Volume 8 Issue 1 May 2005
http://www.chinaenvironment.net/sino/

Published by:
THE PROFESSIONAL ASSOCIATION FOR CHINA'S ENVIRONMENT (PACE)

Contributing to a better environmental future for China and the world

TABLE OF CONTENTS

IN THIS ISSUE **4**

SPOTLIGHT ON CHINA **5**

CLEAN DEVELOPMENT MECHANISM IN CHINA: TAKING A PROACTIVE AND SUSTAINABLE APPROACH 5

Jostein Nygard, Andrew Murray, Charlotte Streck *5*

FEATURED ESSAYS – CDM AND CHINA **12**

OPERATION AND MANAGEMENT OF CDM IN CHINA 12

Gao Guangshen and,Li Liyan (translated by Fan Yue) *12*

CHINESE CDM POLICY: CLARIFICATIONS TO SOME MISUNDERSTOOD ISSUES 19

Lu Xuedu *19*

BARRIER AND VIEW ANALYSIS WITH SUGGESTIONS ON IMMEDIATE ACTIONS FOR CDM PROJECTS IN CHINA 21

Liu Deshun, Zhou Sheng, Pantao, Zheng Zhaoning *21*

THE ROLE OF CHINESE ENVIRONMENTAL NGOS IN CDM PROJECTS – CASE STUDIES AND LESSONS LEARNT 28

Amelia Chung, Mingjie CHEN, Jiaman JIN, Jiqiang ZHANG *28*

BUILDING AN EFFICIENCY POWER PLANT UNDER THE CLEAN DEVELOPMENT MECHANISM 33

Anne Arquit Niederberger , Barbara Finamore, ... *33*

ENVIRONMENTAL BRIEFING **39**

Compiled by Juliana Qiong Wang *39*

FIELD NOTES **51**

BEYOND COMPLIANCE: MAKING VOLUNTARY STANDARDS WORK FOR CHINA 51

Selina Lee-Andersen *51*

In This Issue

The Summer 2005 issue of Sinosphere Journal carries the theme of Clean Development Mechanism (CDM) and China. CDM is one of the three 'flexibility mechanisms' of the Kyoto protocol that devised to assist both industrialized and developing countries to mitigate global greenhouse gas (GHG) emissions in a flexible and co-operative manner. Under the CDM, an industrialized country with a GHG reduction target can invest in a project in a developing country without a target, and claim credit for the emissions that the project achieves. China announced its ratification of the Kyoto Protocol in 2002. Although China accepted no mandatory GHG emissions target under the Protocol, Chinese government has been working actively to define and develop CDM programs in cooperation with international partners. CDM programs in China has entered a critical and urgent period after Russia ratified Kyoto treaty last year that finally triggered the Kyoto Treaty coming into full force.

In the Spotlight on China column, Jostein Nygard, Andrew Murray and Charlotte Streck of the World Bank summarize and update a highly influential study: "Clean Development Mechanism in China: Taking a Proactive and Sustainable Approach", a joint study by World Bank, German GTZ and the Chinese Government. The study estimates that the Chinese share-potential in the international carbon market is huge, about 50% of the entire CDM market. The successful participation in CDM markets could lead to an increase in China's GDP of more than 0.5 percent by 2030. In the article, they provide a comprehensive review of opportunities, barriers and market potentials in CDM projects among various sectors, and offer recommendations for accelerating CDM implementation in China.

