



EU-China CDM Facilitation Project

**Regional Workshop Report**

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## Abbreviations

CDM	Clean Development Mechanism
CERs	Certified Emission Reductions
CPAs	Programme Activities
DOE	Designated Operational Entities
DNA	Designated National Authorities
EB	Executive Board
EU	European Union
GDP	Gross Domestic Product
GHG	Greenhouse Gas
IGCC	Integrated Gasification Combined Cycle
MEP	Ministry of Environmental Protection
MOST	Ministry of Sciences and Technology
NDRC	National Development and Reform Commission
NXCDM	Ningxia CDM Service Center
PCDM	Programmatic Clean Development Mechanism
PDD	Project Design Document
PoA	Programme of Activities
PRCEE	Policy Research Center for Environment and Economy
TRT	Blast Furnace Top Gas Recovery Turbine Unit

## **1 Introduction**

EU-China CDM Facilitation Project aims to strengthen the Clean Development Mechanism (CDM) as a central pillar within China's path to sustainable development. One of the key objectives of the EU-China CDM Facilitation project is to "increase awareness of wider stakeholders in the EU and China about CDM opportunities and reduce barriers to CDM development, thereby increasing the number and scope of potential CDM projects in China". As part of the activities aimed at wider stakeholders, the Project is implementing 10 regional workshops over the duration of the Project.

The number of regional CDM service centres in China has been growing steadily over the past years and the actual development and implementation of CDM projects are carried out at regional level in various sectors. Yet despite this, the NDRC has confirmed that many provincial-and city level authorities are not yet fully aware of CDM opportunities. As a result authorities do not take into account additional financial resources that CDM can deliver. For that reason some projects are not implemented at all or with inferior technology and technical expertise than would be possible with additional revenue streams from CDM. Moreover, the regional small and medium industries with potential CDM opportunities do not have full access to updated information on the progress of national policies in this area. The understanding of CDM at local level often remains insufficient or incorrect. So far the lack of awareness and information reduces the potential of CDM development in China and decreases the quality and quantity of projects. In addition there is a need to improve exchange of information between international investors and local project owners, especially in less developed regions where the relevant information is not easy to access. Based on the stakeholder need assessment, the regional workshops are one of the key components designed to be implemented in 10 different regions in China, with the aim to reach the wider stakeholders at local level, to disseminate updated and practical knowledge, to identify region specific CDM opportunities and challenges, and to raise awareness of potential CDM development.

In total, 10 regional workshops have been implemented in Yunnan, Hubei, Heilongjiang, Shanxi, Ningxia, Jiangsu, Hebei, Xinjiang, Sichuan and Hunan Province. The report first provides a review of the regional workshops and introduces the topics discussed and the main participants. The workshops in general functions as an information platform for not only disseminating knowledge and expertise from national and international level to regional level, but also collecting feedbacks through open discussion and follow-up communication with regional stakeholders.

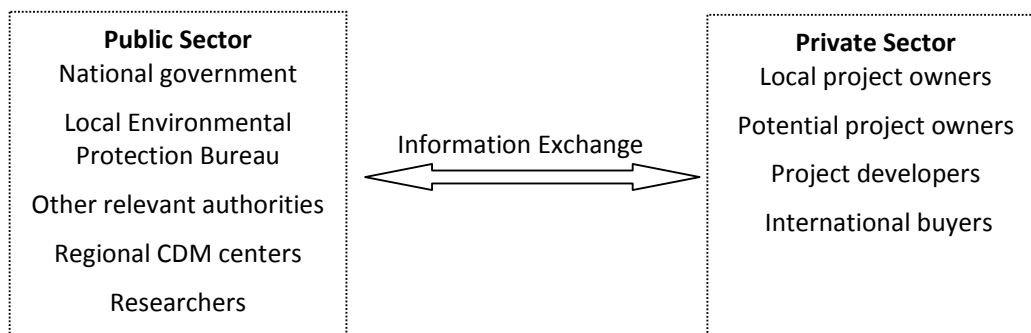
### **1.1 Organisation**

Since November 2007 till January 2009, in total 10 regional workshops were carried out by the EU-China CDM Facilitation Project consortium. The 10 regional workshops were organised by Policy Research Centre for Environment and Economy (PRCEE) of Ministry of Environmental Protection (MEP) in collaboration with Swedish Environmental Research Institute (IVL), DEVELOPMENT Solutions (DS) and with great support from China National Development and Reform Commission (NDRC), provincial and autonomous regional Environmental Protection Departments, Policy and Technology Development centres, CDM service centres and relevant local organisations in Yunnan, Hubei, Heilongjiang, Shanxi, Ningxia, Jiangsu, Hebei, Xinjiang, Sichuan and Hunan Province.

## 1.2 Participant Structure

The workshops target wider stakeholders in both the public and private sectors as shown in Figure 1-1. The participants mainly included official representatives at both national and local levels, selected regional CDM centres, local project owners and potential owners, project developer, researchers and the international buyers.

Figure 1-1: Workshop participants



The regional workshops were structured to facilitate both top-down information dissemination and bottom-up information collection. The national government and researchers provide updated information on CDM policy and future development. Experienced project developers and international buyers disseminated hand-to-hand practical expertise in order to facilitate and encourage local authorities and industries to engage in CDM-project cooperation. Local project owners and potential owners were actively involved in the workshops and discussions. Barriers to CDM development, Q&A, key concerns and needs from ground level were therefore discussed and partly solved on site.

## 1.3 Key policy & technical issues addressed

The regional workshops were designed based on the technical capacity and needs of the region's stakeholders. The contents of the workshops include both general issues of CDM in China and the regional specific topics.

The general issues addressed in the workshops included:

- The principle of CDM
- Management of CDM projects in China<sup>1</sup>
- The development of the Chinese CDM market<sup>2</sup>
- CDM methodologies
- CDM and domestic Energy Conservation/Emission Reduction Programme<sup>3</sup>
- Programmatic CDM and its potential application

The regional CDM service centers mainly presented the development status of regional CDM and

<sup>1</sup> See CDM Policy Improvement report ([www.euchina-cdm.org](http://www.euchina-cdm.org))

<sup>2</sup> See The Pre-2012 CDM Market in China ([www.euchina-cdm.org](http://www.euchina-cdm.org))

<sup>3</sup> See CDM Policy Improvement report ([www.euchina-cdm.org](http://www.euchina-cdm.org))

identified potential areas for CDM development.

