System of Environmental Economic Accounting

Air emission inventories to accounts

Regional Workshop for an Accounting Approach to Climate Change Statistics and Indicators

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United Nations

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Recap of air emission accounts

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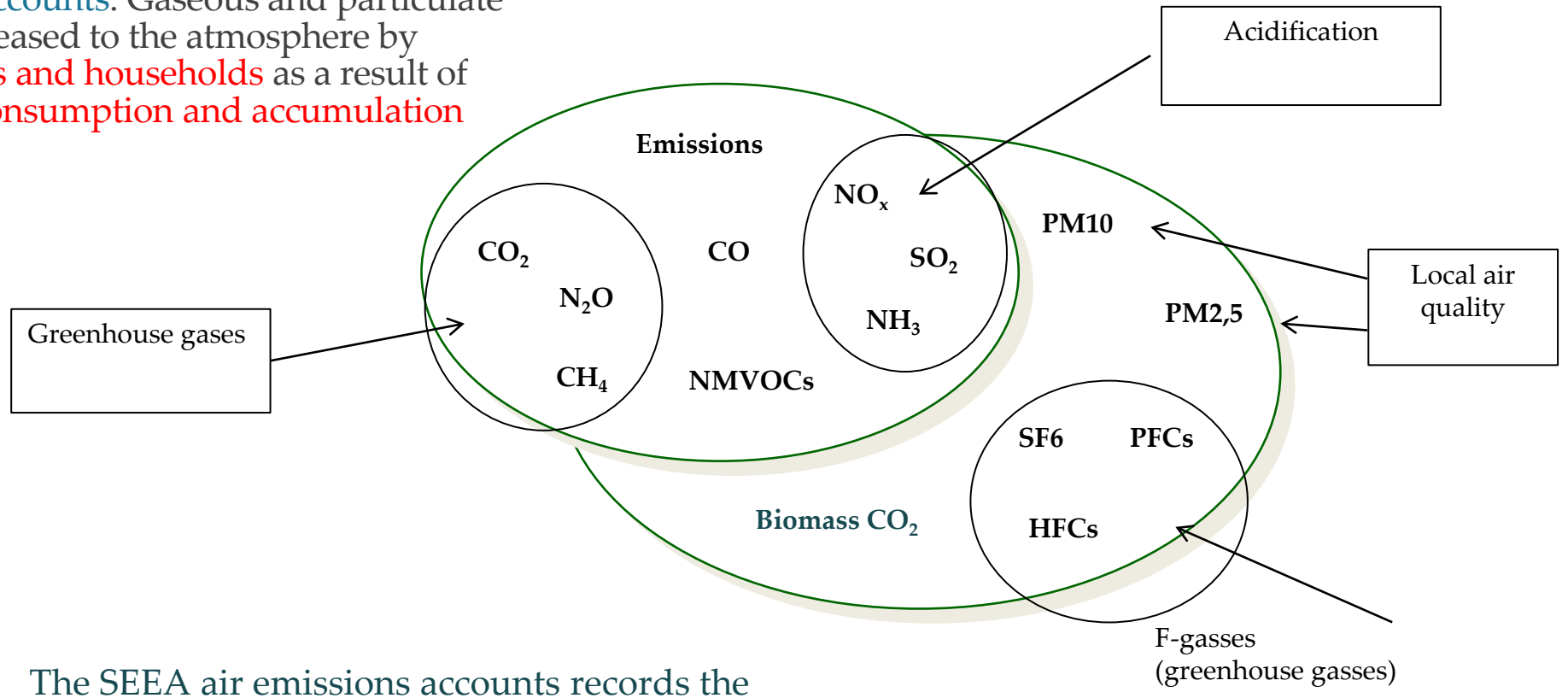
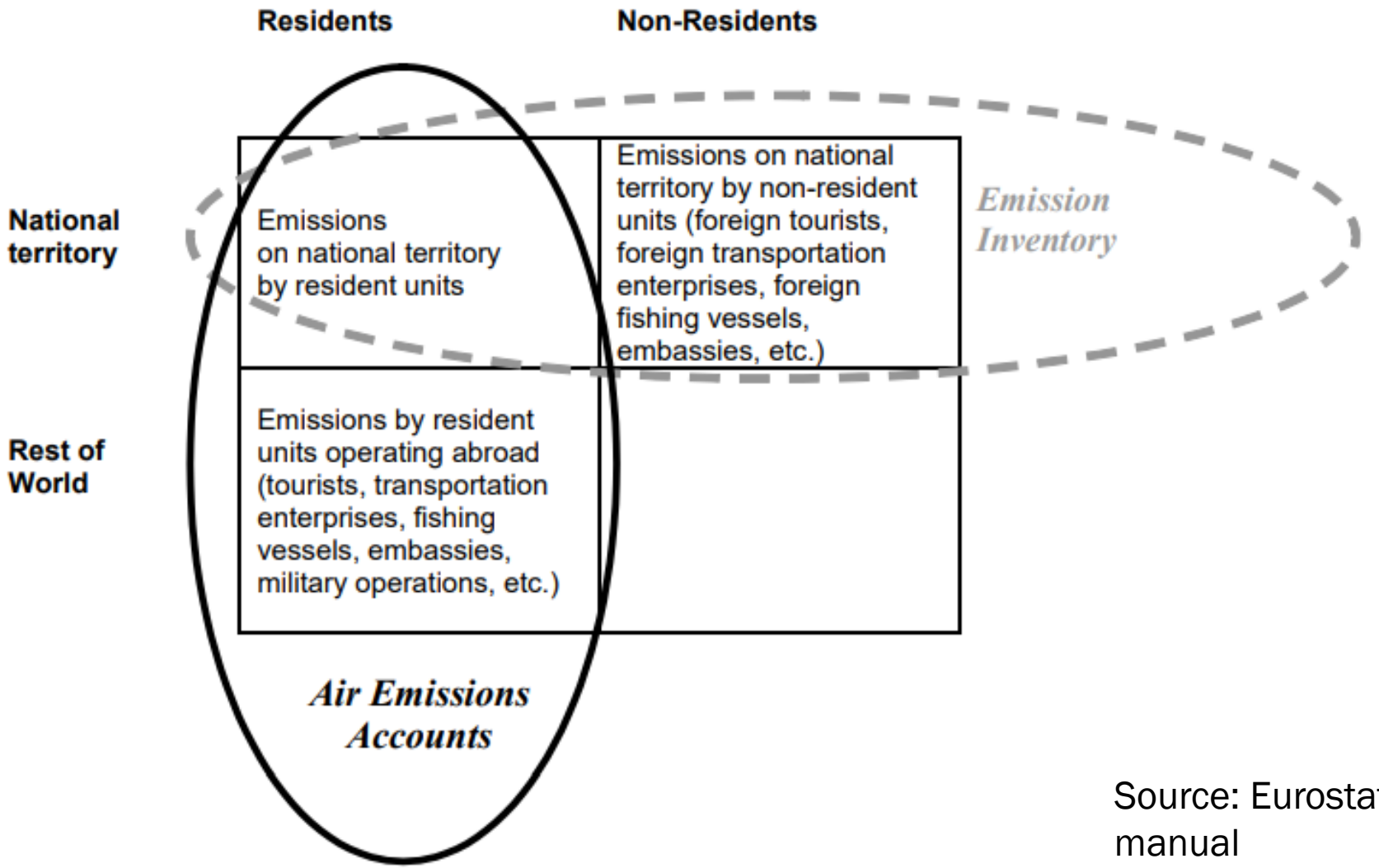
Air emission account: scope

Scope of the accounts: Gaseous and particulate substances released to the atmosphere by establishments and households as a result of production, consumption and accumulation processes.



