worldsteel
ASSOCIATION

CO_2 EMISSIONS DATA COLLECTION

User Guide, Version 5.1

CONTENTS

Table of contents

Introduction 3

Access 4

Home 5

Administration (Superusers) 6

Data collection (All users) 9

Data collection (Superusers) 12

Output averages 13

Output summary 14

Appendices 15

Appendix 1: Data collection 16

Appendix 2: Methodology 17

Appendix 3: Site structure 18

Basic information 18

CO_2 table definitions 19

Appendix 4: Calculation of emissions 22

Appendix 5: Useful conversion factors 25

Appendix 6: Estimating total carbon content 26

Appendix 7: Naming convention for sites 27

INTRODUCTION

worldsteel CO_2 data collection system user guide

Climate change is the biggest issue for the steel industry in the 21st century. The World Steel Association (worldsteel) has proposed a new climate change policy for the industry: a global steel sector approach.

At the core of the proposed framework is the collection and reporting of CO_2 emissions by as many steel companies as possible. Therefore, worldsteel is inviting all steel companies to participate in this vital process.

With the data collected, the industry will argue its case for a global steel sector approach, to be implemented in the post-Kyoto protocol period, after 2012.

The aim of the worldsteel data collection project is to know, as quickly as possible, the current level of emissions from the production of steel worldwide and on a comparable basis.

A secure database for data collection

The database is hosted on dedicated servers at a company with ISO 27001 accreditation. Great care has been taken to ensure that data from your own company's steel plants will be known only to you and the worldsteel staff administering the project. Participating steel companies cannot view each others' data. At worldsteel, the CO_2 data collection project administrators are the only people who can see all the data submitted.

ACCESS

Accessing the CO_2 data collection system

To access the CO_2 Data Collection System (DCS) you need a user ID and password, available on application. You will receive your user ID and password via e-mail.

Superusers and Users

There are two levels of access to the DCS: Superusers and Users.

A Superuser oversees the data collection and approves data once it has been input by Users. Superuser accounts are created by the project administrator at worldsteel following the nomination of a Superuser by a company or federation. A Superuser then creates sites (one for each steel plant) and also creates the User accounts for those sites. A Superuser can edit user accounts, but cannot delete sites once they have been created.

A User enters the data into the DCS. User accounts are created by the Superuser. A User can also edit the data they have entered and submit the data to the Superuser. After the Superuser has approved the submission, the User can view an Output summary of their own data.

To log in

Go to URL: https://co2.worldsteel.org

Enter your user ID (your e-mail address) and password into the boxes provided. When you have successfully logged in, the CO_2 Data Collection System home page appears.

Changing your password

Your user name appears in the top right corner on every screen. Underneath, click on Change password to enter a new password.

To log out

Your user name appears in the top right corner on every screen. Click on Log out to go back to the login screen.

Home page

The sections available to you appear in a menu along the top of the screen.

From the home page you can access up to four sections of the CO_2 DCS:

- Data Collection
- Output Averages
- Output Summary
- Administration

Click on the desired section to go to that page.

Note: access to the sections depends on your user status.

Superuser

Sections available: Data Collection, Output Averages, Output Summary, Administration.

A Superuser can only see data for the sites under their responsibility.

Superuser responsibilities include:

- Creating sites
- Creating authorised users
- Approving data submitted by a User
- Requesting data corrections
- Unapproving data submitted by a User

Superusers can also:

- View collection data
  View results on the Output Averages screen
  View results on the Output Summary screen

User

Sections available: Data Collection, Output Summary.

User responsibilities include:

- Entering and editing data
- Submitting data for approval

Users can also view the CO_2 data for their site.

ADMINISTRATION

Note: available to Superusers only.

Superusers

Superusers have access to two screens from the Administrator main page:

- Sites
- Users

Click on a heading to access the screen.

Sites screen

On this screen you can add and edit information concerning new and existing sites. Existing sites are listed in the table. For each site the table indicates country and type. Once created a site cannot be deleted. However, it can be 'disabled'.

Adding sites

Click on Create new. A new row will be added to the list containing a blank cell under SiteName.

