

Draft Assessment of CO₂ Accounting and Reporting Standard for the Cement Industry, Version 2.0 for Use in Climate Leaders Reporting

EPA is seeking comments on this draft assessment by close of business on February 15, 2007. Please send comments to John Sottong at sottong.john@epa.gov.

Overview

The *CO₂ Accounting and Reporting Standard for the Cement Industry, Version 2.0*, and the accompanying calculation tool (the CSI Protocol) are useful resources for identifying and calculating process emissions from cement manufacturing. The CSI Protocol does deviate from the Climate Leaders reporting protocol on several points, most notably:

- The CSI Protocol treats indirect emissions from purchased electricity as a non-core emission source that does not need to be included in total gross emissions. However, Climate Leaders Partners (Partners) must report emissions from purchased electricity as a line item that is incorporated into total gross emissions.
- The CSI Protocol excludes emissions from owned or leased off-site mobile combustion from the inventory. Climate Leaders Partners must report emissions from mobile sources included in the Partner's organizational boundary per the Climate Leaders *Design Principles*.
- The CSI Protocol does not include CH₄ and N₂O emissions from kiln fuel combustion. Climate Leaders Partners must, at a minimum, estimate all GHG sources that fall within their organizational and operational boundaries per the Climate Leaders *Design Principles*.

The remaining differences between the CSI Protocol and Climate Leaders protocol are relatively insignificant. The CSI Protocol does provide more detailed guidance on cement-specific process emissions.

Partners should use the discussion below of specific differences between the CSI Protocol and the Climate Leaders reporting protocol as a guide in the development of their inventory. Partners can view updated Climate Leaders guidance at www.epa.gov/climateleaders or contact EPA staff or technical contractors for hard copies.

Key Updates to Previous Version

Appendix 8 summarizes differences between Version 2.0 and the previous version of *CO₂ Accounting and Reporting Standard for the Cement Industry*. The most significant changes are:

- Introduction of accounting for organic carbon in raw materials
- Added section and tool calculation for CO₂ emissions from wastewater injected in kilns
- Updated section on methane and nitrous oxide
- Extended guidance on indirect CO₂ related to grid electricity
- Added Emission Rights section

- Added section on intra-company clinker transfers and modified calculation of indirect CO₂ emissions from clinker imports
- Added section on inventory quality
- Added allowance for annual variation in CO₂ emission factors for kiln fuels

Differences from Climate Leaders Protocol

Appendix 6 summarizes differences between the CSI Protocol, EU ETS Monitoring Guidance, U.S. Climate Leaders Program, and the Japanese GHG Reporting System. The differences between the CSI Protocol and the Climate Leaders protocol are discussed below.

Included in Appendix 6

- **Cement-based calcinations emission method** - In a draft Climate Leaders guidance document for the cement industry, Climate Leaders recommended using the clinker-based method outlined in the CSI Protocol but also included an alternative clinker calcinations emission method based on cement production. The CSI Protocol acknowledges the cement-based method as an acceptable option, but notes that IPCC suggests the clinker-based method and lists potential sources of error associated with the cement production method which does not account for: direct additions of carbonate-containing materials to the kiln, internal recycling of dust, and incomplete calcinations of dust leaving the kiln system. Partners should use the clinker-method whenever feasible.
- **CSI additional guidance** - Organic carbon in raw materials, carbon in wastewater injected into kilns, credits for alternative fossil fuels, and internal clinker transfers are not currently addressed in Climate Leaders guidance. Emissions from organic carbon in raw materials and carbon in wastewater injected into kilns is anticipated to be relatively minor; however, initial quantification is recommended by the CSI Protocol since these emissions can be significant at certain facilities. Partners are required to make an initial estimate of these emissions sources.
- **Stationary combustion CO₂ emission factors for kiln fuel, non-kiln fuel, and alternative fossil kiln fuels** - The CSI Protocol uses IPCC default emission factors based on lower heating value (LHV) of fuels unless site and fuel specific data is available. Climate Leaders Partners should use the higher heating value (HHV)-based DOE/EIA/USEPA emission factors in the *Direct Emissions from Stationary Combustion Sources* unless site specific factors are available from fuel supplier.
- **Biomass kiln fuels CO₂ emission factors** - The CSI Protocol offers a default emission factor for solids biomass which differs from the Climate Leaders factors for wood and landfill gas. Note that the Climate Leaders factors listed in the CSI protocol are incorrect as discussed in the Technical Notes below. Partners should use the Climate Leaders factors found in *Direct Emissions from Stationary Combustion Sources*. CO₂ emissions from biomass kiln fuels are reported but not included in the gross emissions totals in both the CSI and Climate Leaders protocols.

