# Designing Carbon Emissions Trading Financial Reporting System in China

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**Abstract:** With the rapid development of carbon emissions trading market, carbon emissions trading financial reporting system become one of the hardest problems in accounting field. Based on analysis of the financial characteristic of carbon emissions trading, this paper studies about accounting object, assumption, elements and measurement of carbon emissions trading, designs accounting statements, accounting statements notes and financial situation statement of it.

**Keywords:** Carbon Emissions Trading; Accounting Statements; Accounting Statements Notes; Financial Situation Statement

## 1 Introduction

With the rapid development of carbon emissions trading market, carbon emissions trading financial reporting system become one of the hardest problems in accounting field. So far, there is not a unified carbon emissions trading financial reporting system, which can rule the contents and methods of carbon accounting information disclosure. Therefore, it is imperative to build a carbon emissions trading financial reporting system.

The disadvantages of traditional mode of industrialization are increasingly being criticized by people, low carbon transition is bound to become the future choice of human being, which is also the choice of sustainable development of society. United Nations Framework Convention on Climate Change introduced international emission trade, joint implementation, and clean development mechanism, etc. market trading methods to address climate change issues, which also apply a successful practice of carbon emissions trading.

Based on analysis of the financial characteristic of carbon emissions trading, this paper study about accounting object, assumption, elements and measurement of carbon emissions trading, and design accounting statements, accounting statements notes, and financial situation statement of it.

## 2 Analyzing Financial Characteristics of Carbon Emissions Trading in China

### 2.1 Analyzing Accounting Characteristics of Carbon Emissions Trading

(1) Accounting Object of Carbon Emissions Trading.

The object of accounting is the content of accounting calculation and supervision, that is, which is also the movement of capital in social reproduction. So carbon emissions trading accounting object is the carbon emissions of funds movement in social reproduction. Carbon emissions trading accounting mainly uses the tool of monetary, reflects and supervises the economic transactions or events relating to carbon emissions, and regularly discloses accounting information related to carbon emissions trading in financial report, which can be used by investors in the carbon trading market as well as the government and other regulatory authorities.

(2) Accounting Assumption of Carbon Emissions Trading.

Accounting assumption is the essential precondition of accounting. Carbon emissions trading accounting continues to apply the accounting entity, continuing operations, accounting period and monetary measurement hypothesis. But when taking into special characteristics of carbon emissions trading, we should increase another two accounting assumptions——non monetary measurement and sustainable development:

(a) Non- monetary Measurement Assumption. It is necessary to add this assumption, because carbon emissions trading related to carbon emissions and other information must be reflected by non monetary measurement unit, such as ton.

(b) Sustainable Development Assumption. carbon accounting entity reflect and supervises carbon emissions trading in the precondition of sustainable development of economic and social.

(3) Accounting Principles of Carbon Emissions Trading.

Accounting principles is quality requirement of accounting information, carbon emissions trading accounting in addition to the basic accounting principles, reliability, relativity, easy to understanding, etc., should also comply with the principles of environmental capital. That is to say, environment as a new element has been given the price. Through the market pricing and trading, environment become the important way to realize the optimization of resources allocation. Carbon emissions right is the environmental capacity resources issued by the government, which cash can be realized in the carbon trading market. This is also the principle of environmental capital.

**2.2 Analyzing Element Characteristics of Carbon Emissions Trading**

Carbon emissions rights have asset characteristics which can be revealed from the perspective of economics and law. The perspective of economics is reflected in the government permits carbon emissions holder emitting, and the restricts non holding companies engaged in the activities; however, the perspective of law and government regulation causes the scarcity of carbon, making carbon emissions right has value.

From the perspective of accounting, carbon emissions right has the characteristics as following:

(1) From the point of view of inventory, carbon emissions mainly obtain from others, so cost can be measured. The primary purpose of holding carbon emissions for companies is maintaining normal production and operation. With the consumption of carbon quota, the value of carbon emission comes into the production cost of the product. However, its value also can be reduced, a regular check should be provided.

(2) From the point of view of intangible assets, carbon emissions right is the capacity of environment resource. Because of the reserve and lending mechanism, it can be regarded as a kind of non monetary long-term assets, which has no real form, but has value.

