

**Guidelines for Accounting and Reporting
Greenhouse Gas Emissions
China Machinery and Equipment
Manufacturing Enterprises
(Trial)**

Instructions

I. Purposes and Significance of the Guidelines

The Guidelines for Accounting and Reporting Greenhouse Gas Emissions from China Mechanical Equipment Manufacturing Enterprises (Trial) (the Guidelines), drafted by National Development and Reform Commission (NDRC), seek to achieve the aim of cutting carbon dioxide emissions per unit GDP by 40% - 45% by 2020 from the 2005 level. It was drafted according to the demands of “establishing the statistical accounting system and building up carbon emission trading market” put forward in the 12th Five-Year Plan Outline and “accelerating the establishment of national, local, enterprise three-level accounting system of greenhouse gas emission and system of requiring key enterprises to directly submit data of greenhouse gas emission and energy consumption” put forward in *12th Five-Year Plan Work Program to Control Greenhouse Gas Emission* (No. 41 Document in 2011 of the State Council). It endeavors to help enterprises (i) scientifically calculate and report their own greenhouse gas emissions, (ii) make control plans of greenhouse gas emission, (iii) take active part in carbon emission trading, and (iv) strengthen enterprises’ social responsibilities. Meanwhile, it paves the way for the competent departments to establish and implement the system of key enterprises reporting greenhouse gas emissions, and accordingly make relevant policies.

II. Preparation Process

The Guidelines are drafted by Sino Carbon Innovation & Investment Co., Ltd, entrusted by National Development and Reform Commission. The writing group used research results and practical experiences from home and abroad about accounting report on greenhouse gas emissions, referred to *Guidelines for Provincial Greenhouse Gas Inventories* issued by the General Office of the NDRC, conducted field research, in-depth studies and pilot tests, and finally finished drafting the *Guidelines for Accounting and Reporting Greenhouse Gas Emissions from China Mechanical Equipment Manufacturing Enterprises (Trial)*. Efforts have been made to ensure that the Guidelines are science-based, comprehensive, standardized and practical. Experts from China Machinery Industry Federation, Foton Co., Ltd, GreeElectronic Appliances Inc. and others made great contribution in the drafting processes.

III. Main Contents

The *Guidelines for Accounting and Reporting Greenhouse Gas Emissions from China Mechanical Equipment Manufacturing Enterprises (Trial)* include seven major parts and appendices, elaborating respectively on the application scope, references, terminology, accounting boundary, accounting method, quality assurance and documentation and reporting content and forms. The greenhouse gases under the Guidelines include carbon dioxide, hydro-fluoro-carbons, perfluoro-carbon and sulfur hexafluoride. The emission sources accounted include fossil fuel burning, industrial production, net purchase use of electricity and heating power. The Guidelines apply to manufacturing enterprises with legal person status and independent accounting units regarded as legal persons.

IV. Issues that Need Clarification

The *Guidelines for Accounting and Reporting Greenhouse Gas Emissions from China Mechanical Equipment Manufacturing Enterprises (Trial)* provide default values for parameters and emission factors needed in the process of accounting, which are from official documents such as *Guidelines for Provincial Greenhouse Gas Inventories* and *2006 IPCC Guidelines for National Greenhouse Gas Inventories*. In addition, electric equipment manufacturing enterprises and refrigeration equipment manufacturing enterprises are similar in greenhouse gas emission systems, thus applying the same accounting method.

Considering the fact that GHG emissions accounting and reporting are a completely new endeavor, some inadequacies may be found in practical application of the Guidelines, and it is hoped that those application units may provide their feedback in a timely manner, all aimed at making further revision and improvement in the future.

The National Development and Reform Commission issued the Guidelines and is responsible for their interpretation and revision.

