EU-China CDM Facilitation Project

Key findings and recommendations:

1) The Pre-2012 CDM Market in China
2) Technology Transfer in CDM Projects in China

Introduction

The EU-China CDM Facilitation Project policy brief "Key findings and recommendations" presents the most important findings from the policy research reports "The Pre-2012 CDM Market in China" and "Technology Transfer in CDM Projects in China". We hope these findings and recommendations will provide stakeholders and policy-makers in Europe and China with important input.

Overview of the CDM market in China

China – the world's major supplier of CER's

The number of CDM projects in the global carbon market has increased sharply the last years. In an international comparison, China's share of the number of projects is about 35%. However, the Chinese projects are on average larger than in the rest of the world, which result in a global market share of almost 42%.

Top countries by Issued CERs (Unit: million tons (MT), by 1 January 2009)

Top countries by issued CERs	MCERs	Share
China	100.0	41.6%
India	54.1	22.5%
South Korea	35.5	14.8%
Brazil	28.4	11.8%
Mexico	5.0	1.9%
Vietnam	4.5	1.2%
Chile	2.9	1.2%
Egypt	2.4	1.0%

Source: UNEP Risoe Center, CDM pipeline statistic, 1 January 2009

Rapid growth, but administrative bottlenecks

There is a rapid growth in the number of CDM projects both in the pipeline and registered at the EB since the beginning of 2006. The number of projects in the pipeline has increased over 11-fold (from 138 to 1608) by the end of 2008. Nevertheless, the rapid increase in the volume of CERs in the pipeline has not been passed through to EB-registered projects. This suggests that there is an administrative bottleneck at both the EB and DOE level.

Increased relative importance of renewable energy and energy efficiency projects

As of 1 January 2009, renewable energy [1] accounted for 39% and 18.13% of CERs in pipeline and for EB registered, respectively, and presented a significant increase for EB-registered projects since 1 January 2006. The increase of renewable energy project scale is mainly due to the fast development of wind power projects in China.

The number of energy efficiency CDM projects shows the second most rapid growth in the pipeline and the most rapid growth for EB-registered projects. Since 1 Jan. 2006, the number of energy efficiency projects in the pipeline has increased by over 10-fold and the volume of annual CERs has increased by more than 15-fold.

[1] Renewable Energy refers to the small hydro, wind power, and biomass.

Presently, hydropower, energy efficiency and wind power represent the majority of China's CDM projects. These three types of CDM projects accounted for 81.5% of the total number of projects in the pipeline, with an annual CER volume of for 49% of the total CER volume.

Decrease in "low-hanging fruit" projects

CDM projects related to industrial gas destruction, such as HFCs and N_2O, have been controversial because of the low investment costs and the large amount of CERs generated. During the observed period, despite the fact that large shares of CERs were generated from a small number of HFC projects, the shares of these projects in the total annual CERs have indeed decreased in the pipeline from 52.9% to 25.5% from December 2006 to May 2008. Because HFC destruction potentials in the Chinese market has, to a large extent, been exhausted and as a result of the income-sharing CDM management measure (taxation of at 65% for HFC projects) in China, this decreasing trend is intensified.

By 1 January 2009, HFC CERs account for 84% of current issued CERs. However, this share is expected to decrease by 2012 to 24% of total CERs issued from CDM projects from China.

Issuance rates of Chinese CDM projects

The issuance rates vary largely across different project types. For industrial gas, such as HFCs, the issuance rate is high at an average level above 100%, overshooting the expected performance indicated in PDDs. For CDM projects of renewable energy, such as hydropower and wind power, the issuance rate is generally lower, at a level of 98% and 78% respectively. Within the same project type, the variations are also large, from around 10% to 160% depending on the specific project.

Regional dimensions

CDM projects are more commonly undertaken in regions with larger population, low level of economic development and/or low per capita income, for instance, in Yunnan, Gansu and Guizhou. For more advanced regions with medium per capital GDP, such as Shandong and Jiangsu, there are also a considerable number of CDM projects. On the other hand the richest provinces/cities have in general fewer CDM projects such as the cities Beijing and Shanghai and the province of Guangdong, suggesting a more complex correlation between income and the number of CDM projects:

- Hydropower projects are highly concentrated to Yunnan, Sichuan and Hunan
- Wind power projects are highly concentrated to Inner Mongolia
- Energy efficiency projects are more evenly distributed across provinces where large-scale heavy and energy-intensive industries and manufacturing are located, such as in Shanxi, Jiangsu, Shandong, Hubei and Anhui.
- The relatively few HFCs and N_2O, projects in Jiangsu, Zhejiang, Shandong and Liaoning have created a very large amount of CERs

The observations suggest that to some extent, CDM is delivering on its promises to support less developed regions where natural resources are least utilised, industry is least efficient and at the same time mitigate emissions. While these factors explain the patterns to some degree, there are also important region-specific policies and institutional factors that drive or hamper CDM development.