The SEEA air emissions accounts records the generation of air emissions by resident economic units and by type of substance.

Emission inventories vs. accounts



Source: Eurostat AEA manual

Emission inventories vs. accounts

Air Emissions Accounts	Air emissions inventory
Residence principle	Territorial principle
Allocation of emissions to economic activities	Process-based allocation of emissions
Breakdown by industries ISIC and households	Breakdown by sectors, (energy; industrial processes; agriculture; land use; land-use change and forestry; waste; other
Allocation of transport emissions to the final producer	Functional allocation of transport emissions

Source: Eurostat AEA manual

Relevant inventories

- UN Framework Convention on Climate Change
  - GHG inventories
    - CO2, N20, CH4, HFCs, PFCs, SF6, NF3
- Convention on Long-range Transboundary Air Pollution
  - Air pollutant inventories
    - Nox, CO, NMVOC, SOX, NH3, particulate matter, heavy metals, persistent organic pollutants
- Focus today on GHG inventories; similar (but not the same) adjustments are needed

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Emission inventory first approach

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Example emission inventory

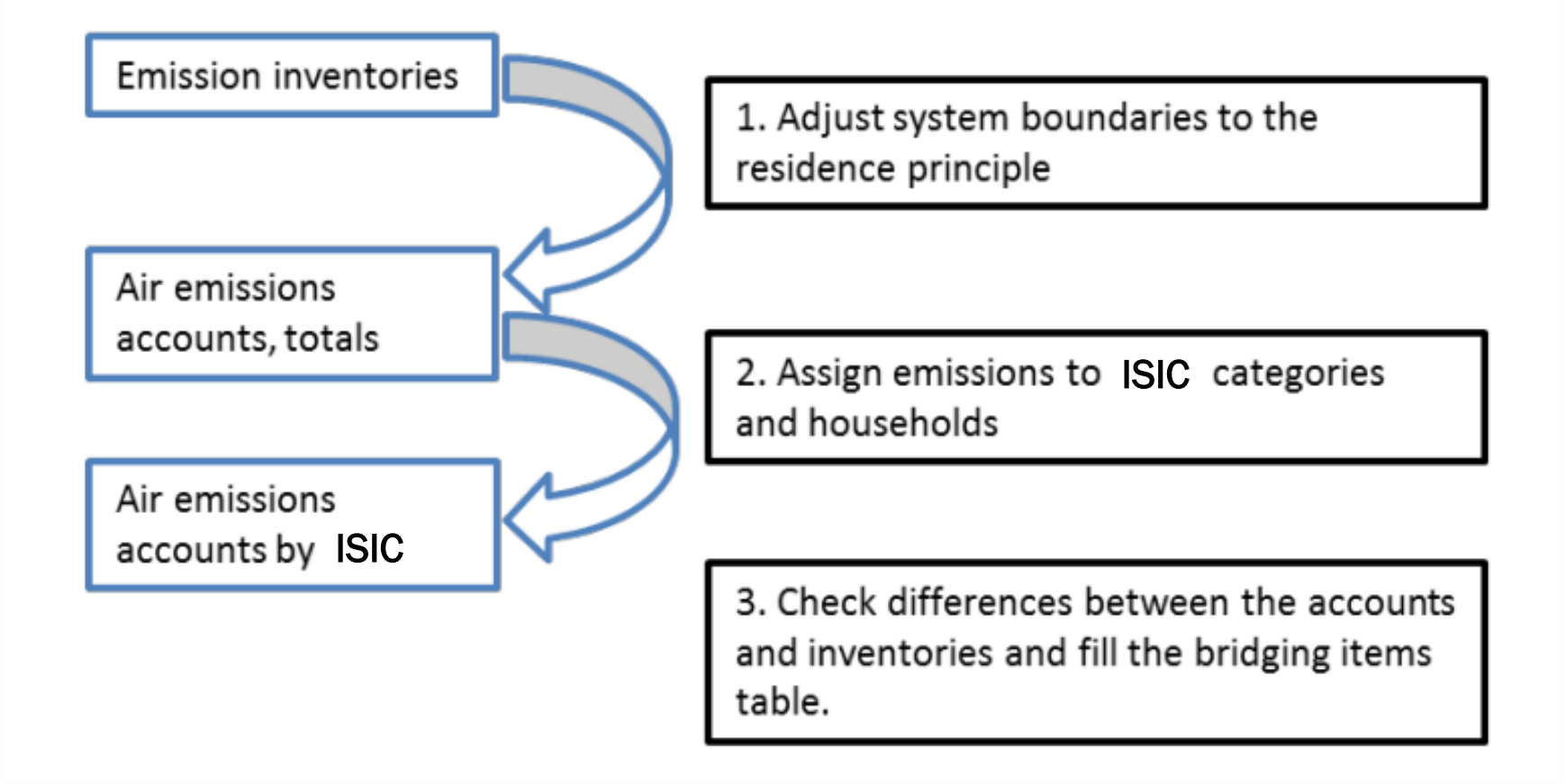
- Indonesia update report to UNFCCC: 2000 and 2019
- CO2: FOLU/LULUCF is biggest sector
- Note! Totals of AEA and inventories have slightly different scope (e.g. emissions from international air transport—memo item in inventories)

