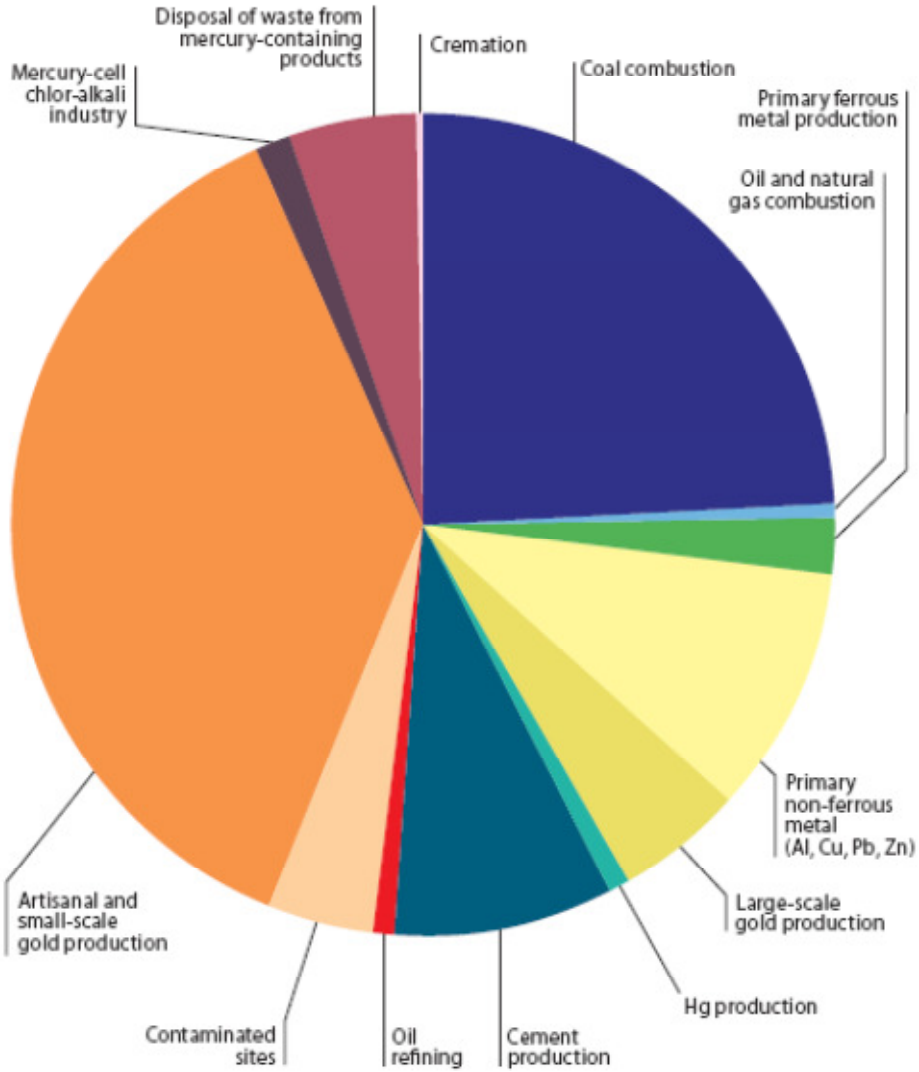

UNEP Global Mercury Partnership
Cement Industry Partnership
Geneva Meeting
June 18, 2013

