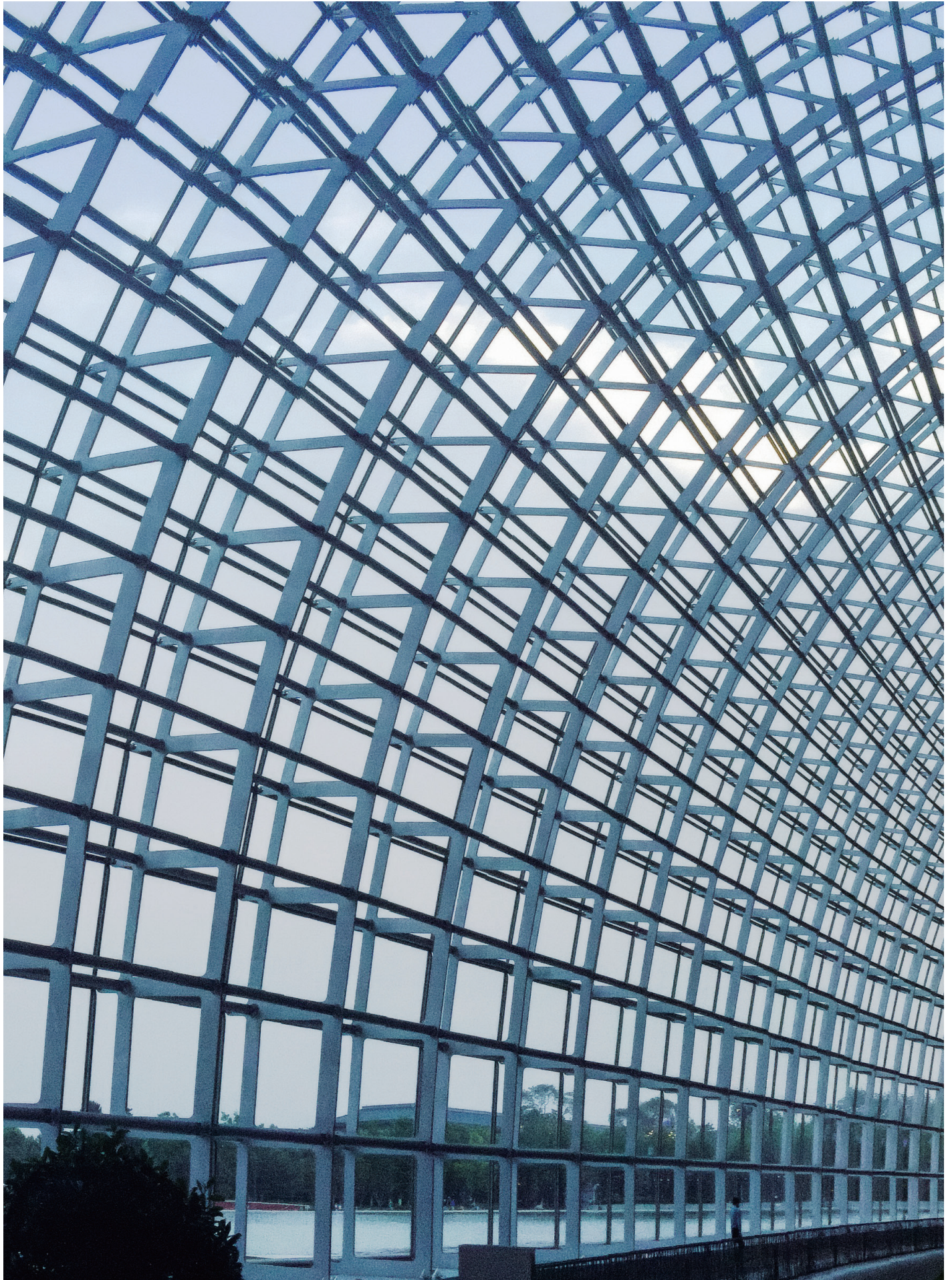




Research on Banking Institutions' Innovation in Carbon Finance Products and Business

China Banking Expert Working Group on Carbon Peak and Carbon Neutrality Goals
WWF Provide Technical Support
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Abstract

The Research on Banking Institutions' Innovation in Carbon Finance Products and Business is conducted by some of the policy banks, national joint-stock commercial banks, urban and rural commercial banks, foreign banks, trust companies and asset management companies in China, under the guidance of the China Banking Association and with the support of the China Banking Expert Working Group on Carbon Peak and Carbon Neutrality Goals. Based on the practical experience of the participating banking institutions in carbon finance, this Report systematically reviews the past and present of international and domestic carbon markets and introduces how different types of mainstream carbon finance products are created and applied in China. It goes on to summarize the problems that emerged in the development of carbon markets, the creation of carbon finance products and the running of carbon finance business, before envisioning the future and offering policy advice.



I. Financial support for the carbon peak and carbon neutrality goals



(I) The importance of providing financial support for the “dual carbon” goals

The “dual carbon” goals put forward in 2020 have placed new requirements on China’s economic model. Emissions reduction depends not only on administrative means, but also on market mechanisms. Carbon trading and reasonable pricing prompt emitters to eliminate outdated capacity, invest more in R&D, optimize resource allocation and internalize the external costs of emissions. Carbon pricing can be achieved through carbon credit, carbon tax, the trading of current or future carbon allowances, and more. In terms of scale and sectoral coverage, allowance trading is so far the most important form of carbon pricing.

As a key market force behind the allocation of resources and production factors, finance plays an indispensable role in the development and maturity of carbon markets. International experience shows that carbon finance products and financial derivatives trading are conducive to a carbon market’s price discovery and risk management processes. The launch of China’s national carbon market made it easier for the banking sector to offer carbon finance services. Banks are now able to provide basic services (authorized opening of carbon accounts, settlement and clearing, and fund supervision), financing services (carbon asset-backed loans, carbon bonds, and carbon funds), and asset management services (carbon futures trading, carbon asset management, and financial counseling).

