United Nations Framework Convention on Climate Change

Reporting tables and CRF tables

Information Event

Experiences and perspectives on the compilation of greenhouse gases inventories and on the use of reporting tables and reporting tools by developing and developed country Parties

20 November 2020

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Transparency Division, UNFCCC secretariat

Outline of the presentation

- GHG Inventory Reporting tables
- Workflow in the CRF Reporter
- Inventory creation
- Inventory compilation (data entry)
- Key features of CRF Reporter (KCA, Recalculations, Completeness check)

GHG Inventory Reporting tables

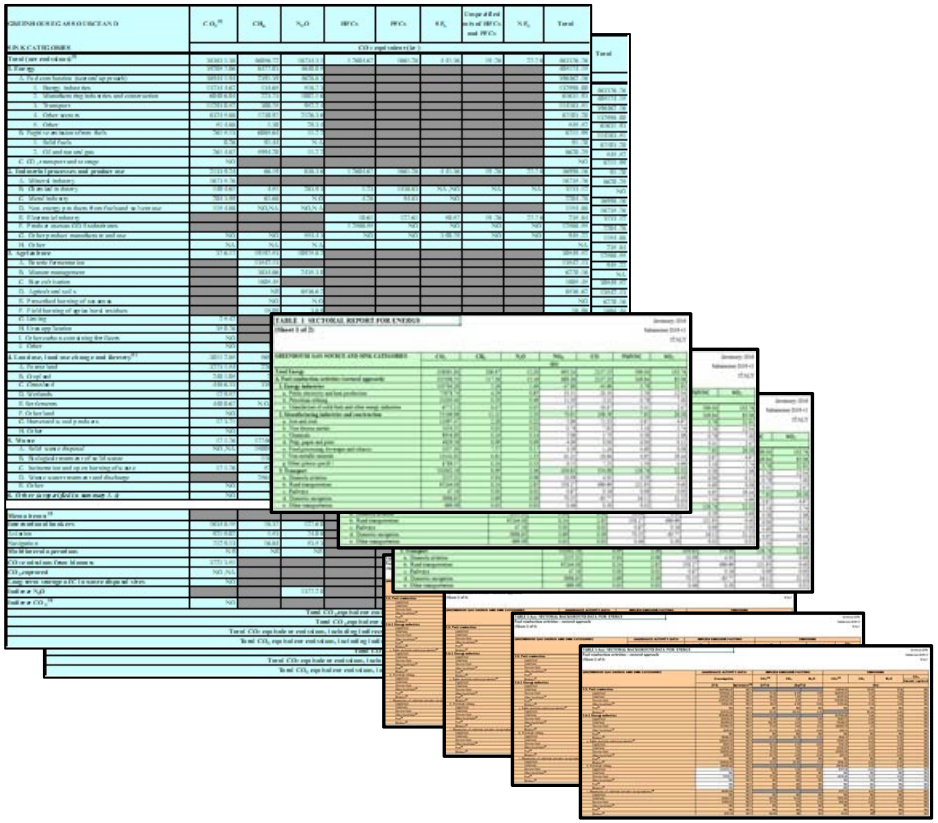
- Compilation of current GHG inventories
  - Non-Annex I Parties — table 1 and 2 of annex to 17/CP.8
  - Annex I Parties — CRF table

Table 2. National greenhouse gas inventory of anthropogenic emissions of HFCs, PFCs and SF_6

Greenhouse gas source and sink categories	HFCs[a,b] (Gg)			PFCs[a,b] (Gg)			SF_6[a] (Gg)
	HFC-23	HFC-134	Other (to be added)	CF_4	C_2F_6	Other (to be added)	
Total national emissions and removals	X	X	X	X	X	X	X
1. Energy							
A. Fuel combustion (sectoral approach)							
1. Energy industries							
2. Manufacturing industries and construction							
3. Transport							
4. Other sectors							
5. Other (please specify)							
B. Fugitive emissions from fuels							
1. Solid fuels							
2. Oil and natural gas							
2. Industrial processes	X	X	X	X	X	X	X
A. Mineral products							
B. Chemical industry							
C. Metal production							
D. Other production							
E. Production of halocarbons and sulphur hexafluoride							
F. Consumption of halocarbons and sulphur hexafluoride	X	X	X	X	X	X	X
G. Other (please specify)							
3. Solvent and other product use							
4. Agriculture							
A. Enteric fermentation							
B. Manure management							
C. Rice cultivation							
D. Agricultural soils							
E. Prescribed burning of savannahs							
F. Field burning of agricultural residues							
G. Other (please specify)							
5. Land-use change and forestry	X[b]	X[b]	X	X	X	X	X
A. Changes in forest and other woody biomass stocks	X[b]	X[b]					
B. Forest and grassland conversion	X	X	X	X	X	X	
C. Abandonment of managed lands		X					
D. CO_2 emissions and removals from soil	X[b]	X[b]					
E. Other (please specify)	X	X	X	X	X	X	
6. Waste							
A. Solid waste disposal on land							
B. Waste-water handling							
C. Waste incineration							
D. Other (please specify)							
7. Other (please specify)	X	X	X	X	X	X	X
Memo items							
International bunkers	X	X	X	X	X	X	X
Aviation	X	X	X	X	X	X	X
Marine	X	X	X	X	X	X	X
CO_2 emissions from biomass	X						

