

# Study on the Realization Path of Carbon Asset Management for Oil and Gas Enterprises in the Context of Double Carbon

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**Abstract:** Peak carbon dioxide emissions and Carbon neutrality is China's solemn commitment to the world, and will bring about a wide and profound economic and social change. The oil and gas industry plays a crucial role in reducing carbon emissions. Therefore, enterprises in this sector must take proactive steps to capitalize on the opportunity of double carbon development. They can learn from the experience of international oil and gas companies in managing carbon assets. To meet the needs of the Chinese socialist development model and the current state of the industry, activities such as developing an ideological understanding, organizing, monitoring data, creating a robust management system, engaging in carbon trading, investing in science and technology, training personnel and constructing platforms should be considered. It will support the sustainable development of oil and gas enterprises and ensure the security of national energy strategy and economic and social development.

**Keywords:** Oil and Gas Enterprises, Carbon Asset Management, Path to Realization

## 1. Introduction

Peak carbon dioxide emissions and Carbon neutrality (hereinafter referred to as *Double Carbon*) is a solemn commitment made by China to the world, which is bound to promote China's efficient utilization of resources and green and low-carbon development, and is also bound to be a broad and profound economic and social change. In September and October 2021, the CPC Central Committee and the State Council successively issued the Opinions of the CPC Central Committee and the State Council on the Complete and Accurate Implementation of the New Development Idea and Doing a Good Job in Carbon Peak and Carbon Neutral Work, and the Action Program for Carbon Peak by 2030, which is the top-level design for the implementation of China's *Peak carbon dioxide emissions and Carbon neutrality* strategy. Subsequently, a series of related policies and measures have been issued in the fields of energy, industry, ecology and environment, urban and rural construction, transportation, agriculture and forestry, and the economy, which have gradually built up a *1+N* policy framework for the implementation of China's *Double Carbon* strategy.

Under the guidance of the *double carbon* strategy, key industries such as electric power, iron and steel, petrochemicals, non-ferrous metals, chemicals, transportation and other key industries not only have to ensure the supply and quality, but also guarantee the people's livelihood, and realize the *new development pattern with the domestic macro-cycle as the main body, and the promotion of international and domestic dual-cycle*, but also have to achieve energy saving, emission reduction and greening. At the same time, they have to realize energy conservation, emission reduction and green development. Oil and gas enterprises shoulder the important responsibility of national energy strategic security, and are the *ballast and stabilizer* of national economic development, and need to understand the requirements and tasks of the *Double Carbon* strategy. They need to fully understand the requirements and tasks of the *Double Carbon* strategy, seize the opportunities of the *Double Carbon* strategy, and rely on technological innovation, management innovation and equipment innovation to gradually promote the implementation of the *Double Carbon* strategy and realize their own high-quality development. Carbon asset management is an important tool for oil and gas enterprises to realize the *Double Carbon* strategy. By improving the carbon asset management capability of oil and gas enterprises, they can efficiently integrate into the global carbon trading market and seize the competitive advantages in the future.

## 2. Defining the Concept of Carbon Asset Management

Carbon assets have become the fifth category of emerging assets after monetary assets, physical assets, intangible assets and data assets. <sup>[1]</sup>Carbon assets refer to carbon emission allowances and carbon emission reduction credits generated under the mandatory or resource-based carbon emissions trading mechanism that affect various types of greenhouse gas emissions of enterprises or projects, with carbon dioxide equivalent as the unit of physical valuation.<sup>[2]</sup> According to the *Greenhouse Gas Protocol: Guidelines for Corporate Accounting and Reporting*, carbon emissions from enterprises mainly include three sources, namely: direct emissions from sources owned and controlled by the enterprise; indirect emissions from energy sources such as electricity and power purchased by the enterprise; and indirect emissions from products of the enterprise in the process of transportation, sale and use. <sup>[3]</sup>With the signing of the Kyoto Protocol, under the three major emission reduction mechanisms of the International Emissions Trading Mechanism (IETM), the Joint Implementation Mechanism (JIM) and the Clean Development Mechanism (CDM), carbon assets have become internationally recognized and circulating assets, and countries have been taking carbon assets as an important hand in the advance layout of carbon trading.