The Featured Essays Column continues to carry the CDM and China theme, presenting five distinctive articles focusing on different aspects of CDM issues in China. Mr. Gao Guangshen and Ms. Li Liyan of Office of National Coordination for Addressing Climate Change, NDRC China, present "Operation and Management of CDM in China". The article discusses a very board range of topics that covers fundamentals of CDM operation and management in China. In the following article, Mr. Lu Xuedu of Office of Global Environmental Affairs, Ministry of Science and Technology of China, presents "Chinese CDM Policy: Clarifications to Some Misunderstood Issues". This paper attempts to clarify some confusions over the "Interim Measures for the Operation and Management of Clean Development Mechanism Projects in China" that published in May, 2004. Prof Liu Deshun et al. of Tsinghua University present: "Barrier and View Analysis with Suggestions on Immediate Actions for CDM Projects in China." Their article offers a brief overview of potentials as well as barriers of CDM in China, and basic requirements for and potential benefits of establishing a CDM regime in China. Ms. Amelia Chung et al. of the Global Environment Institute present: "The Role of Chinese Environmental NGOs in CDM Projects – Case Studies and Lessons Learnt". The authors argue that, in the case of CDM projects, the complex and multiple components of associated activities offer valuable and promising opportunities for Chinese environmental NGOs to fill in as the bridge or intermediate facility that can serve in aspects where the tasks can be more efficiently and effectively carried out compared to the already handful implementation parties. Last but not least, Anne Arquit Niederberger and Barbara Finamore of NRDC present "Building an Efficiency Power Plant under the Clean Development Mechanism." The authors demonstrate the feasibility and advantages of combining CDM with end-use energy efficiency demand-side management (DSM) programs and integrated resource planning for the power sector.

The Field Notes Column presents an article: "Beyond Compliance: Making Voluntary Standards Work for China," by Selina Lee-Anderse. In the Environmental Briefing column, Ms. Juliana Wang continues to provide us with updates on recent environmental developments in China.

We thank all the authors and contributors for their work and support. Our special appreciation goes to Sophie Chou, Linlin FU and Feng AN who have worked very hard and diligently to bring this issue together. We also thank Tao Nuyi and Song Li for valuable input and help.

Editorial Board
Sinosphere Journal

Building an Efficiency Power Plant under the Clean Development Mechanism

Anne Arquit Niederberger[20]*, Barbara Finamore*[21]*,*

China is currently faced with a shortage of electric power in key regions / cities, coupled with double-digit growth in demand. Scheduled manufacturing plant closures and the external costs of emissions from coal-fired power plants have a negative impact on the economy. One immediate and cost-effective way to address these issues is to tap the vast potential for efficient use of electricity by enterprises and households. This paper describes one major effort in China to promote demand-side management (DSM), by introducing the "efficiency power plant" [22] (EPP) concept as a substitute for new generation capacity and leveraging international financial resources for energy saving measures under the Kyoto Protocol's Clean Development Mechanism (CDM).

China's government recognizes that it needs to make fundamental changes to meet its rapidly growing power demand in a sustainable way. In addition to full-scale efforts to diversify its energy portfolio – including plans to boost the share of renewable energy (based on the Renewable Energy Law adopted in February 2005) – energy efficiency has been elevated to a fundamental national policy, with plans to adopt strong measures to save an estimated 800 million tons of coal equivalent by 2020.[23] This aggressive policy has created a rare opportunity for synergy, as it offers a solution to an economic problem that also will have a significant, positive effect on the regional and global environment.

Energy efficiency is a key opportunity for China, because it still uses much more energy, and emits much more pollution, per unit of GDP than the least intensive member countries in the Organization for Economic Co-operation and Development (Regulatory Assistance Project & State Power Economic Research Center, 2004). Despite a dramatic improvement in energy efficiency (and a corresponding reduction in the CO_2 intensity of the economy) in recent years [24], even new equipment has a carbon emissions intensity more than double that of new equipment in the United States (Bate & Montgomery, 2004). This suggests that there is significant potential for reducing greenhouse gas (and other pollutant) emissions by overcoming market barriers and increasing the rate of investment in efficient technologies.

Some researchers estimate that if China and India alone were able to invest in technology now in use in the United States, and replace their existing high-emissions equipment, the savings in carbon emissions by 2012 would approximately match the emission reductions that could be achieved by full implementation of the Kyoto Protocol over the same period (Bate & Montgomery, 2004). Another analysis, by Princeton University, introducing advanced versions of current technologies could cumulatively reduce carbon emissions by 33% by 2050 and significantly reduce oil and gas imports at a lower overall cost than a policy that attempted only to limit sulfur dioxide emissions, a top priority in China (Larson *et al.*, 2003).