- **CH₄ and N₂O emission factors** – The CSI Protocol considers methane and nitrous oxide emissions to be insignificant for kiln fuel combustion, but refers to the World Resources Institute (WRI)/ World Business Council on Sustainable Development (WBCSD) calculation tool for stationary fuel combustion for non-kiln fuels. Climate Leaders requires an estimate of both kiln and non-kiln fuels for Partners inventories.
- **Indirect CO₂ emissions from purchased clinker** – The CSI Protocol requires that CO₂ emissions from purchased clinker be included with indirect emissions. Either a default emission factor or site-specific factor may be used. Reporting purchased clinker emissions is optional under Climate Leaders and should be documented in a line item separate from indirect emissions.
- **Indirect purchased electricity emission factors** – Both the CSI Protocol and Climate Leaders protocol recommend site-specific emission factors provided by the servicing utility. However, the CSI Protocol default is the IPCC national factor while Climate Leaders default factors are from the US EPA eGRID database for US sub-regions. Climate Leaders Partners should follow the Climate Leader's *Indirect Emissions from Purchases/Sales of Electricity and Steam* for calculating emissions from electricity and steam purchases.
- **Continuous emissions monitoring systems (CEMS)** – CEMS are not mentioned in the CSI Protocol but are offered as an alternative to calculated emissions based on fuel consumption in the Climate Leaders guidance.
- **Offset guidance** – The CSI Protocol offers fairly detailed guidance on emission offsets. Climate Leaders and WRI offset guidance is still in development. Climate Leaders will evaluate Partners' use of offsets that follow robust, well-documented quantification methodologies on a case-by-case basis. Partners must always report total gross emissions (i.e. emissions before offsets) in the inventory.
- **Credits for alternative fossil fuels** – The CSI Protocol allows a credit of up to 100% for CO₂ from fossil wastes. Calculations must be in compliance with the relevant reporting scheme. Climate Leaders does not currently have guidance on credits for alternative fuels and will project with Partners on a case-by-case basis.
- **Netting of emissions and credits** – The CSI Protocol allows reporting of both gross and net emissions, but requires transparency consistent with Climate Leaders guidance. However, the CSI Protocol method for the net emission calculation does not include indirect emissions from purchased electricity. Partners are required to include indirect emissions from purchased electricity in their net emission calculation.
- **Process steps for which emissions are to be included** – Appendix 6 states that Climate Leaders does not provide guidance on which installation and process emissions must be included in a cement company's inventory, however, Appendix 1 of Climate Leaders *Design Principles* lists all of the items in the CSI Protocol except for cement grinding and blending. Climate Leaders Partners must also include emissions from cement grinding and blending in their inventories.

- **Internal clinker transfer** – The CSI Protocol offers guidance on intra-company clinker transfer accounting for individual site emission allocation, but states that at a corporate level, these transfers cancel out. Climate Leaders Partners are not required to report these transfers, only their aggregate corporate emissions from clinker.
- **Denominator for performance indicators** – The CSI Protocol does not include purchased electricity in the calculation of CO₂ emissions per ton of cementitious product. Climate Leaders guidance includes indirect emissions from purchased electricity in GHG reduction goal analysis.
- **Precision requirements and uncertainty assessments** – The CSI Protocol requires uncertainty assessment and offers some limited guidance. Climate Leaders does not require quantification of uncertainty ranges, but recommends identifying areas of inaccuracy and methods to improve data accuracy in the inventory management plan (IMP).

Not Included in Appendix 6

- **Reporting year basis** – The CSI Protocol allows an option of reporting on a fiscal year basis while Climate Leaders requires emissions reporting on a calendar-year basis.
- **Organizational boundaries** – the CSI Protocol provides a hybrid approach for determining organizational boundaries; i.e. the CSI Protocol indicates companies should report primarily according to the operational control criterion and secondarily according to the ownership criterion in cases where operational control is not clearly assigned. Partners should refer to Climate Leaders *Design Principles* for guidance on the development of organizational boundaries. Climate Leaders guidance requires Partners to select one method for determining organizational boundaries and to apply that method to all facilities.
- **Mobile emissions** – the CSI Protocol does not require reporting mobile combustion emissions from off-site company owned or leased transportation, while Climate Leaders requires reporting all mobile combustion emissions which fall under the Partner's organizational boundary, both on- and off-site. The CSI Protocol's approach is a deviation from WRI/WBCSD protocol.
- **Minor sources not addressed** – The CSI Protocol does not address emissions of HFCs. Partners should refer to Climate Leaders specific guidance to estimate emissions from HFCs (*Direct HFC and PFC Emissions from Use of Refrigeration and Air Conditioning Equipment* and *Direct HFC and PFC Emissions from Manufacturing Refrigeration & Air Conditioning Equipment*).
- **Deviations from WRI** – The CSI Protocol excludes off-site transportation emissions, CO₂ from wastewater combustion, and CH₄ and N₂O emissions from fuel combustion, all deviations from the WRI GHG Protocol and Climate Leaders guidance. The CSI Protocol does recommend assessing these emissions to determine their significance and including them if warranted. Climate Leaders does require their inclusion in the inventory.

- **Net emissions emphasis** – The CSI Protocol places a strong emphasis on net emissions reporting and performance indicators, which varies from the emphasis in the Climate Leaders program. The CSI Protocol does state on page 33 that “Reporting of net emissions alone, omitting gross emissions, is not acceptable.” However, gross emissions do not include emissions from purchased electricity which is required under Climate Leaders.
- **References** - All references to Climate Leaders guidance documents are outdated. Partners should refer to the most recent versions of Climate Leaders guidance documents, which are located on the Climate Leaders website.

