

Study on the Current Situation of Accounting for Environmental Assets of Enterprises under the "Double Carbon" Target

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Abstract. With the introduction of the dual carbon targets of "carbon peaking" and "carbon neutral", environmental and ecological issues have become critical. Reasonable accounting of environmental assets, which are important components of environmental resources, is a specific requirement for achieving sustainable development of green economy. Improving the accounting of environmental assets to suit the stage and characteristics of China's economic development can better provide basic data support and information basis for strategic decisions and management policies on resources and environment in China. How to scientifically define the connotation and measurement attributes of environmental assets, construct a perfect accounting system, and summarize the existing experience and paths has important theoretical value and practical significance for the sustainable development of enterprises. This paper starts from clarifying and elaborating the concept and scale of environmental assets, specifying their connotation and main measurement attributes, and summarizing their accounting status under the new development requirements.

Keywords: Dual Carbon; Environmental Assets; Accounting.

1. Introduction

At present, with the development of the economy, the conflict between energy consumption and efficient use of the environment in China is obvious, and the contradiction between the full use of natural resources and the sustainable development of assets is becoming more and more obvious. The 19th Party Congress clearly put forward the detailed plan of "building ecological civilization is the millennium plan for the sustainable development of the Chinese nation, we must establish and practice the development concept of green water and green mountains is the silver mountain of gold; firmly take the road of civilization development of production development, rich life and good ecology". As the world's largest developing country and carbon emitter, China has proposed the "double carbon" goal of achieving carbon peaking by 2030 and carbon neutrality by 2060, making full use of scientific and technological innovation to achieve the world's highest carbon emissions intensity reduction in the shortest possible time. "The "carbon peak and carbon neutral" are not only closely related to energy consumption, but also a cross-industry and cross-discipline comprehensive event. As the key subject of the "double carbon" target, sustainable development is the "passing line" for the survival and development of enterprises. The low-carbon economy is also changing the traditional economic accounting theory and method while promoting the high-quality development of enterprises. If we want to implement the "double carbon" concept, we must include environmental assets as important production factors and production results in the social production assessment, and ensure that the social production process and production cycle after the completion of the output includes not only "material assets", but also the enterprise's various The production process and the completion of the production cycle will not only include "material assets", but also "spiritual assets", which are gradually better than those before production. In short, government departments need to evaluate the environmental impact and restoration costs based on the environmental reports issued by enterprises; stakeholders are very concerned about the impact of changes in environmental assets on the business conditions and future financial returns of enterprises based on their own investment returns and safety, so that they can make decisions on the subsequent environmental risks that may occur; the public and consumers want to increase various types of The public and consumers want to

increase various types of environmental assets by various means and thus improve their well-being [1]. Therefore, the identification and accounting of environmental assets in environmental assessment has become a major research priority.

2. Current status of environmental assets research in the context of low carbon economy

It is important to understand the concept of environmental assets accurately, to be in line with the latest international concepts in a timely manner, and to quickly adapt to the future international accounting integration brought about by international economic integration. The inclusion of resource and environmental factors in the scope of accounting for fixed assets by enterprises is conducive to forcing these enterprises to carry out a series of technological improvements in environmental protection necessary to produce products with sustainable development characteristics, improve the overall competitiveness of products in the market, and win in the complex product trade environment. The United Nations System of International Environmental-Economic Accounting (1995) considers environmental assets to include not only natural assets that are sources of raw materials and energy, but also those that provide ecological functions such as waste absorption, biological habitat, environmental services such as flood control and climate control, and other non-economic amenities such as health or aesthetic values. Existing domestic scholars have broadly categorized the ecological assets of tangible entities into the following three types: natural resources; land and connected water surfaces; and ecosystems. It is also argued that only those natural assets that have been formally established in environmental ownership law, are sufficiently legitimate, and have been effectively implemented in environmental practice law, or are foreseeably preserved by natural factors, can truly be recognized as environmental assets. They can be owned not only by individual units, but also by groups or by governments on behalf of society as a whole. Comprehensive literature, this paper defines environmental assets as environmental resources formed by past transactions or events of the accounting subject, owned or controlled by the accounting subject, and expected to bring economic or environmental benefits to the accounting subject.

