

# BECON NEWS

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## Special Update On the China Energy Conservation Project

### Overview

This edition of BECon NEWS updates readers on the China Energy Conservation Project, a cooperative effort between China's State Economic and Trade Commission (SETC), the World Bank and the Global Environment Facility (GEF). The project is introducing energy management companies (also known as energy service companies, or ESCOs) into China and catalyzing a system of robust market-oriented forces for achieving future energy efficiency improvements.

The project is being implemented in two phases: support for establishment and pilot demonstration of energy management companies (EMCs), and a program to support proliferation of the EMC concept throughout China. The three for-profit EMCs created in the demonstration phase are using performance contracting to finance energy efficiency upgrades in state-owned enterprises.

Efficiency improvements lower energy bills, reduce local pollution, and cut carbon dioxide emissions. The energy savings and carbon reduction objectives for the demonstration component of the project are shown below--these indicators include only a portion of the direct energy savings expected from the investments.

Year	1998	1999	2000	2001	2002	2003	2004	2005	2006
Energy Savings (Mtce)	0.04	0.2	0.5	0.8	1.3	1.7	2.1	2.8	3.6
Carbon Reduction (MtC)	0.03	0.1	0.3	0.5	0.9	1.2	1.5	1.9	2.5

Approximately 30 pilot projects using performance contracts are already underway in Beijing, Liaoning, and Shandong. Some of the pilots are completed, and approximately half of the initial investments have been recovered through energy savings.

More detailed information on the project is outlined in the following sections.

- ☞ *Project Rationale and Description*
- ☞ *Project Funding*
- ☞ *Project Implementation*
- ☞ *Review of Project Activities*
- ☞ *EMC Demonstration Experiences*

## Project Rationale and Description

In 1994, China, the World Bank, the GEF and the United Nations Development Programme published the findings of a two-year study entitled “China: Issues and Options in Greenhouse Gas Emission Control”. Among other topics, the report detailed over 25 case studies, mainly in the industrial sector, that indicated many energy conservation projects could be economically, financially, and environmentally attractive. Only a small portion of these projects could be carried out, however, due to the existence of market barriers.

The China Energy Conservation Project is designed to assist in overcoming these barriers by introducing new market-oriented energy conservation mechanisms and improved information dissemination.

The State Economic and Trade Commission conducted extensive discussions with World Bank officials from October 1994 to March 1995. These discussions concluded unanimously that a market-oriented energy conservation project was urgently needed. The GEF, European Commission (EC) and World Bank agreed to help fund the project. On the Chinese side, the State Economic and Trade Commission would function as the lead government executive organization. The Energy Research Institute (ERI) of the State Development and Planning Commission and the Beijing Energy Efficiency Center (BECon) would provide technical assistance.

### How Can Energy Performance Contracting Help Overcome Barriers to Energy Conservation in China?

The objective of energy performance contracting in China is to accelerate energy conservation and efficiency investment by removing two major barriers: (1) inadequate financial incentives, and (2) a lack of capital for project financing. Performance contracting taps market forces to provide greater incentives for financing energy efficiency investments. The EMCs undertake investment projects in "host" enterprises and finance the installation of new equipment. They recover their investments by sharing the value of the energy savings achieved at the host enterprises.

The project includes three components:

 **Energy Management Company Demonstration.** Under this core component, three demonstration EMCs have been developed as commercial businesses. The EMCs have adapted, operationalized and developed energy performance contracting, as used by ESCOs in other countries. The EMCs undertake investment projects in other “host” enterprises.

In the demonstration phase the EMCs finance the investment, shoulder the technical and financial risk, and initially own the equipment installed in the host enterprises. The EMCs implement energy savings projects in host enterprises after signing energy performance contracts. These agreements provide a series of services such as energy efficiency audits, project design, engineering, construction, monitoring, and oversight. The EMC is paid by the host enterprise from a share of the value of the energy savings actually achieved,

according to details agreed upon in the energy performance contract. The EMCs receive most of the money saved by the energy efficiency investment at the beginning, until it is fully compensated for the investment, operating costs, and risks, including a reasonable profit.

As developed in other countries, EMCs that select good projects and manage them well should earn profits for steady growth. The host enterprises incur less risk, provide no investment capital, and eventually own more efficient equipment and enjoy accompanying reduced energy costs.

The energy management company concept can overcome energy conservation barriers faced in China by using innovative financing mechanisms and market-orientation. Moreover, the potential for expansion of the EMC concept throughout the country is high given the strong entrepreneurial spirit found in most Chinese cities.

