ANNEX 1

WORKSHEETS

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Contents

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- CO_2 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-CO_2 emissions sources on land include worksheets for: 1) greenhouse emissions from Biomass Burning; 2) Liming; 3) Urea Fertilization; 4) Direct and Indirect N_2O 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- CO_2 EMISSIONS

Land-use category	Land-use subcategory	Non-CO_2 from Fire	CH_4 emissions from rice cultivation	N_2O 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 N_2O EMISSIONS FROM MANAGED SOILS, AND CO_2 EMISSIONS FROM LIME AND UREA APPLICATION

Emissions	Worksheet
Direct N_2O emissions from Managed Soils	Yes
N_2O 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})
		Tables 10.10 and 10.11	$CH_{4\ Enteric} = N_{(T)} * EF_{(T)} * 10^{-6}$	Tables 10.14 - 10.16	$CH_{4\ Manure} = N_{(T)} * EF_{(T)} * 10^{-6}$
T	**$N_{(T)}$**	**$EF_{(T)}$**	**$CH_{4\ Enteric}$**	**$EF_{(T)}$**	**$CH_{4\ Manure}$**
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_2O 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_2O-N emissions from MMS	Annual direct N_2O 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_2O-N (kg N in MMS)$^{-1}$]	kg N_2O yr^{-1}	
			Table 10.19	Tables 10A-4 to 10A-9	$Nex_{(T)} = N_{rate(T)} * TAM * 10^{-3} * 365$	Tables A4-A8	$NE_{MMS} = N_{(T)} * Nex_{(T)} * MS_{(T,S)}$	Table 10.21	$N_2O_{(mm)} = NE_{MMS} * EF_{3(S)} * 44/28$	
S	**T**	**$N_{(T)}$**	**$N_{rate(T)}$**	**TAM**	**$Nex_{(T)}$**	**$MS_{(T,S)}$**	**NE_{MMS}**	**$EF_{3(S)}$**	**$N_2O_{D(mm)}$**	
	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 N_2O 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	ΔC_G = A * G_{TOTAL} * CF
			A	**G_W**	**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	$L_{wood\text{-}removals} = H * BCEF_R * (1+R) * CF$
		H	**$BCEF_R$**	**R**	**CF**	**$L_{wood\text{-}removals}$**
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	$L_{fuelwood} = [FG_{trees} * BCEF_R * (1+R) + FG_{part} * D] * CF$
			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 4.7 & 4.8	zero (0) or Table 4.4	0.5 or Table 4.3	$L_{disturbances} = A * B_W * (1+R) * CF * fd$	$\Delta C_L = L_{wood\text{-}removals} + L_{fuelwood} + L_{disturbancess}$
			$A_{disturbance}$	**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	Emission factor for climate type	Annual carbon loss from drained organic soils
Initial land use / Land use during reporting year		(ha)	(tonnes C ha^{-1} yr^{-1})	(tonnes C yr^{-1})
			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	$L_{wood\text{-}removals}$ = H * $BCEF_R$ * (1+R) * CF
			H	**$BCEF_R$**	**R**	**CF**	**$L_{wood\text{-}removals}$**
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	$L_{disturbances} = A_{disturbances} * B_W * (1+R) * CF * fd$	$\Delta C_L = L_{wood\text{-}removals} + L_{fuelwood} + L_{disturbances}$
			$A_{disturbances}$	B_W	R	CF	$L_{disturbances}$	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	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
			(ha)	(tonnes C ha^{-1})	(tonnes C ha^{-1})	(yr)	(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 2.2**	**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 comb-ination	Reference carbon stock for the climate and soil comb-ination	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	$\Delta C_{Mineral}$ as in Eq. 2.25
			$A_{(0)}$	**SOC_{ref}**	**D**	**$F_{LU(0)}$**	**$F_{MG(0)}$**	**$F_{I(0)}$**	**$F_{LU(0-T)}$**	**$F_{MG(0-T)}$**	**$F_{I(0-T)}$**	**$\Delta C_{Mineral}$**
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	Emission factor for climate type	Annual carbon loss from organic soils
Initial land use[1] / Land use during reporting year		(ha)	(tonnes C ha^{-1} yr^{-1})	(tonnes C yr^{-1})
			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 growth of perennial woody biomass[2]	Annual carbon stock in biomass removed (removal or harvest)[3]	Annual change in carbon stocks in biomass[4]
Initial land use / Land use during reporting year		(tonnes C yr^{-1})	(tonnes C yr^{-1})	(tonnes C yr^{-1})
		National estimates, or Table 5.1	National estimates, or Table 5.1	$\Delta C_B = \Delta C_G - \Delta C_L$
		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.

