

ANNEX 1

Annex 1: Key sources

Methodology

IPCC Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories, Chapter 7 Methodological Choice and Recalculation

The Tier 1 method to identify *key source categories* assesses the impacts of various source categories on the level and, if possible, the trend, of the national emissions inventory. When the national inventory estimates are available for several years, it is *good practice* to assess the contribution of each source category to both the level and trend of the national inventory. If only a single year's inventory is available, only a Level Assessment can be performed.

The Tier 1 method to identify *key source categories* can be readily completed using a spreadsheet analysis.

Level Assessment – TIER I

The contribution of each source category to the total national inventory level is calculated according to

Equation 7.1

$$\text{Source Category Level Assessment} = \text{Source Category Estimate} / \text{Total Estimate} \\ L_{x,t} = E_{x,t} / E_t$$

Where:

L_{x,t} is the Level Assessment for source x in year t

Source Category Estimate ($E_{x,t}$) is the emission estimate of source category x in year t

Total Estimate (E_t) is the total inventory estimate in year t

Trend Assessment - TIER I

The contribution of each source category's trend to the trend in the total inventory can be assessed if more than one year of inventory data are available, according to

Equation 7.2:

$$\text{Source Category Trend Assessment} = (\text{Source Category Level Assessment}) \times | \\ (\text{Source Category Trend} - \text{Total Trend}) | \\ T_{x,t} = L_{x,t} \times | \{ [(E_{x,t} - E_{x,0}) / E_{x,t}] - [(E_t - E_0) / E_t] \} |$$

Where:

T_{x,t} is the contribution of the source category trend to the overall inventory trend, called the Trend Assessment. The Trend Assessment is always recorded as an absolute value, i.e. a negative value is always recorded as the equivalent positive value.

L_{x,t} is the Level Assessment for source x in year t (derived in Equation 7.1)

$E_{x,t}$ and $E_{x,0}$ are the emissions estimates of source category x in years t and 0, respectively

E_t and E_0 are the total inventory estimates in years t and 0, respectively

The Source Category Trend is the change in the source category emissions over time, computed by subtracting the base year (year 0) estimate for source category x from the current year (year t) estimate and dividing by the current year estimate.

The Total Trend is the change in the total inventory emissions over time, computed by subtracting the base year (year 0) estimate for the total inventory from the current year (year t) estimate and dividing by the current year estimate.

Table 1: GPG Table 7.A1 (Tier I approach)

rank	CRF	IPCC Source Category		Direct	Gg CO2 eq.	Gg CO2 eq.	level 2008	trend	trend	KS
2008	Sector			GHG	1986	2008	%	equ. 7.2	%	trend
1	5	LULUCF/ A Forest land	1. Forest Land remaining Forest Land	CO2	9763	10801	31,24	0,554	1,86	yes
2	1A	1. Energy Industries	a. Public Electricity and Heat Production	CO2	6534	6347	18,35	1,980	6,66	yes
3	1A	3. Transport	b. Road Transportation	CO2	1910	6002	17,36	10,473	35,21	yes
4	5	LULUCF/ C Grasland	2. Land converted to Grassland	CO2	961	1485	4,29	1,178	3,96	yes
5	1A	2. Manufacturing Ind. and Constr.	f. Other	CO2	1775	1253	3,62	1,794	6,03	yes
6	1A	4. Other Sectors	b. Residential	CO2	1100	1188	3,44	0,015	0,05	no
7	1A	4. Other Sectors	a. Commercial/Institutional	CO2	612	696	2,01	0,085	0,29	no
8	2	Industrial Processes	1. Cement Production	CO2	515	608	1,76	0,132	0,45	yes
9	5	LULUCF/ B Cropland	2. Land converted to Cropland	CO2	378	600	1,74	0,505	1,70	yes
10	1A	2. Manufacturing Ind. and Constr.	d. Pulp, Paper and Print	CO2	650	422	1,22	0,753	2,53	yes
11	6	A. Solid Waste Disposal on Land	1. Managed Waste Disposal on Land	CH4	299	400	1,16	0,201	0,68	yes
12	4	A. Enteric Fermentation	1. Non-Dairy Cattle	CH4	263	381	1,10	0,256	0,86	yes
13	4	D. Agricultural Soils	1. Direct Soil Emissions	N2O	435	368	1,06	0,277	0,93	yes
14	4	D. Agricultural Soils	3. Indirect Emissions	N2O	334	287	0,83	0,201	0,68	yes
15	5	LULUCF/ B Cropland	1. Cropland remaining Cropland	CO2	423	270	0,78	0,502	1,69	yes
16	1B	Fugitive Emissions from Fuels	a. Coal Mining and Handling	CH4	359	254	0,74	0,360	1,21	yes
17	4	A. Enteric Fermentation	1. Dairy Cattle	CH4	384	249	0,72	0,446	1,50	yes
18	1A	4. Other Sectors	c. Agriculture/Forestry/Fisheries	CO2	425	234	0,68	0,603	2,03	yes
19	1A	2. Manufacturing Ind. and Constr.	a. Iron and Steel	CO2	1142	208	0,60	2,746	9,23	yes
20	1A	2. Manufacturing Ind. and Constr.	c. Chemicals	CO2	98	164	0,47	0,153	0,51	yes
21	4	B. Manure Management	1. Non-Dairy Cattle	CH4	66	157	0,46	0,229	0,77	yes
22	4	B. Manure Management	13. Solid Storage and Dry Lot	N2O	267	146	0,42	0,385	1,29	yes
23	6	B. Waste Water Handling	2. Domestic and Commercial WW	CH4	113	141	0,41	0,049	0,16	no
24	4	B. Manure Management	8. Swine	CH4	233	138	0,40	0,306	1,03	yes
25	2	Industrial Processes	3. Aluminium Production	CO2	89	133	0,39	0,097	0,32	no
26	4	B. Manure Management	1. Dairy Cattle	CH4	152	130	0,38	0,093	0,31	no
27	1A	2. Manufacturing Ind. and Constr.	e. Food Processing, Bev. and Tob.	CO2	248	125	0,36	0,383	1,29	yes
28	2	Industrial Processes	1. Refrigeration and AC Equipment	HFC	NO	120	0,35	0,319	1,07	yes
29	5	LULUCF/ A Forest land	2. Land converted to Forest Land	CO2	112	112	0,32	0,024	0,08	no
30	2	Industrial Processes	2. Lime Production	CO2	220	110	0,32	0,344	1,16	yes
31	1A	2. Manufacturing Ind. and Constr.	b. Non-Ferrous Metals	CO2	440	97	0,28	1,016	3,42	yes
32	1A	3. Transport	b. Road Transportation	N2O	29	91	0,26	0,161	0,54	yes

