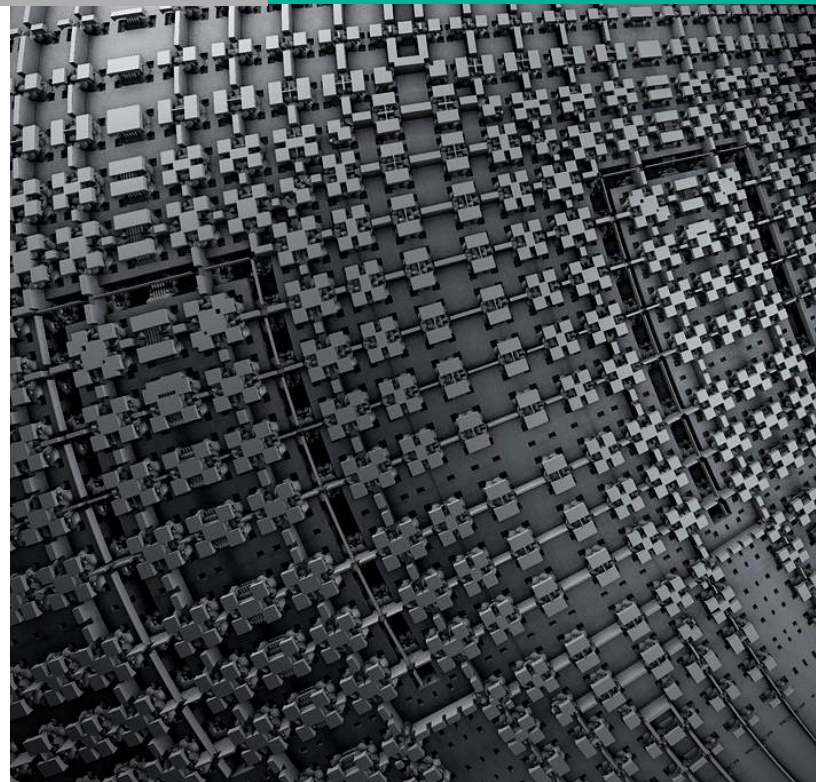
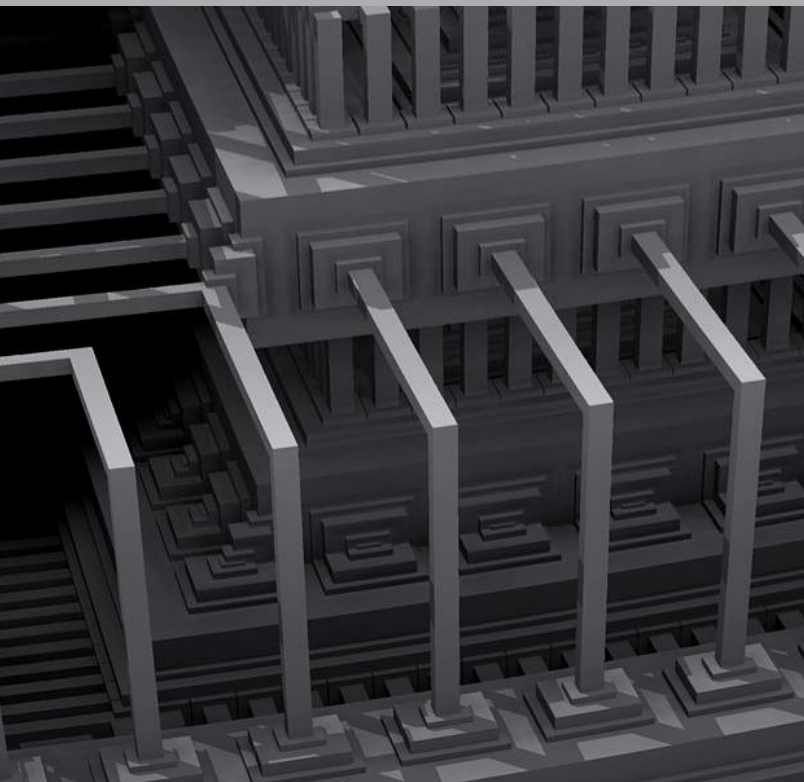


Constructing China's MRV System

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Leveraging Finance for Green Policy Briefs

September 2018



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EXECUTIVE SUMMARY

China officially launched its plan to build a national carbon market in December 2017, and it is estimated to be the world's largest carbon emissions trading market, surpassing that of the European Union (EU). The market will first start with coverage of the power industry that will include entities emitting more than 26,000 annual tons of carbon dioxide, which is almost all of China's power plants.