Objective of the Cement Industry Partnership

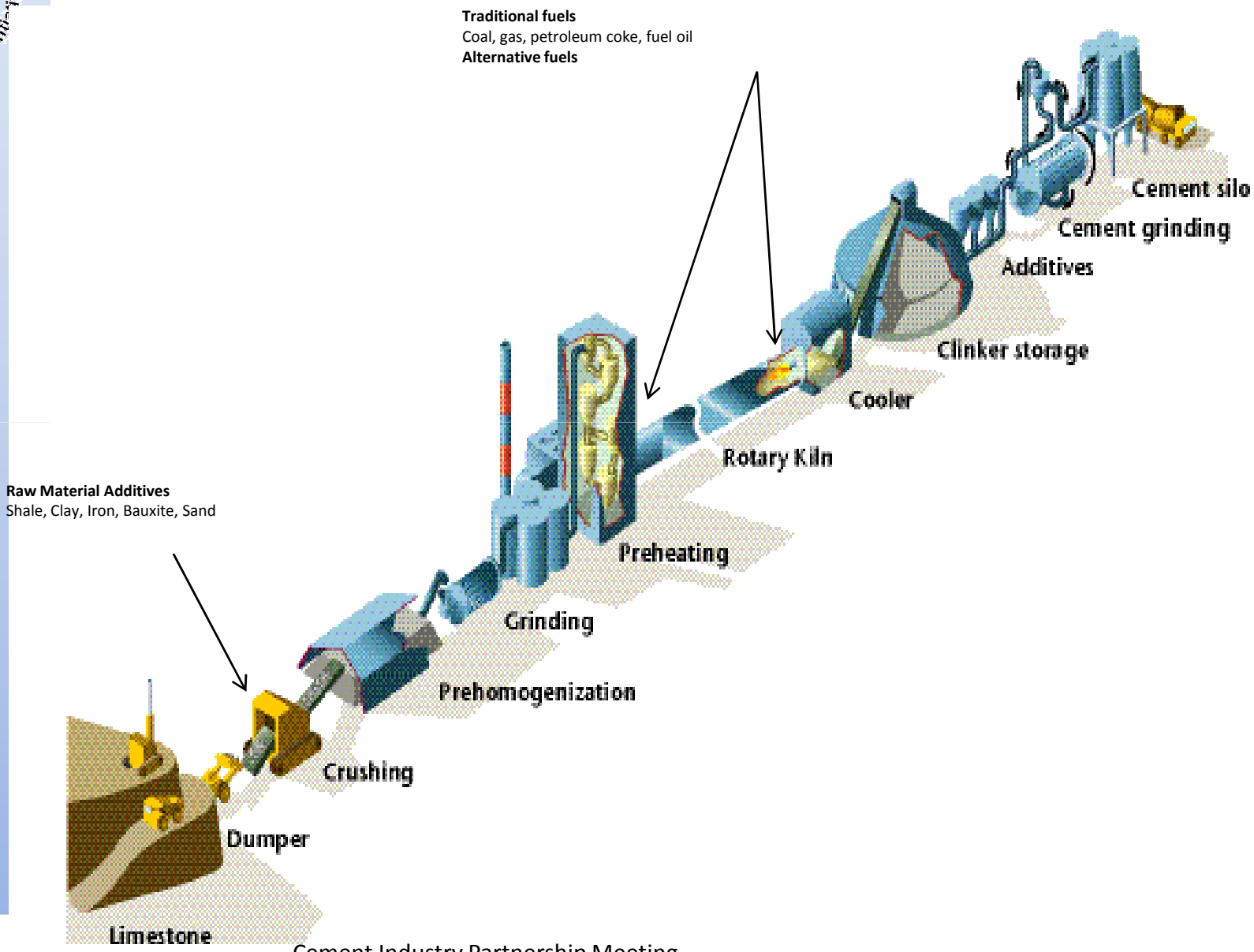
The objective of this partnership area is to minimize mercury releases to the environment from cement manufacture in ways that ensure reductions are globally significant.

The partnership area aims to support such efforts while providing additional information on cost-effective approaches for enhancing reductions of mercury emissions.

