

Annex 9

**Guidelines for Accounting and Reporting  
Greenhouse Gas Emissions**

**China Ceramics Manufacturing  
Enterprises**

**(Trial)**

# Instructions

## I. Purpose and Significance of the Guidelines

In response to the request for “establishing and improving a system for calculating the Greenhouse Gas (GHG) emissions and gradually creating a carbon emission trading market” as made in the *Outline of the 12th Five-Year Plan*, and in response to the request for “accelerating buildup of the working systems for accounting GHG emissions at national, local and enterprise levels, and implementing a system that allows the key enterprises to directly report their data on GHG emissions and energy consumption”, in the *Work Plan for GHG Emission Control during the 12<sup>th</sup> Five-Year Plan Period* (No. 41 [2011] issued by the State Council), in order to ensure that the target of reducing the intensity of carbon dioxide emissions per unit of GDP by 40%-45% by 2020 relative to 2005 will be achieved, the National Development and Reform Commission (NDRC) has formulated the *Guidelines for Accounting and Reporting Greenhouse Gas Emissions from China Ceramics Manufacturing Enterprises (Trial)* (the Guidelines), with the aim to help enterprises (i) scientifically calculate and report in a standard format their GHG emissions, (ii) formulate their GHG emissions control plans, (iii) actively participate in carbon trading, and (iv) enhance their social responsibilities. Meanwhile the Guidelines are designed to pave the way for the competent authorities to establish and implement the reporting system for GHG emissions from key enterprises to have the GHG emissions status of key enterprises in support of decision-making processes.

## II. Preparation Process

The Guidelines have been developed by experts from the National Center for Climate Change Strategy and International Cooperation (NCSC), as entrusted by the NDRC. The writing team has taken into account the research findings and practical experiences for calculating and reporting GHG emissions from relevant enterprises both in China and overseas, as well as the *Guidance for Compiling Provincial Greenhouse Gas Emission Inventory (Trial)*, issued by the NDRC General Office. Through field investigations, in-depth studies and experimental accounting based on individual cases, NCSC completed the development of the *Guidelines for Accounting and Reporting Greenhouse Gas Emissions from China Ceramics Manufacturing Enterprises (Trial)*. Efforts have been made to ensure that the Guidelines are science-based, comprehensive, standardized and practical. In the course of its preparation, NCSC has received strong support from relevant experts from the China Building Material Academy, China Building Material Test & Certification Group Co., Ltd., China Ceramics Industrial Association, China Chamber of Commerce for Import and Export of Light Industrial Products and Arts Crafts Ceramics Branch among others.

### **III. Main Contents**

The Guidelines consist of the main text and two appendices. The seven sections of the main text have clearly defined the application scope of the Guidelines, cited documents and references, terminology and definition, accounting boundary, accounting methodology, quality assurance and documentation, as well as report contents and format, respectively. Emissions of carbon dioxide (not other types of GHGs) are calculated for the purposes of the Guidelines. Emission sources include fossil fuel combustion, industry manufacturing processes and consumption of net purchased electricity for manufacturing. The application scope covers the enterprises with qualified legal entities and independently accounted units that are treated as legal entities, all being involved in the ceramics manufacturing industry.

### **IV. Issues that Need Clarification**

The Guidelines list needed parameters for calculating and the recommended value of emission factors which have referred to both China and overseas competent authoritative documents such as the *Guidance for Compiling Provincial Greenhouse Gas Emission Inventory (Trial)*, *China GHG Gas Inventory Research*, *Public Institutions Energy Consumption Statistics System* and *China Energy Statistical Yearbook* among others.

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 revision 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.....	1
2. References.....	1
3. Terminology and Definitions.....	2
4. Accounting Boundary.....	4
5. Accounting Methodology.....	5
5.1 Emissions from fossil fuels combustion.....	6
5.2 Emissions from Industrial Production Processes.....	8
5.3 Emissions from Consumption of Net Purchased Electricity.....	10
6. Quality Assurance and Documentation.....	13
7. Content and Format of Report.....	13
7.1 Basic Information of Reporting Entities.....	13
7.2 Amount of GHG Emissions.....	13
7.3 Data for Activity Levels and Their Sources.....	13
7.4 Emission Factors and Their Sources.....	13
Appendix I.....	15
Attached tables.....	17
Appendix II .....	20

## 1. Application Scope

The Guidelines apply to the accounting and reporting of GHG emissions from ceramics manufacturing enterprises in China. Enterprises operating in ceramics manufacturing within the Chinese territory may calculate and report their GHG emissions, and formulate their individual GHG emission reports by using the methods provided in the Guidelines.

