Guidelines for Accounting and Reporting Greenhouse Gas Emissions

China Papermaking and Paper Product Production Enterprises

(Trial)

April, 2015

Instructions

I Objectives and Significance of the Guidelines

In line with 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 emissions for 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 China Papermaking and Paper Product Production 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 emission control plan, (iii) actively participate in carbon emissions trading, and (iv) strengthen their social responsibility. Meanwhile, it lays 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 develop the Guidelines. The preparation group 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 Accounting and Reporting Greenhouse Gas

Emissions from China Paper and Paper Product Production Enterprises (Trial). The preparation team strived so that the Guidelines shall be methodologically scientific, comprehensive, standardized and practical. During the preparation of the Guidelines, experts from China National Light Industry Council and China Paper Association offered vigorous supports.

III Main Contents

The Guidelines for Accounting and Reporting Greenhouse Gas Emissions from China Paper and Paper Product Production Enterprises consists of the text and two appendices. The text is comprised of seven sections, namely, scope of application, references, terms and definitions, accounting boundary, accounting methods, data quality management requirements, and report contents and format. Greenhouse gases subject to accounting are carbon dioxide (CO2) and methane (CH3). 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 from 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 that are engaged in paper and paper product production.

IV Issues that Need Clarification

The Guidelines for Accounting and Reporting Greenhouse Gas Emissions from China Paper and Paper Product Production Enterprises (Trial) provide recommended parameters and emission factors needed by accounting, which refer to many literatures including the Guidelines for Preparation of Provincial Greenhouse Gas Inventories (Trial), China Energy Statistical Yearbook, and IPCC Guidelines for National Greenhouse Gas Inventories.

Considering the fact that enterprise-based GHG emissions accounting and reporting are a completely new and complicated endeavor, some inadequacies may be found in practical application of the Guidelines, 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 report contents and format related with the accounting and reporting of greenhouse gas emissions of enterprises engaged in paper and paper product production.

The Guidelines apply to greenhouse gas emissions accounting and reporting of Chinese enterprises engaged in production of paper and paper products. Enterprises with paper and paper product production as their main business may account their greenhouse gas emissions according to the methods provided in the Guidelines and prepare the corporate report on greenhouse gas emissions. Where enterprises are engaged in other product production activities with greenhouse gas emissions apart from paper and paper product production, 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. The greenhouse gas emissions involved in the Guidelines only include emissions of carbon dioxide (CO2) and methane (CH4).

2. References

The following documents are necessary for the application of the Guidelines. For quoted documents with dates, only 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), perfluoro-carbon (PFCs) and sulfur hexafluoride (SF6).

Note: Unless otherwise specified, the greenhouse gases involved in the Guidelines include carbon dioxide (CO2) and methane (CH4) only.

3.2 Reporting entity

Reporting entity refers to independent corporate enterprises or independent accounting entities considered as legal persons that generate greenhouse gas emissions, which shall be accounted and reported.

3.3 Enterprises engaged in paper and paper product production

Enterprises engaged in paper and paper product production refer to all enterprises eligible as legal persons and independent accounting entities that are considered legal persons engaged in paper and paper product production.

3.4 Emissions from fossil fuel combustion

Emissions from fossil fuel combustion refer to emissions of greenhouse gases produced from intentional oxidation of fossil fuels for the purpose of energy utilization1.

[1] The purpose of fuel combustion is to provide heat or mechanical power for certain process.

3.5 Process emissions

Process emissions refer to emissions of greenhouse gases produced by physical or chemical changes apart from fuel combustion in the production process. Some paper and paper product production enterprises use limestone (whose main content is calcium carbonate) as a raw material or desulfurizing agent; the carbonate is decomposed, which causes emissions of CO2.

3.6 CO2 emissions embodied in net purchased electric power

CO2 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.

3.7s CO2 emissions embodied in net purchased heating power

CO2 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.

3.8 Emissions from the anaerobic treatment of waste water

Pulp and paper enterprises produce industrial waste water and cause the emission of methane when they use the anaerobic technology to treat high-concentration, organic waste water.

3.9 Activity level

Activity level refers to the activity amount of production or consumption that causes emissions of greenhouse gases.

Notes: Includes notably the consumption of various types of fossil fuels, consumption of limestone as the raw material, the amount of net purchased electric power, the amount of net purchased heating power, the amount of organics in the waste water of enterprises and the amount of methane recycled by enterprises.

