Guidelines for Accounting and Reporting Greenhouse Gas Emissions

Smelting and Rolling of Other Nonferrous Metals Industrial Enterprises

(Trial)

April, 2015

Instructions

I. Objectives and Significance of the Guidelines

In order to carry out the task of "establishing and perfecting greenhouse gas accounting system and gradually setting up a carbon emission trading market" as proposed in the *Outline of the 12th Five-Year Plan* and the requirements of "building greenhouse gas emission accounting system at the national, local and enterprise levels and carrying out the system of direct energy and greenhouse gas emission data reporting by key enterprises" as proposed in the *Work Plan for Greenhouse Gas Emission Control during the 12th Five-Year Plan* (GF[2011] No. 41), to reduce the CO_2 emission per unit of GDP by 40% to 50% by 2020based on 2005, the National Development and Reform Commission (NDRC) has compiled the *Guidelines for Accounting and Reporting Greenhouse Gas Emissions from the Smelting and Rolling of Other Nonferrous Metals Industrial Enterprises (Trial)*(the Guidelines), to help enterprises to (i) account and report their greenhouse gas emissions in a scientific and standard manner, (ii) formulate the greenhouse gas emissions control plan, (iii) actively participate in carbon emission trading, and (iv) strengthen their social responsibility. Meanwhile, the Guidelines lay a foundation for the authority to establish and implement greenhouse gas emissions reporting system for key enterprises, and provides support for grasping the greenhouse gas emissions of key enterprises and formulating relevant policy.

II. Preparation Process

The NDRC commissioned experts from Tsinghua University to compile the Guidelines. The drafting team has, based on the research findings and practice experiences of enterprises on the accounting and reporting of greenhouse gas emissions and the Guideline for Preparation of Provincial Greenhouse Gas List (Trial) issued by the NDRC Office as the reference, and through field survey, in-depth research and case studies, completed the Guidelines for Greenhouse Gas Emissions from the Smelting

and Rolling Industrial Enterprises of Other Nonferrous Metals (Trial). The drafting team strived so that the Guidelines shall be methodologically scientific, comprehensive, standardized and practical. During the preparation of the Guidelines, experts from China Nonferrous Metals Industry Association (CNMIA) and Aluminum Corporation of China offered valuable support.

III. Main Contents

The Guidelines for Accounting and Reporting Greenhouse Gas Emissions from the Smelting and Rolling Industrial Enterprises of Other Nonferrous Metals (Trial) consist of the text and the appendices. The text is comprised of seven sections, namely, scope of application, references, terms and definitions, accounting boundary, accounting methods, management requirements of data quality and contents and format of the report. Greenhouse gases subject to accounting are carbon dioxide (CO2) and methane (CH4). Categories of emission sources considered in the Guidelines include emissions from the combustion of fossil fuels, process emissions, emissions from the anaerobic treatment of waste water, and emissions embodied in net purchased electric power and heating power. The Guidelines apply to all enterprises eligible as legal persons and independent accounting entities that are considered legal persons engaged in the smelting and rolling industry of nonferrous metals except for aluminum and magnesium.

IV. Issues that Need Clarification

Enterprises engaged in the smelting and rolling of nonferrous metals (except for aluminum and magnesium) using the Guidelines shall deem independent corporate enterprises or independent accounting entities considered as legal persons at the lowest level as the boundary to account and report emissions of greenhouse gasses from all production facilities whose operation is under their control. Where the reporting entity is engaged in other product production activities with greenhouse gas emissions apart from melting and rolling of nonferrous metals (except for aluminum and magnesium) reference shall be made to the guidelines on greenhouse

gas emission accounting and reporting of enterprises in the relevant industries for accounting and reporting the greenhouse gas emissions of these production activities.

Enterprises shall provide corresponding activity level and emission factor data used for calculation of the discharge amount, which shall be used as the basis for checking and verification. Enterprises shall measure their activity levels and emission factor data as far as possible. For the sake of users, the Guidelines refer to many literatures including 2006 IPCC Guidelines for National Greenhouse Gas Inventories, IPCC Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories and Guidelines for Preparation of Provincial Greenhouse Gas Inventories (Trial). The Guidelines also provide parameter and emission factor values for some common fossil fuels for the reference of enterprises unable to conduct direct measurements.

Considering the fact that enterprise-based GHG emissions accounting and reporting are a completely new endeavor, some inadequacies may be found in the practical application, and it is hoped that those application units may provide their individual feedbacks in a timely manner, all aimed at making further revisions in the future.

The Guidelines are published by the National Development and Reform Commission, which is responsible for their interpretation and revision when appropriate.

Contents

1. Application Scope

The Guidelines provide terms, accounting boundary, accounting methods, management of data quality, and contents and format related with the accounting and reporting of greenhouse gas emissions of enterprises engaged in the smelting and rolling industry of nonferrous metals except for aluminum and magnesium.