The Guidelines lays down the methods for accounting, and obtaining relevant parameters, default values, technical requirements and norms on reporting GHG emissions.

Ceramics manufacturing enterprises that produce products other than ceramics and emit GHGs need to calculate and report on the emissions caused by the production of these products as per guidelines for calculating and reporting on GHG emissions of the relevant enterprises.

The GHG emissions in the Guidelines refer to CO<sub>2</sub> emissions of ceramics manufacturing enterprises and do not include emissions of other greenhouse gases.

## 2. References

The Guidelines are established in line with existing international, national and industry standards. Hence, some concepts and requirements in the Guidelines are cited from and referred to the following guiding documents:

*2006 IPCC Guidelines for National Greenhouse Gas Inventories*

*ISO 14064-1 GHG Part One: Norms and Guidelines for Quantification of and Report on GHG Emissions and Removal from an Organizational Perspective*

*Guidance for Compiling Provincial Greenhouse Gas Emission Inventory for 2011*  
(trial)

*GB/T 27969-2011 Evaluation System and Monitoring Methods for Energy Consumption per Unit of Building and Sanitary Ceramic*

*GB/T 25464-2010 Standard on Pollutants Discharge of Ceramics Industry*

*GB/T 2359-2009 Measurement and Calculation Methods of Heat Balances and Heat*

*Efficiency of Ceramics Furnaces*

*GB/T 2589-2008 General Principles on Comprehensive Energy Consumption Calculation*

*GB/T 21252-2007 Quota on Energy Consumption per Unit of Building and Sanitary Ceramic*

### **3. Terminology and Definitions**

#### **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. The GHGs addressed in the Guidelines refer to the six types of GHGs which are controlled under Annex A of the Kyoto Protocol, and they are carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), nitrous oxide (N<sub>2</sub>O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF<sub>6</sub>). The GHGs mentioned in the Guidelines refer to CO<sub>2</sub> emissions from ceramics manufacturing enterprises.

#### **3.2 Ceramics Manufacturing Enterprises**

Ceramics manufacturing enterprises refer to any profit-making economic and manufacturing organization with legal person status (or deemed a legal person) and a stand-alone accounting system, which is engaged in the production and processing of ceramics such as domestic ceramics, decorative ceramics, building and sanitary ceramics, ceramics for chemical industry, electro-ceramics, structural ceramics, functional ceramics and so forth.

#### **3.3 Reporting Entity**

A ceramics manufacturing enterprise that emits CO<sub>2</sub> and calculates (report) its emissions.

#### **3.4 Activity Level Data**

Activity level data refer to the basic data used to calculate CO<sub>2</sub> emissions of

ceramics manufacturing enterprises, including fossil fuel consumption, lower calorific value of fossil fuels, raw materials consumption, production output, consumption of net purchased electricity, etc.

### 3.5 Emission Factors

The emission factor refers to the factor used to quantify the GHG emissions per unit of activity level. An emission factor is usually derived from sample measurements or statistical analysis, indicating the representative emission rate at a particular activity level under given operating conditions.

### 3.6 Rate of carbon oxidation

Rate of carbon oxidation is the ratio at which carbon in fossil fuels has been oxidized in the process of combustion and indicates the extent fossil fuels are combusted.

## **4. Accounting Boundary**

Ceramics manufacturing enterprises are the accounting and reporting entities of CO<sub>2</sub> emissions in the Guidelines. A reporting entity should regard its legal entity as the boundary for identifying, calculating and reporting all relevant emissions from the production system within it, while any double or missing accounts should be avoided.

The scope of CO<sub>2</sub> emissions accounting and reporting by ceramics manufacturing enterprises includes emissions from fossil fuels combustion during operation (including emissions from fossil fuel-based vehicles), emissions from production processes and emissions from consumption of net purchased electricity. The CO<sub>2</sub> emissions from activities for the purpose of internal logistics, staff business trips, raw material procurement, production management, sales system and energy and electricity consumption for residential purposes are excluded. The accounting and reporting boundary of CO<sub>2</sub> emissions of ceramics manufacturing enterprises is as shown in Chart 1.

