

Annex7

**Guidelines for Accounting and Reporting
Greenhouse Gas Emissions
China Plate Glass Enterprises
(Trial)**

Instruction

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”, as described in the *Work Plan for GHG Emission Control during the 12th 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 Plate Glass 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 in support of decision-making processes.

II. Preparation Process

The Guidelines have been developed by experts from the Energy-Environment-Economy Institute (3E) of Tsinghua University, 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 on-site investigations, in-depth studies and experimental accounting based on individual cases, 3E completed the development of the *Guidelines for Accounting and Reporting Greenhouse Gas Emissions from China Plate Glass Enterprises(Trial)*. Efforts have been made to ensure that the Guidelines are

science-based, comprehensive, standardized and practical. In the course of its preparation, 3E has received strong support from relevant experts from the China Building Materials Academy, China Building Material Test & Certification Group Co., Ltd. among others.

III. Main Contents

The *Guidelines for Accounting and Reporting Greenhouse Gas Emissions from China Plate Glass Enterprises (Trial)* contain seven sections and appendices. These sections have clearly defined the application scope of the Guidelines, cited documents and references, terminology and definitions, accounting boundary, accounting methodology, quality assurance and documentation, report contents and format, as well as recommended values of parameters. The calculated GHG is carbon dioxide (without calculating emissions of other GHGs), and emission sources include fuel combustion, industrial processes and consumption of net purchased electricity and heat. The application scope covers the enterprises with qualified legal entities and independently accounted units that are treated as legal entities, all being involved in plate glass manufacturing.

IV. Issues that Need Clarification

Plate glass enterprises using the Guidelines need to acquire relevant data about activity levels and emission factors, in order to account and report GHG emissions within the boundary of enterprises themselves. Having taken into consideration literature and data from home and abroad such as the *Guidance for Compiling Provincial Greenhouse Gas Emission Inventory (Trial)* and the *2012 China Energy Statistical Yearbook* and the *IPCC Guidelines for National Greenhouse Gas Inventories*, the Guidelines provide the default values of emission factors for some common fossil fuels and raw materials, for enterprises to refer to.

Considering the fact that enterprise-based GHG emission 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.

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1. Application Scope

The Guidelines apply to the accounting and reporting of GHG emissions from plate glass enterprises in China. Enterprises engaging in plate glass production within the Chinese territory may calculate their emissions and prepare GHG emission reports according to the accounting methodology provided in the Guidelines.

2. References

The references cited or quoted in the Guidelines mainly include:

Guidance for Compiling Provincial Greenhouse Gas Emission Inventory (Trial);
and

2012 China Energy Statistical Yearbook.

The following documents have been taken into consideration in the development process of the Guidelines:

IPCC Guidelines for National Greenhouse Gas Inventories (1996);

The Inventory of U. S. Greenhouse Gas Emissions and Sinks (EPA 2008); and

EU emissions trading system (EU-ETS)(Phases 1 and 2) Monitoring Guide.

3. Terminology and Definitions

The following terminology and definitions apply to the Guidelines.

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 the Kyoto Protocol Appendix A, and they are carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF₆).

3.2 Reporting entity

A reporting entity shall be an enterprise with a legal person status or an independently accounted unit that can be deemed a legal person, which has

performed as a GHG emission actor and therefore should calculate and report its GHG emissions.

3.3 Emissions from fossil fuel combustion

Emissions from fossil fuel combustion are GHG emissions from the burning of fossil fuels in oxygen during the production process of the enterprise, such as emissions from combustion of raw coal, fuel oil and other fossil fuels.

3.4 Emissions from industrial processes

Emissions from industrial processes refer to GHG emissions from physical or chemical changes during industrial processes apart from fuel combustion, such as emissions from decomposition of carbonate, which is one of the raw materials.

3.5 Emissions from consumption of net purchased electricity and heat

Emissions from consumption of net purchased electricity and heat refer to the CO₂ emissions from electricity or heat generation process corresponding to the consumption of net purchased electricity and heat (steam, hot water) by a plate glass enterprise.

