

CHINA'S ESCO INDUSTRY:

Saving More Energy Everyday Through the Market

*Sun Xiaoliang and Zhu Lin
with Bob Taylor*

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Introduction

With energy performance contracting investment in 2010 totaling more than US\$ 4.24 billion, the business volumes of China's Energy Service Company (ESCO) industry are now on par with those of the ESCO industry in the United States. China's energy performance contracting business has grown remarkably fast during its 14-year history, developing contractual practices, business models and market approaches that are distinctly adapted to the Chinese market. China's ESCO industry is unique in its concentration of almost three-quarters of energy performance contracting investment in industrial sector projects. China's ESCO industry is poised for continued sharp growth in the coming years. Yet, just as its development to date needed to overcome many difficulties, many challenges remain to be tackled for the industry to continue to develop healthily.

The history, current status and characteristics of China's energy performance contracting business are as of yet not well understood outside of China. This report aims to provide a simple overview, primarily for international audiences. The report draws heavily on surveys conducted by the ESCO Committee of the China Energy Conservation Association, also commonly known as China's Energy Management Company Association (EMCA). The report also draws on surveys of non-EMCA members engaged in energy performance contracting as well as interviews of various experts and company representatives.

1. A Brief History of China's ESCO Industry

China's ESCO industry was launched as part of a deliberate plan by the Chinese Government, with support from the World Bank, Global Environment Facility (GEF) and several other international donors. China in the 1990s was in the midst of a transition from a planned to a market economy. Expertise and institutions engaged in the technical aspects of energy conservation had been developed under the planned economy of the 1980s, but avenues for deployment of these skills were changing as Chinese enterprises were becoming more independent from the government. Leaders in China's energy conservation community were enthusiastic about the potential for energy performance contracting by ESCOs as a new, market-based mechanism which might operate in the newly emerging market economy. In 1995-96 the World Bank and the Government agreed to mobilize technical and financial assistance to attempt to introduce and develop energy performance contracting for the first time in China. The China Energy Conservation Project was approved by the World Bank in March 1998, providing GEF grants of \$15 million and IBRD loans¹ of \$63 million

¹ The World Bank Group includes (i) the International Bank for Reconstruction and Development (IBRD), which provides non-subsidized ("hard") loans and other services to developing countries, (ii) the International Development Agency (IDA), which provides concessional-rate loans and grants to low-income developing countries, (iii) the International Finance Corporation (IFC), which provides investments and advisory services to build the private sector in developing countries, and (iv) the Multilateral Investment Guarantee Agency (MIGA) which provides political risk insurance to the private sector.

through the government equally to three new pilot Chinese ESCOs under its main project component.

Piloting the Energy Performance Contracting Concept

Start-up. Many obstacles existed from the very beginning, as the idea of energy performance contracting was completely new and untested in China. Three key challenges at the outset included (i) formation of the new pilot ESCOs, (ii) introducing the details of the new mechanism from abroad and adapting it to Chinese conditions, and (iii) securing counter-guarantees for the IBRD loans.

Box 1. What is Energy Performance Contracting and What are Energy Service Companies (ESCOs)?

While definitions vary, energy performance contracting is generally understood as an energy efficiency project implementation model where one company provides a package of services to a second, host company, and guarantees the energy savings result. Typically the service company provides or helps arrange most of the financing of the project, and is compensated from the energy cost savings achieved. Internationally, an Energy Service Company (ESCO) is generally understood to be a company which undertakes energy performance contracting with host companies.

China's new "General Technical Rules for Energy Performance Contracting (National Standard GB/T 24915-2010), issued by China's National Standardization Management Committee in August 2010, defines energy performance contracting as "an energy conservation service mechanism whereby an energy service company and energy user entity contractually agree on the energy savings target of an energy conservation project, the energy service company provides necessary services for realization of the energy savings target, and the energy user entity pays for the energy service company's investment and reasonable profit from the energy saving results."

The General Technical Rule defines an energy service company in broad terms, including all companies that provide all types of energy efficiency services, and not necessarily energy performance contract service. As during the first and second China Energy Conservation Projects and in EMCA's surveys, however, the term ESCO in this paper includes only energy efficiency service companies that have successfully completed at least one energy performance contracted project.

Following an open canvassing of interest in China's provinces, China's State Economic and Trade Commission (SETC)² accepted proposals from Liaoning Province, Shandong Province and Beijing Municipality to implement the piloting effort. It was decided to form new companies which would be fully dedicated to pioneering the new energy performance contracting business. A new shareholding company was created in each province in early 1996, registered under China's new Company Law, which had become effective less than two years earlier. Provincial supporters mobilized a minimum of RMB 20 million (\$ 2.4 million) each of equity investment from different companies, including provincial government investment companies, electric power companies, and

² The State Economic and Trade Commission was subsequently merged in 2003 with other central government agencies to become the National Development and Reform Commission, which then assumed the SETC's responsibility for government oversight of development of ESCOs.

other enterprises. Asked to provide capital upfront for a completely untested business model, with World Bank and GEF financial support not yet approved, the risk to investors was high.

Support for learning about experience in North America and Europe with the ESCO business models and its adaptation to markets in the three provinces was provided with a timely grant from the European Commission (EC). A first step was detailed introduction to the technical, financial management and business development aspects of the specialized energy performance contracting business model. Then international advisors worked at each company for several months to develop initial project pipelines. Especially important, the EC grant combined support for technical assistance with support for immediate implementation of small, trial investment projects. Both good and bad initial lessons learned from these early projects were critical for laying the operational foundation of the new ESCOs. Business models, target technologies and markets, and basic energy performance contract templates reviewed from abroad were all adjusted substantially during this first year to conform with experiences in the Chinese market.

While the experience gained during 1997 and the presence of partial GEF grant support helped to mitigate risks somewhat, execution of the final agreements for the \$63 million IBRD loan was a major final hurdle. Hard principal and interest repayment guarantees were required upfront from each company by the central and provincial governments, in order to ensure repayment to the World Bank. Yet the prospects of the companies were highly uncertain, being engaged in an entirely new business and with limited equity resources. Investors in one province balked at the last minute at the hard loan security demands from financial authorities, almost scuttling the project in that province.

Implementation. Once all hurdles were overcome, the Energy Conservation Project had a major advantage compared with some other projects internationally aiming to support ESCOs in that it provided the ESCOs with a dedicated, large line of credit from the start. This allowed the ESCOs to focus almost exclusively on the key challenge of making the new mechanism work.

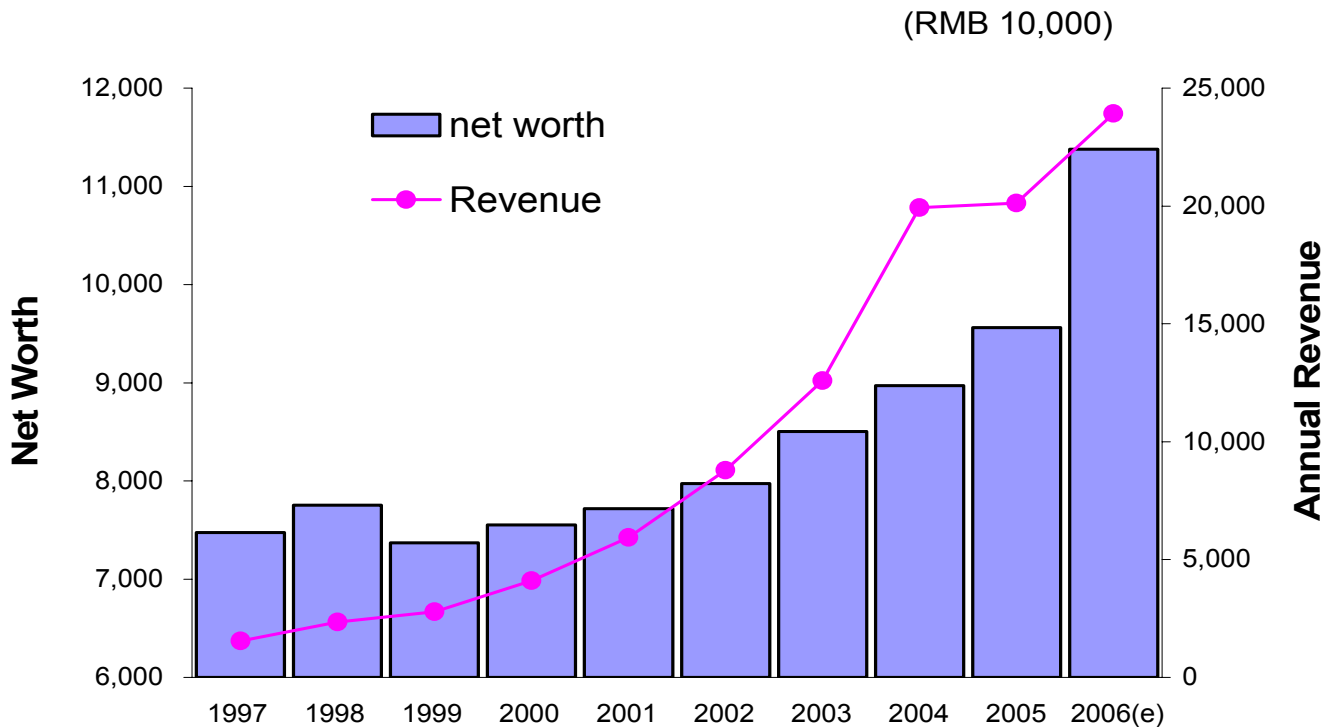
The three companies each focused on a series of “project lines”, within which the companies sought to line up technically similar investments in a series of host enterprises. All projects were implemented with the “shared savings” energy performance contracting model. Each company began with a mix of simple commercial lighting projects, industrial boiler and furnace renovations, industrial variable speed drive motor applications, and various relatively simple industrial equipment retrofits. Within one-two years the simple lighting retrofit market was conceded to lighting manufacturers. Each company began to develop its own personality and market approach. Liaoning Energy Management Company (EMC)³ focused strongly on industrial boilers and kilns, and began to expand its roster of technical staff to develop increasingly diverse and sophisticated industrial projects. Following changes in the economy of Beijing Municipality, Beijing EMC began to focus less on industrial projects and more on commercial and residential building energy savings and coal substitution projects. Shandong EMC maintained its strong focus on industry, and gradually