Table 1. National greenhouse gas inventory of anthropogenic emissions by sources and removals by sinks of all greenhouse gases not controlled by the Montreal Protocol[a] and greenhouse gas precursors

Greenhouse gas source and sink categories	CO_2 emissions (Gg)	CO_2 removals (Gg)	CH_4 (Gg)	N_2O (Gg)	CO (Gg)	NO_x (Gg)	NMVOCs (Gg)	SO_x (Gg)
Total national emissions and removals	X	X	X	X	X	X	X	X
1. Energy	X	X	X	X	X	X	X	X
A. Fuel combustion (sectoral approach)	X		X	X	X	X	X	X
1. Energy industries	X		X	X	X	X	X	X
2. Manufacturing industries and construction	X		X	X	X	X	X	X
3. Transport	X		X	X	X	X	X	X
4. Other sectors	X		X	X	X	X	X	X
5. Other (please specify)	X		X	X	X	X	X	X
B. Fugitive emissions from fuels	X		X		X	X	X	X
1. Solid fuels			X		X	X	X	X
2. Oil and natural gas			X		X	X	X	X
2. Industrial processes	X	X	X	X	X	X	X	X
A. Mineral products	X				X	X	X	X
B. Chemical industry	X		X	X	X	X	X	X
C. Metal production	X		X	X	X	X	X	X
D. Other production	X				X	X	X	X
E. Production of halocarbons and sulphur hexafluoride								
F. Consumption of halocarbons and sulphur hexafluoride								
G. Other (please specify)	X		X	X	X	X	X	X
3. Solvent and other product use	X						X	X
4. Agriculture			X	X	X	X	X	X
A. Enteric fermentation			X				X	
B. Manure management			X	X			X	
C. Rice cultivation			X				X	
D. Agricultural soils			X	X			X	
E. Prescribed burning of savannahs			X	X	X	X	X	
F. Field burning of agricultural residues			X	X	X	X	X	
G. Other (please specify)			X	X	X	X	X	X
5. Land-use change and forestry	X[b]	X[b]	X	X	X	X	X	X
A. Changes in forest and other woody biomass stocks	X[b]	X[b]						
B. Forest and grassland conversion	X	X	X	X	X	X		
C. Abandonment of managed lands		X						
D. CO_2 emissions and removals from soil	X[b]	X[b]						
E. Other (please specify)	X	X	X	X	X	X		
6. Waste			X	X	X	X	X	X
A. Solid waste disposal on land			X		X		X	
B. Waste-water handling			X	X	X	X	X	
C. Waste incineration					X	X	X	X
D. Other (please specify)			X	X	X	X	X	X
7. Other (please specify)	X	X	X	X	X	X	X	X
Memo items								
International bunkers	X		X	X	X	X	X	X
Aviation	X		X	X	X	X	X	X
Marine	X		X	X	X	X	X	X
CO_2 emissions from biomass	X							



GHG Inventory Reporting tables

- table 1 and 2 of annex to 17/CP.8
  - Based on the Revised 1996 IPCC guidelines

Table 1. National greenhouse gas inventory of anthropogenic emissions by sources and removals by sinks of all greenhouse gases not controlled by the Montreal Protocol[a] and greenhouse gas precursors