The Guidelines apply to greenhouse gas emission accounting and reporting of Chinese enterprises engaged in smelting and rolling industry of nonferrous metals except for aluminum and magnesium. Enterprises engaged in the smelting and rolling of nonferrous metals (except for aluminum and magnesium) within the Chinese territory may account their greenhouse gas emissions according to methods provided in the Guidelines and prepare the report on greenhouse gas emissions. Where enterprises are engaged in other product production activities with greenhouse gas emissions apart from the smelting and rolling of other nonferrous metals, references shall be made to the guidelines of greenhouse gas emissions accounting and reporting for enterprises in the relevant industries for accounting and reporting the greenhouse gas emissions of these production activities. The greenhouse gas emissions involved in the Guidelines include carbon dioxide (CO2) only.

2. References

The following documents are indispensable for the application of the Guidelines. For quoted documents with dates, versions with dates are applicable to the Guidelines. For quoted documents without dates, their latest versions (including all revised versions) are applicable.

GB/T 213 Determination of Calorific Value of Coal;

GB/T 384 Determination of Calorific Value of Petroleum Products;

GB/T 22723 Energy Determination for Natural Gas; and

GB 17167 General Principle for Equipping and Managing of the Measuring Instrument of Energy in Energy Using Organization.

3.Terminology and Definitions

For the purpose of the Guidelines, the following terminology and definitions apply.

3.1 Greenhouse gases (GHGs)

A greenhouse gas is natural or man-made atmospheric component in gaseous state that absorbs and emits radiation within the thermal infrared range. There are six types of GHGs which are listed in Annex A of the Kyoto Protocol: carbon dioxide (CO2), methane (CH4), nitrous oxide (N2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulfur hexafluoride (SF6).

Note: Unless otherwise specified, the greenhouse gas emissions involved in the Guidelines only refer to carbon dioxide (CO2).

3.2 Reporting entity

Reporting entity refers to independent corporate enterprises or independent accounting entities considered as legal persons which generate greenhouse gas emissions.

3.3 Enterprises engaged in the smelting and rolling of other nonferrous metals

Enterprises engaged in the smelting and rolling of other nonferrous metals refer to enterprises eligible as legal persons or independent accounting entities that are considered legal persons engaged in the smelting and rolling of nonferrous metals except for aluminum and magnesium.

3.4 Emissions from fuel combustion

Emissions from fuel combustion refer to emissions of greenhouse gases produced from intentional oxidation of fossil fuels for the purpose of energy utilization1in various fixed or mobile combustion equipment (such as boilers, furnaces and internal combustion engines).

3.5 Emissions from fuels used as raw materials

[1]It means that the fuel is burned to provide heat or mechanical power to certain process.

Emissions from fuels used as raw materials refer to emissions of greenhouse gases produced from physical or chemical changes of fuels used as raw materials in industrial production. Enterprises from such sub-industries as copper, lead and aluminum smelting use coke, semi-coke, anthracite, natural gas and other types of fuel as a reducing agent and thus cause CO2 emissions.

3.6 Process emissions

Process emissions refer to emissions of CO2 produced by chemical changes of raw materials except for energy in industrial production.

Some nonferrous metals producing enterprises use limestone (whose main content is calcium carbonate) or dolomite (whose main content is magnesium carbonate and calcium carbonate) as the raw material or desulfurizing agent. The carbonate is decomposed, which causes emissions of CO2.

Moreover, the sub-industry of tombarthite uses sodium carbonate and other carbonates or oxalic acid as the raw material and form tombarthite carbonates and oxalates, which are roasted and decomposed and cause emissions of CO2.

3.7 Emissions embodied in net purchased electric power

Emissions embodied in net purchased electric power refer to emissions of CO2 produced from corresponding electric power production process of net purchased electric power consumed by an enterprise.

3.8 Emissions embodied in net purchased heating power

Emissions embodied in net purchased heating power refer to emissions of CO2 produced from corresponding heating power production process of net purchased heating power consumed by an enterprise.

Note: heating power includes steam and hot water.

3.9 Activity level

Activity level refers to the activity amount of production or consumption that causes emissions of greenhouse gases, such as the consumption of every type of fossil fuel, consumption of energy products as reducing agents, consumption of carbonates as the raw material, consumption of oxalic acid, the amount of net purchased electric power, and the amount of net purchased heating.

3.10 Emission factors

Emission factors refer to the amount of greenhouse gas emissions or removals per unit of activity level.

Note: For example, the CO2 emissions equivalent to the consumption of per TJ of fuels, the CO2 emissions equivalent to the decomposition of per ton of carbonate, the CO2 emissions equivalent to the decomposition of per ton of oxalic acid and the CO2 emissions equivalent to per KWh of net purchased electric power.