3.6 Activity level

Activity level is the activity data of production or consumption that lead to GHG emissions or removals including the amount of fossil fuel consumption, the amount of raw material usage, as well as the amount of purchased or exported electricity or steam in the industrial processes of plate glass.

3.7 Emission factor

Emission factor refers to the factor used to quantify GHG emissions per unit of activity level, for example, the amount of CO₂ emissions per ton of limestone decomposed, the amount of CO₂ emission per kilowatt-hour of on-grid electricity, etc.

3.8 Rate of carbon oxidation

Rate of carbon oxidation is the percentage at which carbon in fuel(s) has been oxidized during a combustion process.

4. Accounting Boundary

An enterprise with a legal person status or a unit that can be deemed a legal person with plate glass production as main business is the boundary for accounting and reporting GHG emissions for the purposes of the Guidelines.

A reporting entity should regard all its production facilities as the boundary for accounting and reporting GHG emissions. Production facilities include direct production systems, subsidiary production systems and affiliated production systems

that directly facilitate production. Among them, subsidiary production system covers drive, electricity supply, water supply, test, machine maintenance, storehouse, transportation, etc. and affiliated production system consists of production control system (factory headquarters) as well as departments and units within site that serve production (e.g. staff canteen, workshop bathroom, healthcare center, etc.)

If a plate glass enterprise produces other products that generate GHG emissions during those industrial processes, it should report its activity level data and sources as required in the GHG emission accounting and reporting guidelines for the enterprises in the relevant sectors. If no accounting methodology is available, the enterprise should only calculate emissions from fossil fuel combustion for those sectors.

To be specific, the key emission sources within the accounting boundary of plate glass enterprises include:

1) Combustion of fossil fuels

Plate glass enterprises' CO₂ emissions from fossil fuel combustion consists of three parts: (i) emissions from burning of such fossil fuels as coal, heavy oil or natural gas in the glass melting and production processes; (ii) emissions from fuel combustion as subsidiary production facilities are used, which include in-plant motor vehicles for carrying and transport, for example, forklift, crane, etc., and some facilities like in-plant machine maintenance station, boiler, and nitrogen-hydrogen station; and (iii) emissions from fuel combustion by the vehicles of the factory during transportation outside the factory.

2) Oxidation of carbon powder in raw ingredients

A certain amount of carbon powder is added into raw ingredients as reductant during the production of plate glass to reduce the temperature for the decomposition of mirabilite, and to accelerate the decomposition and reduction process of sodium sulfate below its melting temperature, which will boost the rapid heating and melting process of the raw ingredients. The carbon in the powder will be oxidized to CO₂.

3) Decomposition of carbonate in raw materials

Carbonate in the raw materials used in plate glass production such as limestone, dolomite and sodium carbonate decomposes at high temperature and emits CO₂.

4) Consumption of net purchased electricity and heat

Consumption of net purchased electricity and heat refers to CO₂ emissions corresponding to consumption of net purchased electricity and heat (steam) by the plate glass enterprise.

5) Emissions from other production processes

If a plate glass enterprise produces other products, it should report its activity level data and sources as required in the GHG emission accounting and reporting guidelines for the enterprises in the relevant sectors.

5. Accounting Methodology

The complete workflow for a reporting entity to account and report its GHG emissions should include the following steps:

- 1) Determination of accounting boundary;
- 2) Identification of emission sources;
- 3) Data collection of activity level;
- 4) Selection and acquisition of data for emission factor;
- 5) Separate calculation of emissions from fossil fuel combustion, emissions from industrial processes, emissions corresponding to consumption of net purchased electricity and heat;
- 6) Summation of all GHG emissions from the enterprise.

The total CO₂ emissions of a plate glass enterprise equals to the CO₂ emissions from the total fossil fuel combustion, the industrial process and consumption of net purchased electricity and heat within the boundary of the accounted enterprise, as indicated in Equation(1):

$$E_{CO_2} = E_{\text{combustion}} + E_{\text{process}} + E_{\text{electricity \& heat}} \dots (1)$$

where,

E_{CO_2} is the total CO₂ emissions of the enterprise (the unit is tCO₂);

$E_{\text{combustion}}$ gives the total CO₂ emissions from fossil fuel combustion (the unit is tCO₂);

$E_{process}$ means the total CO₂ emissions from the industrial process (tCO₂); and

$E_{electricity\&heat}$ represents the total CO₂ emissions from consumption of net purchased electricity and heat by the enterprise (tCO₂).