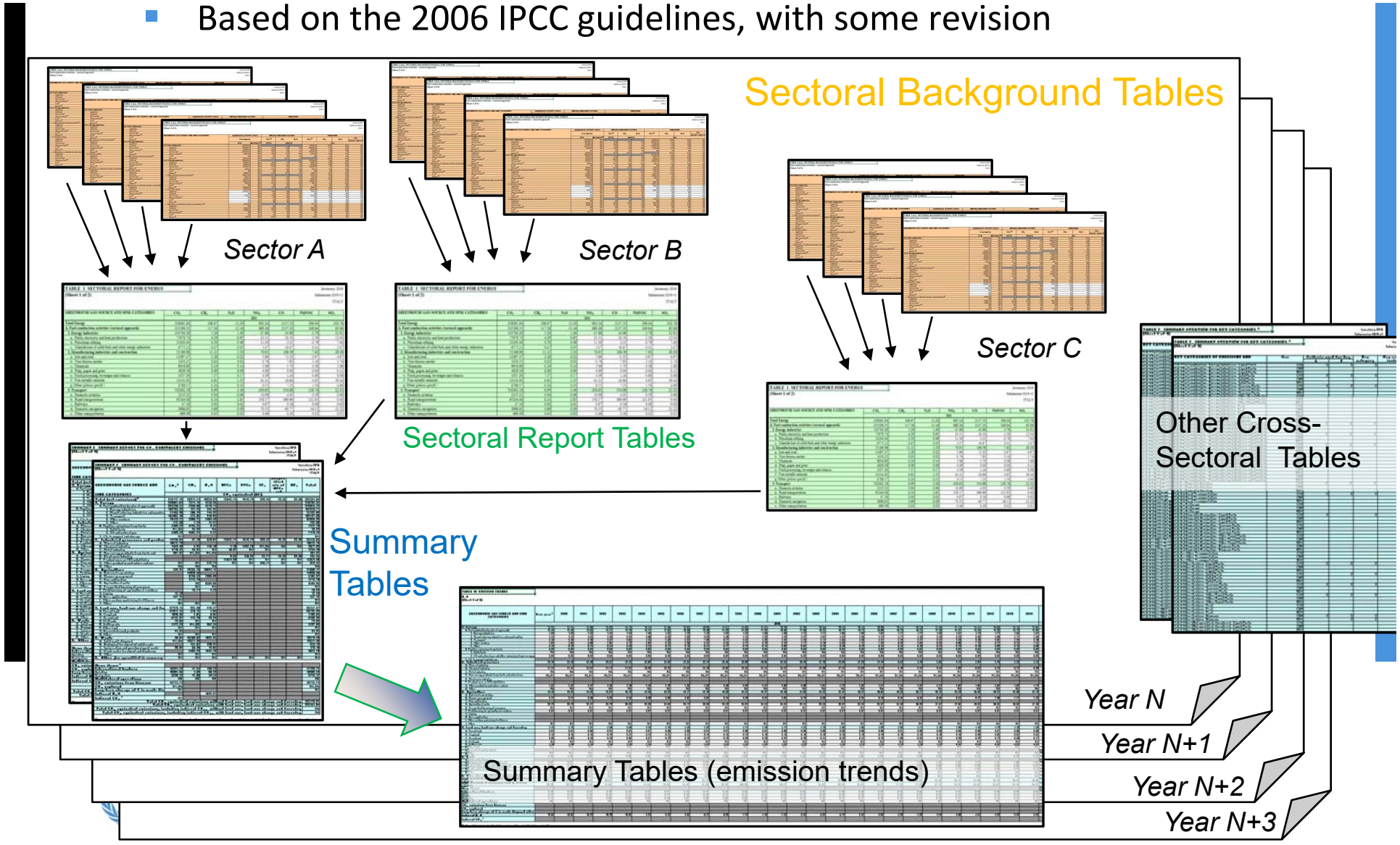
Greenhouse gas source and sink categories	CO_2 emissions (Gg)	CO_2 removals (Gg)	CH_4 (Gg)	N_2O (Gg)	CO (Gg)	NO_x (Gg)	NMVOCs (Gg)	SO_x (Gg)
Total national emissions and removals	X	X	X	X	X	X	X	X
1. Energy	X	X	X	X	X	X	X	X
A. Fuel combustion (sectoral approach)	X		X	X	X	X	X	X
1. Energy industries	X		X	X	X	X	X	X
2. Manufacturing industries and construction	X		X	X	X	X	X	X
3. Transport	X		X	X	X	X	X	X
4. Other sectors	X		X	X	X	X	X	X
5. Other (please specify)	X		X	X	X	X	X	X
B. Fugitive emissions from fuels	X		X		X	X	X	X
1. Solid fuels			X		X	X	X	X
2. Oil and natural gas			X		X	X	X	X
2. Industrial processes	X	X	X	X	X	X	X	X
A. Mineral products	X				X	X	X	X
B. Chemical industry	X		X	X	X	X	X	X
C. Metal production	X		X	X	X	X	X	X
D. Other production	X				X	X	X	X
E. Production of halocarbons and sulphur hexafluoride								
F. Consumption of halocarbons and sulphur hexafluoride								
G. Other (please specify)	X		X	X	X	X	X	X
3. Solvent and other product use	X			X			X	
4. Agriculture			X	X	X	X	X	X
A. Enteric fermentation			X					
B. Manure management			X	X			X	
C. Rice cultivation			X				X	
D. Agricultural soils			X	X			X	
E. Prescribed burning of savannahs			X	X	X	X	X	
F. Field burning of agricultural residues			X	X	X	X	X	
G. Other (please specify)			X	X	X	X	X	
5. Land-use change and forestry	X[b]	X[b]	X	X	X	X	X	X
A. Changes in forest and other woody biomass stocks	X[b]	X[b]						
B. Forest and grassland conversion	X	X	X	X	X	X		
C. Abandonment of managed lands		X						
D. CO_2 emissions and removals from soil	X[b]	X[b]						
E. Other (please specify)	X	X	X	X	X	X		
6. Waste			X	X	X	X	X	X
A. Solid waste disposal on land			X		X		X	
B. Waste-water handling			X	X	X	X	X	
C. Waste incineration					X	X	X	X
D. Other (please specify)			X	X	X	X	X	X
7. Other (please specify)	X	X	X	X	X	X	X	X
Memo items								
International bunkers	X		X	X	X	X	X	X
Aviation	X		X	X	X	X	X	X
Marine	X		X	X	X	X	X	X
CO_2 emissions from biomass	X							

