



Building MRV for a successful emissions trading system in China

Xin Wang (IDDRI)

THE MOVE TO MARKET-BASED INSTRUMENTS

China plans to progressively implement a greenhouse gas emissions trading system (ETS) during the period of the 12th Five Year Plan (FYP, 2011-2015). The objective to introduce carbon markets fits in China's general economic policy orientation. Indeed, China aims at relying less on command-and-control mechanisms, and using more flexible economic instruments.

THE NEED FOR MRV

Carbon markets, if designed and implemented properly, can be a very efficient tool to reduce emissions and can account for incentives for a low-carbon growth in China. Generally speaking, they are more cost-efficient than command-and-control. However, the Measurement, Reporting and Verification (MRV) requirements are often higher, and in any case different. The implementation of a robust MRV system must come prior to the establishment of a ETS. But the accuracy of the MRV system will progressively evolve during the course of implementation, and must be balanced with costs.

BUILDING ON EUROPEAN EXPERIENCE

The ETS shows that the MRV system must be based on precise guidelines and very detailed instructions in order to ensure a smooth functioning. The measurement system should include all the GHGs traded as emission permits. Each country should provide a report covering annual emissions for a calendar year in a reporting period. And verification, through strategic and risk analysis, should address the reliability, credibility and accuracy of monitoring systems as well as reported data and information relating to emissions.

REINFORCING CHINESE CAPACITIES

China has improved its general statistical performance in recent years, which will no doubt facilitate the establishment of a MRV system. In particular, energy audits have been introduced through different policies or (pilot) programmes over the last 10 years. They provide a solid framework, and a good basis for the rapid implementation of pilot ETS in China. However, improvements are necessary, to move from energy to carbon accounting, and to strengthen reporting and verification.

Copyright © 2011 IDDRI

As a foundation of public utility, IDDRI encourages reproduction and communication of its copyrighted materials to the public, with proper credit (bibliographical reference and/or corresponding URL), for personal, corporate or public policy research, or educational purposes. However, IDDRI's copyrighted materials are not for commercial use or dissemination (print or electronic).

Unless expressly stated otherwise, the findings, interpretations, and conclusions expressed in the materials are those of the various authors and are not necessarily those of IDDRI's board.

Citation: Wang, X., 2011. *Building MRV for a successful emissions trading system in China*. Working Papers N°16/11, IDDRI, Paris, France, 16 p.



This paper was developed within the framework of IDDRI's "Learning Platform" project. The author would like to thank Julia Reinaud of IIP Network, Emmanuel Guérin and Elie Bellevrat of IDDRI, Sina Wartmann of Ecofys, Jifeng Li of the State Information Center of China and Robert Gemmill of the European Commission for their helpful insights. However, the author is solely responsible for this paper.



For more information about this document,
please contact the authors:
Xin Wang – xin.wang@iddri.org

Building MRV for a successful emissions trading system in China

Xin Wang (IDDRI)

ABSTRACT	4
INTRODUCTION	5
1. THE EU ETS MRV SYSTEM	5
1.1. Background	5
1.2. Overview of characteristics: what are the key components of MRV?	5
2. ENERGY AUDITS IN CHINA: WHAT CORRESPONDS TO THE MRV REQUESTED FOR THE ETS?	8
2.1. The cleaner production audit	9
2.2. Energy audits under the Top 1 000 Programme	9
2.3. Energy audits at provincial level	10
3. COMPLEMENTARY ISSUES FOR BUILDING A SOLID MRV SYSTEM FOR ETS IN CHINA	10
3.1. From energy to CO ₂ emissions measurement: what complementary elements are needed?	10
3.2. Enhancing human capital for CO ₂ emissions MRV	11
3.3. Publicly available data for research	11
4. CONCLUSION AND REMARKS	11
REFERENCES	13

ABSTRACT

A good monitoring, reporting and verification (MRV) framework is essential to a reliable and efficient emissions trading system (ETS). In the light of this need to provide a solid MRV system for the pilot ETS programmes planned to be implemented by 2013 in China, this paper examines the MRV framework of the EU ETS and the energy audits that were implemented massively during the 11th Five Year Plan (FYP, 2006-2010) in China. It finds first of all that the energy audits use similar procedures to MRV within the EU ETS that could be used as a sound basis upon which to build MRV; second, several complementary studies must be conducted, particularly on CO₂ emissions calculation and capacity building for MRV. Finally, this paper provides some recommendations for developing a solid MRV system in China.