Contents

1. Application Scope	1
2. References.....	1
3. Terminology and Definitions	1
4. Accounting Boundary.....	3
5. Accounting Methodology	5
Calculate the aforementioned greenhouse gas emissions in the following ways:	6
5.1 Emissions from fossil fuel burning	6
5.1.2 Obtaining activity level data	7
5.1.3 Obtaining emission factors data	8
5.2 Emissions from industrial production	9
5.2.1 Greenhouse gas emissions caused by electric and refrigeration equipment production	9
5.2.2 CO ₂ emissions generated by carbon dioxide gas welding	13
5.3 Emissions generated by net purchased electricity and heat	14
5.3.1 Equation	15
5.3.2 Acquisition of activity level data	15
5.3.3 Acquisition of emission factor data	16
6. Quality Assurance and Documentation	16
7. Content and Format of Report.....	17
7.1 Basic information of the reporting entity	17
7.2 Greenhouse gas emissions.....	17
7.3 Activity level and its sources	17
7.4 Emission factors and their sources	18

Appendix II: Recommended Value of Relevant Parameters32

1. Application Scope

The Guidelines apply to accounting and reporting of greenhouse gas emissions for machinery and equipment manufacturing enterprises in China. Any enterprise engaged in machinery and equipment manufacturing within the Chinese territory can make reference to the methods provided in the Guidelines to account and report the enterprise's greenhouse gas emissions. In cases where enterprises produce other products apart from machinery and equipment and emit greenhouse gases, the enterprises shall calculate and report these emissions in accordance with the guidelines for the enterprises in the relevant sectors.

2. References

Documents cited in the Guidelines mainly include:

Provincial Guidance on the Compilation of Greenhouse Gas Inventories (Trial);

The People's Republic of China National Greenhouse Gas Inventory; and

2006 IPCC Guidelines for National Greenhouse Gas Inventories.

The following documents are used as reference in the development process of the Guidelines:

The Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard (2004 Revised Edition);

ISO 14064-1 Greenhouse gases Part 1: Specification with Guidance at the Organization Level for Quantification and Reporting of Greenhouse Gas Emissions and Removals; and

EU ETS Guideline-Methodology for GHG Monitoring and Reporting.

3. Terminology and Definitions

For the purposes of the Guidelines, the following terminology and definitions apply:

3.1 Greenhouse gases (GHGs)

A greenhouse gas is a natural or man-made atmospheric component in a gaseous state that absorbs and emits radiation within the thermal infrared range. The greenhouse gases (herein the Guidelines) refer to six types of greenhouse gases controlled under the Kyoto Protocol, namely, carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulfur hexafluoride (SF₆). The greenhouse gases in the present Guidelines include the following four: CO₂, HFCs, PFCs and SF₆.

3.2 Machinery and equipment manufacturing enterprises

Machinery and equipment manufacturing include metal products industry, manufacturing for machinery of general purposes, manufacturing for machinery of special purposes, automobile industry, railway, shipping, aerospace and other transportation equipment manufacturing, electric machinery and equipment manufacturing.

3.3 Reporting entities

Reporting entities refer to corporate enterprises or independent accounting units regarded as legal persons, with greenhouse gas emissions involved in their activities, which account and report their greenhouse gas emissions.

3.4 Emissions from fossil fuel combustion

Emissions from fossil fuel combustion refer to greenhouse gas emissions generated in the combustion reaction between fossil fuels and oxygen.

3.5 Emissions from industrial production

Emissions from industrial production refer to greenhouse gas emissions resulting from the physical or chemical changes, except for combustion, of raw materials. Such greenhouse gas emissions are caused by physical or chemical reaction except for fuel combustion, greenhouse gas leakage, waste gas treatment and so on in industrial production processes.

3.6 CO₂ emissions from consumption of net purchased electricity and heat

CO₂ emissions from consumption of net purchased electricity and heat refer to greenhouse gas emissions generated from enterprises' consumption of net purchased electricity and heat (steam and hot water).

3.7 Activity level

Activity level is the quantification of production or consumption activities causing greenhouse gas emissions, including consumption of various fuels, use of raw materials, purchased electricity, purchased steam, hot water etc.

3.8 Emission factors

Emission factor is the quantified rate of greenhouse gas emissions per unit of activity. Emission factors are usually obtained through sampling measurement or statistical analysis, indicating the representative emission ratio of a particular activity under given operating conditions.

3.9 Carbon oxidation rate

Carbon oxidation rate is the percentage of total carbon in fuels containing carbon oxidized in the process of combustion.

4. Accounting Boundary

4.1 Enterprise boundary

The reporting entities should be limited to enterprise legal persons. They shall identify, account and report the greenhouse gas emissions from all the production facilities within enterprise boundary. Production facilities include main production system, ancillary production system and affiliated production system. Ancillary production system includes power, electricity supply, water supply, tests, machine maintenance, storerooms, transportation etc. Affiliated production system includes production command system (factory headquarters) and departments and units that are serving production (like staff canteen, workshop bathroom, health station and so on).