China has chosen to begin with the power industry, which produces about 30% of China's national emissions, because of challenges in collecting data in other sectors, building a strong legal foundation, and establishing an efficient system for trading. While there are plans to address these issues over the next two to three years, the effectiveness and longevity of China's national carbon market depends on the construction of a robust monitoring, reporting, and verification (MRV) system for carbon emissions data, as well as gradually including all the "polluting industries" under the emissions trading scheme (ETS).

Successful MRV systems are comprised of traditional participants — government, corporate sector, and third-party verification companies — built upon a solid framework of relevant laws and regulations, technical standards, talent and capacity building, and data reporting systems. The processes to institutionalize and standardize MRV frameworks across MRV participants are essential. It underpins successful data collection used to quantify carbon emissions and to facilitate allowance allocation and trading. These are the building blocks of an effective carbon market.

Since 2013, the Chinese MRV experience in the seven pilot carbon markets that were established to test the system before the national carbon market was launched have provided valuable insights and takeaways, which have been applied in the construction of an MRV system for the national carbon market. Based on these pilot market experiences, the government announced greenhouse gas (GHG) accounting and reporting guidelines for 24 sectors, organized historical data reporting and verification for eight sectors, drafted rules for establishing MRV management systems – including a draft management decree on GHG reporting and on accreditation of third-party verifiers, and draft guidelines for third-party verification. All are pending official approval. Some key barriers to the establishment of the MRV system at this stage include addressing weak legal and institutional support, inadequate technical standards and guidelines, disparate competencies of third-party verification capacity, and the unmet demand for institutionalized and practical capacity building.

As other previously established MRV systems have shown, such as in the EU, it takes a lengthy process of "learning by doing" combined with continuous, incremental improvements, to build a robust and reliable MRV system. In addition, it is important that the government has good top-level design with a clear strategy, a well-defined position, and attainable expectations when constructing a national MRV system.

Based on the experiences of the seven pilot markets — combined with research based on the European exchange, we recommend that the Chinese government consider the recommendations below to develop an effective MRV system.

- Accelerate development of legislative framework and technical guidance
- Strengthen guidance on unified implementation of rules and standards
- Improve and standardize construction of third-party verification service
- Enhance coordination and support for capacity building
- Establish evaluation mechanism for continuous improvement

INTRODUCTION

China officially launched its plan to build a national carbon market in December 2017 and making it, upon establishment, the world's largest carbon emissions trading market, surpassing that of the European Union (EU). China's intention to launch a national carbon market began in 2011 when the National Development and Reform Commission (NDRC) approved plans to launch regional carbon market pilot programs in Shenzhen, Shanghai, Beijing, Guangdong, Tianjin, Hubei and Chongqing. These pilot markets were established shortly after, in 2013 and 2014. Since then, they have been active testing grounds for the development of a national carbon market from the ground up. One important feature tested in the pilot markets was the development of a system of monitoring, reporting, and verification (MRV) that could be applied nationally. A robust MRV system is crucial to establishing and operating a carbon market.

An MRV system is comprised of three components — monitoring, reporting, and verification — that systematically provide accurate, comparable, and credible carbon emissions data. The monitoring aspect of an MRV system refers to the process of gathering data and information on carbon emissions. Reporting is the process of data compilation into inventories or formats that facilitate public disclosure. Verification is the periodic review or independent assessment of these data reports.

Together, the processes of an MRV system provide the foundation for a carbon trading market. The data measured is used to quantify carbon emissions that support allowance allocation and trading, effectively creating a functional carbon market. Data that is reported in a useful way and verified by a third party not only provides governments the ability to make informed decisions, but also serves as a valuable tool for corporates to track and regulate their own carbon emissions.