## 2 The Regional Workshops



### 2.1 Yunnan

On November 12th 2007, the EU-China CDM Facilitation Project completed the first regional CDM workshop in Kunming, Yunnan. The Yunnan workshop is the first of a series of 10 regional workshops aimed to provide local stakeholders with knowledge and training on different aspects of CDM. More than 100 local government officials, Yunnan CDM Technical Service Centre staff, CDM project owners and developers attended. High level officials from Ministry of Environmental Protection, National Development and Reform Commission, and Yunnan Provincial Science & Technology Department presented at the workshop.

#### a) Background in Yunnan

Yunnan Province is located at the Southwest China, with various climate types and complex geological features. The natural resources such as water, biomass, and coal are widely distributed in Yunnan Province. The water resource in Yunnan counts the second in the country, with the huge potential of hydropower development. The black coal reserve ranks top in the country. And the potential of biomass, solar, and wind resource utilisation is also promising. The rich resource of renewable energies provides the unique natural condition for the CDM development in Yunnan.

At the production side, the focus in Yunnan is to improve energy efficiency, safety production and sustainable development through the adoption of the new technologies. The clean production concept has been promoted in key sectors such as metallurgy, chemical industries, construction materials such as

cement and steel industry and coal production. The deployment of renewable energy has also been integrated into the social development strategies.

#### b) CDM development in Yunnan

The CDM projects in Yunnan mainly cover 4 types, including small-hydro power plants, biomass energy utilisation, wind power development, and industrial energy efficiency improvement.

The hydro-power resource in Yunnan is abundant; with the capacity of economically feasible hydro power around 98 GW which counts for one quarter of the total hydro power capacity in China, and the annual power generation capacity of 471 GWh. The hydro resources are mainly distributed in the Northwest of Yunnan province, where the upstream of big rivers such as Yangtze and Mekong is located. The potential for small-hydro CDM is huge, especially for supply side projects. The development of small-hydro power CDM is therefore the key area in Yunnan.

The climate and natural condition in Yunnan is favourable for several types of bioenergy crops, such as *Jatropha curcas*. The development of bioenergy industry especially bioethanol and biodiesel production has been identified as one of the key development strategies in Yunnan, according to the Development Programme of Bioenergy Industry in Yunnan. In the future, the bioenergy development is expected to be integrated with CDM as a key component.

Wind power projects in China have been widely developed as CDM projects due to the relatively mature technology, low development risks, and relatively simple application of CDM methodology. According to the national wind power development plan, the capacity of wind power will reach 30 GW by 2020 in entire China, with 150 MG of capacity developed in Yunnan province. The wind resource in Yunnan is now under evaluation, and 3 best and 2 good development zones are identified. The first phase of Dali wind power plant has been launched, with a designed capacity of 30.6 MW.

The mid- and east of Yunnan including Kunming, Qujing, Yuxi etc is the central area for industries. The large scale steel, cement and fertilizer producers are located in this region. The energy efficiency improvement and other projects focusing on the demand side approaches have potentials to contribute to CO<sub>2</sub> emission reduction. Therefore the CDM projects in this region will most likely be focused on industrial energy efficiency improvement and energy conservation.

## **2.2 Hubei**

The second regional workshop of EU-China CDM Facilitation Project was held in Wuhan, Hubei Province on March 3<sup>rd</sup> 2008. The workshop was locally supported by the Hubei Provincial Service Center for CDM. Official from the European Delegation to China and Mongolia; National Development and Reform Commission (NDRC) and the Ministry of Environmental Protection (MEP) attended the workshop and participated in the opening ceremony. Approximately 80 local officials, service centre staff and project developers attended the event. The workshop focused on the current situation in China for CDM and its future developments, CDM methodologies and their applicability in Hubei and CDM project implementation best practices.

#### a) Background in Hubei

Hubei province is located in the mid-south area of China, along the mid-stream of Yangtze River, and on the north of Dongting Lake. The province is surrounded by mountains in the west, north and east, and the Hanjiang Plain in the south and middle region. Water resources are abundant in this region. The main streams such as Yangtze River and Hanjiang River mix with other small rivers and lakes, and together it

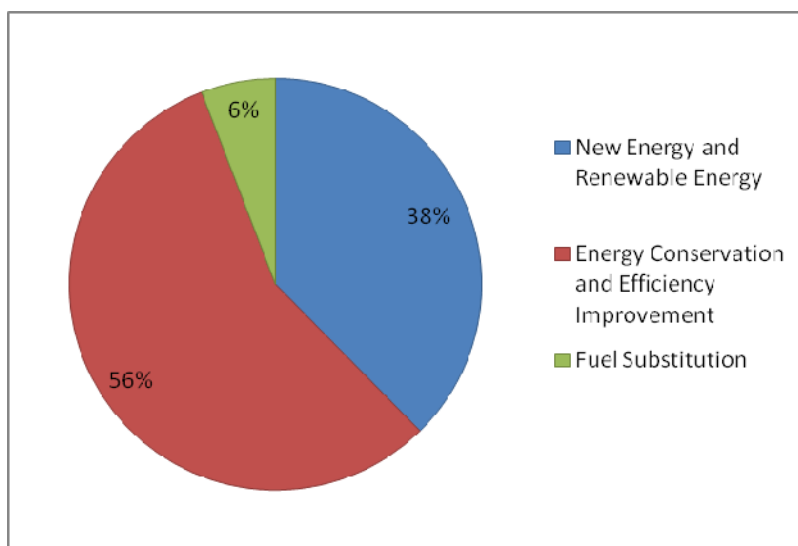
forms a sophisticated water network. The water area constitutes a substantial part of the regions total area. In Wuhan, the capital of Hubei province for example, the water area constitutes 25.6% of the total urban area (highest proportion water area of all cities in China). The average annual temperature is between 15 to 17 °C, while the summer can be extremely hot. The main agriculture area on the Hanjiang Plain often suffers from flood at late spring. During the 1990s the area was flooded on three different occasions, which is much more frequent than normal. At the same time, the area is also more and more frequently subject to draught. The impact of climate change on this region has been intensified in the recent years.

Hubei is an important industrial base in China and the industry in this region is relatively mature. The 10 most dominant industrial sectors, but with potential for further development, have been identified, including steel production, machinery, car manufacture, petrol and chemical industry, textile and package production, etc. The fast developing industries furthermore provide huge potential for CDM market.