³ The Chinese ESCOs were termed “Energy Management Companies” (EMCs or EMCo’s) in order to clearly differentiate them from other existing types of companies involved in energy conservation services, such as energy auditing service companies. This term remains common today. Liaoning EMC (Liaoning Province Energy Conservation Technology Development Co.) has now merged and evolved into the Nengfa Weiye Group. Beijing EMC retains its original name as Beijing Yuanshen Energy Saving Technology Co. Shandong EMC (Shandong Energy Conservation Engineering Co.) has evolved into the Shandong Rongshihua Leasing Co., after obtaining a financial leasing license.

increased the size and sophistication of its projects, with an emphasis on developing long-term relationships with key industrial clients.⁴

As the three pilot ESCOs began to ramp up the new business in 1998-2000 they encountered numerous problems. Some stemmed from lack of familiarity with the idea in the marketplace. Others stemmed from difficulties in the financial and legal regulatory systems to categorized the business, which combines service aspects, equipment procurement and sale, and project financing. Some financial auditors had difficulty with the notion that the companies' assets were located on the premises of other enterprises. Arguments began as to how accounting should be done and how the companies should be taxed. At one point, each of the three had reported their accounts using a different business classification: one as a service company, one as an equipment vendor, and another as a financing entity. Some local authorities began to declare that the energy performance contracting business was illegal. As these problems surfaced, senior authorities in the SETC worked with local officials to research the issues and find solutions. Without this strong and steady central government support, the nascent ESCO industry would most likely have floundered.

Figure 1. Financial Performance of the Three Pilot ESCOs, 1997-2006



Source: World Bank, China Energy Conservation Project Implementation Completion Report (World Bank, 2007)

Instead, the three pilot companies continued to ramp up their investments, now using profits from earlier projects to add to financing from the IBRD loan. Total energy performance contracting

⁴ The NDRC/WB/GEF China Energy Conservation Project Management Office published a definitive collection of 357 case studies of energy performance contracting projects implemented by the three pilot ESCOs in Energy Conservation Project Case Studies of Chinese ESCOs (in Chinese, China Economic Publishing House, 2006).

investments rose to over \$20 million per year during 2002-2004, and then over \$30 million per year during 2005-6. Total energy performance contracting investments reached \$181 million by June 2006, when this part of the China Energy Conservation Project closed.

As shown in Figure 1, the three companies showed strong revenue growth from the beginning. After a slow start, profits were declared by each during the last four years of the project, producing strong growth in net worth during 2002-6. The success of the companies implementing energy conservation projects and generating profits attracted the attention of others.

Development of New ESCOs and Introduction of Commercial Financing

By November 2001 about six small new ESCOs had been formed by interested independent groups and some 15-20 other companies were beginning to test the energy performance contracting concept. Many more were expressing interest. The two biggest constraints faced were lack of practical knowledge and understanding of how to operate the business model (both among ESCOs and host enterprises) and lack of access to capital to finance projects. The Chinese Government and World Bank began to prepare the China Second Energy Conservation Project to help meet these needs. GEF financing of \$26 million for the World Bank-executed project was approved in September 2002 and implementation was completed in June 2010.

The Birth of EMCA. To help meet needs for information dissemination and training in the new business concept, the SETC established a new EMC Development and Service Group in March 2001. The United Kingdom's Department for International Development (DfID) provided key financial support. The Group was able to hire full-time staff, prepare training manuals, design and deliver training courses, and organize workshops for government decision-makers, interested companies and banks. In December 2003 the Group was transformed into EMCA, a new legal entity operating as a type of sub-association of the China Energy Conservation Association. EMCA held its founding members' Launch Meeting in April 2004, with 59 companies as charter members.

Now in its eighth year of operation, EMCA has played a key role as a focal point for promoting the energy performance contracting concept to all parts of society, researching key problems and promoting solutions, and assisting its members to expand business. EMCA's membership increased to 560 members by the end of 2010, of which 428 have implemented energy performance contracting projects. GEF financial support under the Second Energy Conservation Project was important at the outset, but this special financial support gradually declined as planned. EMCA has been fully self-supporting since 2008. EMCA's Energy Service Website and monthly "ESCOs in China" journal are well known and appreciated. The Association continues to update its training materials every year and has delivered almost 100 training courses and workshops, with increasingly focus on special topics. Building on its in-depth understanding of the industry from its members, in part from its annual national survey, EMCA has organized experts and researched pressing issues facing China's ESCOs. Subsequently, EMCA has been able to play a successful role assisting the government to develop key new supportive policies for the industry. From its inception, the Association also has focused on cooperation with a variety of financial institutions to try to increase mutual understanding between ESCOs and financiers, and to promote increasing access to commercial finance for its members. EMCA has maintained a strong focus on ESCO market development activities, and has promoted increased cross-member cooperation, including joint efforts for larger projects. Finally, the Association has become a focal point for exchange with other countries on ESCO development.

Improving Access to Financing. After the successful market operation of the new model by the first three ESCOs, a subsequent challenge was to attract financing from regular domestic commercial lending institutions to assume the financing role initially taken by the government-backed

World Bank loan. Inadequate access to financing is a leading problem in ESCO development in virtually all countries. Some problems arise from the nature of energy efficiency projects in general, such as transaction cost issues or the fact that these operating-cost-saving projects often involve less easily collateralized fixed assets compared to capacity expansion projects. But ESCOs typically also encountered additional problems. One problem is a common lack of familiarity with energy performance contracting in the financing industry. Another problem is the inherent difficulties that small enterprises with limited equity face securing loans for projects or even providing suitable financial backing for energy savings guarantees. Moreover, as new companies typically developed by technical experts, many new ESCOs had little experience in how to successfully navigate through the financing world. Making the case of China's ESCOs yet even more difficult was the fact that financial sector reforms were yet largely incomplete at the turn of the century. With little prospect for reward in the system for taking risks, Chinese banks perceived little to gain by getting involved in the new business.

One program that helped reduce some of these problems and help projects move ahead was the EMC Loan Guarantee Program operated by China National Investment and Guaranty Company (I&G) with GEF and government support under the Second Energy Conservation Project. US\$ 22 million was placed in a reserve account to help cover the risks of default on guarantees for commercial loans from Chinese banks for energy performance contracted energy efficiency projects. I&G issued loan guarantees for 148 ESCO projects during 2004-2009. Guarantees totaled RMB 517 million (\$69 million) supporting RMB 918 million (\$123 million) in energy performance contracted project investment. As non-recoverable default losses were exceptionally small, the \$22 million in the reserve account remained in place at the end of the World Bank project, available for continued support of energy efficiency investments.