5.1 Emissions from fossil fuel combustion

5.1.1 Calculation equation

During the production of plate glass, fuels used for glass melting furnaces mainly include raw coal (coal powder), natural gas, heavy oil, coal tar, coke oven gas, producer gas and petroleum coke. In the supporting production process, fossil fuels mainly consist of diesel and gasoline. The CO₂ emissions from fossil fuel combustion are calculated in Equations (2), (3) and (4):

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

where,

$E_{combustion}$ is CO₂ emissions from combustion of net consumed fossil fuels in the accounting and reporting period (tCO₂);

AD_i is the activity level of fossil fuel i consumed in the accounting and reporting period (GJ);

EF_i is the CO₂ emission factor of fossil fuel i (tCO₂/GJ); and

i is the type of net consumed fossil fuel.

AD_i , the activity level of fossil fuel i consumed in the accounting and reporting period, is calculated in Equation (3):

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

where,

NCV_i is the average lower calorific value of fossil fuel i in the accounting and reporting period. For solid and liquid, the unit of it is GJ/t, and for gas, the unit is GJ/10⁴Nm³; and

FC_i is the net consumed amount of fossil fuel i in the accounting and reporting period. For solid and liquid, the unit of it is t, and for gas, the unit is 10⁴Nm³.

The CO₂ emission factor of fossil fuels is calculated according to Equation (4):

$$EF_i = CC_i \times OF_i \times \frac{44}{12} \dots\dots\dots(4)$$

where,

CC_i is the carbon content per unit of calorific value of fossil fuel i (tC/GJ); and

OF_i is the rate of carbon oxidation of fossil fuel i (%).

5.1.2 Acquisition of activity level data

The net consumption amount of each fossil fuel is determined according to the measurement data of each fossil fuel consumed during the accounting and reporting period.

Enterprises can use the average lower calorific values provided in the Guidelines, as presented in Appendix table 2.1. Enterprises, where possible, can conduct measurement or entrust qualified professional institutions to implement tests. Enterprises can also use the estimated values provided in the voucher of clearing written with the interested party. On the condition of actual measurement, the estimation of lower calorific values of fossil fuels should follow relevant standards such as the *Determination of Calorific Value of Coal GB/T 213*, *Determination of Calorific Value of Petroleum Products GB/T 384* and *Energy Determination for Natural Gas GB/T 22723*.

5.1.3 Acquisition of data for emission factor

Enterprises may use the carbon content per unit of calorific value and the rate of carbon oxidation provided by the Guidelines, as shown in Appendix table 2.2 and table 2.3.

5.2 Emissions from the oxidation of carbon powder in raw ingredients

All carbon powder in the raw ingredients is oxidized to CO_2 . Data of the activity level are the amount of carbon powder input and carbon content, and are acquired from the measurement by enterprises with the unit of ton. The CO_2 emissions from the combustion of carbon powder is calculated according to Equation (5):

$$E_{\text{process 1}} = Q_c \times C_c \times \frac{44}{12} \dots\dots (5)$$

where,

$E_{\text{process 1}}$ is the CO_2 emissions from the combustion of carbon powder during the accounting and reporting period (tCO_2);

Q_c is the consumption of carbon powder in raw ingredients (t);

C_c is the weighted average of carbon content of the carbon powder (%), and if measurement data are not available, it can be regarded as 100%; and

$\frac{44}{12}$ is the conversion rate between CO_2 and carbon.