#### b) The CDM development in Hubei

To date, there are 44 CDM-projects in Hubei approved by DNA, with expected annual CERs around 6 million tons of CO<sub>2</sub> equivalent. Among these projects, there are 27 new energy and renewable energy projects, with annual emission reduction of 2.25 million tons of CO<sub>2</sub> equivalent; and 16 energy conservation and energy efficiency improvement projects, with annual emission reduction of 3.38 million tons of CO<sub>2</sub> equivalent and 1 fuel substitution project (see Figure 2-1).

**Figure 2-1 CDM in Hubei by Expected CERs (thousand tons of CO<sub>2</sub>equivalent)**



The potential for CDM-project development in Hubei is also estimated to be huge. The future CDM development will most likely focus on the three project categories: small-hydro power, methane utilisation and industrial energy conservation. Approximately 150 to 200 projects show promising potential, with annual emission reduction over 10 million tons of CO<sub>2</sub> equivalent.

### **2.3 Heilongjiang**

The third regional workshop, co-organised by the EU-China CDM Facilitation Project Team, the Bureau of Environmental Protection and CDM Technology Service Centre of Heilongjiang Province, was held on 17 April in Harbin, Heilongjiang Province. Official representatives (national as well as provincial) as well as a representative from the EU Delegation in China attended the Workshop. In addition, over 100 participants from the business sector, academia and local authorities attended the event. In addition to the ongoing structural development in the local industry, Heilongjiang Province has great potential for CDM growth in the fields of biomass, waste heat utilisation and energy efficiency. As of January 2008, 17 CDM projects from Heilongjiang had been approved by the NDRC and 5 wind power projects had been registered with the CDM Executive Board.

#### **a) Social economic background in Heilongjiang**

Heilongjiang Province, with an area of 454,000 square kilo meters and a population of 38.2 million, is located in Northeast China. Agriculture is one of the key sectors of Heilongjiang. The four main food products are rice, corn, wheat and soy bean. In 2007, the annual food production was near 40 million tons, which contributed greatly to the food security in China.

Forestry used to be the main sector in Heilongjiang province as well. Under the current national forest conservation programme, the target was shifted from forest production to reforestation. By the end of 11th 5-year plan, the forest coverage is expected to reach 47% from the current 43.6%.

Main industrial outputs include coal, oil, natural gas, chemicals, cements, steel, industrial boils and machinery. In 2007, the annual GDP growth in the industrial sector was 15.8%. Conventional energy production constitutes a major part of the industrial sector in Heilongjiang. Daqing oil field, one of the oldest oil fields in China, is located in this region. Coal is the second most abundant resource in this region

with large coal mines mainly distributed in Jixi, Hegan, Shuangyashan, and Qitaishan; while smaller coal mines are scattered all over the region.

In recent years, the renewable energy sector has developed quickly. The wind power capacity is already over 180MW. Biomass energy has also developed quickly. At the same time, the national energy conservation and emission reduction programme has been implemented in Heilongjiang. The energy consumption/per 10 000 GDP is expected to be reduced 4% compared to the former year. A pollution prevention and treatment project has been initiated in Songhuajiang watershed, which suffered from serious chemical pollution in the past years.

#### b) CDM in Heilongjiang

Currently, wind power plants dominate the CDM projects in Heilongjiang while other industries and project types also have strong CDM-potential. Until the end of February 2008, NDRC has approved 17 CDM projects from Heilongjiang Province, which include 11 wind power projects, 4 biomass power plant projects, 1 waste heat power generation on cement project and 1 small-hydro power project. Until January 28, 2008, 5 wind power projects have been registered by EB.

Apart from the current wind power CDM projects, other areas that are considered to have huge potentials in developing CDM include the energy conservation and energy efficiency improvement, new energy and renewable energy, coal bed methane recovery, and reforestation projects.

According to the provincial 11<sup>th</sup> 5-year plan, the energy conservation targets were set as to reduce 20% of the energy consumption/per 10 000 GDP by 2010, based on the 2005 level. In the industrial sector, the energy consumption per unit added value was to be reduced 25%. To achieve these ambitious targets, a series of energy conservation demonstration projects have been implemented in Heilongjiang. These projects are expected to be integrated into CDM and to reduce the energy conservation costs.

The Long-term plan of the power sector in Heilongjiang shows that the electricity generation source structure by 2010 will be: 80% coal, 15% hydro, and 5% wind, solar and biomass. Until the end of 2006, the coal-based power plants constitute 93%, hydro power plants 6% and wind farms only 0.4% of total capacity in the province. The potential for renewable energy is substantial, which i.e. also mean substantial CDM-development opportunities.

In the major coal mine areas, the plan and target for coal bed methane recovery has also been set. By 2010, 6 billion M<sup>3</sup> of coal bed methane is expected to be produced and used for power generation and household gas. By 2020, 15 billion M<sup>3</sup> of coal bed methane is expected to be produced and used in order to supply gas to 0.3 million households and 6 power plants.

Additionally, Heilongjiang Province is the most important state-owned forest area and the no. 1 producer of timber. The current forest coverage is 43.6% and the total timber volume 1.5 billion M<sup>3</sup>. The 7<sup>th</sup> national forest resource survey shows the forest areas have increased 1.7 million ha, and timber volume have increased 0.16 billion M<sup>3</sup> in the past five years. In the 11<sup>th</sup> 5-year plan, the forest coverage is targeted to increase by 47%. Reforestation and afforestation could also be integrated with CDM, and promote the regional CDM development.

## 2.4 Shanxi

On 31st July 2008, the fourth regional workshop was held in Jinzhong City, Shanxi Province. The workshop was co-organised by the EU-China Facilitation Projects and Shanxi Environmental Protection Bureau. The opening ceremony was hosted by Mr. Ren Yong, Deputy Director General from Policy Research Centre for Environment and Economy of Ministry of Environmental Protection. More than 100 people from different organizations participated in this workshop, including representatives and experts from project consortium as well as Shanxi Air CDM Technique Centre, other scientific research institutes and companies. The representative from Environmental Protection Bureau of Shanxi Province presented the development status of CDM projects in Shanxi, an analysis of the local CDM market, and identified potential CDM development in Shanxi.

On 1st August 2008, a follow-up meeting was held for discussing CDM related issues. About 30 people from relevant administrative departments, companies as well as representatives from EU-China CDM Facilitation Projects participated in the meeting. The discussion and communication were focused on CDM projects development, implementation, trade and relevant policies.