Greenhouse gas emissions from machinery and equipment manufacturing enterprises include: emissions from fossil fuel combustion, industrial production and net purchased and consumed electricity and heat. Because there are various emission types during industrial production, enterprises shall choose the appropriate calculating method according to actual conditions. Examples include emissions from the leakage of SF₆, HFCs and PFCs during the production of electric equipment or refrigeration equipment, and emissions caused by carbon dioxide arc welding in mechanical equipment manufacturing.

For greenhouse gas emissions from mechanical equipment manufacturing enterprises and boundary of accounting, see Figure 1.

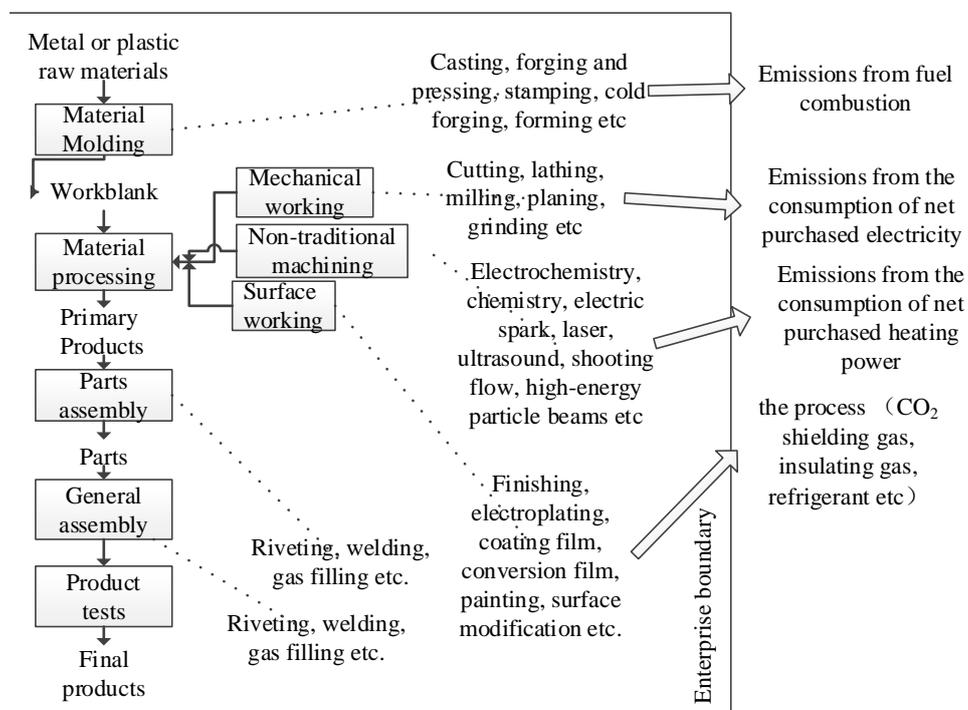


Figure 1 Typical greenhouse gas emissions from mechanical equipment manufacturing enterprises and accounting boundary

4.2 Emission sources and types of gases

Emission sources and types of gases that the reporting entities shall account include:

(1) Emissions from fossil fuel combustion which refer to CO₂ emissions generated by combustion of fossil fuels with oxygen in all kinds of stationary or mobile combustion equipment (such as boiler, internal-combustion engine and waste gas treatment equipment etc).

(2) Emissions from industrial production which refer to greenhouse gas emissions caused by electric equipment manufacturing or refrigeration equipment; by gas use or gas leakage in the process of soldering protected by gaseous CO₂.

(3) CO₂ emissions from net purchased electricity and heat. Although this part of emissions actually takes place in the enterprises producing electric power or heating power, it is triggered by consumption activities of the reporting entities. Thus this part of emissions shall be added to the total emissions of the reporting entities pursuant to relevant requirements.

(4) Other greenhouse gas emissions. In cases where reporting entities produce other products and also cause greenhouse gas emissions, then the enterprises shall account and report these emissions in accordance with the guidelines on accounting and reporting greenhouse gas emission for the enterprises producing these products. Because related methods can be seen in the guidelines on accounting and reporting greenhouse gas emission for the enterprises producing these products, no further explanation will be provided in the present guidelines.