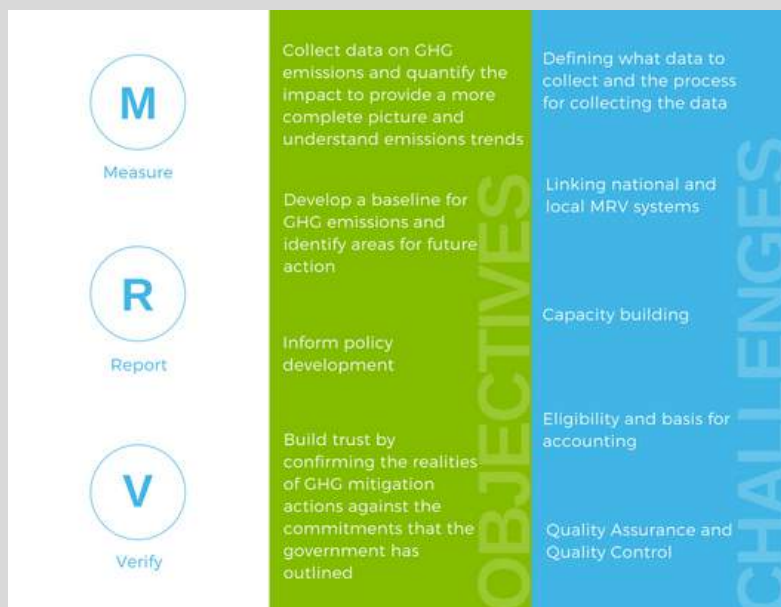
An effective MRV system includes active participants as well as a sound and transparent structure. Traditional participants in MRV systems are the government, corporate sector, and third-party verification companies. These three categories of participants perform their respective responsibilities and cooperate with each other to enable smooth operation of the MRV system.

Successful MRV systems require a cohesive set of participants working collaboratively. But to be effective, the infrastructure must also be solid, which requires the following pillars:

- **Legislative regulations.** China has yet to develop a comprehensive legal infrastructure for carbon trading. Carbon emissions trading regulations should be enacted to establish an MRV system. At the same time, related management measures for both corporate reporting and third-party verification accreditation would encourage standardization of procedures, requirements, and responsibilities of relevant parties for data monitoring, reporting and verification.

- **Technical standards for data collection.** A well-structured MRV system should establish clear guidelines for the collection and verification of GHG emissions data from those trading on the exchange or hoping to qualify. Technical guidance for data monitoring, corporate reporting and third-party verification should be developed. With consistent standards for data monitoring, reporting and verification, the data can be transparent, credible and comparable.
- **Institutionalized procedures.** Institutionalization of MRV procedures facilitates a well-functioning MRV system, including the necessary financial and human resources support. Government authorities, corporate sectors and third-party verification companies should incorporate MRV system practices into their standard operating procedures by allocating requisite allocation of funds and personnel.
- **Capacity building.** Development of talent for all aspects of carbon trading is essential if the exchange is to succeed over the long term. The government authorities, corporate sectors and third-party verification companies involved in MRV efforts should be well versed in relevant procedures, requirements and technical standards. This will require training to be provided at all levels of engagement.
- **Reporting system infrastructure.** A unified data reporting and verification system is essential for a strong MRV system. Online data reporting and verification is an effective approach to improve efficiencies in the MRV system.

The most successful carbon trading markets — the EU and California — have incorporated these five pillars and the three participants, government, corporate sector, and third-party verification companies. In summary, the MRV systems in these established markets demonstrate the significance of data measurement, reporting and verification to the operational viability and longevity of a carbon market.



OVERVIEW OF CURRENT EFFORTS

The importance of establishing an effective MRV system that gives the national carbon market experiment a good chance of survival has been clear to the Chinese government. Each pilot carbon market has its own MRV system, shaped in part by knowledge gained from the EU's general design and operational processes. However, because legislation has not yet been enacted for the standardization of third-party verification at the national level, the actual experiences in the pilot markets have uncovered a number of issues that need to be addressed, such as accreditation of qualified third-party verifiers, disparate technical capacities, and competition between third-party verifiers lacking quality control that often became malicious. Lessons learned from the pilot MRV systems have been useful in constructing China's national MRV system.