Table 1. Summary of National GHG emissions in 2000 and 2019 by gas (Gg CO_2e)

No	Sectors	Year	CO_2	CH_4	N_2O	CF_4	C_2F_6	CO	NOx	NMVOC	SOx	Total 3 Gases
1	Energy	2000	284,503	29,728	3,378			NE	NE	NE	NE	317,609
		2019	615,262	16,464	4,726			NE	NE	NE	NE	636,453
2	IPPU	2000	42,401	98	149	250	22	NO	NO	NO	NO	42,648
		2019	57,252	91	784	46	0	NO	NO	NO	NO	58,128
3	Agriculture	2000	4,710	39,940	39,888			2,737	74	NE	NE	84,537
		2019	7,343	46,407	51,552			2,436	66	NE	NE	105,301
4	FOLU	2000	529,815	1,505	1,040			NE	NE	NE	NE	532,360
		2019	910,280	8,527	6,045			NE	NE	NE	NE	924,853
5	Waste	2000	2,216	57,431	2,544			NE	NE	NE	NE	62,191
		2019	3,026	113,702	3,606			NE	NE	NE	NE	120,333
Total (CO_2-eq)		2000	863,645	128,702	46,998	250	22	2,724	70	0	0	1,039,345
		2019	1,593,163	185,191	66,713	46	0	1,500	41	0	0	1,845,067
Percentage (%)		2000	83.10	12.38	4.52	-	-	-	-	-	-	100.00
		2019	86.35	10.04	3.62	-	-	-	-	-	-	100.00

NE = Not Estimated; NO = Not Occurring

Main adjustments



Source: Eurostat AEA manual

Adjustments for residence principle

- Suggest to prioritize focus on big items first
- Issues requiring residence adjustment
  - International water transport
  - International air transport
  - International road transport
  - Fishing vessels
  - Tourism (non-residents on territory AND residents abroad)
  - Fueling tourism
  - Transportation in pipelines

Adjustments for residence principle

- Data sources to use?
  - Transport statistics
  - Balance of payments (e.g. fuel sales to non-residents and fuel purchases abroad by residents)
  - National accounts data for info on residents' consumption expenditures abroad and nonresidents consumption expenditures on the territory
  - Import/export data –e.g. exports may include fuels delivered to foreign aircrafts at domestic airports
  - Tourism statistics/tourism satellite accounts

Adjustments for residence principle

- OECD air transport CO2 emissions (available for all workshop countries – annual, quarterly, monthly)

