Climate MRV for Africa – Phase 2
Development of National GHG Inventory
IPPU Inventory Overview

Lead partner

Project of the European Commission DG Clima Action

EuropeAid/136245/DH/SER/MULTI

Amr Osama Abdel-Aziz, Assen Gasharov, Mike Bess and Laura Lahti
Team Leader and Key Experts
January 2017

IPPU Overview

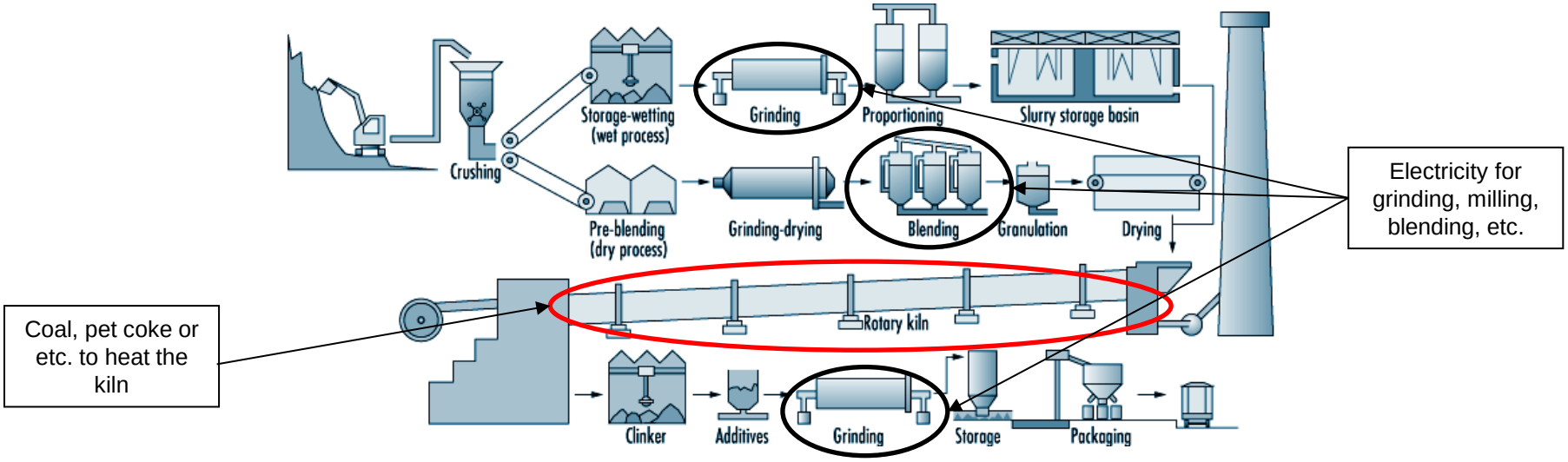
IPPU Sector

- Industrial Processes and Product Use
  - IPCC 2006 Guidelines Sector 2
  - **Industrial Processes**: Processes that chemically or physically transform materials, releasing greenhouse gases
  - **Product Use**: Use of greenhouse gases in products, such as refrigerators, electrical equipment, foams, aerosol cans

- *In the 1996 IPCC Guidelines, these were separated into two sectors (Sectors 2 and 3), but there are benefits to linking the emissions from production of GHGs and their use in products*