[2] Annual growth of perennial woody biomass (ΔC_G) is equal to the area of perennial crop that is not mature times biomass accumulation rate (G) using a national estimate or data from Table 5.1.

[3] Annual carbon stock in biomass removed (ΔC_L) is equal to the area of perennial crops that is annually harvested times the area-specific carbon stock value that is lost (L) using a national estimate or biomass carbon loss data from Table 5.1.

[4] If the area of perennial crops that was harvested in the inventory year equals the mean harvested area over the entire harvest cycle of the perennial crop, the annual change in carbon stocks in biomass can be taken to be zero, and ΔC_G and ΔC_L do not need to be estimated.

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	$\Delta C_{Mineral}$ as in Equation 2.25
			$A_{(0)}$	**$A_{(0-T)}$**	**$SOC_{ref(0)}$**	**$SOC_{ref(T-0)}$**	**D**	**F_{LU}**	**F_{MG}**	**F_I**	**$\Delta C_{Mineral}$**
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[2]	Annual loss of biomass carbon[3]	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 yr^{-1})	(tonnes C yr^{-1})	(tonnes C yr^{-1})
			Table 5.8	0.5	National estimates, or 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_OTHERS}	**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.

[2] Annual biomass carbon growth (ΔC_G) is equal to the area of perennial crop that is not mature times biomass accumulation rate (G) using a national estimate or data from Table 5.9.

[3] Annual carbon stock in biomass removed (ΔC_L) is equal to the area of perennial crops that is annually harvested times the area-specific carbon stock value that is lost (L) using a national estimate or biomass carbon loss data from Table 5.1.

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	Dead wood/litter stock under the old land-use category	Dead wood/litter stock under the new 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 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 5.5	Table 5.5	Table 5.5	Table 5.10	Table 5.10	Table 5.10	$\Delta C_{Mineral}$ as in Equation 2.25
			$A_{(0)}$	SOC_{ref}	D	$F_{LU(0)}$	$F_{MG(0)}$	$F_{I(0)}$	$F_{LU(0-T)}$	$F_{MG(0-T)}$	$F_{I(0-T)}$	$\Delta C_{Mineral}$
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	$L_{Organic}$ = 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)	$\Delta C_{Mineral}$ as in Equation 2.25
			$A_{(0)}$	$A_{(0-T)}$	SOC_{ref}	F_{LU}	F_{MG}	F_I	SOC_0	SOC_{0-T}	D	$\Delta C_{Mineral}$
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 yr^{-1})	(tonnes C 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)	National estimates	National estimates	$\Delta C_B = \Delta C_G + ((B_{AFTER} - B_{BEFORE}) * \Delta A_{TO\_OTHER}) * CF - \Delta C_L$
				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 subcagetory (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	Dead wood/litter stock under the old land-use category	Dead wood/litter stock under the new 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 [1]	Land use during reporting year			(ha yr^{-1})	(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 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 subcagetory (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 2.2**	**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 comb-ination	Reference carbon stock for the climate and soil comb-ination	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		(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	$\Delta C_{Mineral}$ as in Equation 2.25
			$A_{(0)}$	**SOC_{ref}**	**D**	**$F_{LU(0)}$**	**$F_{MG(0)}$**	**$F_{I(0)}$**	**$F_{LU(0-T)}$**	**$F_{MG(0-T)}$**	**$F_{I(0-T)}$**	**$\Delta C_{Mineral}$**
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	$L_{Organic} = A * EF$
		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: CO_2-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-Cfrom 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-Cfrom 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}
			$A_{PeatRich}$	**$EF_{CO_2PeatRrich}$**	**$A_{PeatPoor}$**	**$EF_{CO_2PeatPoor}$**	**CO_2-$C_{WW\ PeatSoil}$**
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	$\Delta C_{WWpeatB}$ = {ΔA_{TO_OTHERS} * (B_{AFTER} - B_{BEFORE}) * CF}/1000	CO_2-$C_{WW\ Peat\text{-}on\text{-}site}$ = CO_2-$C_{WW\ PeatSoil}$ + $\Delta C_{WWpeatB}$
			ΔA_{TO_OTHERS}	**B_{AFTER}**	**B_{BEFORE}**	**CF**	**$\Delta C_{WWpeatB}$**	**CO_2-$C_{WW\ Peat\text{-}\_on\_site}$**
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	$CO_2\text{-}C_{WW\ peat_{off\text{-}site}} = (Wt_{dry\ peat} * Cfraction_{wt\ peat})/1000$	$CO_2\text{-}C_{WW\ peat} = CO_2\text{-}C_{WW\ peat_{on\text{-}site}} + CO_2\text{-}C_{WW\ peat_{off\text{-}site}}$	$CO_{2\ WW\ peat} = CO_2\text{-}C_{WW\ peat} * 44/12$
		Wt_{dry_peat}	**$Cfraction_{wt\_peat}$**	**$CO_2\text{-}C_{WW\ peat_{Off\text{-}site}}$**	**$CO_2\text{-}C_{WWpeat}$**	**$CO_{2WWpeat}$**
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 CO_2-C emissions should be adjusted accordingly.