UNEP 2013 Global mercury assessment attributes 9% of emissions to Cement sector

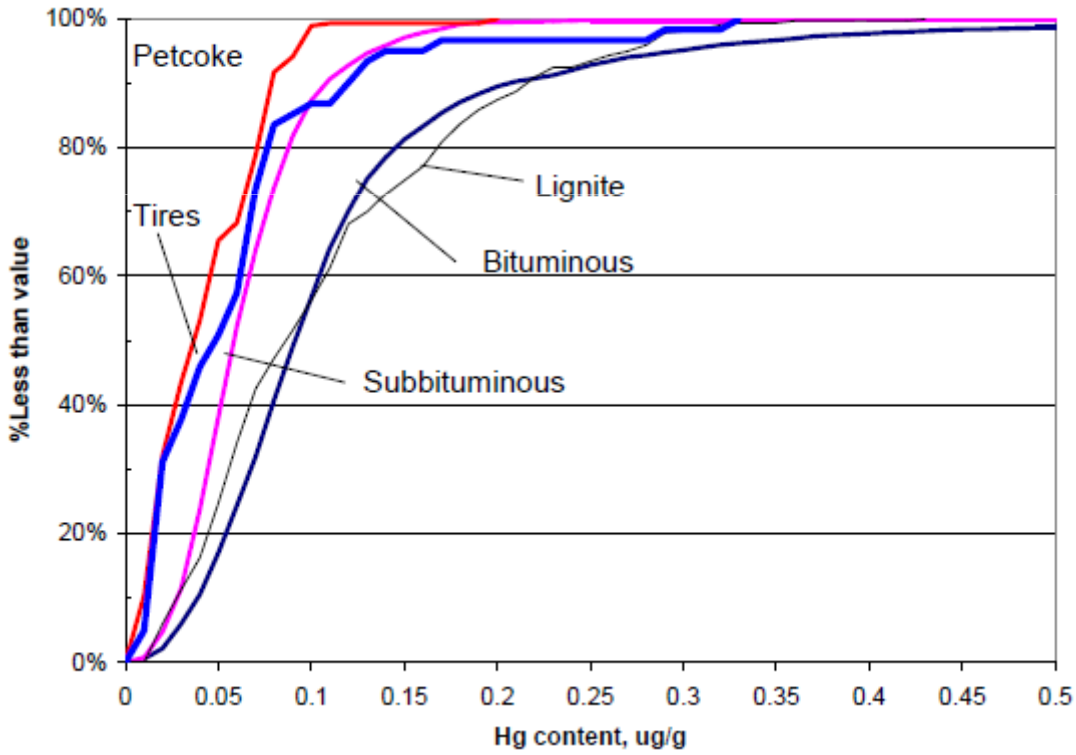


Mercury in the Cement Process



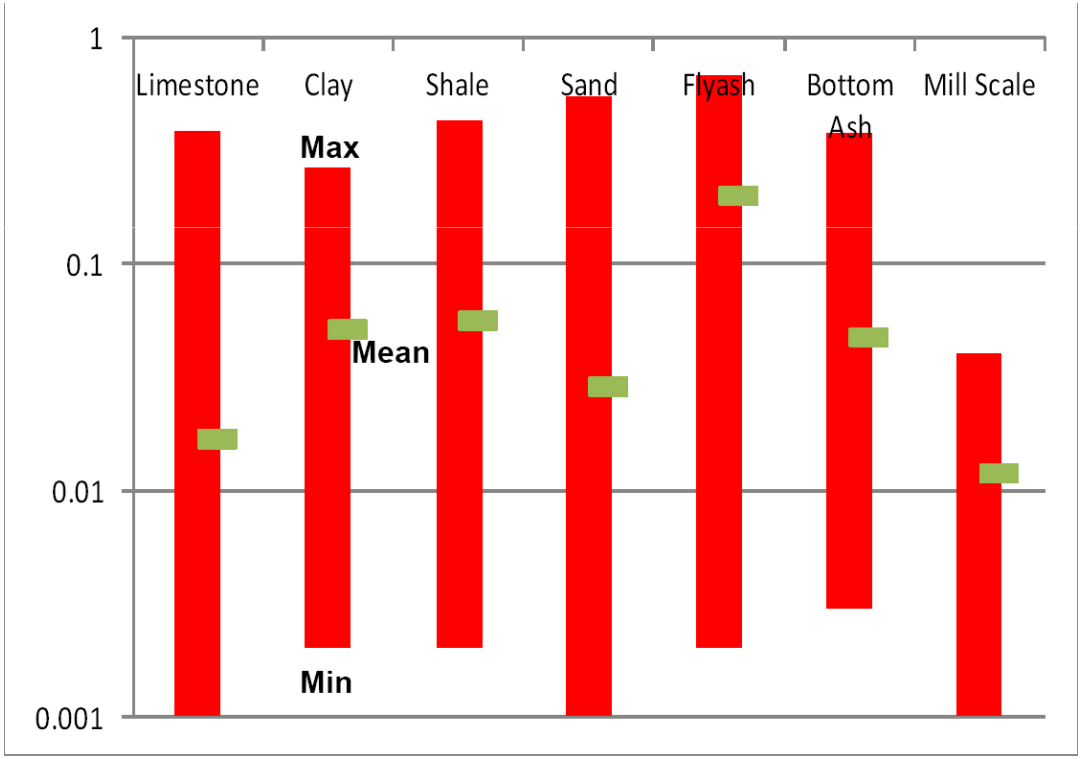
Mercury Content of Fuels

Mercury content	mg/kg (ppm)
Coal	0.1 – 13
Lignite	0.03 – 0.11
Petcoke	0.01 – 0.71
Heavy oil	0.006
Liquid-waste derived fuel	<0.06 – 0.22
Solid-waste derived fuel	< 0.07 – 2.77
Sewage sludge	0.31 – 1.45
Tyre-derived fuel	0.01 – 0.4



Mercury Content of Raw Materials

Raw material	Mercury content in mg/kg
Limestone, lime marl, chalk	< 0.005 – 0.40
Clay	0.002 – 0.45
Sand	< 0.005 – 0.55
Fly ash	< 0.002 – 0.8
Iron ore	0.001 – 0.68
Blast furnace slag	< 0.005 – 0.2
Shale	0.002 – 3.25
Earth crust[7] (avg.)	0.05 - 0.08



Raw Material & Fuel Influence on Mercury Emissions

20 ppb of mercury in mix → 0.031 g/t-clinker

75 ppb of mercury in fuel → 0.010 g/t-clinker

Average mercury emissions → 0.041 g/t-clinker

UNEP Global mercury inventory → 0.058 g/t-cement

University of Liège study (Europe) → 0.035 g/t-cement

Major cement company reporting → 0.032 g/t-clinker

European Regulation:

maximum 0.050 mg/Nm^3 (~0.11 to 0.13 g/t-clinker)

Cement Partnership Business Plan Priority Areas

- Establish sectoral mercury inventories and baselines
  - Improve mercury monitoring techniques
  - Improve sectoral mercury emission inventories
  - Develop methodology for determining plant/process specific mercury emission factors
  - Establish database of global mercury emissions with focus on developing countries which do not have such systems
- Identify and encourage techniques to minimize mercury releases to the environment
  - Review of mercury abatement technologies for cement
  - Gain a better understanding of effectiveness of various abatement strategies for specific plant configurations
  - Develop guide for plants to determine appropriate control strategies for mercury – could be a basis for future BEP / BAT

Cement Partnership Business Plan Priority Areas (2)

- Increase outreach to raise awareness of issue w/in industry
  - Develop outreach materials to disseminate information about mercury releases from the sector
  - Capacity building to promote an understanding of management and control techniques for mercury emissions
  - Support the development of policies and regulatory frameworks supporting the objective of the partnership area.
  - Facilitate exchange of information on emerging technologies for existing and new facilities.