As the *Double Carbon* strategy continues to advance, the knowledge and understanding of carbon assets are becoming richer and richer. Broadly speaking, carbon assets mainly refer to all kinds of carbon resources formed in the process of implementing the strategic goal of *Peak carbon dioxide emissions and Carbon neutrality*, as well as the mechanism created by the relevant activities of carbon manufacturing, carbon trading and carbon finance. From the perspective of the whole life cycle of enterprise operation and management, carbon asset management not only includes the management of carbon assets in the narrow sense such as carbon quotas and national certified voluntary emission reductions, but also includes the management of various carbon-related activities such as carbon emissions, carbon verification, carbon finance, carbon trading, fulfillment management, talent cultivation, and branding of the whole industrial chain. <sup>[4]</sup>It can be seen that enterprises can cut in from the carbon perspective, redefine and account for production and operation activities, carry out carbon emission reduction, carbon trading and other activities in accordance with the relevant institutional arrangements for carbon emission and carbon trading, and realize carbon emission reduction and sustainable development.

## 3. International Experience in Carbon Asset Management

The carbon trading system in European and American countries and regions was established earlier, the construction standards and requirements are relatively clear, and many enterprises, especially oil and gas enterprises, have basically formed a set of carbon asset management system and explored a carbon asset management path that can be used as a reference after continuous exploration and practice since the 1990s.

### 3.1. Quantifying emission reduction targets and clarifying development priorities

In the face of the requirements of global warming, energy saving, environmental protection, green and low-carbon have become the development consensus of all countries in the world. From the perspective of the global energy structure, coal, oil and natural gas are still the main energy sources, and multinational oil and gas enterprises represented by BP and Shell have taken carbon emission reduction as an important opportunity to transform from traditional oil and gas enterprises to comprehensive energy suppliers, and have clarified their carbon emission reduction targets and highlighted their development priorities. In February 2020, BP announced its vision to complete its *clean* transformation by 2050, based on an absolute reduction of 4.15108 tons of carbon dioxide equivalent per year.<sup>[5]</sup> Shell is committed to eliminating conventional flaring in its upstream operations by 2025, reducing its Category 1 and 2 emissions to 50% of 2016 levels by 2030, achieving near-zero methane emissions, and reducing the cumulative carbon intensity of its products by 35% by 2035 compared to 2020, and by 65% by 2050,<sup>[6]</sup> to become a net-zero-emission energy company.<sup>[7]</sup>

### 3.2. Establishment of specialized organizations to promote the implementation of emission reductions

In order to quickly and effectively promote the work related to carbon emission reduction, companies such as BP and Shell have set up specialized carbon emission reduction departments or carbon asset companies to promote carbon emission reduction in a market-oriented or internal market-oriented way. BP has set up a global carbon emissions trading management organization in the comprehensive supply

and trading department of its headquarters to promote the establishment of internal carbon trading mechanism, responsible for carbon emission reduction solutions, new technologies and new cooperation modes, global carbon emission reduction trading, security and operational risks, etc. The subordinate enterprises are specifically responsible for the monitoring, reporting and verification of greenhouse gases in their respective regions, as well as completing the tasks of greenhouse gas emission reduction and compliance. Shell established a carbon trading company in 2001 to centralize the management of carbon compliance of the Group's enterprises, and at the same time, adopt internally negotiated prices to evaluate all newly developed oil and gas projects, so as to ensure that the investment portfolio is adapted to climate change policies.

