

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:

$$\text{Source Category Trend Assessment} = (\text{Source Category Level Assessment}) / (\text{Source Category Trend} - \text{Total Trend}) /$$

$$T_{x,t} = L_{x,t} * \{ [(E_{x,t} - E_{x,0}) / E_{x,t}] - [(E_t - E_0) / E_t] \}$$

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 2007	trend	trend	KS
level 2007	Sector			GHG	1986	2007	%	equ. 7.2	%	trend
1	1A	1. Energy Industries	a. Public Electricity and Heat Production	CO2	6533,755	6564,880	24,78	4,155	8,93	yes
2	5	LULUCF	A. Forest Land	CO2	1589,253	5774,354	21,79	12,037	25,87	yes
3	1A	3. Transport	b. Road Transportation	CO2	1913,811	5148,405	19,43	8,857	19,04	yes
4	1A	2. Manufacturing Industries	f. Other	CO2	1774,835	1268,021	4,79	2,738	5,89	yes
5	1A	4. Other Sectors	b. Residential	CO2	1100,185	1056,211	3,99	0,853	1,83	yes
6	2	Industrial Processes	1. Cement Production	CO2	514,615	555,699	2,10	0,207	0,44	yes
7	1A	4. Other Sectors	a. Commercial/Institutional	CO2	612,110	474,311	1,79	0,829	1,78	yes
8	6	A. Solid Waste Disposal	1. Managed Waste Disposal on Land	CH4	298,801	453,352	1,71	0,288	0,62	yes
9	1A	2. Manufacturing Industries	d. Pulp, Paper and Print	CO2	649,556	452,842	1,71	1,037	2,23	yes
10	4	D. Agricultural Soils ⁽²⁾	1. Direct Soil Emissions	N2O	434,006	397,445	1,50	0,397	0,85	yes
11	4	A. Enteric Fermentation	1. Non-Dairy Cattle	CH4	301,880	397,006	1,50	0,101	0,22	no
12	4	D. Agricultural Soils ⁽²⁾	3. Indirect Emissions	N2O	333,371	312,738	1,18	0,281	0,60	yes
13	1B	Fugitive Emissions	a. Coal Mining and Handling	CH4	358,906	254,452	0,96	0,560	1,20	yes
14	4	A. Enteric Fermentation	1. Dairy Cattle	CH4	429,314	236,662	0,89	0,881	1,89	yes
15	1A	4. Other Sectors	c. Agriculture/Forestry/Fisheries	CO2	426,782	229,301	0,87	0,895	1,92	yes
16	1A	2. Manufacturing Industries	a. Iron and Steel	CO2	1141,586	203,278	0,77	3,674	7,90	yes
17	2	Industrial Processes	3. Aluminium Production	CO2	89,402	187,465	0,71	0,248	0,53	yes
18	1A	3. Transport	b. Road Transportation	N2O	23,696	184,708	0,70	0,487	1,05	yes
19	4	B. Manure Management	8. Swine	CH4	232,219	176,015	0,66	0,327	0,70	yes
20	1A	2. Manufacturing Industries	c. Chemicals	CO2	98,052	173,354	0,65	0,171	0,37	no
21	4	B. Manure Management	13. Solid Storage and Dry Lot	N2O	259,261	164,739	0,62	0,464	1,00	yes
22	4	B. Manure Management	1. Non-Dairy Cattle	CH4	93,492	159,409	0,60	0,145	0,31	no
23	1A	2. Manufacturing Industries	e. Food Processing, Beverages and Tob.	CO2	247,754	131,421	0,50	0,525	1,13	yes
24	2	Industrial Processes	1. Refrigeration and AC Equipment	HFC		130,226	0,49	0,407	0,87	yes
25	2	Industrial Processes	2. Lime Production	CO2	220,206	123,427	0,47	0,446	0,96	yes
26	4	B. Manure Management	1. Dairy Cattle	CH4	167,074	114,932	0,43	0,272	0,58	yes
27	1B	Fugitive Emissions	c. Other (SO2 scrubbing))	CO2		103,088	0,39	0,322	0,69	yes
28	6	B. Waste Water Handling	2. Domestic and Commercial Waste Water	CH4	112,561	96,909	0,37	0,122	0,26	no
29	2	Industrial Processes	3. Aluminium Production	PFC	276,291	91,691	0,35	0,756	1,63	yes
30	1A	4. Other Sectors	b. Residential	CH4	134,677	88,399	0,33	0,232	0,50	yes
31	1A	2. Manufacturing Industries	b. Non-Ferrous Metals	CO2	440,325	83,302	0,31	1,402	3,01	yes