### a) Climate change in Shanxi

Shanxi Province is located in the north of China. The impact of climate change is becoming more and more apparent in Shanxi, with the observation of continuously increased annual temperature and more frequent extreme weather. According to the meteorological records from 18 local meteorological observation stations in Shanxi, the annual average temperature is increasing since 1960s. The temperature rise is apparent since 1980s. "The Climate Change Impact Assessment on Shanxi 2007"<sup>4</sup> shows that the annual average temperature in 2007 was 10.7 °C, which was 1.3 °C higher than the historical data. The temperature has kept increasing for 11 years. The winter of 2007 was the warmest winter in the last 50 years in Shanxi province with average temperature -2.1 °C. Warm winters has caused an increase of pests and crop disease and a decrease of the agricultural product quality.

The extreme climate events have caused negative impacts on the local social and economic development. In 2007, over 7 million people suffered from different types of natural disasters. The disasters caused 48 deaths, and left 214,000 people short of safe drinking water. Around 1.46 million ha of agriculture areas was negatively impacted by the disasters. The direct economic loss from agriculture sector was over 1 billion RMB.

Shanxi province is well aware of climate change. At the same time, it is still necessary to raise local industries awareness of, and capability to take part in, CDM.

### b) CDM development in Shanxi

Coal is the major resource in Shanxi, and coal production is the most important industry in Shanxi Province. According to the "2006-2020 Coal Production and Exploration Plan in Shanxi Province", the confirmed coal reserve is approximately 265 billion tons, which constitute 26% of the total coal reserve in China. The developed CDM-projects in Shanxi are mostly linked to the coal industry.

CDM project development started in 2002 in Shanxi, but initially the progress was very slow. Since 2007, the project development pace has increased due to increased awareness and more experience. As of June 24<sup>th</sup> 2008, 57 CDM projects had been approved by DNA. Among these projects, the majority (21) were related to energy conservation and efficiency improvement of local industries, especially coking coal and coal chemical industries. Coal bed methane recovery projects efficiently reduce emission and are expected

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<sup>4</sup> Issued by Climate Center of Shanxi Province in early 2008.

to generate most CERs. Table 3-1 shows the analysis of current CDM projects in Shanxi that have been approved by DNA.

Table 2-1 The analysis of CDM projects in Shanxi

Number of Total Projects	Project Types			Potential CDM Development Areas
	Category	Number of Projects	Estimated Emission Reduction (t CO <sub>2</sub> equivalent)	
57	Energy conservation and efficiency improvement	21	3,429,322	SF <sub>6</sub> substitution; Utilisation of waste gas from coking coal for chemical production; PV power generation; building energy efficiency; Large scale biogas, etc.
	Coal bed methane recovery	16	14,272,432	
	New energy and renewables	10	438,076	
Total Emission Reduction (t CO <sub>2</sub> equivalent)	Fuel substitution	5	624,921	
	Decomposition of N <sub>2</sub> O	3	2,367,250	
21,937,817	Manufacture (cement additive production)	1	87,928	
	Cement production process improvement	1	230,347	

As of July 21<sup>st</sup>, 2008, 10 projects from Shanxi had been registered by EB, which include 5 coal bed methane recovery projects, 3 N<sub>2</sub>O decomposition projects, and 2 energy conservation and efficiency improvement projects from coking coal industry.

#### c) Future development of CDM in Shanxi

In general, the developed and approved CDM projects are mainly coal bed methane recovery and coking coal waste gas recycle projects, which are closely linked to the major coal industry in Shanxi. The renewable energy projects are at the initial development stage. The local wind power projects are usually small scale, with emission reduction from 8,943 to 37,524 ton CO<sub>2</sub> equivalent. Therefore, bundled project methodology has been applied on these small scale wind power projects, which simplified the application procedure and saved transaction costs. However, as a major energy source and high energy consumption region, Shanxi has not yet fully explored its CDM potentials. As of June 24<sup>th</sup>, 2008, the CDM projects from Shanxi only constitute 4.1% of the total number of projects approved by the DNA in China.

The energy consumption/per 10 000 GDP in Shanxi is 2.95 tceq in 2005, which is 2.4 times as high as the national average level. The energy intensive industry is a key component of the economic structure in Shanxi. The current energy conservation and efficiency improvement projects constitute 18% of the estimated emission reductions, and have more potential. The utilisation of coking coal waste gas for chemical production has been identified as a key for the further CDM development in Shanxi.

Magnesium and magnesium alloy production is one of the major industries in Shanxi Province. The magnesium industry in Shanxi started in the 1980s. Nowadays, Shanxi produces 80% of the magnesium products in China, which i.e. means 50% of the world's total supply. Taiyuan City, the capital of Shanxi alone produces 25% of the total magnesium products in the world. However, the magnesium industry in Shanxi is operated at low cost, with high energy consumption and pollution.

In the magnesium production process there are three potential CDM possibilities: i) Firstly, there is huge potential for energy efficiency improvement in magnesium industry. Based on current practice, the energy intensity can be lowered by 50 percent by just upgrading the technology ii) The second possibility is increased utilisation of waste heat iii) The third possibility is SF<sub>6</sub> substitution. The magnesium industries both in China and internationally have experiences of substituting SF<sub>6</sub> with low concentrations of SO<sub>2</sub>. There is an existing methodology of SF<sub>6</sub> substitution approved by EB but technical barriers still exist, however and the pollution from untreated SO<sub>2</sub> emission is still a concern in the actual implementation. In summary CDM has huge potential in the magnesium industry in Shanxi. CDM has also substantial potential in the areas building energy efficiency, solar energy and large-scale biogas.

Finally, the CDM office of Shanxi Environmental Protection Bureau and Shanxi Air CDM Technique Centre provided recommendations on how CDM can be improved:

- The national agencies should provide support for development of methodologies and try to solve the bottleneck problems that industries and consultants do not have capacity to deal with;
- The national policies should be further developed and support new CDM activities, e.g. policy research on PCDM;
- Financial agencies, e.g. national banks, should support CDM financing, initiate and engage international financial agencies;
- The national approval procedures should be simplified, for example the PDD validation should be mainly based on the validation and verification of DOE in order to avoid the duplication of work;
- New mandatory domestic regulations should be reviewed by stakeholders before implementation in order to avoid exclusion of additionalities, e.g. the regulation on mandatory treatment of coal bed methane with concentrations over 30% has excluded large-scale of projects from CDM.