You can now edit the contents of this row as follows:

- In the first column of the row, click Edit
- Click inside the cell under SiteName and enter the site's name, see Appendix 7 for the naming rules for sites
- Your company name is unchangeable. You can enter a three-digit number to create a site according to the naming rules
- Use the scroll-list in the Country column to select the site's location
- Use the scroll-list in the SiteType column to select the site's type: Ore based, Scrap based or unconventional:
  Ore – Integrated sites (even with EAF on-site)
  Scrap – over 70% scrap (EAF) or external DRI
  Unconventional – all other sites including smelting reduction and combined EAF DRI production
- Finally, click inside the checkbox under SiteEnabled to activate the site.

Click Update in the first column to accept the new site.

To cancel, click Cancel.

Editing site details

In the first column of the row containing the site you want to edit, click Edit. Several cells become active.

You can now edit the contents of this row as follows:

- Click inside the cell under SiteName and change the site's name
- Use the scroll-list in the Country column to change the site's location
- Use the scroll-list in the SiteType column to change the site's type: Ore based, Scrap based or unconventional
- Click inside the checkbox under SiteEnabled to enable or deactivate the site.

Click Update in the first column to accept the changes.

To cancel and revert to the previous details, click Cancel.

Listing entries alphabetically

Table entries can be listed alphabetically according to either OrganizationName or OrganizationType by clicking on the column heading. Click on the column heading again to revert to the original list.

Adding and editing User details

On this screen you can add and edit information concerning new and existing users. Existing users are listed in the table. For each user the table displays first and last name, e-mail address (the User ID) and site.

Adding users

Click on Create new. A new row will be added to the list containing several blank cells.

You can now edit the contents of this row as follows:

- In the first column of the row, click Edit
- Click inside the cell under FirstName and enter the user's first name
- Click inside the cell under LastName and enter the user's last name
- Click inside the cell under Email and enter the user's e-mail address
- Use the scroll-list in the Site column to select the site for which the user is responsible
- Finally, click inside the checkbox under Enable to activate the user details

Click Update in the first column to accept the new user. An e-mail is automatically sent to the new user containing their login details of User ID and password.

To cancel, click Cancel.

Editing user details

In the first column of the row containing the site you want to edit, click Edit. Several cells become active.

You can now edit the contents of this row as follows:

- Edit the user's name under FirstName and LastName
- Edit the user's e-mail address
- Select the user's site
- Use the checkbox under Enable to activate / deactivate the user details.

Click Update in the first column to accept the changes.

To cancel and revert to the previous details, click Cancel.

Removing a user

In the first column of the row containing the user you want to remove, click Delete. A confirmation box appears.

Choose Yes to delete, No to cancel.

Data collection [All users]

In this section you can manage your CO_2 data.

The first screen presents you with a table listing available sites. The four scroll boxes above the table allow you to modify the way sites are displayed, as follows:

- Organisation: choose a specific company or federation, or display all (default = all)
- Site: choose an individual site or display all (default = all)
- Year: select the year (default = previous year)
- Status: choose between:
  - Empty – data not yet collected or included in calculation
  - Draft – data collected and awaiting submission
  - Submitted – data submitted and awaiting corrections / approval by Superuser
  - In Calcs – data verified by Administrator and included in calculations
  - All – data either empty or included in calculations (default)

DATA COLLECTION

For each site you can perform several functions via the table. The number of functions displayed on the table depends on your user status.

All users

- • Edit data: allows you to enter new data or amend data not yet submitted or approved
  • View data: allows you to view data that is included in calculations
  • Submit: submit data for approval

Superusers

- • Corrections requested: ask for data to be amended by user
  • Approve: approve submitted data
  • Un-approve: revoke approval on data

DATA COLLECTION

Data collection [Users]

Entering site data

In the Data Collection table, choose Edit data on your site entry and you will go to the Data Collection Form. Here you can enter or edit data for your site. The Data Collection System uses this data to generate a report showing appropriate CO_2 values.

The data collection form consists of the following parts:

General information

Your chosen site is shown here together with the company name, country and period for which the report will be created.

Site type

The type of site, as defined by the Superuser, is indicated.

Ore – Integrated sites (even with EAF on-site)
Scrap – over 70% scrap (EAF) or external DRI
Unconventional – all other sites including smelting reduction and combined EAF + DRI production

Site structure

This section lists all the possible facilities that may be available at a site.