One of the most effective ways to remove market barriers to investment in energy efficient technologies is through utility-sponsored demand-side management (DSM) programmes that use ratepayer funds to help customers take advantage of energy saving opportunities (e.g. high-efficiency commercial lighting, industrial

[20] Anne Arquit, policy@optonline.net
A + B International (Sustainable Energy Advisors), www.policy-solutions.com,Policy Solutions,333 River Street (1228),Hoboken NJ 07030,
[21] Barbara Finamore , bfinamore@nrdc.org
Senior Attorney, Natural Resources Defense Council,Director, China Clean Energy Program
Natural Resources Defense Council
1200 New York Avenue, NW,Suite 400
Washington, DC 20005

[22] The concept of an "efficiency power plant" was introduced by the Regulatory Assistance Project (RAP), which has played a leading role in the development of the proposed EPP project described in this paper.

[23] See Draft National Energy Plan, 2004-2020, http://www.efchina.org/resources

[24] According to the IEA (2002), for example, "China has made significant progress in reducing the CO_2 intensity of its economy. The CO_2/GDP ratio declined 50.8% between 1990 and 2002, to 0.62 kg CO_2/$US, equivalent to the Annex I North America (Canada and USA) average."

motors, commercial and residential air conditioners).[25] DSM programs have been used by more than 30 countries around the world to reduce the need for new power plants, lower customers' electric bills and improve the environment. The cost of reducing electricity demand through end-use energy efficiency DSM is typically half (or less) than that of building new power generation capacity.

Chinese experts estimate that DSM programmes could eliminate the need to construct 100,000 megawatts of new power plant capacity by 2020—more than five times the installed capacity of the Three Gorges Dam—saving as much as US $125 billion (Hu, 2004) while avoiding emitting air pollutants and hundreds of millions of metric tons of CO_2 emissions annually.

The Natural Resources Defense Council (NRDC) has been working in China for nearly a decade to promote energy-efficiency policies, strategies and technologies and has taken the lead in helping to launch a large-scale DSM programme in Jiangsu Province. NRDC signed a long-term cooperation agreement with the Jiangsu Provincial Economic & Trade Commission in July 2004 and, after six months of cooperative research and analysis with Chinese energy experts and institutions (from the Jiangsu Economic and Trade Commission, the Jiangsu Power Company, the China State Grid Corporation DSM Instruction Center, and the Suzhou Power Company), presented a 10-year DSM strategic plan (Optimal Energy & State Grid Corporation DSM Instruction Center, 2005) to the Jiangsu government. Implementing the entire plan could reduce China's total coal consumption by an estimated 21.2 million metric tons by 2014, eliminating 854 million metric tons of CO_2 emissions, 12 million metric tons of sulfur oxides and 406 thousand tons of nitric oxides in the process. Similar work is underway in collaboration with the municipality of Shanghai (where the cooperation has been with the Shanghai Economic Commission, the Shanghai Municipal Electric Power Company and the Shanghai Energy Conservation Supervision Center).

However, there are a number of challenging barriers to overcome, including a lack of institutions and supportive tariff structures that would enable utilities to profitably meet customer demand with energy savings on an equal footing with traditional supply expansion. To demonstrate the benefits of utility-funded DSM, "efficiency power plant" (EPP) pilot projects have been proposed in Jiangsu Province and Shanghai. An EPP is a bundled set of energy efficiency programmes (in this case, the first set of proposed DSM initiatives in the Jiangsu and Shanghai 10-year DSM strategic plans) designed to deliver reductions in energy demand that represent the energy and capacity equivalent of a large conventional power plant (CPP). The following table summarizes the common features that efficiency and conventional thermal power plants share, as well as the unique advantages of EPPs (Asian Development Bank 2005a and 2005b):