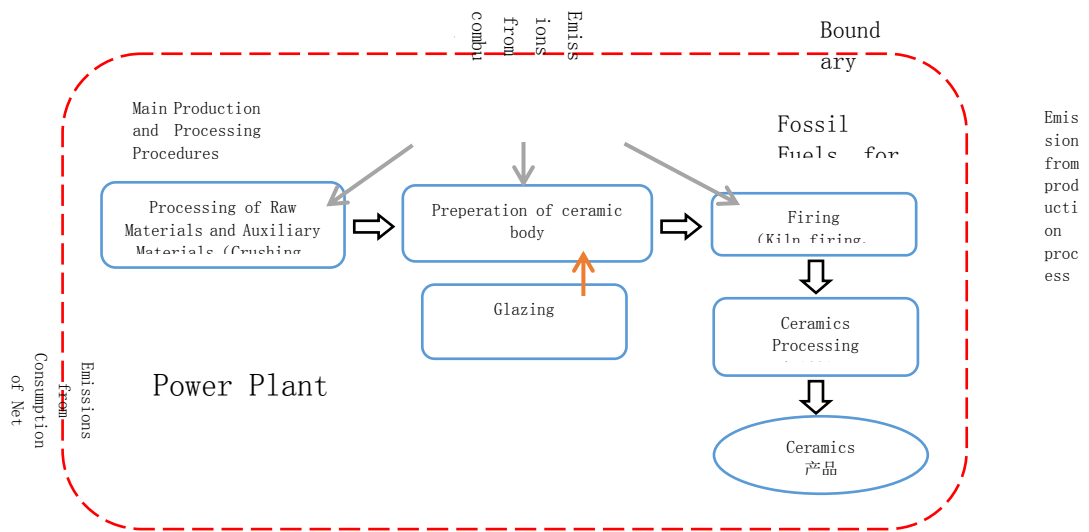


Chart1 Boundary of CO<sub>2</sub> Emissions from Ceramics Manufacturing Enterprises

Sources of CO<sub>2</sub> emissions accounted and reported by ceramics manufacturing enterprises include:

#### 4.1 Emissions from fossil fuel combustion

Emissions from fossil fuel combustion refers to CO<sub>2</sub> emissions from the burning of fossil fuels in the process of ceramics production, for instance combustion of coal, diesel, heavy oil, water gas, natural gas and liquefied petroleum gas. Equipment that consumes fossil fuels includes gas generator, steam furnace, raw materials dryer, spray dryer, ceramic billet dryer, kiln, etc. The CO<sub>2</sub> emissions from the combustion of gasoline, diesel and other fossil fuels that are consumed by vehicles for production purposes also fall into this category.

#### 4.2 Emissions from Industrial Production Processes

The carbonates, such as calcium carbonate (CaCO<sub>3</sub>) and magnesium carbonate (MgCO<sub>3</sub>), that are contained in calcite, magnesite and dolomite as raw materials of ceramics emit CO<sub>2</sub> after decomposition under high temperature in the ceramics firing process, as follows:





#### 4.3 Emissions from Consumption of Net Purchased Electricity

Emissions from consumption of net purchased electricity refer to CO<sub>2</sub> emissions from the consumption of net purchased electricity by electrified production equipment in ceramics manufacturing enterprises, including those for storing and distributing raw materials, crushing, grinding, mixing, sieving, and moulding raw materials, forging, glazing and drying ceramic billet, cooling and distributing products, and others. Such emissions actually take place at facilities under electricity suppliers.

Ceramics manufacturing enterprises that produce products other than ceramics and emit GHGs need to calculate and report on the emissions caused by the production of these products as per guidelines for calculating and reporting GHG emissions of the relevant enterprises.

