2O_{WW\ peatExtraction}} = (A_{PeatRich} * EF_{N_{2O-N_{PeatRich}}}) * 44/28 * 10^{-6}$
			$A_{PeatRich}$	$EF_{N_{2O-N_{PeatRich}}}$	$N_{2O_{WW\ PeatExtraction}}$
WL _{Peat}	WL _{Peat}	(a)			
		(b)			
		(c)			
Total					

Sector		Agriculture, Forestry and Other Land Use			
Category		Land Converted to Wetlands: N₂O Emissions from land converted for peat extraction			
Category code		3B4bi			
Sheet		1 of 1			
Equation		Eq. 2.2	Equation 7.7		
Land-use category		Subcategories for reporting year	Area of nutrient rich peat soils managed for peat extraction, including abandoned areas in which drainage is still present	Emission factor for drained nutrient-rich Wetlands organic soils	Direct N ₂ O emissions from peatlands managed for peat extraction
Initial land use ¹	Land use during reporting year		(ha)	(kg N ₂ O-N ha ⁻¹ yr ⁻¹)	(Gg N ₂ O yr ⁻¹)
				Table 7.6	$N_{2O_{WW}}^{peatExtraction} = (A_{PeatRich} * EF_{N_{2O-N}^{PeatRich}} * 44/28 * 10^{-6})$
			A_{PeatRich}	EF_{N₂O-N_{PeatRich}}	N₂O_{WW}^{PeatExtraction}}
FL	WL _{Peat}	(a) (b)			
Sub-total					
CL	WL _{Peat}	(a) (b)			
Sub-total					
GL	WL _{Peat}	(a) (b)			
Sub-total					
SL	WL _{Peat}	(a) (b)			
Sub-total					
OL	WL _{Peat}	(a) (b)			
Sub-total					
Total					

¹ If data by initial land use are not available, use only "non-WL" in this column.

Sector		Agriculture, Forestry and Other Land Use					
Category		Land Converted to Wetlands: CO ₂ Emissions from Land Converted to Flooded land					
Category code		3B4bii					
Sheet		1 of 1					
Equation		Eq. 2.2	Equation 7.10				
Land-use category		Subcategories for reporting year	Area of land converted annually to Flooded Land from original land use <i>i</i>	Biomass immediately following conversion to Flooded Land	Biomass in land immediately before conversion to Flooded Land	Carbon fraction of dry matter	Annual change in carbon stocks in biomass on Land Converted to Flooded land
Initial land use ¹	Land use during reporting year		(ha yr ⁻¹)	(tonnes dm ha ⁻¹)	(tonnes dm ha ⁻¹)	[tonnes C (tonne dm) ⁻¹]	tonnes C yr ⁻¹
			A_i	(default = 0)	Table 4.7	0.5 or Table 4.3	$\Delta C_{LWflood_LB} = [\sum i A_i * (B_{AFTER_i} - B_{BEFORE_i})] * CF$
			B_{AFTER_i}	B_{BEFORE_i}	CF	$\Delta C_{LWflood_LB}$	
FL	WL _{Flooded}	(a)					
		(b)					
Sub-total							
CL	WL _{Flooded}	(a)					
		(b)					
Sub-total							
GL	WL _{Flooded}	(a)					
		(b)					
Sub-total							
SL	WL _{Flooded}	(a)					
		(b)					
Sub-total							
OL	WL _{Flooded}	(a)					
		(b)					
Sub-total							
Total							

¹ If data by initial land use are not available, use only "non-WL" in this column.

Sector		Agriculture, Forestry and Other Land Use			
Category		Settlements Remaining Settlements: Annual change in carbon stocks in organic soils			
Category code		3B5a			
Sheet		1 of 1			
Equation		Eq. 2.2	Equation 2.26		
Land-use category		Subcategories for reporting year	Land area of cultivated organic soil	Emission factor for climate type	Annual carbon loss from cultivated organic soils
Initial land use	Land use during reporting year		(ha)	(tonnes C ha ⁻¹ yr ⁻¹)	(tonnes C yr ⁻¹)
				Table 5.6	L_{organic} = A * EF
			A	EF	L_{organic}
SL	SL	(a)			
		(b)			
		(c)			
Total					

Sector		Agriculture, Forestry and Other Land Use						
Category		Land Converted to Settlements: Annual change in carbon stocks in biomass						
Category code		3B5b						
Sheet		1 of 1						
Equation		Eq. 2.2	Equation 2.16			Equation 2.15, 2.16		
Land-use category		Subcategories for reporting year	Annual area of Land Converted to Settlements	Biomass stocks before the conversion	Carbon fraction of dry matter	Annual biomass carbon growth	Annual loss of biomass carbon	Annual change in carbon stocks in biomass
Initial land use ¹	Land use during reporting year		(ha)	(tonnes dm ha ⁻¹)	[tonnes C (tonne dm) ⁻¹]	(tonnes C ha ⁻¹ yr ⁻¹)	(tonnes C ha ⁻¹ yr ⁻¹)	(tonnes C yr ⁻¹)
				Table 5.8	0.5	Table 5.9	National estimates, or Table 5.1	$\Delta C_B = \Delta C_G + ((0 - B_{BEFORE}) * \Delta A_{TO_OTHERS} * CF) - \Delta C_L$
			ΔA_{TO_OTHERS}	B_{BEFORE}	CF	ΔC_G	ΔC_L	ΔC_B
FL	SL	(a)						
		(b)						
Sub-total								
CL	SL	(a)						
		(b)						
Sub-total								
GL	SL	(a)						
		(b)						
Sub-total								
WL	SL	(a)						
		(b)						
Sub-total								
OL	SL	(a)						
		(b)						
Sub-total								
Total								

¹ If data by initial land use are not available, use only "non-SL" in this column.