Unique Advantages of Efficiency Power Plants	Common Features EPPs & CPPs
o can be built faster o begin delivering energy services as soon as construction begins o are much cheaper o are much cleaner o are climate-friendly	o can meet customer needs o can be financed conventionally o can be bought and paid for by utilities o can be part of new power markets

The proposed EPPs could be built in only two years, but would continue to reduce demand over the lifetime of the technologies used, which is estimated to average 13 years. The specific measures proposed as part of the EPPs are promotion of efficient:

- electric motor systems in industry;
- cooling/heating and lighting systems in industrial and commercial buildings; and
- residential lighting and electrical appliances (Asian Development Bank 2005a):

[25] Another type of DSM, electricity load management, is not discussed in this paper since it does not reduce carbon emissions.

Industrial Motors: This program would increase the use of high-efficiency motors when older equipment is replaced naturally, existing facilities are expanded, existing processes are overhauled, and when new industrial facilities are built. The program would improve the efficiency of entire motor drive systems, including proper sizing and system design, application of variable frequency drives, and more efficient fans and pumps. The industrial motors program would provide financial incentives to facility owners that offset the entire cost premium of high-efficiency motors over standard equipment. Where appropriate, it will supplement these customer incentives with payments to distributors to stock and for manufacturers to ship premium-efficiency motors. It would also include marketing efforts at all points in the motor supply chain. The program would also provide technical assistance for improved motor system sizing and design.

New Construction Cooling: This program would increase investment in high-efficiency technology in planned purchases of new cooling equipment in existing buildings and in new construction, both in commercial facilities and residential apartment buildings. It would also promote high-efficiency design of the overall cooling system, including proper sizing of cooling equipment and auxiliaries.

New Construction Lighting: The lighting program would increase the use of high-efficiency lighting fixtures and design in the remodeling of existing buildings and in new building construction. The program would place special emphasis on integrating high-efficiency lighting and cooling to take maximum advantage of the substantial scale economies and electricity savings from simultaneous treatment of both. It would also include the practice of "commissioning" new buildings to make sure the equipment is installed correctly and is working properly.

Residential Products and Appliances: This program would target residential consumer purchases of high-efficiency TVs, freezers, clothes washers, rice cookers, and refrigerators. It would build directly upon and support China's recently-established voluntary labeling program. It would stimulate consumer demand and the production, distribution, and retail stocking of high-efficiency products and appliances. It would do so using financial incentives to buyers and, as appropriate, to others throughout the supply chain. The program would also adapt the successful utility-Energy Star efforts to conditions in China.

Preliminary analysis of the Jiangsu EPP (Asian Development Bank, 2005a) indicates that two years of such DSM investments can lead to a peak demand reduction equivalent to a 464 MW power plant. This EPP has high peak load coincidence, high reliability and at a lifetime delivered cost of about US$ 0.01 (or about 8 fen) per kWh saved. The EPP can be installed for a utility cost of US$ 197 million (or a total of RMB 1552 million, discounted to 2005, assuming a first year investment of RMB 477 million and a second year investment of RMB 1144 million). If the costs are assigned equally to capacity and energy, the EPP can be built for approximately $200 per kW installed, and less than ½ cent per kWh produced. Additional EPPs could be built (and the resulting energy savings and peak demand reductions would accelerate), if the initial 2-year investment period were extended.

For Shanghai, preliminary results are similar (Asian Development Bank, 2005b): The analysis shows that these DSM investments can provide in two years the equivalent of a 179 MW power plant, at a delivered cost of about 8 fen per kWh saved and a utility cost of US$69 million (or a total of RMB 544 million, discounted to 2005, assuming a first year investment of RMB 146 million and a second year investment of RMB 424 million). If the costs are assigned equally to capacity and energy, the EPP can be built for approximately $200 per kW installed, and less than ½ cent per kWh produced.