Keywords: MRV, emissions trading, energy audits, China

INTRODUCTION

China plans to progressively implement an emissions trading system (ETS) during the period of the 12th Five Year Plan (FYP, 2011-2015). So far, pilot ETS programmes are under development and would be introduced in two provinces (Hubei and Guangdong) and five municipalities (Beijing, Tianjin, Shanghai, Chongqing and Shenzhen) by 2013. Such market-based instruments provide cost-effectiveness, which corresponds to China's general policy orientation of using more economic instruments to address climate change. This would contribute to China's low-carbon development (LCD), particularly the achievement of energy- and carbon-intensity objectives in the short term during the 12th and 13th FYPs, and would facilitate absolute GHG emissions reduction in the long term.

One of the fundamental issues guaranteeing the successful running of an ETS is its monitoring, reporting and verification (MRV) system. A good MRV system is essential to both the establishment and the functioning of the ETS pilot programmes and the potential nationwide ETS in China. By providing an overview of the MRV system of the EU ETS (so far the biggest ETS in the world) and examining the current statistical system, particularly energy audits in China, this paper aims to demonstrate the feasibility of establishing a solid MRV system for ETS pilot programmes in China, and the need for some additional measures to develop the system. This serves current needs for implementing pilot ETS programmes and could be used as a starting point for further research on detailed MRV plans.

This paper is organised as follows: section 1 explains the essential components of the MRV system for the EU ETS and draws key lessons; section 2 examines current Chinese energy audit systems that have similar frameworks to MRV in the EU ETS; section 3 highlights key complementary studies for

establishing MRV systems in China; and section 4 concludes and gives recommendations on how to associate current energy audits practices with the establishment of MRV systems for the pilot ETS programmes in China.

1. THE EU ETS MRV SYSTEM

1.1. Background

Based on the request of EU Directive 2003/87/EC, the establishment of the EU ETS must be accompanied by a solid and transparent MRV system. During the first phase of the EU ETS (2005-2007), Commission Decision 2004/156/EC, which provided MRV guidelines (henceforth MRG2004) was adopted to provide the necessary MRV service for the EU ETS. As the first phase of the EU ETS ensured information dissemination and collected a wealth of experiences on the functioning and drawbacks of an ETS, related MRV criteria (2004/156/EC) (henceforth MRG2007) were adjusted and published under Commission Decision 2007/589/EC in order to better adapt to MRV needs during the second phase of the EU ETS (2008-2012). The current MRV guidelines will be revised for the next phase of the EU ETS (2013-2020). The guidelines are legally binding upon all Member States of the European Union (EU) (see Art. 14 and 15 of EU Directive 2003/87/EC).

1.2. Overview of characteristics: what are the key components of MRV?

The role of MRV in a full ETS calendar year is illustrated as follows:

- 1 January of year N: the beginning of the EU ETS calendar year;
- 28 February: allocation of quotas to installations;

- 31 March: installations must submit their verified emissions for year N-1 to the competent authority of their country (in accordance with MRV procedures);
- 30 April: installations must surrender allowances equivalent to their emissions (allowances or eligible Kyoto credits);
- 15 May: publication of year N-1 emissions by the European Commission;
- 31 December: end of the EU ETS calendar year.

We now focus on the current MRV guidelines (MRG2007). MRG2007 is provided in the annex of Commission Decision 2007/589/EC. It is composed of a general guideline (44 pages) and eleven guidelines for specific activities (37 pages). Table 1 lists the contents of the general guideline. Table 2 lists the components of specific guidelines of MRG2007. As seen, very detailed instructions are given in order to ensure the smooth functioning of MRV.

In practice, MRV is carried out according to the following steps:

- Each operator of installations develops monitoring plans, which include monitoring methodologies (that differ according to installation types and scale), quality control, etc.
- The competent authority then reviews and approves the monitoring plans. Information regarding each installation must be kept up-to-date and reported to the competent authority for approval.
- Next, the operator may implement the monitoring plans.
- The verifier will examine the operator's report and make an independent site visit before completing a verification report. Unverified or unsatisfactory verification of an operator's annual emissions report will lead to the suspension of CO₂ allowances transferred to the operator (Art. 15 of EU Directive 2003/87/EC).
- The operator will send the verification report together with its annual emissions report to the competent authority (before 31 March, as mentioned above).
- The competent authority makes a final decision on CO₂ emissions for each installation.