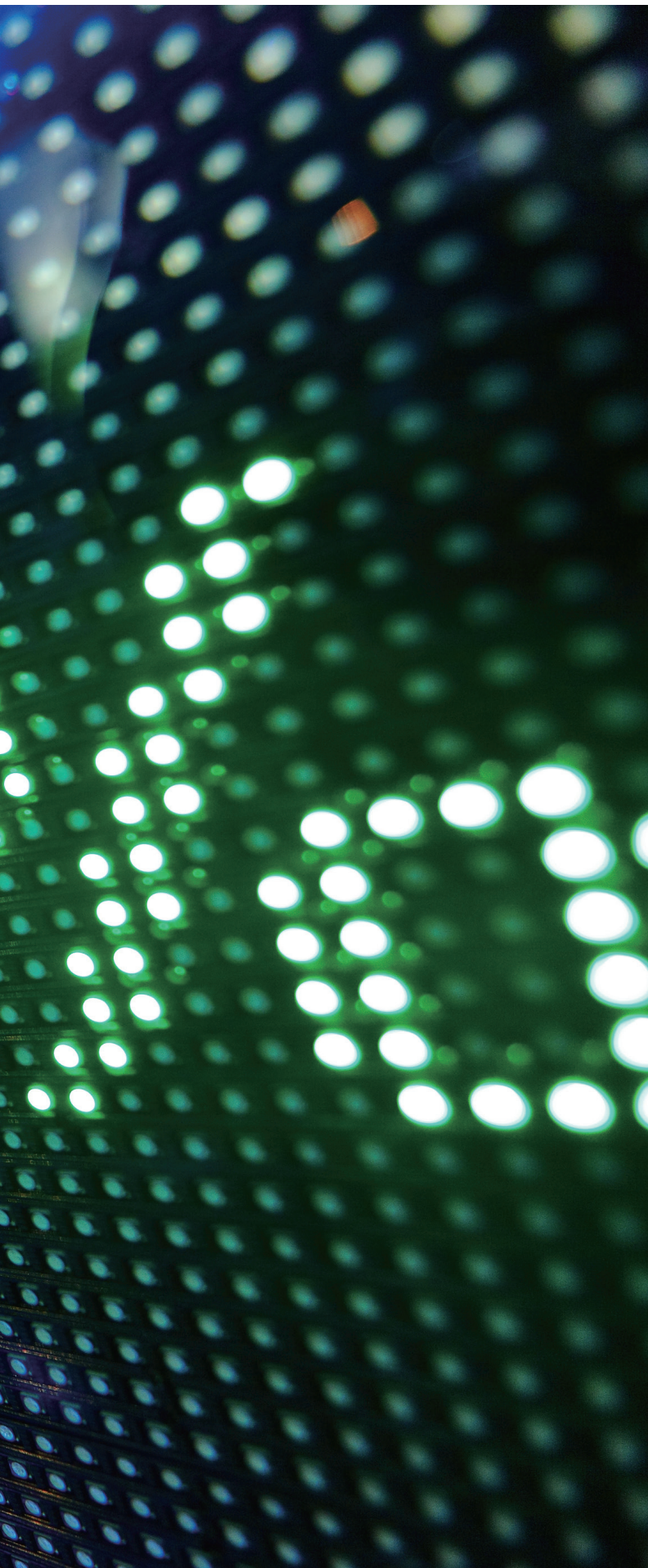
(II) The progress in providing financial support for the “dual carbon” goals

Generally speaking, banking institutions are leading the financial support for the “dual carbon” goals. National commercial banks, joint-stock commercial banks and urban commercial banks have reached a consensus on green transformation. Internally, there are three core driving forces behind green finance development and innovation: regulatory guidance, social responsibility, and business opportunities. Most banks conducted top-level strategic planning for green finance and implemented their plans through credit restructuring, product innovation, marketing and other approaches. In terms of institutional framework, most banks established at the head office a cross-departmental green finance leading group chaired by a bank leader. They also set up a bank-wide green finance planning and promotion unit, and developed a green finance policy system covering assessment and evaluation, credit approval, marketing and incentives, aiming to turn green finance into an important lever for the eco-friendly, high-quality development of the regional economy. Some banks stood out with their distinctive practices. For example, through its green product system¹, the Bank of Nanjing entitled green finance to a 20 basis point cut in the funds transfer price (FTP) and to earmarked marketing budgets; Huishang Bank, etc. launched a specialized green finance operation system.

¹ To maintain its leadership in innovation, the Bank of Nanjing established a green product system spanning basic products, featured products, investment banking products and personal banking products. The system launched a series of green finance products such as energy performance contracting loans, photovoltaic loans, emissions rights-backed loans, solid waste management loans, water conservation loans and carbon allowance-backed loans to provide comprehensive services for green industries.



II. The present and future of carbon markets



(I) Overview of international carbon markets

Based on the nature of emissions reduction regimes, international carbon markets can be divided into two types: Compliance Carbon Markets and Voluntary Carbon Markets.

1. Compliance Carbon Markets

In a Compliance Carbon Market, participants are free to trade among themselves the carbon allowances issued by the government or regulatory bodies. The key logic is that organizations that emit less will spend less on allowances. The value of an allowance (i.e. “carbon pricing”) is determined by the interaction of supply and demand on the market.

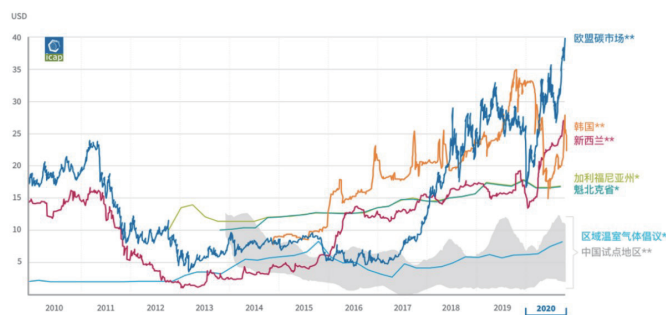
The primary type of Compliance Carbon Markets is the Emission Trading Scheme (ETS), which serves as a market-based policy tool for reducing greenhouse gas emissions. The ETS works on the “cap and trade” principle. A cap is set by the government on the total amount of greenhouse gases that can be emitted by one or more sectors. Companies included in the carbon trading system need to surrender a certain number of allowances to cover every ton of their emissions. These companies can buy or receive allowances, which they can trade with one another as needed.

Compliance Carbon Markets have grown rapidly over the past few years. As of the end of 2021, the 29 existing ETSs covered 16% of global emissions (8,700 MtCO₂e), with a market size of USD 170 billion (as of April 2021). The six well-established compliance carbon markets are: EU ETS, Swiss ETS, Korea ETS, RGGI, California, and Québec. Introduced in 2005, the EU ETS is the most influential and liquid carbon trading market. It was based on the three Kyoto Protocol flexibility mechanisms - International Emissions Trading (IET), Joint Implementation (JI) and Clean Development Mechanism (CDM).