3.11 Coal oxidation rate

Coal oxidation rate refers to the rate of carbon oxidized in the process of fuel combustion. It represents the combustion efficiency of fuels.

4. Accounting Boundary

The reporting entity shall deem an independent corporate enterprise or the independent accounting entity considered as the legal person to be the enterprise boundary for accounting and reporting of greenhouse gas emissions from all production systems. Production systems include the basic production system, auxiliary production system and the affiliated production system that directly serves production. Among them, the auxiliary production system includes dynamics, power supply, water supply, testing, machine maintenance, warehousing and transportation in the plant area. The affiliated production system includes the production control and management system (headquarter) and the departments and units (such as the staff cafeteria, workshop bathrooms and health care stations) serving production in the plant area.

Where enterprises are engaged in other product production activities with greenhouse gas emissions that are not covered in the Guidelines apart from smelting and rolling of other nonferrous metals, references shall be made to the guidelines of greenhouse gas emissions accounting and reporting for enterprises in the relevant industries for accounting and reporting the greenhouse gas emissions of these

production activities. The accounting and reporting of greenhouse gas emissions in the above links shall be included into the total emissions of greenhouse gases of enterprises.

The scope of accounting and reporting of greenhouse gas emissions from the smelting and rolling of other nonferrous metals industrial enterprises mainly includes CO_2emissions from fuel combustion, emissions from energy products used as raw materials (CO2emissions caused by the consumption of metallurgical reducing agents, process emissions (emissions caused by the decomposition changes of various carbonates and oxalic acids consumed by enterprises), CO2emissions produced by electric and heating power purchased by enterprises. See Figure 1 for the greenhouse gas emissions and accounting boundary of the smelting and rolling of other nonferrous metals industrial enterprises.

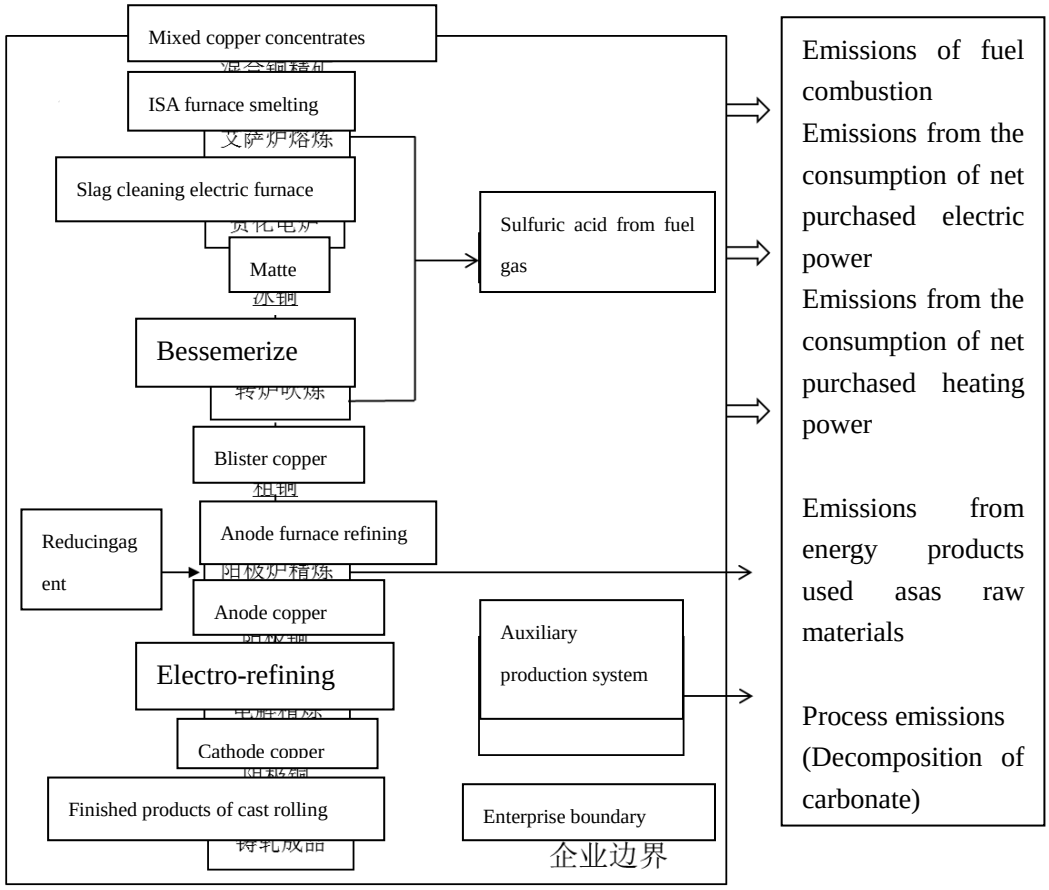

Figure 1 The greenhouse gas emissions and accounting boundary in the smelting and rolling of other nonferrous metals industrial enterprises (using smelting of copper as

an example)

4.1 Emissions from fuel combustion

The emissions from fuel combustion involved in the smelting and rolling of other nonferrous metals industrial enterprises refer to emissions of CO2 produced from the full combustion of coal, fuel gas, diesel and other fuels with oxygen in various fixed or mobile combustion equipment (such as boilers, furnaces and internal combustion engines).