(3) From the perspective of financial assets, the market price of carbon emissions is not stable. There is a special carbon trading market for circulation and transaction of carbon emissions and its financial derivatives. At the carbon trading market, they fulfill delivery obligations at the beginning of every year, which is similar with bonds and other financial assets with the risk and benefit.

In summary, carbon emissions right is a new, special environmental asset, while has part of the characteristics as the stock, intangible assets, and financial assets. We can not be one-sided to recognize it as one of the assets. Carbon assets should be recognized as a new perspective.

**2.3 Analyzing Measurement Characteristics of Carbon Emissions Trading**

Measurement of carbon emissions right, we can refer to the measurement attributes that is the most representative carbon emissions trading accounting treatment methods. The net method is invented by the United States, using historical cost as the measurement attribute; the total method is produced by IASB, which reflects the idea of fair value measurement. The former will be recognized the carbon emissions right as inventory, and carbon emissions right given by government are not treated. When carbon emissions right obtains from different ways using different accounting methods, the measurement of it will lose the comparability. The latter can measure the carbon assets obtained from different ways at market price by improving the carbon emissions. The margin between fair value and cost will be put into deferred revenue, which can avoid the match problem of measurement attribute. Specifically, the measurement characteristics of carbon emissions trading can be reflected in Table 1:

Table 1 Measurement Characteristics of Carbon Emissions Trading

| Historical Cost Measurement | Fair value Measurement |
|---|---|
| Using Net Method | Using Total Method |
| Carbon Emissions Right Obtained from Different Ways Using Different Accounting Methods | Non Reciprocal Trade Characteristics |
| No Carbon Debt | There are Exist Carbon Asset and Carbon Debt |
| Ignoring the Carbon Emission Trading Market | Avoiding the Match Problem of Measurement Attribute |

## 3 The First Innovative Design of the Financial Reporting System of Carbon Emissions Trading: Accounting Statements

**3.1 Carbon Emissions Trading Content Should be Added in Balance Sheet**

Carbon Asset should be added in current assets, which is used to reflect the market value of carbon emission rights obtained from buying or government. Its ending balance should be based on the sum of "Carbon Assets —— Cost", "Carbon Assets —— Fair Value Changes" and other accounts.

At the same time, Carbon Debt should be added in current liabilities, to reflect the enterprises paying the government for the market value of carbon emissions rights. Its ending balance should be based on the sum of "Carbon Liability —— Cost", "Carbon Liability —— Fair Value Changes" and other accounts.

Table 2 Balance Sheet
[Company Name] Date:

| Assets | Balance of 20×4 | Balance of 20×5 | Liabilities and Owner´s Equity | Balance of 20×4 | Balance of 20×5 |
|---|---|---|---|---|---|
| Current Assets | | | Current Liabilities | | |
| Cash | | | Short-term Loans | | |
| Carbon Asset | | | Carbon Liability | | |
| …… | | | …… | | |
| Other Current Assets | | | Total Current Liabilities | | |
| Total Current Assets | | | Long-term Liabilities | | |
| Long-term Assets | | | …… | | |
| Available-for-sale Financial Assets | | | Total Long-term Liabilities | | |
| Hold-to-maturity Investment | | | Owner´s Equity | | |
| …… | | | …… | | |
| Other Long-term Assets | | | …… | | |
| Total long-term Assets | | | Total Owner´s Equity | | |
| Total Assets | | | Total Liabilities and Owner´s Equity | | |

**3.2 Carbon Emissions Trading Content Should be Added in Income Statement**

"Investment Income" increases the investment income from carbon emission rights. The project should be based on the amount of money received from the sale of carbon emission rights and its credit value.

Amount of amortization of deferred revenue content should be added in "Non-business Income", which reflect free obtaining carbon emissions rights. The project accrual should be based on proportion of free obtaining carbon emissions rights multiply by its credit value.

Because of excess carbon emissions paying government should put in "Non-business Expenditure" account. The project should be based on the amount of cash or bank deposits paid to the government and other relevant departments, due to the actual payment of excess carbon emissions.