The EU ETS covers energy, chemical, power, iron and steel, cement and other sectors of each EU member state. Local companies that emit more than they have allowances for may either make up the differences by purchasing allowances at carbon trading centers like the European Exchange (EEX) and the Intercontinental Exchange (ICE), or achieve compliance through Certified Emission Reductions (CERs) under CDM and Assigned Amount Units (AAUs) under JI. The EU ETS also put together the Market Stability Reserve (MSR) to regulate

the market against large impact on carbon price when the allowances in circulation are too many or too few. Companies included in the EU ETS account for half of the EU's total emissions. At more than EUR 200 billion, the allowances traded in the EU ETS in 2020 reached 8,100 MtCO₂e (more than four times the allowances issued over the year), making up 90% of the world's total. Carbon futures accounted for a large proportion of the trading. Since 2020, with the adoption of the European Green Deal and the gradual implementation of long- and short-term climate goals in EU countries, the EU ETS has tightened up allowances and pushed the carbon price to a record high. In 2021, due to allowance and energy crunches, the final settlement price for ICE EU carbon allowance futures soared from EUR 33/ton at the beginning of the year to EUR 80/ton by year's end, with the peak at more than EUR 90/ton, though it fell back to around EUR 65/ton between February and March 2022, largely for geopolitical reasons.

Launched in 2015, the Korea ETS is the third-largest carbon market after the EU ETS and China ETS. It is operated based on the Act on Allocation and Trading of Greenhouse Gas Emission Allowances and the corresponding carbon trading mechanisms. Its market stabilization measures may include: additional auctioning of allowances from the reserve; establishment of the top and bottom limits to the number of allowances entities can hold; an increase or decrease of the borrowing limit; an increase or decrease of the offset limit; and temporary setup of a price ceiling or price floor. The Korea ETS covers eight sectors: iron and steel, cement, petrochemical, oil refinery, energy, construction, waste, and aviation. Companies included in the Korea ETS account for 74% of Korea's total emissions. The current carbon price hovers between USD 25 and USD 30 per ton.



Source: International Carbon Action Partnership (ICAP), Emissions Trading Worldwide: Status Report 2021

2. Voluntary Carbon Markets

A Voluntary Carbon Market, as its name implies, finances voluntary emissions reduction programs (direct actions such as afforestation, or innovative technologies such as direct air carbon capture). Carbon credits that these programs generated can be traded on the market, and used to offset the buyers' carbon emissions. Because the purchase of carbon credits is not mandatory, Voluntary Carbon Markets do not set the carbon prices themselves. However, if such credits were allowed for use in Compliance Carbon Markets, they would have some influence on carbon pricing.

Despite the rapid growth of Voluntary Carbon Markets (annual carbon credits generation rose from 6 MtCO₂e in 2007 to 300 MtCO₂e in 2020), they still account for a negligible share of global emissions (less than 5‰ in 2020).

Voluntary Carbon Markets apply to specific sectors. A case in point is the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) developed by the International Civil Aviation Organization. CORSIA requires international airlines to offset their emissions in excess of the 2019 baseline with carbon credits generated through voluntary emission reduction programs. As of July 2021, more than 75% of the world's airlines (from more than 88 countries and regions) participated in CORSIA on a voluntary basis.

Overall, challenges persist across international carbon markets:

First, the coverage of Compliance Carbon Markets is limited, and the average carbon price too low. As of the end of 2021, ETS and carbon tax covered only one-fifth of global emissions; carbon price was below USD 40/ton in more than 85% of the time, which fell short of the Paris Agreement goals and was insufficient to incentivize companies to cut emissions.

Second, Voluntary Carbon Markets need to effectively enhance their credibility to grow at scale. The quality of carbon credits generated through voluntary emission reduction programs varies greatly from region to region, and the flows of these credits are limited by the lack of unified classification standards across markets.

Third, the continued disconnect between carbon markets cripples liquidity and decarbonization. National/Regional

governments are taking a largely siloed approach to the carbon markets under their watch.

Fourth, there is still no clear mechanism for the commodification of Carbon Removal. Carbon Removal is a process in which CO₂ is removed from the atmosphere and sequestered for long periods of time. Growing to a critical mass will be difficult for Carbon Removal, unless it is commodified and traded on the market.

Fifth, the lack of standardization further affects the liquidity and scalability of carbon markets. Much remains to be done to standardize the financial accounting methods, emissions reduction measurements and regulatory systems for carbon markets, as well as the ways products are traded and contracts concluded.

(II) Developments of China's carbon markets

China's carbon market system went through the CDM stage (2002-2012) and the local piloting stage (2011-2020). It is currently undergoing the national construction stage (2021-present).

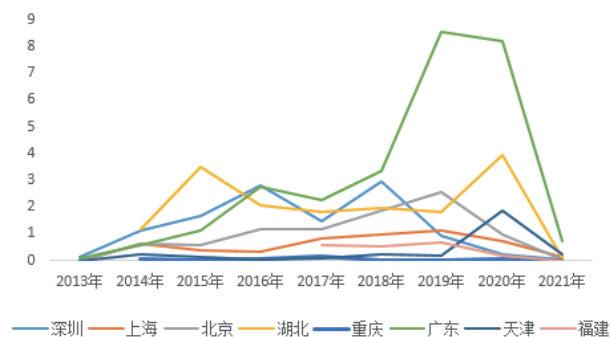
In 2004, China formulated the Interim Measures for the Operation and Management of Clean Development Mechanism Projects. According to the data published by the UN Framework Convention on Climate Change, China had 3,764 CDM registered projects as of 2019. However, due to the changing landscape of the CDM, the country has seen almost no new CDM project since 2013.

China's carbon trading program took off in 2011 when the National Development and Reform Commission (NDRC) approved seven provincial/municipal pilot markets, namely Beijing, Shanghai, Tianjin, Chongqing, Hubei, Guangdong and Shenzhen. In 2016, Fujian became the eighth pilot market in the country. Each of these markets has adopted a basically identical structure while allowing for regional differences. Specifically, the trading targets mainly include local carbon allowances, China Certified Emission Reductions (CCERs) and local CERs; allowances are mostly allocated for free and occasionally auctioned; the common ways of allowance trading are open bidding and agreement-based transfer. As of December 2021,

the eight pilot markets covered nearly 3,000 companies in more than 20 sectors including iron and steel, power, and cement; 25.078 MtCO₂e of allowances were traded for RMB 10.06 billion; the carbon price varied between RMB 10 and RMB 90 per ton. Since the establishment of the national carbon market, the trading volume of the eight local markets has waxed before it wanes.

In 2012, China began to establish the CCER trading market. CCER trading became a reality after the CCER trading information platform went online in 2015. In 2017, CCER project filing was suspended while the existing CCERs remained available for trading. As of December 2021, the NDRC validated 2,856 and registered 1,047 CCER projects; it also approved for issuance the emissions reductions of 287 CCER projects. Driven by the approval for offsetting with CCERs, a staggering 176.78 MtCO₂e of CCERs were traded across China in 2021, a significant increase from the previous year. In particular, Shanghai and Guangdong remained robust with a trading volume of 60.608 MtCO₂e and 17.482 MtCO₂e respectively; at 42.766 MtCO₂e, Tianjin saw a significant increase in market activity.