4.2 Emissions from energy products used asas raw materials

Emissions from energy products used asas raw materials refer to emissions of CO2 produced from the consumption of metallurgical reducing agents. The metallurgical reducing agents that are commonly used include coke, semi-coke, anthracite, and natural gas.

4.3 Process emissions

The process emissions involved in the smelting and rolling of other nonferrous metals industrial enterprises mainly refer to the total emissions caused by the decomposition of various carbonates and oxalic acids consumed by enterprises.

4.4 Emissions embodied in net purchased electric power

Emissions embodied in net purchased electric power refer to CO2 emissions embodied in net purchased electric power consumed by enterprises.

4.5 Emissions embodied in net purchased heating power

Emissions embodied in net purchased heating power refer to CO2 emissions embodied in net purchased heating power (steam and hot water) consumed by enterprises.

5. Accounting Methodology

The complete workflows for the greenhouse gas emissions accounting and reporting of the reporting entity shall basically include the following:

(1) Determine the accounting boundary;

(2) Identify and determine the emission sources;

(3) Collect activity level data;

(4) Select and acquire emission factor data;

(5) Account the emissions of fuel combustion, emissions from energy products used as raw materials, process emissions and emissions embodied in net purchased electric power and heating power;

(6) Summarize the total greenhouse gas emissions of the enterprise.

The total emissions of greenhouse gases from the smelting and rolling of other nonferrous metals industrial enterprises are equal to the missions of fossil fuel combustion, emissions from energy products used asas raw materials, process emissions, and emissions from the net purchased electric and heating power of all production systems within the boundary of enterprises, and are calculated in line with Equation (1).

$$E = E_{combustion} + E_{rawmaterial} + E_{process} + E_{power} + E_{heat} \quad \text{……(1)}$$

where,

E refers to the total emissions of greenhouse gases of the reporting entity, and is expressed in unit tCO_2;

$E_{combustion}$ refers to the emissions of fuel combustion of the reporting entity, and is expressed in unittCO_2;

$E_{rawmaterial}$ refers to the emissions from energy products used asas raw materials and is expressed in unittCO_2;

$E_{process}$ refers to the process emissions and is expressed in unit tCO_2;

E_{power} refers to the emissions of electric power purchased by the reporting entity and is expressed in unit tCO_2; and

E_{heat} refers to the emissions of heating power purchased by the reporting entity and is expressed in unit tCO_2.

The emissions of greenhouse gases above are accounted in line with the following methods:

5.1 Emissions from fuel combustion

CO_2 emissions from fuel combustion of the reporting entity are equal to the sum of CO_2 emissions from the combustion of various fuels in the accounting and reporting year and are calculated in line with Equation (2).

$$E_{combustion} = \sum_{i=1}^{n} (AD_i \times EF_i) \quad \text{.....(2)}$$

where,

$E_{combustion}$ refers to the emissions of CO_2 produced in the combustion of fossil fuels in the year of accounting and reporting and is expressed in unit tCO_2.

AD_i refers to the activity factor of CO_2 of the i^{th} fossil fuel and is expressed in unit GJ；

EF_i refers to the emission factor of CO_2 of the i^{th} fossil fuel and is expressed in unit tCO_2/GJ； and

I refers to the code of the fossil fuel type.

5.1.1 Activity level data acquisition

The activity data of fuel combustion is the product of the consumption amount of various fuels and the average lower heating value in the year of accounting and reporting, and is expressed in Equation (3):

$$AD_i = NCV_i \times FC_i \quad \text{.....} \quad (3)$$

where,

AD_i refers to the activity data of the i^{th} fossil fuel in the year of accounting and reporting, and is expressed in GJ;

NCV_i refers to the average lower heating value of the i^{th} fuel in the year of accounting and reporting and applies the recommended value provided by Appendix II of the

Guidelines; for solid or liquefied fuels, in unit GJ/t; for gaseous fuels, in unit GJ/10,000 Nm^3; qualified enterprises may comply with *GB/T 213 Determination of Calorific Value of Coal, GB/T 384 Determination of Calorific Value of Petroleum Products* and *GB/T 22723 Energy Determination for Natural Gas, and conduct detection;*

FC_i refers to the net consumption of the i^{th} fuel in the year of accounting and reporting and applies the data of enterprises; relevant calculators shall comply with *GB 17167 General Principle for Equipping and Managing of the Measuring Instrument of Energy in Energy Using Organization*; for solid or liquefied fuels, in unit t; for gaseous fuels, in unit 10,000 Nm^3.