Table 2. National greenhouse gas inventory of anthropogenic emissions of HFCs, PFCs and SF_6

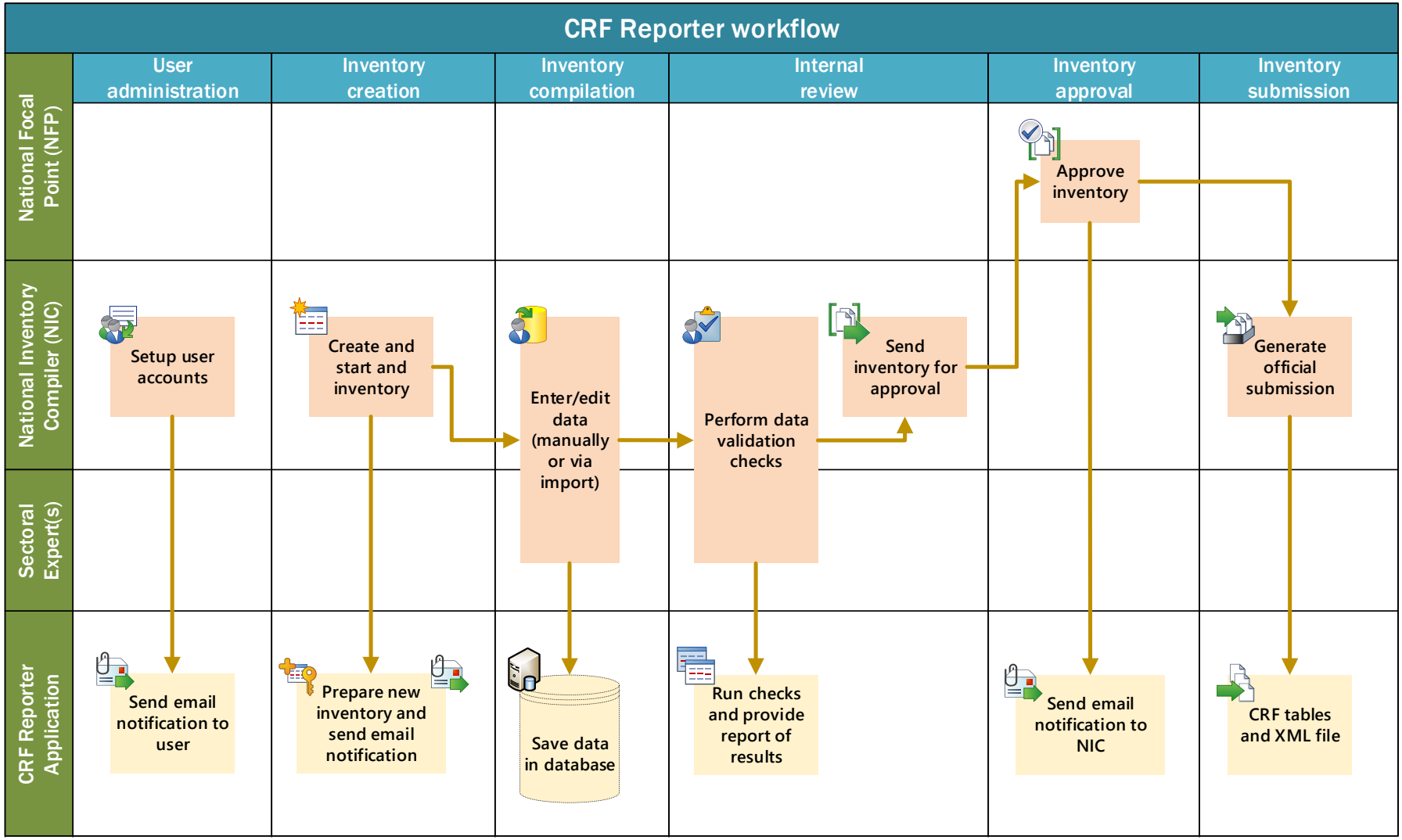
Greenhouse gas source and sink categories	HFCs[a,b] (Gg)			PFCs[a,b] (Gg)			SF_6[a] (Gg)
	HFC-23	HFC-134	Other (to be added)	CF_4	C_2F_6	Other (to be added)	
Total national emissions and removals	X	X	X	X	X	X	X
1. Energy							
A. Fuel combustion (sectoral approach)							
1. Energy industries							
2. Manufacturing industries and construction							
3. Transport							
4. Other sectors							
5. Other (please specify)							
B. Fugitive emissions from fuels							
1. Solid fuels							
2. Oil and natural gas							
2. Industrial processes	X	X	X	X	X	X	X
A. Mineral products							
B. Chemical industry							
C. Metal production	X	X	X	X	X	X	X
D. Other production							
E. Production of halocarbons and sulphur hexafluoride	X	X	X	X	X	X	X
F. Consumption of halocarbons and sulphur hexafluoride	X	X	X	X	X	X	X
G. Other (please specify)							
3. Solvent and other product use							
4. Agriculture							
A. Enteric fermentation							
B. Manure management							
C. Rice cultivation							
D. Agricultural soils							
E. Prescribed burning of savannahs							
F. Field burning of agricultural residues							
G. Other (please specify)							
5. Land-use change and forestry							
A. Changes in forest and other woody biomass stocks							
B. Forest and grassland conversion							
C. Abandonment of managed lands							
D. CO2 emissions and removals from soil							
E. Other (please specify)							
6. Waste							
A. Solid waste disposal on land							
B. Waste-water handling							
C. Waste incineration							
D. Other (please specify)							
7. Other (please specify)	X	X	X	X	X	X	X
Memo items							
International bunkers							
Aviation							
Marine							
CO_2 emissions from biomass							

