The 17th Workshop on GHG Inventories in Asia(WGIA17)

- Capacity building for measurement, reporting and verification -

Energy Volume Overview

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Content

1. Updated/new guidance in energy volume in 2019 refinement: overview
2. Updated/new guidance in oil and gas system (1B2)
3. Q/A

1. Updated/new guidance in energy volume in 2019 refinement: overview

- Mandate from IPCC-44: focusing on Fugitive emission (1.B):

Coal system (1B1)	Oil and gas system (1B2)	Fuel transformation (NEW)
1. Include guidance on emissions from exploration and CO_2 emissions	include update/inclusion of EFs representative for current practice. Additional guidance for **unconventional oil and gas production** and abandoned well	Include new section on fuel transformation
2. Include new section on abandoned surface coal mines		

What presents in 2019 refinements

Sub-category	mandate	Delivery
Coal system (1B1)	1 . Include guidance on emissions from exploration and CO_2 emissions	1.1 CO_2 emission from coal mining: well developed 1.2 Coal exploration: general guidance in main text and more information in Appendix as the base for future methodology development;
	2. Include new section on abandoned surface coal mines	2.1 Abandoned surface coal mines: : include in Appendix as the base for future methodology development; 2.2 Abandoned underground mines: adds year-specific default input values for 2017-2050.
Oil and gas system (1B2)	include update/inclusion of EFs representative for current practice. Additional guidance for **unconventional oil and gas production** and abandoned well	Well developed.
Fuel transformation	Include new section on fuel transformation	1. Solid to solid: charcoal and bio-char production, coke production, developed; 2. Gasification: coal to liquids, gas to liquids, developed 3. Wood pellet production, biomass to liquid, biomass to gas: include in Appendix as the base for future methodology development

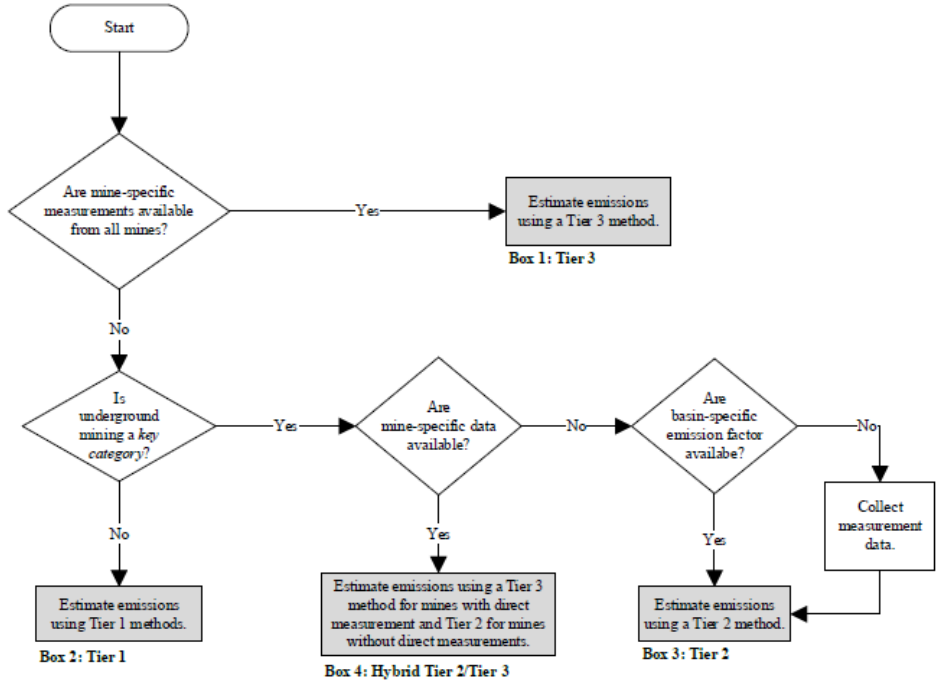
Coal system: CO_2 emission from coal mining

- Method: underground mining

EQUATION 4.1.3A (NEW)
TIER 1: GLOBAL AVERAGE METHOD – UNDERGROUND MINING – CARBON DIOXIDE
CO_2 emissions = CO_2 Emission Factor • Underground Coal Production • Conversion Factor