## 5. Accounting Methodology

The total CO<sub>2</sub> emissions of ceramics manufacturing enterprises can be calculated by the following equation:

$$E_{total} = E_{combustion} + E_{Industry} + E_{electricity} \quad (1)$$

Where,

$E_{total}$  is the total CO<sub>2</sub> emissions of ceramics enterprises within the accounting period (tCO<sub>2</sub>);

$E_{combustion}$  gives the CO<sub>2</sub> emissions from fossil fuels combustion of ceramics enterprises within the accounting period (tCO<sub>2</sub>);

$E_{Industry}$  represents the CO<sub>2</sub> emissions from industrial production processes of ceramics enterprises within the accounting period (tCO<sub>2</sub>);

$E_{electricity}$  defines the CO<sub>2</sub> emissions from consumption of net purchased electricity by ceramics enterprises within the accounting period (tCO<sub>2</sub>);

#### 5.1 Emissions from Fossil Fuels Combustion

### 5.1.1 Emissions Calculation Equation

The calculation of CO<sub>2</sub> emissions from both fossil fuels combustion and fossil fuels for vehicles in the process of ceramics production can follow Equation (2) below:

$$E_{combustion} = \sum(AD_i \times EF_i) \quad (2)$$

Where,

$E_{combustion}$  represents the CO<sub>2</sub> emissions from fossil fuels combustion of ceramics manufacturing enterprises within the accounting period (tCO<sub>2</sub>);

$AD_i$  represents the activity level of  $i$  type of fossil fuel of ceramics manufacturing enterprises within the accounting period (GJ);

$EF_i$  refers to the CO<sub>2</sub> emission factors of  $i$  type of fossil fuel of ceramics manufacturing enterprises within the accounting period (tCO<sub>2</sub>/GJ);

Data concerning the activity level of  $i$  type of fossil fuel of ceramics manufacturing enterprises within the accounting period, or  $AD_i$ , can be obtained by Equation (3):

$$AD_i = FC_i \times NCV_i \quad (3)$$

Where,

$FC_i$  constitutes the net consumption of  $i$  type of fossil fuel of ceramics enterprises within the accounting period (t is the unit for solid or liquid fossil fuels; Nm<sup>3</sup>: unit for gas fossil fuels);

$NCV_i$  is the lower calorific value of  $i$  type of fossil fuel of ceramics manufacturing enterprises within the accounting period (GJ/t: unit for solid and liquid fossil fuels; GJ/Nm<sup>3</sup>: unit for gas fossil fuels);

The equation for CO<sub>2</sub> emission factor,  $EF_i$ , of  $i$  type of fossil fuel used in equipment  $m$  within the accounting period is calculated as follows:

$$EF_i = CC_i \times \alpha_i \times \rho_l \quad (4)$$

Where,

$CC_i$  is the carbon concentration per unit of calorific value of  $i$  type of fossil fuel of ceramics manufacturing enterprises within the accounting period (tC/GJ);

$\alpha_i$  is the rate of carbon oxidation of  $i$  type of fossil fuel of ceramics manufacturing

enterprises within the accounting period (%wt);

$\rho_l$  Shows the ratio of CO<sub>2</sub> to C in terms of molecule weight.

### 5.1.2 Acquisition of Data for Activity Level

Data for activity level in relation to CO<sub>2</sub> emissions from fossil fuels combustion is the product of consumption of various types of fossil fuels of ceramics manufacturing enterprises and their lower calorific values within the accounting period.

The actual consumption of a specific type of fossil fuels of ceramics manufacturing enterprises within the accounting period can be determined by looking into the changes of purchased amount, sold amount and stocked amount of this type of fossil fuel. Purchased and sold amounts of fossil fuels are based on the figures on settlement statements, such as purchase or sales orders. Data on changes of stock can be collected in reference to the regular stock records or by other methods in accordance with relevant requirements. The consumption of various types of fossil fuels of ceramics manufacturing enterprises within the accounting period can be calculated by Equation (5):

$$FC_i = Q_{fuel, 1} + (Q_{fuel, 2} - Q_{fuel, 3}) - Q_{fuel, 4} \quad (5)$$

Where,

$FC_i$  is the net consumption of fossil fuels of ceramics manufacturing enterprises within the accounting period (t is the unit for solid or liquid fossil fuels; Nm<sup>3</sup> is the unit for gas fossil fuels);

$Q_{fuel,1}$  describes the purchase amount of fossil fuels of ceramics manufacturing enterprises within the accounting period (t: unit for solid or liquid fossil fuels; Nm<sup>3</sup>: unit for gas fossil fuels);