What the IPPU Sector is *not*

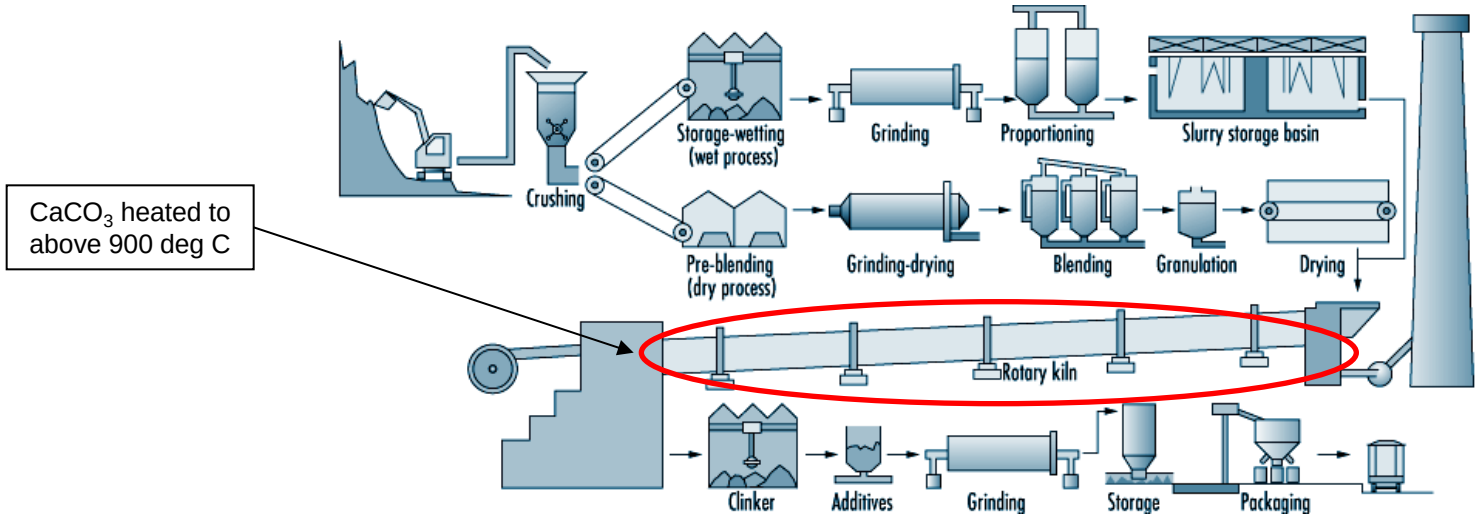
- Energy use of fossil fuels in industrial processes is ***not*** included in IPPU emissions
  - For example, emissions from fossil fuels used for heat or electricity generation at an industrial plant are included in ***Energy*** (Sector 1)



Source: Encyclopaedia of Occupational Health and Safety Ed. 3, Articles “Cement” by L. Prodan

IPPU Sector Encompasses *Process* Emissions

- CO_2, N_2O and other GHG emissions resulting directly from the transformation of materials through industrial processes
  - For example, CO_2 emissions from the thermal decomposition of limestone during cement production



Source: Encyclopaedia of Occupational Health and Safety Ed. 3, Articles "Cement" by L. Prodan