MRV is made up of several important components, which are illustrated below. All detailed techniques and requirements for MRV can be found in MRG2007.

Monitoring

Boundaries must be clearly defined from the outset. The monitoring system for an ETS should include all the GHGs traded as emission permits

(CO₂ in the case of the EU ETS). Emissions from both regular operations and abnormal events should be included.

Second, at installation level, MRG2007 defines 14 items to be included in a monitoring plan. These include:

a. Description of the monitored site: description of the installation and activities to be monitored; responsibilities for monitoring; emission sources and streams of each monitored activity;

b. Description of the monitoring method and required data: calculation-based and measurement-based approaches can be chosen by operators.

For the former, the necessary data include:

- activity data;
- emissions factors;
- oxidation factor (for combustion);
- conversion factor (for process emissions);
- tiers (different choices of parameters for CO₂ emissions calculation for installations with different scales. The bigger the installation, the stricter the criteria for accounting for uncertainties);
- fall-back approach (in case of technical difficulty and unreasonable costs);
- transferred emissions.

For the latter approach, the necessary data include:

- tiers;
- sampling rates;
- missing data;
- corroborating calculation of emissions.

c. Justification of uncertainty, description of the procedures for data acquisition, handling and control activities and others.

Reporting

Each operator shall include the above-mentioned information when reporting to the competent authority of his country. The report covers annual emissions for a calendar year in a reporting period. According to Annex IV of EU Directive 2003/87/EC, each country shall take measures to coordinate reporting requirements with any existing reporting requirements in order to minimise the reporting burden.

Verification

Verification should address the reliability, credibility and accuracy of monitoring systems as well as reported data and information relating to emissions. Emissions data using reliable and credible data and information that enable emissions to be determined with a high degree of certainty can be validated with a similarly high degree of certainty.

Table 1. Contents of the general guidelines of MRG2007

Name	Description
Introduction	
Definition	This part provides a very clear definition of the related terms used. Terms are grouped accordingly.
Monitoring and reporting principles	This part outlines principles for ensuring the accurate and verifiable monitoring and reporting of GHGs.
Monitoring of GHG emissions	This part explains boundaries of monitoring; calculation- and measurement-based monitoring; monitoring plan (p.12 of MRG2007).
Calculation-based methodologies for CO2 emissions	Define general calculation formulas (p.13) and data for combustion and process emissions; present tiers (different approaches) for calculating necessary variables for different firms/ installations; fall-back approaches in case of technical/cost constraints;
Measurement-based methodologies	Define the conditions under which an operator can use such methods; Provide further procedures and requirements
Uncertainty assessment	Define the uncertainty assessment procedure for both calculation- and measurement-based CO2 monitoring.
Reporting	Define elements to be reported . (p25)
Retention of information	Related data shall be retained for at least ten years.
Control and verification	Define data control approaches Define verification principles and methods (strategic and risk analysis, verification, (internal) verification report). The session has been revised consistent with other guidelines of major institutions, such as the European Cooperation for Accreditation (EA), the European Committee for Standardisation (CEN) and the International Standardisation Organisation (ISO).
Emission factors	49 fuel types
List of CO2-neutral biomass	
Determination of activity-specific data and factors	Net calorific values and emission factors for fuels; Oxidation factors; Process emission factors, conversion factors, composition data; Biomass fraction; Sampling method and frequency of analysis (p40);
Reporting format	Including identification of installation , activities overview, emissions
Reporting categories	Define emissions reporting format and code (IPCC).
Requirements for installations with low emissions	Set exemptions for small installations (with annual CO2 emissions below 25 000 tonnes)

Source: Commission Decision 2007/589/EC.

Table 2. MRV guidelines for specific activities in MRG2007

Use of guidelines	Contents of guidelines
Activities listed in Annex I of Directive 2003/87/EC	Combustion emissions
Activity-specific guidelines for activities listed in Annex I of Directive 2003/87/EC	Mineral oil refineries
	Coke ovens
	Metal ore roasting and sintering
	Pig iron and steel
	Cement clinker
	Lime
	Glass
	Ceramic products
	Pulp and paper
Others	Determination of GHG emissions by continuous emission measurement system

Source: Directive 2003/87/EC, Commission Decision 2007/589/EC.