Sector		Agriculture, Forestry and Other Land Use					
Category		Land Converted to Settlements: Annual change in carbon stocks in dead organic matter due to land conversion ¹					
Category code		3B5b					
Sheet		1 of 1					
Equation		Eq. 2.2	Equation 2.23				
Land-use category		Subcategories for reporting year	Area undergoing conversion from old to new land-use category	Dead wood/litter stock, under the new land-use category	Dead wood/litter stock, under the old land-use category	Time period of the transition from old to new land-use category	Annual change in carbon stocks in dead wood/litter
Initial land use ²	Land use during reporting year		(ha)	(tonnes C ha ⁻¹)	(tonnes C ha ⁻¹)	(yr)	(tonnes C yr ⁻¹)
			National statistics or international data sources	Table 2.2 for litter, or national statistics	default =0	default = 1	$\Delta C_{DOM} = A_{on} * (C_n - C_o) / T_{on}$
			A_{on}	C_n	C_o	T_{on}	ΔC_{DOM}
FL	SL	(a)		0	1		
		(b)		0	1		
Sub-total							
CL	SL	(a)		0	1		
		(b)		0	1		
Sub-total							
GL	SL	(a)		0	1		
		(b)		0	1		
Sub-total							
WL	SL	(a)		0	1		
		(b)		0	1		
Sub-total							
OL	SL	(a)		0	1		
		(b)		0	1		
Sub-total							
Total							

¹ Use separate worksheets to separately estimate carbon stock changes in deadwood and in litter.
² If data by initial land use are not available, use only "non-SL" in this column.

Sector		Agriculture, Forestry and Other Land Use										
Category		Land Converted to Settlements: Annual change in carbon stocks in mineral soils										
Category code		3B5b										
Sheet		1 of 2										
Equation		Equation 2.25, Formulation B in Box 2.1 of Section 2.3.3.1										
Land-use category		Eq. 2.2	Area for land-use change by climate and soil combination	Reference carbon stock for the climate/soil combination	Time dependence of stock change factors (D) or number of years over a single inventory time period (T)	Stock change factor for land-use system in the last year of an inventory time period	Stock change factor for management regime in last year of an inventory period	Stock change factor for C input in the last year of the inventory period	Stock change factor for land-use system at the beginning of the inventory time period	Stock change factor for management regime at the beginning of the inventory time period	Stock change factor for C input at the beginning of the inventory time period	Annual change in carbon stocks in mineral soils
Initial land use ¹	Land use during reporting year	Subcategories for reporting year	(ha)	(tonnes C ha ⁻¹)	(yr)	(-)	(-)	(-)	(-)	(-)	(-)	(tonnes C yr ⁻¹)
				Table 2.3; Chap. 2, Sec. 2.3.3.1	(default is 20 yr; if T>D then use the value of T)	See Chap. 8, Sec. 8.3.3	See Chap. 8, Sec. 8.3.3	See Chap. 8, Sec. 8.3.3	See Chap. 8, Sec. 8.3.3	See Chap. 8, Sec. 8.3.3	See Chap. 8, Sec. 8.3.3	$\Delta C_{\text{Mineral}}$ as in Equation 2.25
			$A_{(0)}$	SOC_{ref}	D	$F_{LU(0)}$	$F_{MG(0)}$	$F_{I(0)}$	$F_{LU(0-T)}$	$F_{MG(0-T)}$	$F_{I(0-T)}$	$\Delta C_{\text{Mineral}}$
FL	SL	(a)			20							
		(b)			20							
Sub-total												
CL	SL	(a)			20							
		(b)			20							
Sub-total												
GL	SL	(a)			20							
		(b)			20							
Sub-total												
WL	SL	(a)			20							
		(b)			20							
Sub-total												
OL	SL	(a)			20							
		(b)			20							
Sub-total												
Total												

¹ If data by initial land use are not available, use only "non-SL" in this column.

Sector		Agriculture, Forestry and Other Land Use			
Category		Land Converted to Settlements: Annual change in carbon stocks in organic soils			
Category code		3B5b			
Sheet		2 of 2			
Equation		Eq. 2.2	Equation 2.26		
Land-use category		Subcategories for reporting year	Land area of cultivated organic soil	Emission factor for climate type	Annual carbon loss from cultivated organic soils
Initial land use ¹	Land use during reporting year		(ha)	(tonnes C ha ⁻¹ yr ⁻¹)	(tonnes C yr ⁻¹)
			Table 5.6	L_{Organic} = A * EF	
			A	EF	L_{Organic}
FL	SL	(a)			
		(b)			
Sub-total					
CL	SL	(a)			
		(b)			
Sub-total					
GL	SL	(a)			
		(b)			
Sub-total					
WL	SL	(a)			
		(b)			
Sub-total					
OL	SL	(a)			
		(b)			
Sub-total					
Total					

¹ If data by initial land use are not available, use only "non-SL" in this column.

Sector		Agriculture, Forestry and Other Land Use						
Category		Land Converted to Other Land: Annual change in carbon stocks in biomass						
Category code		3B6b						
Sheet		1 of 1						
Equation		Eq. 2.2	Equation 2.16			Equation 2.15, 2.16		
Land-use category		Subcategories for reporting year	Annual area of Land Converted to Other Land	Biomass stocks before the conversion	Carbon fraction of dry matter	Annual biomass carbon growth	Annual loss of biomass carbon	Annual change in carbon stocks in biomass
Initial land use ¹	Land use during reporting year		(ha)	(tonnes dm ha ⁻¹)	[tonnes C (tonne dm) ⁻¹]	(tonnes C ha ⁻¹ yr ⁻¹)	(tonnes C ha ⁻¹ yr ⁻¹)	(tonnes C yr ⁻¹)
				Table 5.8	0.5	Table 5.9	National estimates, or Table 5.1	$\Delta C_B = \Delta C_G + ((0 - B_{BEFORE}) * \Delta A_{TO_OTHERS}) * CF - \Delta C_L$
			ΔA_{TO_OTHERS}	B_{BEFORE}	CF	ΔC_G	ΔC_L	ΔC_B
FL	OL	(a)						
		(b)						
Sub-total								
CL	OL	(a)						
		(b)						
Sub-total								
GL	OL	(a)						
		(b)						
Sub-total								
WL	OL	(a)						
		(b)						
Sub-total								
SL	OL	(a)						
		(b)						
Sub-total								
Total								

¹ If data by initial land use are not available, use only "non-OL" in this column.