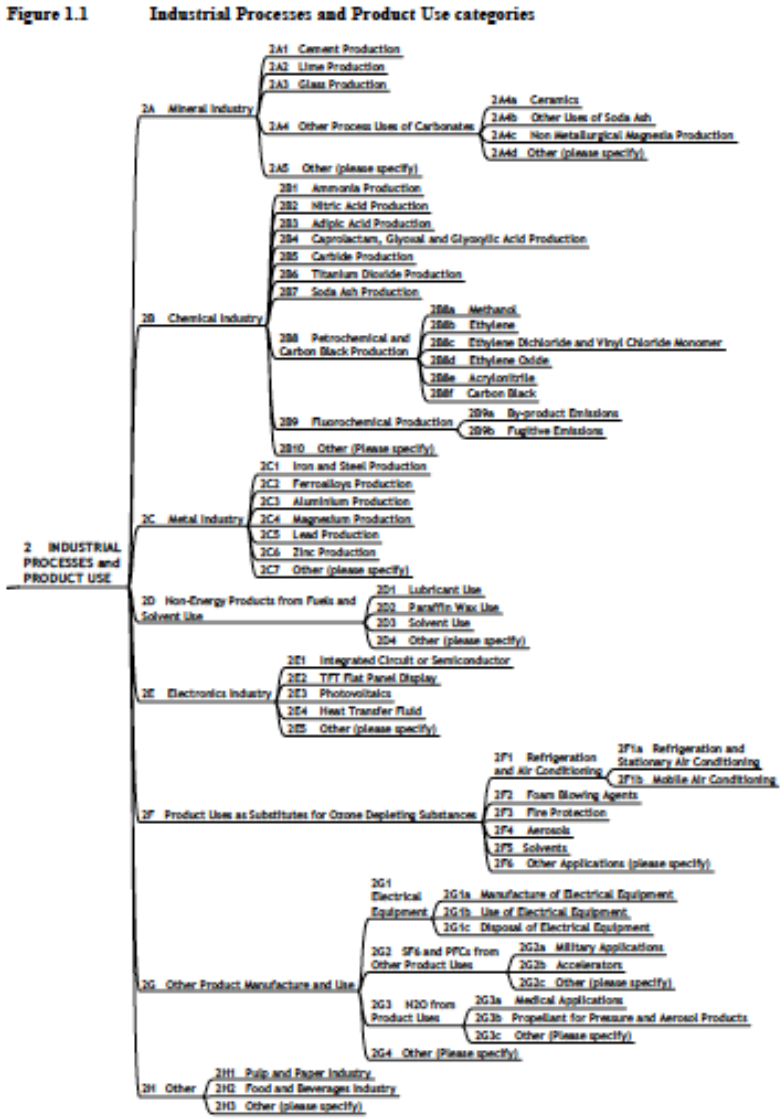
$CaCO_3$ + (*heat*) → CaO + CO_2

Fossil Fuels in IPPU: Non-Energy Uses

- **Feedstock**: Raw material in a chemical conversion process
  - Example: CH_4 used in ammonia production
- **Reductant**: Reducing agent in the production of metals or inorganic processes
  - Example: Coke used in a blast furnace for pig iron production
- **Non-energy Product**: Fossil fuels used directly for their physical or diluent properties
  - Example: Asphalt / Bitumen used in road paving

IPPU Categories

- 2A: Mineral Industry
- 2B: Chemical Industry
- 2C: Metal Industry
- 2D: Non-Energy Products from Fuels and Solvent Use
- 2E: Electronics Industry
- 2F: Product Uses as Substitutes for Ozone Depleting Substances
- 2G: Other Product Manufacture and Use
- 2H: Other



Source: IPCC 2006, Vol. 3 Ch. 1, Figure 1.1

2A Mineral Industry GHGs

2 Industrial Processes and Product Use (Note 1, 2)	CO_2	CH_4	N_2O	HFCs	PFCs	SF_6	Other halo-genated Gases (Note3)
2A Mineral Industry							
2A1: Cement Production	X	*					
2A2: Lime Production	X	*					
2A3: Glass Production	X	*					
2A4: Other Process Uses of Carbonates							
2A4a: Ceramics	X	*					
2A4b: Other Uses of Soda Ash	X	*					
2A4c: Non Metallurgical Magnesia Production	X	*					
2A4d: Other	X	*					
2A5: Other	X	*	*				

- Cement production emissions in Egypt: 16,716,754 tonnes CO_2e in 2005

= most important sources of GHG emissions in the industrial processes sector in Egypt according to the Third National Communication.

2B Chemical Industry GHGs

2 Industrial Processes and Product Use (Note 1, 2)	CO_2	CH_4	N_2O	HFCs	PFCs	SF_6	Other halo-genated Gases (Note3)
2B Chemical Industry							
2B1: Ammonia Production	X	*	*				
2B2: Nitric Acid Production	*	*	X				
2B3: Adipic Acid Production	*	*	X				
2B4: Caprolactam, Glyoxal and Glyoxylic Acid Production	*	*	X				
2B5: Carbide Production	X	X	*				
2B6: Titanium Dioxide Production	X	*	*				
2B7: Soda Ash Production	X	*	*				
2B8: Petrochemical and Carbon Black Production							
2B8a: Methanol	X	X	*				
2B8b: Ethylene	X	X	*				
2B8c: Ethylene Dichloride and Vinyl Chloride Monomer	X	X	*				
2B8d: Ethylene Oxide	X	X	*				
2B8e: Acrylonitrile	X	X	*				
2B8f: Carbon Black	X	X	*				
2B9: Fluorochemical Production (Note 4)							
2B9a: By-product Emissions (Note 5)				X	X	X	X
2B9b: Fugitive Emissions (Note 5)				X	X	X	X
2B10: Other	*	*	*	*	*	*	*

- Ammonia production emissions in Egypt: 1,924,848 tonnes CO_2e in 2005
- Nitric Acid production emissions in Egypt: 5,042,460 tonnes CO_2e in 2005

2C Metal Industry GHGs

2 Industrial Processes and Product Use (Note 1, 2)	CO_2	CH_4	N_2O	HFCs	PFCs	SF_6	Other halo-genated Gases (Note3)
2C Metal Industry							
2C1: Iron and Steel Production	X	X	*				
2C2: Ferroalloys Production	X	X	*				
2C3: Aluminium Production	X	*			X		
2C4: Magnesium Production (Note 6)	X			X	X	X	X
2C5: Lead Production	X						
2C6: Zinc Production	X						
2C7: Other	*	*	*	*	*	*	*