### ***3.3. Completion of monitoring statistics and mastery of accurate data***

In order to better grasp the situation of carbon emissions and make a good foundation for participating in carbon market transactions, international oil and gas enterprises have endeavored to do a good job in monitoring and statistics of carbon emissions and carbon inventory-related data. BP continuously improves the real-time monitoring of carbon emissions of its subsidiaries and invites third-party organizations to audit and verify carbon emission reports, so as to provide reliable and accurate data support for carbon trading and carbon asset management. Shell Group has established a model for calculating the carbon footprint of petroleum and petrochemical products throughout their life cycle, analyzing and calculating the carbon emissions of oil and gas products throughout their life cycle, from production to consumption, and quantifying them in terms of carbon emission intensity, so as to provide oil and gas product users and consumers with products with lower carbon emissions, achieve product upgrading, and realize the goal and task of energy saving and emission reduction. The goal of energy saving and emission reduction will be realized by upgrading products.

### ***3.4. Focus on scientific and technological innovation to support transformation and upgrading***

In the process of transforming traditional oil and gas enterprises into comprehensive energy suppliers, multinational companies have done a good job in energy-saving and low-carbon scientific and technological innovation of existing oil and gas-related technologies on the one hand, and on the other hand, they have taken the development of new energy sources, such as wind power and photovoltaic power generation, as a key area, and are actively exploring the road of coordinated development of various energy sources.

BP for energy saving and emission reduction technology innovation and research investment has been growing steadily, mainly focusing on the research and application of carbon dioxide capture, recycling, and storage technology (CCUS technology) in the upstream business, and the research of refinery unit renovation and energy efficiency enhancement technology in the downstream refining business,<sup>[8]</sup> and it plans to increase its investment in the low-carbon field by 5 billion U.S. dollars by 2030, and increase its investment in renewable energy sources such as wind power, solar power, and hydropower. Renewable energy capacity has increased by a factor of 20 when compared to the levels recorded in 2019. This growth has resulted in a combined cumulative installed capacity of 50GW. Shell Group's operating costs and investment in CCUS in 2021 will be around US\$146 million, and the related CCUS projects have already stored more than 11.5 million tons of CO<sub>2</sub>, and it plans to invest US\$10 billion to US\$15 billion from 2023 to 2025 in support of technologies including Biofuels, hydrogen, electric vehicle charging, and carbon capture and storage (CCS) projects to support the development and implementation of low-carbon energy solutions.

## **4. Realization Path of Carbon Asset Management for Chinese Oil and Gas Enterprises**

### ***4.1. Unifying thoughts and raising awareness of society***

Oil and gas enterprises shoulder the important responsibility of national energy strategic security, and are the *ballast* and *stabilizer* of national economic development, so it is necessary to clarify this strategic positioning and requirements. Based on global experience in reducing carbon emissions, carbon emissions reduction alone is not the ultimate goal; emissions should not be reduced merely for the sake of reduction. Instead, carbon emissions reduction represents a significant strategic opportunity for traditional oil and gas companies to transform into integrated energy suppliers. Carbon assets have become an important source of competitive advantage for future energy companies. China's oil and gas enterprises should take the protection of national energy strategic security and national livelihood as the

primary strategic objective, take carbon emission reduction as an important hand in the transformation, clarify the overall strategy of carbon emission reduction and carbon asset management, and formulate a detailed emission reduction plan, and set emission reduction targets with reference to the industry average as well as based on China's resource situation and the trend of national development on energy demand growth, and stabilize the supply of existing oil and gas production. While stabilizing the existing oil and gas production and supply, we should deeply explore the advantages of the existing oil and gas upstream, midstream and downstream industrial chain, strengthen industrial cooperation, proactively carry out research and development work on wind energy, photovoltaic, energy storage, etc., explore the development of new energy business, build a road of coordinated development of comprehensive energy in line with our own characteristics and strengths, and lay out the future new energy industry in advance, so as to get ready for carbon neutrality.