Sector		Agriculture, Forestry and Other Land Use										
Category		Land Converted to Other Land: Annual change in carbon stocks in mineral soils										
Category code		3B6b										
Sheet		1 of 2										
Equation		Eq. 2.2										
Equation		Equation 2.25, Formulation B in Box 2.1 of Section 2.3.3.1										
Land-use category		Subcategories for reporting year	Area for land-use change by climate and soil combination	Reference carbon stock for the climate/soil combination	Time dependence of stock change factors (D) or number of years over a single inventory time period (T)	Stock change factor for land-use system in the last year of an inventory time period	Stock change factor for management regime in last year of an inventory period	Stock change factor for C input in the last year of the inventory period	Stock change factor for land-use system at the beginning of the inventory time period	Stock change factor for management regime at the beginning of the inventory time period	Stock change factor for C input at the beginning of the inventory time period	Annual change in carbon stocks in mineral soils
Initial land use ¹	Land use during reporting year		(ha)	(tonnes C ha ⁻¹)	(yr)	(-)	(-)	(-)	(-)	(-)	(-)	(tonnes C yr ⁻¹)
				Table 2.3; Chap. 2, Sec. 2.3.3.1	(default is 20 yr; if T>D then use the value of T)	See Chap. 9, Sec. 9.3.3	See Chap. 9, Sec. 9.3.3	See Chap. 9, Sec. 9.3.3	See Chap. 9, Sec. 9.3.3	See Chap. 9, Sec. 9.3.3	See Chap. 9, Sec. 9.3.3	$\Delta C_{\text{Mineral}}$ as in Equation 2.25
			A₍₀₎	SOC_{ref}	D	F_{LU(0)}	F_{MG(0)}	F_{I(0)}	F_{LU(0-T)}	F_{MG(0-T)}	F_{I(0-T)}	
FL	OL	(a)			20							
		(b)			20							
Sub-total												
CL	OL	(a)			20							
		(b)			20							
Sub-total												
GL	OL	(a)			20							
		(b)			20							
Sub-total												
WL	OL	(a)			20							
		(b)			20							
Sub-total												
SL	OL	(a)			20							
		(b)			20							
Sub-total												
Total												

¹ If data by initial land use are not available, use only "non-OL" in this column.

Sector		Agriculture, Forestry and Other Land Use			
Category		Land Converted to Other Land: Annual change in carbon stocks in organic soils			
Category code		3B6b			
Sheet		2 of 2			
Equation		Eq. 2.2	Equation 2.26		
Land-use category		Subcategories for reporting year	Land area of cultivated organic soil	Emission factor for climate type	Annual carbon loss from cultivated organic soils
Initial land use ¹	Land use during reporting year		(ha)	(tonnes C ha ⁻¹ yr ⁻¹)	(tonnes C yr ⁻¹)
				Table 5.6	L_{Organic} = A * EF
			A	EF	L_{Organic}
FL	OL	(a)			
		(b)			
Sub-total					
CL	OL	(a)			
		(b)			
Sub-total					
GL	OL	(a)			
		(b)			
Sub-total					
WL	OL	(a)			
		(b)			
Sub-total					
SL	OL	(a)			
		(b)			
Sub-total					
Total					

¹ If data by initial land use are not available, use only "non-OL" in this column.

Sector		Agriculture, Forestry and Other Land Use								
Category		Emissions from Biomass Burning in Forest Land (Forest Land Remaining Forest Land)								
Category code		3C1a								
Sheet		1 of 2								
Equation		Equation 2.2		Equation 2.27						
Land-use category		Area burnt	Mass of fuel available for combustion ²	Combustion factor ²	Emission factor for each GHG	CH ₄ emissions from fire	CO emissions from fire	N ₂ O emissions from fire	NO _x emissions from fire	
Initial land use	Land use during reporting year	Subcategories for reporting year ¹	(ha)	(tonnes ha ⁻¹)	(-)	[g GHG (kg dm burnt) ⁻¹]	(tonnes CH ₄)	(tonnes CO)	(tonnes N ₂ O)	(tonnes NO _x)
				Table 2.4	Table 2.6	Table 2.5	$L_{\text{fire-CH}_4} = A * M_B * C_f * G_{\text{ef}} * 10^{-6}$	$L_{\text{fire-CO}} = A * M_B * C_f * G_{\text{ef}} * 10^{-6}$	$L_{\text{fire-N}_2\text{O}} = A * M_B * C_f * G_{\text{ef}} * 10^{-6}$	$L_{\text{fire-NO}_x} = A * M_B * C_f * G_{\text{ef}} * 10^{-6}$
			A	M_B	C_f	G_{ef}	L_{fire-CH₄}	L_{fire-CO}	L_{fire-N₂O}	L_{fire-NO_x}
FL	FL	(a)				CH ₄				
						CO				
						N ₂ O				
						NO _x				
		(b)				CH ₄				
						CO				
						N ₂ O				
						NO _x				
Total						CH ₄				
						CO				
						N ₂ O				
						NO _x				

¹ For each subcategory, use separate line for each non-CO₂ greenhouse gas.