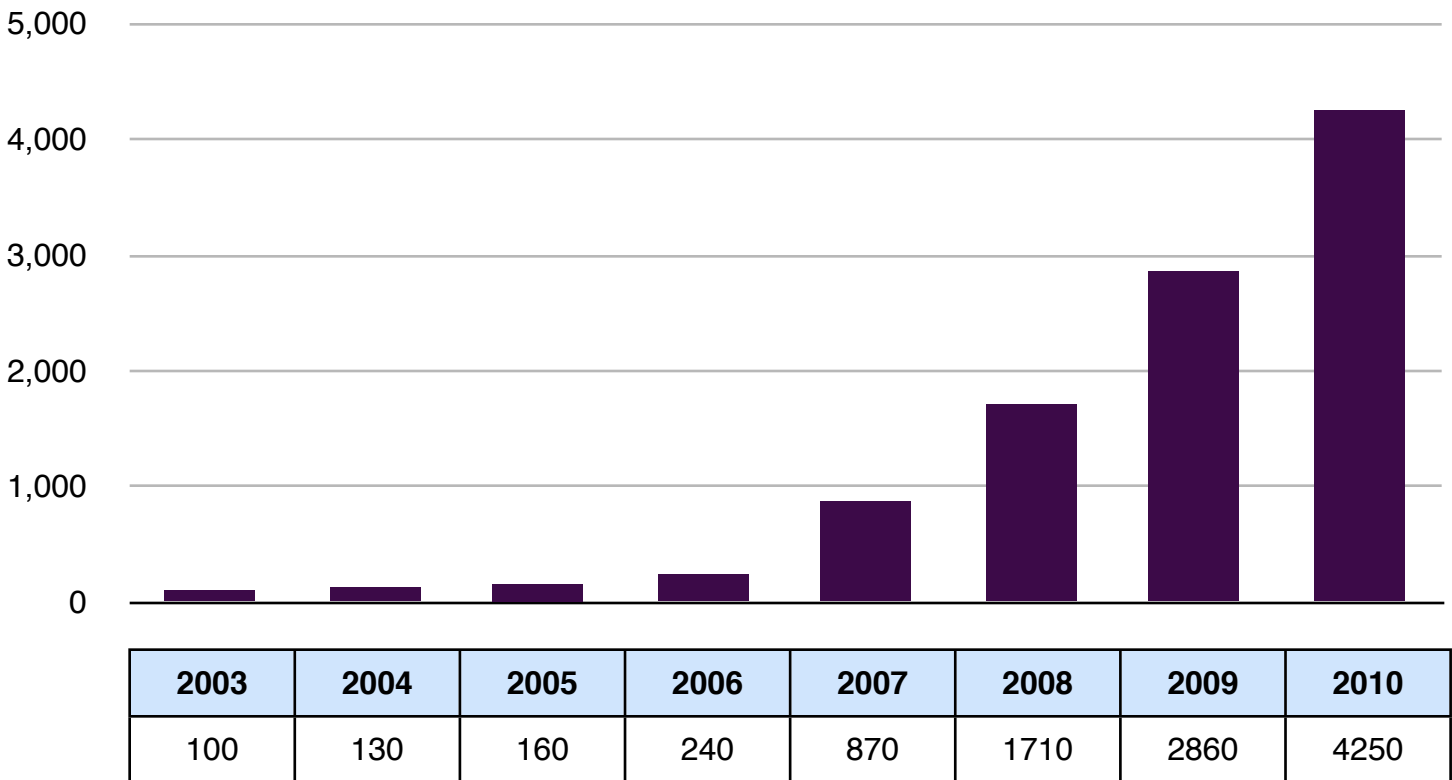
While the lending support to China's new ESCOs was important, perhaps the greatest value of I&G's program was to operationally introduce the new companies to the financing world, and the new energy performance contracting business to the banking industry. I&G developed a dedicated team singularly focused for six years on making financing arrangements for ESCOs work. The guarantee company guaranteed loans to 42 different ESCOs, most of which were privately owned. Two-thirds of these ESCOs received their first bank loan ever under the program, and subsequently were able to build experience and credit records with financial institutions. I&G developed specialized technical and credit appraisal methods for the energy performance contracting business catering to Chinese banking customs. The guarantee company partnered with 12 different banks and six provincial guarantee companies, introducing them to the business and executing transactions. I&G developed new financing approaches as the program evolved. I&G issued guarantees for multi-project lines of credit to 12 different ESCOs with project experience, backed in part with the accounts receivable of the ESCOs from previously executed projects.

A number of ESCOs also benefited from the China Utilities-based Energy Efficiency Financing Program (CHUEE), implemented by IFC with participating Chinese banks. Approved in 2006, the partial-risk loan guarantee and technical assistance programs of the project supported energy efficiency loans of \$512 million during 2006-9, involving two banks. While the project's objective has been to support all types of energy efficiency investments, rather than solely energy performance contracting, about one quarter of the loans so far have involved ESCOs in some way.

Despite the progress achieved, insufficient access to commercial financing remains a central problem for many ESCOs today. Continued focus, innovation and support are required. Still, the programs of 2004-9 were a key element for the successful growth story of the industry during these years. They also have laid a foundation of experience, understanding and creativity to make continued progress in the future attainable.

The Growth of China's ESCO Industry. The existence of successful pilot company examples, the steady encouragement of the Chinese Government, the specific support programs put in place, market dynamics, and high energy user interest in energy conservation resulting from the Government's aggressive 2006-10 energy conservation campaign all combined to produce a period of exceptional growth in China's ESCO industry during 2004-9. Moreover, this growth is virtually certain to continue strongly in the coming years.

**Figure 2. Total Energy Performance Contracting Investment in China, 2003-2010
(million US Dollars)**

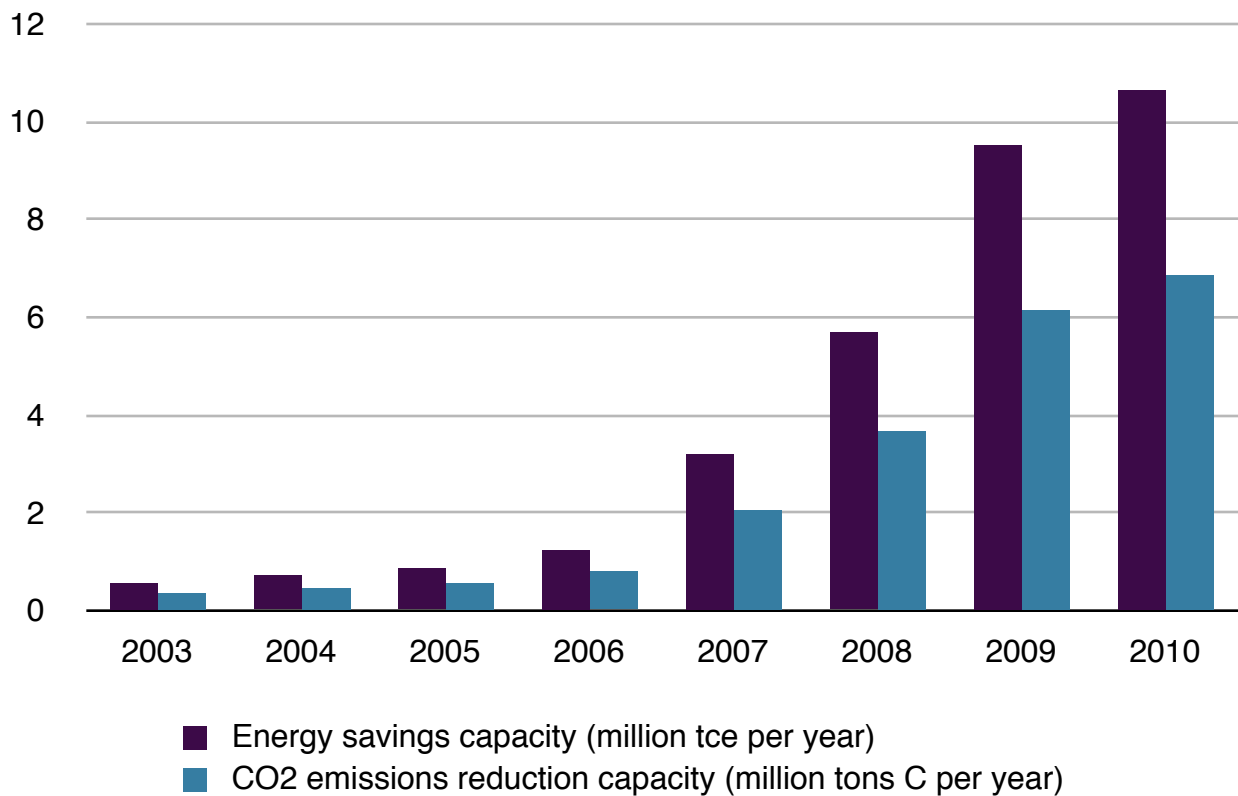


Source: EMCA, "2010 China ESCO Industry Summit Meeting Proceedings," January 2011. EMCA data relies on annual surveys of EMCA members and EMCA estimates for non-EMCA members. 2004-9 figures differ slightly from World Bank/GEF Second Energy Conservation Project Project Management Office statistics. Figures are rounded to the nearest \$10 million. Exchange rates used: 2003: RMB 8.27/\$, 2004: RMB 8.27/\$, 2005: RMB 8.0/\$, 2006: RMB 7.8/\$, 2007: RMB 7.5/\$; 2008-9: RMB 6.84/\$, 2010 RMB 6.77/\$.