EF	value	uncertainty
Lower emission factor	0.05 m^3/ tonne	-50% to +100%
Average Emission Factor	5.9 m^3 /tonne-	-50% to +100%
High emission factor	12. 4m^3/ tonne	-50% to +100%

Figure 4.1.1a (New) Decision tree for carbon dioxide from underground coal mines



- Emission factors are generated by literature review on peer-reviewed papers (including China, India, South Africa), working papers and NIRs of Australia, japan, Czech Republic, Slovakia, Slovenia, Russia, Ukraine……

Why coal exploration moved to appendix

- Activity data that more directly relate to emissions from coal exploration are often unavailable: number of borehole;
- The statistic on “additional resource of coal added to the previous year’s resource” (augmentation of coal resources) is available in common, however, it’s relationship with fugitive emission is hard to identify;
- Tier 1 EF is not able to develop.
- If it is a KC, national methodology should be developed.

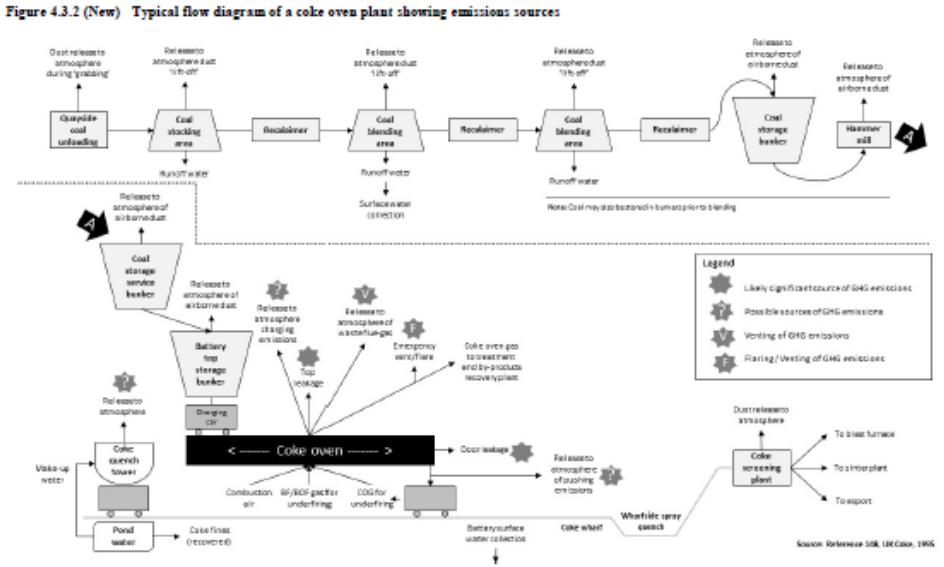
Fuel transformation: CH_4 emission from coking production

1. Leakage from coking production

EQUATION 4.3.2 (NEW)
FUGITIVE GHG EMISSION FROM COKE PRODUCTION

$$Emissions_{GHG} = Activity_{coke\ production} \bullet Emission\ Factor_{GHG}$$

Gas	Default EF	Uncertainty
CH_4	0.049 kg/tonne coke produced	-90% to +900%



2. emission from COG flaring

EQUATION 4.3.3 (NEW)
FUGITIVE CO_2 EMISSIONS FROM THE FLARING OF COKE OVEN GAS

$$Emissions_{CO2} = (Activity_{coke\ oven\ gas\ produced} \bullet R_{COG\ flared} \bullet CC_{coke\ oven\ gas}) \bullet 44/12$$

EQUATION 4.3.4 (NEW)
FUGITIVE CH_4 AND N_2O EMISSION FROM THE FLARING OF COKE OVEN GAS

$$Emissions_{CH4,\ N2O} = Activity_{coke\ oven\ gas\ produced} \bullet R_{COG\ flared} \bullet Emission\ Factor_{CH4,\ N2O}$$

Default value for COG flaring

Gas	ROG	EF(kg/GJ COG flared)	Uncertainty
CO_2	0.02	44.37	±75%
CH_4		0.18	±75%
N_2O		4.9E-04	±75%