² Where data for M_B and C_f are not available, a default value for the amount of fuel actually burnt (M_B * C_f) can be used (Table 2.4). In this case, M_B takes the value taken from the table, whereas C_f must be 1.

Sector		Agriculture, Forestry and Other Land Use								
Category		Emissions from Biomass Burning in Forest Land (Land Converted to Forest Land)								
Category code		3C1a								
Sheet		2 of 2								
Equation		Equation 2.2		Equation 2.27						
Land-use category		Subcategories for reporting year ²	Area burnt	Mass of fuel available for combustion ³	Combustion factor ³	Emission factor for each GHG	CH ₄ emissions from fire	CO emissions from fire	N ₂ O emissions from fire	NO _x emissions from fire
Initial land use ¹	Land use during reporting year		(ha)	(tonnes ha ⁻¹)	(-)	[g GHG (kg dm burnt) ⁻¹]	(tonnes CH ₄)	(tonnes CO)	(tonnes N ₂ O)	(tonnes NO _x)
				Table 2.4	Table 2.6	Table 2.5	$L_{\text{fire-CH}_4} = A * M_B * C_f * G_{\text{ef}} * 10^{-6}$	$L_{\text{fire-CO}} = A * M_B * C_f * G_{\text{ef}} * 10^{-6}$	$L_{\text{fire-N}_2\text{O}} = A * M_B * C_f * G_{\text{ef}} * 10^{-6}$	$L_{\text{fire-NO}_x} = A * M_B * C_f * G_{\text{ef}} * 10^{-6}$
			A	M_B	C_f	G_{ef}	L_{fire-CH₄}	L_{fire-CO}	L_{fire-N₂O}	L_{fire-NO_x}
[non-FL]	FL	(a)				CH ₄				
						CO				
					N ₂ O					
					NO _x					
	(b)					CH ₄				
						CO				
						N ₂ O				
						NO _x				
Total						CH ₄				
						CO				
						N ₂ O				
						NO _x				

¹ Similar tables should be completed separately for each initial land use, and subtotals must be added up. If data by initial land use are not available, use only "non-FL" in this column.

² For each subcategory, use separate lines for each non-CO₂ greenhouse gas.

³ Where data for M_B and C_f are not available, a default value for the amount of fuel actually burnt (M_B * C_f) can be used (Table 2.4). In this case, M_B takes the value taken from the table, whereas C_f must be 1.

Sector		Agriculture, Forestry and Other Land Use									
Category		Emissions from Biomass Burning in Cropland (Cropland Remaining Cropland)									
Category code		3C1b									
Sheet		1 of 2									
Equation		Equation 2.2			Equation 2.27						
Land-use category		Area burnt	Mass of fuel available for combustion ²	Combustion factor ³	Emission factor for each GHG	CH ₄ emissions from fire	CO emissions from fire	N ₂ O emissions from fire	NO _x emissions from fire		
Initial land use	Land use during reporting year	Subcategories for reporting year ¹	(ha)	(tonnes ha ⁻¹)	(-)	[g GHG (kg dm burnt) ⁻¹]	(tonnes CH ₄)	(tonnes CO)	(tonnes N ₂ O)	(tonnes NO _x)	
				(Table 2.4)	Table 2.6	Table 2.5	$L_{\text{fire-CH}_4} = A * M_B * C_f * G_{\text{ef}} * 10^{-6}$	$L_{\text{fire-CO}} = A * M_B * C_f * G_{\text{ef}} * 10^{-6}$	$L_{\text{fire-N}_2\text{O}} = A * M_B * C_f * G_{\text{ef}} * 10^{-6}$	$L_{\text{fire-NO}_x} = A * M_B * C_f * G_{\text{ef}} * 10^{-6}$	
			A	M_B	C_f	G_{ef}	L_{fire-CH₄}	L_{fire-CO}	L_{fire-N₂O}	L_{fire-NO_x}	
CL	CL	(a)				CH ₄					
						CO					
						N ₂ O					
						NO _x					
		(b)					CH ₄				
							CO				
							N ₂ O				
							NO _x				
Total						CH ₄					
						CO					
						N ₂ O					
						NO _x					

¹ For each subcategory, use separate lines for each non-CO₂ greenhouse gas.

² Where data for M_B and C_f are not available, a default value for the amount of fuel actually burnt (M_B * C_f) can be used (Table 2.4). In this case, M_B takes the value taken from the table, whereas C_f must be 1.

Sector		Agriculture, Forestry and Other Land Use								
Category		Emissions from Biomass Burning in Cropland (Land Converted to Cropland)								
Category code		3C1b								
Sheet		2 of 2								
Equation		Eq. 2.2		Equation 2.27						
Land-use category		Subcategories for reporting year ²	Area burnt	Mass of fuel available for combustion ³	Combustion factor ³	Emission factor for each GHG	CH ₄ emissions from fire	CO emissions from fire	N ₂ O emissions from fire	NO _x emissions from fire
Initial land use ¹	Land use during reporting year		(ha)	(tonnes ha ⁻¹)	(-)	[g GHG (kg dm burnt) ⁻¹]	(tonnes CH ₄)	(tonnes CO)	(tonnes N ₂ O)	(tonnes NO _x)
				Table 2.4	Table 2.6	Table 2.5	$L_{\text{fire-CH}_4} = A * M_B * C_f * G_{\text{ef}} * 10^{-6}$	$L_{\text{fire-CO}} = A * M_B * C_f * G_{\text{ef}} * 10^{-6}$	$L_{\text{fire-N}_2\text{O}} = A * M_B * C_f * G_{\text{ef}} * 10^{-6}$	$L_{\text{fire-NO}_x} = A * M_B * C_f * G_{\text{ef}} * 10^{-6}$
			A	M_B	C_f	G_{ef}	L_{fire-CH₄}	L_{fire-CO}	L_{fire-N₂O}	L_{fire-NO_x}
[non-CL]	CL	(a)				CH ₄				
						CO				
						N ₂ O				
						NO _x				
	(b)					CH ₄				
						CO				
						N ₂ O				
						NO _x				
Total						CH ₄				
						CO				
						N ₂ O				
						NO _x				

¹ Similar tables should be completed separately for each initial land use, and subtotals must be added up. If data by initial land use are not available, use only "non-CL" in this column.