5. Accounting Methodology

The complete work flow for reporting enterprises to calculate greenhouse gas emissions includes:

- (1) Setting the accounting boundary;
- (2) Identifying the emission sources;
- (3) Collecting activity data;
- (4) Selecting and obtaining data of emission factors;

- (5) Calculating separately emissions from fossil fuel burning, industrial production and net purchased and consumed electricity and heat;
- (6) Adding up the total greenhouse gas emissions by companies.

The total greenhouse gas emissions by machinery manufacturing enterprises equal the sum of all the greenhouse gas emissions from fossil fuels burning and in industrial production as well as that from net purchased and consumed electricity and heat. Calculate the emissions according to Equation(1):

$$E = E_{burning} + E_{process} + E_{electricity} + E_{heat} \quad (1)$$

where,

E represents total GHG(CO₂) emissions(ton)

$E_{burning}$ represents CO₂ emissions from fossil fuel burning within the boundary of companies(ton)

$E_{process}$ represents GHG(CO₂) emissions in the process of industrial production within the boundary(ton)

$E_{electricity}$ represents CO₂emissions from net purchased electricity(ton)

E_{heat} represents CO₂ emissions from net purchased heat(ton)

Calculate the aforementioned greenhouse gas emissions in the following ways:

5.1 Emissions from fossil fuel burning

5.1.1 Equation

CO₂ emissions from fossil fuel burning is the sum of CO₂ emissions from all types of fossil fuel consumed in the enterprise's accounting and reporting year. Calculate the amount according to Equation (2):

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

where,

$E_{burning}$	Emissions from fossil fuel burning within the enterprise's boundary(ton)
AD_i	Activity level of No. <i>i</i> fossil fuel during the reporting year(GJ)
EF_i	Emission factor of NO. <i>i</i> fossil fuel(tCO ₂ /GJ)
<i>i</i>	Type of fossil fuel

5.1.2 Obtaining activity level data

Activity level of fossil fuel burning by a machinery manufacturing enterprise is the result of all types of fuels consumption multiplied by the average Net Calorific Value (NCV) in the enterprise's accounting and reporting year. Calculate the value according to Equation(3):

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

where,

AD_i	Activity level of NO. <i>i</i> fossil fuel during the reporting period(GJ);
NCV_i	The average NCV of NO. <i>i</i> fossil fuel during the reporting period; for solid or liquid fuel, the unit is GJ/t; for gas fuel, the unit is GJ/10,000Nm ³ ;

- FC_i Net consumption of NO.*i* fuel during the reporting period; for solid or liquid fuel, the unit is ton; for gas fuel, the unit is 10,000Nm³; and
- i* Type of fossil fuel.

Net consumption of fuels is obtained through enterprise's measuring data, and the measurement used should meet the requirement of GB17168 *General Principle for Equipping and Managing of the Measuring Instrument of Energy in Organization of Energy Using*. The reporting enterprise can use the default value in Appendix II of these Guidelines for average NCV of fossil fuel. Qualified enterprises can carry out actual measurement on their own, entrust specialized agencies to do the test, or use test results provided in the voucher of clearing by relevant parties. If the enterprise were to carry out actual measurements, the NCV test of fossil fuel should follow the standards in GB/T 231 *Determination of Calorific Value Coal*, GB/T 384 *Determination of Calorific Value of Petroleum Products* and GB/T 22723 *Energy Determination for Natural Gas*.

5.1.3 Obtaining emission factors data

Data of emission factors of fossil fuel burning from machinery manufacturing enterprises can be calculated through unit carbon content in NCV and carbon oxidation rate. Calculate the value according to Equation(4):

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

where,

- EF_i CO₂ emission factor of NO.*i* fuel(tCO₂ / GJ);
- CC_i Unit carbon content in NCV of NO.*i* fuel(tC/GJ), use default value in Appendix II of the Guidelines;

- OF_i Carbon oxidation rate of NO.i fossil fuel burning(%), use default value in Appendix II of the Guidelines; and
- i Type of fossil fuel.

5.2 Emissions from industrial production

Emissions from machinery manufacturing process is the sum of emissions from each step, calculated against Equation(5).

$$E_{process} = E_{TD} + E_{WD} \quad (5)$$

where,

$E_{process}$ Greenhouse gas emissions from industrial production, tCO₂e;

E_{TD} Emissions from electric and refrigeration equipment production, tCO₂e; and

E_{WD} Emissions from the welding process with CO₂ as a protective gas, tCO₂.