As shown in Figure 2, investment in energy efficiency projects using energy performance contracting has grown exponentially, rising from about \$100 million in 2003 to \$4.25 billion in 2010. Of this total, ESCOs that were EMCA members invested \$3.14 billion in energy performance contracts, while non-EMCA members invested \$1.11 billion. Further strong energy performance contracting growth continues to occur in China in 2011.

Total energy savings and associated reductions in carbon dioxide emissions have climbed sharply along with these investment levels. The energy savings capacity of new assets created during the year of 2010 through energy performance contracting rose to about 10.6 million tce⁵ per year, despite increases cost of generating energy savings capacity over the decade. The corresponding development of new carbon dioxide emission reduction capacity has also risen sharply, with about 6.9 million tons of carbon reduction per year of capacity created in 2010 alone (see Figure 3).

Figure 3. Total Energy Savings and Carbon Dioxide Emissions Reduction Capacity Created from Energy Performance Contracting Investment in China, 2003-2010



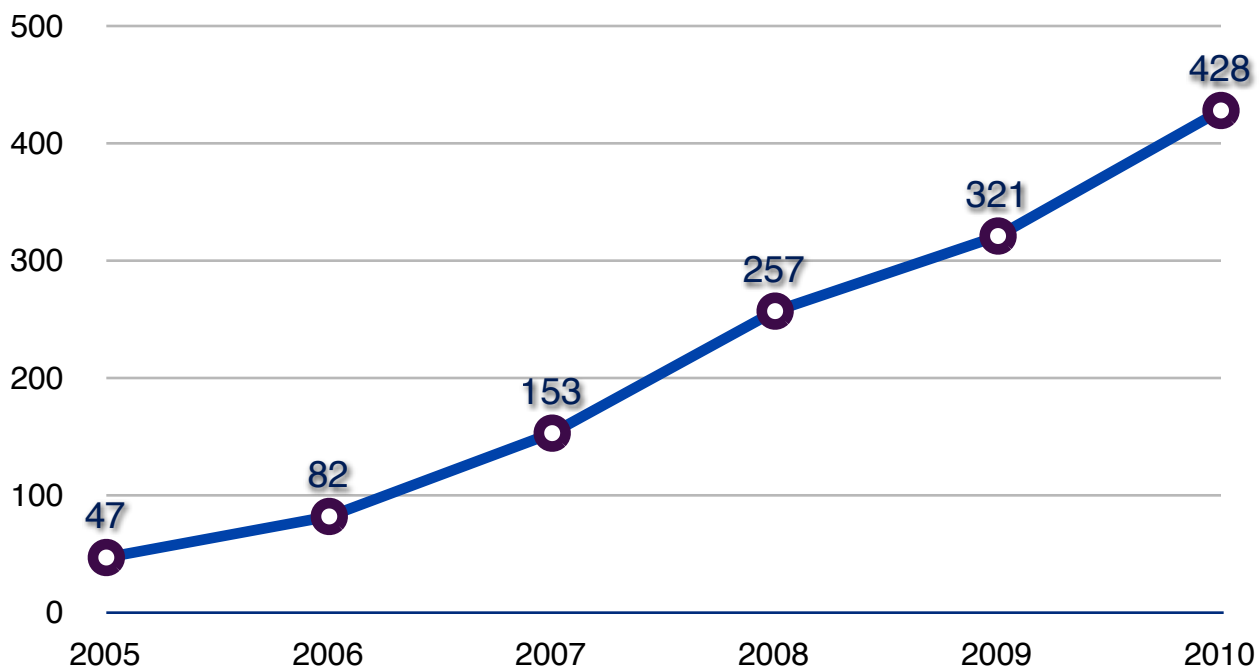
Note: Energy savings and carbon dioxide emissions reductions capacity created is the amount of energy savings and emissions reduction which can be expected every year over the lifetime of the energy savings assets created by the investments. Average asset lifetimes for energy performance contracting investments in China may be around 10 years. So, for example, if energy savings capacity of 100,000 tce are created from a new installation which then generates energy savings for ten years, total energy savings over the asset lifetime would be one million tce.

Source: EMCA estimates based on investment data in Figure 2, estimated energy savings capacity per unit investment rates of RMB 1520/tce during 2003-6, RMB 2050/tce during 2007-9, and RMB 2700 in 2010, and tons of C emission reduction of 0.645/tce.

⁵ One tce is equivalent to 7 million kilocalories or 29,300 million joules.

The total number of companies which have registered as ESCOs in China reached over 900 by the end of 2010. However, many of these are small companies, and may have tried only one or two energy performance contract projects. Quite a few have formed only recently. The number of ESCO members in EMCA has grown sharply, from 47 in 2005 to 428 by the end of 2010 (see Figure 4). In 2010, ESCOs accounted for about three-quarters of EMCA's total membership (the balance includes a variety of other types of entities involved in energy conservation).

Fig. 4 Number of ESCO Members of EMCA, 2005-10



Source: EMCA

While many factors have contributed to the remarkable growth in China's ESCO industry so far, perhaps the most important include:

- Strong and steady government support, which was absolutely essential in early stages but also critical to underline the legitimacy of the industry as it strived to grow.
- Introduction and scale-up of the energy performance contracting business based on a multi-year, strategic approach. Creation and financing of the dedicated pilot EMCs to operationally demonstrate the concept, the creation and operation of EMCA, and the development of special financing programs were especially important.
- Adjustment of the energy performance contracting business model by Chinese companies to match China's market and fast-paced, relationship-based business environment.
- High demand for energy efficiency investment projects in general, spurred in particular by the country's efforts to reduce energy consumption per unit GDP by 20% during 2006-2010.

2. The Characteristics of China's ESCO Industry in 2009-2010

While the general principles of energy performance contracting are the same in China as in other countries, dominant markets, business models and business practices are quite different. As elsewhere, China's energy performance contract business focuses on development of energy efficiency projects with contractual energy savings guarantees, ensuring that investment costs can be paid from the energy savings achieved by the client. Energy performance contracts lay out the service, financing and project implementation obligations of both the ESCO and the client, as well as who is responsible for covering which risks. Different from in North America or Europe, however, industrial enterprises are the dominant clients for energy performance contracting in China. The building sector also is important, but commercial clients also are dominant in the building sector as well. Use of energy performance contracting by public sector clients is really just beginning in China. The focus on commercial clients has helped lead to a fast-paced business centering on projects which can conclude within three years or less. Clients are especially interested in off-balance sheet financing arrangements by ESCOs. Many projects are relatively simple, focusing on a single technology or system renovation. Without the implicit presence of government behind contracts with the commercial entities, as would be the case with public sector clients, repayment risks are the number one concern of Chinese ESCOs. With familiarity and trust in arms-length contract-based business arrangements much less developed in China compared with North America and much of western Europe, reliance on relationships is a key part of the Chinese energy performance contracting business.

Basic Types of Chinese Energy Performance Contracting Models

Energy performance contracts in China are generally classified into three types, or "modes." Although the characteristics of each mode are similar in many respects to those bearing the same English language name, there are differences, and therefore the Chinese categorization cannot truly be used interchangeably with categorizations in other countries. In all cases, ESCOs undertake detailed project design, manage most project implementation aspects, and guarantee energy savings performance. However, financing, contract and asset ownership arrangements vary.

Shared Savings Contracts. In this mode, ESCOs provide the bulk of project financing and are compensated for their investment and services by their client from a portion of the energy cost savings resulting from the project. The assets created by the project are owned by the ESCO until contract completion, when they are transferred to the client, usually for no charge. The minimum energy cost savings stream from the project is estimated by the ESCO in the contract, usually conservatively, and acknowledged by the client. In most cases contracts provide for payment streams to the ESCOs based on an agreed percentage share of the agreed estimated minimum cost savings scenario, as long as project savings monitoring arrangements verify that at least the agreed level of energy savings has materialized with normal asset operation. Any additional savings are usually 'given' to the clients. As long as the project is implemented with the basic results originally expected, these contracts typically result in a predictable payment stream. Although there are cases where payment streams vary every payment period, based on ongoing measurements of actual saving during the contract period, such cases are in the minority. Hence, most Chinese shared savings contracts are actually not the same as the traditional 'shared savings' contracts as defined in North America--they are probably closer in principle to the "ESCO-financed guaranteed energy savings contracts" typically used for federal government energy performance contracting in the US.

As described later, shared savings contracts currently are the only energy performance contracting mode recognized for the Government's new energy performance contracting financial incentives. Hence, this mode of operations is likely to further expand, and probably will become more standardized.

Guaranteed Energy Savings Contracts. In these contracts, clients provide the bulk of project financing themselves. Assets generated belong to the client. In addition to design and implementation services, ESCOs guarantee the energy savings levels from the project. To be considered proper energy performance contracting, failure to achieve the guaranteed energy savings amounts must have direct financing consequences to the ESCO.