The NDRC issued GHG monitoring and reporting guidelines for 24 sectors. Although the national MRV management systems — measures for corporate sectors' data reporting, third-party verification guidelines, and accreditation rules of qualified verifiers — have not been officially released, some relevant research outcomes have been practically applied.

The NDRC organized historical data reporting and verification from 2013-2015 and 2016-2017 respectively by covering key sectors (oil petroleum, chemical, building material, iron and steel, nonferrous metal, paper mill, power and aviation) across the country. Due to institutional restructuring in March 2018, this work has been transferred from the NDRC to the newly established Ministry of Ecology and Environment (MEE). The China National ETS Help Desk was also launched to answer MRV related questions encountered by carbon market participants.

While incremental progress can be seen in the development of a national MRV system for China's national carbon market, there is much ground to cover if the national carbon market is to succeed. This work should begin by addressing the imperfections in the national MRV system — weak legal and institutional framework, rudimentary technical guidelines and standards, disparate competences of third-party verification companies, and demand for capacity building.

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Weak legal and institutional framework

A proper legal framework is a prerequisite for an effective and operational carbon market, and is a source of market credibility. To build a national MRV system, it is imperative to institutionalize the relevant timeframes, procedures, technical requirements, and participants' rights and obligations.

In terms of implementation, all participants in the MRV system need to institutionalize the work of data reporting and verification and incorporate it into their daily routines as standard operating procedure. To date, the work of GHG data reporting and verifications has not been institutionalized as a common practice with a clear timeline, and due to lack of implementation expectations, both local governments and corporate sectors have been confronted with challenges as a result of being caught unprepared and having to blindly navigate the process.

In terms of the data collection itself, there is also a need for improvement of the legislative framework and technical standards. Currently, data collection solely depends on publicly released statistical data and the limited data supplied by corporate sectors' simple data monitoring systems. Data to support a successful carbon trading system must be transparent – with detailed information at the levels of facilities, processes, and products. To ensure data quality and quantities required for a well-functional MRV system and a viable carbon market, more efforts should be made to address this barrier.

"The core goal of an MRV system is to acquire accurate, reliable, measurable, traceable and verifiable data from a carbon emitter."

Rudimentary technical guidelines and standards

The core goal of an MRV system is to acquire accurate, reliable, measurable, traceable and verifiable data from a carbon emitter. As such, data monitoring, measuring, reporting and verification must be based on unified standards to ensure market credibility. But currently, China has not released a comprehensive set of MRV system-related technical guidelines and standards. There are completed emissions accounting and reporting guidelines for 24 sectors, but unfinished technical guidelines and standards for data monitoring and verification. This suggests that additional efforts to address this gap are needed.

Technical guidelines and standards should seek to be flexible and pragmatic to facilitate the data collection process, which serves as a basis for determining allowance allocations for a carbon market. Early application of some established technical guidelines, standards, and templates released by the NDRC showcase the technical deficiencies of the national MRV system. These deficiencies were highlighted in their failed application in highly complex chemicals, petrochemicals, iron, and steel industries, which involve a plethora of products and sophisticated processes. China's incomplete carbon market allowance allocation scheme would benefit from flexible and pragmatic technical guidelines and standards for data collection as it evolves.

In the process of drafting and instituting technical guidelines and standards, the differences in interpretation should be considered. Data processing may vary in practice among different businesses within a particular industry, across industry sectors, and among businesses in different geographical areas. Measures to ease the potential misinterpretation of technical guidelines and standards would be valuable.

Disparate competences of third-party verification companies

The use of third-party independent verification is an important tool to ensure data quality and uphold the credibility of the carbon market. As such, verification processes are both labor and time intensive.

Preliminary estimates show more than 7,000 businesses across the country in eight sectors are expected to perform data reporting and verification processes. Due to the nature of carbon trading, these processes are seasonal and have a certain ebb and flow pattern. The majority of work is concentrated in one season of the year, which places great demands on the professional capabilities and talent pools of third-party verification companies. Allowance trading is typically around June or July annually, and thus most verification work is conducted from March to May.