Air Transport CO2 Emissions

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Country	Japan									
Pollutant	Carbon dioxide									
Measure	tonnes of CO2-equivalent									
Flight type	All flights									
Frequency	Annual									
Seasonality	Non seasonally adjusted									
Time	2014	2015	2016	2017	2018	2019	2020	2021	2022	
Source of emissions										
Estimated CO2 emissions from commercial passenger and freight flights	Domestic aviation (flights departing and arriving in the same country)	Resident airline	"(A) - Domestic flight in country A, operated by a resident airline of country A"	10 351 013	10 385 415	10 316 136	10 359 883	10 464 297	10 741 200	7 148 180	7 295 100	10 576 900
			"(B) - Domestic flight outside of country A, operated by a resident airline of country A"	65 652	63 815	62 467	90 808	111 292	134 745	163 228	226 324	178 311
		Non-resident airline	"(C) - Domestic flight in country A, operated by an airline that is non-resident in country A"	10 814	7 283	7 496	2 507	2 255	60 346	101 675	268 150	233 653
	International aviation (flights departing and arriving in different countries)	Resident airline	"(D) - International flight departing from country A, operated by a resident airline of country A"	5 597 151	6 111 827	6 611 858	6 929 727	7 240 381	7 113 110	3 709 200	4 382 620	4 694 330
			"(E) - International flight arriving in country A, operated by a resident airline of country A"	5 610 109	6 147 744	6 650 383	6 959 643	7 256 649	7 167 620	3 833 220	4 511 050	4 704 420
			"(F) - International flight outside of country A, operated by a resident airline of country A"	17 032	26 425	46 971	57 897	62 216	69 393	49 964	35 093	130 455
		Non-resident airline	"(G) - International flight departing from country A, operated by an airline that is non-resident in country A"	11 872 288	11 804 544	11 829 943	11 859 428	12 274 864	14 105 200	5 917 520	4 384 650	5 007 590
	Recording of estimated CO2 emissions in line with the SEEA (residence principle)	Air transport - Industry H51 (ISIC rev.4): (A)+(B)+(D)+(E)+(F)		21 640 958	22 735 226	23 687 816	24 397 958	25 134 835	25 226 100	14 903 800	16 450 200	20 284 400
		Bridging item - Residents abroad: (B)+(D)+(E)+(F)		11 289 945	12 349 811	13 371 680	14 038 075	14 670 538	14 484 900	7 755 610	9 155 090	9 707 510
		Bridging item - Non-residents on territory: (C)		10 814	7 283	7 496	2 507	2 255	60 346	101 675	268 150	233 653
	Recording of estimated CO2 emissions in line with UNFCCC inventories (territory principle)	Domestic aviation: (A)+(C)		10 361 827	10 392 698	10 323 632	10 362 390	10 466 552	10 801 500	7 249 850	7 563 250	10 810 600
		International aviation (memo item): (D)+(G)		17 469 440	17 916 370	18 441 801	18 789 155	19 515 245	21 240 500	9 660 200	8 849 850	9 893 450