$Q_{fuel,2}$  refers to the amount in stock of fossil fuels of ceramics manufacturing enterprises at the beginning of the accounting period (t: unit for solid or liquid fossil fuels; Nm<sup>3</sup>: unit for gas fossil fuels);

$Q_{fuel,3}$  refers to the final amount in stock of fossil fuels of ceramics manufacturing enterprises at the end of accounting period (t: unit for solid or liquid fossil fuels; Nm<sup>3</sup>:

unit for gas fossil fuels);

$Q_{fuel,4}$  is the sold amount of fossil fuels of ceramics manufacturing enterprises within the accounting period (t is the unit for solid or liquid fossil fuels;  $Nm^3$ : unit for gas fossil fuels);

The ceramics manufacturing enterprises can use the default values of lower calorific values of fossil fuels offered in the Guidelines (See Table 2.1 in Appendix II).

### 5.1.3 Acquisition of Emission Factors

The default values in table 2.1 of Appendix II can be taken as references for the carbon concentration per unit of calorific value and the rate of carbon oxidation  $\alpha_i$  of  $i$  type of purchased fossil fuel.

## 5.2 Emissions from Industrial Production Processes

### 5.2.1 Emissions Equation

CO<sub>2</sub> emissions generated in the process of ceramics production largely come from ceramics firing, where calcium carbonate (CaCO<sub>3</sub>) and magnesium carbonate (MgCO<sub>3</sub>) decompose under high temperature and emit CO<sub>2</sub>. These emissions can be calculated by the equation below:

$$E_{industry} = \Sigma [F_{raw\ material} \times \eta_{material} \times (C_{caco} \times \rho_2 + C_{mgco} \times \rho_3)] \quad (6)$$

Where,

$E_{Industry}$  is the CO<sub>2</sub> emissions produced in the process of industrial production of ceramics manufacturing enterprises within the accounting period (tCO<sub>2</sub>);

$F_{Raw\ Materials}$  is consumption of raw materials by ceramics manufacturing enterprises within the accounting period (t);

$\eta_{Raw\ Materials}$  refers to the utilization rate of raw materials of ceramics manufacturing enterprises within the accounting period (%wt);

$C_{caco3}$  is the mass fraction of CaCO<sub>3</sub> in raw materials used by ceramics manufacturing enterprises within the accounting period (%wt);

$C_{MgCO_3}$  is the mass fraction of  $MgCO_3$  in raw materials used by ceramics manufacturing enterprises within the accounting period (%wt);

$\rho_2$ — Conversion coefficient of molecule weight between  $CO_2$  and  $CaCO_3$ ;

$\rho_3$ — Conversion Coefficient of molecule weight between  $CO_2$  and  $MgCO_3$ ;

### 5.2.2 Acquisition of Data for Activity Level

Data for activity level of industrial production include annual consumption of raw materials of ceramics manufacturing enterprises, utilization rate of raw materials and mass concentration of  $CaCO_3$  and  $MgCO_3$  in raw materials.

Consumption of raw materials can be determined by the changes of purchased, sold and stocked raw materials within the accounting period. Purchased and sold amounts of raw materials are based on the figures on settlement statements, such as purchase or sales orders. Data on changes of stock of raw materials can be collected in reference to the regular stock records or by other methods in accordance with relevant requirements. Consumption of raw materials can be calculated by Equation (7):

$$F_{\text{raw materials}} = Q_{\text{raw materials}, 1} + (Q_{\text{raw materials}, 2} - Q_{\text{raw materials}, 3}) - Q_{\text{raw materials}, 4} \quad (7)$$

Where,

$F_{\text{Raw Materials}}$  is consumption of raw materials by ceramics manufacturing enterprises within the accounting period (t);

$Q_{\text{raw materials}, 1}$  stands for the purchased amount of raw materials by ceramics manufacturing enterprises within the accounting period (t);

$Q_{\text{raw materials}, 2}$  constitutes the stock amount of raw materials of ceramics manufacturing enterprises at the beginning of accounting period (t);

$Q_{\text{raw materials}, 3}$  is the stock amount of raw materials of ceramics manufacturing enterprises at the end of the accounting period (t);

$Q_{\text{raw materials}, 4}$  is the sold amount of raw materials of ceramics manufacturing enterprises within the accounting period (t);

Utilization rate of raw materials ( $\eta_{Raw\ Materials}$ ) is determined by the actual production of ceramics manufacturing enterprises.