5.1.2 Emission factor data acquisition

The CO_2 emission factor of fuel combustion is calculated in line with Equation (4):

$$EF_i = CC_i \times OF_i \times \frac{44}{12} \quad \text{.....(4)}$$

where,

EF_i refers to the emission factor of CO_2 of the i^{th} fuel and is expressed in tCO_2/GJ;

CC_i refers to the carbon content of per unit of heating of the i^{th} fuel and is expressed in tC/GJ. Table 1 in the Appendix II may be referred to;

OF_i refers to the carbon oxidation rate of the i^{th} fuel and Table 1 in the Appendix II may be referred to; and

$\frac{44}{12}$ refers to the molecule ratio of CO_2 to carbon.

5.2 Emissions from energy products used as raw materials

Emissions from energy products used as raw materials refer to greenhouse gas emissions produced from chemical changes of fuels or energy products consumed as raw materials in industrial production. Enterprises in the sub-industries such as

copper, lead and zinc metallurgy use coke, semi-coke, anthracite, natural gas and other energy products as the reducing agents and cause the missions of CO_2.

The CO_2 emissions from energy products used as raw materials (metallurgical reducing agents) are calculated in line with Equation (5):

$$E_{raw\ material} = AD_{reducing\ agent} \times EF_{reducing\ agent} \quad \cdots\cdots(5)$$

where,

$E_{raw\ material}$ refers to the emissions of CO_2 caused by energy products used as raw materials in the year of accounting and reporting and is expressed in unit tCO_2.

$EF_{reducing\ agent}$ refers to the CO_2 emission factor of energy products used as the reducing agent, and is expressed in tCO_2 / treducing agent;

$AD_{reducing\ agent}$ refers to the activity level, the consumption of energy products used as the reducing agent in the year of accounting and reporting and is expressed in unit t for solid or liquefied energy; in unit 10,000Nm^3, for gaseous energy.

5.2.1 Activity level data acquisition

The needed activity level refers to the consumption of energy products used as the reducing agent in the year of accounting and reporting, applies the data of enterprises, and is expressed in unit t for solid or liquefied energy; and in unit 10,000Nm^3, for gaseous energy.

5.2.2. Emission factor data acquisition

The emission factor data apply the recommended value provided by Appendix II in the Guidelines.

5.3 Process emissions

Process emissions refer to the total emissions caused by the decomposition of various carbonates and oxalic acids consumed by enterprises, and are calculated in

line with Equation (6):

$$E_{process} = E_{oxalic\ acid} + \sum E_{carbonate} = AD_{oxalic\ acid} \times EF_{oxalic\ acid} + \sum (AD_{carbonate} \times EF_{carbonate}) \quad \text{.....（6）}$$

where,

$E_{process}$ refers to the process emission amount in the year of accounting and reporting and is expressed in unit tCO_2;

$E_{oxalic\ acid}$ refers to the process emissions caused by the decomposition of oxalic acid and is expressed in unit tCO_2;

$E_{carbonate}$ refers to the process emissions caused by the decomposition of carbonate and is expressed in unit tCO_2;

$AD_{oxalic\ acid}$ refers to te consumption of oxalic acid in the year of accounting and reporting and is expressed in unit t;

$AD_{carbonate}$ refers to the consumption of carbonate in the year of accounting and reporting and is expressed in unit t;

$EF_{oxalic\ acid}$ refers to the emission factor of CO_2decomposedby oxalic acid and is expressed in uint tCO_2 / toxalic acid; and

$EF_{carbonate}$ refers to the emission factor of CO_2decomposedbycarbonate and is expressed in unit tCO_2 / tcarbonate.

5.3.1 Activity level data acquisition

The needed activity level refers to the consumption of various oxalic acids and carbonates in the year of accounting and reporting, applies the data of enterprises and is expressed in unit t.

5.3.2 Emission factor data acquisition

The emission factor of CO_2 decomposed by carbonate applies the recommended value provided by Appendix II in the Guidelines.

The emission factor of CO_2 decomposed by carbonate is calculated in line with Equation (7).

$$EF_{oxalic\ acid} = 0.349 \times PUR_{oxalic\ acid} \cdots\cdots (7)$$

where,

$EF_{oxalic\ acid}$ refers to the emission factor of CO2 decomposed by oxalic acid and is expressed in unit tCO_2 ／ toxalic acid;

0.349 refers to the molecule ratio of CO_2 to industrial oxalic acid; and

$PUR_{oxalic\ acid}$ refers to the purity (content) of oxalic acid and applies the standard value provided by the supplier; where the standard value is unavailable, the default value, 99.6%, is used.