 **Information Dissemination Component.** This component supports the development of a new system to provide practical information on energy conservation project results to Chinese enterprise managers. The system is operated by the new Energy Conservation Information Dissemination Center (ECIDC), a not-for-profit organization established on 9 January 1998. The Center functions under a performance contract with the SETC's Project Management Office (PMO). Information will be provided by the Center free of charge. New information resources will be developed with particular emphasis on financial results actually achieved by enterprises, problems and solutions during implementation, impacts on main enterprise production or other key risks, and contact information on enterprises with relevant experience. Dissemination work will focus on influencing enterprise decision-makers, and ECIDC's performance will be evaluated based on how many enterprises actually use the information provided to implement energy conservation projects.

 **Program Management and Monitoring Component.** In order to ensure the entire project is successfully implemented, a Project Management Office (PMO) with a five-year lifespan was established within the SETC. This component supports the activities of two distinct units in the PMO:

- ✓ *The EMC Development Unit*
- ✓ *The Program Management and Monitoring Unit*

The purpose of the EMC Development Unit is to promote and assist the creation of new EMCs in China by any interested domestic or international parties. This unit: provides operational support and technical assistance for the implementation of EMC demonstration components, provides policy advice to the Chinese government, and implements a series of training activities for staff and experts nominated by the PMO. To maximize success of the entire project, it is necessary to develop a variety of different types of EMCs in many parts of China, including joint ventures with foreign funds.

The Program Management and Monitoring Unit has been responsible for guiding and leading operation of the three EMCs. It uses experiences from the existing EMCs' operation as a feedback tool for future planning.

## Project Funding Support

Financial support from the European Commission, the GEF and the International Bank for Reconstruction and Development (World Bank) provide unique and critical assistance to the project.

- **EC Grant** - In December 1996, the European Commission approved a grant of ECU 4 million (about US \$4.5 million) to provide initial support for EMC pilot projects before other funding support was available. The grant became effective in June 1997.
- **GEF Grant** - A GEF grant of \$22 million will be made effective in the beginning of 1999. Each EMC will receive approximately \$5 million of this grant to support implementation of pilot projects over all of the project lines. Another \$5 million will be provided to the Energy Conservation and Information Dissemination Center, and the remaining \$2 million will be used in the Program Management and Monitoring Component.

### *EMC Project Lines:*

*Each EMC has planned its business to including a series of planned and approved project lines, as illustrated in the following:*

- *Efficient Electric Lighting*
- *Efficient Electric Motor Drives*
- *Boiler Combustion Efficiency*
- *Electric Arc Furnace Renovation*
- *Steam & Air Hammer Replacement*
- *Furnace and Kiln Renovation*
- *Power Transformer Renovation*
- *Condensed Water Recovery*
- *District Heating Renovation*
- *Waste Heat Recovery*

- **IBRD Loan.** An IBRD loan of \$63 million will be onlent to the EMCs on commercial terms. IBRD, domestic counterpart loans, reinvested profits, and, increasingly, domestic commercial loans arranged by the EMCs will provide the capital for replication of successful pilot projects on a large scale and EMC growth.

## Project Implementation

### **Energy Management Company Demonstration Component**

The three EMCs are for-profit limited liability shareholding companies, established and registered in Beijing Municipality, Liaoning province and Shandong province in 1996

according to China's Company Law. The company shareholders are public entities or publicly owned corporations, but the EMCs are autonomous from the government, with independent accounting, independent management, and sole responsibility for their profits and losses.

The official names and shareholders of the EMCs are:

- Beijing Yuanshan Energy Saving Technology Company, Ltd.
- Liaoning Province Energy Conservation Technology Development Company, Ltd.
- Shandong Energy Conservation Engineering Company, Ltd.

All projects implemented by the EMCs are characterized by: (a) simple, proven technology; (b) straightforward monitoring and verification of energy savings; (c) rapid payback periods (generally within 3 years); and (d) careful selection of competent host enterprises.

### **Current Status of Pilot Project Implementation**

Most of the EC-funded pilot projects were implemented by the EMCs beginning in June 1997. A total of 30 demonstration projects are being carried out with investment of \$3.73 million. The EC grant accounts for about three-quarters of this investment (\$2.86 million). Through November 1998, the EMCs have been paid back about \$1.29 million, or about 46 % of their total investments.

**Beijing EMC** has invested \$1.21 million in 12 demonstration projects. The EC grant accounted for \$918,900 of the total. The Beijing EMC has been paid back approximately \$150,000 from the projects already. Most of the demonstration projects have entered into the stage of profit sharing. The Beijing EMC has already recovered its investment cost from one project: the Lugu Boiler Renovation Project.