² For each subcategory, use separate lines for each non-CO₂ greenhouse gas.

³ Where data for M_B and C_f are not available, a default value for the amount of fuel actually burnt (M_B * C_f) can be used (Table 2.4). In this case, M_B takes the value taken from the table, whereas C_f must be 1.

Sector		Agriculture, Forestry and Other Land Use									
Category		Emissions from Biomass Burning in Grassland (Grassland Remaining Grassland)									
Category code		3C1c									
Sheet		1 of 2									
Equation		Equation 2.2		Equation 2.27							
Land-use category		Subcategories for reporting year ¹	Area burnt	Mass of fuel available for combustion ²	Combustion factor ²	Emission factor for each GHG	CH ₄ emissions from fire	CO emissions from fire	N ₂ O emissions from fire	NO _x emissions from fire	
Initial land use	Land use during reporting year		(ha)	(tonnes ha ⁻¹)	(-)	[g GHG (kg dm burnt) ⁻¹]	(tonnes CH ₄)	(tonnes CO)	(tonnes N ₂ O)	(tonnes NO _x)	
				(Table 2.4) ²	Table 2.6	Table 2.5	$L_{\text{fire-CH}_4} = A * M_B * C_f * G_{\text{ef}} * 10^{-6}$	$L_{\text{fire-CO}} = A * M_B * C_f * G_{\text{ef}} * 10^{-6}$	$L_{\text{fire-N}_2\text{O}} = A * M_B * C_f * G_{\text{ef}} * 10^{-6}$	$L_{\text{fire-NO}_x} = A * M_B * C_f * G_{\text{ef}} * 10^{-6}$	
			A	M_B	C_f	G_{ef}	L_{fire-CH₄}	L_{fire-CO}	L_{fire-N₂O}	L_{fire-NO_x}	
GL	GL	(a)				CH ₄					
						CO					
						N ₂ O					
						NO _x					
		(b)					CH ₄				
							CO				
							N ₂ O				
							NO _x				
		(c)					CH ₄				
							CO				
							N ₂ O				
							NO _x				
Total						CH ₄					
						CO					
						N ₂ O					
						NO _x					

¹ For each subcategory, use separate line for each non-CO₂ greenhouse gas.

² Where data for M_B and C_f are not available, a default value for the amount of fuel actually burnt (M_B * C_f) can be used (Table 2.4). In this case, M_B takes the value taken from the table, whereas C_f must be 1.

Sector		Agriculture, Forestry and Other Land Use									
Category		Emissions from Biomass Burning in Grassland (Land Converted to Grassland)									
Category code		3C1c									
Sheet		2 of 2									
Equation		Equation 2.2		Equation 2.27							
Land-use category		Subcategories for reporting year ²	Area burnt	Mass of fuel available for combustion ³	Combustion factor ³	Emission factor for each GHG	CH ₄ emissions from fire	CO emissions from fire	N ₂ O emissions from fire	NO _x emissions from fire	
Initial land use ¹	Land use during reporting year		(ha)	(tonnes ha ⁻¹)	(-)	[g GHG (kg dm burnt) ⁻¹]	(tonnes CH ₄)	(tonnes CO)	(tonnes N ₂ O)	(tonnes NO _x)	
				Table 2.4	Table 2.6	Table 2.5	$L_{\text{fire-CH}_4} = A * M_B * C_f * G_{\text{ef}} * 10^{-6}$	$L_{\text{fire-CO}} = A * M_B * C_f * G_{\text{ef}} * 10^{-6}$	$L_{\text{fire-N}_2\text{O}} = A * M_B * C_f * G_{\text{ef}} * 10^{-6}$	$L_{\text{fire-NO}_x} = A * M_B * C_f * G_{\text{ef}} * 10^{-6}$	
			A	M_B	C_f	G_{ef}	L_{fire-CH₄}	L_{fire-CO}	L_{fire-N₂O}	L_{fire-NO_x}	
[non-GL]	GL	(a)				CH ₄					
						CO					
						N ₂ O					
						NO _x					
		(b)					CH ₄				
							CO				
							N ₂ O				
							NO _x				
Total						CH ₄					
						CO					
						N ₂ O					
						NO _x					

¹ Similar tables should be completed separately for each initial land use, and subtotals must be added up. If data by initial land use are not available, use only "non-GL" in this column.

² For each subcategory, use separate lines for each non-CO₂ greenhouse gas.

³ Where data for M_B and C_f are not available, a default value for the amount of fuel actually burnt (M_B * C_f) can be used (Table 2.4). In this case, M_B takes the value taken from the table, whereas C_f must be 1.

