

Present condition of ESCO business for carrying out climate change countermeasures in Japan

Chiharu Murakoshi
Jyukankyo Research Institute
Hiro-o Bldg, 3-12-40, Hiro-o, Shibuya-ku
Tokyo, 150-0012
Japan
hal@jyuri.co.jp

Hidetoshi Nakagami,
Jyukankyo Research Institute
Hiro-o Bldg, 3-12-40, Hiro-o, Shibuya-ku
Tokyo, 150-0012
Japan
nakagami@jyuri.co.jp

Keywords

energy efficiency, ESCOs, COP3, climate change countermeasures, global warming, governmental support for energy efficiency

Abstract

The ESCO business in Japan started in 1996. Although there was only one ESCO as of 1996, there are now more than 20 companies and entries from utilities have also performed positively. The market scale of ESCO business was 556 million Euro in 2001, and is expected to grow 50% in 2002.

The Japanese government drew up the action plan to cope with COP3 and planned to reduce final energy consumption by 57 million kL-oil equivalent by 2010, of which 1 million kL is expected to be reduced by ESCO business activity. In order to achieve this target, the government contributed the subsidy of 294 million Euro to energy efficiency retrofit for buildings in 2002.

In the private sector, the Japan Association of Energy Service Companies (JAESCO) was established in 1999. It has matured into an organization containing 110 members, and a number of new members are currently joining. ESCO business introduction in local authorities has made less progress.

However, many local authorities are considering introduction of ESCO schemes. By 2010, when all local authorities will have implemented their climate change countermeasures, it is possible that such programs will grow to be the largest ESCO market. It is expected that the ESCO business in Japan will grow greatly from now on. However, there are also many problems to be solved for introduction.

We describe the current situation of the ESCO business in Japan, governmental support for energy efficiency including ESCO business, stance of local authorities, and future market barriers.

Introduction

In June 2002 the Government of Japan ratified the Kyoto Protocol. With the USA having renounced the Kyoto Protocol, trends in Russia are of great concern but the bold step of Japan has major significance in advancing the Kyoto Protocol toward effectiveness.

In the Kyoto Protocol Japan has promised to reduce its 2010 emissions of greenhouse gases to 6% less than 1990 emissions. Among total greenhouse gas emissions, CO₂ emissions arising from energy use are to be stabilized at 1990 levels, so we can say that the target reduction from energy efficiency is stabilization in 2010 at 1990 levels of energy use. Reaching this target will be very difficult. For instance, 2000 CO₂ emissions were already 10% above 1990 levels, so a major cut of around 20% will be needed by 2010.

The New Climate Change Policy Programme (NCCPP), which Japan formulated in March 2002, sets a phased approach to reach the target. Step 1 is 2002 to 2004, Step 2 is 2005 to 2007, and Step 3 is 2008 to 2012. The degree of attainment will be verified at each step. If, upon inspection for each step, a lag in reaching the target is found, then additional countermeasures not in the current plan will be considered. At these points there is also a significant possibility of including compulsory measures such as taxes and regulations.

To achieve the greenhouse gas reductions target promised in the Kyoto Protocol widely ranging positive countermeasures are needed. The central government and local authorities have planned various climate change countermeasures and are executing these plans. But even if all these plans are implemented the 6% reduction target will not be reached easily.

Against this background, ESCO enterprises are included in the climate change countermeasures specified by the Ministry of Economy, Trade and Industry (METI) Energy Council. ESCO projects are expected to save one million kL-oil equivalent. Measures by METI and others to encourage the spread of ESCO business have been hammered out. Also, the progress of ESCO business has been featured in the climate change countermeasure plans of many local authorities. But there are many barriers to the spread and growth of ESCO business. For example there is little recognition of what ESCO business is, and the advantages of performance contracting are not understood. Also, concerning the availability of financing, which is essential for expanding a business, some leasing companies have begun to offer limited recourse financing, but nearly all financial institutions continue as before, offering only asset-based or corporate-finance loans. In addition, in the public sector market, due to institutional issues, there have been just under 20 projects implemented at the level of local authorities, and the central government still has no experience with ESCO projects.