3.10 Emission factors

Emission factors refer to quantity of greenhouse gas emissions per unit of a given type of production or consumption.

Note: For example, the CO2 emissions equivalent to the consumption of per TJ of fuels, the CO2emissions equivalent to the decomposition of per ton of limestone, the CO2 emissions equivalent to per KWh of electric power, and the CO2emissions equivalent to per ton of organics in the treatment of industrial water.

3.11 Coal oxidation rate

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

3.12 Global warming potential (GWP)

Global warming potential refers to the parameter that relates the influence on infraredradiation of a certain greenhouse gas in a certain period of time with that of an equivalent amount of CO2.

3.13 Carbon dioxide equivalent

Carbon dioxide equivalent expresses the amount of CO2which would need to be released to equal the global warming potential of a given quantity of another greenhouse gas.

Notes: The carbon dioxide equivalent of greenhouse gases is equal to the quantity of a given greenhouse gas multiplied by its global warming potential.

4. Accounting Boundary

The reporting entity shall deem independent corporate enterprise or the independent accounting entity considered as the legal person as 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.

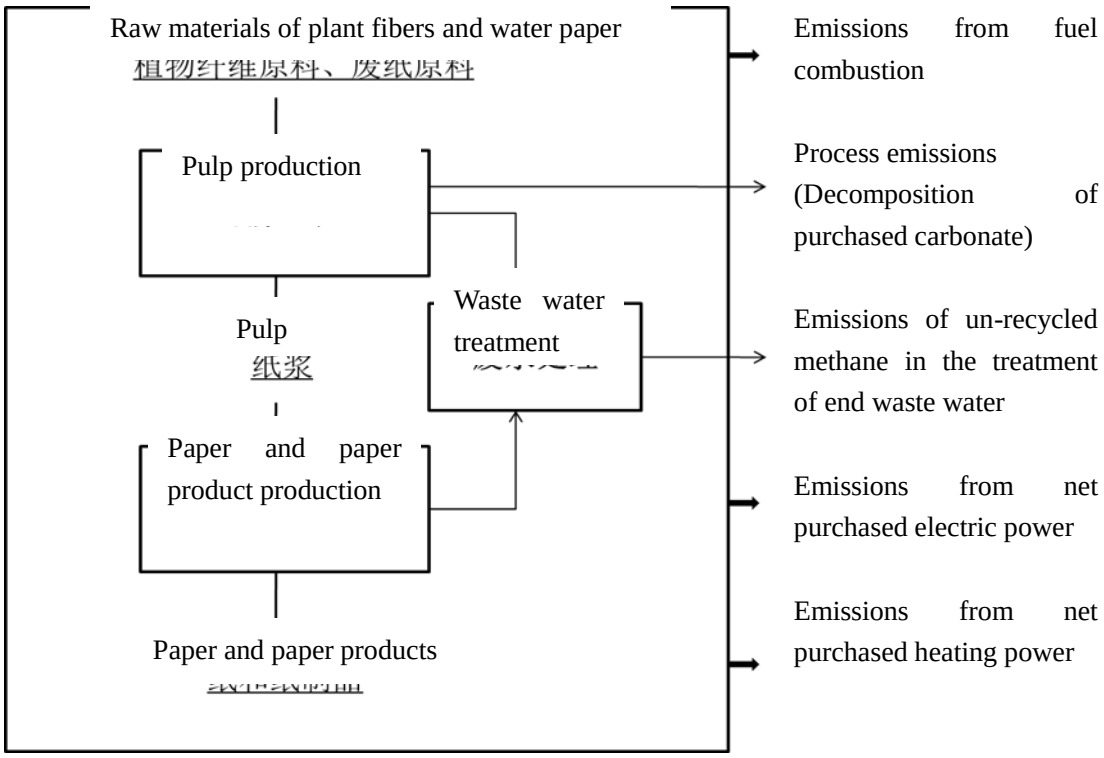

Figure 1The accounting boundary of greenhouse gases produced by paper and paper product production enterprises

Where enterprises are engaged in other production activities with greenhouse gas emissions apart from paper and paper products, 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 emission 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.