#### ***4.2. Establishment of institutions and strengthening of monitoring***

Carbon asset management requires the promotion of specialized agencies and the support of carbon inventory data. Oil and gas enterprises can set up a specialized carbon asset management department or company to make use of market means to strengthen the management and operation of carbon assets, so as to achieve the purpose of acquiring carbon assets, optimizing costs, expanding profits and enhancing influence. Oil and gas enterprises can make full use of the statistics and data on carbon emissions in previous years, analyze in depth the carbon emissions and carbon emission intensity of their existing businesses, rank them, and define the key areas and tasks of carbon emission reduction monitoring and management. On this basis, companies can establish carbon emission accounting standards and processes by specialty for key carbon emission sectors and site characteristics, realize real-time monitoring of key carbon emission sectors, standardize carbon inventory, clarify carbon footprint, establish scientific standards to standardize the recording of quantitative data, and ensure the accuracy and timeliness of data collection, aggregation and statistics. At the same time, oil and gas companies should also extend the real-time monitoring and collection of carbon emission data to all departments and project sites within the company, so as to realize the full coverage of carbon emission data collection and monitoring. In addition, oil and gas enterprises can hire an external third-party company to carry out carbon verification on a regular basis to ensure that the relevant data are accurate and reliable, and that the relevant conclusions are true and credible, so as to prepare for the enterprises' participation in the carbon trading market and the development of carbon asset management.

#### ***4.3. Streamlining mechanisms and improving systems***

The implementation of carbon asset management must rely on carbon asset system construction to guarantee. In the face of the challenges and opportunities brought by carbon emission reduction and carbon trading, oil and gas enterprises need to combine the characteristics of the industry, based on their own reality and business situation, take the establishment of a specialized carbon asset management department or company as an entry point, clarify the responsibilities of the carbon asset management department or company by sorting out and adjusting the existing energy-saving and emission reduction processes and systems, rationalize the carbon asset management system within the enterprise, and enhance the construction and improvement of processes and systems in the areas of emission management, verification management, trading management, data management, etc. to ensure that all emission reduction and asset management work is carried out according to rules and regulations. It has also strengthened the construction and improvement of processes and systems for emission management, verification management, trading management, data management and other aspects to ensure that the various emission reduction and asset management work is in order. During the implementation of carbon asset management, oil and gas companies also need to continuously improve and perfect the management system and system processes according to the implementation situation, and at the same time, do a good job in reviewing and supervising the compliance of relevant systems and processes, strengthen compliance risk management, ensure that all management systems and measures are put in place, and ensure that the carbon emission reduction and asset management work is carried out efficiently.

#### ***4.4. Take the initiative to introduce carbon trading and explore the path to realize the value of carbon assets***

The carbon market is the main place to realize the value of carbon assets. Enterprises acquire emission reductions by buying or selling carbon emission rights, or by developing low-carbon projects, and can benefit from trading after certification. From the perspective of global and national management and

requirements for carbon emission reduction, it has become an inevitable trend to gradually expand the main body of carbon emission trading, and more enterprises will be included in the carbon trading market. For non-emission-control enterprises, they need to grasp their own carbon emissions and energy use, accelerate technological innovation and transformation, develop voluntary emission reduction projects, explore the construction of an internal carbon market trading mechanism, incorporate carbon emissions and quotas into the annual performance appraisal of each unit, and take the actual carbon emissions of each unit as the basis of accounting, allocate quotas to them, and realize the internal trading of quotas, and promote the participation of internal units in the carbon emission reduction work by means of the market, in order to prepare for the future participation in the national carbon trading market, and to promote the participation in the carbon emission reduction work. This is to promote the participation of internal units in carbon emission reduction by market means, and to prepare for the future participation in the national carbon market and the innovation of carbon financial products.