Definition of ESCO in Japan

The definition of an ESCO varies by country. In England it was called Contract Energy Management (CEM) and in Europe there are still times when it is called Third Party Finance. In China it is called Energy Management Company (EMC). ESCO business in Japan was planned with reference to the ESCO business model in the USA. Therefore, the way of thinking about ESCO business in Japan is the same as that of traditional ESCO business in the USA. However, utility restructuring in Japan has happened in a limited way so energy service businesses have not developed as diversely as in the USA. In other words, an ESCO in Japan differs from the usual energy conservation consultant with activities such as development, sales, planning and installation of energy efficient equipment. Our ESCOs offer comprehensively everything related to improving energy efficiency, including financing. They are energy efficiency improvement businesses that cover the cost of energy efficiency improvements with the savings from decreased operating costs and use performance contracts that guarantee a certain level of efficiency improvement.

The reason ESCO business has received notice in Japan is that it is a new business model that can implement energy efficiency retrofits of existing buildings. Despite the potential for large energy savings this potential has, until now, been difficult to realise in the existing building stock.

Current situation of ESCO business in Japan

SIMPLE BACKGROUND OF THE ESCO BUSINESS

Japan took up the issue of ESCO business in 1996 when METI set up the Advisory Committee on ESCO Investigation. This committee began investigating ESCO business in the USA as a model and making plans to adapt this model for use in Japan. From 1997 the Energy Conservation Centre Japan (ECCJ) has convened a committee annually whose duties include studying measures to adapt ESCO business for Japan, analysing the effectiveness of demonstration projects, and studying measurement and verification (M&V) protocols. Since then, the number of private sector corporations launching ESCO businesses has grown, and gradually become noteworthy. At the end of 2002 there are about 30 companies calling themselves ESCO. Twenty of these have had actual experience using performance contracts.

In October 1999 the Japan Association of Energy Service Companies (JAESCO) was formed (Chairman, Yoichi Kaya, Professor Emeritus, Tokyo University). The main ESCOs in Japan took part in planning JAESCO. Its mission is to foster the healthy development and spread of ESCO business in Japan. There were 16 organisations as founding members. Membership has grown quickly to 110 as of November 2002.

PROFILE OF ESCOS

JAESCO membership increased quickly from 28 in 1999 to 106 in three years. However, the number of those companies that are actual ESCOs, with experience in performance contracting business, has not increased in recent years, holding steady at 20. The total capital of JAESCO members is 48 953 million Euro, with an average of 462 million Euro per company. The average number of employees per company is a large 6 160, reflecting the presence of electric utilities, steel companies, and major appliance manufacturers among the membership. There are ten electric utility companies in Japan. With one exception these are large enterprises, and nearly all have joined JAESCO. The average capital per firm for the 20 ESCOs is 326 million Euro, falling short of the JAESCO member average, while the average employee number of 8 500 exceeds the member average. Furthermore, half of the ESCOs (ten firms) have capital of 10 million Euro or less, but six of these are subsidiaries of large corporations.

One characteristic of ESCOs in Japan is that they are mainly composed of large corporations.

MARKET SIZE

JAESCO surveyed its members regarding actual results of business so far. In the fiscal year 2001 there were 1 760 energy efficiency retrofit projects with investment of 556 million Euro, a major increase over the previous year. Of these projects, 222 were so-called ESCO business, based on performance contracts, with investment of 62 million Euro. ESCO business held only 11% of the market in 2001 but the share is doubling annually and is expected to be around a 100 million Euro market in the fiscal year 2002. Among the performance contracts, the commercial sector (e.g., offices and hospitals) had a higher share (38 million Euro) than the industrial sector (24 million Euro). In contrast to the USA,

where the public sector has been the main market, for Japan the private sector has been nearly the whole market. There have been fewer than 20 projects executed at public facilities. As for the type of contract, in 2000 82% were guaranteed savings contracts, but in 2001 the share of this type decreased to 52% while shared savings contracts reached the same scale of investment.

This survey compiled results from the 48 JAESCO member companies that had actual results for energy efficiency retrofit projects. If the market of non-member firms is added there is an even larger market growing.