Sector		Agriculture, Forestry and Other Land Use								
Category		Emissions from Biomass Burning in Wetlands (Land Converted to Wetlands)								
Category code		3C1d								
Sheet		1 of 1								
Equation		Eq. 2.2	Equation 2.27							
Land-use category		Subcategories for reporting year ²	Area burnt	Mass of fuel available for combustion ³	Combustion factor ³	Emission factor for each GHG	CH ₄ emissions from fire	CO emissions from fire	N ₂ O emissions from fire	NO _x emissions from fire
Initial land use ¹	Land use during reporting year		(ha)	(tonnes ha ⁻¹)	(-)	[g GHG (kg dm burnt) ⁻¹]	(tonnes CH ₄)	(tonnes CO)	(tonnes N ₂ O)	(tonnes NO _x)
					Table 2.6	Table 2.5	$L_{\text{fire-CH}_4} = A * M_B * C_f * G_{\text{ef}} * 10^{-6}$	$L_{\text{fire-CO}} = A * M_B * C_f * G_{\text{ef}} * 10^{-6}$	$L_{\text{fire-N}_2\text{O}} = A * M_B * C_f * G_{\text{ef}} * 10^{-6}$	$L_{\text{fire-NO}_x} = A * M_B * C_f * G_{\text{ef}} * 10^{-6}$
		A	M _B	C _f	G _{ef}	L _{fire-CH₄}	L _{fire-CO}	L _{fire-N₂O}	L _{fire-NO_x}	
[non-WL]	WL	(a)				CH ₄				
						CO				
						N ₂ O				
						NO _x				
	(b)					CH ₄				
						CO				
						N ₂ O				
						NO _x				
Subtotal					CH ₄					
					CO					
					N ₂ O					
					NO _x					

¹ Similar tables should be completed separately for each initial land use, and subtotals must be added up. If data by initial land use are not available, use only "non-WL" in this column.

² Subcategories are created by vegetation type within strata ((a), (b), (c) etc.) within the country. For each subcategory, use separate lines for each non-CO₂ greenhouse gas.

³ Where data for M_B and C_f are not available, a default value for the amount of fuel actually burnt (M_B * C_f) can be used (Table 2.4). In this case, M_B takes the value taken from the table, whereas C_f must be 1.

Sector	Agriculture, Forestry and Other Land Use				
Category	Liming: Annual CO₂-C emissions from Liming				
Category code	3C2				
Sheet	1 of 1				
Equation	Equation 11.12				
Type of lime applied	Annual amount of calcic limestone (CaCO ₃)	Emission factor	Annual amount of dolomite (CaMg(CO ₃) ₂)	Emission factor	Annual C emissions from liming
	(tonnes yr ⁻¹)	[tonnes of C (tonne of limestone) ⁻¹]	(tonnes yr ⁻¹)	[tonnes of C (tonne of dolomite) ⁻¹]	(tonnes C yr ⁻¹)
		default is 0.12		default is 0.13	CO ₂ -C Emission = (M _{Limestone} * EF _{Limestone}) + (M _{Dolomite} * EF _{Dolomite})
	M_{Limestone}	EF_{Limestone}	M_{Dolomite}	EF_{Dolomite}	CO₂-C Emission
Limestone					
Dolomite					
Total					

Sector	Agriculture, Forestry and Other Land Use		
Category	Urea Fertilization: Annual CO₂ emissions from Urea Fertilization		
Category code	3C3		
Sheet	1 of 1		
Equation	Equation 11.13		
Subcategories for reporting year	Annual amount of Urea Fertilization	Emission factor	Annual CO ₂ -C emissions from Urea Fertilization
	(tonnes urea yr ⁻¹)	[tonnes of C (tonne of urea) ⁻¹]	(tonnes C yr ⁻¹)
		default is 0.20	CO ₂ -C Emission = M * EF
	M	EF	CO₂-C Emission
(a)			
(b)			
(c)			
Total			

Sector		Agriculture, Forestry and Other Land Use				
Category		Direct N ₂ O Emissions from Managed Soils				
Category code		3C4				
Sheet		1 of 2				
Equation		Equation 11.1				
Anthropogenic N input type		Annual amount of N applied		Emission factor for N ₂ O emissions from N inputs	Annual direct N ₂ O-N emissions produced from managed soils	
		(kg N yr ⁻¹)		[kg N ₂ O-N (kg N input) ⁻¹]	(kg N ₂ O-N yr ⁻¹)	
		F		Table 11.1	N ₂ O-N _{inputs} = F * EF	
		F		EF	N ₂ O-N _{inputs}	
Anthropogenic N input types to estimate annual direct N ₂ O-N emissions produced from managed soils	synthetic fertilizers	F _{SN} : N in synthetic fertilizers		EF ₁		
	animal manure, compost, sewage sludge	F _{ON} : N in animal manure, compost, sewage sludge, other				
	crop residues	F _{CR} : N in crop residues				
	changes to land use or management	F _{SOM} : N in mineral soils that is mineralised, in association with loss of soil C from soil organic matter as a result of changes to land use or management				
Anthropogenic N input types to estimate annual direct N ₂ O-N emissions produced from flooded rice	synthetic fertilizers	F _{SN} : N in synthetic fertilizers		EF _{1FR}		
	animal manure, compost, sewage sludge	F _{ON} : N in animal manure, compost, sewage sludge, other				
	crop residues	F _{CR} : N in crop residues				
	changes to land use or management	F _{SOM} : N in mineral soils that is mineralised, in association with loss of soil C from soil organic matter as a result of changes to land use or management				
Total						

Sector		Agriculture, Forestry and Other Land Use						
Category		Direct N ₂ O Emissions from Managed Soils						
Category code		3C4						
Sheet		2 of 2						
Equation		Equation 11.1						
Anthropogenic N input type ^{1,2}		Annual area of managed/drained organic soils	Emission factor for N ₂ O emissions from drained/managed organic soils	Annual direct N ₂ O-N emissions produced from managed organic soils	Amount of urine and dung N deposited by grazing animals on pasture, range and paddock	Emission factor for N ₂ O emissions from urine and dung N deposited on pasture, range and paddock by grazing animals	Annual direct N ₂ O emissions from urine and dung inputs to grazed soils	Annual direct N ₂ O emissions from urine and dung inputs to grazed soils
		(ha)	(kg N ₂ O-N ha ⁻¹ yr ⁻¹)	(kg N ₂ O-N yr ⁻¹)	(kg N yr ⁻¹)	[kg N ₂ O-N (kg N input) ⁻¹]	(kg N ₂ O-N yr ⁻¹)	(kg N ₂ O-N yr ⁻¹)
			Table 11.1	N ₂ O-N _{OS} = F _{OS} * EF ₂		Table 11.1	N ₂ O-N _{PRP} = F _{PRP} * EF _{3PRP}	N ₂ O _{Direct-N} = N ₂ O-N _{input} + N ₂ O-N _{OS} + N ₂ O-N _{PRP}
		F _{OS}	EF ₂	N ₂ O-N _{OS}	F _{PRP}	EF _{3PRP}	N ₂ O-N _{PRP}	N ₂ O _{Direct-N}
Managed organic soils	CG, Temp							
	CG, Trop							
	F, Temp, NR							
	F, Temp, NP							
	F, Trop							
Urine and dung inputs to grazed soils	CPP							
	SO							
Total								