## **2.5 Ningxia**

The Ningxia Regional Workshop was the fifth regional workshops. It was held on 4 September, 2008 in Yinchuan, Ningxia Hui Autonomous Region, and was co-organised by the EU-China CDM Facilitation Project Team and the Bureau of Environmental Protection of Ningxia. Official representatives from both the national and provincial levels attended the Workshop. In addition, participants from the business sector, academia and local authorities attended the event. The opening session was hosted by senior officials from General of Department of International cooperation of MEP; Climate Change Department of NDRC; Department of Regulations in Ministry of Foreign Affairs; China CDM Fund and Bureau of Environmental Protection of Ningxia.

The workshop focused on the current CDM-situation in China and development trends, CDM and the energy conservation programme in China and CDM project implementation best-practices. In addition the workshop participants also discussed regional issues including the impact of climate change on the region, local CDM development and future climate change and emissions reductions activities.

### **a) Climate Change in Ningxia**

Ningxia Hui Autonomous region is located in the central North of China bordering Gansu and Shangxi on the West and East; and the Inner Mongolia Autonomous region in the North. Ningxia is dry and desert-like. It relies on irrigation to support some agricultural activities. During recent years, extreme weather events

has occurred more frequently in Ningxia and the temperature increase has become apparent. The recent monitoring results show that the annual average temperature from 2001 to 2006 has increased 1.5 °C compared to the 1960s level. In the yellow-river irrigation area, the temperature has increased most drastically, with a 1.7 °C annual increase. In the south mountainous area, the temperature increase has been less drastic. The precipitation has also changed. From the autumn of 2004, the middle-regions of Ningxia experienced abnormal and extreme draught due to the continuous low precipitation. In the summer of 2008, the agriculture area experienced the most extreme torrent rain in the history of weather record.

Climate change has significant impact on the agriculture and farming in Ningxia. The damage due to extreme weather such as draught has increased. The forests and other ecosystems have also been affected. Climate change will further increase the frequency of extreme weather and local people's health and life will be at increased risk.

As a less developed region in China with a fragile ecosystem, Ningxia is highly vulnerable to climate change. Under the national climate change strategy, the regional government has actively responded to climate change. The key response include the institutional development, such as the establishment of the leading workgroup and CDM Service Centre, the adjustment of the economic structure and energy structure, technology development, as well as the introduction of new legislation and communication activities in order to raise awareness. However, due to poverty and overall socio-economic conditions the climate change adaptation and mitigation capacity in Ningxia is weak. Climate adaptation of the agricultural sector, a shift to a less coal-dominated energy structure and further development of the water resource are key challenges for the region.

#### b) Introduction of Ningxia CDM Service Centre

CDM development in this region is supported by the Ningxia CDM Service Centre (NXCDM), which was set up by the Government in October 2003 as the first provincial CDM support organisation in China. Presently, 28 full-time staff work at the NXCDM. The team includes experienced researchers from Department of Science and Technology of Ningxia, and professionals with expertise in environmental sciences, energy, engineering and technology, international trade and law and CDM procedures and CER-trading.

Since the establishment, NXCDM plays an important role in enhancing public awareness of global environmental protection, promoting the development of CDM in Ningxia, and international cooperation on CDM and environmental issues. The work of the NXCDM has provided a strong framework for other regional CDM service centres in China. The experiences of CDM development from NXCDM have been disseminated to other provinces and regions through workshops. In particular the experiences of promoting international cooperation through research and capacity training activities as well as CDM awareness raising within the region have been proved to be successful.

#### c) CDM projects in Ningxia

At the time of the regional workshop NXCDM had developed 21 CDM projects, including projects on renewable energy, energy efficiency and fuel substitution. The table below illustrates the number of projects at various stages of the project development process. By September, 2008, the total issued CERs of the projects developed by NXCDM were valued as 649,501tCO<sub>2</sub>, worth more than 4.5 million RMB.

**Table 2-2 The CDM projects in Ningxia**

Project Development Progress	Number of projects	Percentage of China's CDM projects
<b>Total developed projects</b>	21	
<b>Approved by National DNA</b>	18	Accounted for 1.2% of the approved projects in China
<b>Registered by CDM EB</b>	13	Accounted for 5% of the registered projects in China
<b>Issued</b>	<b>The first issued</b>	Accounted for 8.2% of the issued projects in China
	<b>The second issued</b>	
<b>Under Validation</b>	5	
<b>Retroactive projects</b>	4	Accounted for 66.67% retroactive projects

## **2.6 Jiangsu**

The sixth regional workshop was implemented in Nanjing, Jiangsu Province on 27 October 2008. Nanjing was the main meeting venue, while participants from Shanghai and Hangzhou participated in the workshop via videophone. The workshop focused on the wider Yangtze River Delta Area, but the main focus area was CDM in Jiangsu province.

The workshop was co-organised by Policy Research Centre for Environment and Economy (PREE) of Ministry of Environmental Protection (MEP), Yangtze River Delta Area Innovation System Construction Joint Conference Office, and hosted by Productivity Promotion Centre of Jiangsu Province. The participants of this workshop included national level officials from Department of Climate Change of NDRC, Science and Technology Department of MEP; provincial officials from Science and Technology Department of Jiangsu Provinces, Jiangsu Development and Reform Committee, Jiangsu Productivity Promotion Centre; an official from the Swedish Energy Agency and research institutes and companies.

### **a) CDM Progress in Jiangsu**

Jiangsu is an industrial province in China with high energy demand. CDM activities started early in Jiangsu. The early projects for example include Nanjing Tianjingwa, Changshu Sanaifu projects. However, to date, the scale of CDM projects is not significant compared to the industrial level and economic situation in this region. On 10 October 2008, there were 47 projects approved by DNA in Jiangsu, among which 13 projects were registered with the EB. They account for a small percentage of the CDM projects in China as shown in the table below.

**Table 2-3 The CDM projects in Jiangsu**

Category	Jiangsu	China	Percentage in the country
Approved by DNA	47	1595	2.95%
Registered by EB	13	280	4.64%
With CER issued	5	68	7.35%
Issued CER (ton)	27,677,413	64,242,437	43.01%

#### b) CDM priorities in Jiangsu

On 10 October 2008, among the projects approved by Chinese DNA, the top four project categories were renewable energy (including wind power, bioenergy, power generation from waste incineration, and solar PVs), energy conservation and efficiency improvement (from sectors such as cement, funerals, steel, super-critical and natural gas based power generation), emission reduction from chemical industries (such as HFC<sub>23</sub>, N<sub>2</sub>O reduction, and utilisation of flue gas), and methane recycle and utilisation from landfills and breeding farms.