Sector		**Agriculture, Forestry and Other Land Use**			
Category		**Wetlands Remaining Wetlands: N_2O 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_2O emissions from peatlands managed for peat extraction
Initial land use	Land use during reporting year		(ha)	(kg N_2O-N ha^{-1} yr^{-1})	(Gg N_2O yr^{-1})
				Table 7.6	$N_2O_{WW\ peatExtraction} = (A_{PeatRich} * EF_{N2O-NPeatRich}) * 44/28 * 10^{-6}$
			$A_{PeatRich}$	**$EF_{N2O-N_{PeatRich}}$**	**$N_2O_{WW\ PeatExtraction}$**
WL_{Peat}	WL_{Peat}	(a)			
		(b)			
		(c)			
Total					

Sector	Agriculture, Forestry and Other Land Use			
Category	**Land Converted to Wetlands: N_2O 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_2O emissions from peatlands managed for peat extraction
Initial land use[1] / Land use during reporting year		(ha)	(kg N_2O-N ha^{-1} yr^{-1})	(Gg N_2O yr^{-1})
			Table 7.6	$N_2O_{WW\ peatExtraction} = (A_{PeatRich} * EF_{N2O-NPeatRich}) * 44/28 * 10^{-6}$
		$A_{PeatRich}$	**$EF_{N2O-NPeatRich}$**	**$N_2O_{WW\ PeatExtraction}$**
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*	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}
			(default = 0)	Table 4.7	0.5 or Table 4.3	$\Delta C_{LWflood_{LB}} = [\ \Sigma i\ A_i * (B_{AFTER_i} - B_{BEFORE_i})\ ] * CF$
		A_i	**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 yr^{-1})	(tonnes C yr^{-1})	(tonnes C yr^{-1})
				Table 5.8	0.5	National estimates	National estimates	$\Delta C_B = \Delta C_G + ((0 - B_{BEFORE}) * \Delta A_{TO\_OTHERS} * CF) - \Delta C_L$
			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
		(ha)	(tonnes C ha^{-1})	(tonnes C ha^{-1})	(yr)	(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 =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	Eq. 2.2	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. 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	$\Delta C_{Mineral}$ **as in Equation 2.25**
		$A_{(0)}$	**SOC_{ref}**	**D**	**$F_{LU(0)}$**	**$F_{MG(0)}$**	**$F_{I(0)}$**	**$F_{LU(0-T)}$**	**$F_{MG(0-T)}$**	**$F_{I(0-T)}$**	**$\Delta C_{Mineral}$**
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 yr^{-1})	(tonnes C yr^{-1})	(tonnes C yr^{-1})
				Table 5.8	0.5	National estimates	National estimates	$\Delta C_B = \Delta C_G + ((0 - B_{BEFORE}) * \Delta A_{TO\_OTHERS}) * CF - \Delta C_L$
			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 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	$\Delta C_{Mineral}$ 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		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_2O 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_2O)	(tonnes NO_x)
				Table 2.4	Table 2.6	Table 2.5		L_{fire}-CH_4 = $A * M_B * C_f * G_{ef} * 10^{-3}$	L_{fire}-CO = $A * M_B * C_f * G_{ef} * 10^{-3}$	L_{fire}-N_2O = $A * M_B * C_f * G_{ef} * 10^{-3}$	L_{fire}-NO_x = $A * M_B * C_f * G_{ef} * 10^{-3}$
			A	**M_B**	**C_f**	**G_{ef}**		**L_{fire}-CH_4**	**L_{fire}-CO**	**L_{fire}-N_2O**	**L_{fire}-NO_x**
FL	FL	(a)				CH_4					
						CO					
						N_2O					
						NO_x					
		(b)				CH_4					
						CO					
						N_2O					
						NO_x					
Total						CH_4					
						CO					
						N_2O					
						NO_x					

