Principles for a Steel Industry Methodology for Reporting Carbon-Related Energy Sources and Raw Materials

Purpose

In response to the Bush Administration's challenge to American business sectors to develop and implement voluntary programs to accomplish reductions of greenhouse gas emissions, the steel industry has committed to develop and implement a sector-wide energy consumption reporting protocol for the purpose of tracking energy improvements over time. Because the underlying purpose is to show a corresponding reduction in greenhouse gas emissions, the reporting protocol is also designed to account for greenhouse gas emissions as well as energy consumption. It is the purpose of this document to provide the principles and framework for that reporting protocol.

Data Processing and Confidentiality

This steel industry initiative is predicated on establishing a sector-wide energy efficiency improvement goal. Data for participating companies will be submitted to a central data collection entity (such as a password-protected web-based system or an independent third-party) and will be aggregated for the entire industry sector for purposes of making periodic reports to DOE. All individual company data will be treated with confidentiality. However, consistent with principles of transparency, accuracy, data quality control, and verification, an independent third-party, embodied with confidential consultant-client or attorney-client privilege, may be given access to the data with permission of the participating companies. Individual companies are, of course, free to reveal their own information as they wish.

Energy Consumption and Carbon Dioxide (CO2) Emissions

Because virtually all of the greenhouse gas emissions associated with steel production consist of CO2 emissions, and because CO2 emissions are closely related to energy consumption, the primary focus of this reporting methodology will be carbon-related energy sources. Reporting companies may report energy sources either in terms of physical units (*e.g.*, tons, gallons, cubic feet) or heat value (million BTUs). However, not all of the energy used is entirely associated with CO2 emissions and vice-versa. Therefore, CO2 emissions from some carbon-bearing raw materials emissions also need to be accounted for. For these reasons, the reporting protocol must be designed to serve the dual purpose of tracking both energy consumption and CO2 emissions.

Organizational Boundary Limits

Companies participating in the voluntary reporting program are expected to report on all emission sources for all operations within facilities for which they have operating control and where steel is produced, either by electric arc furnace (EAF) or basic oxygen furnace (BOF). Facilities that may be separated physically by public roads, railroad rights-of-way, water bodies, or parcels of land but are otherwise under the same operational control should be considered to be single facilities. Supporting operations that may be contained within a plant facility (*e.g.*, slag processing, industrial gas production, lime plants) should be included unless these facilities are operated by other entities and energy attributable to these operations can be separated from plant totals. Stand-alone processing facilities (*e.g.*, iron ore facilities, fabrication plants, cold rolling operations, coating facilities, etc.) should not be included unless closely coupled operationally with the steel production facility. Joint venture reporting responsibility should fall to the operating entity.

Consistency

Reporting of energy consumption and greenhouse gas emissions sources or removals should be comparable over time. For this reason, companies should be consistent from one reporting period to the next in terms of deciding which facilities and activities are included in inventories. When corporate structural changes such as acquisitions, divestments, or mergers occur and facilities are added or dropped from reports, reporting entities should identify whether those facilities have been previously included and report what adjustments may be necessary for prior reporting periods.

Physical Boundary Limits (Fenceline Principle)

The basic criterion for reporting should be net energy consumed or carbon-bearing materials consumed within the physical boundary of the facility. Since the basic purpose of this program is to account for energy or greenhouse gas emissions from steel production facilities, it is unnecessary to account for the movement of primary and secondary energy sources within the confines of plant boundaries. For example, if all of the carbon in metallurgical coal is accounted for by the total quantity of coal entering a plant, it is not necessary to determine if that carbon is ultimately emitted as CO2 emissions from coke battery stacks, blast furnace stoves, flares, boilers, BOF off-gas, or other sources of byproduct fuel combustion. It is only important to make adjustments for carbon that may leave the plant boundary in a form other than CO2 (*e.g.*, sold or transferred coke, tar, byproducts, or byproduct fuels such as blast furnace gas or coke oven gas). Adjustments can also be made for carbon contained in steel products if deemed to be significant. In other words, calculations are intended to be based on a net carbon balance within the fenceline of the facility. In addition, it is not necessary to draw a distinction between carbon that may be emitted as carbon monoxide (CO) and CO2 because the conversion of CO to CO2 is rapid in comparison to the life of CO2 in the atmosphere.