Despite the fact that the EPPs can provide energy services at a quarter of the cost of the construction of new power plants, investments in DSM energy saving programmes under EPPs still require up-front capital investment. And, in contrast to the well-established practice of financing conventional power plants, lenders lack experience with such diversified programmes and are reluctant to provide loans. In addition, tariff structures currently do not allow utilities to charge customers for energy services provided

as a result of investments in increased efficiency. To overcome some of these barriers, the NRDC team has proposed developing these two EPPs under the CDM.

The Clean Development Mechanism (CDM) is a market instrument included in the UN Kyoto Protocol, which gives monetary value to greenhouse gas emission reductions achieved in developing countries. The Protocol (which entered into force for 140 countries and the European Union on 16 February 2005) contains legally binding emissions targets for so-called Annex I (industrialized) countries (which are to reduce their collective emissions of six key greenhouse gases by at least 5% on average over the period 2008 – 2012, compared with 1990 levels).

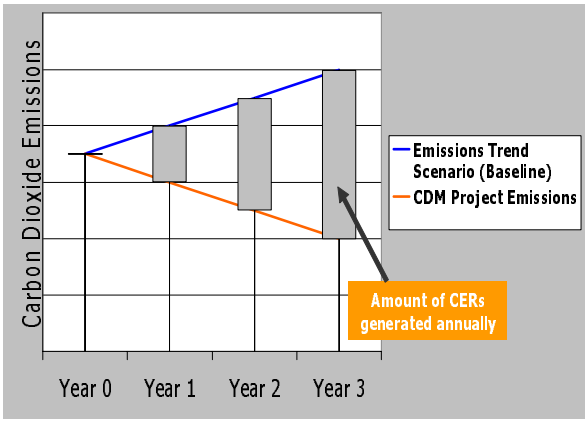
The CDM allows industrialized countries (and authorized private entities) to acquire credits for greenhouse gas emission reductions that result from the implementation of climate protection projects located in developing countries such as China, to which they financially contribute. The projects must also contribute to the sustainable development of the project host country.

Figure 1. Schematic Diagram of the Clean Development Mechanism

Source: Arquit Niederberger and Albrecht (1999)

The resulting credits (known as CERs or certified emission reductions) are fully fungible and can be used by private entities / governments to meet their domestic / international climate protection obligations. The amount of CERs generated by a project is based on the difference between the baseline emissions validated by a third party under the CDM rules and the actual emissions that occur after the EPP is built (see Figure 2).

Figure 2. Additionality and Calculation of CER volume



The Chinese Government has adopted a proactive CDM strategy and has established the necessary institutional prerequisites for CDM project approval. The Designated National Authority (National Development and Reform Commission) has already approved several CDM projects, and the Government is eager to see more demonstration projects, particularly in energy efficiency.

The Jiangsu and Shanghai EPP projects could demonstrate how China can actively leverage CDM funding to support its energy policy priorities (e.g., in the context of the Medium to Long-Term Energy Conservation Plan) and, in so doing, can draw on world-class Chinese CDM expertise (e.g., members of international CDM Executive Board and its Methodology Panel). Many other CDM experts have been trained under capacity building programs of bilateral donors, international organizations and development banks over the past couple of years.

Our preliminary calculations of the value of CO_2 emissions reductions achieved by the EPPs assume a market clearing price of RMB

40 per ton (ca. US$ 4.8/t CO_2)[26]. The following figures show the EPP capital investment cost in 2005-06 and the estimated value of the corresponding volume of CERs, for the Jiangsu Province (464 MW) and Shanghai EPPs (179 MW), respectively[27].