5.4 Emissions from net purchased electric power

The CO_2 emissions from corresponding electric power production process of net purchased electric power consumed by an enterprise is calculated in line with Equation (8):

$$E_{power} = AD_{power} \times EF_{power} \quad \cdots\cdots (8)$$

where,

E_{power} refers to the CO_2 emissions from corresponding electric power production process of net purchased electric power and is expressed in unit tCO_2;

AD_{power} refers to the net purchased power in the accounting and reporting year and is expressed in MWh; and

EF_{power} refers to the emission factor of the annual average power supply of regional grids and is expressed in tCO_2/MWh.

5.4.1 Activity level data acquisition

The net purchased heat in the accounting and reporting year refers to the total heat purchased by enterprises deducted by the heat sold by enterprises. The activity data is determined by the heat record of enterprises, the invoice of heat fees provided by

the supplier or the data on the final statement and other accounting vouchers.

5.4.2 Emission factor data acquisition

The emission factor of power consumption shall be divided according to the geographical location of enterprises in relation to the current electrical grid divisions between Northeast, North China, East China, Central China, Northwest and Southern China, and applies the emission factor of corresponding region released by the authorities in the most recent years.

5.5 Emissions from net purchased heating power

The hidden CO_2 emissions from corresponding heating power production process of net purchased heating power consumed by an enterprise is calculated in line with Equation (9):

$$E_{heat}=AD_{heat}\times EF_{heat} \quad \ldots\ldots (9)$$

where,

E_{heat} refers to the CO_2 emissions from corresponding heating power production process of net purchased heating power and is expressed in unit tCO_2;

AD_{heat} refers to consumption of net heat purchased by the enterprise in the accounting and reporting year, and is expressed in unit GJ; and

EF_{heat} refers to the annual average emission factor of heat and is expressed in unit tCO_2/GJ.

5.5.1 Activity level data acquisition

The net purchased heating power in the accounting and reporting year refers to the total heating power purchased by enterprises deducted by the heating power they sell. The activity data is determined by the heat record of enterprises, the invoice of heat fees provided by the supplier or the data on the final statement and other accounting vouchers.

5.5.2 Emission factor data acquisition

The emission factor of power consumption may use the recommended value, 0.11tCO_2/GJ, or the official data released by the government.

6. Quality Assurance and Documentation

The reporting entity shall strengthen the quality management of greenhouse gas data, including but not limited to:

6.1 Establish the rules and regulations for quantification and reporting of greenhouse gases of the enterprise, including organizations and personnel in charge, work procedure and contents, work cycle and time; special personnel shall be designated for the accounting and reporting of greenhouse gas emissions of enterprises.

6.2 Rank various types of greenhouse gases in line with their importance and establish the list of greenhouse gas sources of enterprises. Raise corresponding requirements for the acquisition of the activity data and emission factor data of different ranks.

6.3 Evaluate the current monitoring conditions, continuously enhance the monitoring ability of enterprises and formulate corresponding monitoring plans, including monitoring over the activity data, lower heating value, and the average purity of dolomite; conduct regular maintenance and management for calculators, detection equipment and online monitors, and record data for filing.

6.4 Establish a complete record and management system for greenhouse gas data, including data sources, acquisition time, and relevant personnel in charge.

6.5 Establish an interior audit and verification system for the greenhouse gas emissions of enterprises. Cross-check the data of greenhouse gas emissions regularly, identify possible risks of data errors and provide corresponding solutions.

7. Contents and Format of Report

The reporting entity shall report the following contents as per the format shown in

Appendix I.

7.1 Basic information of the reporting entity

The basic information of the reporting entity shall include the name, property, reporting year, industry involved, organization or institution code, legal representative, person in charge and contact information of the reporting entity.

7.2Emissions of greenhouse gases

The reporting entity shall report the total annual emissions of greenhouse gases, and respectively report the emissions of fuel combustion, emissions from energy products used asas raw materials, process emissions and emissions implied in net amounts of electric power and heating power purchased.

7.3 Activity level data and data sources

The reporting entity shall report the net consumption and corresponding lower heating values of various fuels used for industrial production, consumption of energy products used as a reducing agent, consumption of oxalic acid, consumption of various carbonates, and the amount of net electric and heat power purchased in the reporting year and specify the sources of these data (apply the recommended values or detected values in the Guidelines).

Where enterprises are engaged in other product production activities with greenhouse gas emissions that are not covered by the Guidelines apart from smelting and rolling of other nonferrous metals, references shall be made to the guidelines of greenhouse gas emission accounting and reporting for enterprises in the relevant industries for accounting and reporting the greenhouse gas emissions of these production activities, and the activity level data and data sources shall be reported.

