Carbon Trading: A Market-based Engine for Global Climate Governance

Background: What is carbon trading?

Carbon emission trading began in Rio de Janeiro in 1992, when 160 countries agreed the UN Framework Convention on Climate Change (UNFCCC).

Carbon Trading, as an innovative mechanism, has become a key tool to achieve the goal of carbon neutrality by leveraging the economic leverage to reduce emissions in the global fight against climate change. Its essence is to turn carbon dioxide emission rights into tradable commodities, and through market pricing and free circulation, encourage enterprises and society to reduce greenhouse gas emissions at the lowest cost. This mechanism is not only in line with the global emission reduction framework of the Paris Agreement, but also closely related to the core issues of climate action (Goal 13), clean energy (Goal 7) and industrial innovation (Goal 9) in the United Nations Sustainable Development Goals (SDGs).

The logic of carbon trading and pricing:

At the heart of carbon trading is the 'Cap-and-Trade' mechanism. The government sets a cap on the total amount of carbon emissions based on the emission reduction target and allocates the emission allowances to companies. Companies that emit less than their quota can sell the remaining credits for a profit; if they emit more than their quota, they have to buy additional credits or pay a fine.

The theoretical basis of this mechanism is based on the Coase Theorem, which states that the optimal allocation of environmental resources can be achieved through market transactions by clarifying the property rights of emission rights.

In a carbon pricing mechanism, the determination of the carbon price relies mainly on the balance between market supply and demand dynamics and policy interventions. In addition, in the carbon market, carbon sinks, which can be regarded as a carbon asset, also affect the carbon price. As an example, when carbon sinks increase, companies can purchase a portion of them for compliance, at which point their demand for carbon emission allowances decreases and the carbon price may fall. Besides, different types of carbon sinks are priced differently due to their different sequestration capacities, durability and monitoring costs, as well as market recognition; for example, the price of forestry carbon credits is usually higher than that of industrial emission reduction projects.

Typical carbon market:

Developed countries such as the European Union (EU) have established an emissions trading system (EU ETS) since 2005. Since its launch in 2005, the EU ETS has gone through four phases of reform:

Phase I (2005-2007): Pilot phase, the main objective was to establish and test the mechanism, and quotas were almost exclusively issued free of charge, but oversupply caused prices to plummet to zero.

Phase 2 (2008-2012): Adjustments to quota allocations and caps were made and an auction mechanism was introduced for the first time, but the influx of international credits and the financial crisis led to a persistent oversupply problem.

Phase 3 (2013-2020): A major reform phase that establishes a unified EU emissions cap, with auctioning becoming the main allocation method, while strictly limiting the use of international credits.

Phase 4 (from 2021): In order to achieve the "Fit for 55" climate goal, the ETS will be further reformed, with a reduction in the allocation of free allowances, the introduction of a carbon border adjustment mechanism in order to prevent carbon leakage, and support for the modernization of the energy system through the Low Carbon Fund.

In fact, the EU is transitioning its Emissions Trading System (ETS) to the Carbon Border Adjustment Mechanism (CBAM). Starting next year, the ETS will begin phasing out and will be gradually replaced by CBAM, with full implementation expected. By integrating CBAM into its climate strategy, the EU seeks to build a more sustainable economic system and advance the transition to a low-carbon global economy.

Why is carbon trading so important?

1.Cost Effectiveness: Maximizing Emissions Reductions at the Lowest Costs

Carbon trading allows companies with low abatement costs to reduce emissions and sell allowances, while companies with high abatement costs reduce their compliance costs by buying allowances. This market-based "flexible emission reduction" mechanism is significantly better than the traditional "one-size-fits-all" model of administrative directives.

2.Catalyst for technological innovation and industrial upgrading

Carbon trading effectively promotes technological progress and industrial transformation through market mechanisms. By setting a cap on carbon emissions and allocating emission quotas, the carbon trading policy has prompted enterprises to reduce the cost of carbon emissions through technological innovation. In addition, through the carbon pricing mechanism, the carbon trading policy has prompted high-carbon industries to gradually lose competitiveness, while low-carbon industries have gained more development opportunities through technological advantages, thus promoting the adjustment of industrial structure from high-carbon to low-carbon. At the same time, carbon trading has spawned new green industries, such as carbon capture and storage (CCUS) and forestry carbon sinks, forming a huge green industry ecosystem. Through these mechanisms, carbon trading not only promotes technological innovation, but also accelerates the green transformation of traditional high-energy-

consuming industries, providing important support for the realization of a green and low-carbon economy.

Challenges and Future Prospects

Despite the effectiveness of carbon trading, challenges such as lack of data transparency and limited market liquidity still need to be addressed. For example, China is setting up a third-party verification system to ensure that corporate emissions data are real and credible, while the European Union is exploring the inclusion of shipping and construction in its trading system to expand its coverage. In the future, the prosperity of carbon financial derivatives (e.g., carbon futures, carbon funds) will further enhance market vitality, while the synergy of global carbon pricing mechanisms is expected to become a new pillar of climate governance. In addition, carbon trading can work with other policies such as carbon taxes and disclosure requirements. For example, carbon trading is usually applied to industries with large emissions (such as electricity, steel, cement, etc.), while carbon tax can cover areas that are difficult to be reached by the carbon trading system, such as small and medium-sized enterprises and residential energy use. This division of labor can effectively circumvent the problem of carbon leakage. Meanwhile, disclosure requirements can promote the synergistic implementation of carbon taxes and carbon trading by enhancing market transparency.

Conclusion

Carbon trading is not only an environmental policy tool, but also a change that reshapes the rules of the global economy. Through the concept of “pollution has a price”, it incorporates ecological value into business decision-making and drives mankind's leap towards a low-carbon civilization. As China's carbon market has shown, when market forces are deeply coupled with climate goals, they can unleash far more green kinetic energy than expected - which is why carbon trading is so important to the world.

Authors:
Forrest Gan Yuan
Currently pursuing a Master of Science in Sustainable Technology for Carbon Neutrality at The Hong Kong Polytechnic University
Undergraduate student of Environmental Science, University of Guangzhou
Contact: https://www.linkedin.com/in/forrest-gan-299330332/