Trading Volume of China's Pilot Carbon Markets (Unit: RMB 100 Million)



Source: Wind, Research and Innovation Department of Hwabao Securities

In 2021, the inclusion of the “dual carbon” goals in the 14th Five-Year Plan hastened the birth of the national carbon market. With the Measures for the Administration of Carbon Emissions Trading (For Trial Implementation) and the Interim Regulations for Carbon Emissions Trading successively put in place, trading officially kicked off in the national market on July 16. The only

trading targets were spot national emissions allowances, and all the first traders were from the power sector (2,225 power companies). Between 2021 and 2025, the national market will cover 7,000-10,000 companies in eight sectors, namely power, petrochemical, chemical, building materials, iron and steel, non-ferrous metals, paper-making, and domestic civil aviation. Most of the allowances will be allocated for free, though after a time an increasing proportion of allowances will be allocated at a cost. Companies are allowed to use CCERs to offset no more than 5% of their emissions, provided that such CCERs, regardless of type and generation time, do not come from emissions reduction programs included in the national carbon allowances management. As of the end of 2021, 178 MtCO₂e of emissions allowances were traded for RMB 7.661 billion in the national market, with a peak trading price of RMB 62.29/ton. The closing price on the last trading day of the year was RMB 54.22/ton, up 12.96% from the opening price of RMB 48.00/ton on the first day of market launch.

Considering its lack of sectoral coverage (the power sector only), products (mainly spot trading of allowances), and liquidity (with a 4% turnover rate), China's national carbon market is at the same development level as the EU ETS in Phase I (2005-2007), meaning there is still a long way to go before the national market can reach its ideal state. However, with the gradual implementation of the above-mentioned plans and rules, the national market will witness a notable rise in trading volume, liquidity (turnover rate) and carbon price.

China has yet to have a mature Voluntary Carbon Market since CCER project filing was suspended in 2017. The construction of such markets will enable the country and its companies to foster a more favorable environment for carbon trading, cut emissions at lower costs, and move closer towards carbon neutrality. International practices show that a reliable Voluntary Carbon Market enjoys four striking features as follows:

1. Indispensable: The carbon credits generated through voluntary emissions reduction programs must be used to offset emissions in excess of the baseline. In other words, without a Voluntary Carbon Market, such offsetting would be impossible;

2. Sustainable: The Carbon Removal or emissions reductions represented by the generated carbon credits must be irreversible in the long run;
3. Rigorous: Precautions must be sufficiently available in case of green-washing through voluntary emissions reduction programs;
4. Measurable: In the interest of accuracy, emissions reductions through voluntary programs must be measured by a qualified third-party auditor.

Banking institutions can get involved in carbon finance and carbon markets in the following three ways:

First, facilitating carbon market operations. Banks can develop and provide life-cycle basic services spanning account opening, settlement and depository for carbon exchanges. Jointly established by DBS Bank, Singapore Exchange, Standard Chartered Bank, and Temasek, Singapore's global carbon trading platform Climate Impact X (CIX) completed pilot auction of a carbon credits portfolio through two of its main business - GreenEx and Project Marketplace. By connecting themselves to the China ETS and the corresponding registration system, Agricultural Bank of China, Industrial and Commercial Bank of China, Industrial Bank, etc. are able to provide carbon asset trading entities with clearing and settlement services.

Second, serving carbon asset trading entities. Banks can issue carbon allowance- or CCER-backed loans and offer carbon asset custody and management services to traders. Barclays, Standard Chartered Bank and DBS Bank developed carbon futures, carbon forwards, carbon options and other financial products. China Construction Bank, Industrial Bank, etc. are issuing emissions rights- and CCER-backed loans and other financial credit products. As lead/joint underwriters, Agricultural Bank of China, Bank of China, etc. are helping to issue carbon neutrality bonds, transition bonds and other bonds related to carbon performance. China Construction Bank, Ping An Bank, CITIC Bank, etc. tested the waters of the personal carbon account business, aiming to drum up enthusiasm for low-carbon consumption by linking personal carbon footprint with financial services.

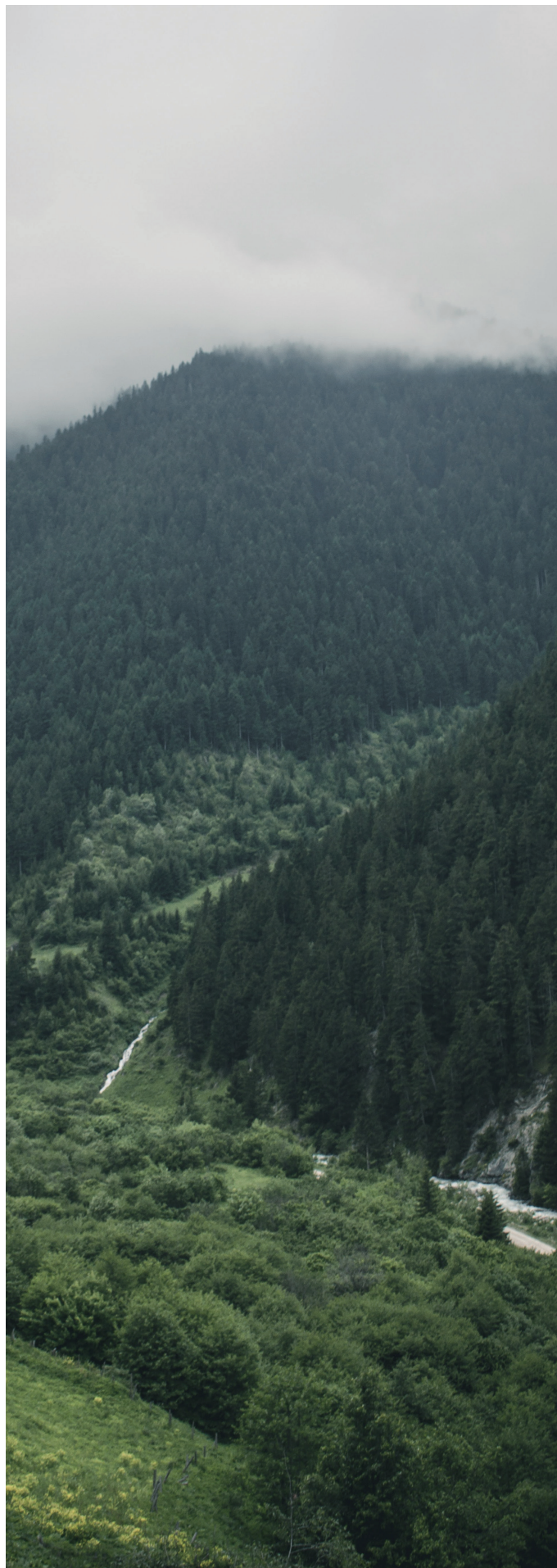
Third, engaging in carbon trading. As emitters themselves, banks also need to buy offsets like CCERs. Industrial Bank,

Shanghai Pudong Development Bank, NRC Bank, etc. achieved carbon neutrality across their outlets through CCER purchasing or carbon sinks.