The verifier is given access to all sites and installations in order to carry out verification work independently. Throughout the whole verification process, the verifier should determine misstatements and non-conformities.

The verification methodology given by MRG2007 establishes the following procedures for verification:

(1) A verifier should conduct *strategic analysis*, which includes:

- Verifying whether the monitoring plan has been approved by the competent authority;
- Verifying whether this plan is the right version;
- Understanding each activity performed by the installation;
- Understanding the monitoring plan;
- Applying the materiality level for different CO₂ emissions levels of installations.

(2) *Risk analysis* must be conducted. A site visit may be made when necessary. Risk analysis is composed of:

- Analysing inherent risks and control risks related to the scope and complexity of the operator's activities and emissions sources and source streams, which could lead to material misstatements and non-conformities;
- Making a verification plan, which includes:
 - A verification program;
 - A data sampling plan indicating which data must be tested in order to form a verification opinion (materiality level defined above).

(3) A *verification process* will be initiated. The verifier should conduct site visits when appropriate in order to:

- Inspect the operation of meters and monitoring systems;
- Conduct interviews;
- Collect sufficient information and evidence.

Furthermore, the verifier must request the operator to provide any missing data.

(4) An *internal verification report* will be prepared at the end of the verification process. Based on the contents of this report, the verifier will check all elements/criteria for the final report.

(5) The verifier will provide a *verification report* to the operator, who will submit it together with his annual emissions report to the competent authority. The non-material non-conformities and non-material misstatements are key elements determining the final decision of the verifier.

The contents of the verification report include:

- Verification methodology;
- Findings;
- Verification opinion.

These reports (monitoring and verification) do not constitute the basis for the quota of the following year's allowances. However, the verified emissions figure does provide the basis for the number of allowances that the operator needs to surrender to avoid a civil penalty (€100/t for every tonne of CO₂ not surrendered). The verified report may serve as the basis for establishing the need for a site inspection by the competent authority.

The frequency of verification varies according to the verifier's risk analysis for a particular installation in the given year. More than one site visit may be required or justified each year (sometimes to witness different processes or to interview different people), but a single site visit is most common. However, the single site visit to a large complex installation may take more than one day.

The nature of site visits also varies among Member States. Some set a mandatory site visit requirement and some only allow this site visit requirement to be waived in exceptional circumstances. Others rely totally on the risk analysis. Some allow waiver of the site visit in the case of installations involving low emissions (less than 25 000 tCO₂ emissions per year).

We have so far provided an overview of MRV system of the EU ETS. As seen, the MRV system advances together with the EU ETS and is conducted made by balancing accuracy and costs. Key features of such a MRV system can be given: first, the monitoring requirements may differ (slightly) according to the various phases of an ETS; second, the MRV system can be improved and adjusted progressively with the development of the ETS; third, a fall-back approach should be prepared in case of difficulties (or unreasonably high costs) for ensuring standard MRV methodologies; fourth, MRV guidelines and examples for companies must be provided before the implementation of the ETS. The following sections will examine the Chinese contexts by assessing whether such key features of MRV can be applied in order to ensure a successful implementation and functioning of ETS in China.

2. ENERGY AUDITS IN CHINA: WHAT CORRESPONDS TO THE MRV REQUESTED FOR THE ETS?

China has improved its general statistical performance in recent years, which will no doubt facilitate the establishment of an MRV system. In

particular, energy audits have been introduced through different policies or (pilot) programmes over the last 10 years. Energy audits follow a recommended (voluntary) standard, the General Technical Principle of Enterprise Energy Audit (GB/T 17166-1997), and are defined¹ as follows: “the companies concerned conduct inspections, examinations and analysis of the physical and financial procedures of energy use based on related laws, regulations, standards and norms, etc.” This kind of audit requires the companies in question to follow sets of standards that are similar to MRG2007 for the EU ETS, and are therefore worthy of detailed examination.