**Liaoning EMC** has invested \$1.38 million in 8 demonstration projects of which the EC grant amounts to \$1.04 million. The Liaoning EMC has recovered \$944,700 from the projects. Most of projects have entered the stage of profit sharing. Among these, the investment costs of two projects have already been fully recovered.

**Shandong EMC** has invested \$1.13 million into 10 demonstration projects. The EC grant accounted for \$884,600 of the total. Shandong EMC has been paid back \$190,800 from the projects so far. Most of EC projects have also entered into the stage of profit sharing and the investment costs of two projects have been fully recovered. One of the projects (autoclave insulation), however, has failed because the "host" enterprise merged with another enterprise, and the project was cancelled.

Regarding the financial status of the EMCs, some of the companies' receivable profits have not yet been obtained due to the average account receivable period being longer than expected. The EMCs have thus made little profits since their inception. The energy saving profits returned to the EMCs will increase with time and growth. For now, the EMCs are enjoying relatively stable financial structure and good development trends.

## **Information Dissemination Component**

From April to October 1998, World Bank experts reviewed and critiqued a draft from the Energy Conservation Information Dissemination Center entitled "Project Implementation Plan for Information Dissemination". Since then, the Center and World Bank officials have held detailed discussions on the working plan for the first year of operations, especially regarding the service purchase during this period plan. This plan requires at a minimum that the Center deliver to government and local organizations: 10 case studies from different industrial sectors, 2 technical guides, an on-site workshop, a newsletter, and an annual report.

The groups also discussed how to properly work out the project performance indicators for energy savings. A working agreement was signed between the Project Management Office (PMO) and the Center. The PMO revised the draft "Project Implementation Plan for Information Dissemination," and drew up another document entitled "Requirements of the Annual Implementation Plan for the Center". The first document is a five-year business plan based on the experience of a company in the United Kingdom.

The other document is a contract between the PMO and the Center for monitoring annual operations. Additionally, the bidding of an "A package" of service purchases (capacity building and training of the Center) in the first year was finished according to the plan. The bidding of a "B package" (case study and monitoring service) is ongoing.

## **Program Management and Monitoring Component**

From 1996 to 1997, this component was mainly responsible for managing operation of the three EMCs, previewing project feasibility report, helping them to analyze the risk of the project and assisting the experts of the World Bank to approve the projects for each EMC. In the beginning of 1998, the World Bank required this component to preview the new project lines, if the three EMCs would intent to start the new project lines in the future. In August 1998, the Project Management Unit reviewed 6 new project lines for energy management performance contracting. The Unit approved 4 of these new project lines before submitting them to the World Bank for final approval.

A new management information system (MIS) software package is being developed to assist each EMC in financial management, project evaluation, decision-making, and client evaluation. WaterHouse Company was selected to undertake this task through competitive bidding. The PMO signed a contract with Waterhouse in October of 1998. The MIS package will be complete at the beginning of next year.

The EMC Development Unit, established in April 1998, has made progress by

- Setting up relations with local energy conservation centers and providing information to potential EMC developers in China. The Unit has worked extensively with the Tianjin Energy Conservation Center and helped transform it into an EMC. Other "old-style" energy conservation centers working with the Unit and considering the transformation to performance contracting EMC structure are: the Energy Conservation Center of the former Ministry of Chemical Industry, the Hebei Provincial Energy Conservation Center and the Jiangsu Provincial Energy Conservation Center.
- Providing assistance to other potential EMC developers and acting as a go-between with potential international partners who wish to set up joint venture EMCs in China.

Electricity de France and Henan No. 1 Electric Power Energy Conservation Company are exploring such a joint venture.

- Compiling EMC dissemination materials.
- Providing guidance to the Xinjiang Oilfield Energy Conservation and New Technology Company in implementing energy saving projects with EMC operation mechanisms.

### Activities Review

Various activities completed under the whole project include:

#### **Initial project preparation activities**

- In April 1996, Beijing, Liaoning and Shandong EMCs were first established. following advisory sessions with international experts on energy performance contracting concepts and a competitive process undertaken by SETC to select provinces to participate in the project.