Regarding the funding sources for the 556 million Euro invested in energy efficiency retrofit projects, 89% was self financed, and 7% was subsidy, the next largest share, showing that subsidies have a major role in funding such projects. In contrast, funding from financial institutions and leases together comprised only 4%. The self-finance numbers probably include funds firms raised via corporate finance, but only a tiny fraction of corporate finance funds were obtained for the purpose of energy efficiency retrofit projects. We can see that corporations that can afford to execute energy efficiency retrofits are limited to the wealthy ones, and also that the finance environment for energy efficiency retrofits is quite behind the times.

Governmental Support System

OUTLINE OF CLIMATE CHANGE POLICY IN JAPAN

Since COP3 in 1997 the central government has implemented various policies aimed at reaching the greenhouse gas emissions reduction target. One representative plan is the Energy Council Report (ECR) issued in June 2001, to reduce final energy consumption by 57 million kL-oil equivalent by 2010. Based on the ECR the New Climate Change Policy Programme (NCCPP) was announced in March 2002, setting forth strategies to implement ECR policies. In addition, two laws were enacted to urge the government to expedite its own energy efficiency measures: Law Concerning the Promotion of Measures to Cope with Global Warming, and Law Concerning the Promotion of Procurement of Eco-Friendly Goods and Services by the State and Other Entities (Law on Promoting Green Purchasing). These laws call for making and executing climate change countermeasure plans, promoting green purchasing, and conducting energy audits. On the premise that all measures will be executed comprehensively, the government boldly ratified the Kyoto Protocol in June 2002. The series of energy efficiency policies has been like a tail wind for promotion of ESCO business. The ECR forecasted that, by facilitating installation of Building Energy Management Systems (BEMS) and ESCO business, energy consumption could be cut by 1.6 million kL-oil equivalent. To reach this target subsidy policies have been expanded. Also, in the 2003 revision of the Energy Conservation Law (ECL) large-scale office buildings are new targets of regulation, and the installation of whole-building BEMS and expedition of ESCO activities are encouraged voluntarily.

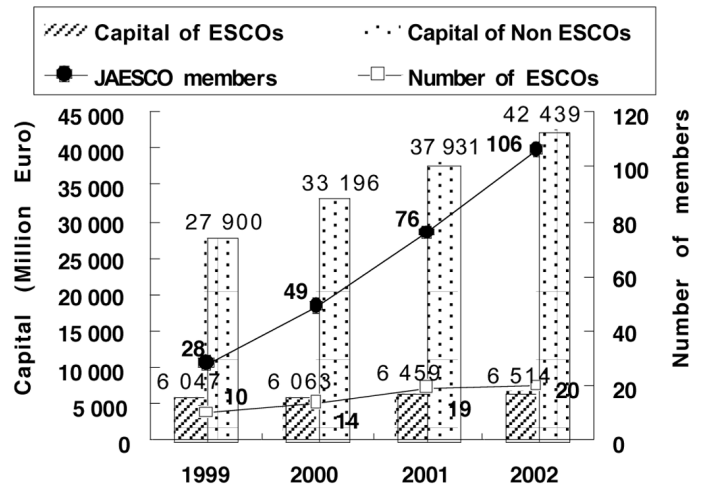


Figure 1. The number of JAESCO members and their total Capital Data Source: JAESCO (2002).

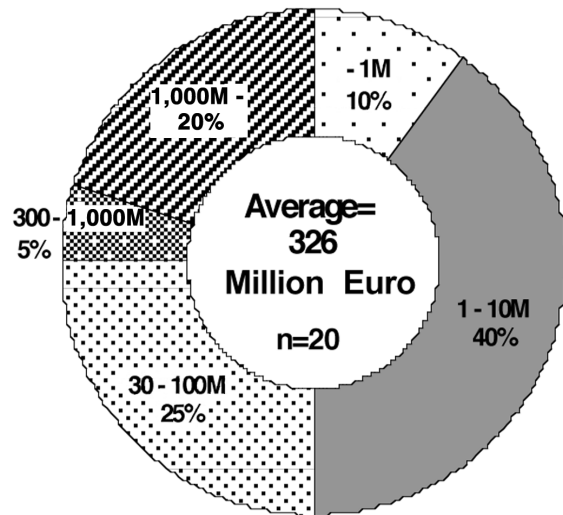


Figure 2. Capital Distribution of ESCOs Data Source: JAESCO (2002).