GHG Inventory Reporting tables

- CRF tables
  - Based on the 2006 IPCC guidelines, with some revision

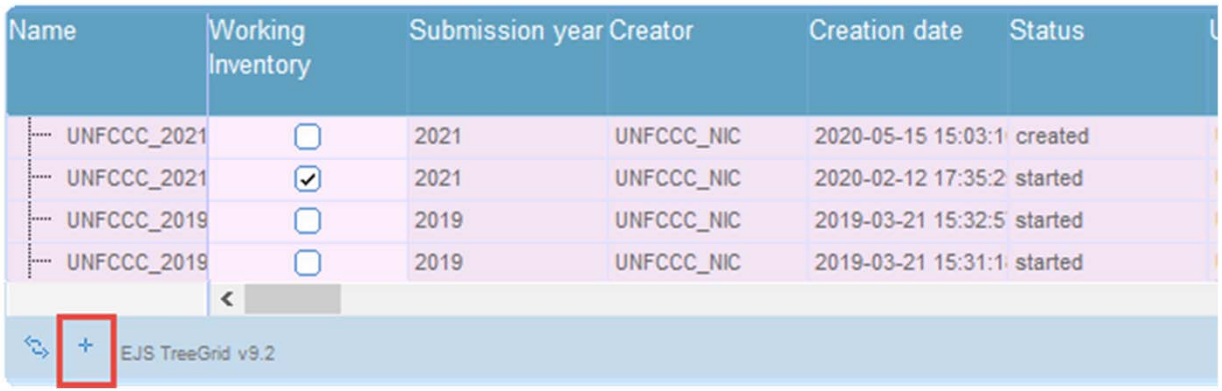


Workflow in the CRF Reporter



Inventory creation

- The inventory follows the structure and format of the agreed CRF tables (annexed to decision 24/CP.19)
- Creating a new inventory preserves the data contained in the previous inventory



Name	Working Inventory	Submission year	Creator	Creation date	Status
UNFCCC_2021	☐	2021	UNFCCC_NIC	2020-05-15 15:03:1	created
UNFCCC_2021	☑	2021	UNFCCC_NIC	2020-02-12 17:35:2	started
UNFCCC_2019	☐	2019	UNFCCC_NIC	2019-03-21 15:32:5	started
UNFCCC_2019	☐	2019	UNFCCC_NIC	2019-03-21 15:31:1	started

EJS TreeGrid v9.2

General Properties	
Name	UNFCCC_2021_2
Submission year	2021
Creator	UNFCCC_NIC
Creation date	2020-02-12 17:35:25.66
Status	started
Updater	UNFCCC_NIC
Submission date	

Sector	
Energy	☑
Industrial Processes and Prod	☑
Agriculture	
Option_A	☐
Option_B	☐
Option_C	☑
LULUCF	

Inventory Years	
1989	☐
1990	☐
1991	☑
1992	☑
1993	☑
1994	☑
1995	☑

Inventory compilation – Data entry (manual entry)

- Input only for AD and emissions (white cells)
- Data entry by multiple users
- Real-time saving
- Propagation of notation keys
- Overwriting formulas

Id	[3. Agriculture][3.G Liming] [3.G.1 Limestone CaCO3]	Unit	1990	2005
L1	Amount applied	t/year	4,175,229.999	3,008,160.00
L2	Method			
L3	CO2		T1	T1
L4	Emission factor information			
L5	CO2		D	D
L6	Emissions			
L7	CO2	kt	1,837.1024303	1,323.5907142
L8	Implied emission factor			
L9	CO2	t CO2-C/t	0.1200000803	0.1200000284
L10	Documentation box			

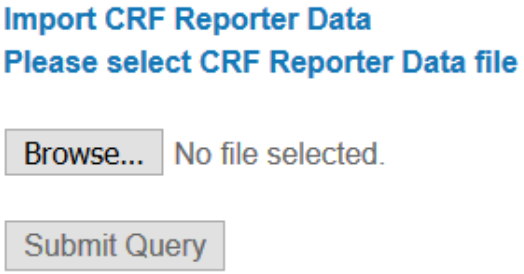
Id	[Sectors/Totals][1. Energy][1.AA Fuel Combustion - Sectoral approach][1.A.1 Energy Industries][1.A.1.a Public Electricity and Heat Production] [1.A.1.a.iii Heat plants]	Unit	1991	1992
L23	Emissions			
L24	CO2	kt	111.222	356.78
L25	Liquid fuels	kt		
L26	Solid fuels	kt		
L27	Gaseous fuels	kt		
L28	Other fossil fuels	kt		
L29	Peat	kt		
L30	Biomass	kt		
L31	CH4	kt	91.78	109.5567
L32	Liquid fuels	kt		
L33	Solid fuels	kt		
L34	Gaseous fuels	kt		
L35	Other fossil fuels	kt		
L36	Peat	kt		
L37	Biomass	kt		