7.4 Emission factor data and data sources

The reporting entity shall report the carbon content and carbon oxidation date per unit of heat of various fuels used for industrial production in the reporting year, the emission factor of energy products used as a reducing agent, the emission factor of oxalic acid, the emission factor of various carbonates, and the emission factor of electric and heating power, and specify the sources of these data (apply the recommended values or detected values in the Guidelines).

Where enterprises are engaged in other product production activities with greenhouse gas emissions that are not covered by the Guidelines apart from smelting and rolling of other nonferrous metals, references shall be made to the guidelines of greenhouse gas emission accounting and reporting for enterprises in the relevant industries for accounting and reporting the greenhouse gas emissions of these production activities, and the emission factor data and data sources shall be reported.

Appendix I: Report Format Template

Greenhouse Gas Emissions Report for the Smelting and Rolling of Other Nonferrous Metals Industrial Enterprises

Reporting entity (seal):

Reporting year:

Date of preparation:

The enterprise calculated its greenhouse gas emissions of the year _____and filled out the related data sheets. The reporting entity herewith reports the relevant information as follows:

I Basic information of the reporting entity

II Emissions of greenhouse gas

III Description of data of activity level and the data sources

IV Description of data of emission factor and the data sources

This report is true and reliable. If the information provided in this report fails to reflect the reality, this enterprise represented by its legal person will bear the corresponding legal responsibility.

Legal person (Signature):

Date

Attachments:

Table 1-1: Summary Sheet of CO_2 Emissions of the Reporting Entity

Table 1-2: Data Sheet of Activity Level of the Reporting Entity

Table 1-3: Data Sheet of Emission Factor of the Reporting Entity

Table 1-1: Summary Sheet of CO_2 Emissions of the Reporting Entity in (Unit: tCO_2)

Type of source	Emissions (Units: ton CO2)
Fuel combustion	
Energy as raw materials	
Industrial production process	
CO_2 emissions from net electric power purchased	
CO_2 emissions from net heating power purchased	
Total emissions of greenhouse gas of the enterprise:	

Table 1-2: Data Sheet of Activity Level of the Reporting Entity

	Type of fuel	Net consumptionamount(t/10,000 Nm^3)	Lower heating value (GJ/t, GJ/10,000 Nm^3)
Combustion of fossil fuels*	Anthracite		
	Bitumite		
	Lignite		
	Cleaned coal		
	Other washed coal		
	Other coal products		
	Petroleum coke		
	Coke		
	Crude oil		
	Fuel oil		
	Gasoline		
	Diesel		
	Kerosene		
	Liquefied natural gas		
	Liquefied petroleum gas		
	Coal tar		
	Coke oven gas		
	Blast furnace gas		
	Converter gas		
	Other gas		
	Natural gas		

	Refined dry gas		
Energy as raw materials**	Parameters	Data	Unit
	Consumption of semi-coke as the reducing agent		t
	Consumption of coke as the reducing agent		t
	Consumption of anthracite as the reducing agent		t
	Consumption of natural gas as the reducing agent		10,000Nm^3
Industrial production process	Consumption of sodium carbonate		t
	Consumption of limestone		t
	Consumption of dolomite		t
	Consumption of oxalic acid		t
Net purchased power and heat	Electric power purchased from other enterprises		MWh
	Electric power sold		MWh
	Heating power purchased from other enterprises		GJ
	Heating power sold		GJ

*The reporting entity shall add other types of energy that are not listed in the table but actually consumed by the enterprise;

**Where the reporting entity is involved in product production activities with greenhouse gas emissions not covered in the Guidelines apart from the smelting and rolling of other nonferrous metals, it shall specify them in a new report.

Table 1-3: Data Sheet of Emission Factor of the Reporting Entity

	Type of fuel	Net consumptionamount (ton carbon/10,000 Nm^3)	Lower heating value[2] (GJ/10,000 Nm^3)
Combustion of fossil fuels*	Anthracite		
	Bitumite		
	Lignite		
	Cleaned coal		
	Other washed coal		
	Other coal products		
	Petroleum coke		
	Coke		
	Crude oil		
	Fuel oil		
	Gasoline		
	Diesel		
	Kerosene		
	Liquefied natural gas		
	Liquefied petroleum gas		
	Coal tar		
	Coke oven gas		
	Blast furnace gas		
	Converter gas		
	Other gas		
	Natural gas		

	Refined dry gas		
Energy as raw materials	Parameters	Data	Unit
	Consumption of semi-coke as the reducing agent		tCO_2/t
	Consumption of coke as the reducing agent		tCO_2/t
	Consumption of anthracite as the reducing agent		tCO_2/t
	Consumption of natural gas as the reducing agent		$tCO_2/10{,}000Nm^3$
Industrial production process	Emission factor decomposed by sodium carbonate		tCO_2/t
	Emission factor decomposed by limestone		tCO_2/t
	Emission factor decomposed by dolomite		tCO_2/t
	The purity (content) of oxalic acid		%
Net purchased power and heat	Emission factor of power consumption		tCO_2/MWh
	Emission factor of heat consumption		tCO_2/GJ

*The reporting entity shall add other types of energy that are not listed in the table but actually consumed by the enterprise;

**Where the reporting entity is involved in product production activities with greenhouse gas emissions not covered in the Guidelines apart from the smelting and rolling of other nonferrous metals, it shall specify them in a new report.