Accounting for Tonnage

Based upon the data collected, industry goals may be expressed either in terms of an energy improvement per ton of steel produced or energy use per ton of steel shipped, and both will be tracked. Steel produced is defined as cast tons. With respect to steel shipments, care should be taken to avoid double-counting in the case of intra-company transfers of intermediate steel products. Intra-company transfers should be counted as shipments only if the facility to which the transfers are made are not included in the energy survey.

Purchased or Transferred Non-Carbon Energy Sources

Although there are no direct emissions of CO2 associated with the consumption of electricity or steam, these energy sources are common to other reporting protocols currently in use and will be reported because they can represent a significant component of steel industry energy usage. Because data will be aggregated for all participating steelmaking facilities throughout the U.S., when it is necessary to assign CO2 emission equivalents to electricity usage, emission factors representing the mix of power generation fuels for the entire U.S. power grid will be used. Electricity generated on-site but transferred off-site will be assigned a carbon value based on the fuel used to generate the electricity. Carbon associated with steam, whether purchased or generated on-site and transferred off-site, will be accounted for based on the fuel used to generate that steam. For purposes of this protocol, oxygen is not considered an energy source.

Carbon-Bearing Raw Materials and Co-Products

Beyond the energy sources identified above, there is no intent to identify carbon or energy burdens associated with other raw materials such as iron ore, scrap, semi-finished steel, or ferroalloys.

However, raw materials with intrinsic carbon contents (*e.g.*, iron carbide, carbon electrodes, charge carbon, or limestone) should also be reported if they are material or significant. Similarly, adjustments for off-site transfers of byproducts or co-products such as slag, scrap, or coke byproducts should be accounted for only if the carbon equivalent is material or significant.

Materiality

This reporting methodology is guided by the principle of balancing simplicity with completeness and accuracy. The reporting form lists those materials judged to be of possible significance for the industry as a whole. However, these or other materials may be of greater or lesser significance at a given facility. For example, distillate fuel oil, diesel fuel, gasoline, or other fuels or materials may be important contributing sources at some facilities. Moreover, other reporting protocols may necessitate accounting for these emissions. Accordingly, reporting companies should consider the magnitude or significance of the carbon emissions or transfers associated with certain activities along with the resources necessary to quantify those data and should exercise judgment as to whether the information is material in the total scope of the plant's operations. As a general guideline, emissions estimated to be less than 1% of a facility's total may be considered non-material or *de minimis*.

Non-CO2 Greenhouse Gases

While CO2 is deemed to be the greenhouse gas of dominant interest for the steel industry and will be the only gas tracked on an industry-wide basis, other reporting protocols provide for reporting of other known greenhouse gases as well, specifically methane (CH4), nitrous oxide (N2O), sulfur hexafluoride (SF6), perfluorocarbons (PFCs), and hyrdrofluorocarbons (HFCs). Accordingly, reporting companies may at their option report emissions of these other greenhouse gases of interest if they are known to be emitted and are material (considering their global warming potential coefficients).

Indirect Emissions and Carbon-Related Activities

In addition to sources of greenhouse gases emitted directly from steel plants (commonly referred to as Scope 1 emissions) and sources of purchased electricity and steam (Scope 2 emissions), other reporting protocols also provide for optional reporting of indirect emissions associated with the facility's activity (Scope 3). Examples of indirect emissions include carbon burdens associated with raw materials production, transportation of raw materials or products, employee-related emissions due to commuting or business travel, off-site waste disposal, or other upstream or downstream activities. Scope 3 emissions will not be included in steel industry totals, but companies may, at their option, separately report such indirect emissions, as well as carbon sequestration projects.