Inventory compilation – Data entry (Excel import)

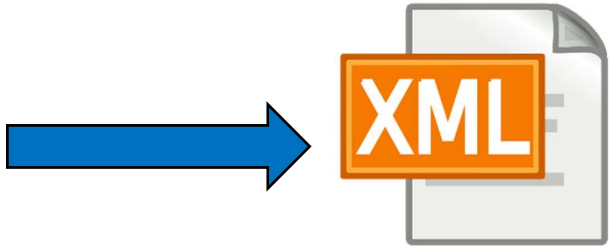
- Input only for AD and emissions (white cells)

UNFCCC 2021	UNFCCC_2021_1		
[3. Agriculture][3.G Liming][3.G.1 Limestone CaCO3]			
[3. Agriculture][3.G Liming][3.G.1	Unit	1990	2005
Amount applied	t/year	4175230.00	3008160.00
Method			
CO2		T1	T1
Emission factor information			
CO2		D	D
Emissions			
CO2	kt	1837.10	1323.59
Implied emission factor			
CO2	t CO2-C/t	0.12	0.12
Documentation box			

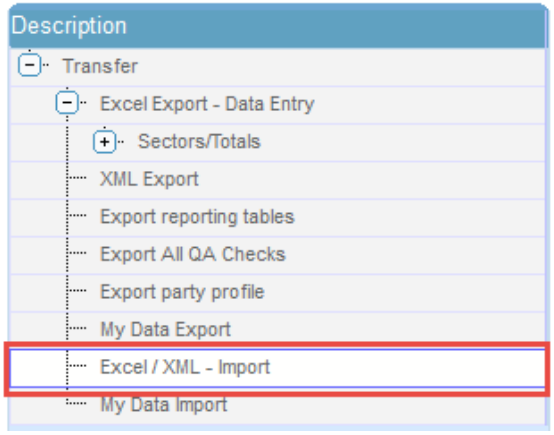
Possibility to work offline



Inventory compilation – Data entry (XML import)



Interoperability with national systems



Import CRF Reporter Data

Please select CRF Reporter Data file

Browse... No file selected.

Submit Query

Inventory compilation – Automatic calculation

Id	[3. Agriculture][3.G Liming] [3.G.1 Limestone CaCO3]	Unit	1990	2005
L1	Amount applied	t/year	4,175,229.999	3,008,160.00
L2	Method			
L3	CO2		T1	T1
L4	Emission factor information			
L5	CO2		D	D
L6	Emissions			
L7	CO2	kt	1,837.1024303	1,323.590714
L8	Implied emission factor			
L9	CO2	t CO2-C/t	0.1200000803	0.1200000284
L10	Documentation box			

Id	[3. Agriculture][3.G Liming]	Unit	1990	2005
L1	Method			
L2	CO2		T1	T1
L3	Emission factor information			
L4	CO2		D	D
L5	Emissions			
L6	CO2	kt	2,200.7899166	1,416.8902477
L7	Documentation box			

Id	[Sectors/Totals]	Unit	1991	1992
L1	Emissions			
L2	Total (with LULUCF)	kt CO2 equivalent	834,126.17824	827,962.6151
L3	Aggregate F-gases	t CO2 equivalent	5,739,894.905	4,504,582.124
L4	CO2	kt	626,619.7727(	621,672.44567
L5	CH4	kt	6,169.0385417	5,944.6331040
L6	N2O	kt	159.53203724	178.42201250
L7	HFCs	kt CO2 equivalent	2,684.4247156	2,052.9272977
L8	PFCs	kt CO2 equivalent	3,051.0925373	2,447.2771745
L9	Unspecified mix of HFCs a	kt CO2 equivalent	NO,NA	NO,NA
L10	SF6	kt	0.0001920022	0.0001920022
L11	NF3	kt	NO,NA	NO,NA
L12	NOx	kt	2,548.4174204	2,404.8461161
L13	CO	kt	9,222.3885846	7,962.8630490
L14	NMVOC	kt	1,461.5555534	1,282.6850354
L15	SO2	kt	3,896.4473216	3,172.1238068
L16	NH3	kt	13.862294147	17.126642743