#### ***4.5. Increase investment in science and technology and focus on personnel training***

From the perspective of the oil and gas industry chain, upstream exploration and development has already realized less carbon emissions by reducing flare combustion and electricity substitution, while downstream refining and chemical industries have higher energy consumption and higher emissions. Oil and gas companies should increase investment in science and technology, carry out research and development of carbon dioxide capture, utilization and storage technology (CCUS technology) for the upstream, and make reserves for carbon emissions in the midstream and downstream segments. For the refining and chemical business downstream, it is crucial to adjust to the local environment. It is necessary to implement several methods, such as increasing the scale of CCUS, upgrading electrification, and integrating renewable energy sources such as wind and solar. In order to reduce carbon emissions across the entire oil and gas industry chain, promotion of carbon asset management is necessary. This involves not only traditional fields such as oil and gas exploration, development, storage, transportation and refining, but also low-carbon technology development and new energy technology. Carbon finance, along with other related fields, requires the upfront laying out and active cultivation of specialized and complex skills to achieve progress in low-carbon, energy-efficient, and environmentally friendly technology. Additionally, the management of carbon assets should be optimized with a reduction in carbon emissions intensity to facilitate integration into the carbon market. Such an approach necessitates the development of specialized talent. Develop carbon financial products and trading to increase the value of carbon assets owned by oil and gas companies. Additionally, encourage the coordinated and sustainable growth of diversified energy and financial asset businesses within the oil and gas industry.

#### ***4.6. Improve the platform construction and realize the common construction and sharing***

In order to realize real-time mastery of the enterprise's carbon emissions and carbon asset status, improve the efficiency of carbon asset management, strengthen effective supervision, and prevent and control compliance risks, oil and gas enterprises need to establish an integrated carbon asset management platform. The carbon asset management platform consists of a base layer for carbon inventory work, data statistics and accounting, and a development layer for carbon asset management, development and utilization. The basic layer is mainly used to comprehensively identify carbon emission sources based on the enterprise carbon inventory model, conduct carbon emission statistics according to national carbon inventory and accounting standards, and prepare carbon inventory reports and emission lists for carbon asset management and government review. According to the carbon emission monitoring data of enterprises, it can identify and analyze the space for enterprise emission reduction, laying the foundation for emission reduction project declaration and carbon asset management. The development layer is mainly based on the carbon inventory data of the foundation layer, to carry out the supervision and assessment of carbon asset management work, to incorporate carbon emission-related indicators into the performance assessment system, to formulate the carbon trading scheme, to explore carbon financial product innovation, to improve the carbon asset management system of the enterprise, and to truly realize the transformation of the enterprise into a digital, intelligent and comprehensive energy supplier with the carbon emission reduction and carbon assets as the entry point, and to enhance the comprehensive competitiveness of the oil and gas enterprise.

## **5. Conclusion**

China has already established a *I+N* policy framework for the implementation of the *Double Carbon*

strategy, and various industries are actively exploring the path of implementing the *Double Carbon* strategy. The oil and gas industry, as an important field for the implementation of the *Double Carbon* strategy, shoulders the important responsibility of safeguarding the national energy strategic security and the people's livelihood, and needs to take the initiative to seize the opportunity of double carbon development, build a carbon asset management system, and solidly push forward the orderly implementation of carbon emission reduction work. Carbon asset management not only includes the management of carbon assets in the narrow sense, such as carbon quotas and national certified voluntary emission reductions, but also includes the management of carbon-related activities such as carbon emissions, carbon verification, carbon finance, carbon trading, fulfillment management, talent cultivation, and branding of the whole industrial chain. The carbon asset experience of global oil and gas multinational enterprises is mainly to quantify the emission reduction target, clarify the development focus, establish a special organization, promote the implementation of emission reduction, do a good job in monitoring and statistics, grasp accurate data, focus on scientific and technological innovation, and do a good job in transformation and upgrading. In carbon asset management, Chinese oil and gas enterprises should unify their thoughts, raise awareness, establish organizations, strengthen monitoring, rationalize mechanisms, improve systems, take the initiative to introduce carbon trading, explore the path of realizing the value of carbon assets, increase scientific and technological inputs, focus on talent cultivation, do a good job in platform construction, realize joint construction and sharing, and build a road of carbon asset management that meets the needs of the development of socialism with Chinese characteristics in the new era and the reality of the enterprise's development to achieve sustainable development of oil and gas enterprises, and ensure national energy strategic security and energy strategic security.

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