(III) The prospects for carbon markets

There is enormous room for development in Chinese and international carbon markets alike. Research predicts that these markets will overcome the aforesaid challenges stage by stage. A carbon-neutral or net-zero world will not be beyond our grasp if the markets can keep endorsing emissions reduction initiatives and grow at scale.

- Short term (in the coming 1-2 years): The world is anticipating a wave of aggressive climate measures on top of a surge in decarbonization policies for high-emissions areas. Carbon pricing mechanisms will cover 50% (against the current 20%) of global emissions. Inter-market carbon credits trading will become a partial reality.
- Medium term (in the coming 5 years): Given an increasingly aggressive policy environment, carbon pricing mechanisms will account for the vast majority of global emissions reductions. As carbon matures into an investable asset class, carbon finance and derivatives trading will gain significant momentum.
- Long term (in the coming 10 years): Carbon emissions will be almost completely covered by diverse mechanisms such as carbon markets and carbon tax. With national/regional carbon markets connected to one another, larger-scale markets will take shape in the world.
- Final stage (a net-zero world): Carbon markets will be progressively scaled down. Carbon credits generated from Carbon Removal will be used as the main tool to offset any outstanding emissions.





III. The composition of carbon finance product system



Carbon finance products in the international markets generally fall under five categories: carbon trading services, carbon financing services, carbon asset management, carbon financial derivatives and carbon support services (these categories can be sub-divided into many groups). The first two are the focus of the international banking community.

In China, the earliest carbon finance products were mainly used for CDM project development and financing. With the steady progress of local piloting and the launch of the national market, new types of carbon finance business came into existence, including deal making, carbon asset-backed financing, and energy conservation and emissions reduction financing. However, given the market barriers and operational constraints, China's financial institutions, especially banks, are typically focused on carbon trading services and carbon asset-backed financing under the existing legal framework. By contrast, carbon asset management, carbon financial derivatives and carbon support services are just off the starting line. It will take time before the three categories of products reach maturity and deliver any replicable business model.

As local carbon markets advance alongside the supporting institutional framework, China's carbon finance products will be better aligned with international ones. A carbon finance product system covering settlement, financing and derivative trading will take shape to provide holistic life-cycle solutions for the compliance of emitters, the development of carbon sinks, the management and monetization of carbon assets, and carbon market making.

1. Carbon trading services

In the early days, participants in China's carbon markets largely consisted of trading centers, settlement agencies, emitters, and CCER project owners. The current market players mainly include financial institutions that offer services such as settlement, account opening, deal making, spot trading, and fund supervision. In the future, China's carbon markets will grant access to market makers, brokers and other established players of mature financial markets.

(1) Deal making

With extensive experience in carbon trading and a large customer base, financial institutions can serve as a bridge between emitters with trading needs and between emissions reduction project owners and intermediaries. For example, they can buy large quantities of carbon allowances for emitters with capacity expansion plans. As the China ETS is still in its infancy, financial institutions can also provide intermediary services to meet the diversified needs of inexperienced traders and keep the market flowing.

(2) Settlement of floor transactions and supervision over fund transfers

Banking institutions experienced in cross-commodity market settlement and system connection can open settlement accounts for carbon exchanges and their members (including emitters and investors) and assist the exchanges in managing fund transfers by members and between designated settlement accounts of different banks, developing the data reconciliation system, managing the margins deposited by members into designated settlement accounts separately and establishing for each member an individual ledger with transaction records and calculations in a daily and chronological order.

In the capacity of settlement regulators, banking institutions can also reconcile and confirm the trading data from the exchanges and proceed with the fund transfers. The main functions of a regulatory bank include: checking the validity of the linkage between member account and bank account; checking the adequacy and availability of funds in an account; and checking whether the amount after netting matches the current balance. For large amount of funds, banking institutions can confirm by phone with the contact person appointed by the member concerned.

(3) Market Maker

A carbon market maker quotes both a buy and a sell price of carbon forwards, carbon futures, carbon swaps, carbon options and other derivatives to facilitate trade and increase liquidity. For example, Goldman Sachs, a well-known investment bank, functions as a market maker for emissions trading, weather derivatives and other climate-related commodities. Although market making mechanisms have not yet found their

way to China's carbon markets, Shanghai Environment and Energy Exchange and some other institutions have announced their plans to introduce market makers.

(4) Brokerage

Brokers include inter-dealer brokers who serve professional market makers, and agents who buy and sell on behalf of institutional or individual investors. The European markets, for example, feature both professional brokerage firms such as ICAP and Marex, and conventional financial institutions that function as agents, including ING. With the China ETS in operation, the high-profile issuance of national carbon asset brokerage licenses will help reshape the local industrial landscape.

2. Carbon financing services

Carbon financing is a focal point of the carbon finance business of international banks. It is also a breakthrough point for the innovation of China's financial institutions. On the basis of providing basic trading services, financial institutions can respond to the diverse needs of emitters and green enterprises with new products. The products for emitters range from carbon asset revitalization and management to green industry chain financing. Those for green enterprises (e.g. new-energy and forestry companies) include carbon sink development services.

(1) Carbon asset revitalization

Carbon assets (e.g. carbon allowances and CERs) are revitalized mainly through financing. The following carbon finance products and services allow companies to fund-raise with carbon assets as pledge:

a) Carbon asset-backed financing

The carbon asset-backed credit business enables companies to borrow using their own carbon assets as pledge. In case of default, such assets can be monetized/sold to secure repayment. Financial institutions extend loans under the credit lines that they set up based on the carbon assets of the borrowers, the status quo of the carbon markets, along with government regulations, price trends and other factors.

