United Nations Statistics Division

CO_2 Emissions from Fuel Combustion: Important guidance from IRES

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SEMINAR ON

Mainstreaming Energy Sustainable Development Goals (SDGs), Targets and Indicators into Statistical Programmes in Select African Countries

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The Concept of Production

- 5.10: *Primary production is the capture or extraction of fuels or energy… within the national territory in a form suitable for use. Inert matter removed from the extracted fuels and quantities reinjected, flared or vented are not included.*

- Data for oil and gas production should be NET of reinjected, flared and vented quantities
- (These quantities are otherwise important for emissions inventories, just not included here)

Scope of Emissions Statistics

- IRES 2.18: data on the production of energy outside energy industries is collected and included in total energy production.
- Result: industrial waste burnt for energy, oil products refined and distributed informally etc should all be included in energy data (and thus in emissions from fuel combustion)
- Emissions data should be on the territory (not residence) principle, just like energy statistics. Important difference for many countries

Importance of energy vs non-energy

- Non-energy use of fuels means that there are no emissions from combustion of these fuels (b/c there is no combustion).
- For most fuels (diesel, fuel oil), industrial deliveries normally a good proxy for consumption (combustion) in an energy balance.
- However: for many other products (naphtha, natural gas, petroleum coke) the energy/non-energy split shouldn't be assumed: further demand-side information is required
- **How to estimate this?**
  - Gas delivered to iron&steel industry likely combusted, but gas delivered to chemical and petrochemical industry could be both
  - Many products can be assumed to be most/all energy use (eg. gasoline) or non-energy use (e.g. lubricants) if further information is not available.

Example: Senegal

Naphtha

Naphtha (NP); Metric tons, thousand (WSR)		1999	2000	2001	2002	2003	2004
NP01	Production	0	17	46	37	0	3
NP013	From refineries	0	17	46	37	0	3
NPGA	Total energy supply	0	17	46	37	0	3
NPSD	Statistical differences	0	0	0	0	0	0
NP08	Transformation	0	17	46	37	0	3
NP088	**Transformation in electricity plants**	**0**	**17**	**46**	**37**	**0**	**3**

- Despite over 95% of naphtha being consumed for non-energy purposes globally, all of Senegal's use is shown in the UN DB as transformation in electricity plants from 2000 to 2004 (which will affect emission calculations).
- Why?
  - Product misclassification?
  - Use/Consumption misclassification?
  - True?

Importance of Domestic /International

- Quantities of fuel used by ships and planes making international voyages are excluded from a country's energy supply under IRES methodology. This then agrees with IPCC emissions inventories
- **How to estimate this**?
  - For flights for **most** countries, the **majority** of jet kerosene will be used for international aviation (exceptions: large countries like the USA, Indonesia, Brazil…)
  - The split can be estimated by looking at deliveries to different companies or airports, or from airlines' own route information. (Note Russia estimates a 50/50 split…)
  - For shipping, analysis of port of call information (i.e. administrative data) can be used to make similar estimates

Blended biofuels

- Only the fossil component of blended gasoline or diesel should be included in the emissions from fuel combustion
- So either report these products separately as fossil and non-fossil (IEA), or provide memo items on the proportion of the total product that is of bio origin (UNSD)

- Obs: Customs data based on HS not very helpful to determine the bio component, since biodiesel as defined in HS can contain up to 70% of fossil diesel

Follow International Classifications!

- Aligning product definitions with SIEC/IRES means no adjustments necessary to calculate emissions based on IPCC guidelines
  - Why? The product definitions in SIEC agree with IPCC products completely!
- Energy Balances calculated according to IRES principles can also be plugged straight into emission calculations
  - Why? Adjustments for bunkers and non-energy use are built into IRES-compliant energy balances, and are in the right unit; energy stats already follow the territory principle

IPCC methodology
CO_2 Emissions

Sector	Energy				
Category	Fuel combustion activities				
Category Code	1A [(a)]				
Sheet	1 of 4 (CO_2, CH_4 and N_2O from fuel combustion by source categories – Tier 1)				
	Energy consumption			CO_2	
	A Consumption (Mass, Volume or Energy unit)	B Conversion Factor[(b)] (TJ/unit)	C Consumption (TJ)	D CO_2 Emission Factor (kg CO_2/TJ)	E CO_2 Emissions (Gg CO_2)
			C=A*B		E=C*D/10^6
Liquid fuels					
Crude Oil					
Orimulsion					
Natural Gas Liquids					
Motor Gasoline	10 kt (or Gg)	44.3 TJ/kt	443	73300	32.47
Aviation Gasoline					
Jet Gasoline					
Jet Kerosene					
Other Kerosene					

From basic energy stats

From energy balances
(more straightforward to calculate emissions)

Importance of specific NCVs

2014	Coal (kt)	Default NCV	Specific NCVs	Coal (TJ) default NCV	Coal (TJ) specific NCV	Default emission factor for coal (t CO2/TJ)	CO2 (tons) default NCV	CO2 (tons) specific NCV
Primary production	131.8	25.8	20.10	3400	2649			
Imports	29.0	25.8	23.20	748	673			
Exports	-12.4	25.8	28.20	-319	-349			
Stock changes	-0.5	25.8	20.10	-14	-11			
Total energy supply	147.9			**3,815**	**2,962**	94.6	**360,899**	**280,193**

- 29% higher CO_2 emission estimates by using default NCVs

Thank you.

http://unstats.un.org/unsd/energy