In the initial phase of the national carbon market, experienced verification companies and verifiers have been in short supply. This has led to questions about the wide range of competencies and capabilities exhibited by the verification companies and verifiers that fill the void. The NDRC had recommended official procurement and bidding criteria for local governments for selecting verification companies and verifiers. But in reality, the selection criteria at the local level often differ and are tailored to expedite processes. As a result, some verification companies resort to low-price competition tactics, offering below-cost prices.

In the area of quality control, China lacks effective ways to supervise and manage verification companies. There are no performance evaluation mechanisms, and there are inadequate penalties imposed for poor performance by verification services or companies. Although reviews or expert assessments of verification companies may be organized in some regions, quality control is not institutionalized nationally. Bottom line, there is a large enforcement gap for verification companies.

Demand for capacity building

Data MRV involves many detailed and material technical requirements. A qualified verifier must be familiar not only with the basics, processes, and technologies of a sector, but also with MRV system rules, guidelines and standards. A qualified verification company should also have support staff with familiarity and working knowledge of MRV system requirements. It is essential that the verification industry's workforce be trained with practical skills and be provided with hands-on learning opportunities.

The NDRC has been responsible for much of the national MRV system training to date, but coordination, guidance on funding, course design and training execution remain areas to be improved. At the provincial level, local governments, particularly those in the capacity-building centers of the existing pilot markets, have provided training. While this has substantively contributed to local capacity building, it has also yielded mixed results due to a lack of coordinated national policies and technical guidance on course design, training materials and evaluations.

The shift of national carbon market responsibilities from the NDRC's Climate Change Department to MEE will leave space at both national and local levels to increase the quantity of training sessions and improve the design and implementation of these sessions.

RECOMMENDATIONS

China's national MRV system was built from the ground up — modeled on the EU, California, and pilot markets' experiences. As other MRV systems have shown, it takes a lengthy process of “learning by doing” and continuous, incremental improvement to have a MRV system capable of supporting a robust carbon market. In a national MRV system, it is important to have a clear strategy, a defined position and realistic expectations. It is also equally critical to set goals and determine the best means to achieve those goals, with the understanding that the progress of an MRV system will be subject to the inevitable problems that arise through the early development phases.

China's national MRV system is in its initial stages of development and is prime for improvement and growth as it matures. The national carbon market would be the greatest beneficiary, as a strong MRV system yields high-quality data that, in turn, supports its long-term viability. In order to develop a robust MRV system, China should consider the following recommendations.

1. Accelerate development of legislative framework and technical guidance.

The underlying significance of the MRV system to a national carbon market is well documented and makes practical sense. In China's case, with a newly established national carbon market, progress of the MRV system will be key to shaping its future. While much can be taken from the pilot markets' MRV experiences, the government should accelerate development of the national MRV system. It should establish parameters around the legislative framework for the national carbon market and address the technical guidelines and standards for the MRV system.

- **Construction of legal framework for national carbon market.** The basic law supporting the national carbon market should be issued by the State Council in the form of Interim Regulations for the Management of Carbon Emissions Trading, in order to address legal barriers. It would detail the foundation for a system of carbon emissions data monitoring, reporting and verification, outline responsibilities of participants, and provide the legal mandate for standardized management of third-party verification companies. To realize progress on this front in the form of implementation, the MEE should also issue Administrative Measures for the Reporting of Corporate Carbon Emissions Data and Administrative Measures for the Accreditation and Management of Third-party Verification Companies. The administrative measures would not only define the management system of the MRV, the obligations of participants, the procedures and the requirements, but would also lay an institutional foundation for daily MRV management and activities.