On the other hand, China's supporting institutional framework for allowance- and CCER-backed financing is

still rudimentary. The reasons are many: financial institutions are not yet qualified to open accounts and trade on China's national carbon market; there is neither a clear rule on carbon asset pledge and registration, nor a detailed description of the legal effect of asset mortgage rights; the pricing, repurchase and valuation mechanisms for emission rights are awaiting improvement; and the market is far from liquid. Also, instead of being the exclusively eligible pledge, carbon assets are only one of the means of credit enhancement. In terms of trading activity and asset liquidity, China's national carbon market still lags behind mature financial markets. Its daily average trading volume pointed to RMB 4-5 million during the first week (excluding Day One) of market launch.

b) Carbon financing with interests paid by a third party

Carbon financing with interests paid by a third party refers to the business in which a company applies with a financial institution for a loan backed by prospective carbon assets, with the loan interests paid by a third-party organization beforehand to the margin account designated by the said institution. The company will repay the loan with the cash flow generated from the carbon assets it is expected to hold/operate in the future.

(2) Green industry chain financing

In a broader sense, carbon finance includes fund-raising for green equipment, projects and supply chains. The so-called "green industry chain financing" involves not only emissions rights-related assets, but also a variety of investment and financing activities in favor of emissions reduction and climate change mitigation and adaptation. As China marches towards the "dual carbon" goals, the emissions compliance needs are giving emitters, whether in the newborn national market or the fledgling local ones, a substantial push towards clean and efficient energy. In response to such needs, financial institutions are empowering corporate efforts in energy conservation and transformation and emissions reduction with eco-friendly instruments, including but not limited to green loans, green bonds, green leasing, green trust and green supply chain finance.

Financial institutions can also seek to integrate the emissions information and ESG standards of fund-raising entities and projects into their credit extension process, systematically direct credit resources towards low-carbon

business, engage in climate investment and financing, and bring carbon finance into step with the rest of their business. HSBC, for example, issued an emissions rights-related loan, the first of its kind in China from a foreign bank, to a state-owned energy group, after the bank's credit assessors took into full account the liquidity and market value of the borrower's emission rights. Domestic banks are also developing carbon performance-related loan products where the interest rates are linked to emissions in some cases (e.g. Industrial Bank's "carbon footprint loans") and emissions intensity in others (e.g. China Construction Bank's "concessionary carbon loans").

(3) Carbon sink financing

The term "carbon sink" is derived from the Kyoto Protocol signed by parties to the UNFCCC in 1997. A carbon sink involves the process, activity or mechanism through which to remove CO₂ from the atmosphere. Carbon sink assets are typically registered in domestic or international voluntary emissions reduction program systems for trading and offsetting purposes. Common types of voluntary emissions reductions include CCERs, local CERs, and reductions from Verified Carbon Standard (VCS) projects. Companies can offset part of their emissions by developing carbon sink assets or directly purchasing the said types of reductions. China's national market, for example, permits the use of CCERs to offset up to 5% of carbon allowances. As you can see, CCERs have a relatively stable market value and a certain degree of liquidity. Financial institutions can use a variety of products to support the development and operations of carbon sinks, and integrate the future benefits of carbon sinks into the credit approval and guarantee processes. With extensive experience in carbon trading and a large customer base, these institutions can also serve as deal makers for emitters, carbon sink owners and intermediaries.

3. Carbon asset management

Carbon assets, like physical assets and other types of financial assets, can be outsourced to professional institutions for value maintenance and appreciation. These institutions can help companies diversify from passive management (e.g.

emissions compliance and carbon asset revitalization) to active management. The main forms of carbon asset management include carbon asset custody, carbon borrowing, carbon asset (reverse) repurchase, carbon fund and carbon trust.

In the absence of a clear go-ahead to open accounts and trade on China's national carbon market, financial institutions are managing carbon assets locally with a focus on CCERs. Asset management products are expected to propagate after the national market further opens.

(1) Carbon asset custody

Carbon asset custody refers to the services which allow companies to entrust their carbon assets to financial institutions or professional carbon asset managers (e.g. trust plans) and share the benefits (fixed or floating income) without directly participating in carbon trading. By outsourcing asset management to the professionals, companies can focus on their main business while keeping compliance costs and risks to a minimum. Through life-cycle supervision, the standardized custody services delivered by carbon exchanges can benefit both emitters and asset managers - reducing credit barriers and asset risks on one hand, and ensuring efficient fund use on the other. Better still, the involvement of these exchanges will help the custodians reach out to more customers. As carbon markets are rising, carbon asset custody will be in significantly higher demand, and a larger number of financial institutions will be scrambling for a piece of this pie.

(2) Carbon borrowing

Carbon borrowing refers to the business in which the carbon assets borrowed by one party from another are traded on an exchange or used for emissions compliance. The borrower is required to return the assets and pay a fee to the lender at the end of the agreed borrowing period. Beyond the compliance period, emitters or other entities can lend their carbon allowances or credits to financial institutions or asset managers for a fee (positive lending). This benefits all parties involved: the lenders can put their idle assets to use, the borrowers can leverage their expertise to generate profits from the assets, and the carbon exchange becomes more active and liquid. During the compliance period, emitters that are short on allowances can borrow from intermediaries and repay them with

allowances issued in the following year. This allows emitters to manage their compliance journey in a smoother and more cost-effective way (reverse lending).

(3) Carbon asset repurchase

Carbon asset repurchase refers to the process of selling and buying back a specific quantity of carbon allowances. In this transaction, repurchase party (allowance holder) sells the allowances to reverse repurchase party (allowance buyer), with the understanding that the repurchase party will buy back at an agreed price and time of the same quantity of carbon allowances. To complete the repurchase, both parties need to sign a repurchase agreement and submit it to the carbon exchange for verification. The repurchase will be finalized on the agreed date when all the allowances have been bought back. In the repurchase agreement, both parties should specify the quantity of allowances to be sold, the price and time of repurchase, and other relevant details. Until the repurchase is complete, The buyer has the right to manage the allowances as it sees fit.

The carbon asset repurchase business connects the financial and carbon markets, providing a new way for emitters and credit holders (repurchase parties) to access short-term financing. By selling their idle carbon assets, these actors can obtain the funds they need. For financial institutions and asset managers (reverse repurchase parties), the demand for acquiring allowances to participate in carbon trading can be met.

(4) Reverse repurchase of carbon assets

Reverse repurchase of carbon assets refers to the practice of financial institutions buying a specific quantity of emitters' legal and saleable carbon assets (allowances or CCERs) through trust plans and special purpose vehicles (SPVs). An SPV may authorize a third party to buy and sell allowances and CCERs on secondary markets. The financial institutions then sell back the same amount of carbon assets on an agreed date, collecting a "ticking fee" in the process. This business helps companies monetize and increase the value of their carbon assets beyond the compliance period. Until the reverse repurchase is completed, the carbon exchange keeps the allowances and funds held by the third party under closed management to prevent them from being used for other purposes. It also monitors the transfer of

allowances and CCERs on the agreed date to ensure the safety of the carbon assets.