- Implied emission factors
- Aggregations
- Conversion to CO_2 equivalent

Automatic calculation – Key category analysis

Category	Classification	Measure	Gas	Unit	Source	Target	Level w/ Lulucf	Trend w/ Lulucf	Level w/o Lulucf	Trend w/o Lulucf
Adipic Acid Production	no classification	Emissions	N2O	kt	no source	no target	0.000	0.000	0.000	0.000
Adipic Acid Production	no classification	Emissions	CO2	kt	no source	no target	0.000	0.000	0.000	0.000
Aerosols	no classification	Emissions	Aggregate F-gases	t CO2 equivalent	no source	no target	0.000	0.000	0.000	0.000
Agricultural Soils	Direct N2O Emissions From Managed Soils	Emissions	N2O	kt	no source	no target	0.077	0.000	0.096	0.000
Agricultural Soils	Farming	Emissions	CH4	kt	no source	no target	0.000	0.000	0.000	0.000
Agricultural Soils	Farming	Emissions	N2O	kt	no source	Indirect N2O Emissions From	0.008	0.000	0.010	0.000

TABLE 7 SUMMARY OVERVIEW FOR KEY CATEGORIES (1)
(Sheet 1 of 1)

Inventory 1990
Submission 2021 v1
UNFCCC

KEY CATEGORIES OF EMISSIONS AND REMOVALS	Gas	Criteria used for key source		Key category excluding LULUCF	Key category including LULUCF
		L	T		
1.A.1 Fuel combustion - Energy Industries - Liquid Fuels	CO2	X		X	X
1.A.1 Fuel combustion - Energy Industries - Liquid Fuels	CH4				
1.A.1 Fuel combustion - Energy Industries - Liquid Fuels	N2O	X		X	X
1.A.1 Fuel combustion - Energy Industries - Solid Fuels	CO2	X		X	
1.A.1 Fuel combustion - Energy Industries - Solid Fuels	CH4				
1.A.1 Fuel combustion - Energy Industries - Solid Fuels	N2O				
1.A.1 Fuel combustion - Energy Industries - Gaseous Fuels	CO2				
1.A.1 Fuel combustion - Energy Industries - Gaseous Fuels	CH4				
1.A.1 Fuel combustion - Energy Industries - Gaseous Fuels	N2O	X		X	X
1.A.1 Fuel combustion - Energy Industries - Other Fossil Fuels	CO2				
1.A.1 Fuel combustion - Energy Industries - Other Fossil Fuels	CH4				
1.A.1 Fuel combustion - Energy Industries - Other Fossil Fuels	N2O	X		X	X
1.A.1 Fuel combustion - Energy Industries - Peat	CO2				

Automatic calculation – Recalculation

TABLE 8 RECALCULATION - RECALCULATED DATA
(Sheet 1 of 4)

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2					
	Previous submission	Latest submission	Difference	Difference[1]	Impact of recalculation on total emissions excluding LULUCF[2]	Impact of recalculation on total emissions including LULUCF[3]
	CO_2 equivalent (kt)			(%)		
Total national emissions and removals	37052.99	37271.18	218.19	0.59	0.39	0.36
1. Energy	30153.51	30149.12	-4.39	-0.01	-0.01	-0.01
A. Fuel combustion activities	30153.48	30149.11	-4.37	-0.01	-0.01	-0.01
1. Energy Industries	11145.01	11145.01	0.00	0.00	0.00	0.00
2. Manufacturing industries and construction	3942.63	3942.63	0.00	0.00	0.00	0.00
3. Transport	5034.90	5030.54	-4.37	-0.09	-0.01	-0.01
4. Other sectors	10030.94	10030.94	0.00	0.00	0.00	0.00
5. Other	IE	IE				
B. Fugitive emissions from fuels	0.03	0.01	-0.03	-83.66	0.00	0.00
1. Solid fuels	NO	NO				
2. Oil and natural gas	0.03	0.01	-0.03	-83.66	0.00	0.00
C. CO_2 Transport and storage	NO	NO				
2. Industrial processes and product use	2247.52	2247.91	0.39	0.02	0.00	0.00

Internal review – Export of reporting tables

TABLE 1 SECTORAL REPORT FOR ENERGY
(Sheet 1 of 2)

Inventory 1990
Submission 2021 v1
UNFCCC

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2	CH_4	N_2O	NO_X	CO	NMVOC	SO_2
	(kt)						
Total Energy	258240.28	1783.16	768.44	2642.52	11254.20	1874.49	5311.08
A. Fuel combustion activities (sectoral approach)	254064.54	356.19	757.44	2634.25	11247.95	1667.68	5260.63
1. Energy industries	20483.56	221.14	704.36	608.43	214.57	8.55	3135.50
a. Public electricity and heat production	151.00	25.50	20.22	464.36	154.49	6.53	2435.31
b. Petroleum refining	20165.56	0.64	456.14	36.84	9.02	0.63	161.49
c. Manuf							
2. Manufac							
a. Iron an							
b. Non-fe							
c. Chemic							
d. Pulp, p							
e. Food p							
f. Non-m							

SUMMARY 2 SUMMARY REPORT FOR CO_2 EQUIVALENT EMISSIONS
(Sheet 1 of 1)