In the future plan for CDM development, Jiangsu province has identified several prioritised areas for the pre-2009 stage, which include:

- New biomass power plants and waste incineration power generation projects;
- Energy conservation and efficiency improvement for 5 key sectors and 2,200 key enterprises with over 5000 tceq energy consumption per year;
- Recycle and utilisation of flue gas from steel industry;
- Promotion of key energy conservation technologies, such as TRT, Coke Dry Quenching technique, and regenerative heating furnace;
- Waste heat utilisation of cement kiln;
- Utilisation of ultra-super critical power generation; gas turbine and IGCC; and wind power in power generation sector.

Together with the Energy Conservation and Emission Reduction programme in Jiangsu, the potential of CDM project development is considered huge in Jiangsu. In the coming 3 years, an increased number of CDM projects can be expected from this region.

#### c) Productivity Promotion Centre of Jiangsu Province

The CDM Service Centre of Productivity Promotion Centre of Jiangsu Province is vital for the promotion of CDM development in Jiangsu. It was established in February 2006 in order to provide training, project development and other consultant services for project owners in Jiangsu province. Like other regional CDM Service Centre, it has played a key role in promoting CDM in Jiangsu. The main activities which have been carried out at the centre include international cooperation on training and capacity building, public dissemination and education, a carbon resource survey, CDM project development and business facilitation activities.

The centre has set up several objectives for its future activities including: facilitating and speeding up the CDM project progress; expertise training; public awareness raising; key-technology development and dissemination, as well as international technology cooperation and communication.

## **2.7 Hebei**

The 7th regional workshop was implemented by the consortium on 17 April 2009 in Shijiazhuang, Hebei Province. The workshop was supported by the Department of Environmental Protection, Hebei Province. CDM experts presented on topics regarding national CDM policies, approval procedures, pollution reduction and CDM, current international carbon market status and CDM developments in Hebei Province. Over 120 participants, including officials from the National Development and Reform Commission (NDRC) and the Ministry of Environmental Protection (MEP), local officials from Hebei authorities, CDM service center, local project owners and key private and public stakeholders attended the workshop.

### **a) Climate change in Hebei**

Hebei province is a province in the northern parts of China, surrounding Beijing and Tianjin municipalities. It borders Liaoning to the northeast, Inner Mongolia to the north, Shanxi to the west, Henan to the south, and Shandong to the southeast. Bohai Bay of the Yellow Sea is to the east. Hebei has a continental monsoon climate, with temperatures of -16 to -3 °C in January and 20 - 27 °C in July, and with annual precipitation of 400 to 800 mm, occurring mostly in the summer. A small part of Hebei, an exclave disjointed from the rest of the province, is wedged between the municipalities of Beijing and Tianjin.

In 2008, Hebei's GDP was 1.62 trillion yuan, an increase of 10.1% compared to the previous year (i.e. GDP growth ranked 6<sup>th</sup> among regions in China). Hebei's main agricultural products are cereal crops including wheat, maize, millet, and sorghum. Cash crops like cotton, peanut, soya bean and sesame are also produced.

The main industrial outputs include textiles, coal, steel, iron, engineering, chemical production, petroleum, power, ceramics and food. Kailuan coal mine, is one of China's first modern coal mines, and remains a major mine with an annual production of over 20 million metric tonnes. Much of the North China Oilfield is found in Hebei, and there are also major iron mines in Handan and Qian'an.

Climate change impacts are becoming more and more apparent, e.g. continuously increasing temperatures and more frequent extreme weather. Based on the meteorological statistics provided by local 49 meteorological observation stations the annual average temperature increased 0.38°C every 10 years during the period 1966 - 1999. At the same time, the annual precipitation is decreasing, which in combination with the gradually increasing temperature explains Hebei's increasing problems with drought. Climate change is also affecting local agriculture development. Since the winter of 1986, Hebei has experienced more than 20 warm winters which has negatively affected the wheat production.

### **b) CDM Development in Hebei**

CDM development started in 2005 in Hebei, as of April 1<sup>st</sup> 2009, 66 CDM projects in Hebei province had been approved by DNA, which accounted for 3.41% of the total number of approved projects in China. Among these 20 projects were also successfully registered at CDM EB. The 20 registered projects are expected to generate total emission reduction equivalent to more than 300 million tons of CO<sub>2</sub>, with an approximate value of 300 billion yuan. Table 2-4 shows the analysis of the 20 registered CDM projects in Hebei.

**Table 2-4 Analysis of registered CDM projects in Hebei as of March 6th, 2009**

<b>Number of Total Registered Projects</b>	<b>Category</b>	<b>Number of Projects</b>	<b>Estimated Emission Reduction (t CO2 equivalent)</b>
<b>20</b>	Energy conservation and efficiency improvement	3	901,454
	Decomposition of N <sub>2</sub> O	1	324,858
	New energy and renewable energy	16	1,910,786

The annual CO<sub>2</sub> emission in Hebei constitutes 7% of the total emissions in China. In future, Hebei will be mainly focusing on CDM development in the following areas:

- Wind power generating;
- Biomass energy generating;
- Waste incineration generating and recovery of landfill methane generating;
- Energy conservation and reduce consumption;
- Recovery of coal field gas in coal mines;
- Solar energy power generating and solar energy heating.

## **2.8 Xinjiang**

On 21 August 2009, the EU-China CDM Facilitation Project implemented the 8<sup>th</sup> Regional Workshop in Urumqi, Xinjiang. The Policy Research Center for Environment and Economy (PRCEE) of Ministry of Environmental Protection (MEP) led the organization of the workshop, with the support from Xinjiang Environmental Protection Department and the Xinjiang Policy and Technology Development Center for Environmental Protection. Officials from MEP, NDRC, and the Environmental Protection Department, Development and Reform Commission, Technology and Science Department, Foreign Affairs Department, Economy and Information Commission and Bureau of Meteorology of Xinjiang Uygur Autonomous Region attended the workshop and gave the speeches. Over 100 participants, including local officials, representatives from local research institutes, and industrial representatives attended the workshop. The Project team leader and the deputy project team leader from IVL also attended the workshop.

The key issues presented and discussed during the workshop included: international and national climate change policies, climate change and the domestic energy conservation and emission reduction programme, the impact of climate change on ecosystem, international carbon market developments and trends, CDM rules and practices. The workshop was highly appreciated and the attendees considered it informative and valuable. The workshop enhanced the participants' understanding of climate change science, relevant policies, regulations and the current and future development status. The workshop will strengthen local climate change mitigation and adaptation initiatives, including CDM development and implementation.