Price guidance

A particular feature of the Chinese carbon market is the government will give unwritten price guidance for CERs to a certain project if necessary. The NDRC does not fix the price for CER, yet the 15th clause of the Measures for Operation and Management of Clean Development Mechanism Projects in China stipulates that the deal price is an element for validation by National CDM Project Board. This price guidance is thought to be necessary because of the immaturity of the CDM market in China, market disadvantages of the project owners, etc.

Stakeholders in the Chinese CDM market

Up until 2006, *project owners* were for the most part involved in smaller scale activities under the CDM. This reflected the limited awareness of CDM in China, a shortage of capacity in execution of CDM projects and a general immaturity of the policy framework. However more recently, there has been a marked increase in the participation of large-scale SOEs and investment groups. The SOEs are involved in sectors such as energy intensive manufacturing industries (such as iron, steel, chemicals and cement) and power generation (traditional and renewable energy sources such as hydro and wind). The increased presence of these large SOEs has marked a change in the market where more CDM projects are now initiated by project owners themselves, as opposed to the earlier stages where it was the project developers who drove CDM development.

By 1 January 2009, there were over 260 *project developers*, i.e. domestic and foreign consultant companies, involved in 1608 CDM projects in China. However, the size, scope of service provided and the level of human resource capacity vary substantially across different project developers. Among the EB-registered projects, 242 out of 352 CDM projects (i.e. more than 68%) were developed by the top 20 developers.

DOEs, authorised to validate greenhouse gas emission reduction projects and verify/certify the emissions they reduce, are key stakeholders in the CDM project cycle as they perform a mandatory function within the project cycle. The DOEs in China are all international organisations, where the top four DOEs have a market share of more than 80 %, with no domestic firm having received accreditation as of January 2009[2]. The absence of domestic DOEs is considered a major bottleneck, by project owners as well as project developers, in the Chinese CDM market.

Technology transfer in CDM projects in China

The definition of technology transfer

During government negotiations on the role of technology in GHG mitigation, developing countries have voiced a strong interest in gaining improved access to technology. It has been understood that an improved understanding between different groups on what technology transfer entails and the possible measures to establish and encourage a mutually beneficial process is critical to bridge gaps of misunderstanding and to accelerate the negotiation process at this point. Technology transfer is a broad concept with many different definitions, and is widely variable depending on the context. The differences in the understanding of what technology transfer is and how it can be achieved, in particular from the perspective of the wider stakeholders and policymakers, highlight the underlying tension around the issue and, at the same time, underline the need for advancing mutual understanding. The Technology Transfer in CDM Projects in China report establishes an operational definition of technology transfer, based on IPCC's definition of technology transfer, in order to assess the level of technology transfer in CDM projects.

In the conducted assessment, the operational definition of technology transfer comprises the following key elements:

[2] On 25 March 2009 at EB 46, two Chinese Applicant Entities (AEs), the China Environmental United Certification Center (CEC) and China Quality Certification Centre (CQC) were accredited as Designated Operational Entities (DOE) for both verification and verification/certification functions. CEC and CQC are the first two Chinese DOEs which can now perform CDM project validation and verification services both in China and around the world after participating in the EU-China CDM Facilitation Project's DOE traineeship in 2008.

- **Foreign origin and degree of novelty:** The technology has to be imported/originated from a developed country. However, the novelty can differ depending on if the imported technology is new to the Chinese market or new to the province or to a specific industrial sector.

- **Capacity building:** Technology transfer covers not only introduction of physical equipments but also dissemination of tacit "know-how" to enhance the ability to manufacture, operate, maintain and master new technologies.

- **Performance improvement:** The outcome of technology transfer is not the new technology per se but improved environmental performance (i.e. more efficient GHG reduction or the capacity to generate more CERs compared to existing technologies).

Level of technology transfer

CDM is not explicitly driven by facilitating technology transfer but by cost calculations and revenues from CERs. While private-sector participation in GHG reduction has indeed increased, technology transfer is still not a primary interest for the private sector.

The PDD review showed that:

- Approximately 41% of the projects covered mentioned technology transfer. The field survey and case studies show that within projects with technology transfer 2/3 cites transfer of capital equipment at market prices. The other 1/3 of projects cites knowledge and capacity training, which typically means training for operation and maintenance. There is no core and crucial technologies transferred for operation and maintenance, let alone the transfer of know-how manufacture.
- The project types with the highest frequency of technology transfer, such as N_2O, HFC23, fuel switch, energy efficiency and landfill gas, are largely associated with imported equipment.
- Technology transfer from the EU is concentrated in wind power projects, with Denmark and Spain as two predominant suppliers (and also German technology, to a lesser extent).
- The variation of technology transfer within the same project type is also substantial, suggesting that project type alone may not be a sufficient indictor for the likelihood of technology transfer.
- The technology suppliers are most commonly multinational enterprises from EU countries (e.g. Germany, Demark, France and Spain), the USA and Japan.
- In terms of China's CDM sectors, the USA and Japan dominate the supply of energy efficiency technology in several key CDM sectors such as steel, iron and cement. EU dominance is well represented in renewable energy technology.