[1] For each subcategory, use separate line for each non-CO_2 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_2O 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_2O)	(tonnes NO_x)
				Table 2.4	Table 2.6	Table 2.5		L_{fire}-CH_4 = $A * M_B * C_f * G_{ef} * 10^{-3}$	L_{fire}-CO = $A * M_B * C_f * G_{ef} * 10^{-3}$	L_{fire}-N_2O = $A * M_B * C_f * G_{ef} * 10^{-3}$	L_{fire}-NO_x = $A * M_B * C_f * G_{ef} * 10^{-3}$
			A	**M_B**	**C_f**	**G_{ef}**		**L_{fire}-CH_4**	**L_{fire}-CO**	**L_{fire}-N_2O**	**L_{fire}-NO_x**
[non-FL]	FL	(a)				CH_4					
						CO					
						N_2O					
						NO_x					
		(b)				CH_4					
						CO					
						N_2O					
						NO_x					
Total						CH_4					
						CO					
						N_2O					
						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-CO_2 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 (Table2.4). 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		Subcategories for reporting year[1]	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_2O 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_2O)	(tonnes NO_x)
				(Table 2.4)	Table 2.6	Table 2.5		L_{fire}-CH_4 = $A * M_B * C_f * G_{ef} * 10^{-3}$	L_{fire}-CO = $A * M_B * C_f * G_{ef} * 10^{-3}$	L_{fire}-N_2O = $A * M_B * C_f * G_{ef} * 10^{-3}$	L_{fire}-NO_x = $A * M_B * C_f * G_{ef} * 10^{-3}$
			A	**M_B**	**C_f**	**G_{ef}**		**L_{fire}-CH_4**	**L_{fire}-CO**	**L_{fire}-N_2O**	**L_{fire}-NO_x**
CL	CL	(a)				CH_4					
						CO					
						N_2O					
						NO_x					
		(b)				CH_4					
						CO					
						N_2O					
						NO_x					
Total						CH_4					
						CO					
						N_2O					
						NO_x					