- **Establish complete set of MRV system technical guidelines and standards.** To establish a reliable MRV system, first steps include articulating technical guidelines and standards for data monitoring, reporting and verification; issuing guidelines for third-party verification; and publishing templates for verification reports. These measures would serve to further standardize verification guidelines and tools. Efforts should be made to encourage development of monitoring plans and templates that are gradually implemented at facility, process, and product levels. It is essential to establish compatibility and convergence of the MRV and carbon allowance management systems to ensure collected data meets the technical standards of allowance allocations. An efficient MRV system will continue to update and revise initial technical guidelines and standards; China should do this with its initially released accounting and reporting guidelines for the eight key industrial sectors.
- **Upgrade China's national statistical system to address climate change.** The current national statistical system is outdated and the government should invest in a comprehensive research arm that would propose recommendations for improvement and encourage revision of relevant laws and regulations. The research should evaluate the existing national statistical system and the current state of businesses' management of carbon emission data. It should address the needs of key businesses as related to carbon emissions allowance management, and of China as a nation regarding its requirements for climate change statistics in the future. The purpose of the research and recommendations would be an upgraded national statistical system that can address climate change and strengthen institutional safeguards and support for monitoring, reporting and verification of carbon emissions data management for key businesses.

2. Strengthen unified implementation of rules and standards

For an MRV system that is in its initial stages, it is vital that the government take steps to ensure that the structural framework and standards of the MRV system are coordinated and consistent. This will help to reduce confusion among system participants and to substantiate the authority of the MRV system. The China National ETS Help Desk and the data reporting system are key parts of the MRV system and play a fundamental role in providing consistency.

- **Underscore importance of China National ETS Help Desk.** As part of the announcement of the national carbon market, NDRC instituted a help desk to help bridge any gaps in understanding and support the adoption of market mechanisms. The platform is outfitted to answer questions on carbon market fundamentals including the MRV system, carbon allowance allocation, and registration procedures. The help desk is essential to ensuring uniform interpretations and implementation of the relevant rules and standards for carbon trading. As such, maintaining a functioning and effective help desk, with a capable administrative team, should be a priority.
- **Emphasize systematic and practical data reporting system.** The construction of China's data reporting system should be standardized because it will not only increase efficiencies, but will also facilitate the design and improvement of monitoring, reporting, and verification elements for the platform. It should focus on presenting relevant rules, guidelines and technical standards in user-friendly interfaces and tables that would lower technical thresholds for data processing and reduce subjective interpretations and implementation of the rules. The construction of the data reporting system must also involve experts who have practical experience in integrating the rules, guidelines and technical standards of MRV systems with the practical needs of users. The goal should be ease of use for users with all levels of technical expertise. Lastly, as rules and standards for the carbon market are continually changing, the data reporting system should be designed to allow for resultant changes.

3. Improve and standardize construction of third-party verification service

The network of third-party verification companies in China continues to grow as the national carbon market develops. In theory, third-party verification companies lend an independent voice to the data measuring and reporting process that underlies the carbon markets. China would do well to strengthen regulation of the third-party verification companies in order to ensure credibility and objectivity of the MRV system. The suggestions below are some measures that can be employed to keep third-party verification companies in check.

- **Standardize management of third-party verification companies.**

To ensure the independence, impartiality, and integrity of verification results, the government should set standards on the management and accreditation of verification companies, including qualifications, thresholds for entry, administration procedures, and delegation of authority. Third-party companies must have commensurate expertise and professional ethics to ensure validity of the MRV system. It is also necessary and urgent that the government impose ex-post supervision of third-party companies and penalties for any inappropriate behavior.

"In a national MRV system, it is important to have a clear strategy, a defined position and realistic expectations."

- **Strengthen development and self-regulation of third-party verification companies.** In the initial phase of the national carbon market, one of the major tasks is to train a number of qualified verifiers within a limited timeframe to meet verification needs — without sacrificing data integrity. The government should establish a self-regulatory organization for verification companies to encourage self-discipline and fair competition in the industry. This organization should also introduce a verifier registration and rating system, regularly convene conferences and seminars for its members to discuss various topics on verification practices, and organize verifier training and assessments.
- **Guarantee the financing of verification services and standardize service fees.** Sources of funding are an important guarantee of effective performance for verification services. Whether verification services are purchased by the government with public finances or by a business, the government should establish rules for financing future verification projects. When the government decides to purchase verification services by open tender, it should take effective measures to prevent verification companies' race to the bottom and to ensure the quality of the services.