At present, scholars in China have conducted research from both macro and micro levels of economics, and initially constructed the framework of China's macro environmental accounting system to explore [2], and proposed a new idea of accounting system with clear property rights of environmental resources [3] to construct an environmental accounting system. Some scholars have studied the strategic control of environmental costs of Chinese enterprises under the ecological economy development model[4],and initially explored the construction of an enterprise carbon accounting system under the low-carbon economy path [5]. In terms of the accounting methods of environmental assets, there are some that draw on the traditional cost approach theory, which takes the price paid for rebuilding or restoring the ecological environment as a measure of the price of environmental assets [6]; there are also some that draw on pricing theory, which takes the present value that can bring the owner an expected return over its lifetime as the basis for valuation, such as the ground rent method [7] and the emission rights market model [8]; there are also researchers who try to base on real market There are also researchers who try to value environmental assets based on real market price data, such as the direct market approach, fair value measurement method[9],option futures pricing method, integrated dynamic price fitting method, and other methods that measure the value of enterprises based on their total registered capital and applicable income tax rates and their respective environmental protection coefficients[10]. The existing methods are more or less based on theoretical basis only and lack practical operation. Since the protection and restoration of environmental assets is a long-term process and is affected by a variety of factors, their restoration costs are difficult to be reliably determined at the present time; secondly, environmental assets cannot bring cash flows to the enterprise on a continuous and stable basis, but can only bring future economic benefits to the enterprise together with other assets, which inevitably leads to the profitability of environmental assets not being divested from the overall profitability of the enterprise, making the

income method of Third, environmental assets can only be relative to a specific region or project, and are unique in nature. It is difficult to find cases of similar transactions of environmental assets, which makes the market approach pricing also unable to reach reasonable conclusions.

Accurate accounting of relevant assets can enable business managers to have a more accurate grasp of business development and operations and make more scientific decisions. However, most of the current research treats the natural and social environment on which the enterprise depends as an external factor of production, but does not include it as an internal production factor in the accounting system, which leads to the fact that the accounting system of environmental assets in China has not yet been constructed, which has a negative impact on the development of environmental accounting in China. The development of "double carbon target" and low carbon economy provides new opportunities for the improvement of environmental assets theory and accounting system [11].

3. New connotation of environmental asset accounting system environmental Accounting Objectives

3.1 Environmental accounting objectives

Stakeholder theory, economic decision usefulness theory and social responsibility theory are the basic theories of environmental accounting. Stakeholder decision usefulness theory is based on the perspective of sustainable development, which emphasizes that the goal of environmental accounting is not only based on the usefulness of micro business entities' business decisions, but also takes into account two important factors: the extent to which governments at all levels fulfill their environmental fiduciary responsibilities and guarantee citizens' environmental rights, and the extent to which citizens maintain their own right to development. The responsibilities of existing enterprises in China include economic, social and moral responsibilities as well as legal responsibilities, which are also due to the fact that enterprises consume a large amount of resources in the production process and are obliged to assume the corresponding responsibilities at the same time. Environmental accounting needs to provide useful information for stakeholders' decision making, to make reasonable decisions with the goal of maximizing stakeholders' interests, to reflect the development of enterprises and to promote environmental and social welfare, and to achieve sustainable human development.