5.3 Emissions from decomposition of raw materials

During the production of plate glass, limestone, dolomite, sodium carbonate and other carbonates in the raw materials decompose in molten state under high temperature and produce carbon dioxide. The CO₂ emitted as a result of the decomposition of carbonates is calculated according to Equation (6):

$$E_{process2} = \sum_i (M_i \times EF_i \times F_i) \quad \dots\dots(6)$$

where,

$E_{process2}$ is the carbon dioxide (CO₂) emissions from the decomposition of carbonates in raw materials during the accounting and reporting period (tCO₂) ;

M_i is the weight of consumed carbonate i (t);

EF_i is the specific emission factor of carbonate i (tCO₂/t);

F_i is the calcination proportion of carbonate i (%), and if measurement data are not available, it can be regarded as 100%; and

i is the type of the carbonate.

The consumption of raw materials at a plate glass enterprise is based on production operating records. The calcination proportion of carbonates can either be acquired from measurement data of the enterprise or be assumed to be 100%. Enterprises can use data on emission factors provided in the Guidelines, as presented in Appendix table 2.4.

5.4 Emissions from consumption of net purchased electricity and heat

5.4.1 Calculation formula

The CO₂ emissions from production activities corresponding to the consumption of net purchased electricity and heat (eg. steam) can be calculated according to Equation (7):

$$E_{electricity\&\ heat} = AD_{electricity} \times EF_{electricity} + AD_{heat} \times EF_{heat} \quad \dots\dots (7)$$

where,

$E_{electricity\&heat}$ is the CO₂ emissions from production activities corresponding to the consumption of net purchased electricity and heat with the unit of ton (tCO₂);

$AD_{electricity}$ and AD_{heat} represent the net purchased electricity (MWh) and heat (eg. steam) (GJ) respectively during the accounting and reporting period; and

$EF_{electricity}$ and EF_{heat} are CO₂ emission factors for electricity (tCO₂/MWh) and heat (tCO₂/GJ) respectively.

5.4.2 Acquisition of data for activity level

According to the purchase and sale vouchers of clearing as well as the energy balance sheet archived by electricity (or heat) suppliers and plate glass enterprises, the activity level can be calculated according to Equation (8):

Net purchased electricity (heat) = purchased amount –electricity (heat) consumption on other products except plate glass –sold electricity (heat)…… (8)

5.4.3 Acquisition of data for emission factor

In accordance with the location of an enterprise in relation to the current geographical divisions of electricity grids, i.e. those in the Northeast, North China, East China, Central China, Northwest, and Southern China, the enterprise should choose its electricity supply emission factor among those published most recently by the competent national authority. The emission factor of heat supply can be assumed to be 0.11 tCO₂/GJ for the time being, and should be updated in line with the official data published by the competent government department.

6. Quality Assurance and Documentation

A reporting entity from the plate glass manufacturing industry should establish a quality assurance and documentation system for accounting and reporting its GHG emissions, the content of which includes:

- Establishment of rules and regulations of accounting and reporting GHG emissions, including responsible institutions and staff, workflow and

contents, work cycle as well as timeline; designation of special staff responsible for accounting and reporting GHG emissions;

- Establishment of a list of GHG emission sources for the enterprise, with appropriate accounting methods for each source, which shall be documented and archived;
- Establishment of a sound statistical record system for enterprise GHG emissions and energy consumption;
- Establishment of a sound monitoring programme for GHG emission parameters. Where appropriate, enterprises should regularly monitor parameters that have a large impact on their GHG emissions, such as the lower calorific values of fossil fuels. In principle, for every batch of purchased fossil fuels, the lower caloric values should be monitored.
- Establishment of internal auditing for GHG emission reports; and
- Establishment of a management mechanism for documenting and archiving GHG data, as well as for preserving and maintaining them.

7. Content and Format of Report

The reporting entity from the plate glass manufacturing industry should report the following information in line with the format provided in the AppendixI:

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 fuel combustion, emissions from industrial process and emissions from consumption of net purchased electricity and heat.

7.3 Activity level and their sources

A reporting entity should report net consumption amounts of various fossil fuels consumed by the enterprise as well as their corresponding lower calorific values; the weight of carbon in raw ingredients and the carbon content; the consumption

amounts of various carbonates; the amount of net purchased electricity and heat; and should indicate the sources of these data (recommended values in the Guidelines or measured values).