5.2.1 Greenhouse gas emissions caused by electric and refrigeration equipment production

Emissions caused by SF₆, HFCs and PFC leakage in electric or refrigeration equipment production is calculated using Equation(6).

$$E_{TD} = \sum_i ETD_i \quad (6)$$

where,

E_{TD} Emissions caused by electric or refrigeration equipment manufacturing, tCO₂e;

ETD_i Leakage of greenhouse gas NO.*i*, tCO₂e; and

i Type of greenhouse gas.

Each type of greenhouse gas leakage is calculated against Equation(7).

$$ETD_i = (IB_i + AC_i - IE_i - DI_i) \cdot GWP_i \quad (7)$$

where,

ETD_i Leakage of greenhouse gas NO.*i*, tCO₂e;

IB_i Initial stocks of greenhouse gas NO. *i*, t;

IE_i Final stocks of greenhouse gases NO.*i*, t;

AC_i Purchased volume of greenhouse gas NO.*i* during the reporting period, t;

DI_i Outward sales/offsite use of greenhouse gas NO.*i* during the reporting period, t;

GWP_i Global warming potential of greenhouse gas NO.*i*; and

i Type of greenhouse gas.

Outward sales/offsite use of greenhouse gases is calculated using Equations (8) and (9), Equation (8) for non meter measurement and Equation (9) for meter measurement.

$$DI_i = MB_i - ME_i - E_{L,i} \quad (8)$$

Or

$$DI_i = MM_i - E_{L,i} \quad (9)$$

where,

DI_i Outward sales/offsite use of greenhouse gas NO.*i*, t;

MB_i The mass of greenhouse gas NO.*i* in the container before filling the equipment, t;

ME_i The mass of greenhouse gas NO.*i* in the container after filling the equipment, t;

MM_i Filling volume of greenhouse gas NO.*i* measured by gas flowmeter, t;

$E_{L,i}$ Leakage of greenhouse gas No.*i* during filling operation, t; and

i Type of greenhouse gas.

Leakage of greenhouse gas in pipes, valves, and others during filling process is calculated using Equation(10).

$$E_{L,i} = \sum_k CH_k \cdot EF_{CH,k} \quad (10)$$

where,

$E_{L,i}$ Leakage of greenhouse gas NO.*i* during filling operation, t;

CH_k The frequency of filling the equipment at the connection point *k* during the reporting period;

$EF_{CH,k}$ The emission factor of leakage caused at the connection point *k* while filling the gas, t/time;

k Connection points of the pipeline; and

i Type of greenhouse gas.

The initial stock, final stock and offsite usage volume of filling gas is based on accounting records of the enterprise. The purchase amount and outward sales data are from settlement voucher. Emission factor of leakage caused by filling gas is evaluated by the enterprise or provided by equipment suppliers. The following figure is recommended when data is unavailable: at 0.5MPa, 20 degrees Celsius, the filling operation resulting in 0.342 mol emissions each time. Get emission factor of leakage by multiplying molar mass of each gas.

5.2.2 CO₂ emissions generated by carbon dioxide gas welding

Carbon dioxide gas welding is used by the enterprises in industrial production. CO₂ is directly emitted into the air during the welding process. The emission volume is calculated against Equations(11) and (12).

$$E_{WD} = \sum_{i=1}^n E_i \quad (11)$$

$$E_i = \frac{P_i \times W_i}{\sum_j P_j \times M_j} \times 44 \quad (12)$$

where,

E_{WD} CO₂ emissions caused by carbon dioxide gas welding, tCO₂;

E_i CO₂ emissions of shielding gas NO. i , tCO₂;

W_i Net usage of shielding gas NO. i during the reporting period, t;

P_i Percentage by volume of CO₂ in shielding gas NO. i , %;

P_j Percentage by volume of gas NO. j in a mixed gas of the first gas species j , %;

M_j Molar mass of gas NO. j in a mixed gas, g/mol;

i Type of shielding gas; and

j Types of gas in mixed shielding gas.