4.1 CO_2 emissions from fossil fuel combustion

The emissions from fossil fuel combustion involved by paper and paper product production enterprises refer to emissions of CO2 produced from the complete 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 Process emissions

The process emissions involved in the paper and paper product production of enterprises mainly refer to the CO2 emissions caused by the decomposition of limestone(whose main content is calcium carbonate) purchased and consumed by enterprises.

4.3 CO2 emissions embodied in net purchased electric power

CO2 emissions embodied in net purchased electric power refer to CO2emissions embodied in the net purchased electric power consumed by enterprises. This part of emission is actually from power production enterprises.

4.4 CO2emissions embodied in net purchased heating power

CO2 emissions embodied in net purchased heating power refer to CO2emissions embodied in the net purchased heating power (steam and hot water) consumed by enterprises. This part of emission is actually from heating power production enterprises.

4.5 Methane emissions from the anaerobic treatment of waste water

Pulp and paper enterprises produce industrial waste water and cause emissions of methane when they use anaerobic technology to treat high-concentration, organic waste water.

Notes: The nitrous oxide emissions of paper and paper product production enterprises caused by their waste water treatment are no more than 1% of their total emissions, and thus are not considered.

5. Accounting Methodology

The complete workflows for corporate 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 from fossil fuel combustion, process emissions, emissions embodied in net purchased electric power and heating power, and emissions from waste water treatment;

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

The total emissions of greenhouse gases from paper and paper product production enterprises are equal to the emissions from fossil fuel combustion, process emissions, emissions from the net purchased electric and heating power, and total emissions from waste water treatment of all production systems within the boundary of enterprises. They are calculated using Equation (1):

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

where,

E refers to the total emissions of greenhouse gases of enterprises and is expressed in unit tCO_2e;

$E_{\text{combustion}}$ refers to the emissions of fuel combustion of enterprises and is expressed in unittCO_2;

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

$E_{\text{power and heat}}$ refers to the emissions of electric and heating power purchased by enterprises and is expressed in unit tCO_2; and

$E_{\text{waste water}}$ refers to emissions produced from the anaerobic treatment of waste water and is expressed in unittCO_2e.

The emissions of greenhouse gases above are accounted using the following methods:

5.1 Emissions from fossil fuel combustion

The CO_2 emissions from fossil fuel combustion are equal to the sum of CO_2 emissions from the combustion of various fossil fuels in the accounting and reporting year and are calculated using 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 in the accounting and reporting year 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 level of fossil fuel combustion is the product of the consumption amount of various fossil fuels and the average lower heating value in the accounting and reporting year, and is expressed in Equation (3):

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

where,

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

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

5.1.2Emission factor data acquisition

The CO_2 emission factor of fossil fuel combustion is calculated using Equation (4):

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

where,

EF_i refers to the CO_2emission factor of the i^{th}fossil fuel and is expressed in unit tCO_2/TJ;

CC_i refers to the carbon content for per unit of heat of the i^{th} fuel and is expressed in unit tC/GJ. The recommended value provided in Appendix II of the Guidelines may be referred to; and

OF_i refers to the carbon oxidation rate of the i^{th}fossil fuel, is expressed in unit % and applies the recommended value provided in Appendix II of the Guidelines.

5.2 Process emissions

Process emissions refer to CO_2 emissions produced by the decomposition of limestone (whose main content is calcium carbonate) purchased and consumed by enterprises, and are calculated using Equation (5):

$$E_{process} = L \times EF_{limestone} \quad (5)$$

where,

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

L refers to the consumption of limestone in the accounting and reporting year and is expressed in unit t; and

$EF_{limestone}$ refers to the CO_2 emission factor of roasted limestone and is expressed in unit tCO_2/tlimestone.

5.2.1 Activity level data acquisition

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

5.2.1 Emission factor data acquisition

The emission factor shall apply the recommended value, i.e. 0.405 tCO_2/tlimestone.

5.3 Indirect CO_2 emissions from net purchase of power

The emissions refer to the indirect CO_2 emissions in the power production link equivalent to power purchased by enterprises and are calculated using Equation (6):

$$E_{power} = AD_{power} \times EF_{power} \quad \ldots\ldots (6)$$

where,

E_{power} refers to the CO_2 emissions in the power production link equivalent to power

purchased 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 average power emission factor of regional grids and is expressed in tCO_2/MWh.