Inventory 1990
Submission 2021 v1
UNFCCC

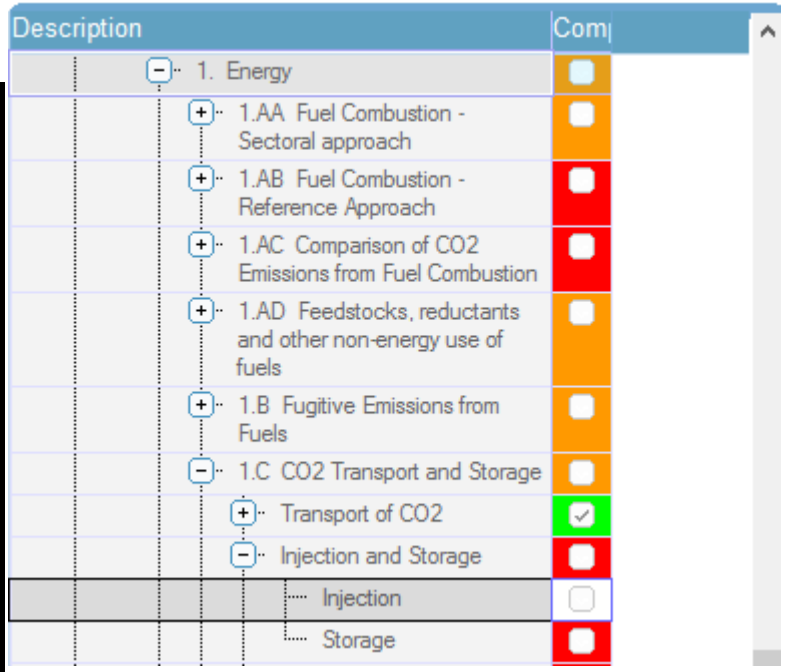
GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2[(1)]	CH_4	N_2O	HFCs	PFCs	SF_6	Unspecified mix of HFCs and PFCs	NF_3	Total
	CO_2 equivalent (kt)								
Total (net emissions)[(1)]	640874.33	171732.57	1260166.29	2439.82	2775.09	72.78	NO,NA	NO,NA	2078060.88
1. Energy	258240.28	44579.09	228995.53						531814.91
A. Fuel combustion (sectoral approach)	254064.54	8904.77	225716.47						488685.78
1. E									
2. M									
3. T									
4. C									
5. C									

TABLE 10 EMISSION TRENDS
SUMMARY
(Sheet 6 of 6)

Inventory 1990
Submission 2021 v1
UNFCCC

GREENHOUSE GAS EMISSIONS	Base year[(1)]	1990	Change from base to latest reported year
	CO_2 equivalent (kt)		(%)
CO_2 emissions without net CO_2 from LULUCF	598912.31	598912.31	0.00
CO_2 emissions with net CO_2 from LULUCF	640874.33	640874.33	0.00
CH_4 emissions without CH_4 from LULUCF	170442.96	170442.96	0.00
CH_4 emissions with CH_4 from LULUCF	171732.57	171732.57	0.00
N_2O emissions without N_2O from LULUCF	498072.84	498072.84	0.00
N_2O emissions with N_2O from LULUCF	1260166.29	1260166.29	0.00

Internal review – QA/QC procedures (e.g., Completeness check)



Id	[1. Energy][1.C CO2 Transport and Storage][Injection and Storage][Injection]	Unit	2012	2013	2014	2015	2016	2017	2018
L1	CO2 transported or injected	kt	NO	NO	NO	NO	NO	NO	
L2	Method								
L3	CO2		NA	NA	NA	NA	NA	NA	
L4	Emission factor information								
L5	CO2		NA	NA	NA	NA	NA	NA	
L6	Emissions								
L7	CO2	kt	NO	NO	NO	NO	NO	NO	
L8	Implied emission factor								
L9	CO2	kg/kt	NO	NO	NO	NO	NO	NO	
L10	Documentation box								

Summary of the key features of the CRF Reporter

- Follows the structure and format of the agreed CRF tables for Annex I Parties (annexed to decision 24/CP.19)
- Allows multiple users working in parallel
- Performs automatic population of summary and trend tables based on sectoral background tables
- Has built-in functionality to perform automatic calculations
  - Aggregation of emissions and AD data at higher category levels
  - Implied emission factors
  - Key category analysis (Tier 1)
  - Recalculation differences at category level
  - CO_2 equivalent (using GWPs from Annex I reporting guidelines)
- Propagates notation keys
- Allows overwriting cells with embedded formulas in certain categories in order to report data at a less disaggregated level
- Supports data entry offline (through the use of Excel and XML import)
- Has built-in functionality to perform certain QA/QC procedures
- Enables interoperability with other systems (through the use of an XML schema)
- Ability to copy previous inventories prepared within the CRF Reporter

CRF Reporter for developing country Parties

SBSTA 50 "***invited developing country Parties*** *to request access to the CRF Reporter and* ***requested the secretariat*** *to facilitate access to and use of the CRF Reporter*"

- The secretariat prepared a separate environment as a "playground" https://crfnaitest.unfccc.int/crfapp/
- Webinars were conducted as part of the June Momentum (attended by 80+ participants), as well as for groups of Parties upon request
- Access has been provided to over 30 developing Parties
- To request for access, send email to: crfweb@unfccc.int