Figure 3. Jiangsu Province EPP Utility Cost & CER Value, discounted (464 MW)

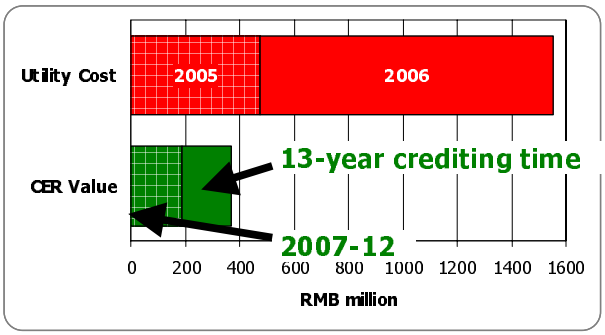
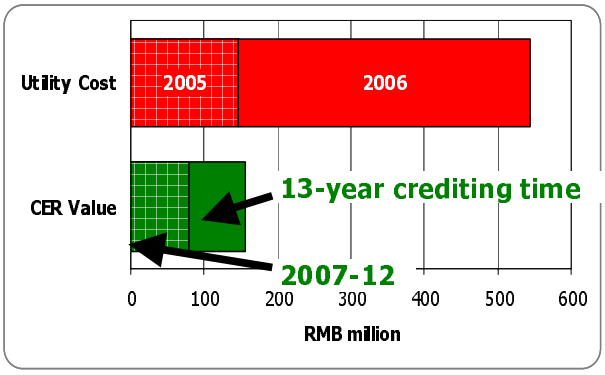


Figure 4. Shanghai EPP Utility Cost & CER Value, discounted (179 MW)



At this stage of project development, these estimates are still rough, as they are based on preliminary designs of DSM programmes and the resulting preliminary estimates of abatement costs, energy savings and GHG emission reductions.

With respect to the emission factor, a conservative approach was taken, relying mainly on data from case study analysis of a potential CDM project in Shanghai (World Bank, 2004). Although supply from the East China Power Grid (which transmits a significant fraction of hydropower from western China) is expected to increase, it was assumed for the preliminary CDM calculation presented here that the EPP will mainly substitute for new capacity that would otherwise have to be built on the Shanghai Grid. As the CO_2 intensity of electricity supply on the Shanghai Grid is already decreasing (shifting away from coal-fired generation to cleaner fuels & more efficient power plants), we assumed that the fuel rate of supply will continue falling at a rate of 1 gce / kWh annually. The result is an average baseline emission factor (built margin) for the period 2006-12 of 910 g CO_2/kWh for Shanghai[28]. For simplicity, we applied the same value to the Jiangsu EPP analysis, which gives conservative results.

These values resulted in cumulative greenhouse gas emission reductions for the 2007-12 period of 6.28 million tons of CO_2 for the Jiangsu EPP and 2.64 Mt CO_2 for the Shanghai EPP, whereas total emission reductions for the two years of investment are much larger (15.5 Mt CO_2 and 6.52 Mt CO_2, respectively), as they continue over the average 13-year lifetime of the energy saving equipment installed. Figures 3 and 4 therefore show the present value of CERs generated through 2012 (assuming revenues of RMB 40 / ton CO_2, as indicated above), as well as for the entire crediting period (assumed to be 13 years, for reductions implemented in 2006 and 2007).

Leveraging additional CDM financial resources from foreign sources is fully compatible with the EPP model (utility funding of demand-side management), and would have a number of advantages, including:

[26] As is the case in all emerging market situations, it is virtually impossible to predict the future price with any level of certainty, but this is below the current price of EU allowances (which has ranged from €7-9 / RMB 75-95 per ton over the past year and has recently exceeded €15 per ton) and UK allowances (currently trading at about RMB 50/ton) and is within the range of average prices reported for compliance-ready project-based reductions, which is between $4-5/ton (see, for example, Natsource, 2004). A team of Chinese and international experts have modeled an equilibrium price of $5.2-6.5/ton (World Bank, 2004)

[27] Values are given in 2005 present value, discounted at a rate of 6.4%.

[28] For details, refer to World Bank (2004), in particular, Annex I, Case Study 4, included in the CD-ROM that accompanies the study.