(5) Carbon fund

In developed countries, carbon funds are commonly established to support energy conservation and emission reduction projects. These funds are either set up by the government or in collaboration with one or more companies and are used to invest in carbon assets in both primary and secondary markets for a return. Examples of well-known carbon funds include the World Bank Community Development Carbon Fund (CDCF) and the Asian Development Bank Future Carbon Fund (FCF).

(6) Carbon trust

Unlike other types of green trusts, carbon trusts focus specifically on reducing emissions, which is more conducive to sustainability and the low-carbon competitiveness of companies. Carbon trusts are still relatively new in China, and investors often perceive green projects as lacking sustainable profitability, despite their social responsibility. Such under-appreciation of the long-term value of green investments has an impact on the popularity and scalability of carbon trusts.

4. Carbon financing derivatives

Carbon financing derivatives are financial contracts that are based on carbon spot assets and can be used as trading instruments. These derivatives include carbon forwards, futures, options, and swaps, as well as tradable structured products such as carbon indices, bonds, and asset-backed securities (ABS). Carbon financial derivatives are crucial for the growth of carbon markets as they help brick-and-mortar companies hedge their carbon assets, allow investors to arbitrage across periods and lock in their risks, and keep financial intermediaries safe.

(1) Carbon futures

At present, only carbon allowances and emissions rights (carbon spot) can be traded on China's national and local carbon markets. However, these markets have the potential for trading derivatives such as carbon futures, options, swaps, and forwards. As a crucial part of the carbon trading product system, a mature derivatives market is beneficial for improving the

efficiency of carbon pricing, assisting emitters and other market players in managing the risks of carbon price fluctuations, and enhancing the overall operational quality of the spot market. While both carbon spot assets and carbon futures are traded in the EU ETS, carbon futures make up more than 90% of the total trading volume.

The Guangzhou Futures Exchange is working on the development of carbon futures under the guidance of the China Securities Regulatory Commission. The exchange will monitor the operations and rules of the spot market, and launch carbon futures when the conditions are favorable.

(2) Carbon-related structured deposits

Carbon-related structured deposits are financial products offered by banks to companies. These products are designed to manage funds and allowances based on the banks' expertise in carbon finance and trading experience in China's carbon markets. The banks will tailor the products to the companies' allowance needs and income expectations by incorporating assets such as carbon price and carbon neutrality bonds into the original wealth management or structured deposit products. On the product's maturity date, the banks will offer diverse interest and allowance payment structures based on agreed allocation principles, allowing companies to choose from flexible income options and benefit from independent third-party management services.

(3) Carbon bonds

Carbon bonds are issued by the government, financial institutions, and companies that meet regulatory requirements for bond issuance. These bonds take into account carbon-related factors, such as carbon price and income from CCERs, as well as interest rates. Debt financing instruments with carbon-related income options will also be developed to help companies raise funds for emissions reduction projects. In addition to interest, these companies may also repay creditors with part of the proceeds from the sale of carbon credits generated through these projects.

5. Carbon support services

Carbon support services are an important part of international carbon finance product and service systems, yet these services are still in their early stages of development in China. The two main forms of carbon support services are carbon index and carbon insurance.

(1) Carbon index

The carbon index reflects the supply and demand in primary and secondary markets, based on real-time trading price and volume. This index not only allows investors to gain perspective on the overall market situation, but also helps policy makers and mechanism developers assess opportunities and changes in climate risks. As these indices become more prevalent, we can expect to see an increase in index-based exchange-traded products (ETPs).

Currently, China does not have a widely recognized carbon index. This year, however, the SSEE officially started developing a carbon index that it expects to act as a “thermometer” of market price. Once the index is established, the exchange plans to create index-based ETPs to attract investment to low-carbon sectors.

(2) Carbon insurance

Carbon insurance refers to insurance products designed to protect against risks associated with carbon assets, such as fluctuations in carbon prices, loss of carbon assets, damage to emissions-reducing equipment, and uncertainty in CCER volume for traders.

Currently, China's carbon insurance market is still largely in its conceptual stage, with only a few companies trying intermittently to develop carbon insurance products. A significant amount of work needs to be done before a comprehensive system of insurance products can be traded on carbon markets at a large scale. However, as carbon markets continue to grow, there will be an increasing demand for carbon insurance.





IV. Carbon finance promotion suggestions

Carbon finance in China is still in its infancy compared to more advanced international markets. Constant exploration is necessary to increase market awareness and activity, as well as to improve the supporting mechanisms and institutional framework.

(I) Suggestions for carbon markets

1. Diversify market participants to increase market activity

First, clarify the timetable for the inclusion of seven high-emitting industries - petrochemical, chemical, building materials, iron and steel, non-ferrous metals, paper, and domestic civil aviation - in the national market, as an effort to improve market liquidity. Second, grant market access to experienced financial institutions, carbon asset management companies, institutional investors, and individuals to encourage innovation in carbon finance products. Third, encourage and help financial institutions, companies, and individuals to actively participate in carbon market transactions through initial transaction tax exemptions, the development of intermediary institutions, enhanced investor education, digitization of transaction processes including account opening, and other measures to improve the effectiveness of pricing.

2. Build environmental and carbon asset pledge information platforms

First, establish and improve the national carbon emissions information platform by integrating the national carbon market registration and settlement system, national environmental information management data reporting platform (<http://permit.mee.gov.cn>), and data from trade associations. This platform should ensure that corporate emissions data are standardized, dynamically updated, and easily accessible. Grant query permission to financial institutions so they can access corporate emissions data in bulk and offer targeted support for carbon finance, energy conservation and emissions reduction.

Second, create a carbon asset mortgage registration and credit investigation sub-system under the national carbon market registration and settlement system to facilitate information sharing and interactive queries through a unified interface.

Establish the environmental equity mortgage registration system covering the registrant; mortgage information, verification and public disclosure; information queries; and rights and responsibilities of all parties. The query platform will improve the transparency of emissions rights and corporate emissions data, allowing banks to access the allowance ownership of potential customers and data related to emissions and emitters.

Third, revise corporate accounting standards to ensure more comprehensive coverage of corporate emissions data in financial and audit reports, including but not limited to information on contingent liabilities arising from emissions during production and operations, allowance allocation, and carbon price sensitivity analysis.

3. Strengthen policy support

First, to encourage commercial banks to participate in carbon finance and trading, regulatory authorities may provide policy preferences involving fiscal and tax policies, MPA assessment, loan-to-deposit ratio, ratio of project capital to total capital, and ratio of capital at credit risk. Second, implement differential assessment and risk weight setting for high- and low-carbon assets to guide financial institutions towards increasing the proportion of low-carbon assets they hold. This will increase overall demand on carbon markets and provide financial support for the development of a globally competitive low-carbon, green industry.