2.1. The cleaner production audit

The cleaner production audit was introduced by the *Cleaner Production Promotion Law* (effective as of 1 January 2003) and implemented by the *Interim Measures for Clean Production Audits* published in 2004. The audit is mandated at least once every five years and mainly aims at reducing environmental pollution by major polluting companies. However, it also targets industrial processes and systems causing pollution through the use of energy and the operation of energy systems (Shen et al., 2010). Participants in this audit will have to provide raw material and energy balances (as well as meeting other demands of cleaner production audits). During the 11th FYP (2006-2010), such auditing was introduced for companies that had failed to meet energy-saving and pollution-reduction targets (State Council, 2007).

Local environmental protection bureaus supervise the cleaner production audits, which can be performed by the companies themselves, local cleaner production centres, industrial associations or qualified engineering firms. According to Shen et al. (2010), at least 10,000 companies (including major energy-intensive and power industries) had performed cleaner production audits by the end of 2008.

2.2. Energy audits under the Top 1 000 Programme

The Top 1,000 Energy-Consuming Companies Programme² (hereafter known as the Top 1,000 Programme) was introduced in 2006 as one of the important initiatives for achieving the

energy-intensity target during the 11th FYP. This programme includes the 1,008³ largest energy-intensive companies, which accounted for one third of China’s total energy use and almost half of industrial energy use in 2004 (NDRC, 2006a). Targeted companies are asked to commit to performing energy audits and to developing energy-saving plans. So far, there are several documents guiding these energy audits, including:

- *The Guide to the Enterprise Energy Auditing Report*;
- *Enterprise Energy Conservation Plan Auditing Report*;
- *Basic Knowledge of Energy Auditing and Analysis of Energy Conservation Potential and Manual of Energy Management Software for Enterprises* along with a series of textbooks and published energy auditing report templates for nine major industries. (These were distributed during two energy auditing workshops that were held in Beijing in late 2007);
- *Evaluation Guide for the Enterprise Energy Auditing Report and the Enterprise Energy Conservation Plan Report*;
- Energy auditing software, developed by the China Energy Conservation and Monitoring Information website (<http://www.cecs.gov.cn/>).

Energy audits required by the Top 1 000 Programme are performed in a similar way to the MRV requirements listed in MRG2007. However, mandatory energy audits are only required once for the companies involved in the Top 1,000 Programme, unless they fail to pass the government review. Major components of the energy audit include (NDRC, 2006b):

- Energy consumption analysis for the company;
- Examination of the energy measurement and reporting system;
- Assessment of the operational efficiencies of equipment;
- Evaluation of energy use indicators of products and production;
- Plan of efficiency improvement measures.

In terms of elements required by the **monitoring** process, the following data are collected under energy audits (Shen et al., 2010):

- General information about the company;
- Specific information about the energy system and energy-consuming equipment;
- Company energy consumption and balance:
 - Fuel types;
 - Level of energy use;

3. Which later became 938 companies due to merger or cessation of business.

1. In Chinese: 企业能源审计就是审计单位根据国家有关的节能法规法律、技术标准、消耗定额等，对企业能源利用的物理过程和财务过程进行的监督检查和综合分析评价..

2. There are a number of literary references that clearly describe the Top 1,000 Programme (for example, Price et al., 2010, 2008; Shen et al., 2010; Dai, 2007; Feng, 2007).

- Types of energy use;
- Energy procurement;
- Energy costs, etc.;
- Company energy management system;
- Actual measurement of the operational performance of energy systems and energy-consuming equipment, accuracy of energy measurement and monitoring devices.

In terms of **reporting**, both the template (samples) and recommendations for the energy audit reporting are provided by NDRC (NDRC, 2006b, 2006c). Under the Top 1,000 Programme, targeted companies are requested to submit a detailed energy audit report (together with their energy saving plans) to NDRC. Local authorities (in charge of energy conservation) review all submissions related to energy audits in their administrative region and then submit these to NDRC within a period of no more than six months. Companies that fail to pass the evaluation of their submission to NDRC will have to resubmit within three months (NDRC, 2006a, 2006b). The detailed reporting process is described by Shen et al. (2010).

In terms of **verification**, an expert team is organised in different governments to evaluate and verify energy audit reports. However, local verifiers organise random compliance audits in at least 10% of all companies concerned in their regions.