Adjustments for ISIC

Correspondence between CRF-NFR and NACE rev.2

	CRF second committment period	NACE Rev.2, 2-digit level as in the AEA Questionnaire	
Code	Label	Code	Comment
1	**1. Total Energy**	-	see below
1.A	**A. Fuel combustion activities (sectoral approach)**	-	see below
1.A.1	**1. Energy industries**		see below
1.A.1.a	a. Public electricity and heat production	D	
1.A.1.b	b. Petroleum refining	C19	
1.A.1.c	c. Manufacture of solid fuels and other energy industries	B, C19, C24, D	
1.A.1.c.i	i. Manufacture of solid fuels	C19, C24	
1.A.1.c.ii	ii. Oil and gas extraction	B	
1.A.1.c.iii	iii. Other energy industries	D	
1.A.1.c.iv	iv. Other (please specify)	CS	Country specific allocation
1.A.2	**2. Manufacturing industries and construction**	-	see below
1.A.2.a	a. Iron and steel	C24, C25	split between C24 and C25 is country specific
1.A.2.b	b. Non-ferrous metals	C24, C25	split between C24 and C25 is country specific
1.A.2.c	c. Chemicals	C20, C21	
1.A.2.d	d. Pulp, paper and print	C17, C18	If no data available for split allocate all emissions to C17
1.A.2.e	e. Food processing, beverages and tobacco	C10-C12	
1.A.2.f	f. Non-metallic minerals	C23	
1.A.2.g	g. Other (*please specify*)	-	see below
1.A.2.g.i	i. Manufacturing of machinery	C28	
1.A.2.g.ii	ii. Manufacturing of transport equipment	C29, C30	
1.A.2.g.iii	iii. Mining (excluding fuels) and quarrying	B	
1.A.2.g.iv	iv. Wood and wood products	C16	
1.A.2.g.v	v. Construction	F	
1.A.2.g.vi	vi. Textile and leather	C13-C15	
1.A.2.g.vii	vii. Off-road vehicles and other machinery	CS	Country specific allocation
1.A.2.g.viii	viii. Other *(please specify)*	C22, C25, C26, C27, C31_32, C33	include data on small enterprises without information on type of industry

- Emissions reported by classification which delineates emissions by technical processes (CRF, common reporting format)
- Need to create a crosswalk between CRF and ISIC/national classification
- Some 1:1 correspondence, e.g. petroleum refining (1.A.1) → ISIC C19 'Manufacture of coke and refined petroleum products'
- Correspondence table provided by Eurostat can be used as reference

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Adjustments for ISIC – road transport

- Road transport is a special case!
- Auxiliary data sources will be especially helpful (road transport/traffic statistics, vehicle registers, etc)

1	Correspondence between CRF-NFR and NACE rev.2			
2	CRF second committment period	ISIC		
3	Label	Code	Comment	Row
33	b. Road transportation	H49, Household T, 01-99	Country specific allocation. May be very difficult.	30
34	i. Cars	H49, Household T, 01-99	Country specific allocation. May be very difficult.	31
35	ii. Light duty trucks	H49, Household T, 01-99	Country specific allocation. May be very difficult.	32
36	iii. Heavy duty trucks and buses	H49, Household T, 01-99	Country specific allocation. May be very difficult.	33
37	iv. Motorcycles	H49, Household T, 01-99	Country specific allocation. May be very difficult.	34
38	v. Other (please specify)	H49, Household T, 01-99	Country specific allocation. May be very difficult.	35
		H49, Household T, 01-99	Country specific allocation. May be	

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Challenges

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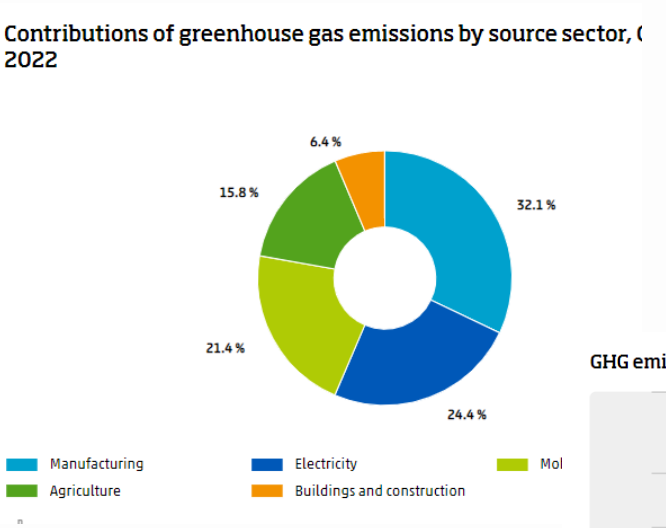
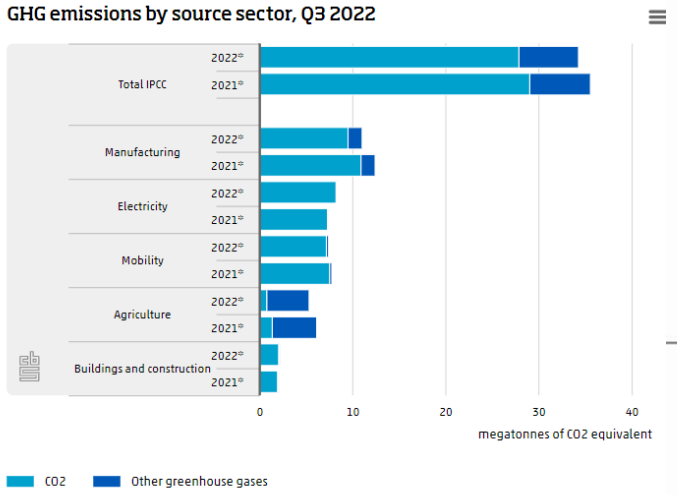
Challenges (and opportunities)