The contents of  $\text{CaCO}_3$  and  $\text{MgCO}_3$  should be tested on each batch of raw materials, and calculated based on weighted average contents of  $\text{CaCO}_3$  and  $\text{MgCO}_3$  in raw materials within the accounting period. The following standards must be adhered to in testing for the contents of  $\text{CaCO}_3$  and  $\text{MgCO}_3$  in raw materials: *GB/T4743 Methodology on Chemical Analysis of Ceramic Materials and Products*, *QB/T2578-2002 Methodology on Photometric Analysis of Chemical Components of Ceramic Raw Materials*, etc.

### 5.3 Emissions from Consumption of Net Purchased Electricity

#### 5.3.1 Emissions Calculation Equation

The  $\text{CO}_2$  emissions from consumption of net purchased electricity for production by ceramics manufacturing enterprises can be calculated with the equation below:

$$E_{electricity} = \sum (EA_{electricity} \times EF_{electricity\ grid}) \quad (8)$$

Where,

$E_{electricity}$  indicates  $\text{CO}_2$  emissions from consumption of net purchased electricity for production within the accounting period ( $\text{tCO}_2$ );

$EA_{electricity}$  is the consumption of net purchased electricity for production within the accounting period (MWh);

$EF_{electricity\ grid}$  refers to  $\text{CO}_2$  emissions factor for the regional electricity grid which supplied net purchased electricity for production within the accounting period ( $\text{tCO}_2/\text{MWh}$ ).

#### 5.3.2 Acquisition of Data for Activity Level

The activity level data pertinent to  $\text{CO}_2$  emissions from the net purchased electricity for production is the consumption of net purchased electricity for production. The consumption of net purchased electricity for production can be acquired from the sale/purchase settlement documents archive by suppliers/ceramics manufacturing enterprises, namely:

$$EA_{electricity} = Q_{electricity\ supply,1} - Q_{electricity\ supply,2} \quad (9)$$

Where,

$EA_{electricity}$  is the consumption of net purchased electricity for the production by ceramics manufacturing enterprises within the accounting period (MWh);

$Q_{electricity\ supply,1}$  means the consumption of externally purchased electricity for production of ceramics manufacturing enterprises within the accounting period (MWh);

$Q_{electricity\ supply,2}$  is the electricity output of ceramics manufacturing enterprises within the accounting period(MWh).

### 5.3.2 Emission Factors for Consumption of Net Purchased Electricity for Production

To reflect the electricity mix and specific emissions of different areas, emission factors of regional electricity grids are recommended to be taken as CO<sub>2</sub> emissions factors of net purchased electricity for production. According to the current layout of the state power grid, namely, North China Grid, Northeast China Grid, East China Grid, Center China Grid, Northeast China Grid and South China Grid, CO<sub>2</sub> emission factors of regional power grids can be calculated by the equation below:

$$EF_{Electricity\ Grid} = \frac{E_{CO_2,Electricity\ Grid,Fossil\ Fuel}}{PS_{Electricity\ Grid}} \quad (10)$$

Where,

$EF_{Electricity\ Grid}$  refers to CO<sub>2</sub> emission factors of regional electricity grids within the accounting period (tCO<sub>2</sub>/MWh);

$E_{Electricity\ Grid, Fossil\ Fuels}$  is the CO<sub>2</sub> emissions from electricity generation using fossil fuels in regional power grids within the accounting period (tCO<sub>2</sub>);

$PS_{Electricity\ Grid}$  represents total electricity supply of regional electricity grids within the accounting period (MWh);

The CO<sub>2</sub> emissions from electricity generation using fossil fuels in regional electricity grids and the total electricity supply of regional electricity grids differ over the years and should be updated from the data released annually by the NDRC and *Yearbook of China*

*Electricity, which is compiled by the Editorial Committee of Yearbook of China Electricity and published by China Electric Electricity Press.*