2. Updates/new guidance in oil and gas system: General

- One set of data other than two sets

2006 GLs

Table 4.2.4: tier 1 EFs for developed countries

Table 4.2.5: tier 1 EFs for developed countries + EIT

2019 Refinements

Tier 1 EFs by segments and by technology
(segments: oil exploration, oil production…….)
(technology: conventional/unconventional, onshore/offshore, with/without recovery, LDAR)

- One set of aggregated data with disaggregated data in annex

2006 GLs

Conventional oil production	Leakage
	Venting
	flaring

2019 Refinements

	Main text	Annex 4A.2
Conventional oil production	All	7%
		83%
		10%

2. Updates/new guidance in oil and gas system: General

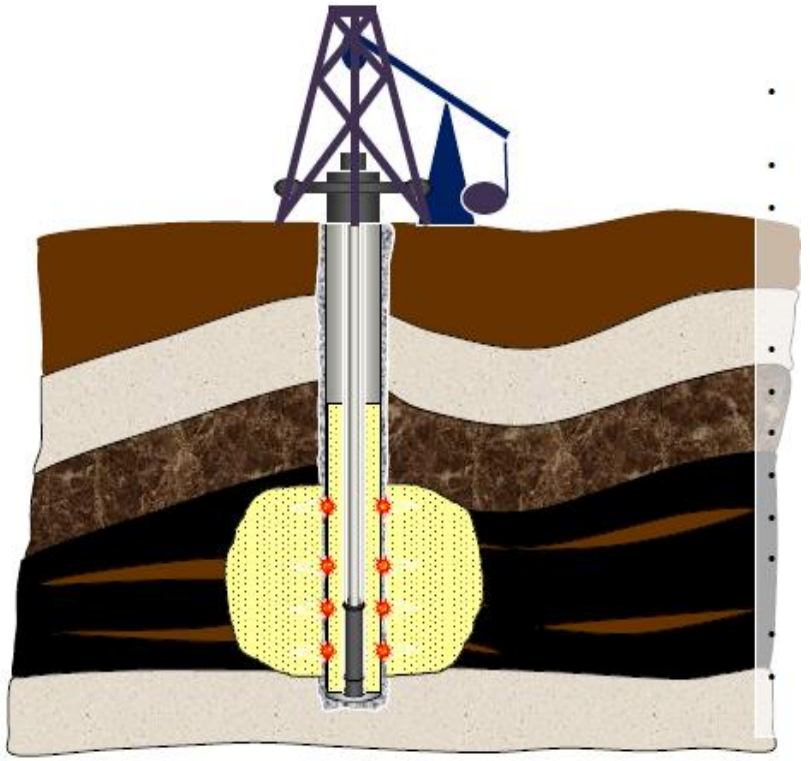
- Alternative emission factors provided for one segment

Segment	technology	Emission source	CH_4 EF	Unit of measure
Gas transmission	With limited LDAR	all	3.36	Tonnes/ million cubic meter gas consumption
			4.10	Tonnes/kilometer pipeline
	With extensive LDAR	all	1.29	Tonnes/ million cubic meter gas consumption
			2.08	Tonnes/kilometer pipeline

- Data source: US, Canada, Germany, Norway, Australia

New guidance in oil and gas system

1. Unconventional oil/gas exploration
   - with hydraulic fracturing well completion practices
   - Tier 1 emission factors are provide by unit of measure (well number or oil/gas production, and by technology (with or without recovery/flaring)
2. Abandoned oil/gas well;
3. Coal bed methane production;
4. LNG: export/import/storage;
5. Town gas distribution;
6. Post-meter emission: includes fugitive emissions beyond gas meters and from natural gas-fueled vehicles;



Disagreement on IPCC-49

1. The “unbalanced treatment” to coal exploration and oil/gas exploration
   - Coal exploration locates in appendix, whereas Oil/gas exploration in main text
   - Move oil/gas exploration to appendix
2. Final solution:
   - 2019 refinement was adopted and accepted by using procedure 10(b);
   - A new paragraph for coal exploration is added In the main text for general guidance.
   - Two footnotes added in oil and gas exploration section, respectively.

Tips for using energy volume in 2019 refinements

- Accuracy and completeness are improved;
- Requiring more information than 2006 GLs:
  - What technology used in the system;
  - Different unit of measurement;
- Capacity building may be required.
- It is always good to develop CS parameters.

Thanks!

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