Enter the number of operational units for each facility at your site into the fields provided. The program recalculates every time a number is entered or changed, so there may be a slight delay before you can enter the next number. However, by moving between fields using your keyboard's tab button you can enter data without recalculating after each entry. When you have finished entering data, press enter or click on Calculate in the floating window. Only enter numerals. Do not use words. For example, write '6', not 'six'. The CO_2 table will only show the relevant rows, depending on the values entered.

Basic information

This section lists basic information about the site's production. This is used to calculate CO_2 intensity for the site. Enter the appropriate production quantities (in metric tonnes) from your site. All types of production from the site must be reported to ensure accurate analysis.

Tick the box next to 'Data verified by external body' if your data has been verified by an external body.

Data collection [Users]... continued

CO_2 table

This section lists the specific information needed to calculate CO_2 data for the site. Enter your data for any appropriate fields into the table's active cells (light yellow). The structure of the table and the definition of the columns are explained in Appendix 3. When you have entered all values, click Calculate to calculate CO_2 values. Then click Save to save the report. After saving you will be returned to the Data Collection table. Confirm that you want to submit your data by clicking on Submit. An e-mail is automatically generated and sent to your Superuser, verifying the data submission.

Note: Once you have submitted data you can only view the submitted data. You cannot edit it any further, unless the Superuser requests a change.

You can exit from this screen by pressing the Exit button. This will take you back the the site list.

Change requests from the Superuser

If you receive an e-mail notification from your Superuser requesting changes, repeat the above procedure to correct the data. After making any corrections, Save and Submit the report again.

Viewing submitted site data

Choosing View data on the Data Collection table opens the Data Collection Form for your site, allowing you to view data.

DATA COLLECTION

Data collection [Superusers]

Choosing View data on the Data Collection table opens the Data Collection Form for your chosen site. Here you can review data entered by the users.

Refer to the section 'Data collection [User]' on page 10 for a description of the Data Collection form content.

You can change any of the data. The calculated values will be updated to reflect these changes.

Note: any changes you make are NOT saved. This allows Superusers to check figures before requesting changes to be made by the user responsible for the site.

Click on Exit or on the the Data Collection tab to return to the Data collection table.

Once the data is approved your administrator can include it in the overall calculations. You will then be able to view the results of your data on the Output Averages and Output Summary screens. (Until the administrator includes your data, they will not appear on these screens).

OUTPUT AVERAGES

Ouput averages [Superusers]

The Output Averages screen presents you with an overview of CO_2 averages by region. Superusers can view regional averages relating to their company or organisation.

The three scroll boxes above the table of averages allow you to define which results are displayed.

Output descriptions

Note: all values are expressed in metric tons (tonnes).

CO_2 emission

Total CO_2 emissions = sum of Scope 1 + Scope 2 + Scope 3

Crude steel

Total carbon crude steel production

Scope 1

Direct emissions

Scope 2

Energy-related upstream emissions

Scope 3

Other upstream emissions and credits

Intensity

CO_2 intensity = total CO_2 emissions / total carbon crude steel production

OUTPUT SUMMARY

The Output Summary screen presents you with an overview of final CO_2 calculations. The amount of information that can be viewed depends on your user status, as follows:

- Users can see a summary of CO_2 results from their site
- Superusers can view results from any site belonging to their company or organisation

The five scroll boxes above the summary table allow administrators and Superusers to define which results are displayed.

Output descriptions

Note: all values are expressed in metric tons (tonnes).