## **6. Quality Assurance and Documentation**

Ceramics manufacturing enterprises should establish a quality assurance and documentation system for their CO<sub>2</sub> emission reports, the content of which includes:

- Establishing a set of rules and regulations for quantifying and reporting CO<sub>2</sub> emissions, including organizations, designated institutions, work procedures, etc.
- Establishing a table for CO<sub>2</sub> emission sources, identifying appropriate quantification method correspondingly, documenting and archiving.
- Establishing a program for data acquisition, monitoring plan and work procedures and designating relevant units and personnel the responsibilities of sampling, monitoring, analyzing, recording, collecting and documenting.
- Establishing contingency measures for cases of data loss and of changes in production or reporting method.
- Establishing plans for regular calibration and testing of monitoring equipment.
- Establishing norms for files management and keeping and maintaining files and data records on annual GHG report.

## **7. Content and Format of Report**

The reporting entity should report the following information in line with the format provided in the Appendix I:

### **7.1 Basic information of the reporting entity**

The basic information of the reporting entity should include the name or title, business nature, reporting year, industrial sector, Organization Code Certificate, legal representative, person responsible for filling in the report, and focal point of the reporting entity.



## 7.2 Amount of GHG emissions

A reporting entity should report the total GHG emissions of the enterprise for the accounting and reporting period. It should also report emissions from fossil fuels combustion, emissions from the process of industrial production and emissions from consumption of net purchased electricity separately.

## 7.3 Data for Activity Level and their Sources

The reporting entity should report the net consumption and lower calorific values of the various types of fossil fuels, consumption of raw materials, utilization rate of raw materials and volume of net purchased electricity that are consumed in the production of all products.

In case the enterprise engages in production of other products, it should report its data for activity level and sources as required by the guidelines for accounting and reporting GHG emissions of relevant sectors.

## 7.4 Emission factors and their sources

A reporting entity should report the carbon concentration per unit of calorific value and data about the rate of carbon oxidation of various fossil fuels it consumed. It should also report emission factors adopted by the enterprise for calculating its electricity consumption.

In case the enterprise engages in production of other products, it should report its data for activity level and sources as required by the guidelines for accounting and reporting GHG emissions of relevant sectors.

**Greenhouse Gas Emission Report  
China Ceramics Manufacturing  
Enterprises**

**Reporting Entity (Official Seal):**

**Reporting Year:**

**Date of Production:** (Day/Month/Year)

In accordance with the *Guidelines for Accounting and Reporting Greenhouse Gas Emission from China Ceramics Manufacturing Enterprises (Trial)* (the Guidelines) issued by the National Development and Reform Commission (NDRC), this reporting entity has accounted the total GHG emissions amount of its enterprise for the year \_\_\_\_\_, and filled in the data in the relevant tables. The entity herewith reports the relevant information as follows:

- I. **Basic Information of Enterprise**
- II. **Greenhouse Gas Emissions**
- III. **Explanatory Description of Activity Level Data and Sources**
- IV. **Explanatory Description of Emission Factors and 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):

(Day/Month/Year)

**Attachments:**

**Table 1-1:** Carbon Dioxide Emissions of the Reporting Entity in Year\_\_

**Table 1-2:** Activity Level Data for the Reporting Entity in Year\_\_

**Table 1-3:** Emission Factors and Relevant Data for the Reporting Entity in Year\_\_

**Table 1-1: Carbon Dioxide Emissions for the Reporting Entity in Year \_**

<b>Total CO<sub>2</sub> Emissions of the Enterprise (tCO<sub>2</sub>)</b>	
Emissions from fossil fuel combustion (tCO <sub>2</sub> )	
Emissions from industrial processes (tCO <sub>2</sub> )	
Emissions (tCO <sub>2</sub> ) from consumption of net purchased electricity (tCO <sub>2</sub> )	