Conversion Factors

The reporting methodology is designed to facilitate estimates of energy consumption and CO2 emissions by applying default values and emission factors that allow for conversion of physical units of fuel or raw materials into energy equivalents and CO2. The conversion factors to be employed are shown as background information in Appendix A. Where more specific information that differs from the default values is available or known, those data should be furnished at the reporter's option.

Survey of Steel Industry Carbon Sources

Reporting Year or Period _____

Company/Plant _____

Name of Person Reporting _____

Phone No. _____ Fax No. _____ Email _____

Steel Produced (tons)[1] _____ By EAF_____ or BOF _____

Steel Shipments (tons)[2] _____

Energy/Carbon Source	Amt. Consumed[3]	Million BTU[4]
Boiler or Steam Coal (tons)		
Coking or Injection Coal (tons)		
Purchased Coke (tons)		
EAF Charge Carbon (tons)		
EAF Injected Carbon (tons)		
No. 6 Fuel Oil (gallons)		
Natural Gas (million cu. ft.)		
Purchased Steam (lbs)		
Purchased Electricity (kwh)		
Limestone (tons)		X
Raw Dolomite (tons)		X
Net Carbon Electrodes (tons)		X
Purchased Pig Iron (tons)		X
Purchased DRI/HBI (tons)		X
Other Carbon Sources (tons)		X

Please provide any other information you believe to have a significant positive or negative effect on the reporting company's quantity of carbon emissions during the reporting year (*e.g.*, gasoline, diesel fuel, propane, or landfill methane consumption). _____

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[1] Tons cast or in the ingot mold. Companies or plants having both EAF and BOF production are requested to submit separate forms for each.

[2] Intra-company transfers should not be reported as shipments unless going to a plant not included in the energy data base.

[3] Adjustments should be made for any transfers or sales of carbon-bearing byproduct fuels or energy sources (*e.g.*, coke, coke oven gas, blast furnace gas, coke byproducts, electricity, or steam) to sources outside of plant boundaries. If Purchasing records are used, inventories adjustments should be made to reflect actual consumption.

[4] Optional for companies choosing to report in energy units as opposed to physical units.

Appendix A
Steel Industry Energy and CO2 Conversion Factors

Energy/Carbon Source	Energy Value	CO2 Factor
Boiler or Steam Coal	25 million BTU/ton	5,130 lb/ton
Coking or BF Injection Coal	27 million BTU/ton	5,540 lb/ton
Coke	26 million BTU/ton	6,580 lb/ton
EAF Charge or Injected Carbon	26 million BTU/ton	5,540 lb/ton
No. 6 Fuel Oil	150,000 BTU/gal	26 lb/gal
Distillate/Diesel Oil	140,000 BTU/gal	22 lb/gal
Gasoline	124,000 BTU/gal	19 lb/gal
Light Oil	140,000 BTU/gal	26 lb/gal
Tar	160,000 BTU/gal	35 lb/gal
Liquefied Petroleum Gas	90,000 BTU/gal	12 lb/gal
Natural Gas	1,000 BTU/cu ft	0.12 lb/cu ft
Blast Furnace Gas	90 BTU/cu ft	0.044 lb/cu ft
Coke Oven Gas	500 BTU/cu ft	0.048 lb/cu ft
Steam (coal basis)	1,000 BTU/lb	0.06 lb/lb
Electricity (U.S. grid basis)	3,413 BTU/kwh	1.4 lb/kwh
Limestone (12% C)	---	880 lb/ton
Raw Dolomite (12.8% C)	---	940 lb/ton
Carbon Electrodes (99% C)	---	7,260 lb/ton
Pig Iron (4% C)	---	290 lb/ton
DRI or HBI (2% C)	---	145 lb/ton
Iron Carbide (6.5% C)	---	480 lb/ton
Carbon Steel (0.04% C)	---	0.0015 lb/ton