- 1997: Kyoto Protocol from COP3
- 1998: METI set up a system of subsidies for energy efficiency retrofits
- May 1998: Energy Conservation Law revised
- Oct. 1998: Law Concerning the Promotion of Measures to Cope with Global Warming enacted
- June 1999: New Japanese Appliance Energy Efficiency Standards enacted
- July 1999: Law for Private Finance Initiative (LPFI) enacted
- May 2000: Law Concerning the Promotion of Procurement of Eco-Friendly Goods and Services by the State and Other Entities (Law on Promoting Green Purchasing) enacted
- June 2001: Energy Council Report
- March 2002: The New Climate Change Policy Programme (NCCPP)
- June 2002: Kyoto Protocol ratified
- April 2003: Energy Conservation Law revised

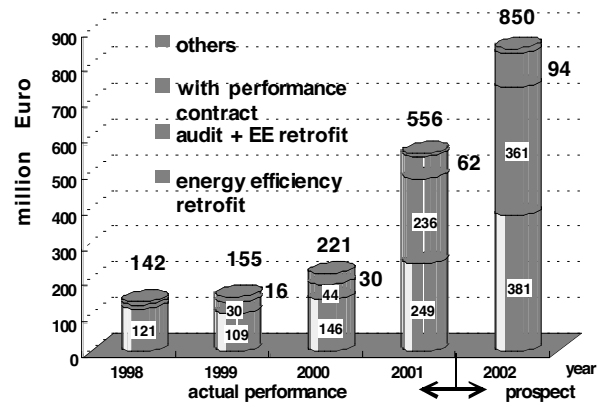
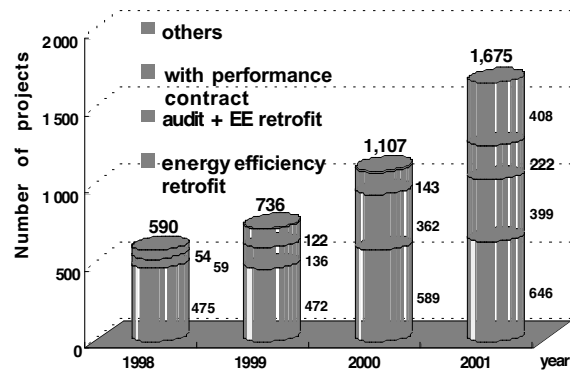


Figure 3. Market size of ESCO business /number of projects and investments.
Data source: JAESCO (2002) Note: The total of 48 JAESCO member companies.

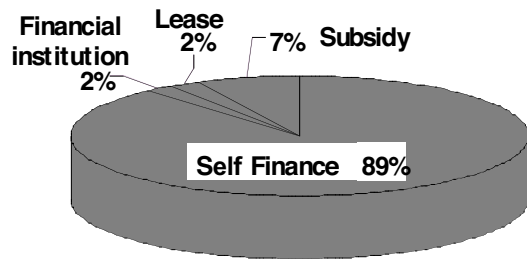


Figure 4. Source of fund for energy efficiency retrofit projects
Data source: JAESCO (2002) Note: The total of 48 JAESCO member companies.

Energy conservation law

The basic law governing energy efficiency policy in Japan is the Energy Conservation Law (ECL), which has been revised twice. The ECL contains the following five standards.

- Housing energy efficiency standards
- Commercial building energy efficiency standards
- Equipment and appliance energy efficiency standards (Top runner approach)
- Export equipment and appliance energy efficiency standards (Top runner approach)
- Large-scale factory and business facility energy efficiency standards

These standards were strengthened from 1998 levels beginning in 1999. Appliances and export equipment use what is called the top runner approach because the energy efficiency standard is set at that of the most efficient model. Subject appliances are air conditioner, fluorescent lighting, television, VCR, copier, computer, magnetic disk unit, and refrigerator, but presently standards for gas and oil heating appliances, hot water supply appliances, cookware, hot toilet seat, vending machine and transformer will be enforced from 2003 April.