[1] For each subcategory, use separate lines for each non-CO_2 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 (Table2.4). 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_2O 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_2O)	(tonnes NO_x)
				Table 2.4	Table 2.6	Table 2.5		L_{fire}-CH_4 = A * M_B * C_f * G_{ef} * 10^{-3}	L_{fire}-CO = A * M_B * C_f * G_{ef} * 10^{-3}	L_{fire}-N_2O = A * M_B * C_f * G_{ef} * 10^{-3}	L_{fire}-NO_x = A * M_B * C_f * G_{ef} * 10^{-3}
			A	**M_B**	**C_f**	**G_{ef}**		**L_{fire}-CH_4**	**L_{fire}-CO**	**L_{fire}-N_2O**	**L_{fire}-NO_x**
[non-CL]	CL	(a)				CH_4					
						CO					
						N_2O					
						NO_x					
		(b)				CH_4					
						CO					
						N_2O					
						NO_x					
Total						CH_4					
						CO					
						N_2O					
						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-CO_2 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_2O 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_2O)	(tonnes NO_x)
				(Table 2.4)[2]	Table 2.6	Table 2.5		L_{fire}-CH_4 = A * M_B * C_f * G_{ef} * 10^{-3}	L_{fire}-CO = A * M_B * C_f * G_{ef} * 10^{-3}	L_{fire}-N_2O = A * M_B * C_f * G_{ef} * 10^{-3}	L_{fire}-NO_x = A * M_B * C_f * G_{ef} * 10^{-3}
			A	**M_B**	**C_f**	**G_{ef}**		**L_{fire}-CH_4**	**L_{fire}-CO**	**L_{fire}-N_2O**	**L_{fire}-NO_x**
GL	GL	(a)				CH_4					
						CO					
						N_2O					
						NO_x					
		(b)				CH_4					
						CO					
						N_2O					
						NO_x					
		(c)				CH_4					
						CO					
						N_2O					
						NO_x					
Total						CH_4					
						CO					
						N_2O					
						NO_x					

[1] For each subcategory, use separate line for each non-CO_2 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_2O 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_2O)	(tonnes NO_x)
				Table 2.4	Table 2.6	Table 2.5		L_{fire}-CH_4 = $A * M_B * C_f * G_{ef} * 10^{-3}$	L_{fire}-CO = $A * M_B * C_f * G_{ef} * 10^{-3}$	L_{fire}-N_2O = $A * M_B * C_f * G_{ef} * 10^{-3}$	L_{fire}-NO_x = $A * M_B * C_f * G_{ef} * 10^{-3}$
			A	**M_B**	**C_f**	**G_{ef}**		**L_{fire}-CH_4**	**L_{fire}-CO**	**L_{fire}-N_2O**	**L_{fire}-NO_x**
[non-GL]	GL	(a)				CH_4					
						CO					
						N_2O					
						NO_x					
		(b)				CH_4					
						CO					
						N_2O					
						NO_x					
Total						CH_4					
						CO					
						N_2O					
						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-CO_2 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_2O 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_2O)	(tonnes NO_x)
					Table 2.6	Table 2.5		L_{fire}-CH_4 = A * M_B * C_f * G_{ef} * 10^{-3}	L_{fire}-CO = A * M_B * C_f * G_{ef} * 10^{-3}	L_{fire}-N_2O = A * M_B * C_f * G_{ef} * 10^{-3}	L_{fire}-NO_x = A * M_B * C_f * G_{ef} * 10^{-3}
			A	**M_B**	**C_f**	**G_{ef}**		**L_{fire}-CH_4**	**L_{fire}-CO**	**L_{fire}-N_2O**	**L_{fire}-NO_x**
[non-WL]	WL	(a)				CH_4					
						CO					
						N_2O					
						NO_x					
		(b)				CH_4					
						CO					
						N_2O					
						NO_x					
Subtotal						CH_4					
						CO					
						N_2O					
						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-CO_2 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 CO_2-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 = ($M_{Limestone}$ * $EF_{Limestone}$) + ($M_{Dolomite}$ * $EF_{Dolomite}$)
	$M_{Limestone}$	**$EF_{Limestone}$**	**$M_{Dolomite}$**	**$EF_{Dolomite}$**	**CO_2-C Emission**
Limestone					
Dolomite					
Total					

Sector	**Agriculture, Forestry and Other Land Use**		
Category	**Urea Fertilization: Annual CO_2 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**	**CO_2-C Emission**
(a)			
(b)			
(c)			
Total			