Outsourcing Contracts. In this mode, ESCOs finance and develop energy savings assets within the client's facilities, and operate these assets over an extended period for agreed compensation, which is linked in one way or another to the energy savings achieved. The ESCO owns the assets, and transfers them to the client at the end of the contract, which may be 8-10 years. One common example is the development of on-site "BOT" power generating facilities using waste heat or byproduct gas from the plant. The ESCO erects and operates the plant, purchasing the energy resource for a small fee or no charge, and selling the electricity to the plant at a rate well below the plant's purchase price from the grid. Another case is where ESCOs develop or purchase local district heating assets, undertake energy efficiency renovations and operate the system, and receive remuneration from the larger difference between heat sales revenue and fuel costs. In a final example, an ESCO develops, purchases or leases the lighting and/or space conditioning assets of a building, undertakes energy efficiency renovations, operates the systems, pays the building's electricity bills, and charges the building owner or occupant fees for predefined lighting and/or space conditioning services, at costs lower than before the ESCO's involvement.

ESCOs and their clients have developed many variations on these modes, different types of financing arrangements and different types of risk-sharing regimes. Companies with leasing licenses are beginning to offer financial leasing contracts developed around energy efficiency projects. Some companies are beginning to look at the development of special purpose companies for large projects involving several ESCOs working together.

Contract provisions and monitoring and verifications (M&V) schemes are typically far simpler than in North America. For the many projects which involve relatively simple equipment replacement or renovation, minimum energy savings estimates are relatively easily agreed between ESCOs and clients. If the equipment operates at commissioning as expected energy savings may then be stipulated and payments schedules agreed in the contract then confirmed. Many contracts specify a "normal" operating regime which is used to calculate stipulated savings, and payments to the ESCO accordingly. Risks of operating regime changes usually fall to the client. Energy prices for calculating energy cost savings streams also are typically set out in the contract, so that the benefits or risks of energy price changes also fall to clients. Of course, where clients have specific needs or concerns, ESCOs often will vary contractual arrangements. However, if ESCOs are looking to banks or other financial institutions for project loan financing, it is important for project payment regimes to be as fixed and predictable as possible. Generally speaking, the greater the contingencies on the payment stream, the more difficult it is to secure outside financing.

ESCO Markets

EMCA's annual membership surveys---including specific reports on 1256 completed energy performance contracting projects during 2007-9--show that while the industrial and building sectors each account for about one half of the projects undertaken, industrial sector projects account for about three-quarters of total energy performance contracting investment (see Figures 5 and 6 below). All-China Marketing Research Company's survey of energy performance contracting by non-EMCA members during 2008-9 also shows a concentration of investment in the industrial sector, at 76% of total investment, and a higher share of industrial projects, comprising 65% of total projects.

Fig. 5 Energy Performance Contracting Projects by Sector, 2007-9

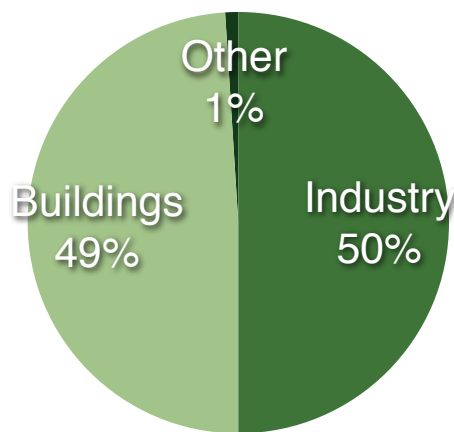
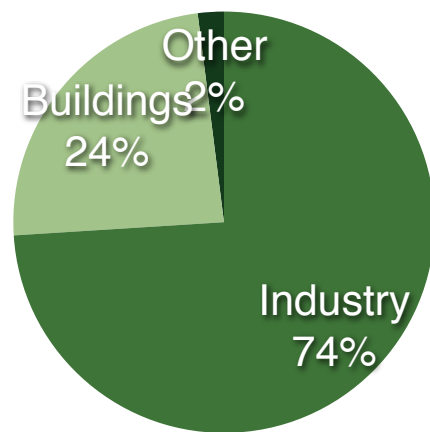


Fig. 6 Energy Performance Contracting Investment by Sector, 2007-9



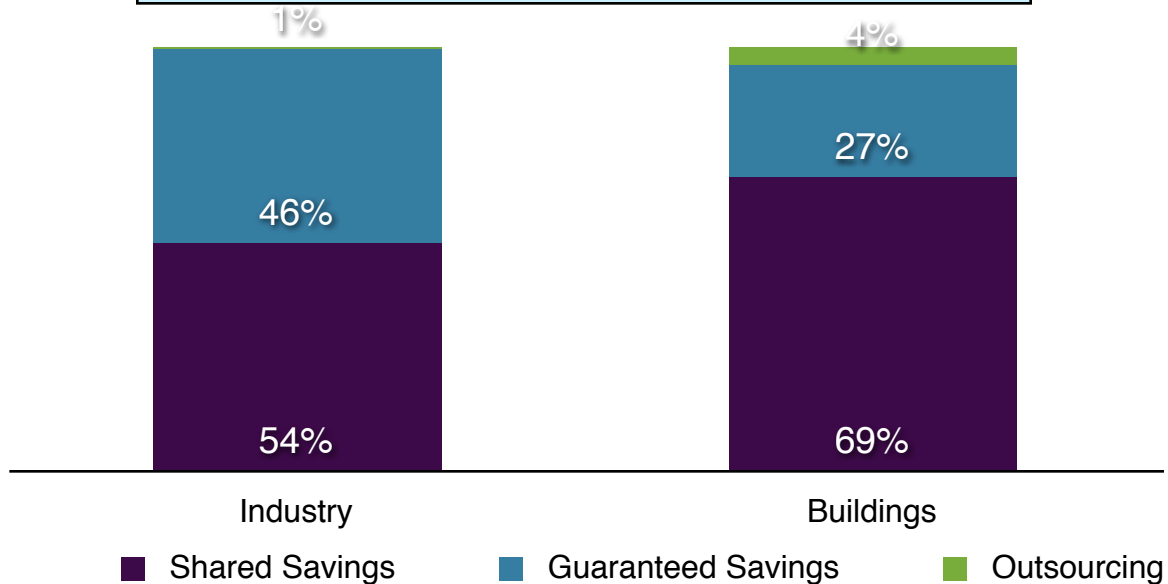
Source: EMCA 2007, 2008 and 2009 Member Surveys

Among the total number of energy performance contract projects reported in EMCA member surveys during 2007-9, 61% were shared savings contracts, while about 36% were guaranteed savings projects. In industry, however, shared savings contracts accounted for only 54% of total projects, while guaranteed savings accounted for 46% (see Figure 7). Buildings projects provided a contrast, where shared savings projects accounted for 69% of the total.

Generally, speaking most clients prefer shared-savings contracts if they can be provided at reasonable cost because the ESCO provides the financing off of the client's balance sheet. Shared-savings projects can be a very attractive business proposition for the client, who need not provide most of the upfront funds nor pay the ESCO if the energy efficiency guarantees of the project are not met. At the end of the contract period---usually three years or less--the client will receive the assets and future continued energy savings at no charge, and the asset will have been paid for entirely from the savings generated during the contract period.

However, guaranteed savings contracts also have played an important role in the business in China. In some cases, guaranteed savings contract business may evolve as an extension of

Figure 7 Share of Energy Performance Contracted Projects of EMCA Members by Mode, 2007-9



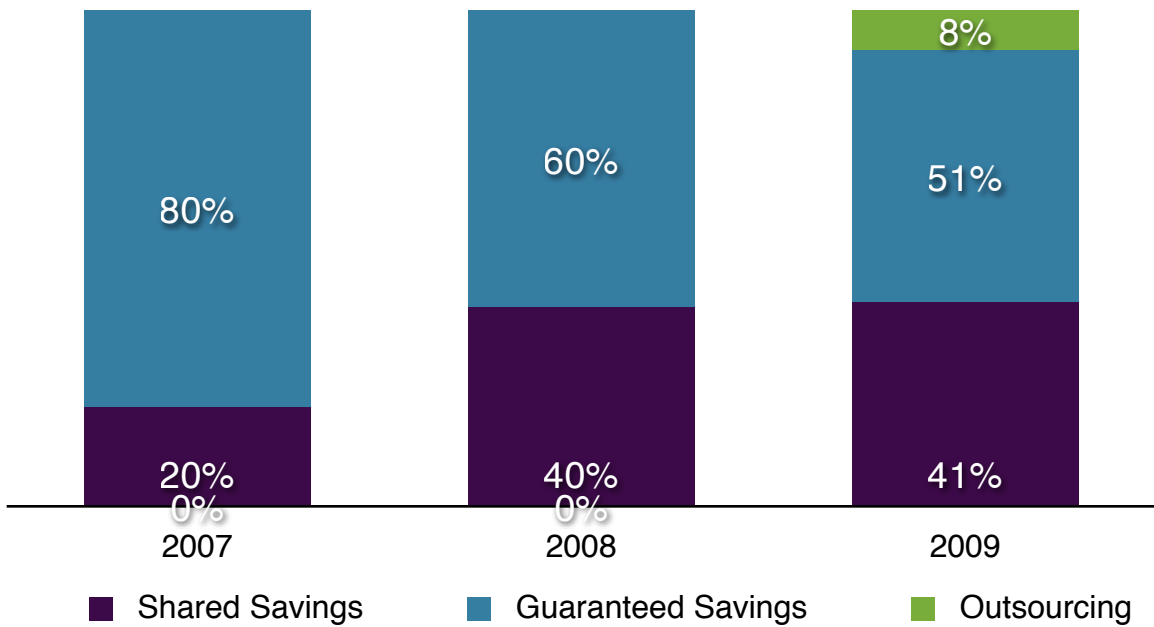
Note: EMCA's Member Survey for 2009 also includes five projects listed separately as financial leasing projects, which are not included here or in subsequent analysis.