Table 3 Income Statement for the Years Ending
[Company Name]

| items | Accrual of 20×5 | Accrual of 20×4 |
|---|---|---|
| Operation Revenue | | |
| Subtract: Operation Cost | | |
| …… | | |
| Add：Investment Income | | |
| Among: Investment Income from Carbon Emission Rights | | |
| Operation Profit | | |
| Add: Non-operating Income | | |
| Among: Amount of Amortization of Deferred Revenue from Carbon Emission Rights | | |
| Subtract: Non-operating Expenses | | |
| Among: Loss of Fines from Excess Carbon Emissions | | |
| Profit Before Tax | | |
| Subtract: Income Tax | | |
| Net Profit | | |

**3.3 Carbon Emissions Trading Content Should be Added in Cash Flow Statements**

Table 4 Cash Flow Statements for the Years Ending
[Company Name]

| items | Accrual of 20×5 | Accrual of 20×4 |
|---|---|---|
| Cash Flows from Operating Activities | | |
| …… | | |
| Cash Inflow from Operating Activities | | |
| Cash Outflow from Buying Carbon Emissions Rights | | |
| Cash Outflow from Fines of Excess Carbon emissions Rights | | |
| …… | | |
| Cash Outflow from Operating Activities | | |
| Net Cash Flow from Operating Activities | | |
| Cash Flow from Investing Activities | | |
| Cash Inflow from Selling Carbon Emissions Rights | | |
| …… | | |
| Cash Inflow from Investing Activities | | |
| Cash Outflow from Buying Carbon Emissions Rights | | |
| …… | | |
| Cash Outflow from Investing Activities | | |
| Net Cash Flow from Investing Activities | | |
| Cash Flow from Financing Activities | | |
| …… | | |
| Net Cash Flow from Financing Activities | | |
| Net Cash Flow | | |

Under the "Cash Flow From Operating Activities" project, " Cash outflow from buying carbon emissions rights " and " Cash outflow from fines of excess carbon emissions rights" should be added in it.

Under the " Cash Flows from Investing Activities", " Cash Inflow from selling carbon emissions rights " and " Cash outflow from buying carbon emissions rights" should be added in it.

## 4 The Second Innovative of Carbon Emissions Trading: Accounting Statements Notes

Carbon disclosure can´t cover all valuable carbon accounting information but those presented in accounting statements, the information still required to disclose in the accounting statements notes includes the balance and change of carbon asset, carbon liability and capital surplus involved in carbon emissions right, the amount of investment income, non-operating income and expenditure involved in carbon emissions right, the amount of operating cash flow, investing cash flow involved in carbon emissions right and so on. If necessary, the notes need to give a detailed explanation to significant changes of the amount of related items.

### 4.1 The Change Analysis of Items Related to Carbon Emissions Trading in Balance Sheet

(1) The change analysis of carbon asset item.

Carbon asset belongs to asset items, mainly for accounting the change and balance of carbon emissions right that enterprises purchased or government issued. The change analysis of carbon asset item needs to provide the opening and closing balance, the increase and decrease of current period and other information of carbon asset, which is classified in accordance with the details of cost and fair value change.

Table 5 The Change Analysis of Carbon Asset Item

| Carbon Asset Details | Balance of 20×4 | Increase of Current Period | Decrease of Current Period | Balance of 20×5 |
|---|---|---|---|---|
| Cost | | | | |
| Fair Value Change | | | | |
| Total | | | | |

(2) The change analysis of carbon liability item.

Carbon liability belongs to liability items, mainly for accounting the change and balance of carbon liability arising from the actual carbon emissions in enterprises. The change analysis of carbon liability item needs to provide the opening and closing balance, the increase and decrease of current period and other information of carbon liability, which is classified in accordance with the details of cost and fair value change.

Table 6 The Change Analysis of Carbon Liability Item

| Carbon Liability Details | Balance of 20×4 | Increase of Current Period | Decrease of Current Period | Balance of 20×5 |
|---|---|---|---|---|
| Cost | | | | |
| Fair Value Change | | | | |
| Total | | | | |

(3) The change analysis of capital reserve item.