Technical Notes

Errors observed in the tool:

- **Error in conversion from percent to fraction** – CaO and MgO content percentage (Lines 22 and 23) entered as either 99 or .99 both show up as 99%. The CaO and MgO calculations (lines 24 and 25) divide by 100, even though the content is already entered as a %. If input 200 tons of clinker production and 99% CaO, the sheet calculates 2 tons CaO, rather than 198 tons CaO.

Minor errors and omissions were observed in the protocol document.

- **Unclear reference** – Page 3, last sentence – “The Cement CO₂ Protocol is consistent with this reporting requirement, except for some minor deviations which are summarized in *Scopes of Revised WRI/WBCSD GHG Protocol*, p. 3.” The page reference should be page 35.
- **Duplicated text** – (1) Page 11, second and third bullets in left column; (2) Page 11, last two paragraphs of right column; (3) End notes, page 58, 20 and 21 are duplicates of 18 and 19.
- **Reference program differences** – Page 3, bottom of left column- list of activities to include in corporate inventory-Partners should note that Climate Leaders requires emissions from all sources to be included.
- **Inconsistent gross indicator basis** – Page 33, last paragraph, “In order to be complete, voluntary reporting shall include the CO₂ emissions (including indirect CO₂ emissions from consumption of grid electricity)...” seems to be in conflict with gross emissions calculation which excludes emissions from purchased electricity.
- **Minor error in emission factor conversion** – Appendix 6, Biomass kiln fuels- Climate Leaders factor stated to be 92 kg CO₂/GJ-LHV for wood and 55 kg CO₂/GJ-LHV for landfill gas, this value should be 93 kg CO₂/GJ-LHV for wood and 52 kg CO₂/GJ-LHV for landfill gas.

Calculation: $92.93 \text{ kg CO}_2/\text{MMBTU-HHV} \times 0.947 \text{ MMBTU}/\text{GJ} = 88 \text{ kg CO}_2/\text{GJ-HHV} \times \text{GJ-HHV}/0.95 \text{ GJ-LHV} = 93 \text{ kg CO}_2/\text{GJ-LHV}$

Calculation: $51.81 \text{ kg CO}_2/\text{MMBTU-HHV} \times 0.947 \text{ MMBTU/GJ} = 49.1 \text{ kg CO}_2/\text{GJ-HHV} \times \text{GJ-HHV}/0.95 \text{ GJ-LHV} = 52 \text{ kg CO}_2/\text{GJ-LHV}$

- **Clarification required** – Appendix 6, Consolidation rules- the CSI Protocol states “Following recommendations of WRI/WBCSD protocol (2004) with minor deviations”. The CSI protocol does not list or reference the deviations. Climate Leaders Partners should refer to Climate Leaders and WRI guidance on consolidation rules to ensure consistency.
- **The following website references on page 37 do not work:**

IEA- <http://www.ieagreen.org.uk/prghgt42.htm>

USEPA Climate Leaders- <http://www.epa.gov/climateleaders/protocol.html>

Sources Referenced

CSI 2005. *CO₂ Accounting and Reporting Standard for the Cement Industry, Version 2.0*, Cement Sustainability Initiative (CSI) of the World Business Council for Sustainable Development.
<http://www.ghgprotocol.org/DocRoot/SKDvWSX7r0JknM8D3fIJ/TF1-CO2%20Protocol-June2005.pdf>

CSI No Date. *WBCSD CSI CO₂ Emissions Inventory Protocol, Version 2.0 (tool)*.
<http://www.ghgprotocol.org/DocRoot/SKDvWSX7r0JknM8D3fIJ/CO2%20Protocol%20V2.0%20050520.xls>

U.S. EPA 2004. *Climate Leaders Greenhouse Gas Inventory Protocol Core Module Guidance: Direct Emissions from Stationary Combustion Sources*.
<http://www.epa.gov/climateleaders/docs/stationarycombustionguidance.pdf>

U.S. EPA 2004. *Climate Leaders Greenhouse Gas Inventory Protocol: Direct Emissions from Mobile Combustion Sources*. <http://www.epa.gov/climateleaders/docs/mobilesourceguidance.pdf>

U.S. EPA 2004. *Climate Leaders Greenhouse Gas Inventory Protocol: Indirect Emissions from Purchases/Sales of Electricity and Steam*. <http://www.epa.gov/climateleaders/docs/indirectelectricityguidance.pdf>

U.S. EPA 2004. *Climate Leaders Greenhouse Gas Inventory Protocol: Direct HFC and PFC Emissions from Use of Refrigeration and Air Conditioning Equipment*.
http://www.epa.gov/climateleaders/docs/refrige_acequipuseguidance.pdf

U.S. EPA 2005. *Climate Leaders Greenhouse Gas Inventory Protocol: Design Principles*.
<http://www.epa.gov/climateleaders/docs/climateleadersdesignprinciples.pdf>