- Iron and Steel production emissions in Egypt: 1,576,175 tonnes CO_2e in 2005
- Aluminium production emissions in Egypt: 1,080,500 tonnes CO_2e in 2005

2D Non-Energy Products & 2E Electronics GHGs

2 Industrial Processes and Product Use (Note 1, 2)	CO_2	CH_4	N_2O	HFCs	PFCs	SF_6	Other halo-genated Gases (Note3)
2D Non-Energy Products from Fuels and Solvent Use (Note 7)							
2D1: Lubricant Use	X						
2D2: Paraffin Wax Use	X	*	*				
2D3: Solvent Use (Note 8)							
2D4: Other (Note 9)	*	*	*				
2E Electronics Industry							
2E1: Integrated Circuit or Semiconductor (Note 10)	*		*	X	X	X	X
2E2: TFT Flat Panel Display (Note 10)				X	X	X	X
2E3: Photovoltaics (Note 10)				X	X	X	X
2E4: Heat Transfer Fluid (Note 11)							X
2E5: Other	*	*	*	*	*	*	*

2F ODS Substitute GHGs

2 Industrial Processes and Product Use (Note 1, 2)	CO_2	CH_4	N_2O	HFCs	PFCs	SF_6	Other halo-genated Gases (Note3)
2F Product Uses as Substitutes for Ozone Depleting Substances							
2F1: Refrigeration and Air Conditioning							
2F1a: Refrigeration and Stationary Air Conditioning	*			X	X		*
2F1b: Mobile Air Conditioning	*			X	X		*
2F2: Foam Blowing Agents	*			X	*		*
2F3: Fire Protection	*			X	X		*
2F4: Aerosols				X	X		*
2F5: Solvents (Note 12)				X	X		*
2F6: Other Applications	*	*	*	X	X		*

2G Other Product Use & 2H Other GHGs

2 Industrial Processes and Product Use (Note 1, 2)	CO_2	CH_4	N_2O	HFCs	PFCs	SF_6	Other halo-genated Gases (Note3)
2G Other Product Manufacture and Use							
2G1: Electrical Equipment							
2G1a: Manufacture of Electrical Equipment (Note 13)					X	X	*
2G1b: Use of Electrical Equipment (Note 13)					X	X	*
2G1c: Disposal of Electrical Equipment (Note 13)					X	X	*
2G2: SF_6 and PFCs from Other Product Uses							
2G2a: Military Applications					*	X	*
2G2b: Accelerators (Note 14)					*	X	*
2G2c: Other					X	X	*
2G3: N_2O from Product Uses							
2G3a: Medical Applications			X				
2G3b: Propellant for Pressure and Aerosol Products			X				
2G3c: Other			X				
2G4: Other	*	*		*			*
2H Other							
2H1: Pulp and Paper Industry (Note 15)	*	*					
2H2: Food and Beverages Industry (Note 15)	*	*					
2H3: Other	*	*	*				

IPPU-specific QC

- Specific **Quality Control (QC)** methods for industrial process and product use emissions are recommended by the IPCC
- **QC of Completeness**
  - ***CO_2 Completeness Check***: Uses *energy balance data* to check that all significant emissions of CO_2 from the non-energy uses of fossil fuels are reported somewhere in the inventory, without double counting.
  - ***Feedstock Balance Check***: Uses *feedstock supply data* and *production data on feedstock required* to check for omissions or mis-allocations of feedstock fuels and their related emissions

IPPU-specific QC

QC of Allocation

- Review, summarize and document where and how non-energy use of fuels has been accounted for in the inventory- in the Energy Sector or in the Industrial Processes and Product Use Sector.

Considerations for IPPU

- **Diversity** of sources and gases
  - Determination of Key Categories is important, to know where to focus efforts
- **Activity data** is often site- or equipment-specific
  - Key Categories!
  - Relationships with individual companies or sector associations
  - Management of confidential data
- **GHG abatement opportunities**
  - Concentrated efforts can have a big impact (e.g. nitrous oxide catalyst in HNO_3 plant, refrigerator recycling program)

Thank you!

Amr Osama Abdel-Aziz, Assen Gasharov, Mike Bess and Laura Lahti