3.2 Definition and Classification of Environmental Assets

Corporate environmental assets include related environmental protection facilities, environmental compensation, natural resources and ecological environment. For micro-economies such as enterprises, environmental resources are not recognized as asset content, and the liability element does not reflect the environmental responsibility to be borne by the enterprise, which is not recognized as owner's equity, environmental income and expenses, and environmental profit accounting is inaccurate. Traditional accounting uses monetary measurement as the essential feature of accounting, and only recognizes substances that can be measured and exchanged for value in common currency, and does not reflect the value of the entire social production, consumption and the corresponding ecological cycle, so the accounting object and content have a certain incompleteness. It has been argued that environmental assets are more of a right given to an enterprise by the owner of the environment to produce and operate in a particular environment in a certain way [12]. In environmental accounting environmental assets are extremely critical accounting elements and the discussion about it is the core of environmental accounting research. In order to achieve significant development, contemporary enterprises must rely on the support of national policies and the rational use of environmental resources. The concept of low carbon economic development of enterprises under the goal of "double carbon" is more concerned with the sustainable development and subsequent impact of enterprises. In the United Nations System of Environmental and Economic Accounting (SEEA), there are three types of environmental assets, the first one is productive economic assets, the second one is natural economic assets, and the third one is natural non-economic

environmental assets. Another view is that tangible environmental assets are divided into three main categories: natural resources, land and connected water surfaces, and ecosystems[13]. Environmental assets can be further divided into two categories: resource-based environmental assets and non-resource-based environmental assets [14].

3.3 Scope of accounting for environmental assets

The scope of accounting for environmental assets is divided into two views: the former view is that the scope of accounting for environmental assets is broader than in traditional national accounting (SNA), including the value of ecological services that are usually not priced, in addition to the value of ecosystems that are embodied in the provision of food, energy, water, or other necessities. The latter view is that the scope of environmental asset accounting is limited to the individual components that can provide the resources needed for economic activities, but does not extend to the individual elements under these components, nor does it include the ecosystem formed by the combination of individual components. China's environmental asset accounting should be based on national characteristics and the current stage of economic development, and research and practice on environmental asset accounting with Chinese characteristics should be carried out. In addition, the research and development of China's environmental asset accounting should start from the overall supporting theory of environmental economic accounting and international advanced practical experience, and explore and improve it with China's national conditions.

The specific accounting content of the environmental assets account starts from the beginning of the period, and in the middle records various changes in the stock due to exploration and exploitation, natural changes, disaster losses, reclassification and other factors, and ends with the total stock of resources at the end of the period. The environmental asset inventory changes due to changes in measurement technology and price changes during the accounting period are reflected in the physical and value accounts respectively. The following dynamic equilibrium relationship for the environmental asset accounts is currently recognized by academia:

Total inventory of assets at the beginning of the period + increase in inventory during the period - decrease in inventory during the period = total inventory of assets at the end of the period.

The depletion loss component should also be set aside before accounting is performed, and the applicable valuation method should be selected according to the type of environmental assets.

3.4 Environmental asset measurement attributes

The measurement scope of environmental asset measurement is such that when a company incurs environmental protection costs, they are generally reflected in the depletion of assets and there are transactions that are in fact economic operations. Therefore, it is more common to use historical cost to calculate the cost of environmental protection. In fact, most companies charge environmental protection costs through historical cost, except that environmental protection cost items were not established independently at the time to calculate them, and some others one into fixed asset accounts, such as the purchase of environmental protection equipment, and others into administrative expense accounts, such as sewage treatment fees.

Environmental assets not only meet the general properties of assets, but also have their own special characteristics, so it is necessary to have a more comprehensive understanding of the measurement properties of environmental assets before studying the accounting of environmental assets, so as to delineate the object and scope of accounting, and then accurate recognition and follow-up work. The measurement of environmental assets is a continuous process of quantifying the amount of change in environmental assets, i.e., the process of confirming, calculating and identifying the amount and quantity of environmental assets based on the identification of environmental assets, in accordance with certain methods and procedures. As far as possible, the measurement attributes of environmental assets should reflect the qualities that are recognized by society at large as bringing economic benefits to the company, but the present value of future cash flows differs from such measurement attributes as historical cost and replacement cost in that it best reflects the characteristics of how what economic

benefits flow into the company. Internationally, the types of environmental asset accounts are set up in comprehensive detail, including the two main basic forms of physical asset-based accounts and environmental value-based accounts. The physical type includes minerals, energy resources, land resources, soil resources, forest and flower resources, aquatic resources, other environmental biological resources, etc. The value type includes carbon emission rights, etc. Besides, environmental asset accounts and their dynamic balance relationship, measurement and valuation of depletion of environmental assets are also the reference factors for considering their measurement attributes.