Capital reserve belongs to owners´ equity items, mainly for accounting the change and balance of capital reserve caused by various sources, and it should also include the fair value change of carbon asset and carbon liability on the balance sheet date. When the fair value of carbon asset falls or the fair value of carbon liability rises, it means that other capital reserve decreases; when the fair value of carbon asset rises or the fair value of carbon liability falls, it means that other capital reserve increases.

Table 7 The Change Analysis of Capital Reserve Item

| Carbon Transactions Causing Other Capital Reserve Change | Balance of 20×4 | Increase of Current Period | Decrease of Current Period | Balance of 20×5 |
|---|---|---|---|---|
| Fair Value Change of Carbon Asset | | | | |
| Fair Value Change of Carbon Liability | | | | |
| Total | | | | |

### 4.2 The Change Analysis of Items Related to Carbon Emissions Trading in Income Statement

(1) The change analysis of investment income item.

Enterprises hold carbon emissions right to be sold, the related gains and losses when disposed are included in investment income, and it is reflected in "investment income from the sale of carbon emissions right" of income statement. When the disposal price is greater than the book value of carbon asset, it means that investment income increases; when the disposal price is less than the book value of carbon asset, it means that investment income decreases.

Table 8 The Change Analysis of Investment Income Item

| Carbon Transactions Causing Investment Income Change | Accrual of 20×5 | Accrual of 20×4 |
|---|---|---|
| Sale of Carbon Emissions Right | | |

(2) The change analysis of non-operating income item.

During the actual carbon emissions in enterprises, the amortization of deferred income related to free carbon emissions right is included in non-operating income, and it is reflected in "deferred income amortization recognized because of free carbon emissions right" of income statement. When carbon emissions actually occur in enterprises, in addition to increasing carbon liability and indirect cost, the deferred income amortization recognized because of free carbon emissions right should be included in non-operating income.

Table 9 The Change Analysis of Non-operating Income Item

| Carbon Transactions Causing Non-operating Income Change | Accrual of 20×5 | Accrual of 20×4 |
|---|---|---|
| Deferred Income Amortization Recognized Because of Free Carbon Emissions Right | | |

(3) The change analysis of non-operating expenditure item.

In compliance liquidation, there is no purchase of short carbon emissions right on the carbon market in advance, so the enterprise can not fully offset carbon emissions actually occurred. The government will impose a fine on the enterprise, as a result of excess carbon emissions, corresponding loss counts into non-operating expenditure, and it is reflected in "fines paid to the government because of excess carbon emissions" of income statement.

Table 10 The Change Analysis of Non-operating Expenditure Item

| Carbon Transactions Causing Non-operating Expenditure Change | Accrual of 20×5 | Accrual of 20×4 |
|---|---|---|
| Fines Paid Because of Excess Carbon Emissions | | |

**4.3 The Change Analysis of Items Related to Carbon Emissions Trading in Cash Flow Statement**

(1) The change analysis of items related to cash flow from operating activities.

Enterprises buy carbon emissions right to fulfill delivery obligation, corresponding cash outflow is included in cash flow from operating activities, and it is reflected in "cash paid to buy carbon emissions right to fulfill obligation" of cash flow statement; enterprises pay fines as a result of excess carbon emissions, corresponding cash outflow is also included in cash flow from operating activities, and it is reflected in "fines paid because of excess carbon emissions" of cash flow statement.

Table 11 The change analysis of items related to operating cash flow

| Carbon Transactions Causing Operating Cash Flow Change | Accrual of 20×5 | Accrual of 20×4 |
|---|---|---|
| Cash Paid to Buy Carbon Emissions Right to Fulfill Obligation | | |
| Fines Paid Because of Excess Carbon Emissions | | |
| Total | | |

(2) The change analysis of items related to cash flow from investing activities.

Enterprises buy carbon emissions right to invest and trade, corresponding cash outflow is included in cash flow from investing activities, and it is reflected in "cash paid to buy carbon emissions right to invest and trade" of cash flow statement; enterprises sell carbon emissions right, corresponding cash inflow is also included in cash flow from investing activities, and it is reflected in "cash received from the sale of carbon emissions right" of cash flow statement.