- Inventory first approach is a good approach for those who do not have physical energy flow accounts
- Mix of inventory and energy accounts is usually taken if countries have both
  - > Oftentimes there are differences between the energy account and emission inventory
  - > Compiling air emission accounts provides an opportunity to resolve or clarify these discrepancies
- LULUCF emissions are becoming more and more important and included in policy targets—opportunity for land/carbon accounts to improve these estimates and provide a time series
- Communicating the differences / complementariness between the accounts and inventories

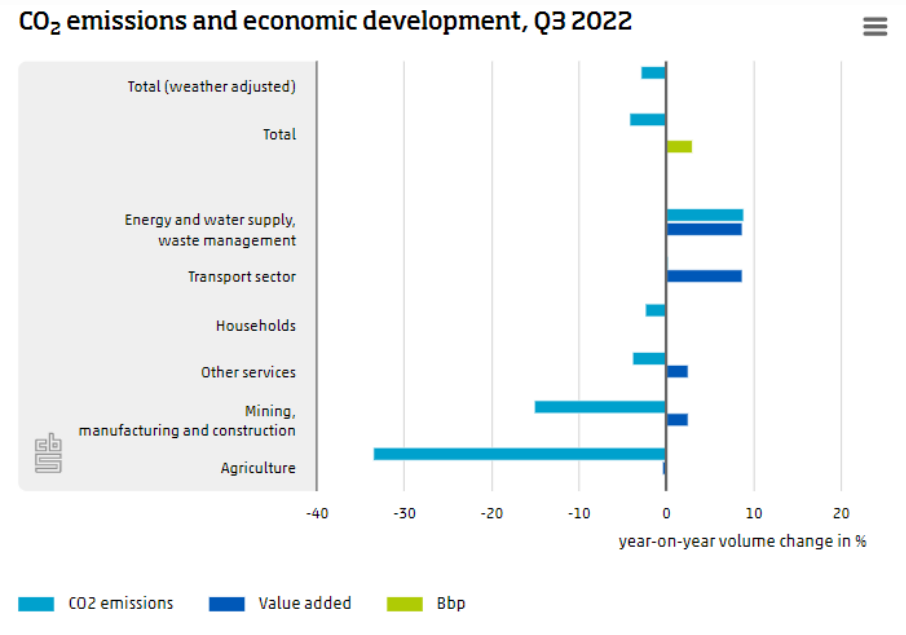
Challenges (and opportunities)

- Some countries disseminate information from inventories and accounts together, highlighting different aspects of air emissions
- E.g.: https://www.cbs.nl/en-gb/news/2022/50/greenhouse-gas-emissions-4-percent-lower-in-q3-2022





Statistics Netherlands also calculates CO_2 emissions from all domestic economic activities according to the national accounts. Compared to emissions according to the IPCC definitions, this also includes the CO_2 emissions from international air and sea transport and the emissions from combustion of biomass. In the message below, the CO_2 emissions are presented in accordance with the calculation method of the national accounts.



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