Chinese MEP and NDRC paid great attention to this workshop, and the Xinjiang Environmental Protection Department provided strong support to it. The Xinjiang Environmental Protection Department is assured that the workshop supported local climate change mitigation actions, CDM development and social-economic development.

#### a) Climate change in Xinjiang

Located in the northwest China, Xinjiang Uygur Autonomous Region was known in China as the Western Territory in ancient times. With total area of 1,660,000 square kilometres Xinjiang is the largest region in China. Xinjiang shares 5,600 kilo meters of frontier with Mongolia in the northeast, with Russia, Kazakhstan, Kyrgyzstan and Tajikistan in the west, and with Afghanistan, Pakistan and India in the southwest.

The region is known for its various productions, including grapes, melons, pears, cotton, wheat, silk, walnuts and sheep. Xinjiang also has large deposits of minerals and oil. Oil and gas extraction industry in Aksu and Karamay is booming, with the West–East Gas Pipeline which is connected with Shanghai. The oil and petrochemical sector account for 60% of Xinjiang's local economy.

The ecological condition in Xinjiang is characterized by dry weather, little precipitation, large dessert area (Gobi), low forest coverage and high in soil salinity, therefore Xinjiang is highly vulnerable to climate change. The total desert area is reportedly 430,000 square kilometers with very limited oasis areas. The natural vegetation is scarce. Forest coverage is approximately 3% and lake and wetlands cover 12%-18% of the entire land area in Xinjiang. Due to droughts, low amount of precipitation and instant evaporation, saline soil area in Xinjiang already stretches over approximately 62,100 square kilometers, severely impacting local agriculture and farming.

Oil, coal, nonferrous metal and water resource are abundant in Xinjiang. It is estimated that approximately 2.19 trillion tons of coal resources, which constitute 40% of total coal resources in China, and 20.92 million tons of oil resources, which constitute 30% of total oil resources in China and 10.85 trillion cubic meters natural gas, which constitute 34% of total natural gas resources in China, are located in the region. With a booming economy and fast industrial development, Xinjiang urgently needs to take action on greenhouse gas emissions. The most commonly emitted greenhouse gases in Xinjiang are CO<sub>2</sub> and CH<sub>4</sub>. CO<sub>2</sub> emissions are mainly linked to fossil fuel combustion, while CH<sub>4</sub> emissions mainly are linked to fossil fuel extraction, transport, fuel effusion during process and effusion emission in husbandry.

#### b) CDM development in Xinjiang

Event though the fact that CDM development in Xinjiang only started in 2006, over the years the Xinjiang Uygur Autonomous Region government has paid great attention to the local CDM development. Xinjiang CDM Projects Management Office was founded in September 2006, with the support of Xinjiang Autonomous Region Development and Reform Commission, Science and Technology Bureau, Environment Protection Bureau and Meteorology Bureau. The Xinjiang CDM Development Office was set up by the end of 2006 and in April 2007, the Xinjiang CDM technology service centre was launched. As of July 18<sup>th</sup> 2008, 22 projects in total in Xinjiang were approved by the DNA, with total annual emission reductions amounting to 420,610 t CO<sub>2</sub>e. Approved projects include: Urumqi Tuoli Wind Power Station 30MW project, Urumqi Wulapo 30MW Wind Power Project and Tianshan Cement Plant Waste Heat Generating project which also were successfully registered at CDM EB. As of June 2009, Xinjiang had 7 projects registered at the CDM EB. CDM projects approved by the DNA include: New energy and renewable energy (hydropower, wind power and biomass energy); energy saving and energy efficiency (waste heat utilisation of cement kiln and steel industry and reduce fugitive emissions from oil and gas); recovery and using of landfill gas and waste disposal.

At this stage, local CDM development is mainly concentrated to the following areas:

- Energy conservation and efficiency improvement, particularly in oil processing, natural gas extraction, coking, nuclear fuel processing, chemical manufacturing, non-metal mineral products, power and heat supplies;

- Micro-hydropower plants, wind power, waste disposal, biogas energy utilisation in large-scale farms;

In the future, CDM will according to plan be introduced in the following areas: coal field fire extinguishing, utilisation of coal bed methane, central heating, building energy conservation, utilisation of household biogas, solar utilisation and auto natural gas utilisation.

## **2.9 Sichuan**

On 13 November 2009, the 9<sup>th</sup> Regional Workshop of EU-China CDM Facilitation Project was implemented in Chengdu, Sichuan. The Policy Research Center for Environment and Economy (PRCEE) of Ministry of Environmental Protection (MEP) led the organisation of the workshop, with the support from Sichuan Environmental Protection Bureau. Officials from MEP, NDRC, Sichuan Environmental Protection Bureau, Sichuan Development and Reform Commission, and experts from Sichuan Bureau of Meteorology attended the workshop and gave the speeches. Over 100 participants, including local officials, representatives from local research institutes, and industrial representatives attended the workshop.

Key issues presented and discussed during the workshop included: the progress of the UNFCCC negotiations, international and national climate change policies; climate change and the domestic energy conservation and emission reduction programme; impact of climate change on ecosystem; international carbon market development; CDM project risk management, CDM regulations and practices.

### **a) Climate change in Sichuan**

Sichuan is located in the southwestern parts of China and the capital is Chengdu. The total area is 485,000 square kilometres and the population is approximately 87.25 million. Sichuan borders Qinghai province to the northwest, Shaanxi province to the northeast and Tibet Autonomous Region to the west. The Yangtze River flows through the region. The Minjiang River in central Sichuan is an arm of the upper Yangtze River, which it joins at Yibin. The climate is highly variable in the province: the Sichuan Basin (including Chengdu) in the eastern half of the province has a subtropical monsoon climate while the southern part of the province has a sunny, subtropical climate with very mild winters and hot summers.

Sichuan is one of the major producers of agricultural products in China. Grain, including rice and wheat, is the major agricultural product and in 1999 Sichuan was the no 1 producer of grain in China. The impacts of climate change started to become apparent in the early 1990s: the annual temperature in Sichuan had been increasing continuously (e.g. in 2006, the average winter temperature was 1 °C higher than historical data), average precipitation had been decreasing (e.g. in the west of Sichuan precipitation was 20-40mm less compared to the historical records). Climate change is not only decreasing the sustainability of Sichuan agricultural production, e.g. warm winters hinder crop growth and agricultural production, but the increased frequency of extreme weather is also causing an unsteady water supply.