2.3. Energy audits at provincial level

Alongside the Top 1,000 Programme, similar programmes have been implemented at provincial level for key companies in the region in order to assist them in achieving their energy targets (Shen et al., 2010). Energy audits (as well as the submission of audit reports) were therefore conducted within companies that consume less energy than those included in the Top 1 000 Programme. In terms of MRV, energy audits for local programmes usually follow the same line as energy audits under the Top 1 000 Programme. Table 3 shows the types and number of companies required to perform energy audits in Beijing and Shanghai during the 11th FYP.

Table 3. Companies required to perform energy audits at local level

	Annual energy consumption of companies under energy audits (tce)	Number of companies under energy audits (excluding companies in Top 1 000 Programme)
Beijing	20 000 or above	50
Shanghai	10 000 or above	359

Source: Shen et al. (2010), based on data from local energy conservation centres in China.

3. COMPLEMENTARY ISSUES FOR BUILDING A SOLID MRV SYSTEM FOR ETS IN CHINA

Energy audits constitute a very important and positive basis upon which the MRV system can be developed for ETS programmes in China. There are, however, several insufficiencies that are key areas to be completed during the next stage of work in order to build a solid ETS MRV system.

3.1. From energy to CO₂ emissions measurement: what complementary elements are needed?

Energy audits only collect energy consumption and management data. In order to provide CO₂ emissions data at installation level, new factors must be added based on energy audits. These include:

- CO₂ emissions factor;
- Oxidation factor for combustion CO₂ emissions;
- Conversion factor for process CO₂ emissions, etc.

So far, there are several insufficiencies based on CO₂ emissions monitoring in China. First, a number of these variables are obtained based on surveys or taken directly from IPCC's default value, thus leading to an unsatisfactory degree of representativeness. This will reduce the accuracy of figures for CO₂ emissions at installation level. Second, there are a number of statistical incompatibilities between Chinese and IEA (international) standards. This may not affect the accuracy of MRV but will impact data comparability between China and other countries. For example, the fossil fuel energy types in China's statistical work include fewer than 20 types of fossil fuels (including biomass), while the IPCC guideline (IPCC, 2006) includes more than 50 types of fossil fuels whose combustion (oxidation) will generate CO₂ emissions.

However, the current statistical parameters can be used for a fast-start MRV system and can be progressively improved by further elements. Here, the sectoral GHG inventory programmes underway are worth highlighting. These programmes were launched in March 2009 in China, aimed mainly at complying with the Second National Communication to the UNFCCC to be completed before 2012. So far, there is no detailed information on the contents of these GHG inventories. However, integrating fundamental requirements for an ETS MRV system – especially detailed CO₂ emissions sources and data – into the ongoing research on GHG inventories will no doubt contribute to the smooth functioning of the MRV system.

3.2. Enhancing human capital for CO₂ emissions MRV

There is a lack of manpower for energy statistics in China (Yu, 2010; Niu, 2007). At company level, some firms do not have specific employees in charge of (energy) statistics, which are usually calculated by site managers who lack sufficient statistical knowledge. At county level, there are no energy statistics units for certain counties. At city level, the people in charge of energy statistics are sometimes also responsible for other newly added statistical categories.

Consequently, this affects the quality and accuracy of MRV work. First, in terms of monitoring and reporting for existing programmes on energy conservation, reporting relies on self-assessment by companies and local government. For example, for the Top 1,000 Programme, some companies had the expertise to conduct energy audits, but many others encountered difficulties due to the lack of qualified auditing personnel and had to hire outside experts for assistance (Lu, 2006). In China, such outside experts include private consulting firms, energy service companies, provincial energy conservation centres and the China Energy Conservation Association (CECA). However, the technical expertise and abilities of these organisations vary considerably, with some being highly skilled in energy auditing and others needing significant training (Price et al., 2008). Second, in terms of verification, only about 10% of key companies are spot-checked by central authorities, mainly due to the lack of statistical human capacities. Such a level of coverage is unsatisfactory for the smooth functioning of the ETS, whose efficiency and liability depend largely on the verification of reported CO₂ emissions.