Standards for large factories and businesses target facilities using more than 3 000 kL/year or 12 million kWh/year

as Type 1 energy management facilities that are requested to improve energy efficiency by 1% annually. The standards also target facilities using more than 1 500 kL/year or 6 million kWh/year as Type 2 energy management facilities that are requested to report their energy consumption. Type 1 energy management facility standards had mainly applied to factories, but in the 2003 ECL revision all large-scale facilities will be targets. The 2003 ECL revision features are listed below.

- Inclusion of large-scale commercial buildings as targets of regulation
- Addition of regulations for air conditioning equipment
- Addition of regulations for use of BEMS
- Strengthening of application to tenant buildings
- Addition of regulations for installation of cogeneration (which is energy efficient)
- Addition of regulations for electrical generating equipment
- Addition of encouragement for the practical use of ESCOs.

The 2003 ECL revision has great significance for ESCO business. Type 1 energy management facilities are required to prepare plans to implement energy efficiency improvements and improve energy efficiency by 1% annually. Also, installation of BEMS is indicated under standards for introduction of high-efficiency equipment, and it is suggested that the necessary studies be subcontracted to ESCOs.

The New Climate Change Policy Programme

The NCCPP is the plan to attain the targets in the Kyoto Protocol. The programme content, based on the 2001 ECR is shown below.

- Encourage introduction of alternative and renewable energy
- Improve equipment energy efficiency
- Encourage improved energy efficiency of buildings and offices

- Reconsider the Japanese lifestyle
- Introduce low-pollution vehicles
- Encourage use of mass transit
- Encourage the Nippon Keidanren's voluntary action plan
- Increase nuclear power generation by 30%.

To realize these plans concrete measures such as strengthening of standards and regulations, expansion of subsidies, and provision of tax incentives are needed, but it is also important to observe progress on implementation. The NCCPP splits the time until 2012 into three steps for assessing progress. The first step is 2002 to 2004, second step is 2005 to 2007, and the third step is 2008 to 2012. In 2004 and 2007 the status of implementation will be evaluated. If implementation is behind schedule then additional measures will be taken. The plan is to reduce energy use by 57 million kL-oil equivalent through improved energy efficiency, but doing so will be difficult. Also, due to a scandal in which trouble at nuclear power plants was hidden, it is not considered desirable to expand nuclear power generation. Tokyo Electric Power Company (TEPCO), at the centre of the scandal, has nine of its 17 plants off-line at the end of 2002 with four more units scheduled to close for inspection in March 2003. Especially for TEPCO, with 13 plants off-line power outages are a possibility.

Work has already begun on the evaluation planned for 2004. At this step, if implementation is behind schedule it is likely that measures such as strengthening regulations and introducing taxes will be newly considered.

SUBSIDY PROGRAMME

METI has a subsidy program to encourage introduction of energy efficient equipment. The subsidy ratio is one third of total project cost but METI has readied a programme aimed at the public sector with a subsidy of one half. The total subsidy fund has risen to 210 million Euro. From 1998 on subsidies have been used for many ESCO projects. In particular the "Project to support businesses for the rational use of energy" has made ESCOs a target of subsidy, making possible the use of shared-savings contracts and giving ESCOs preferential treatment in awarding subsidies. Also, the "Project to introduce and promote high-efficiency energy systems in residences and buildings" has made subsidies applicable to BEMS introduction from 2002 on. The breakdown of subsidy funds is as follows.

- Project to support businesses for the rational use of energy (75.8 million Euro)
- Project to introduce and promote high-efficiency energy systems in residences and buildings (102.5 million Euro)
- Local energy-saving diffusion-and-promotion project (31.7 million Euro)

Apart from these three subsidy systems, there is also a subsidy for local authorities to study the possibility of introducing ESCO projects, called the "Local energy-saving planning project" with a budget of 5.7 million Euro. For 2003 in addition to continuation of these subsidies, an interest rebate for energy efficiency investments has been con-

sidered, so soon there will be even more incentive for investment in energy efficiency.