5.3.1 Activity level data acquisition

The net purchased electric power in the accounting and reporting year refers to the total power purchased by enterprises less any power they sell. The activity level data are determined by the power record of enterprises, the invoice of power fees provided by the supplier or the data on the final statement and other accounting vouchers.

5.3.2 Emission factor data acquisition

The emission factor of power consumption shall be divided according to the geographic location of enterprises' production centers in relation to the current electrical grids in Northeast, North China, East China, Central China, Northwest and South. The emission factor of the corresponding electrical grid released by the authorities in recent years are applied.

5.4 Indirect CO2 emissions from net purchase of heat

The emissions refer to the indirect CO_2 emissions from net purchase of heat in the heat production link and is calculated using Equation (7):

$$E_{heat}=AD_{heat}\times EF_{heat} \quad \ldots\ldots (7)$$

where,

E_{heat} refers to the CO_2 emissions in the heat production link equivalent to purchased heat 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 ton CO_2/GJ.

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 less any heat they sell. The activity data are 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 may use the recommend value, 0.11tCO_2/GJ, or the official data released by the government.

5.5 Emissions from the anaerobic treatment of waste water

The emissions refer to the methane emissions produced from the anaerobic treatment of industrial waste water in the production of enterprises and are calculated using the following equation:

$$E_{GHG\_waste\ water}=E_{CH4\_wate\ water}\times wat_{CH4}\times H4^{-3} \quad (8)$$

where,

$E_{GHG\_waste\ water}$ refers to the CO_2 equivalent produced in the anaerobic treatment of waste water, and is expressed in unittCO_2e;

GWP_{CH4} refers to the GWP value of methane, and according to the *Guideline for Preparation of Provincial Greenhouse Gas List (Trial)*, is 21;

$$E_{CH4\_wate\ water}=(TOW—S)\cdot EF—R \quad (9)$$

where,

$E_{CH4\_waste\ water}$ refers to the emissions of methane in the anaerobic treatment of waste water (kg);

TOW refers to the total amount of organics eliminated by the anaerobic treatment of waste water (kg COD);

S refers to the total amount of organics eliminated through sludge (kg COD);

EF refers to the emission factor of methane (kg methane/kg COD); and

R refers to the recycled amount of methane (kg methane).

5.5.1 Activity level data acquisition

Activity level data include the total amount of organics (TOW) eliminated through the anaerobic treatment of waste water, the total amount of organics eliminated through sludge (S) and the recycled amount of methane (R).

5.5.1.1 TOW data acquisition

If the enterprise has data on COD eliminated through the anaerobic treatment of waste water, the data can be directly used for TOW. Otherwise, the enterprise may use Equation (10):

$TOW=W:COD_{in}—COD_{out}）$ (10)

W	The amount of waste water produced from the anaerobic treatment (m^3); use the statistic data of the enterprise;
COD_{in}	The concentration of chemical oxygen demand in waste water at the entrance of the anaerobic treatment system (kg COD/m^3); use the average detected value of the enterprise;
COD_{out}	The concentration of chemical oxygen demand in waste water at the exit of the anaerobic treatment system (kg COD/m^3); use the average detected value of the enterprise;

5.5.1.2 S data acquisition

Use the calculated data of the enterprise. If the enterprise is unable to calculate the total amount of organics eliminated through sludge, the default value, 0, may be

used.

5.5.1.3. R data acquisition

Use the calculated data, account, or statistical statement of the enterprise.

5.5.2 Emission factor data acquisition

Use Equation (11):

$$EF=Bo*MCF \quad (11)$$

Bo — The maximum production capacity of the anaerobictreatment of waste water (kg methane/kg COD); and

MCF — Methane correction factor, no dimension, the maximum productioncapacity (Bo) reached by diffierent treatment and emission means or systems, and the anaerobic extent of the system.

The maximum production capacity (Bo) of methane in the anaerobic treatment of waste water prefers data most recently released by the state; if such data are unavailable, the recommended value, 0.25 kg methane/kg COD, in the Guidelines may be used.

For the methane correction factor, MCF, enterprises with conditions may conduct detection themselves or commission qualified professional institutions to conduct detection, or use the recommended value, 0.5, in this Guideline.

6. Management of Data Quality

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 according to 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 emission sources with different ranks.

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

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 the 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 in Appendix I.