Total CO_2 emissions = sum of Scope 1 + Scope 2 + Scope 3

Total carbon crude steel production

Scope 1

Direct emissions

Energy-related upstream emissions

Other upstream emissions and credits

CO_2 intensity = total CO_2 emissions / total carbon crude steel production

APPENDICES

Appendix 1: Data collection

Appendix 2: Methodology

Appendix 3: Key definitions

Appendix 4: Calculation of emissions

Appendix 5: Useful conversion factors

Appendix 6: Estimating total carbon content from proximate analysis

Appendix 7: Naming convention for sites

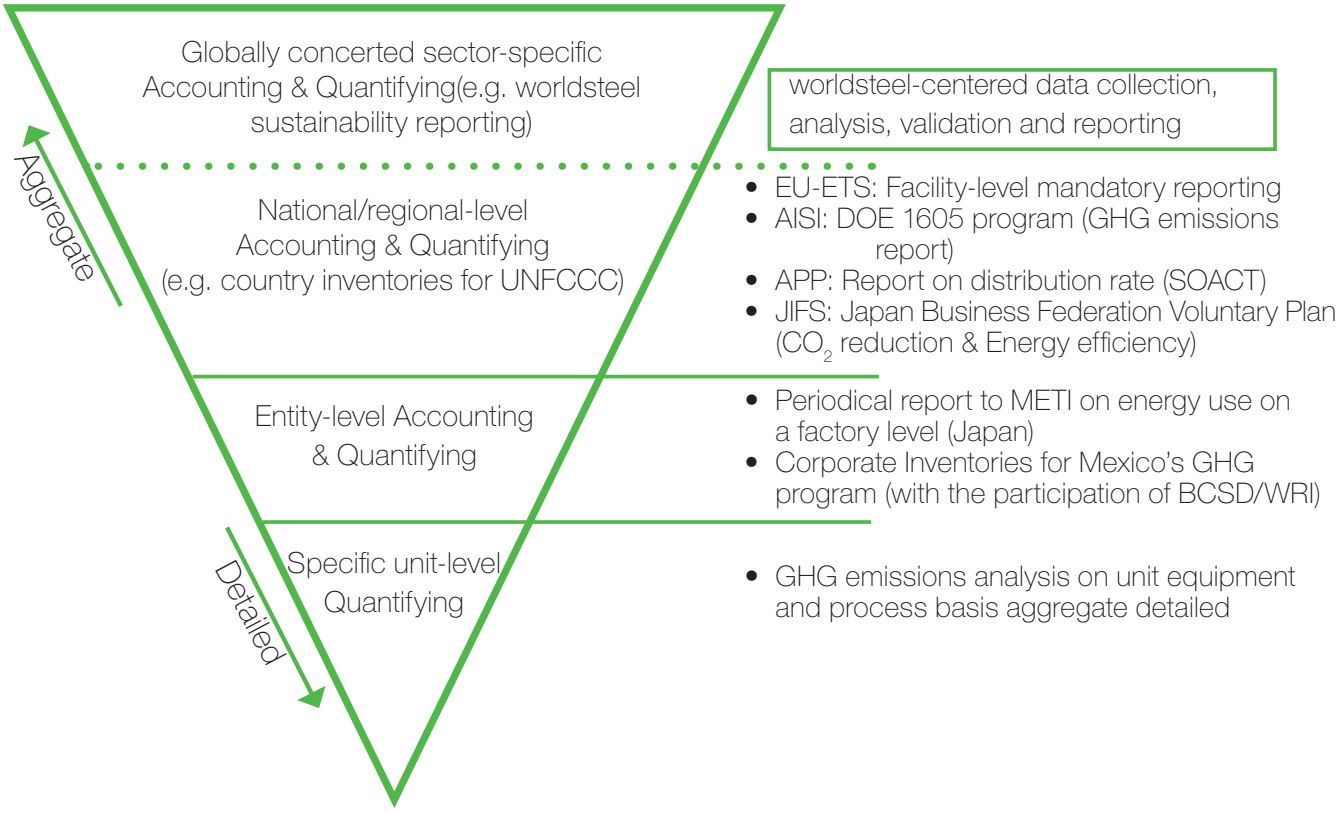
APPENDIX 1

Data collection

Individual sites, companies and federations already capture a lot of detailed information relating to CO_2 emissions. But, being gathered separately, an overview of regional or worldwide data cannot be calculated. By using the CO_2 Data Collection System to collect and compile all CO_2 emission data, worldsteel can provide a complete overview of emissions for the entire steel industry.

The diagram below gives a detailed structural analysis of data collection practices.