#### **Subsequent major activities (from April 1996 to late 1998)**

- An assessment of international experiences in energy performance contracting by the PMO and three EMCs.
- Preparation of first-draft EMC business plans, including project development and scheduling, and corporate finance, with substantial international expert assistance.
- Initial training in project design, verification of energy savings, and development of contract models appropriate for Chinese conditions.
- Development of customized training materials, curriculum, and course delivery for a major two-part course for EMC project managers. The courses covered the technical and commercial aspects of energy performance contracting.
- Technical assistance on EMC financial management and development of relevant procedures and management information systems;
- World Bank/GEF China Energy Conservation Project delegation, led by SETC visited the United States and Canada in September 1996. Primary objectives were to hold bilateral discussion on implementing the schedule for the project. The delegation also visited several energy service companies (ESCO) in the US and Canada including Honeywell, Rose Technology, Johnson Controls and Public Service Conservation Resources.
- On 20 June 1997, the Chinese government signed the European Commission (EC) grant contract with the World Bank acted as a representative of the EC.
- On 3 July 1997, the SETC held a workshop in Dalian on “Mechanisms for Transformation of Energy Conservation Technical Service Organizations”. The workshop focused on informing government policy officials and provincial government

staff (14 provinces and cities and different energy saving centers) of energy performance contracting.

- ❑ On 23 September 1997, the Ministry of Finance (MOF) signed a subsidiary EC grant contract with the chairmen of the board of the three EMCs.
- ❑ On 31 October 1997, the World Bank mission formally approved the implementation plan of the "China Energy Conservation Project".
- ❑ On 15 November 1997, SETC organized a survey delegation to visit the United States and Canada. The delegation consisted of government and local energy conservation management officials, financial staff from central and local governments, and project managers from the PMO and the three EMCs. The main objective was how to better introduce and implement the new concept of energy conservation.
- ❑ On 26 June 1998, the Project Agreement, GEF Grant Agreement, and Loan Agreement were formally signed in Washington, DC by the Chinese government and the World Bank.
- ❑ On 31 August 1998, a workshop on "Energy Markets and Energy Conservation Project Financing in China" was held in Urumuqi, Xinjiang Province. The main purpose was to introduce new mechanisms of project financing and the potential for financing energy conservation markets. Representatives of the State Development Bank, China Industrial and Commercial Bank, and local banking bureaus were invited to attend this workshop.
- ❑ On 9 October 1998, a study tour organized by SETC visited Europe. Trip objectives were to understand European energy conservation markets, technical service, and governmental energy conservation policy. Members involved in the delegation were mainly project managers and financial staff of the three EMCs, and managerial staff from the PMO and provincial financial staff.
- ❑ In mid-November 1998, a Subsidiary GEF Grant Agreement and Subsidiary Loan Agreement were signed between the Ministry of Finance and the Local Finance Bureau, and between the Local Finance Bureau and the three EMCs.

### Experiences with EMC Demonstrations

#### **Relevant Issues Demonstrating EMCs in China**

Compared to ESCOs in Canada and the USA, Chinese EMCs are adapting energy performance contracting with a greater focus on industrial applications, and have developed a number of project concepts which have big market potential in China today but would not have a significant market in the West. The unique problems are reflected in the following:

- ❑ In North America, ESCO activities are focused mainly at the residential and commercial building sector and at hospitals. It is obvious that the benefits of energy savings are

conveniently measured. In contrast to these, the focus of EMCs' business in China is on industrial sectors. It is not easy to calculate and verify energy savings due to different industrial equipment and technical processes. It is therefore necessary to have domestic technical experts involved in examining and approving the project.

- Interest rates for domestic loans in China have fallen significantly over the past 18 months, leading to a reluctance to use EMCs when enterprises could borrow money themselves to make upgrades. If the internal rate of return (IRR) for a project exceeds 12 percent, clients often think that the interest rate of the EMC investment capital is too high. The client would like borrow directly from a bank and make the upgrades with their own technical and financial experts.
  
- In-depth capacity building for project manager is needed.

### **Defining the EMC Financial Structure in China**

Energy management companies are in many ways a unique type of business, combining aspects of an industrial enterprise with aspects of a bank or leasing company. Operating EMCs in China is a new process so it can be difficult to do so under existing Chinese law in terms of management of assets, taxes, and credit.

#### **1) Assets and Tax Management**

In China, existing EMCs can not manage their assets according to the regulations found in the leasing sector. EMCs need to apply for special approval if they want to conduct a leasing business. This same situation also exists in tax management.

#### **2) Financial Management**

According to the regulations governing loan applications from Chinese banks, loan recipients must be the ones who do project construction. In the case of EMCs which use performance contracting, they are regarded as financiers by banks. This can result in certain problems for EMCs later on.

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