4. Enhance coordination and support for capacity building

The full potential of China's MRV system will not be realized without capacity building. The scaling of the MRV system from regional pilot experiments to a larger nationwide scheme will require systematic hiring of talent. As emphasized in a Paulson Institute policy brief, capacity building has been identified as the "key" to growth of green finance in China. It is similarly the case with China's carbon markets. The Chinese government should consider the following:

- **Invest more financial resources in capability building.** Participants that come from different industrial backgrounds and have only elementary knowledge of the carbon market characterize the current stage of China's national carbon market. This portends an immense and urgent need for capacity building that involves the training of a large number of people, including government officials at the provincial and municipal levels, staff of key businesses, and verifiers. The government should provide special funding to establish continual and systemic support for capacity-building programs, given the highly technical operating structure, fluid rules, and personnel turnover of the nascent MRV system.
- **Provide coordinated guidance on capability building.** With jurisdiction over the national carbon markets, improved coordination and technical assistance should be provided for capability building. This should mobilize and engage multiple parties to build diverse capacities including compiling, updating, disseminating, or recommending high-quality training materials, and ensuring that capacity-building activities are available nationwide.

5. Establish evaluation mechanism for continuous improvement

The natural development of an MRV system is a highly practical “learn-by-doing” process in which incremental progress inches towards a robust MRV system. As such, lessons learned through trial and error and small-scale implementation are valuable experiences that governments should take stock of on a recurring basis. Here are some specific recommendations to encourage regular evaluation of the MRV system.

- **Establish a permanent and ad-hoc working group for evaluations.** The Chinese government should begin to assemble a working group of industry-recognized professionals that would meet regularly and be responsible for assessments. An ad-hoc working group should also be created to address issues that may arise in the areas of MRV-related laws, technical guidelines and standards, implementation, procedures, third party management and capacity building. Special government funds should be arranged to finance the activities of both types of evaluative working groups.
- **Devise an evaluation schedule for MRV system and summarize best practices.** China's national MRV system should have an evaluation schedule to ensure accountability. It is recommended that evaluations occur on an annual basis initially — particularly during early stages of system implementation — and once every 3-5 years when the system is operating normally. The working groups would track and summarize developments of the MRV system on a regular basis to provide practical conclusions and recommendations that would improve practices, revise laws and regulations, and optimize the technical guidelines and standards surrounding the MRV system.
- **Convene stakeholders' consultation meetings.** The Chinese government should convene meetings regularly to discuss the evaluations with representatives of local governments, businesses, third-party verification companies and industry experts. These meetings would offer a forum to help ensure that conclusions and recommendations for improvement from the evaluations are discussed and realized.

CONCLUSION

Tapped to be the world's largest carbon trading market, China's national carbon market is under great expectation to succeed. An active, thriving and enduring national carbon market in China could make a large dent in reducing domestic and global GHG emissions — and would be an example for future carbon markets. Arguably, the most important element to support China's national carbon market is a robust MRV system.

The value of a strong MRV system to a carbon market has largely been confirmed by other carbon market experiences in the EU and California, and China's nascent national carbon market would similarly benefit. MRV systems methodically provide accurate, comparable and credible data that quantify carbon dioxide emissions and prompt allowance allocation and trading — the foundation of a functional carbon market. Drawing from solid frameworks in pilot markets, China has made significant strides toward establishing a national MRV system. However, this system is still in its initial stages and there is room for improvement.

The recommendations suggested in this policy paper are intended to outline a roadmap for a strong and sustainable MRV system. As the national MRV system continues to develop, this is an ideal time to begin implementing these recommendations. Through a continuous process of evaluation and adjustment, China's MRV system should, in time, become as effective as other carbon market MRV systems and establish China's place among global leaders in carbon emissions control.

NATIONAL MRV SYSTEM RECOMMENDATIONS FOR CHINA

1. ACCELERATE DEVELOPMENT OF LEGISLATIVE FRAMEWORK AND TECHNICAL GUIDANCE
2. STRENGTHEN GUIDANCE ON UNIFIED IMPLEMENTATION OF RULES AND STANDARDS
3. IMPROVE AND STANDARDIZE CONSTRUCTION OF THIRD-PARTY VERIFICATION SERVICES
4. ENHANCE COORDINATION AND SUPPORT FOR CAPACITY BUILDING
5. ESTABLISH EVALUATION MECHANISM FOR CONTINUOUS IMPROVEMENT