rank	CRF	IPCC Source Category		Direct	Gg CO2 eq.	Gg CO2 eq.	level 2008	trend	trend	KS
2008	Sector			GHG	1986	2008	%	equ. 7.2	%	trend
33	2	Industrial Processes	3. Limestone and Dolomite Use	CO2	19	89	0,26	0,183	0,62	yes
34	1A	4. Other Sectors	b. Residential	CH4	135	89	0,26	0,153	0,51	yes
35	1B	Fugitive Emissions from Fuels	a. Coal Mining and Handling	CO2	120	82	0,24	0,130	0,44	no
36	6	B. Waste Water Handling	2. Domestic and Commercial WW	N2O	59	60	0,17	0,010	0,03	no
37	4	D. Agricultural Soils	2. Pasture, Range and Paddock Manure	N2O	24	54	0,16	0,076	0,26	no
38	1A	3. Transport	c. Railways	CO2	68	41	0,12	0,089	0,30	no
39	2	Industrial Processes	1. Iron and Steel Production	CO2	40	31	0,09	0,034	0,11	no
40	1B	Fugitive Emissions from Fuels	b. Natural Gas	CH4	56	30	0,09	0,083	0,28	no
41	1A	1. Energy Industries	a. Public Electricity and Heat Production	N2O	26	29	0,08	0,002	0,01	no
42	1A	4. Other Sectors	c. Agriculture/Forestry/Fisheries	N2O	49	28	0,08	0,067	0,23	no
43	3	Solvent and Other Product Use	D. 1. Use of N ₂ O for Anaesthesia	N2O	82	28	0,08	0,163	0,55	yes
44	1A	2. Manufacturing Ind. and Constr.	f. Other	N2O	35	26	0,08	0,031	0,10	no
45	5	LULUCF/ C Grassland	1. Grassland remaining Grassland	CO2	5	24	0,07	0,049	0,16	no
46	4	A. Enteric Fermentation	3. Sheep	CH4	4	23	0,07	0,050	0,17	no
47	2	Industrial Processes	4. Soda Ash Production and Use	CO2	8	22	0,06	0,035	0,12	no
48	2	Industrial Processes	3. Aluminium Production	PFC	276	19	0,06	0,748	2,51	yes
49	1A	4. Other Sectors	b. Residential	N2O	21	19	0,06	0,009	0,03	no
50	2	Industrial Processes	8. Electrical Equipment	SF6	10	19	0,05	0,021	0,07	no
51	6	B. Waste Water Handling	1. Industrial Wastewater	CH4	96	16	0,05	0,236	0,79	yes
52	4	A. Enteric Fermentation	8. Swine	CH4	23	15	0,04	0,028	0,09	no
53	2	Industrial Processes	4. Carbide Production	CO2	45	14	0,04	0,092	0,31	no
54	1A	3. Transport	b. Road Transportation	CH4	23	12	0,03	0,036	0,12	no
55	2	Industrial Processes	7. Other (Glass Production)	CO2	5	11	0,03	0,015	0,05	no
56	4	B. Manure Management	12. Liquid Systems	N2O	6	9	0,03	0,005	0,02	no
57	1A	1. Energy Industries	c. Manufacture of Solid Fuels and Other	CO2	105	9	0,02	0,280	0,94	yes
58	4	B. Manure Management	9. Poultry	CH4	16	7	0,02	0,028	0,09	no
59	4	A. Enteric Fermentation	6. Horses	CH4	5	7	0,02	0,004	0,01	no
60	2	Industrial Processes	2. Ferroalloys Production	CO2	58	6	0,02	0,150	0,51	yes
61	1A	3. Transport	c. Railways	N2O	9	5	0,01	0,011	0,04	no
62	1A	3. Transport	a. Civil Aviation	CO2	1	5	0,01	0,011	0,04	no
63	1A	2. Manufacturing Ind. and Constr.	f. Other	CH4	6	4	0,01	0,008	0,03	no
64	2	Industrial Processes	5. Other (Methanol)	CH4	3	4	0,01	0,002	0,01	no
65	6	C. Waste Incineration	a. and b. waste incineration	CO2	NO	4	0,01	0,010	0,03	no
66	1A	1. Energy Industries	a. Public Electricity and Heat Production	CH4	2	3	0,01	0,003	0,01	no