If a plate glass enterprise produces other products apart from plate glass, it should report its activity level and sources as requested in the GHG emission accounting and reporting guidelines for the enterprises in the relevant sectors.

7.4 Emission factors and their sources

A reporting entity should report the carbon content per unit of calorific value, and carbon oxidation rate of various fossil fuels consumed by its enterprise; emission factors of various carbonates and their calcination proportion; as well as data and sources of electricity and heat emission factors used for accounting (recommended values in the Guidelines or measured values).

If a plate glass enterprise produces other products, it should report its emission factor data and sources as requested in the GHG emission accounting and reporting guidelines for the enterprises in the relevant sector.

AppendixI: Report Format Template

Greenhouse Gas Emission Report China Plate Glass 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 Plate Glass Enterprises(Trial)* issued by the National Development and Reform Commission, this reporting entity has accounted the total GHG emission amount of its enterprise for the year _____, and filled in the data in the relevant tables. The reporting 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 Emission Report of the Reporting Entity in year 20__

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

Table 1-3: Emission Factors and Calculation Co-efficient of the Reporting Entity

Table 1-1: Carbon Dioxide Emission Report of the Reporting Entity in year 20

Total CO₂ Emissions (tCO₂) of an Enterprise	
Emissions (tCO ₂) from fuel combustion	
Emissions(tCO ₂)from the oxidation of carbon powder in raw ingredients	
Emissions (tCO ₂) from decomposition of raw materials	
Emissions (tCO ₂) from consumption of net purchased electricity	
Emissions (tCO ₂) from consumption of net purchased heat	

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

		Net Consumption (t, 10 ⁴ Nm ³)	Lower calorific value (GJ/t, GJ/10 ⁴ Nm ³)
Fossil fuel combustion*	Anthracite		
	Bituminous coal		
	Lignite (brown coal)		
	Cleaned coal		
	Other washed coal		
	Other coal products		
	Coke		
	Oil		
	Fuel oil		
	Gasoline		
	Diesel		
	General kerosene		
	LNG		
	LPG		
	Tar		
	Crude benzene		
	Cokeoven gas		
	Blast furnace gas		
	Linz Donaniz Converter Gas (LDG)		
	Other gases		
Natural gas			
Refinery gas			
Industrial processes**		Data	Unit
	consumption of carbon powder in raw ingredients		t
	carbon content of carbon powder in raw ingredients		%
	consumption of limestone		t
	consumption of dolomite		t
consumption of sodium carbonate		t	
consumption of net purchased electricity & heat		Data	Unit
	Net-purchased electricity		MWh
	Net-purchased heat		GJ

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

** The enterprise should add any other types of carbonate in raw materials actually used by the enterprise in its operations, which are not listed in this table.

Table 1-3: Emission Factors and Calculation Co-efficient of the

Reporting Entity

		Carbon content per unit of calorific value (tC/GJ)	Rate of carbon oxidation (%)
Fossil Fuel Combustion*	Anthracite		
	Bituminous coal		
	Lignite (brown coal)		
	Cleaned coal		
	Other washed coal		
	Other coal products		
	Coke		
	Crude oil		
	Fuel oil		
	Gasoline		
	Diesel		
	General kerosene		
	LNG		
	LPG		
	Tar		
	Crude benzene		
	Coke oven gas		
	Blast furnace gas		
	Linz Donaniz Converter Gas (LDG)		
	Other gases		
Natural gas			
Refinery gas			
Industrial processes **		data	unit
	Emission factor for limestone		t CO ₂ /t
	Calcination ratio for limestone		%
	Emission factor for dolomite		t CO ₂ /t
	Calcination ratio for dolomite		%
	Emission factor for sodium carbonate		t CO ₂ /t
	Calcination ratio for sodium carbonate		%
net purchased electricity & heat		data	unit
	Electricity		tCO ₂ /MWh
	Heat		tCO ₂ / GJ

* The enterprise should add on its own the other types of energy actually used by the enterprise in its

operations, which are not listed in this table.