Table 12 The change analysis of items related to investing cash flow

| Carbon Transactions Causing Investing Cash Flow Change | Accrual of 20×5 | Accrual of 20×4 |
|---|---|---|
| Cash Paid to Buy Carbon Emissions Right to Invest and Trade | | |
| Cash Received From the Sale of Carbon Emissions Right | | |
| Total | | |

## 5 The Third Innovative Design of the Financial Reporting System of Carbon Emissions Trading: Financial Situation Statement

Financial situation statement is an part of the financial report, as a form of information disclosure outside sheets, it makes supplementary specification for some significant information that can not be or is not conveniently reflected in the statutory financial statements, but can help report users comprehensively and correctly understand the content of financial statements, financial condition, contingent events and future development. Carbon emissions trading accounting requires enterprises to fully reflect the information dealing with climate change in financial situation statement, specifically including the following:

**5.1 Description of Carbon Emissions Trading Process**

Judging from international experience, the carbon emissions trading platform uses market-based instrument and financial innovative way to promote energy conservation, and it is the core of carbon emissions trading system, which not only promotes the development of carbon emissions trading market, but also provides a more transparent information disclosure channel for carbon emissions trading. To implement the 2020 greenhouse gas emissions control target, China began to carry out the carbon emissions trading pilot in October 2011, and the pilot areas included two provinces of Hubei, Guangdong and five cities of Beijing, Shanghai, Shenzhen, Tianjin, Chongqing, which represented the distance to establish a national unified carbon emissions trading market is a step closer. With the establishment of carbon trading markets in various regions, the carbon emissions trading is increasingly active, and the volume becomes more and more. Carbon emissions trading participants include government, enterprises, third-party certification body, carbon emissions trading center, and the basic trading process is shown in Figure:

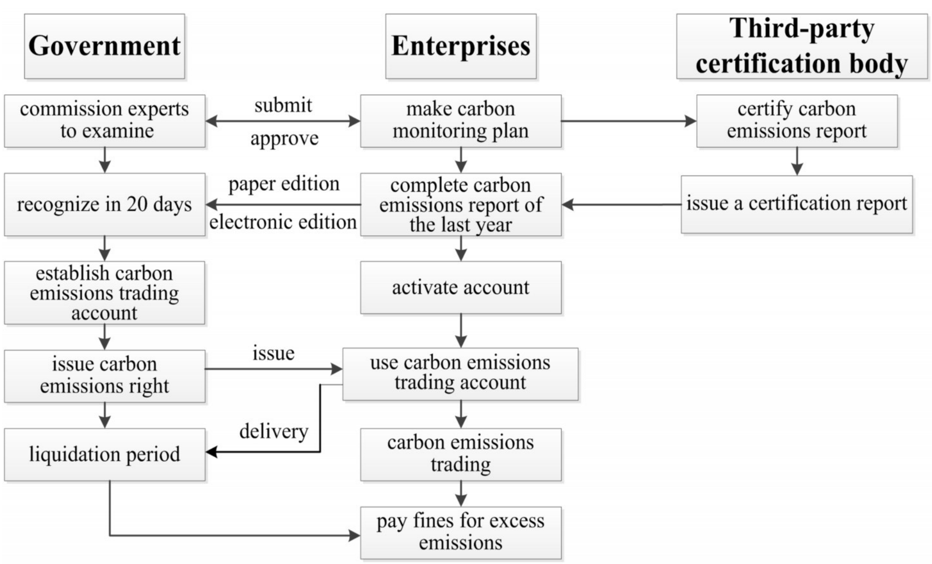


Figure The process of carbon emissions trading

**5.2 Description of Carbon Emissions Trading Accounting**

When related carbon emissions transactions occur in different enterprises, accounting should be in accordance with uniform and determinate method. When the enterprise gets carbon emissions right issued by government, it should debit "carbon asset - cost" in accordance with the market price, credit "deferred income", the amortization of which will be included in non-operating income during actual carbon emissions. However, the accounting of purchasing carbon emissions right is relatively simple. The enterprise should debit "carbon asset - cost", credit "bank deposit" according to the price paid. When carbon emissions occur actually, the enterprise should debit "manufacturing cost", credit "carbon liability - cost" in accordance with the market price. The fair value of carbon emissions right fluctuates on the balance sheet date, so the enterprise should adjust the book value of carbon asset and carbon liability in accordance with the market price, debit or credit "capital reserve - other capital reserve". Generally, the enterprise fulfills delivery obligation in the first half of the year, it should debit "carbon liability - cost or fair value change" and credit "carbon asset - cost or fair value change" in accordance with the product of the actual carbon emissions amount last year and the market price at delivery time. After the liquidation, the enterprise can choose to sell the excess carbon emissions right in the carbon trading market, at the same time debit "bank deposit" and credit "carbon asset - cost or fair value change", then the corresponding difference is included in "investment income "(probably in debit or credit); while the "capital reserve - other capital reserve" originally recognized due to the fair value change of carbon asset should turn into "investment income". When excess carbon emissions occur, the enterprise need to purchase short carbon emissions right in the carbon trading market, also pay fines to the government, in the meantime debit "non-operating expenditure" and credit "bank deposit".

**5.3 Description of Carbon Emissions Trading Financial Report**

Carbon emissions trading financial report discloses not only the existing accounting information of the enterprise but also the accounting information on carbon emissions trading. To ensure the quality of carbon emissions trading accounting information, the enterprise should audit its carbon emissions trading financial report through an independent third party. At present, the accounting information disclosure of carbon emissions trading is not mandatory in the world, most enterprises choose voluntary disclosure of carbon emissions accounting information in financial report, and the content and way of the information disclosure have many differences, which needs to be further standardized. In general, the information disclosure ways associated with carbon emissions trading include separate disclosure and consolidated disclosure with financial statements. Taking into account the lower cost of information disclosure and the view of decision usefulness, to disclose carbon emissions trading information in the mainstream financial report and achieve the effective integration of carbon emissions trading financial report and mainstream financial report is rational and right choice before formulating a unified "accounting standard of carbon emissions right trading". When carbon emissions trading occurs, the information that enterprises should disclose at least in the financial statement includes:

(1) Carbon risk management, low carbon development opportunities, climate strategy and carbon reduction targets.

(2) The selection of carbon accounting method, the preparation of carbon emissions accounting report and its external verification and auditing, the comparison of carbon emissions differences, the tonnes of direct or indirect emissions reduction of greenhouse gas.

(3) Carbon emissions reduction projects, carbon emissions trading, carbon emissions reduction intensity, carbon emissions reduction planning.

(4) Carbon emissions reduction responsibility and their own contributions.

## 6 Summary

Traditional industrialization causes global warming and other problems, as a means of market emissions reduction, the carbon emissions trading is widely used in the world, which leads to related carbon emissions trading accounting issues. Based on the comprehensive and systematic study of carbon emissions trading financial reporting system, the paper regulates the information disclosure of the existing carbon emissions trading accounting from three aspects of accounting statements, accounting statements notes and financial situation statement, and the changes of report items and related conclusions are as follows:

(1) As to carbon emissions transactions related to balance sheet items, since carbon emissions right is a new, unique environmental asset, it should be recognized as carbon asset no matter what kind of ways the enterprise used to obtain the carbon emissions right; both carbon asset and carbon liability caused by actual carbon emissions are measured in accordance with fair value, and related fair value change is recognized as capital reserve.

(2) As to carbon emissions transactions related to income statement items, after the carbon emissions right that the government issued is taken as income-related government grant and included in deferred income, the amortization is recognized as non-operating income in accordance with a certain method during the actual carbon emissions; when the enterprise pays a fine to the government for excess carbon emissions, it should increase non-operating expenditure according to the amount actually paid by the enterprise.

(3) As to carbon emissions transactions related to cash flow statement items, when the enterprise purchases carbon emissions right to fulfill obligations or pays a fine for excess carbon emissions, the related cash outflow is reflected in "cash flow from operating activities"; when the enterprise purchases carbon emissions right to invest and trade or sells carbon emissions right, the related cash outflow or inflow should be reflected in "cash flow from investing activities".

In addition to listing carbon emissions trading accounting information through adding related items in the accounting statements, the accounting statements notes should disclose significant changes of the relevant items in accounting statements, and the financial situation statement should provide the information about dealing with global climate change.

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