Source: EMCA 2007, 2008 and 2009 Member Surveys

regular equipment sales business --in addition to providing standard warranties, vendors may offer energy savings performance guarantees as a means to help expand sales. But the role of guaranteed savings contracts also relates to the capacity of ESCOs to provide the project financing. Most Chinese ESCOs are relatively small companies. In 2009, almost one-half of EMCA-member ESCOs had registered capital of under RMB 5 million, equivalent to US\$ 730,000 (see Figure 11). Hence, most ESCOs are strictly limited both as to how much they can finance themselves and how much they can borrow, given their small equity holdings. For large projects, if ESCOs are unable to secure the financing guaranteed savings contracts become the only option. As Figure 9 shows, there is a clear relationship between choice of guaranteed savings and the size of project investment. In the industrial sector, where financing needs per project are the greatest, guaranteed savings contracts were used for 46% of the projects reported in EMCA's surveys during 2007-9. But guaranteed savings contracts accounted for 64% of total energy performance contracted investment in industry over the same period. The average size of guaranteed savings contracted projects in industry was RMB 15.2 million (\$2.2 million), whereas the average size of shared savings contracted projects was less than half of that, at RMB 6.8 million (\$1.0 million). In the buildings sector, the same trend existed, with the average size of guaranteed savings projects during 2007-9 at RMB 4.9 million (\$700,000), and the average size of shared savings projects at RMB 2.4 million (\$345,000).

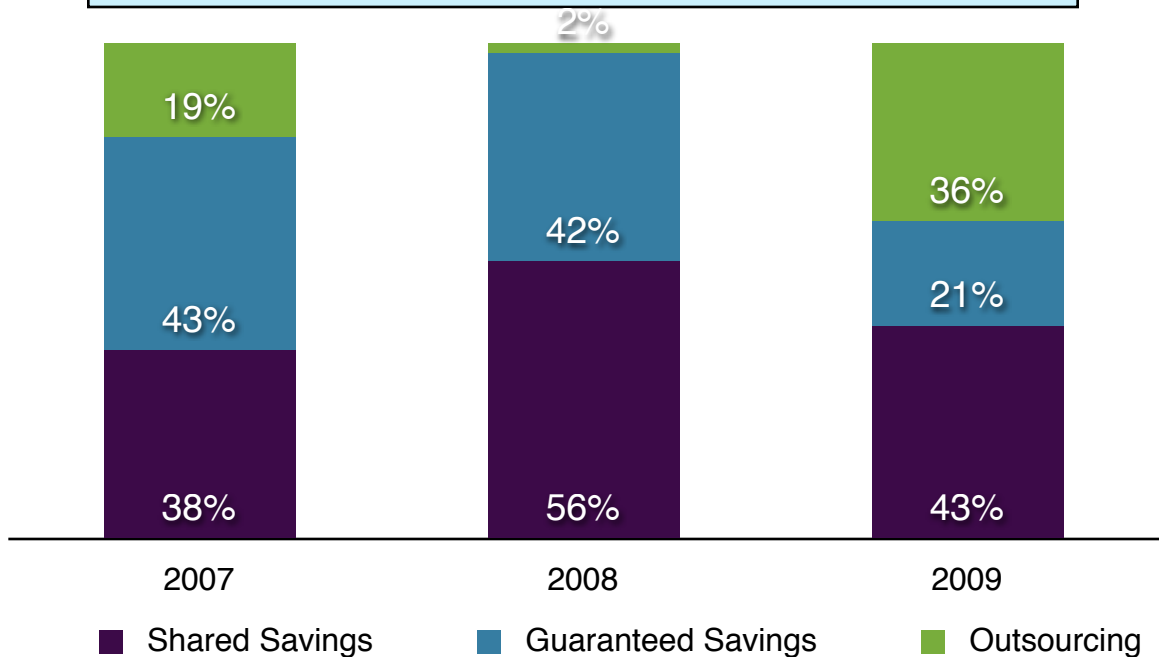
Over time, the share of guaranteed savings project investment has been falling, in favor of shared savings and outsourcing contract investments. Whereas guaranteed savings contracts accounted for 80% of energy performance contracting investment in industry by EMCA-member

Figure 8. The Industrial Sector: Share of Energy Performance Contracted Investment by EMCA Members by Mode, 2007-9



Source: EMCA 2007, 2008 and 2009 Member Surveys

Figure 9. The Buildings Sector: Share of Energy Performance Contracted Investment by EMCA Members by Mode, 2007-9



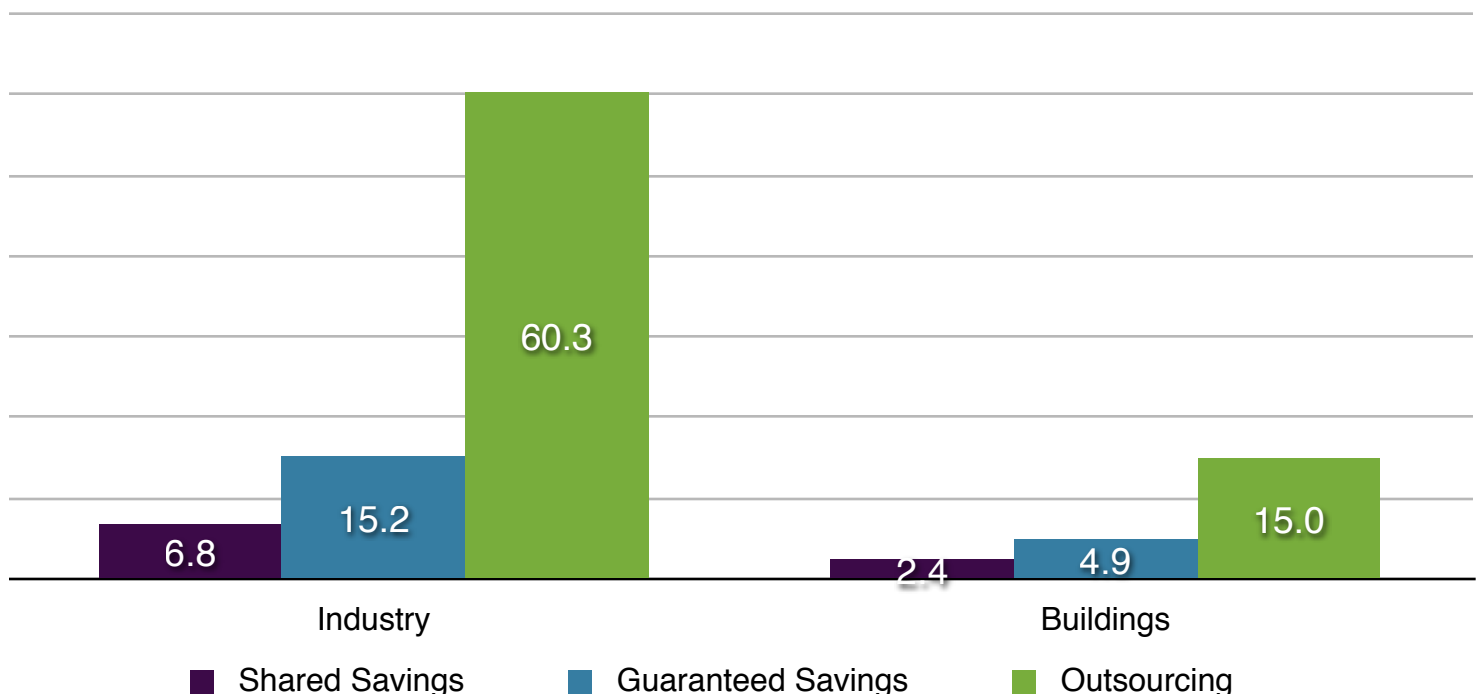
Source: EMCA 2007, 2008 and 2009 Member Surveys

ESCOs in 2007, the share has fallen sharply to 51% in 2009 (see Figure 8). In the building sector, the share of guaranteed savings in energy performance contracting investment by EMCA-member ESCOs has fallen from 43% in 2007 to 21% in 2009 (Figure 9).