Sector	Agriculture, Forestry and Other Land Use				
Category	Direct N_2O 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_2O emissions from N inputs		Annual direct N_2O-N emissions produced from managed soils
	(kg N yr^{-1})		[kg N_2O-N (kg N input)$^{-1}$]		(kg N_2O-N yr^{-1})
			Table 11.1		N_2O-$N_{N\ inputs}$ = F * EF
	F		**EF**		**N_2O-$N_{N\ inputs}$**
Anthropogenic N input types to estimate annual direct N_2O-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_2O-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_2O 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_2O emissions from drained/managed organic soils	Annual direct N_2O-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_2O emissions from urine and dung N deposited on pasture, range and paddock by grazing animals	Annual direct N_2O emissions from urine and dung inputs to grazed soils	Annual direct N_2O emissions from urine and dung inputs to grazed soils
	(ha)	(kg N_2O-N ha^{-1} yr^{-1})	(kg N_2O-N yr^{-1})	(kg N yr^{-1})	[kg N_2O-N (kg N input)$^{-1}$]	(kg N_2O-N yr^{-1})	(kg N_2O-N yr^{-1})
		Table 11.1	$N_2O\text{-}N_{OS} = F_{OS} * EF_2$		Table 11.1	$N_2O\text{-}N_{PRP} = F_{PRP} * EF_{3PRP}$	$N_2O_{Direct}\text{-}N = N_2O\text{-}N_{N\ input} + N_2O\text{-}N_{OS} + N_2O\text{-}N_{PRP}$
	F_{OS}	**EF_2**	**$N_2O\text{-}N_{OS}$**	**F_{PRP}**	**EF_{3PRP}**	**$N_2O\text{-}N_{PRP}$**	**$N_2O_{Direct}\text{-}N$**
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_2O Emissions from Managed Soils: N_2O 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_2O emission from atmospheric deposition of N on soils and water surfaces	Annual amount of N_2O-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_2O-N) (kg NH_3-N + NO_x-N volatilized)$^{-1}$	(kg N_2O-N yr^{-1})
		Table 11.3			Table 11.3	Table 11.3	$N_2O_{(ATD)}$-N = [(F_{SN} * $Frac_{GASF}$) + (F_{ON} + F_{PRP}) * $Frac_{GASM}$)] * EF_4
	F_{SN}	**$Frac_{GASF}$**	**F_{ON}**	**F_{PRP}**	**$Frac_{GASM}$**	**EF_4**	**$N_2O_{(ATD)}$-N**
(a)							
(b)							
(c)							
Total							

Sector	Agriculture, Forestry and Other Land Use							
Category	**Indirect N_2O Emissions from Managed Soils: N_2O 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_2O emission from N leaching and runoff	Annual amount of N_2O-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_2O-N (kg N leaching and runoff)$^{-1}$]	(kg N_2O-N yr^{-1})
						Table 11.3	Table 11.3	$N_2O_{(L)}$-N = (F_{SN} + F_{ON} + F_{PRP} + F_{CR} + F_{SOM}) * $Frac_{LEACH-(H)}$ * EF_5
	F_{SN}	**F_{ON}**	**F_{PRP}**	**F_{CR}**	**F_{SOM}**	**$Frac_{LEACH-(H)}$**	**EF_5**	**$N_2O_{(L)}$-N**
(a)								
(b)								
(c)								
Total								

Sector	Agriculture, Forestry and Other Land Use					
Category	Indirect N_2O 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 loss due to volatilisation of NH_3 and NO_x	Emission factor for N_2O emissions from atmospheric deposition of nitrogen on soils and water surfaces	Indirect N_2O emissions due to volatilization from Manure Management
		kg N yr^{-1}	(-)	kg N yr^{-1}	[kg N_2O-N (kg NH_3-N + NO_x-N volatilised)$^{-1}$]	kg N_2O yr^{-1}
			Table 10.22	$N_{volatilization\text{-}MMS} = NE_{MMS} * Frac_{(GasMS)}$	Table 11.3	$N_2O_{G(mm)} = NE_{volatilization\text{-}MMS} * EF_4 * 44/28$
S	**T**	**NE_{MMS}**	**$Frac_{(GasMS)}$**	**$N_{volatilization\text{-}MMS}$**	**EF_4**	**$N_2O_{G(mm)}$**
	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 N_2O 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 N_2O Emissions from Manure Management**[1]					
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)	$N_{MMS\_Avb} = NE_{MMS} * (1-Frac_{LossMS} * 10^{-2}) + N_{(T)} * MS_{(T,S)} * N_{beddingMS}$
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_2O 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	Subcate-gories 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 CH_4 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 CH_4 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)