Market barriers

LOW RECOGNITION FOR ESCO BUSINESS

ESCO business differs from a simple energy efficiency retrofit in that it offers many varied services, starting from an energy audit, and possibly including a comprehensive plan for improvements, M&V, guaranteed energy savings, procurement of resources, and others. The business model draws out the maximum merit to the user, but aspects of the model are hard to understand. In particular, the user does not bear much risk simply by signing a shared-savings contract, but there have been cases where the user says this is "too good to be true" and walks away. Furthermore, there are cases where facilities managers probably hold suspicions about having issues with their management pointed out to them by ESCOs. Also, most organisations budget on a single-fiscal-year basis, so in order to arrange investment conditions the recognition and consent of many superiors is needed. For example, if a facility manager is to carry out ESCO business, he or she must explain the new business model called ESCO to many bosses and receive their understanding and approval. Especially for long-term contracts, this process takes lots of time.

One reason for the aforementioned problems is that there is low awareness of ESCO business. Therefore, JAESCO is conducting activities to raise the level of awareness.

ISSUES OF APPLICATION TO LOCAL AUTHORITIES

Central and local government facilities are thought to be the largest future market for ESCO business. But market development has hardly succeeded. There are currently fewer than 20 projects with results for local authorities and there are no projects at facilities of the central government.

ESCO business differs from typical government construction projects, being characterised by performance contracting accompanied by guaranteed energy savings. Through performance contracting, the contractor tries to maximise the customer's (in this case, the local authority) profit while providing long-term maintenance for energy efficiency improvements. The more efficiency measures installed, the more energy will be saved, but if one introduces measures in order of economic effectiveness there is a point where the total return for, for example, a 15-year period, is maximised by choosing a certain combination of measures. If more measures are installed the total return decreases. Choosing the optimal combination of technologies effectively maximises profits of both ESCO and customer. Also, because the contractor must protect the customer's profit due to the guaranteed energy savings, there is no incentive for the contractor to intentionally recommend excessive performance levels at the planning stage, nor to conduct trials of methods with higher performance than necessary. Furthermore, by responding appropriately during the contract period to problems such as poor management, breakdowns, and degradation of performance, the effectiveness of energy efficiency measures can be maintained over a long period.

To execute this kind of performance contract the following conditions are needed.

1. The project must be mainly according to the contractor's proposal.
2. Planning and execution must be procured together.
3. The contractor must provide sufficient maintenance support.

To meet these conditions a scheme is used in which an optional contract is executed and the contractor is chosen according to a comprehensive evaluation using the proposal method (as opposed to competitive bidding, typical of public works projects). This method is possible under the current administrative system, but various procedural issues remain unsolved.

Procedures related to project specifications and budgeting

Generally, when a local authority makes a public request for proposals (RFP) for a construction project, budgeting is done together with the treasury and legislative body before issuing the RFP. For ESCO business the local authority makes a budget request based on the energy efficiency measures and expected energy savings identified by an energy audit. However, the actual methods and budget are considered by a selection committee, based on the proposal chosen. The most effective ESCO projects are those procured by proposal freely from the ESCO, but with the RFP the planning and execution methods and budget are proposed at the same time. Accordingly, the results of preliminary studies made before the RFP issue and the content of proposals received will differ.

There are many cases where the technical expertise and equipment for preliminary studies does not exist in-house at the local authority. The easiest method in these cases is to rely on free information offered by ESCOs, but this results in loss of transparency and fairness. Budgeting for hiring technical experts for preliminary studies and the growth of organisations that can offer these services are needed.

For privately financed projects problems can be avoided by making sure that the maximum price determined by preliminary studies is not too low. In such cases, because the financial risk is borne privately, persuasion within the local authority often goes smoothly. However, if the funding comes from the local authority itself, because the risk is borne publicly, preparing the budget request takes great care. For RFPs for ESCO business issued until now the project methods have been already limited at the time of the RFP. Placing limits on methods at this stage causes a loss of flexibility for the project.

An important funding source for local authorities to carry out preliminary studies is the subsidy of the "Local energy-saving planning project". Recently the number of local authorities applying to use these monies for ESCO business feasibility studies has increased. But the New Energy and Industrial Technology Development Organization (NEDO) has requested that contractors for these studies be hired by competitive bidding, which has resulted in excessive price competition. That the contractor awarded the feasibility study has an advantage when submitting a proposal for project execution may be one factor stimulating this price

competition. If there is an advantage, then the transparency and fairness of the proposal system are in doubt. By the way, for the PFI, the participation of the PFI consultant in bidding on the actual project is regulated.