Multi-level accounting & quantifying



APPENDIX 2

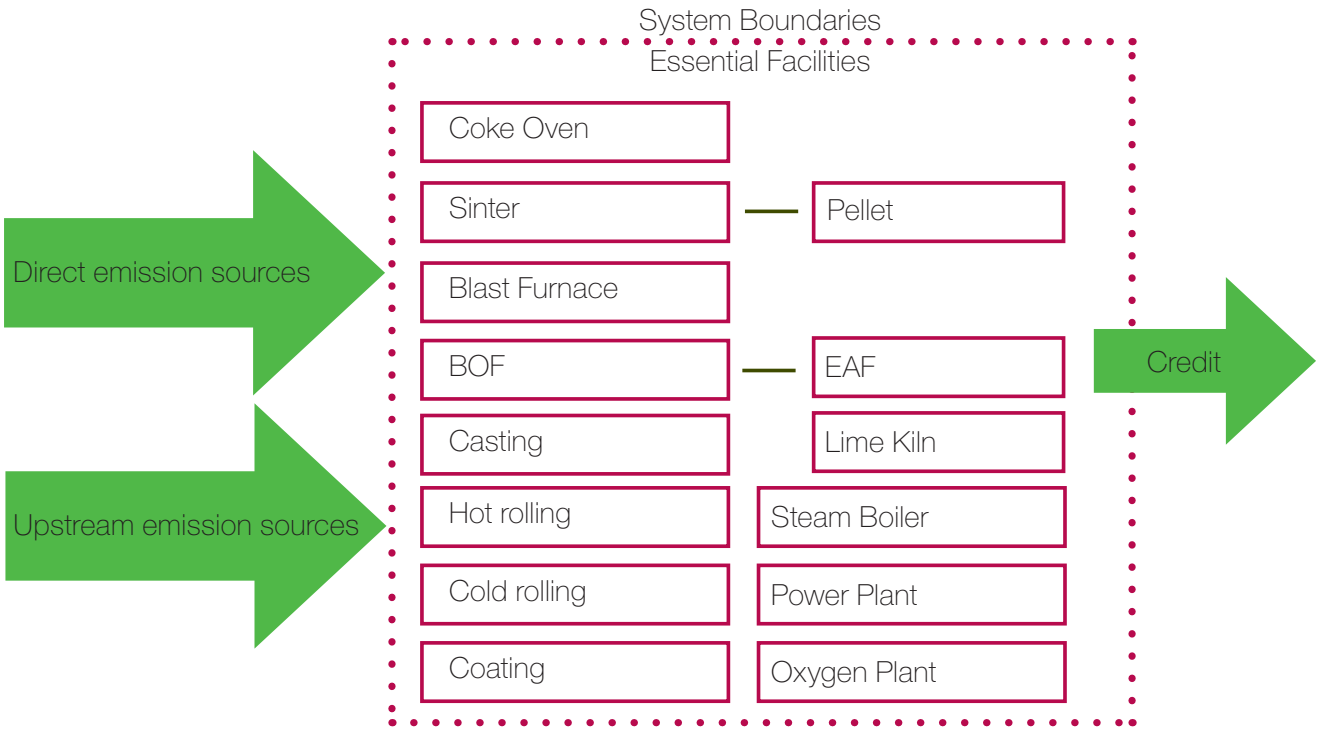
Methodology

The basic methodology for calculating emissions is illustrated below. Calculations incorporate Scope 1, Scope 2 and Scope 3 emissions, according to the GHG (greenhouse gas) protocol.

- • Basic definition of calculation (direct/indirect/credit)
- • Agreed (default/measured) common conversion factors

CO_2 emissions = Direct + Indirect – Credit

CO_2 intensity = CO_2 emissions (tonne)/crude steel (tonne)



Upstream value of mining and transport is excluded from the system boundary.

Upstream value of petroleum products for oil refining is included.

Upstream CO_2 value: sum of CO_2 emitted during the production of each item

Upstream energy value: sum of energy consumed during the production of each item.

APPENDIX 3

Site structure

HDG lines: Hot Dip Galvanizing lines

EG: Electro-Galvanized lines

Smelting Red: Smelting Reduction

Basic information

Total coke production
Total dry coke delivered by the batteries after quenching (including BF coke and fines, excluding wet quenching sludge)

Sinter production
Merchant sinter delivered to BF bunkers before screening

Hot metal production
Total hot metal at main runner

DRI production
Total DRI at plant outlet

BOF crude steel production
Total crude steel production using BOF

Open hearth crude steel production
Total crude steel production using Open hearth

EAF crude steel production
Total crude steel production using EAF

Carbon crude steel production
Sum of BOF, Open hearth and EAF crude steel production

Granulated slag production
Total production of dry granulated blast furnace slag

Purchased carbon steel scrap
Total external procurement of scrap (pre- and post-consumer scrap, excluding home scrap)

APPENDIX 3 (CONTINUED)

CO2 table definitions

Procured / purchased
mounts entering site from external sources, net of inventory change ahead of home production (for example: net electricity purchased from the grids)

Delivered / sold
Amounts delivered from the site, excluding internal use (for example: net coke sold)

Carbon content
Total carbon content on dry basis. If unknown, it can be estimated by proximate analysis (see appendix 6). If no data is provided, a default value will be used

Net calorific value
Heating value of fuel on dry basis with reference to water vapour. If no data is provided a default value will be used.