**Table 1-2: Activity Level Data for the Reporting Entity in Year \_\_**

	Type of fuels	Net consumption (t, 10 <sup>4</sup> Nm <sup>3</sup> )	Lower calorific value (GJ/t, GJ/10 <sup>4</sup> Nm <sup>3</sup> )
<b>Fossil fuel combustion *</b>	Anthracite		
	Bituminous coal		
	Lignite (brown coal)		
	Mould coal		
	Coke		
	Crude oil		
	Gasoline		
	Diesel		
	General Kerosene		
	Fuel oil		
	Coal tar		
	LNG		
	LPG		
	Other petroleum products		
	Natural gas		
	Water gas		
	Coke oven gas		
	Other gases		
	Refinery gas		
<b>Industrial processes</b>	<b>Industrial production activity</b>	<b>Data</b>	<b>Unit</b>
	Raw material		t
	Utilization rate of raw material		%wt
	Calcium carbonate content		%wt
	Magnesium carbonate content		%wt
<b>Net purchased electricity</b>	<b>Amount</b>	<b>Data</b>	<b>Unit</b>
	Net purchased electricity		MWh

\* The reporting entity should add any other types of energy actually used by the enterprise in its operations, which are not listed in this table.

**Table 1-3: Emission Factors and Calculation Coefficient for the Reporting Entity in Year**

	Type of fossil fuel	Carbon content per unit of calorific value (tC/GJ)	Rate of carbon oxidation (%)
<b>Fossil fuel combustion*</b>	Anthracite		
	Bituminous coal		
	Lignite (brown coal)		
	Mould coal		
	Coke		
	Crude oil		
	Gasoline		
	Diesel		
	General Kerosene		
	Fuel oil		
	Coal tar		
	LNG		
	LPG		
	Other petroleum products		
	Natural gas		
	Water gas		
	Coke oven gas		
	Other gases		
	Refinery gas		
<b>Industrial processes</b>	<b>Emission factor for industrial processes</b>	<b>Data</b>	<b>Unit</b>
<b>Net purchased electricity for production</b>	<b>Electricity grid and its emission factor</b>	<b>Data</b>	<b>Unit</b>
			tCO <sub>2</sub> /MWh

\* The reporting entity should add any other types of energy actually used by the enterprise in its

operations, which are not listed in this table.

## Appendix II Relevant Default Values

**Table 2-1: Possible Type of Fuel and Default Values of their Carbon Content per Unit of Calorific Value, Rate of Carbon Oxidation, and Lower Calorific Value**

Type of fuel	Fuel	Unit	Lower calorific value <sup>a)</sup> (GJ/t, GJ/10 <sup>4</sup> Nm <sup>3</sup> )	Carbon content per unit of calorific <sup>b)</sup> (tc/TJ)	Rate of carbon oxidation <sup>b)</sup> (%)
Solid fuel	Anthracite	t	23.2 <sup>c)</sup>	27.8	94
	Bituminous coal	t	22.3 <sup>c)</sup>	25.6	93
	Lignite (brown coal)	t	14.8 <sup>c)</sup>	27.8	96
	Mould coal	t	17.5 <sup>d)</sup>	33.6	90
	Coke	t	28.4	28.8	93
Liquid fuel	Crude oil	t	41.8	20.1	98
	Gasoline	t	43.1	18.9	98
	Diesel	t	42.7	20.2	98
	General Kerosene	t	43.1	19.6	98
	Fuel oil	t	41.8	21.0	98
	Coal tar	t	33.5	22.0	98
	LNG	t	51.4 <sup>d)</sup>	15.3	99
	LPG	t	50.2	17.2	99
	Other petroleum products	t	40.9 <sup>d)</sup>	20.0	98
Gaseous fuel	Natural gas	Nm <sup>3</sup>	389.3	15.3	99
	Water gas	Nm <sup>3</sup>	10.4	12.2	99
	Coke oven gas	Nm <sup>3</sup>	173.5	13.6	99
	Other gases	Nm <sup>3</sup>	52.3	12.2	99
	Refinery gas	Nm <sup>3</sup>	46.1	18.2	99

a) Data source: *China Energy Statistical Yearbook 2012*, China Statistics Press, Beijing, 2011;

b) Data source: *Guidance for Compiling Provincial Greenhouse Gas Emission Inventory (Trial)*, Table 2.6 and Table 2.7

c) Data source: *China's Studies on Greenhouse Gas Inventory*, Table 2-54(a), China Environmental Science Press, Beijing, 2007; and



- d) Data source: *Statistical Rules on Energy Consumption by Public Service*, Part VI, Appendix II, developed by the Government Offices Administration of the State Council and reviewed and approved by National Bureau of Statistics in July 2011.