A sufficient number of authorised people/institutes is necessary for effective MRV. Current institutes in charge of energy audits will need to enhance their human capital in order to meet the

MRV requirements. Training programmes are also crucial once the MRV standard is written and in order to guarantee the certification of companies or organisations eligible to perform MRV. Here, the Energy Saving Unit Audit Organization authorised by MOF and NDRC for the energy saving subsidy programme, the Energy Conservation and Supervision Centres (alternatively known as the Energy Conservation Centre) and local associations conducting audit practices can play a contributory role.

3.3. Publicly available data for research

So far, the publicly available data at both national and provincial levels (such as the Statistical Yearbook and the Energy Statistical Yearbook at national level and local/provincial statistics bureaus) does not provide sufficient information on the number and scale of installations or their energy consumption by type. Such information can very probably be obtained from statistical institutions as well as from sector associations, which have a semi-official role and participate in data reporting in China. However, the lack of data availability constitutes a barrier to public research on ETS in China.

4. CONCLUSION AND REMARKS

Comparing the MRV system for the EU ETS and the energy and clean production audits carried out at central and local levels in China during the 11th FYP (2006-2010), we find that current practices for energy audits provide a solid framework, similar to the MRV system in the EU ETS, despite remaining insufficiencies in general statistical performance. This provides a positive support for the short-term implementation of the pilot ETS in China. Based on such energy audits, the MRV system can be designed separately by completing the current energy audit system in China. Some key complementary work may include:

- Completing required data and parameters for CO₂ emissions calculation and monitoring (e.g. oxidation factor, carbon contents, etc.);
- Determining verification frequency and assigning verifiers;
- Deciding how and to whom the verification report and monitoring report will be submitted (e.g. separate submissions);
- Calculating the cost for operators' compliance with MRV in order to set different levels of MRV stringency for companies of different sizes, etc.

Some initial remarks on building the MRV system may be useful for a short-term implementation

of pilot ETS programmes in selected municipalities and provinces.

First, the monitoring requirements may differ slightly according to the various phases of an ETS. For the preparatory stage of the implementation of the ETS, monitoring requirements will depend on the mode of emissions permit allocation. In the case of grandfathering, which particularly aims to reveal information for the better functioning of the ETS in the future, the data mentioned above will be essential in order to calculate historical emissions and to determine the amount of permits allocated to each installation. In the case of permit auctioning, it is not necessary to have data for the calculation of the historical emissions of each installation. However, after the implementation of the ETS, the data mentioned in section 1 will be vital.

Second, the MRV system can be improved and adjusted progressively with the development of the ETS. For example, comparing MRG2007 and MRG2004 (the MRV system used during the first phase of the EU ETS), reference emission factors and reference net calorific values have been extended and updated using information from the 2006 Guidelines of the Intergovernmental Panel on Climate Change. More price definitions were added in MRG2007. A detailed comparison of both MRV systems can be found at the European Commission's Answers to FAQ⁴.

Third, a fall-back approach should be prepared in case of difficulties (or unreasonably high costs) for ensuring standard MRV methodologies. Such an approach has been provided without compromising accuracy for specific or complex installations where general standards of CO₂ emissions monitoring cannot be applied in MRG2007.

Fourth, MRV guidelines and examples for companies must be provided before the implementation of the ETS. Such issues have been discussed on the European Commission's website in order to facilitate and simplify their monitoring and reporting actions⁵. The development of an MRV system for pilot ETS programmes in China can use such EU documents as an example and adjust them according to specific Chinese contexts.

Finally, two options may be considered in terms of MRV capacity of companies which will be included in pilot ETS programmes: first, if pilot ETS programmes are implemented in currently selected municipalities and provinces, the companies (having one or several installations) that have already conducted energy/clean production audits under the above-mentioned programmes can be included. Second, and alternatively, the ETS pilot programme can be introduced in the next phase of the Top 1,000 Programme, of which the companies involved represent a significant share of CO₂ emissions. ■