3.5 Accounting for environmental assets

There are two views on the specific accounting methods for measuring the value of environmental assets: one viewpoint considers the direct market approach, the alternative market approach and the hypothetical market approach as the mainstream valuation methods from a practical point of view; and another viewpoint takes the valuation methods for depleting costs of natural resources, specifically the user cost approach, the net price approach and the NPV (net present value) approach, as the means of judgment from an economic perspective. The estimation methods of environmental degradation cost are two kinds of valuation methods: cost-based valuation method and damage generation valuation method. In addition, with the development of green finance and the rise of carbon emission rights accounting in recent years, carbon emission rights are recognized by enterprises as an environmental asset as quotas allocated to them by the government, but the asset does not incur costs related to the environmental activities of the enterprise.

The current stock value on environmental assets is generally accounted for according to the environmental asset valuation formula proposed by Aizhu Zhang in 2001.

Real use value = direct use value + indirect use value

Total user value = real use value + expected use value of future products

Natural asset value = total user value + existence of use value

The indirect use value, future use value and existence use value are accounted for using the price substitution method, willingness to pay method and willingness to accept method.

3.6 Accounting value of environmental assets

In addition to their direct involvement in the production and operation of enterprises, environmental assets also have some other indirect economic values. Since some economic activities interact with and affect the resources and environment, some specific economic activities sometimes do not end up directly causing environmental pollution or artificially damaging environmental resources, but still objectively have indirect effects on economic and environmental development and other citizens' well-being. We should also take into account the relationship between environmental assets and social labor. For example, the direct economic value of the environmental assets invested in the production process eventually results in a shortage of labor, or the degradation of the ecological environment leads to a loss of labor in society as a whole. In addition, certain good natural environmental conditions themselves have irreplaceable utility and value for our daily lives. However, this does not mean that the actual quantity and quality of environmental assets are only affected to a certain extent after they have been widely used by other enterprises, because of the unique social public goods properties of environmental resources. The quantity and quality of environmental assets may also be affected by the inadvertent behavior of non-users of environmental assets.

4. Revelation

Different regions and different urban clusters in China have different resource and environmental conditions, so if we start with non-differentiated environmental asset accounting, it will increase the difficulty and workload of accounting and reduce the actual effect of environmental asset accounting. At present, it is desirable to carry out differentiated and step-by-step accounting for the characteristics of resources and environment in different regions, and learn from each other's experience in

environmental assets practice, so as to lay a good foundation for China's environmental assets accounting work.

In addition, considering the large population and resources in China, the traditional large heavy industry sectors such as coal, power generation, chemical industry, iron and steel smelting and many other sectors will still have a large amount of workload and labor force, although the overall impact of these large industry sectors on the social and ecological environment has been relatively bad, but China at this stage is still not possible to implement large-scale shutdown in a short period of time under the comprehensive consideration of many aspects. The best strategy is to conduct a more scientific and reasonable detailed investigation and accounting of the environmental assets management issues involved in these large industrial sectors, fully assess their consumption of natural resources and the extent of harmful effects on the economic and ecological environment, so that the development of the industry remains at a reasonable level, which will not lead to heavy environmental costs. The development of the industry should be kept at a reasonable level that will not lead to heavy environmental costs but will not affect the normal development of the market economy. In summary, it is imperative to establish a sound accounting system and method for environmental assets that is suitable for China's economic development and industry and resource characteristics. Combined with the above analysis of environmental assets as corporate assets research status, the following conclusions can be drawn.

1). Clarify asset property rights and market mechanism, provide institutional guarantee.