Scope 1 emissions (according to greenhouse gas protocol)
Direct emissions from site chimneys determined from straight carbon balance

Scope 2 emissions (according to greenhouse gas protocol)
Upstream emissions or credits related to procurement / delivery of electricity and steam from site

Scope 3 emissions (according to greenhouse gas protocol)
Other upstream emissions or credits related to procurement / delivery of pre-processed materials / by-products from site. A Scope 3 charge is applied to exported BF and BOF gas to correct their direct emissions credit, taking their value in use into account as the difference between their actual CO2 emissions and the potential savings in electricity generation.

Coking coal
Coal for making coke, including anthracite

BF injection coal
PCI (Pulverised Coal Injection) coal, including anthracite

Sinter/BOF coal
Coal for sinter/BOF, including anthracite

Steam coal
Boiler coal for producing electricity and steam, including anthracite

EAF coal
Coal for EAF, including EAF injected carbon, EAF charge carbon and anthracite

APPENDIX 3 (CONTINUED)

SR/DRI coal
Coal for SR/DRI, including anthracite (SR: Smelting Reduction, DRI: Direct Reduced Iron)

Coke
A solid carbonaceous material

Charcoal
Devolatalised or coked carbon neutral materials (trees, plants)

Heavy oil
Bunker-C oil

Light oil
Diesel oil (not including bio-diesel oil)

Kerosene
Paraffin (oil)

LPG
Liquefied petroleum gas

Limestone
Calcium carbonate (CaCO3)

Burnt lime
CaO

Crude dolomite
Calcium and magnesium carbonate (CaCO3, MgCO3)

Burnt dolomite
CaO, MgO

EAF/BOF electrodes
Net use of EAF/BOF electrodes or attrition loss

Gas based DRI
DRI (Direct Reduced Iron)

Electricity
World average value based on IEA 2006

Coal based DRI
DRI (Direct Reduced Iron)

APPENDIX 3 (CONTINUED)

Oxygen
O2

Nitrogen
N2

Argon
Ar

Coke Oven gas
COG

Blast Furnace gas
BFG

BOF gas
LDG (Linze Donawitz Gas)

BF slag to cement
BF granulated slag sold to cement industry for credits

BOF slag to cement
BOF slag sold to cement industry for credits

CO_2 to external use
CO2 sold to carbonated drink manufacturers for credits

APPENDIX 4

Calculation of emissions

The following tables show the values used by the application to calculate the total emissions for a site. The listed CO_2 emission factors were defined and agreed by a worldsteel panel of experts.

Direct emission factors

Item	Unit	Default ncv (GJ/unit)	Conversion factor (tCO_2/GJ)	Emission factor (tCO_2/unit)	Reference
Coking coal	dry t	32.200	0.0950	3.059	IEA
BF injection coal	dry t	31.100	0.0950	2.955	IEA
Sinter/BOF coal	dry t	29.300	0.0950	2.784	IEA
Steam coal	dry t	25.900	0.0950	2.461	IEA
EAF coal	dry t	30.100	0.1082	3.257	IEA
SR/DRI coal	dry t	31.100	0.0950	2.955	worldsteel
Coke	dry t	30.100	0.1082	3.257	worldsteel
Charcoal	dry t	18.800	0.000	0.000	worldsteel
Heavy oil	m^3	37.700	0.0771	2.907	IEA
Light oil	m^3	35.100	0.0741	2.601	IEA
Kerosene	m^3	34.700	0.0715	2.481	IEA
LPG	t	47.300	0.0631	2.985	IEA
Natural gas	k.m3N	35.900	0.056	2.014	IEA
Limestone	dry t	0.000	0.000	0.440	IPCC
Crude dolomite	dry t	0.000	0.000	0.471	worldsteel
EAF/BOF electrodes	t	0.000	0.000	3.663	IPCC
Pig Iron	t	0.000	0.000	0.172	worldsteel
Gas based DRI	t	0.000	0.000	0.073	IPCC
Coal based DRI	t	0.000	0.000	0.073	IPCC
Ferro-Nickel	t	0.000	0.000	0.037	ISSF
Ferro-Chromium	t	0.000	0.000	0.275	ISSF
Ferro-Molybdenium	t	0.000	0.000	0.018	ISSF
Coke oven gas	$k.m^3N$	19.000	0.044	0.836	worldsteel
Blast furnace gas	$k.m^3N$	3.300	0.270	0.891	worldsteel
BOF gas	$k.m^3N$	8.400	0.180	1.512	worldsteel
Coal tar	t	37.000	0.092	3.389	WRI
Benzole	t	40.570	0.083	3.382	worldsteel