On a more positive note, the Law on Promoting Green Purchasing (LPGP) specifies energy audit on its list of procured services, and there are many cases of local authorities wanting to undergo energy audits. It is possible to use the ECCJ free energy audit but this is not sufficient as a preliminary study for ESCO business. It would be good to set up a subsidy system related to the LPGP to budget for energy audits and studies to estimate project revenues and expenditures.

In the USA, the federal or state government holds the budgeting power. For federal agency projects, the federal government (and for state or municipal agency projects, the state government) supports the hiring of outside technical consultants by the agency to make preliminary studies of potential ESCO projects.

Accounting system issues

Under the public sector accounting system, energy costs, construction costs, and ESCO service fees are all in separate budget categories. Each must be budgeted separately, and mutual reconciliation after budgeting is not generally recognised.

After ESCO project construction energy costs decrease and the total budget also decreases. But there are some local authorities that interpret making a budget request based on a forecast made at the time of project procurement as dangerous. Also, for ESCO business the risk due to energy price changes is borne by the local authority, so the risk for local authorities related to budgeting for energy costs does not decrease.

Because ESCO business must completely pay for itself within the range of current utility costs, it can be effective from the standpoint of getting the most from an ESCO project, to think of ESCO service costs as allocated to the budget category of current energy costs. This allocation method can simplify procedures. For example, if ESCO service costs are added in the category of consumption costs, ESCO service costs and energy costs can be considered together. This integration of costs into one budget category is very effective in simplifying both specification of the project and budget procedures. It also avoids problems that arise due to ESCO service costs and energy costs being paid by two different officers.

In the USA, for the federal government's own ESCO, the Federal Energy Management Program (FEMP), this kind of diversion of funds among budget categories is recognised, allowing streamlining of procedures.

Issues regarding RFPs for multiple facilities

For privately financed ESCO business, small-scale investment conditions are unattractive for ESCOs. The Osaka urban prefectural government has set a precedent of issuing one RFP for four facilities at once, and the number of examples of this kind of practice is likely to increase. There are several possible ways to arrange the contract and energy savings guarantee in cases of one RFP for multiple facilities. There could be a separate contract and a separate energy

savings guarantee for each facility, or the whole project could be bundled into one contract and one guarantee. In most cases the service fee paid to the ESCO is a fixed amount. If a loss occurs a penalty is assessed but if the profit is larger than forecasted the excess is not returned to the ESCO. (Returning extra profit to the ESCO is a possible option under the current system, but no local authority chooses it.) Therefore, a bundled, single energy savings guarantee has a lower risk to the ESCO than a separate guarantee per facility. It is expected that using a bundled contract will result in identifying some ESCOs willing to propose higher levels of energy savings (i.e., taking on more risk), which can also be seen as beneficial for local authorities. However, for facilities with separate budget management, the local authority seeks separate contracts and energy savings guarantees. Clearly it is difficult to execute a bundled contract and guarantee for different facilities with varying payback periods. If the energy savings guarantees are not bundled the conditions for assessing a penalty should have some flexibility.

Subsidy programme

Usually when a subsidy is received, bids are submitted after the subsidy is awarded. For ESCO business the retrofit methods are determined as a result of proposal selection so the proposal submission and selection must occur before the application for subsidy can be submitted, contrary to the usual practice. If the target of the subsidy is ESCOs the subsidy application can occur before proposal submission, but if the target is local authorities this problem applies.

FINANCIAL BARRIERS

It is difficult to obtain advantageous financing for energy efficiency retrofit projects, in part, due to the typically long payback periods. There is the possibility of project finance under the PFI, but there have been no cases where project finance enterprises have offered project finance for the kind of small-scale projects that characterise ESCO business.