7.1Basic 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 amount of greenhouse gas emissions, and respectively report the emissions from fossil fuel combustion, process emissions, emissions implied in net purchased electric and heating power and emissions from the anaerobic treatment of waste water.

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 in the reporting year, consumption of limestone, the amount of net purchased electric and heating power, the total amount of organics through the anaerobic treatment of waste water, the amount of waste water produced from the anaerobic treatment, the concentration of chemical oxygen demand in the waste water from the entrance of the anaerobic treatment system, the concentration of chemical oxygen demand in the waste water from the exit of the anaerobic treatment system, the total amount of organics eliminated by way of sludge, and the amount of recycled methane, and specify the sources of these data (apply the recommended value or detected value 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 paper and paper product production, 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 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 rate for per unit of heat of various fuels used in industrial production in the reporting year,

the emission factor of limestone, the emission factor of electric and heating power of the production place of the reporting entity, the maximum production capacity and correction factor of methane in the anaerobic treatment system of waste water, and specify the sources of these data (apply the recommended value or detected value 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 paper and paper product production, 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 and the activity level data and data sources shall be reported.

Appendix I: Report Format Template

Greenhouse Gas Emissions Report for China Paper and Paper Product Production 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 gases

III Description of data of activity level and the data sources

IV Description of data of emission factor and the data sources

The report is true and reliable. If the information provided in this report fails to reflect the reality, this enterprise will bear the corresponding legal responsibility.

Legal person (Signature):

Date

Attachments:

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

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 Annual Greenhouse Gas Emissions of the Reporting Entity (Unit: tCO_2e)

	CO_2	Methane	Total
Total CO2 emissions of the enterprise			
Emissions from fossil fuel combustion		/	
Process emissions		/	
Emissions from net purchased electric power		/	
Emissions from net purchased heating power		/	
Emissions from waste water treatment	/		

Table 1-2: Data Sheet of Activity Level 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		
Process emission	Parameters	Data	Unit
	Consumption of limestone		t
Net purchased electric and heating power	Electric power purchased from other enterprises		MWh
	Electric power sold		MWh
	Heating power purchased from other enterprises		GJ
	Heating power sold		GJ
Waste water treatment	The total amount of organics eliminated through the anaerobic treatment of waste water		kgCOD
	The amount of waste water produced from the anaerobic treatment		m^3
	The concentration of chemical oxygen demand in waste water at the entrance of the anaerobic treatment system		$kgCOD/m^3$
	The concentration of chemical oxygen demand in waste water at the exit of the anaerobic treatment system		$kgCOD/m^3$
	the total amount of organics eliminated through sludge		kgCOD
	the recycled amount of methane		kg

*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	Carbon content of per unit of heat (tC/GJ)	Carbon oxidation rate (%)
Fuel combustion *	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		
Process**	Parameters	Data	Unit
	CO2 emission factor of roasted limestone		tCO_2/t
Net purchased electric and heating power	Emission factor of electric power consumed		tCO_2/MWh
	Emission factor of heating power consumed		tCO_2/GJ
Waste water treatment	The maximum production capacity of methane in the anaerobic treatment system of waste water		kg CH_4/kg COD
	Methane correction factor		-

*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 Properties of Fossil Fuels

Type of fuel		Unit	Lower heating value （GJ/t, GJ/$\times 10^4$Nm^3）	Carbon content ofper unit of heat (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	10^4Nm^3	179.81[a]	13.58[b]×10^{-3}	99%
	Blast furnace gas	10^4Nm^3	33.000[d]	70.8[c]×10^{-3}	99%
	Converter gas	10^4Nm^3	84.000[d]	49.60[d]×10^{-3}	99%
	Other coal gases	10^4Nm^3	52.270[a]	12.2[b]×10^{-3}	99%
	Natural gas	10^4Nm^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 Values of Other Emission Factors

Parameters	**Unit**	**Emissionfactor**
CO_2emissionfactor of roastedlimestone	**tCO_2/tlimestone**	**0.405**
The maximum production capacity of methane in the anaerobic treatment system of waste water	**kg CH_4/ kg COD**	**0.25**
Methanecorrectionfactor	**--**	**0.5**
Emission factor of electric power consumed	**tCO_2/MWh**	**Mostrecentlyreleasedvalue of the state**
Emission factor of heating power consumed	**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 (2006).*

[4] *Climate Change: The Physical Science Basis (IPCC 5th Assessment Report).*