4. Promptly promote the creation and trading of carbon futures and other derivatives

Improve the carbon ETP system by creating carbon futures and other derivatives in a timely manner. This can help better meet the needs of emitters for risk hedging, enhance the attractiveness of carbon markets to financial institutions without emissions compliance requirements, and extend the depth and improve the liquidity of these markets.

5. Improve the mechanisms for carbon pricing and market making

First, introduce market making mechanisms to the national carbon market at an appropriate time to improve market liquidity, stabilize carbon asset prices, and establish a carbon pricing hub. This will allow a group of financial institutions with financial market (e.g. bond market) making experience

to enter the market and provide bilateral offers and other market making services. Second, establish efficient, open, and transparent mechanisms for carbon trades and the issuance of carbon indices, providing financial institutions with fundamental guidance and reference for carbon asset evaluation and pricing. Third, set up carbon market price stabilization mechanisms based on MSR and other international practices. These mechanisms can promptly absorb or release carbon assets in response to changes in supply and demand, and improve market regulation to avoid imbalances and excessive fluctuations in carbon prices.

6. Improve CCER and other voluntary emissions reduction mechanisms

Resume and improve CCER and other voluntary emissions reduction mechanisms as China's national carbon market continues to advance under the "dual carbon" goals. This includes promptly establishing project management mechanisms, project development standards, industry methodology, and emissions reduction policies for compliance. Also, build the necessary infrastructure for CCER trading, registration, custody, mortgage and pledge. By doing so, financial institutions will be able to identify and support emissions reduction projects, increase the income of these projects, and enhance market activity through CCER trading.

7. Vigorously promote carbon finance innovation and piloting

Accelerate the implementation of climate investment and financing initiatives in the "7+2" carbon trading pilot cities and cities with strong foundations for green finance. Explore innovative carbon finance solutions, such as carbon asset securitization, carbon futures, carbon wealth management, cross-border carbon trading, and carbon market making, to drive the growth of the national carbon market, inform carbon finance policy making, and establish a carbon pricing hub with global influence.

(II) Suggestions for carbon finance

1. Draw on proven market experience to standardize carbon finance products

China's carbon finance markets are currently dominated by non-standardized products such as credit, which lack price stability and liquidity. In contrast, using other mature financial products as targets for pledge financing offers advantages in terms of convenience, efficiency, and replicability. For instance, both stock-backed and credit bond-backed financing on exchange have market-recognized pledge rates for reference, and their convenience and efficiency are superior to emissions rights-backed financing. Based on the successful experience of mature financial and carbon markets, it is suggested that China improve the institutional framework of its carbon markets, standardize its carbon finance products, and lay the foundation for wider adoption and promotion.

2. Utilize financial technology to enhance the effectiveness of carbon finance products

Another obstacle to the innovation, replication and promotion of carbon finance products is the lack of standardized emissions data. To address this issue, we recommend the following actions: First, leverage financial technology to integrate and verify corporate emissions and reductions data from various sources, including corporate data management platforms, regulatory databases, satellite remote sensing, and third-party databases. Second, promote Active Ownership among financial institutions by maintaining regular communication with companies and project operators to determine the standards and frequency of carbon data disclosure. Link the level of disclosure to credit ratings, and incentivize companies and projects to improve their emissions measurements and reduction efforts. Third, enhance the authenticity and accuracy of emissions data through the use of third-party organizations for regular checks, feasibility studies, and periodic visits and surveys.

(III) Suggestions for banking institutions' involvement in carbon finance

The China ETS officially launched in July 2021, but there is still room for improvement in terms of market participation, participant diversity, and transaction volume stability. It is suggested that banks and financial institutions enhance their carbon market services and accelerate the development of

carbon finance business by focusing on the following three areas:

1. Top-level design

Expand the participation in the national carbon market by allowing qualified commercial banks to join, and actively develop secondary markets to increase liquidity. Track the progress of the CCER market restart and develop relevant carbon finance products when appropriate to revitalize corporate carbon assets.

2. Carbon finance business innovation

Create carbon finance products, such as carbon bonds, to provide a stable and sustainable source of funding for companies implementing low-carbon strategies. Innovate in bond, fund, asset management, and other carbon finance products to support emissions performance and trading. Offer carbon asset-backed financing and structured deposit services to companies participating in pilot programs. Develop retail products, such as low-carbon wealth management and structured deposits, for individual carbon accounts. The goal is to offer a diverse range of innovative carbon finance services for both companies and individuals.

3. Carbon finance risk prevention

Follow domestic and international carbon markets closely, conduct climate risk sensitivity stress tests, and analyze the impact of carbon price, industry baseline, and paid allowance proportions on companies. Identify the transmission of stress from carbon markets to companies to banks, and explore carbon finance risk management mechanisms to support the growth of carbon finance business.

Achieving a peak in CO₂ emissions before 2030 and carbon neutrality before 2060 is a major strategic decision made by the CPC Central Committee with Xi Jinping as the core. It is related to the sustainable development of the Chinese nation and the building of a community with shared future for mankind. It is also the only way for China to promote high-quality development in the new era. To fully implement the Xi Jinping Thought on Ecological Civilization as well as the major decisions and arrangements on carbon peak and carbon neutrality, the China Banking Association and more than 60 of its members set up the China Banking Expert Working Group on Carbon Peak and Carbon Neutrality Goals (the “Expert Working Group”) on June 11, 2021, under the guidance of the China Banking and Insurance Regulatory Commission (CBIRC).

With the support of its members, the Expert Working Group has been vigorously offering assistance and guidance to banking institutions since the day it was established. As a result, an increasing number of these institutions worked out “dual carbon” plans, streamlined their investment and financing structure, optimized their climate risk management system, and conducted extensive exploration and practice in low-carbon, green transformation.

Under the framework of the Expert Working Group and in line with its Five-Year Plan, the Beijing Office of the Switzerland-based World Wildlife Fund helped the Expert Working Group carry out the Research on Banking Institutions’ Innovation in Carbon Finance Products and Business. Based

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on the practical experience of the participating banking institutions in carbon finance, the research systematically reviews the past and present of international and domestic carbon markets and introduces how different types of mainstream carbon finance products are created and applied in China. It goes on to summarize the problems that emerged in the development of carbon markets, the creation of carbon finance products and the running of carbon finance business, before envisioning the future and offering policy advice. The research also serves as the foundation for this Report, “Research on Carbon Finance Products and Business of Banking Institutions”.

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Due to the constraints of time, this Report has left something to be desired. We would appreciate your critical advice.

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