Net usage of welding shielding gas is calculated against Equation(13) based on settlement voucher of purchases and sales of shielding gas and accounting records of the enterprise. The initial stock, final stock and offsite usage volume of gas is based on accounting records of the enterprise. Purchase amount and outward sales data are from settlement vouchers. Other parameters are acquired from the description on the shielding gas cylinder or provided by shielding gas suppliers.

$$W_i = IB_i + AC_i - IE_i - DI_i \quad (13)$$

where,

W_i Volume of shielding gas used, t;

IB_i Initial stock of shielding gas NO.*i*, t;

IE_i Final stock of shielding gas NO.*i*, t;

AC_i Amount of shielding gas NO.*i* purchased during the reporting period, t;

DI_i The amount of shielding gas NO.*i* sold during the reporting period, t; and

i Types of shielding gas containing CO₂

5.3 Emissions generated by net purchased electricity and heat

5.3.1 Equation

CO₂ emissions generated by net purchased electricity and heat are calculated against Equations(14) and (15).

$$E_{electricity} = AD_{electricity} \times EF_{electricity} \quad (14)$$

$$E_{heat} = AD_{heat} \times EF_{heat} \quad (15)$$

where ,

$E_{electricity}$ Emissions generated by net purchased electricity, tCO₂;

E_{heat} Emissions generated by net purchased heat, tCO₂;

$AD_{electricity}$ Net purchased electricity used by the enterprise, MWh;

AD_{heat} Net purchased heat used by the enterprise, GJ

$EF_{electricity}$ Emission factor of annual average electricity supply in the regional grid, tCO₂ / MWh; and

EF_{heat} Emission factor of heat supply, tCO₂ / GJ.

5.3.2 Acquisition of activity level data

Volume of net purchased electricity is based on electricity meter records. If no records are available, data in the electricity bill or settlement vouchers provided by suppliers can be adopted. The enterprise should calculate net purchased electricity data from different grids separately.

Volume of net purchased heat is based on thermal meter records. If no records are available, data in the thermal invoice or settlement vouchers provided by suppliers can be adopted.

5.3.3 Acquisition of emission factor data

Average emission factors of regional power grid should be divided based on the current production 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. Regional emission factors in corresponding areas released by the national authorities should be used for calculation. The CO₂ emission factor for purchased heat is assumed to be 0.11 tCO₂/GJ for the time being until the official data is released by the government authority and should remain updated.

6. Quality Assurance and Documentation

Reporting entities should set up a quality assurance and documentation system for reports on greenhouse gas emissions, which includes:

6.1 Setting up rules and regulations for accounting and reporting of greenhouse gas emissions, including institutions and persons in charge, work procedure and content, work cycle and timelines; appointing professionals to take charge of the accounting and reporting of the company's greenhouse gas emissions.

6.2 Establishing and improving the record system of greenhouse gas emissions and energy consumption.

6.3 Making and improving greenhouse gas emissions monitoring plans. Companies, if permitted, can monitor parameters on a regular basis including NCV and carbon content of main fuels, carbon oxygenation rate of key combustion equipment, and emission factors of leakage from gas filling.

6.4 Setting up an internal auditing system for greenhouse gas emission reports;
and

6.5 Setting up the management system of documents to save documents and related data of greenhouse gas emission accounting and reporting.

7. Content and Format of Report

Reports should include contents according to format specified in Appendix I:

7.1 Basic information of the reporting entity

Basic information of the reporting entity should include the name of the entity, its nature of business, reporting year, industry involved, organization code, legal representative, person in charge and contact information.

7.2 Greenhouse gas emissions

Reporting entities should report the total amount of greenhouse gas emissions in the year, as well as the amount of fossil fuel burning and discharge, emissions during industrial production, and emissions from net purchase of electricity and heating power.

7.3 Activity level and its sources

Reporting entities should report the consumption of fuels for production and their corresponding NCV during the reporting year; the consumption of feed gas in industrial production; leakage of insulating gas in electric equipment manufacturing, leakage of refrigerating fluid in refrigeration equipment manufacturing, padding operation, net use of electro welding shielding gas and volume ratio of gas mixture; net purchase of electricity and heat. Sources of these data should be noted (using the recommended value or measured value in this guide).

If reporting entities are also engaged in production other than mechanical equipment manufacturing, they should report their activity level data and sources by referring to greenhouse gas emission accounting and reporting guidelines for the enterprises in the relevant sectors.

7.4 Emission factors and their sources

Reporting entities should report data in the reporting year such as the amount of unit carbon content in NCV and carbon oxidation rate of fuels for production, emission factors of leakage from gas filling, annual average emission factors of electricity supply in regional electricity grids, and emission factors of heat power supply. Entities should also note the sources of data (using recommended value or measured value in the present Guidelines).