4. Available at http://ec.europa.eu/clima/documentation/ets/docs/monitoring/mrg2faq_sep_2007.pdf.

5. For example, see http://ec.europa.eu/clima/policies/ets/monitoring_templates_en.htm.

REFERENCES

- IPCC, 2006, Guidelines for National Greenhouse Gas Inventories, IPCC <http://www.ipcc-nggip.iges.or.jp/public/2006gl/index.html>
- National Development and Reform Commission (NDRC), 2006a. Implementation of Top-1000 Enterprise Energy Conservation Action Plan, No.571 [2006], April 7, 2006. http://hzs.ndrc.gov.cn/newzwxw/t20060413_66111.htm
- National Development and Reform Commission (NDRC), 2006b. Guide on Reviewing Enterprise Energy Audit Report and Energy Saving Plan, December 6, 2006. http://www.ndrc.gov.cn/hjbh/hjjsjyxsh/t20061211_98547.htm
- National Development and Reform Commission (NDRC), 2006c. Reference Cases of Enterprise Energy Audit Report and Energy Saving Plan, November 15, 2006. http://www.ndrc.gov.cn/hjbh/hjjsjyxsh/t20061115_93465.htm
- Niu, H.B., 2007, Several reflections on energy statistics, Zhejiang Statistics 2007(2), pp.32-33. (in Chinese)
- Price, L., Wang, X., Yun, J., 2008, China's Top-1000 energy-consuming enterprises program: reducing energy consumption of the 1000 largest industrial enterprises in China, LBNL Paper, LBNL-519E.
- Shen, B., Price, L., Lu, H., 2010, Energy audit practices in China: national and local experiences and issues, LBNL Paper, LBNL-4159E.
- State Council, 2007, Notice about the Issuance of Comprehensive Energy Saving and Pollution Reduction Work Plan, June 3, 2007. http://www.gov.cn/jrzq/2007-06/03/content_634545.htm
- Yu, M., 2010, Energy statistics at town level, *Manager Journal*, 2010(01), p.348 (in Chinese)

Building MRV for a successful emissions trading system in China

Xin Wang (IDDRI)

IDDRI'S PUBLICATIONS

- What are the key issues to be addressed by China in its move to establish Emissions Trading Systems? E. Bellevrat. *Working Papers* N°17/2011, IDDRI.
- Climate-related policies in India and China: current state and prospects. E. Bellevrat. *Working Papers* N°20/2011, IDDRI.
- Chinese renewable energy and technology policies: Legal compatibility with WTO rules & Economic interactions with other countries' climate and industrial policies. E. Guérin & J. Schiavo. *Idées pour le débat/Working Papers* N°02/2011, IDDRI.
- Getting the carbon price right through climate border measures: A Chinese perspective. T. Voituriez & X. Wang. *Climate Policy* 11 (2011) 1257-1261.
- An analysis on the short-term sectoral competitiveness impact of carbon tax in China. X. Wang, J.-F. Li, Y.-X. Zhang. *Idées pour le débat/Working Papers* N°03/2010, IDDRI.
- Post-2012 Climate Change Agreement: Why MRV is important. M. Wemaère. *Idées pour le débat/Working Papers* N°07/2009, IDDRI.

Publications available online at : www.iddri.org

The Institute for Sustainable Development and International Relations (IDDRI) is a Paris and Brussels based non-profit policy research institute. Its objective is to develop and share key knowledge and tools for analysing and shedding light on the strategic issues of sustainable development from a global perspective.

Given the rising stakes of the issues posed by climate change and biodiversity loss, IDDRI provides stakeholders with input for their reflection on global governance, and also participates in work on reframing development pathways. A special effort has been made to develop a partnership network with emerging countries to better understand and share various perspectives on sustainable development issues and governance.

For more effective action, IDDRI operates with a network of partners from the private sector, academia, civil society and the public sector, not only in France and Europe but also internationally. As an independent policy research institute, IDDRI mobilises resources and expertise to disseminate the most relevant scientific ideas and research ahead of negotiations and decision-making processes. It applies a crosscutting approach to its work, which focuses on five threads: global governance, climate change, biodiversity, urban fabric, and agriculture.

IDDRI issues a range of own publications. With its *Working Papers* collection, it quickly circulates texts which are the responsibility of their authors; *Policy Briefs* summarize the ideas of scientific debates or issues under discussion in international forums and examine controversies; *Studies* go deeper into a specific topic. IDDRI also develops scientific and editorial partnerships: among others, *A Planet for Life. Sustainable Development in Action* is the result of collaboration with the French Development Agency (AFD) and The Energy and Resources Institute (TERI), and editorial partnership with Armand Colin.

To learn more on IDDRI's publications and activities, visit www.iddri.org

IDDRI



SciencesPo.

www.iddri.org