The trend of declining guaranteed savings contracting among the smaller, non-EMCA-member ESCOs appears similar. The share of guaranteed savings project in the total number of energy performance contracted projects has fallen from 54% during 2004-5 to 46% during 2008-9 (All China Marketing Research Co., 2010). In terms of investment volumes, shared savings contracts accounted for 81% of non-EMCA member ESCO investment during 2008-9, while guaranteed savings contracts accounted for 13% and outsourcing contracts accounted for 6%. In contrast to the larger ESCOs, however, the average size of guaranteed savings projects among non-EMCA members (RMB 180,000) is much smaller than the average size of shared savings contracted projects (RMB 1.0 million). Perhaps most guaranteed savings projects among this category of ESCOs are simple equipment sale contracts with some sort of energy efficiency guarantee.

While the number of outsourcing contracts reported in EMCA’s 2007, 2008 and 2009 surveys totaled only 29 of 1256, their average investment size was far larger than the other types of contracts (see Figure 10). While only three 2009 outsourcing contract projects were captured in the industrial project reports, their average size was RMB 60 million (\$8.8 million). In the building sector, 15 outsourcing projects were reported in 2009, and because their average size was RMB 15 million (\$2.2 million) each, the share of outsourcing contracts in total energy performance contracting investment in the building sector rose to 36%. These building sector projects include transfer-own-transfer local housing complex district heating system energy efficiency, operation and management outsourcing contracts, which is a growing business.

Figure 10 Average Size of Energy Performance Contracted Projects by EMCA Members, 2007-9 (RMB millions)



Source: EMCA 2007, 2008 and 2009 Member Surveys

The average size of the total number of energy performance contracted projects reported in EMCA's 2007, 2008 and 2009 surveys was RMB 7.4 million (\$1.1 million). However, the average size of industrial projects was over three times the average size of projects in the building sector--RMB 11.0 million (\$1.6 million) in industry, compared to RMB 3.6 million (\$0.5 million) in buildings (see Figure 10). Among non-EMCA member ESCOs, the average project size during 2008-9 was less than one-tenth the average for EMCA members, at RMB 670,000 (\$98,000).

To date, most projects undertaken by Chinese ESCOs have tended to focus narrowly on specific energy systems in industry or buildings, aiming to achieve relatively straight-forward, quick-return energy savings through addition or upgrading of key equipment and perhaps related operational improvements. Financial paybacks are commonly high--allowing the ESCO to receive full payment and profits within three years or less even if 20% or more of the energy cost savings during the contract period is given to the client. In industry, completion of comprehensive energy audits by ESCOs prior to contracting is rare. Preparatory work will focus on analysis of the specific targeted system. ESCOs typically specialize in one or perhaps a few systems, where they have expertise. They also may have relationships with suppliers or produce equipment themselves. Common project areas in industry include industrial boiler renovation and cogeneration, steam system upgrading, electric power distribution system renovation, motor and motor drive system renovation, industrial kiln and furnace renovation, cooling system upgrades, and waste heat, steam and gas recovery and use. There also are specialized projects which may involve proprietary technology from partners. In buildings, common projects include air conditioning and ventilation system renovations and operational improvements, lighting system upgrades, district heating system upgrading and operational improvement, geothermal heat pump applications, and introduction of proper energy controls and management systems.

Types of Chinese ESCO Companies

To develop successful energy performance contracting businesses, ESCOs need three types of skills: technical skills and practical experience, capacity to arrange and manage financing and mitigate financial risks, and business entrepreneurship and project/client management skills. Very few firms have all three of these skills successfully developed in-house when they launch energy performance contracting businesses. As elsewhere, Chinese ESCOs vary substantially as to which skills they are strongest on and which they need to develop further, depending to a large extent on their institutional background and market approach.

The first three pilot companies developed during the 1990s began with a source of dedicated financing, broad technical knowledge, good market contacts and basic project management skills. Over time they developed energy performance contracting expertise across a range of markets and subsectors, as well as increasing sophistication in financial management. They have taken different paths ultimately, emphasizing different strengths, but still maintained breadth in business scope. In addition to these first three, several other companies have also followed a basically similar model---relying on relatively strong financial backing, broad technical skills and scope, and strengths in project management--but there numbers have been few, as it is difficult for most to put these ingredients together.

As the new century began, most new ESCOs that entered the business had their main strengths in technical skills. Some new entrants have been vendors of energy-efficient equipment, or their subsidiaries, looking for new ways to increase market penetration for their products. Some companies have innovative proprietary technology, and have aimed to use energy performance contracting as a key commercial outlet. Some companies are organized to take business advantage of the special skills of several core staff in diagnosis of energy efficiency opportunities in specific

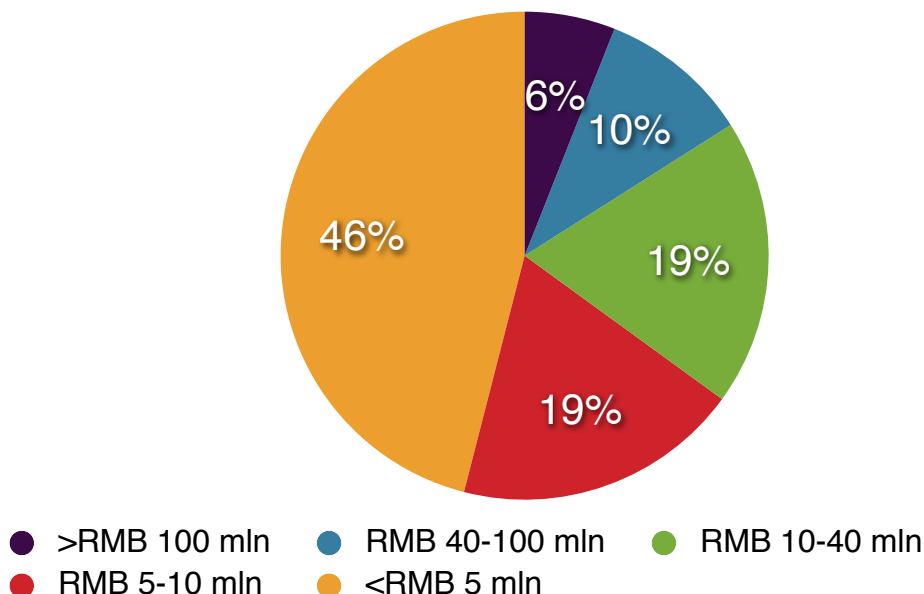
energy systems and design of projects to capture these opportunities. Typically, the biggest issue faced by these technology-focused companies is securing financing and managing financial risks properly. In addition, if their focus remains on only a few technical solutions, they may face problems maintaining a sustainable position in the market, as other companies present competition or China's fast-paced market evolves past the original opportunity.

Some new ESCOs have evolved from local energy conservation technical centers. These centers are supported by local government and typically have a long history of providing technical energy conservation services such as auditing and project review. The centers may develop energy performance contracting business themselves, or through a spin-off ESCO company, as a means to gain commercial benefit from their technical knowledge. Typical challenges faced include both accessing financing and managing financial risks, and the details of managing business aspects, including project implementation and operation in addition to design.

Some new ESCOs begin operation in a good position to serve a dedicated market that they have special relationships with--offering energy efficiency investment packaging assistance for partners or other types of aligned companies. Some successful ESCOs have begun as subsidiaries of large corporation groups, serving other subsidiaries under the group umbrella. These ESCOs may subsequently launch 'outside' businesses with fully independent clients as well, especially with clients in the same industrial category.

During 2009-2010 an increasing number of large firms with strong financial backing have been entering the business. Several large energy supply companies have formed new ESCO subsidiaries. Strong financial companies specializing in project and company investment, and sometimes project management as well, have also begun to enter the business. For these companies, financial arrangements and risk mitigation are their core strengths. In their efforts to pursue new energy performance contracting businesses, they need to partner with or acquire staff or firms strong on energy efficiency technology and project design and implementation.

Figure 11 Registered Capital of EMCA-Member ESCOs, 2009



Source: EMCA 2009 Member Survey

ESCO corporate and shareholding structures vary substantially. The majority are joint-stock shareholding companies, often including a mix of private shareholders and shareholders which have substantial state participation. A significant share are fully privately owned. A few are fully owned by one state entity, but such companies are rare.

Size of ESCOs. The average amount of registered capital among EMCA-member ESCOs in 2009 was RMB 27.8 million (\$4.1 million). The average gross output of EMCA-member ESCOs that year was RMB 143 million (\$21 million). The average size of non-EMCA-member ESCOs was far smaller. The gross output value of 94% of these ESCOs in 2009 was less than RMB 50 million (\$7 million).