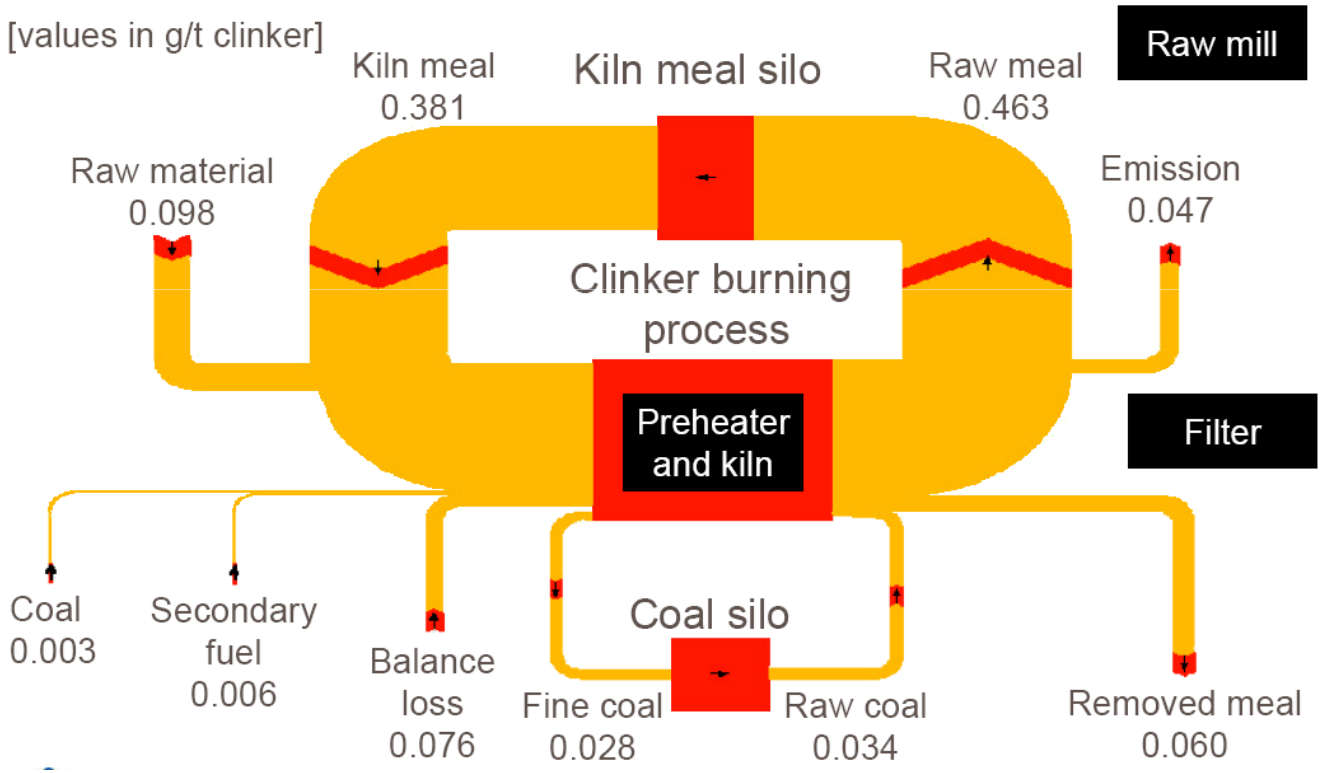
Establish sectoral mercury inventories and baselines

- Various sources indicate a range of possible emissions
  - UNEP 2013 Global mercury assessment attributes 0.058 g/t-cement - 173 tons or approximately (9% of anthropogenic emissions)
  - The 2010 University of Liège study commissioned by CSI/Cembureau found 0.035 g/t-cement (40% less than UNEP)
- Industry data of measurements outside of Europe and North America has not been extensively analyzed.

Issues that the Cement Industry Partnership could address related to Mercury Inventories

- Measurement of mercury in stacks can be difficult and beyond the present capability of many testing companies. Development of a testing quality protocol could facilitate accurate measurements.
- Cement plants typically are only able to do spot measurements for mercury emissions. CSI has developed guidelines in its document "Guidelines for Emissions Monitoring and Reporting in the Cement Industry" to estimate total emissions from spot testing. Is there a need for the Partnership to develop this further?
- System mercury balances may offer a better estimate of emissions than spot measurements
  - Variability of mercury levels in fuels and materials will influence the results
  - Representativeness of sample

Mercury Balance in a Cement System



Mercury cycle under meal removal (ECRA, 2008).

Identify and encourage techniques to minimize mercury releases

- Promote methodology for reducing emissions through raw material and fuel control
- Effectiveness of dust shuttling varies
  - for different process configurations
  - depending on percent oxidized Hg in kiln gas
  - opportunity to compile more extensive information to allow plants to better estimate benefit from dust shuttling or methodologies to improve its efficiency
- Cost effective absorption technology for various process configurations
  - Adsorption technologies used in other industries (power) often are not directly applicable as all material is often recycled.
  - Wet scrubbers not generally used in cement industry as SO2 is typically low. Would only be effective on soluble oxidized mercury.
- Further development of mercury CEMs, especially for developing countries

Increase outreach to raise awareness within industry

- Few plants outside of North America and Europe have performed mercury balances to understand their sources and emissions
  - Analysis methods for mercury in materials
  - Stack gas sampling for mercury emissions
  - Methodology to perform mercury balances
- Control methods are not well understood


DISCUSSION AND QUESTIONS
- Objectives
- Priority Areas
- Technology
- Outreach