- The yellow boxes are modifiable. If the data is not measured or available, default values will be used.Measurement of carbon content and net caloric value is highly recommended to obtain more accurate CO_2 emissions.
- EAF/BOF electrodes

If the data of electrodes is available, enter the number of consumed electrodes in your site. Entering the data is highly recommended for EAF makers. If the data is not available or empty (in the case of scrap based sites), a default emission factor is considered as 0.005 tCO_2/total crude steel.

Upstream emission factors

Item	Unit	Energy Equiv. value (GJ/unit)	Emission factor (tCO_2/unit)	Reference
Coke	dry t	4.000	0.224	worldsteel
Heavy oil	m^3	0.000	0.275	IEA
Light oil	m^3	0.000	0.247	IEA
Kerosene	m^3	0.000	0.247	IEA
Burnt lime	t	4.500	0.950	worldsteel
Burnt dolomite	t	4.500	1.100	worldsteel
Pellets	t	2.100	0.137	worldsteel
EAF/BOF electrodes	t	0.000	0.650	worldsteel
Pig Iron	t	20.900	1.855	worldsteel
Gas based DRI	t	14.100	0.780	worldsteel
Coal based DRI	t	17.900	1.210	worldsteel
Electricity	MWh	9.800	0.504	IEA
Steam	t	3.800	0.195	IEA
Oxygen	$k.m^3N$	6.900	0.355	IEA
Nitrogen	$k.m^3N$	2.000	0.103	IEA
Argon	$k.m^3N$	2.000	0.103	worldsteel
Coke oven gas	$k.m^3N$	19.000	0.977	worldsteel
Blast furnace gas	$k.m^3N$	3.300	0.170	worldsteel
BOF gas	$k.m^3N$	8.400	0.432	worldsteel

- worldsteel: worldsteel Expert Group ISSF: ISSF Expert Group
- Both energy equiv. value and emission factor of electricity are world average values based on IEA CO_2 emissions from fuel combustion 2006. These values will be updated on an annual basis.
- eg. CO_2 Emission factor of Electricity = Energy equiv. value * conversion factor
  = 9.8 GJ/MWh * 0.0514 TCO_2/GJ = 0.504 TCO_2/MWh
- Energy equiv. value: 9.8 GJ/MWh , conversion factor: 0.0514 TCO_2/GJ (ref. IEA)

APPENDIX 4 (CONTINUED)

Note for byproduct gases

Item	Emission factor (tCO2/k.m3N)	
	Direct	Upstream
Coke Oven gas	0.836	0.977
Blast furnace gas	0.891	0.170
BOF gas	1.512	0.432

Calculation CO_2 emissions of byproduct gases

Scope 1 stands for direct emissions factor based on carbon content of each gas. As agreed by a worldsteel panel of experts, instead of using scope 1, the upstream emission factor which is an electricity-equivalent value will be used for calculating CO_2 emissions of byproduct gases.

Scope 1	Direct * (Purchased – Sold)
Scope 3	(Upstream-Direct) * (Purchased – Sold)
Total (Sum of Scope 1 and 3)	Upstream * (Purchased – Sold)

Credits

BF slag to cement	t	0.550
BOF slag to cement	t	0.300
CO2 to external	t	1.000

BF and BOF slag to cement are potential credits. Their emission factors are not finalised yet. They need to be determined after discussion among member companies and cement industries.