The performance contract also has merit in rising financing. In Japan financing is done either on an asset base or a credit base (the credit base is project finance). Asset-based financing of projects that, like energy efficiency retrofits, are not the customer's core business and furthermore have long payback periods, is often left undone, as the customer does not want to risk assets. In contrast, project finance carries out funding in light of the profitability of the project. There are many types of risk for the financier and complicated procedures are necessary, such as setting up a Special Purpose Company (SPC). For this reason, it has been thought to be appropriate only for large-scale projects. In contrast to the risky nature of most project finance investments, the ESCO business energy savings guarantee insures that the project cash flow will be positive, so for the financial institution, financing ESCO business can serve as a hedge against risk. Also, the ESCO offers assurance of the reliability of the project technical aspects, so the financier need not exercise due diligence. Furthermore, the project cash flow is made clear by the M&V reporting, making it even simpler to implement project finance. Being able to gain financing in this way, outside the constraints of the usual financing framework is extremely important to encouraging investment in

energy efficiency. Performance contracting can be effective in helping to realise this funding environment.

Despite the merits of performance contracting, the financial institutions still think of project finance as a large-scale investment involving setting up a SPC, exercising due diligence, and keeping accounts separate from other projects, inappropriate to small-scale projects such as ESCO business due to high administrative costs. The state of the funding environment is a serious issue for the future expansion of financing for energy efficiency retrofits. Development and spread of advantageous funding instruments such as a simple form of project finance that considers the characteristics of ESCO business or limited recourse financing has become a major issue.

Conclusion

Since the first oil shock in 1973 Japan has actively driven its energy efficiency policy forward, gaining good marks globally for energy conservation, reflected in its low energy intensity. Since the 1997 COP3 Japan has implemented many energy efficiency policies in an effort to drive energy efficiency even further. Against this backdrop, Japan began grappling with ESCO business in 1996, nearly seven years ago. From the standpoint of western countries with developed ESCO industries, the scale of the ESCO market in Japan is small, but its future possibilities are large. At the same time that governmental support is maturing, we can say that ESCO business is receiving notice in both the private and public sector markets. Some issues do remain to be solved regarding the financing system and institutional aspects of public sector construction projects. Still, we have high expectations that ESCO business will shoulder a major load as a climate change countermeasure.

References

- Advisory Committee on ESCO Investigation. 1996. "Investigating the possibilities for diffusion of ESCO business in Japan." Ministry of International Trade and Industry.
- Association for ESCO Business Introduction in Japan. 1998. "Committee report for ESCO business introduction in Japan." Energy Conservation Centre Japan.
- C. A. Goldman. 1996. "Future Prospects for ESCOs in a Re-structured Electricity Industry." In proceedings of the ACEEE 1996 Summer Study on Energy Efficiency in Buildings.
- C. Murakoshi, H. Nakagami & M. Yokoo, "The trend and subject of ESCO business in Japan", In proceedings of the Improving Electricity Efficiency in Commercial Buildings, May 2002.
- C. Murakoshi, H. Nakagami & T. Sumizawa, 2000. "Exploring the feasibility of ESCO business in Japan: demonstration by experimental study", in proceedings of the ACEEE 2000 Summer Study on Energy Efficiency in Buildings.
- Committee on ESCO Business Demonstration. 1999. "Feasibility study for Model Energy Efficiency Retrofits." Energy Conservation Centre Japan.
- [DOE] U.S. Department of Energy. 1997. International Performance Measurement and Verification Protocol.

- D. S. Dayton and C. A. Goldman, 1998. "The Energy Services Company (ESCO) Industry: Analysis of Industry and Market Trends." In proceedings of the ACEEE 1998 Summer Study on Energy Efficiency in Buildings.
- E. Vine, C. Murakoshi & H. Nakagami, 1998. "International ESCO Business Opportunities and Challenges: A Japanese Case Study." *Energy* Vol.23, No.6, 1998.
- E. Vine, C. Murakoshi & H. Nakagami, 1999. "The evolution of the US energy service company (ESCO) industry: from ESCO to Super ESCO." *Energy* Vol.24, 1999.
- Ministry of Public Management, Home Affairs, Posts and Telecommunications, "The Study on the Measures to Cope with Global Warming at the local authorities", March 2001.
- R. D. Cudahy, T. K. Dressen. 1996. "A Review of the Energy Service Company (ESCO) Industry in the United States." The World Bank.

Acknowledgements

We thank Barbara Litt for her help in translating this paper into English.