### **b) CDM development in Sichuan**

Sichuan's economy currently constitutes 5% of China's total economy and Sichuan's greenhouse gas emissions' account for 5-6% of total greenhouse gas emissions in China. Sichuan is believed to have substantial CDM development potential in areas such as hydropower, wind power, renewable energy, waste heat and gas generating, metallurgy, cement, paper manufacturing and recovery of landfill gas. Statistics indicate that as of December 2009, all in all 232 CDM projects located in Sichuan were approved by the DNA, accounting for almost 10% of the total number of DNA approved projects in China. The annual emission reductions from the approved projects were expected to be 42,004,560.5 t CO<sub>2</sub>e.

**Table 2-5 CDM projects in Sichuan as of December 2009**

Project Development Progress	Number of Projects	Percentage of China's CDM projects	Estimated Emission Reduction (t CO2 equivalent)	CERs Percentage of China's CDM projects
<b>Approved by DNA</b>	232	Accounted for 9.97 % of the approved projects in China	42,004,560.5	9.44%
<b>Registered by EB</b>	67	Accounted for 9.18 % of the registered projects in China	12,736,319.9	6%
<b>With CER Issued</b>	7	Accounted for 3.57% of the issued projects in China	2,725,206	2.38%

The future CDM development in Sichuan is expected to focus on decomposition of N2O, fuel substitution, new energy and renewables, solar power, energy conservation and efficiency improvement. As much of the new energy industry is planned to be based in the west of China, an increased number of CDM projects can be expected from this region in the coming years.

## **2.10 Hunan**

On 15 January 2010, the EU-China CDM Facilitation Project implemented the 10th Regional Workshop in Changsha, Hunan Province. The workshop was organised by the Policy Research Centre for Environment and Economy (PRCEE) of the Ministry of Environmental Protection (MEP). The workshop was supported by the Hunan Environmental Protection Department.

Officials from MEP, National Development and Reform Commission (NDRC), Hunan Environmental Protection Department, Hunan Science and Technology Department and Hunan Forestry Department gave presentations during the workshop, which was attended by over 110 participants, including local officials, representatives from local research institutes, and industrial representatives.

The 10th Regional Workshop in Hunan was the final regional workshop implemented by the EU-China CDM Facilitation Project. Held shortly after COP15 in Copenhagen, the workshop covered not only CDM-related topics but also discussions on environmental protection and climate change solutions, climate change and low-carbon economy and analysis of the COP15. Officials from PRCEE and MEP delivered presentations on climate change mitigation strategies, environmental protection and low-carbon economy development.

Over 110 participants, including key private and public stakeholders, attended the workshop. The workshop reached a wide range of regional stakeholders and received very positive feedbacks from participants. The Hunan Environmental Protection Department made great efforts to support this event and the local media coverage was substantial, e.g. the local evening news programme reported from the workshop.

### **a) Climate change in Hunan**

Hunan Province is located in the southern part of China, on the south bank of the Yangtze River. Located in the central subtropical zone, Hunan's climate is subtropical, with mild winters and plenty of precipitation.

January's average temperature is 3 to 8 °C while July's average temperature is 27 to 30 °C. Average annual precipitation is 1200 to 1700 mm.

Recent monitoring results indicate that since the 1950s, the average annual temperature has increased 0.8 degree across Hunan province, and the number of annual sunshine duration has decreased 173.2 hours compared to historical records (1980- 1989). The impact of climate change has become apparent since 2000. In 2000, Zhangjiajie in Hunan was subject to a serious drought in both spring and summer while in July 2006 daily precipitation in Zhangjiajie reached an all-time high of 455.55 mm. In April 2006, Changsha meteorology station recorded wind speeds reaching 32m/s. In 2008, Hunan reported the heaviest ice storm since 1949.

The climate change impact in Hunan is also evidently affecting biological species in the water areas. Dongting Lake, a large shallow lake located in northeastern of Hunan, is a flood-basin of the Yangtze River, thus the lake's size depends on the season. In 2007, fears were expressed that China's Finless Porpoise, a native of the lake, might face extinction inter alia due to climate change. .

#### b) CDM Development in Hunan

Hunan has a potential hydropower capability of 15.32 million kw, of which 10.84 million kw currently can be exploited. A number of large hydropower plants have already been launched in Hunan, e.g. Fengtan, Dongjiang and Wuqiangxi while an additional number of hydropower and thermal power plants will be set up in 2010.

The first CDM project in Hunan approved by DNA was Binzhou Hydropower Plant on October 8th 2005. The estimated emission reduction was 40,000 tons CO<sub>2</sub>e. Since then, project development has picked up pace thanks to increased awareness and experience. As of 30th December 2009, 138 CDM projects in Hunan have been approved by the DNA, with estimated annual emission reductions of 14,154,918 t CO<sub>2</sub>e.

**Table 2-6 The CDM projects in Hunan**

Category	China	Hunan	Percentage in the country
Approved by DNA	2,327	138	5.93%
Expected Annual CERs(ton)	445,404,398	14,154,918	3.18%
Registered by DNA	715	45	6.29%
Expected Annual CERs(ton)	199,947,293	5,410,853	2.71%

Hunan Development and Reform Commission has identified CDM potentials in the following sectors in Hunan:

- Landfill gas and utilisation of methane recovery;
- Wind power;
- Utilisation technology of biomass energy;
- Hydropower;
- Building energy conservation;
- Construction of energy resources in rural areas;
- Forestry.

### **3 Summary and conclusions**

#### **3.1 Summary**

In general, the regional workshops successfully reached the wider stakeholders, by providing a network for CDM stakeholders at local level, policy-makers at national level and international players. The workshops achieved the targets of knowledge dissemination and collection.

Most regions in China have experiences of CDM projects and the projects are closely related to the regions industrial character and the local resources. Most regional stakeholders have basic CDM-knowledge, especially the local project developers and regional CDM service centers. However, knowledge and capacity gaps still exist, especially among the local project owners. The key knowledge gaps to be filled include: the understanding and application of specific methodologies, particularly additionality issues; the specific requirements of DOE validation and verification; international business experiences, e.g. how to conduct business with international buyers; and the impacts of new domestic regulations on future CDM activities.

Many general issues were covered and addressed in the workshop presentations and discussions, including presentations on state-of-the-art climate change science, CDM policy development and domestic regulations, but also more specific topics relevant for the specific region were addressed.