Environmental natural assets are a kind of public goods with externalities, and externalities are an important factor leading to market failure. According to Coase's theorem, as long as the property rights are clear and the transaction costs are zero or small, the final result of market equilibrium is efficient regardless of who is given the property rights at the beginning, and then the Pareto optimum of resource allocation is realized. Therefore, the effective way to eliminate externalities is to clarify property rights, for example, the Kyoto Protocol is designed according to this principle of emission rights. Whether it is the rational use of natural resources or the effective management of environmental pollution, only through the formation of a recognized price standard in the market, the environmental activities required to be recorded by environmental accounting can be better integrated with the market economy. The 19th National Congress proposed to "speed up the establishment of a legal system and policy guidance for green production and consumption, and establish a sound economic system for green, low-carbon and circular development". Accelerate the establishment of the national environmental asset accounting system related to the rapid development of the system and the formation of norms and maturity.

2). Expand the scope of environmental assets recognition and calculation, avoid accounting errors.

In view of the indirect nature of the economic value of environmental assets, the connotation of environmental assets can be appropriately expanded, and environmental assets can be defined as the naturally existing living and non-living environmental resources on the earth that can provide benefits to human beings, which together constitute the bio-physical environment, including minerals, energy resources, land, soil resources, forest resources, aquatic resources, other biological resources, and water resources, and of course, the quality of the ecological environment. In addition, with the rise of carbon accounting in recent years, carbon emission rights, as quotas allocated to enterprises by the government, are recognized by enterprises as an environmental asset, but resources such as these should also be reasonably included in the category of environmental assets of enterprises. For example, in response to the urgent demand for a good ecological environment at this stage in China, subjects such as the comprehensive quality rating of the atmosphere can be gradually introduced into the environmental asset account to enrich the current content of the environmental asset account for enterprises and financial institutions in China, and specifically we can choose to carry out a pilot or take the lead in the relevant experiments in the framework of some regions. The expanded environmental asset accounts can be initially only for physical accounting, through the actual effect of accounting and then continue to promote, and then improve the summary of relevant experience and organize the systematic accounting methods and content, to be relatively mature after trying to

carry out asset value accounting, in order to continue to accumulate experience for China's environmental asset accounting work, and eventually form a complete environmental asset accounting system.

3). Supplementary accounting assets non-monetary measurement methods improve the measurement system.

Environmental accounting has broken through the scope of traditional financial accounting in terms of time, object, scope and measurement methods, so the accounting of environmental assets should not be limited to monetary measurement. For the possible environmental impact caused by non-users of environmental assets, if we only use a traditional monetary measurement method to separately account for environmental assets, it will not truly and accurately reflect the actual quantitative scale and intrinsic quality of environmental assets and real-time value changes. This is because accounting is done only when environmental matters affect the price and cost of products, including environmental disasters due to major spills, impairment issues due to environmental degradation, and environmental maintenance reserves for waste disposal, obsolescence, and environmental restoration needs, which are often difficult to measure in monetary terms. The inclusion of natural capital in accounting is an obvious choice to internalize environmental effects, but the complexity of ecosystems makes it difficult to accurately price ecosystem services in accounting. And as cities grow, the assessment of urban ecosystem assets should shift from focusing on the quantity of assets, i.e., how many ecosystem assets a city has, to focusing more on the quality, i.e., how ecosystem assets can be better. Efforts should be made to achieve "quality" improvement. Therefore, this paper believes that China can consider supplementing non-monetary information to fully reflect the changes in the quantity and quality of environmental assets under the existing development of asset accounting.

4). Strengthen the quality training of environmental accounting professionals and provide talent guarantee.

The final implementation of environmental accounting system cannot be achieved without the efforts of relevant professionals. The field of accounting education in China has not yet fully opened the direction of environmental accounting, which is one of the factors of the slow development of the relevant theory. At present, there are problems such as system research is not systematic, practical operation talents are not professional enough and elite talents are scarce. In response to the existing problems, China should offer more accounting courses in the direction of environmental accounting in colleges and universities to cultivate multi-level and high-level talents in the environmental field, and should also encourage enterprises in various industries to organize the exchange and sharing activities for corporate accounting practitioners to learn environmental theory and practical operation knowledge, and to exchange and learn from advanced enterprises with good environmental asset accounting, so as to strengthen the cultivation of environmental accounting practitioners and to provide a good basis for the development of environmental accounting system. To provide talent guarantee for the development of environmental accounting system.

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