- providing a significant additional source of revenues from CER sales (or investment in CDM projects);
- contributing a secure hard currency revenue stream for debt servicing purposes (beginning with the second year of CER transactions, annual CER sales will amount to nearly RMB 48 million for the Jiangsu EPP and over RMB 20 million for the Shanghai EPP, which could easily cover loan repayment needs);
- reducing or eliminating possible rate impacts from utility-funded DSM measures;
- improving access to the most advanced technologies available; and
- ensuring full value for the Chinese contribution to global climate protection.

In conclusion, given the substantial hurdles to the implementation of large-scale utility demand-side management programmes and the effort required to devise credible, yet cost-effective baseline and monitoring methodologies for such complex projects, we believe the additionality of the two projects can be convincingly demonstrated. The projects are of strategic significance in demonstrating the feasibility and advantages of end-use energy efficiency DSM and integrated resource planning, and could be replicated many times over in Jiangsu and Shanghai, at the national level and internationally. Jiangsu and Shanghai are now considering various options for the funding and administration of these projects.

Refenence

Arquit Niederberger, Anne, and Christian Albrecht (1999): "Internationale Zusammenarbeit zum Klimaschutz: Chance für Wirtschaft", Umwelt Focus 6: 17-21.

Asian Development Bank (2005a): The "Efficiency Power Plant": A Rapid, Low-Cost Path For Energy-Saving Investments In Jiangsu. Prospectus.

Asian Development Bank (2005b): The "Efficiency Power Plant": A Rapid, Low-Cost Path For Energy-Saving Investments In Shanghai. Prospectus.

Bate, Roger, and David Montgomery (2004): Beyond Kyoto: Real Solutions to Greenhouse Emissions from Developing Countries, AEI Online (Washington), http://www.aei.org/publications/pubID.20982/pub_detail.asp

Hu, Zhaoguang (2004): "Demand side management: strategic option for sustainable development in China's power sector". Paper presented at 19th World Energy Congress, Australia.

IEA (2004): CO2 Emissions from Fuel Combustion: Highlights 1971-2002. Paris: OECD/International Energy Agency, 129 pp.

Larson, Wu, DeLaquil, Chen, and Gao (2003): "Future Implications of China's Energy-Technology Choices", Energy Policy 31: 1189-1204.

Natsource (2004): "Overview of emerging markets for greenhouse gas commodities: Understanding the role of risk in pricing," in Dornau, Robert (Ed.): Greenhouse Gas Market 2004: Ready for Takeoff. Geneva: International Emission Trading Association.

Optimal Energy and State Grid Corporation DSM Instruction Center (2005): DSM Strategic Plan for Jiangsu Province: Economic, Electric and Environmental Returns from an End-Use Efficiency Investment Portfolio in the Jiangsu Power Sector. Joint Report Prepared in Accordance with the Memorandum of Understanding Between the Jiangsu Provincial Economic and Trade Commission and the Natural Resources Defense Council (USA) on Cooperation in DSM Strategic Planning.

Optimal Energy and Shanghai Energy Conservation Supervision Center (2005): DSM Strategic Plan for Shanghai: Economic, Electric and Environmental Returns from an End-Use Efficiency Investment Portfolio in the Shanghai Power Sector. Joint Report Prepared in Accordance with the Memorandum of Understanding Between the Shanghai Provincial Economic and Trade Commission and the Natural Resources Defense Council (USA) on Cooperation in DSM Strategic Planning.

Regulatory Assistance Project and State Power Economic Research Center (2004): Demand-Side Management in China's Restructured Power Industry: How Regulation and Policy can Deliver DSM Benefits to a Growing Economy and a Changing Power System. Draft June 2004.

World Bank (2004): Clean Development Mechanism in China: Taking a Proactive and Sustainable Approach, 2nd Edition. Washington: The World Bank, 170 pp.
Note: English version: http://www.worldbank.org.cn/English/content/cdm-china.pdf and Chinese version: http://www.worldbank.org.cn/chinese/content/cdm_ch.pdf.