If reporting entities are engaged in production other than mechanical manufacturing, they should report their data of emission factors and sources of emission by referring to greenhouse gas emission accounting and reporting guidelines for the enterprises in the relevant sectors.

**Greenhouse Gas Emission Report for China
Machinery and Equipment Manufacturing
Companies**

Reporting Entity (Seal):

Reporting Year:

Date: Day/ Month/ Year

Based on the *Guidelines for Accounting and Reporting Greenhouse Gas Emissions from China Machinery and Equipment Manufacturing Enterprises (Trial)* issued by the National Development and Reform Commission, the entity has checked the amount of greenhouse gas emission in the year of _____ and completed related data tables. Relevant facts are listed as follows:

I. Basic Information of the Company

II. Greenhouse Gas Emissions

III. ActivityLevel Data and Sources

IV. Data of Emission Factors and their 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 Representative (Signature):

Day/ Month/ Year

Attachments:

Table 1-1: Summary Sheet of Greenhouse Gas Emissions of Reporting Entity

Table 1-2: Activity Level Data of Reporting Entity

Table 1-3: Emission Factors of Reporting Entity

**Table 1-1: Carbon Dioxide Emissions Summary Sheet for the Reporting Entity
in the year __**

Types of Sources	Mass of Greenhouse Gas (Unit: t)	CO ₂ Equivalent (Unit: tCO ₂ e)
CO ₂ emissions from fossil fuel burning		
CO ₂ emissions from industrial production		
HFCs* emissions from industrial production		
PFCs*emissions from industrial production		
SF ₆ *emissions from industrial production		
Total CO ₂ emissions from the net purchase of electricity and heat power (tCO ₂ e)		

*: Report the actual emissions of HFC_s and PFC_s and voluntarily report other emissions.

Table 1-2: Emission Data of Reporting Entity

	Types of Fuels	Consumption (t, 0000Nm ³)	NCV (GJ/t, GJ/10000Nm ³)
Fossil Fuel Burning*	Blind coal		
	Soft coal		
	Brown coal		
	Cleaned coal		
	Other washed coal		
	Briquette coal		
	Petroleum coke		
	Other coal products		
	Coke		
	Crude oil		
	Fuel oil		

	Gasoline		
	Diesel		
	Ordinary kerosene		
	Refinery dry gas		
	Liquefied natural gas		
	Liquefied petroleum gas		
	Naphtha		
	Aviation gasoline		
	Aviation kerosene		
	Other petroleum products		
	Natural gas		
	Coke oven gas		

		Blast furnace gas		
		Converter gas		
		Other coal gas		
Industrial Processes**	Refrigeration or electric equipment manufacturing***	Name of parameter	Value	Unit
		Initial stock of refrigerating fluid or insulating gas		t
		End-of-period stock of refrigerating fluid or insulating gas		t
		Purchase of refrigerating fluid or insulating gas		t
		Mass of refrigerating fluid or insulating gas before filling		t
		Mass of refrigerating fluid or insulating gas		t

		after filling		
		Mass of refrigerating fluid or insulating gas measured by gas flowmeter		t
		Filling of refrigerating or electric equipment		t
	Carbon dioxide arc welding***	Initial stock of shielding gas		t
		Closing stock of shielding gas		t
		Purchase of shielding gas		t
		Selling of shielding gas		t
		Percent by volume of CO ₂ in gas mixture		%
		Percent by volume of A in gas mixture		%

		Percent by volume of B in gas mixture		%
		Percent by volume of C in gas mixture		%
		Percent by volume of D in gas mixture		%
Net Purchase of Electricity and Heat		Net purchase of electricity		MWh
		Net purchase of heat power		GJ

* The company should add other types of energy actually consumed but not listed in the table.

** The company should add greenhouse gas emission links actually covered but not listed in the table. If the company engages in production other than mechanical equipment, greenhouse gas emission links not covered in this guide should be reported. Please mark the consumption amount of other fluorine-containing gas.