Averages, however, can be misleading. There is actually great variation in ESCO size. As shown in Figure 11, 46% of EMCA-member ESCOs reported registered capital of less than RMB 5 million (\$730,000). At the same time, 18 of EMCA's members were ESCOs with registered capital of over RMB 100 million (\$14.6 million). While the majority of China's ESCOs are small companies, there are large companies as well which play key roles in the market. The large ESCO company sector also is expected to grow substantially in the future.

3. A View to the Future

The Increase in Policy Support in 2010

The Year 2010 was a watershed year for the development of China's ESCO industry. In late 2009 and early 2010, several of China's senior leaders discussed the status and prospects of the emerging new ESCO industry with relevant government departments and ESCO representatives. A variety of statements of support followed. In April 2010, China's State Council issued a major national government policy statement of support, including a set of specific new favorable taxation and incentives policies and clarification of accounting principles. Box 3 provides further details.

Since April 2010, much work has been done to launch implementation of the new policies and associated programs. To set up implementation of the new financial award incentives, China's MOF and NDRC issued a "Temporary Method for Management of Energy Performance Contracting Project Government-budgeted Award Funds" on June 3, 2010. This regulation sets the procedures, criteria and amounts for award of investment subsidy payments to ESCOs for qualified completed energy performance contracting investments. RMB 240 (\$ 36) of central government funds will be awarded per tce of annual energy savings capacity created by qualified energy performance contract investments, with an additional award from local governments of at least RMB 60 (\$9) per tce.⁶ To qualify for receipt of the awards, ESCOs must be registered by MOF and NDRC. They must have independent legal status, registered capital of at least RMB 5 million (\$730,000), and be able to demonstrate sufficient technical, operational and financial management capacity. Only shared-savings contracted projects currently qualify, for which ESCOs must provide over 70% of total project investment. Annual energy savings capacity generated per project must be under 10,000 tce⁷. Energy savings capacity generated per project must also be at least 100 tce/year in all cases, and at least 500 tce/year for industrial sector projects. Equipment and statistical systems must already be in

⁶ In some cases provinces or municipalities have already committed larger amounts of additional awards.

⁷ Other investment awards have been provided by the central government since 2007 to enterprises for energy conservation projects implemented through traditional modes that generate 10,000 tce or more of annual energy savings capacity.

place to enable energy savings to be measured, monitored and verified. Project applications should be submitted to local government authorities upon completion of project erection. Local government authorities will organize appraisals of the project and its contract to confirm eligibility, and will confirm annual energy savings capacity levels. Provincial authorities are responsible for detailed supervision

Box 3. Highlights of the April 2010 National Policy Document on ESCOs

On April 2, 2010, China's State Council endorsed and issued a key policy document supporting further development of ESCOs in China called "Opinions on Accelerating the Promotion of Energy Performance Contracting and the Development of the Energy Efficiency Service Industry." The "Opinions" were jointly prepared by the NDRC, Ministry of Finance, Peoples' Bank of China and General Tax Bureau.

The document describes energy performance contracting as a market-based mechanism in which an ESCO signs an energy performance contract with an energy user, provides the client with energy efficiency diagnostic, financing, renovation and other services, and earns back its investment and a reasonable profit from a share of the energy savings results. The new policy instructs localities and ministries to "fully recognize the importance of promoting energy performance contracting and developing ESCOs, take effective measures, and actively create a favorable policy environment for accelerating the development of the ESCO industry."

After noting achievements already achieved, but needs to further strengthen the ESCO industry, the policy sets a development objective for 2012 to "support the cultivation of a batch of specialized ESCOs, develop and strengthen a group of integrated large ESCOs, and establish a fully thriving, mature and orderly energy service market with fresh and distinctive characteristics." By 2015, the development objective is to establish a relatively complete energy efficiency service system, achieve progress in the expansion of specialized ESCOs, achieve progress enhancing service capacity, open up and broaden lines of service, and establish energy performance contracting as one of the main ways that energy using units implement energy efficiency renovations."

To help achieve these goals, specific supportive policy provisions include:

- Launching of government financial award incentives for completion of qualified energy performance contracted projects, similar to those previously offered for large energy conservation projects undertaken by enterprises themselves;
- Implementation of turnover tax, value added tax, and partial corporate income tax exemptions for qualified energy performance contracted projects, and clarification of other aspects of tax treatment;
- Clarifications on accounting provisions, including provision for government entities to list energy performance contract payments under energy costs; and
- Encouragement of banks and other financial institutions to create new credit products, open up and expand the scope of guarantee products, and simplify application and approval procedures to meet the special needs of ESCO financing.

The document also provides (a) encouragement and support for ESCOs to become larger and stronger, (b) support for ESCO industry organizations such as EMCA to fully realize their potential, and (c) directives to local governments to also take measures to provide a favorable operating environment for EMCs. Specific measures aimed at these goals are also included.

and report on program implementation to central government authorities, who undertake overall supervision and provide funding to the provinces in aggregate amounts.

During the summer and fall of 2010, ESCOs applied to provincial-level government authorities for registration. After review by both provincial and central government authorities and experts, NDRC and MOF issued the first batch list of registered ESCOs qualifying for application for investment awards in October 2010. This list included 460 ESCOs in 22 provinces and municipalities.⁸ In October 2010, China's Ministry of Industry and Information Technology (MIIT) also issued a first-batch list of 53 ESCOs which it recommended for industrial energy performance contracting projects.

China's National Standardization Management Committee issued the "General Technical Rules for Energy Performance Contracting (National Standard GB/T 24915-2010) August 19, 2010. The General Rules provide official definition of terms (see Box 1); notes the many other relevant national standards concerning energy measurement, enterprise energy balancing, auditing, etc.; and sets out basic principles for monitoring and verification of savings. An illustrative model shared-savings contract is attached for reference.

Details on the new tax treatment provisions for energy performance contract business called for the State Council's policy statement were issued by the Ministry of Finance and National Tax Bureau on December 31, 2010, becoming effective the following day. In cases where ESCOs account energy performance contracts as a service business and pay turnover tax, they will now be temporarily exempt from this tax for contracts meeting the specified criteria. In cases where ESCOs account energy performance contracts as equipment sales and pay value-added tax, they also will now be temporarily exempted from this tax for contracts meeting the specified criteria. Finally, the first three years of income from an energy performance contract project is now exempt from corporate income tax, and income tax is applicable to only 50% of project income during the fourth through sixth years. Among other specifications, contracts must be shared-savings contracts with ESCOs providing at least 70% of the project finance to be eligible for the favorable tax treatment.

Future Challenges

With unprecedented policy support from the Government and strong market demand, China's ESCO industry is poised for almost certain strong growth in the coming years. The industry can begin to achieve a much larger share of its potential. At the same time, however, new and different types of problems can be expected.

With the Central Government's policy support and incentives programs, and provincial government's following suit, the development of the ESCO industry can be expected to gradually become geographically more balanced with more ESCOs being developed in the interior parts of the country to serve those markets. The size of many ESCOs is likely to increase, and business models become more normalized. With its new responsibility to review ESCO legal status, contracts, and energy savings monitoring and verification practices in cases where ESCOs apply for financial awards or favorable tax treatment, the government will be more heavily involved in monitoring the industry and its business practices. This can help improve the credibility of ESCOs and further legitimize their business. But care also must be taken to not stifle the creativity, innovation and search for improved and clever business approaches which has been such a strong point in Chinese ESCO industry during the last five years.

⁸ Some municipalities listed are below provincial level.

New markets are likely to develop in China for energy performance contracting, especially the public facilities market, which has been so important for ESCOs in many other countries. This sector includes central government, provincial and municipal government, university, hospital and perhaps primary and secondary school markets. Recent policy statements point to a strong drive to improve the energy efficiency in this sector in the coming years, hopefully expanding the role of energy performance contracting. While the April 2010 national policy statement opens door for energy performance contracting in the public facilities sector, much detailed work and new experimentation with operational models will be required to overcome specific barriers, including project approval and government procurement procedures, expensing of energy performance contract payments, metering and savings verification issues, improving host enterprise incentives to undertake projects, and others.

Major challenges remain to improve the capacity of China's ESCOs to undertake solid projects, manage their businesses well, and increase their market credibility and creditworthiness. Project development needs to expand into more complex and integrated projects which can capture greater portions the potential energy savings in enterprises. Increased sophistication in management of project repayment and portfolio risks is needed. More efforts are needed to develop simple but efficient monitoring and verification practices. In particular, however, further expansion of opportunities and mechanisms for greater formal financing of ESCO projects by banks and other financial institutions is a must. While progress has been made in this area in recent years, the requirements for shared-savings contracting and ESCO investment of 70% or more of project costs will even further increase the needs for ESCOs to be able to efficiently enter into financing contracts with lending institutions.