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2008	Sector			GHG	1986	2008	%	equ. 7.2	%	trend
67	4	A. Enteric Fermentation	4. Goats	CH4	1	3	0,01	0,004	0,01	no
68	1A	4. Other Sectors	a. Commercial/Institutional	CH4	15	2	0,01	0,039	0,13	no
69	5	LULUCF	A. Forest Land	CH4	0	2	0,00	0,005	0,02	no
70	1A	4. Other Sectors	a. Commercial/Institutional	N2O	5	2	0,00	0,010	0,04	no
71	1A	2. Manufacturing Ind. and Constr.	d. Pulp, Paper and Print	N2O	1	1	0,00	0,001	0,00	no
72	1A	2. Manufacturing Ind. and Constr.	d. Pulp, Paper and Print	CH4	1	1	0,00	0,000	0,00	no
73	1A	2. Manufacturing Ind. and Constr.	c. Chemicals	N2O	0	1	0,00	0,002	0,01	no
74	4	B. Manure Management	14. Other AWMS	N2O	1	1	0,00	0,002	0,01	no
75	1A	1. Energy Industries	b. Petroleum Refining	CO2	62	1	0,00	0,178	0,60	yes
76	1A	2. Manufacturing Ind. and Constr.	c. Chemicals	CH4	0	1	0,00	0,001	0,00	no
77	1A	4. Other Sectors	c. Agriculture/Forestry/Fisheries	CH4	1	1	0,00	0,003	0,01	no
78	4	B. Manure Management	6. Horses	CH4	0	1	0,00	0,000	0,00	no
79	4	B. Manure Management	3. Sheep	CH4	0	1	0,00	0,001	0,00	no
80	2	Industrial Processes	2. Foam Blowing	HFC	NO	1	0,00	0,001	0,00	no
81	1A	2. Manufacturing Ind. and Constr.	a. Iron and Steel	CH4	2	0	0,00	0,005	0,02	no
82	1A	2. Manufacturing Ind. and Constr.	a. Iron and Steel	N2O	3	0	0,00	0,009	0,03	no
83	1A	2. Manufacturing Ind. and Constr.	e. Food Processing, Bev. and Tob.	N2O	1	0	0,00	0,001	0,00	no
84	1A	2. Manufacturing Ind. and Constr.	e. Food Processing, Bev. and Tob.	CH4	0	0	0,00	0,000	0,00	no
85	2	Industrial Processes	3. Fire Extinguishers	HFC	NO	0	0,00	0,000	0,00	no
86	1A	2. Manufacturing Ind. and Constr.	b. Non-Ferrous Metals	N2O	1	0	0,00	0,003	0,01	no
87	1A	2. Manufacturing Ind. and Constr.	b. Non-Ferrous Metals	CH4	1	0	0,00	0,002	0,01	no
88	1A	1. Energy Industries	c. Manufacture of Solid Fuels and Other	N2O	0	0	0,00	0,000	0,00	no
89	4	B. Manure Management	11. Anaerobic Lagoons	N2O	1	0	0,00	0,002	0,01	no
90	6	C. Waste Incineration	a. and b. waste incineration	N2O	0	0	0,00	0,000	0,00	no
91	4	B. Manure Management	4. Goats	CH4	0	0	0,00	0,000	0,00	no
92	1A	1. Energy Industries	b. Petroleum Refining	N2O	0	0	0,00	0,000	0,00	no
93	1A	3. Transport	c. Railways	CH4	0	0	0,00	0,000	0,00	no
94	1A	3. Transport	a. Civil Aviation	N2O	0	0	0,00	0,000	0,00	no
95	1A	1. Energy Industries	c. Manufacture of Solid Fuels and Other	CH4	0	0	0,00	0,001	0,00	no
96	1B	Fugitive Emissions from Fuels	b. Natural Gas	CO2	0	0	0,00	0,000	0,00	no
97	1A	3. Transport	a. Civil Aviation	CH4	0	0	0,00	0,000	0,00	no
98	1A	1. Energy Industries	b. Petroleum Refining	CH4	0	0	0,00	0,000	0,00	no
99	5	LULUCF	A. Forest Land	N2O	0	0	0,00	0,000	0,00	no
		Total			31869	34579	100		100	