¹ The area must be disaggregated by Cropland and Grassland (CG), Forest (F), Temperate (Temp), Tropical (Trop), Nutrient Rich (NR), and Nutrient Poor (NP) categories, respectively, see Equation 11.1.

² The amount must be disaggregated by CPP and SO, which refer to Cattle, Poultry and Pigs, and Sheep and Other animals, respectively. See Equation 11.1.

Sector	Agriculture, Forestry and Other Land Use						
Category	Indirect N ₂ O Emissions from Managed Soils: N ₂ O from Atmospheric Deposition of N Volatilised from Managed Soils						
Category code	3C5						
Sheet	1 of 2						
Equation	Equation 11.9						
Anthropogenic N input type	Annual amount of synthetic fertilizer N applied to soils	Fraction of synthetic fertilizer N that volatilises	Annual amount of animal manure, compost, sewage sludge and other organic N additions intentionally applied to soils	Annual amount of urine and dung N deposited by grazing animals on pasture, range and paddock	Fraction of applied organic N fertilizer materials (F _{ON}) and of urine and dung N deposited by grazing animals (F _{PRP}) that volatilises	Emission factor for N ₂ O emission from atmospheric deposition of N on soils and water surfaces	Annual amount of N ₂ O-N produced from atmospheric deposition of N volatilised from managed soils
	(kg N yr ⁻¹)	(kg NH ₃ -N + NO _x -N) (kg of N applied) ⁻¹	(kg N yr ⁻¹)	(kg N yr ⁻¹)	(kg NH ₃ -N + NO _x -N) (kg of N applied or deposited) ⁻¹	(kg N ₂ O-N) (kg NH ₃ -N + NO _x -N volatilized) ⁻¹	(kg N ₂ O-N yr ⁻¹)
		Table 11.3			Table 11.3	Table 11.3	$N_2O_{(ATD)-N} = [(F_{SN} * \text{Frac}_{GASF}) + (F_{ON} + F_{PRP}) * \text{Frac}_{GASM}] * EF_4$
	F_{SN}	Frac_{GASF}	F_{ON}	F_{PRP}	Frac_{GASM}	EF₄	N₂O_{(ATD)-N}
(a)							
(b)							
(c)							
Total							

Sector	Agriculture, Forestry and Other Land Use							
Category	Indirect N₂O Emissions from Managed Soils: N₂O from N leaching/runoff from Managed Soils							
Category code	3C5							
Sheet	2 of 2							
Equation	Equation 11.10							
Anthropogenic N input type	Annual amount of synthetic fertilizer N applied to soils	Annual amount of animal manure, compost, sewage sludge and other organic N additions intentionally applied to soils	Annual amount of urine and dung N deposited by grazing animals on pasture, range and paddock	Amount of N in crop residues (above and below-ground), including N-fixing crops, and from forage/pasture renewal, returned to soils annually	Annual amount of N mineralized/immobilized in mineral soils associated with loss/gain of soil C from soil organic matter as a result of changes to land use or management	Fraction of all N additions to managed soils that is lost through leaching and runoff	Emission factor for N ₂ O emission from N leaching and runoff	Annual amount of N ₂ O-N produced from managed soils in regions where leaching and runoff occurs
	(kg N yr ⁻¹)	(kg N yr ⁻¹)	(kg N yr ⁻¹)	(kg N yr ⁻¹)	(kg N yr ⁻¹)	[kg N (kg of N additions) ⁻¹]	[kg N ₂ O-N (kg N leaching and runoff) ⁻¹]	(kg N ₂ O-N yr ⁻¹)
						Table 11.3	Table 11.3	$N_2O_{(L)-N} = (F_{SN} + F_{ON} + F_{PRP} + F_{CR} + F_{SOM}) * \text{Frac}_{LEACH-(H)} * EF_5$
	F_{SN}	F_{ON}	F_{PRP}	F_{CR}	F_{SOM}	Frac_{LEACH-(H)}	EF₅	N₂O_{(L)-N}
(a)								
(b)								
(c)								
Total								

Sector		Agriculture, Forestry and Other Land Use				
Category		Indirect N ₂ O Emissions from Manure Management ¹				
Category code		3C6				
Sheet		1 of 2				
Equation		Equation 10.25	Equation 10.26		Equation 10.27	
Manure management System (MMS) ¹	Species/Livestock category ²	Total nitrogen excretion for the MMS ³	Fraction of managed livestock manure nitrogen that volatilises	Amount of manure nitrogen that is lost due to volatilisation of NH ₃ and NO _x	Emission factor for N ₂ O emissions from atmospheric deposition of nitrogen on soils and water surfaces	Indirect N ₂ O emissions due to volatilization from Manure Management
		kg N yr ⁻¹	(-)	kg N yr ⁻¹	[kg N ₂ O-N (kg NH ₃ -N + NO _x -N volatilised) ⁻¹]	kg N ₂ O yr ⁻¹
			Table 10.22	$N_{\text{volatilization-MMS}} = NE_{\text{MMS}} * \text{Frac}_{(\text{GasMS})}$	Table 11.3	$N_{2O_{G(\text{mm})}} = NE_{\text{volatilization-MMS}} * EF_4 * 44/28$
S	T	NE _{MMS}	Frac _(GasMS)	N _{volatilization-MMS}	EF ₄	N ₂ O _{G(mm)}
	Dairy Cows					
	Other Cattle					
	Buffalo					
	Sheep					
	Goats					
	Camels					
	Horses					
	Mules & Asses					
	Swine					
	Poultry					
	Other ²					
Total						

¹ The calculations must be done by Manure Management System, and for each management system, the relevant species/livestock category (ies) must be selected. For the Manure Management Systems, see Table 10.18.