** The enterprise should add on its own the other types of carbonates materials actually used by the enterprise in its operations, which are not listed in this table.

Appendix II: Relevant Default Values

Table 2-1: Calorific Value of Fuels used in China Plate Glass Industry

Fuel name	Average lower calorific value	Unit
Raw coal	20908	MJ/t
Cleaned coal	26344	MJ/t
Middling coal	8363	MJ/t
Slime	10454	MJ/t
Coke	28435	MJ/t
Crude oil	41816	MJ/t
Fuel oil	41816	MJ/t
Gasoline	43070	MJ/t
General kerosene	43070	MJ/t
Diesel	42652	MJ/t
LPG	50179	MJ/t
Refinery gas	45998	MJ/t
Natural gas	38.931	MJ/m ³
Coke oven gas	17.354	MJ/m ³
Producer gas	5.227	MJ/m ³
Heavy oil catalytic cracking gas	19.235	MJ/m ³
Heavy oil thermal cracking gas	35.544	MJ/m ³
Coke gas	16.308	MJ/m ³
Pressure gasified gas	15.054	MJ/m ³
Water gas	10.454	MJ/m ³
Coal tar	33453	MJ/t

Data sources: 1. China Energy Statistical Yearbook 2012; 2. Data from classic enterprise investigation

Table 2-2: Carbon Content of Fossil Fuels used in China Plate Glass

Industry

Fuel name	Carbon content (tC/TJ)
Raw coal	26.37
Anthracite	27.49
Common bituminous coal	26.18
Lignite (brown coal)	27.97
Washed coal	25.41
Mould coal	33.56
Coke	29.42
Crude oil	20.08
Fuel oil	21.10
Gasoline	18.90
Diesel	20.20
General kerosene	19.41
LPG	16.96
Refinery gas	18.20
Other petroleum products	20.00
Natural gas	15.32
Coke oven gas	13.58
Others	11.96

Data sources: 1. Guidance for Compiling Provincial Greenhouse Gas Emission Inventory (Trial);

2. Data from sector-specific investigation

Table 2-3: Rates of Combustion Oxidation for Fossil Fuels used in China

Plate Glass Industry

Fuel name	Rate of oxidation
Coal (kilns)	98%
Coal (industrial furnace)	95%
Coal (industrial boilers)	91%
Coke	98%
Crude oil	99%
Fuel oil	99%
Gasoline	99%
General kerosene	99%
Diesel	99%
LPG	99.5%
Refinery gas	99.5%
Natural gas	99.5%
Coke oven gas	99.5%
Producer gas	99.5%
Heavy oil catalytic cracking gas	99.5%
Heavy oil thermal cracking gas	99.5%
Coke gas	99.5%
Pressure gasified gas	99.5%
Water gas	99.5%
Coal tar	99%

Data sources: 1. Guidance for Compiling Provincial Greenhouse Gas Emission Inventory (Trial); 2. Data from classic enterprise investigation

Table 2-4: Emission Factors for Common Carbonate Materials

Carbonates	Ore name	Molecular weight	Emission factor (tCO ₂ /t carbonate)
CaCO ₃	Calcite or aragonite	100.0869	0.43971
MgCO ₃	Magnesite	84.3139	0.52197
CaMg(CO ₃) ₂	Dolomite	184.4008	0.47732
FeCO ₃	Siderite	115.8539	0.37987
Ca(Fe,Mg,Mn)(CO ₃) ₂	Ankerite	185.0225 ~ 215.6160	0.40822 ~ 0.47572
MnCO ₃	Rhodochrosite	114.9470	0.38286
Na ₂ CO ₃	Sodium carbonate	106.0685	0.41492

Sources: 1. *CRC Manual on Chemistry and Physics (2004)*; 2. *2006 IPCC Guidance on National GHGs Inventory*

Table 2-5: Other Recommended Emission Factors

Parameter	Unit	CO ₂ emission factor
Electricity consumption	tCO ₂ /MWh	The most update value published by authorities
Heat consumption	tCO ₂ /GJ	0.11