Appendix II: Relevant Default Values

Table 2-1: Default Values of Parameters of Common Fossil Fuels

Type of fuel		Unit	Lower heating value (GJ/t, GJ/$\times 10^4$Nm^3)	Carbon content in unit heat value (tC/GJ)	Carbon oxidation rate of the fuel
Solid fuels	Anthracite	t	26.7[c]	27.4[b]×10^{-3}	94%
	Bitumite	t	19.570[d]	26.1[b]×10^{-3}	93%
	Lignite	t	11.9[c]	28.0[b]×10^{-3}	96%
	Dry-cleaned coal	t	26.334[a]	25.41[b]×10^{-3}	90%
	Other washed coal	t	12.545[a]	25.41[b]×10^{-3}	90%
	Other coal products	t	17.460[d]	33.60[d]×10^{-3}	90%
	Petroleum coke	t	32.5[c]	27.5[b]×10^{-3}	100%
	Coke	t	28.435[a]	29.5[b]×10^{-3}	93%
Liquid fuels	Crude oil	t	41.816[a]	20.1[b]×10^{-3}	98%
	Fuel oil	t	41.816[a]	21.1[b]×10^{-3}	98%
	Gasoline	t	43.070[a]	18.9[b]×10^{-3}	98%
	Diesel	t	42.652[a]	20.2[b]×10^{-3}	98%
	Kerosene	t	43.070[a]	19.6[b]×10^{-3}	98%
	Liquefied natural gas	t	44.2[c]	17.2[b]×10^{-3}	98%
	Liquefied petroleum gas	t	50.179[a]	17.2[b]×10^{-3}	98%
	Refinery dry gas	t	45.998[a]	18.2[b]×10^{-3}	98%
	Coke tar	t	33.453[a]	22.0[c]×10^{-3}	98%
Gas fuels	Coke oven gas	10^{4}Nm^3	179.81[a]	13.58[b]×10^{-3}	99%
	Blast furnace gas	10^{4}Nm^3	33.000[d]	70.8[c]×10^{-3}	99%
	Converter gas	10^{4}Nm^3	84.000[d]	49.60[d]×10^{-3}	99%
	Other coal gases	10^{4}Nm^3	52.270[a]	12.2[b]×10^{-3}	99%
	Natural gas	10^{4}Nm^3	389.31[a]	15.3[b]×10^{-3}	99%

Notes: *China Energy Statistical Yearbook (2013); Guidelines for Provincial Greenhouse Gas Inventories(Trial)*； *IPCC Guidelines for National Greenhouse Gas Inventories (2006);* and *experience data of the industry*

Table 2-2: Recommended Emission Factor Values of Energy Products Usedas Raw Materials

Parameters	**Unit**	**Data**
Emission factor of semi-coke as the reducing agent	tCO_2/t	2.853
Emission factor of coke as the reducing agent	tCO_2/t	2.862
Emission factor of anthracite as the reducing agent	tCO_2/t	1.924
Emission factor of natural gas as the reducing agent	$tCO_2/10,000\ Nm^3$	21.622

Sources：*China Energy Statistical Yearbook (2013)*； *Guidelines for Provincial Greenhouse Gas Inventories(Trial)*； and *experience data of the industry*

Table 2-3: Recommended Values of Process Emission Factors

Parameters	Unit	Data
Emission factor decomposed by sodium carbonate	tCO_2/t	0.411
Emission factor decomposed by limestone	tCO_2/t	0.405
Emission factor decomposed by dolomite	tCO_2/t	0.468
Purity (content) of oxalic acid	%	99.6

Source: Industrial experience data

Table2-4: Recommended Values of Other Emission Factors

Parameters	Unit	Emission factor of CO_2
Emissionfactor of powerconsumption	tCO_2/MWh	Apply the value most recently released by the state
Emissionfactor of heatconsumption	tCO_2/GJ	0.11

References

[1] *Guidelines for Provincial Greenhouse Gas Inventories (Trial)*;

[2] *China Energy Statistical Yearbook (2013)*;

[3] *IPCC Guidelines for National Greenhouse Gas Inventories (1996)*; and

[4] *IPCC Guidelines for National Greenhouse Gas Inventories (2006).*