*** Other types of gas, if any, should also be reported.

Table 1-3: Emission Factors and Calculation Coefficients

Fuel Types		Unit carbon content in NCV (tC/GJ)	Carbon oxidation rate (%)
Fossil Burning*	Blind coal		
	Soft coal		
	Brown coal		
	Cleaned coal		
	Other washed coal		
	Briquette coal		
	Petroleum coke		
	Other coal products		
	Coke		
	Crude oil		

	Fuel oil		
	Gasoline		
	Diesel		
	Ordinary kerosene		
	Refinery dry gas		
	Liquefied natural gas		
	Liquefied petroleum gas		
	Naphtha		
	Aviation gasoline		
	Aviation kerosene		
	Other petroleum products		
	Natural gas		

		Coke oven gas		
		Blast furnace gas		
		Converter gas		
		Other coal gas		
Industrial Processes**		Name of Parameter	Value	Unit
	refrigerating or electric equipment manufacturing	Emission factor of leakage from gas filling		t/one time
	Carbon dioxide arc welding***	Molar mass of A in gas mixture		g/mol
		Molar mass of B in gas mixture		g/mol
		Molar mass of C in gas mixture		g/mol
		Molar mass of D in gas mixture		g/mol
		Percent by		g/mol

		volume of D in gas mixture		
Net Purchase of Electricity and Heat		Net purchase of electricity		tCO ₂ /MWh
		Net purchase of heat		tCO ₂ / GJ

* The company should add other types of energy actually consumed but not listed in the table.

** The company should add greenhouse gas emission links actually covered but not listed in the table. Other parameters of the same category should also be listed. If the company engages in production other than mechanical equipment, greenhouse gas emission links not covered in this guide should be reported.

*** Other types of gas, if any, should also be reported.

Appendix II: Recommended Value of Relevant Parameters

Table 2-1: Recommended Value of Relevant Parameters of Common Fossil

Fuels

Types of fuel		Unit of measurement	NCV (GJ/t, GJ/ $\times 10^4 \text{Nm}^3$)	Carbon content per unit heat value (tC/GJ)	Carbon oxidation rate of fuels
Solid Fuels	Blind coal	t	26.7 ^c	27.4 ^b $\times 10^{-3}$	94%
	Soft coal	t	19.570 ^d	26.1 ^b $\times 10^{-3}$	93%
	Brown coal	t	11.9 ^c	28 ^b $\times 10^{-3}$	96%
	Cleaned	t	26.334 ^a	25.41 ^b	90%
	Other	t	12.545 ^a	25.41 ^b	90%
	briquette	t	17.460 ^d	33.6 ^b $\times 10^{-3}$	90%
	Petroleum	t	32.5 ^c	27.5 ^b $\times 10^{-3}$	98%
	Other coal products	t	17.460 ^d	33.60 ^d $\times 10^{-3}$	90%
	Coke	t	28.435 ^a	29.5 ^b $\times 10^{-3}$	93%
	Liquid Fuel	Crude oil	t	41.816 ^a	20.1 ^b $\times 10^{-3}$
Fuel oil		t	41.816 ^a	21.1 ^b $\times 10^{-3}$	98%
Petroleum		t	43.070 ^a	18.9 ^b $\times 10^{-3}$	98%
Diesel		t	42.652 ^a	20.2 ^b $\times 10^{-3}$	98%
Common kerosene		t	43.070 ^a	19.6 ^b $\times 10^{-3}$	98%
Refinery		t	45.998 ^a	18.2 ^b $\times 10^{-3}$	99%
Liquefied		t	44.2 ^c	17.2 ^b $\times 10^{-3}$	98%

	Liquefied petroleum gas	t	50.179 ^a	17.2 ^b ×10 ⁻³	98%	
	naphtha	t	44.5 ^c	20.0 ^b ×10 ⁻³	98%	
	Other petroleum	t	40.2 ^c	20.0 ^b ×10 ⁻³	98%	
Fuel	Gas	Natural gas	10	389.31 ^a	15.3 ^b ×10 ⁻³	99%
		Coke oven	10	179.81 ^a	13.58 ^b ×10 ⁻³	99%
		Blast	10	33.000 ^d	70.8c×10 ⁻³	99%
		Converter	10	84.000 ^d	49.60	99%
		Other coal	10	52.270 ^a	12.2 ^b ×10 ⁻³	99%

Notes:

a: Annals of China Energy Statistics in 2013; b: Guides on Provincial Greenhouse Gas Lists (Trial); c: Guides on Greenhouse Gas Lists of IPCC Countries in 2006; d: Research on China's Greenhouse Gas List (2007)

Table 2-2: Recommended Values of Other Emission Factors

Name of Parameters	Unit	Emission Factor of CO ₂
Electricity	tCO ₂ /MWh	The latest national value adopted
Heat power	tCO ₂ /GJ	0.11