Views on barriers to technology transfer

From our survey, a number of observations emerged on barriers to technology transfer. The research underscores the fact that there are convergent views between Chinese and EU stakeholders within both the private and public spheres on what the barriers to technology transfer are, though there are some issues where understanding diverges.

Views diverged in particular on impact of different aspects of domestic regulation on technology transfer:

- *Blocking technology diffusion and Intellectual Property Rights (IPR):* The concern voiced by several Chinese stakeholders is that technology owners in developed countries are all too effective at protecting their technology, and are able to monopolize access to clean technology and actively seek to limit technology transfer for private interests. On the other hand, European enterprises interviewed explained that exporting to China is favoured over setting up a local production facility and IPR-associated risks are an important factor cited by many.

- *Weak incentives for project owners to pursue technology transfer:* There is a lack of support, such as subsidies or other policies, to encourage technology suppliers in developed countries to engage in technology transfer to China. The relatively high price of technology from developed countries results in most Chinese project owners substituting with similar local technologies.
- *Price differential and financing issues:* Foreign technology is often more expensive than domestic Chinese counterparts, causing many Chinese project owners to substitute with similar but cheaper Chinese technologies. This is often the case especially when project owners do not adequately consider full lifetime costs and benefits of the new technologies (e.g. energy inputs, maintenance and other potentially hidden costs) are not properly assessed. Rather, the focus is on the higher initial investment costs.
- *Human resources:* Project owners cited the lack of human capital to run their facilities fitted with unfamiliar and/or new technology as a barrier to technology transfer. Lack of qualified management impedes operations and often results in sub-par performance of installations. This barrier to technology transfer is particularly disturbing for complex process projects, such as energy efficiency.
- *Methodology bottlenecks:* The lack of methodologies in the fields of construction, buildings and energy efficiency was cited during several interviews as a barrier to scaling up CDM. Likewise, opportunities for technology import within these sectors will not be tapped until relevant methodologies are approved by EB.
- *The 49/51% rule:* Under the current CDM regulation in China, Chinese funded or Chinese-holding enterprises within the territory of China are eligible to conduct CDM projects with foreign partners. Chinese-holding means that Chinese side will hold over 51% shares. Some buyers think that this rule is a particularly important barrier for projects requiring large investments (50 million USD and above) and may also hinder the implementation of more advanced technology. There is, understandably, debate about the importance of this barrier to technology transfer. On other side, Chinese and EU actors interviewed maintained that this factor is not a major barrier, while others did cite it as an important one.

Suggestions on how to increase the level of technology transfer

Supporting further technology transfer to China through the CDM will require a broad set of policy initiatives undertaken at the national, bilateral and international level. The suggestions provided in this section are by no means a recipe that taken together will secure technology transfer, nor are they for that matter agreed upon by all the members of the EU-China CDM Facilitation Project.

- *Chinese perspective on the EU and CDM:* There is an expression of a need for a change in the way CDM is seen in the EU[3]. In particular the EU needs to recognize that there are significant benefits for the EU for supporting technology transfer to China, not only the business and trade opportunities but also the benefits of mitigation of climate change.
- *Targeted financial support:* As expressed by many project owners, an important barrier to technology transfer is lack of financial incentives to pursue technology transfer. Some different suggestions on how to approach this barrier could be the establishment of a CDM technology transfer compensation mechanism, financial support to project owners and/or "green loans".
- *CDM project management and monitoring:* Introduce a clearer and more operational definition of technology transfer in the project approval process, at least at the DNA level. Prioritise technologies to reflect China's interest in promoting more sustainable development and be aligned with China's other initiatives for tackling climate change.
- *Market regulation and support:* Policy will need to strike a balance between the need for foreign technology transfer and national technology innovation and R&D. This would need to balance targeted support for the transfer of appropriate technologies through CDM projects, maintain

[3] In this context the EU refers to both the member states as well as the EU Commission.

National Treatment (i.e. no favourable treatment of domestic suppliers) for foreign technology suppliers and support domestic research and development and innovation.

- *Capacity building and enhancement:* The lack of capacity and the corresponding lack of access to information is an important reason why CDM projects suffer from a low rate of technology transfer rate. In order to enhance the capacity in China it is important to take advantage of the established national and regional institutional infrastructures as well as e.g. to establish an information exchange platform between project owner and technology supplier, such as a regular technology exchange conference.
- *CDM development at the international level:* Define technology transfer more clearly in operational terms at the international level. Enhance verification along the project chain and ensure that technology transfer information described in PDD is consistent, observable and measureable.

References and more information

Pre-2012 CDM Market in China report (available at www.euchina-cdm.org)

Technology Transfer in CDM Projects in China report (available at www.euchina-cdm.org)

For more information on the EU-China CDM Facilitation Project (www.euchina-cdm.org)