rank	CRF	IPCC Source Category		Direct	Gg CO2 eq.	Gg CO2 eq.	level 2007	trend	trend	KS
level 2007	Sector			GHG	1986	2007	%	equ. 7.2	%	trend
32	1B	Fugitive Emissions	a. Coal Mining and Handling	CO2	120,238	81,829	0,31	0,198	0,43	yes
33	6	B. Waste Water Handling	2. Domestic and Commercial Waste Water	N2O	58,858	63,340	0,24	0,024	0,05	no
34	6	B. Waste Water Handling	1. Industrial Wastewater	CH4	96,116	70,491	0,27	0,143	0,31	no
35	4	D. Agricultural Soils ⁽²⁾	2. Pasture, Range and Paddock Manure	N2O	23,753	54,133	0,20	0,079	0,17	no
36	3	Solvent and Other Product Use	D. 1. Use of N ₂ O for Anaesthesia	N2O	81,903	42,160	0,16	0,177	0,38	no
37	1A	3. Transport	c. Railways	CO2	68,182	37,471	0,14	0,140	0,30	no
38	2	Industrial Processes	4. Carbide Production	CO2	44,985	34,285	0,13	0,063	0,13	no
39	1B	Fugitive Emissions	b. Natural Gas	CH4	56,205	30,681	0,12	0,116	0,25	no
40	2	Industrial Processes	1. Iron and Steel Production	CO2	40,149	28,126	0,11	0,064	0,14	no
41	1A	4. Other Sectors	c. Agriculture/Forestry/Fisheries	N2O	49,388	27,621	0,10	0,100	0,22	no
42	1A	1. Energy Industries	a. Public Electricity and Heat Production	N2O	26,201	27,592	0,10	0,013	0,03	no
43	2	Industrial Processes	2. Ferroalloys Production	CO2	57,635	24,552	0,09	0,141	0,30	no
44	4	A. Enteric Fermentation	3. Sheep	CH4	4,242	22,038	0,08	0,053	0,11	no
45	1A	4. Other Sectors	b. Residential	N2O	20,936	19,168	0,07	0,019	0,04	no
46	2	Industrial Processes	8. Electrical Equipment	SF6	10,241	18,840	0,07	0,020	0,04	no
47	4	A. Enteric Fermentation	8. Swine	CH4	23,103	18,290	0,07	0,030	0,06	no
48	1A	3. Transport	b. Road Transportation	CH4	18,220	18,109	0,07	0,012	0,03	no
49	2	Industrial Processes	4. Soda Ash Production and Use	CO2	10,290	17,802	0,07	0,017	0,04	no
50	4	B. Manure Management	12. Liquid Systems	N2O	6,764	8,668	0,03	0,002	0,00	no
51	1A	2. Manufacturing Industries	f. Other	N2O	35,285	7,862	0,03	0,109	0,23	no
52	4	B. Manure Management	9. Poultry	CH4	16,446	7,467	0,03	0,039	0,08	no
53	4	A. Enteric Fermentation	6. Horses	CH4	5,498	7,417	0,03	0,002	0,01	no
54	2	Industrial Processes	5. Other (Methanol)	CH4	2,929	6,234	0,02	0,008	0,02	no
55	2	Industrial Processes	3. Limestone and Dolomite Use	CO2	20,305	6,067	0,02	0,058	0,12	no
56	1A	3. Transport	c. Railways	N2O	8,651	4,754	0,02	0,018	0,04	no
57	1A	2. Manufacturing Industries	f. Other	CH4	6,753	4,032	0,02	0,013	0,03	no
58	4	A. Enteric Fermentation	4. Goats	CH4	1,050	2,964	0,01	0,005	0,01	no
59	1A	1. Energy Industries	a. Public Electricity and Heat Production	CH4	1,595	1,861	0,01	0,000	0,00	no
60	1A	3. Transport	a. Civil Aviation	CO2	0,622	1,710	0,01	0,003	0,01	no
61	1A	1. Energy Industries	c. Manufacture of Solid Fuels	CO2	104,728	1,653	0,01	0,390	0,84	yes
62	1A	4. Other Sectors	a. Commercial/Institutional	CH4	15,279	1,374	0,01	0,053	0,11	no
63	1A	4. Other Sectors	a. Commercial/Institutional	N2O	5,087	1,187	0,00	0,015	0,03	no
64	1A	2. Manufacturing Industries	d. Pulp, Paper and Print	N2O	1,383	0,997	0,00	0,002	0,00	no
65	1A	2. Manufacturing Industries	d. Pulp, Paper and Print	CH4	1,060	0,943	0,00	0,001	0,00	no