APPENDIX 4 (CONTINUED)

US to metric measurement conversion table

1 scf	Volume	0.026862 m^3N
1 gal	Volume	0.003785 m^3
1 lb	Weight	0.453592 kg
1 nt	Weight	0.907184 mt
1 mmBTU	Energy	1.054349 GJ
1 mBTU/scf	Energy	39.251136 MJ/m^3N
1 mBTU/nt	Energy	1.162222 MJ/mt
1 BTU/gal	Energy	0.278530 MJ/m^3

Conditions

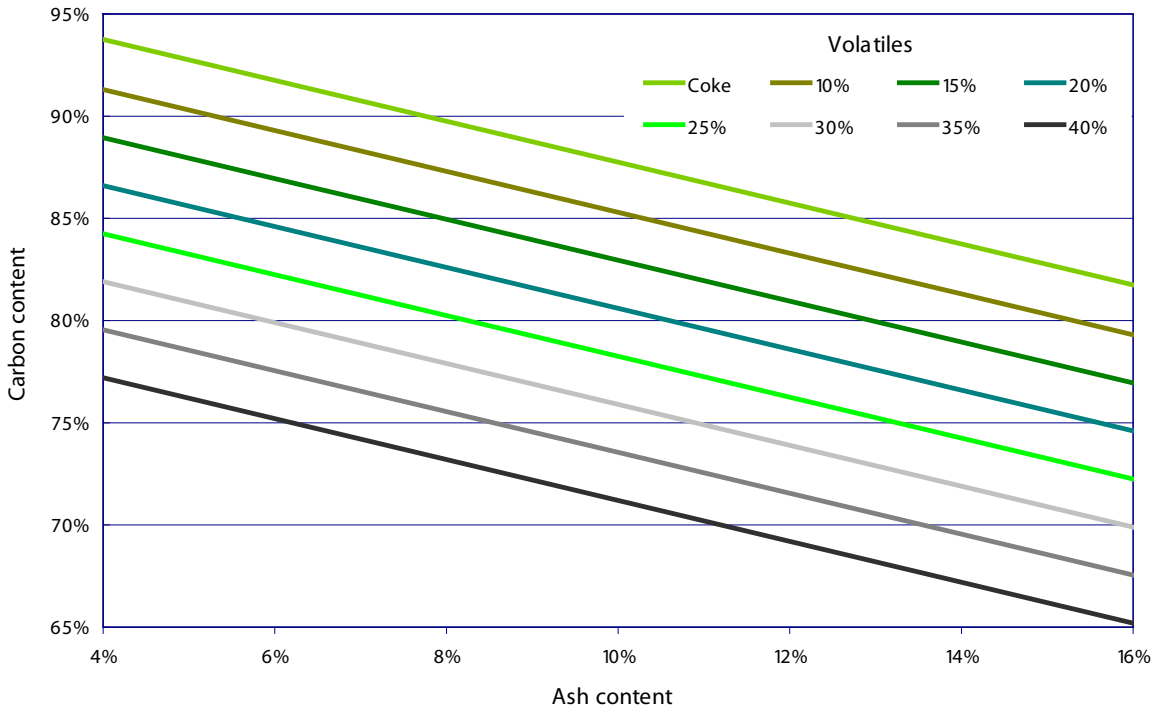
1 m^3N	1 atm (1.013 x 105 Pa) , 0 °C
1 scf	30 Hg – 60 °F

APPENDIX 6

Estimating total carbon content from proximate analysis

The following table shows the carbon content in coals and cokes.

Carbon content in coals and cokes



Use the following calculation to estimate the total carbon content:

Coals

Total carbon content, C = 100 - Ash - 0.47*Volatiles

Volatiles are considered as coke oven gas (53% carbon by weight)

Coke

Total carbon content, C = 97.75 – Ash

APPENDIX 7

Naming rules for sites

The following naming convention must be used for all site names.

Company	Sites		Full name
Four-letter code	001	Site name 1	AAAA001
	002	Site name 2	AAAA002

worldsteel
ASSOCIATION

World Steel Association

Rue Colonel Bourg 120
B-1140 Brussels
Belgium

T: +32 2 702 8900
F: +32 2 702 8899
E: steel@worldsteel.org

C413 Office Building
Beijing Lufthansa Center
50 Liangmaqiao Road
Chaoyang District
Beijing 100125
China

T: +86 10 6464 6733
F: +86 10 6464 6744
E: china@worldsteel.org

worldsteel.org