² Specify livestock categories as needed using additional lines (e.g. llamas, alpacas, reindeers, rabbits, fur-bearing animals etc.)

³ See worksheet for Direct N₂O from Manure Management (3A2) for the value of Total N excretion for the MMS (NE_{MMS}).

Sector		Agriculture, Forestry and Other Land Use					
Category		Indirect N₂O Emissions from Manure Management¹					
Category code		3C6					
Sheet		2 of 2					
Equation		Equation 10.34					
Manure Management System (MMS) ²	Species/Livestock category ³	Total nitrogen excretion for the MMS	Amt. of managed manure nitrogen for livestock category T that is lost in the Manure Management Sys.	Number of animals	Fraction of total annual nitrogen excretion managed in MMS for each species/livestock category	Amount of nitrogen from bedding	Amount of managed manure nitrogen available for application to managed soils or for feed, fuel, or construction purposes
		(kg N yr ⁻¹)	(per cent)	(head)	(-)	(kg N animal ⁻¹ yr ⁻¹)	(kg N yr ⁻¹)
			Table 10.23		Tables 10A-4 to 10A-9	(If applicable to MMS - see text under Equation 10.35)	$N_{MMS_Avb} = NE_{MMS} * (1 - \text{Frac}_{\text{LossMS}} * 10^{-2}) + N_{(T)} * MS_{(T,S)} * N_{\text{beddingMS}}$
S	T	NE_{MMS}	Frac_(LossMS)	N_(T)	MS_(T,S)	N_{beddingMS}	N_{MMS_Avb}
	Dairy Cows						
	Other Cattle						
	Buffalo						
	Sheep						
	Goats						
	Camels						
	Horses						
	Mules & Asses						
	Swine						
	Poultry						
	Other ³						
Total							
¹ The available nitrogen data to be estimated in this worksheet are necessary to coordinate with the calculation and reporting of N ₂ O emissions from Managed Soils (see Chapter 11). ² The calculations must be done by Manure Management System, and for each management system, the relevant species/livestock category(ies) must be selected, and the same set of worksheets must be used for all management systems. For the Manure Management Systems, see Table 10.18. ³ Specify livestock categories as needed using additional lines (e.g. llamas, alpacas, reindeers, rabbits, fur-bearing animals etc.)							

Sector	Agriculture, Forestry and Other Land Use								
Category	Rice Cultivation: Annual CH ₄ emission from rice								
Category code	3C7								
Sheet	1 of 2								
Equation	Eq. 2.2	Equation 5.1		Equation 5.2			Equation 5.3		
Rice Ecosystem	Subcategories for reporting year ¹	Annual harvested area	Cultivation period of rice	Baseline emission factor for continuously flooded fields without organic amendments	Scaling factor to account for the differences in water regime during the cultivation period	Scaling factor to account for the differences in water regime in the pre-season before the cultivation period	Application rate of organic amendment in fresh weight	Conversion factor for organic amendment	Scaling factor for both types and amount of organic amendment applied
		(ha yr ⁻¹)	(day)	kg CH ₄ ha ⁻¹ day ⁻¹	(-)	(-)	(tonnes ha ⁻¹)	(-)	(-)
				Table 5.11	Table 5.12	Table 5.13		Table 5.14	$SF_o = (1+ROA_i * CFOA_i)^{0.59}$
		A	t	EF_c	SF_w	SF_p	ROA_i	CFOA_i	SF_o
Irrigated									
	Sub-total								
Rainfed and deep water									
	Sub-total								
Upland									
	Sub-total								
Total									

¹ Rice ecosystem can be stratified according to water regimes, type and amount of organic amendments, and other conditions under which CH₄ emissions from rice may vary.

Sector	Agriculture, Forestry and Other Land Use			
Category	Rice Cultivation: Annual CH ₄ emission from rice			
Category code	3C7			
Sheet	2 of 2			
Equation	Equation 2.2	Equation 5.2		Equation 5.1
Rice Ecosystem	Subcategories for reporting year ¹	Scaling factor for soil type, rice cultivar, etc., if available	Adjusted daily emission factor for a particular harvested area	Annual CH ₄ emission from Rice Cultivation
		(-)	(kg CH ₄ ha ⁻¹ day ⁻¹)	Gg CH ₄ yr ⁻¹
			$EF_i = EF_c * SF_w * SF_p * SF_o * SF_{s,r}$	$CH_{4Rice} = A * t * EF_i * 10^{-6}$
		SF_{s,r}	EF_i	CH_{4Rice}
Irrigated				
	Sub-total			
Rainfed and deep water				
	Sub-total			
Upland				
	Sub-total			
Total				

¹ Land should be stratified according to ecosystems, water regimes, type and amount of organic amendments, and other conditions under which CH₄ emissions from rice may vary. The disaggregation of the annual harvest area of rice needs to be done at least for three baseline water regimes including irrigated, rainfed, and upland. Within each stratum, sub-strata should be separated for each type of organic amendment (see Equation 5.3)