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level 2007	Sector			GHG	1986	2007	%	equ. 7.2	%	trend
66	4	B. Manure Management	14. Other AWMS	N2O	1,322	0,847	0,00	0,002	0,01	no
67	1A	2. Manufacturing Industries	c. Chemicals	N2O	0,248	0,829	0,00	0,002	0,00	no
68	1A	2. Manufacturing Industries	c. Chemicals	CH4	0,107	0,609	0,00	0,001	0,00	no
69	4	B. Manure Management	6. Horses	CH4	0,428	0,577	0,00	0,000	0,00	no
70	1A	4. Other Sectors	c. Agriculture/Forestry/Fisheries	CH4	1,436	0,566	0,00	0,004	0,01	no
71	4	B. Manure Management	3. Sheep	CH4	0,101	0,523	0,00	0,001	0,00	no
72	2	Industrial Processes	2. Foam Blowing	HFC		0,504	0,00	0,002	0,00	no
73	2	Industrial Processes	7. Other (Glass Production)	CO2	0,226	0,393	0,00	0,000	0,00	no
74	1A	2. Manufacturing Industries	a. Iron and Steel	CH4	2,057	0,381	0,00	0,007	0,01	no
75	1A	1. Energy Industries	b. Petroleum Refining	CO2	62,225	0,275	0,00	0,234	0,50	yes
76	1A	2. Manufacturing Industries	a. Iron and Steel	N2O	3,270	0,233	0,00	0,012	0,02	no
77	1A	2. Manufacturing Industries	e. Food Processing, Beverages and Tob.	N2O	0,615	0,184	0,00	0,002	0,00	no
78	2	Industrial Processes	3. Fire Extinguishers	HFC		0,182	0,00	0,001	0,00	no
79	1A	2. Manufacturing Industries	e. Food Processing, Beverages and Tob.	CH4	0,178	0,178	0,00	0,000	0,00	no
80	4	B. Manure Management	11. Anaerobic Lagoons	N2O	0,948	0,141	0,00	0,003	0,01	no
81	1A	2. Manufacturing Industries	b. Non-Ferrous Metals	CH4	0,691	0,130	0,00	0,002	0,00	no
82	1A	2. Manufacturing Industries	b. Non-Ferrous Metals	N2O	1,252	0,089	0,00	0,004	0,01	no
83	4	B. Manure Management	4. Goats	CH4	0,025	0,071	0,00	0,000	0,00	no
84	1A	3. Transport	c. Railways	CH4	0,078	0,043	0,00	0,000	0,00	no
85	1A	3. Transport	a. Civil Aviation	N2O	0,005	0,015	0,00	0,000	0,00	no
86	1A	1. Energy Industries	c. Manufacture of Solid Fuels	N2O	0,226	0,004	0,00	0,001	0,00	no
87	1A	1. Energy Industries	c. Manufacture of Solid Fuels	CH4	0,201	0,001	0,00	0,001	0,00	no
88	1A	1. Energy Industries	b. Petroleum Refining	N2O	0,069	0,001	0,00	0,000	0,00	no
89	1A	3. Transport	a. Civil Aviation	CH4	0,000	0,001	0,00	0,000	0,00	no
90	1A	1. Energy Industries	b. Petroleum Refining	CH4	0,094	0,000	0,00	0,000	0,00	no
		Total			21927,660	26496,537	100,000	46,522	100,000	