

**PROJECT STUDY
ON
ENERGY CONSERVATION
BY
UTILIZING ESCO**

**FINAL REPORT
SUMMARY**

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**JAPAN INTERNATIONAL COOPERATION AGENCY
(JICA)**

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Abbreviations and Acronyms

3-CEE	3-Country Energy Efficiency
ADB	Asian Development Bank
AFD	Agence Française de Développement
ASTAE	Asian Alternative Energy Program
BAESCO	Brazilian Association of Energy Service Companies
BEE	Bureau of Energy Efficiency (India)
CDM	Clean Development Mechanism
CEM	Contract Energy Management (U.K.)
CER	Certified Emission Reduction
CFL	Compact Fluorescent Lamp
CHP	Combined Heat & Power
CNI&G	China National Investment & Guaranty CO., Ltd.
CONAE	National Commission for Energy Conservation (Mexico)
COP/MOP1	The first Conference of the Parties serving as the Meeting of the Parties
COP/MOP2	The second Conference of the Parties serving as the Meeting of the Parties
DEDE	Department of Alternative Energy Development and Efficiency (Thailand)
DEDP	The Department of Energy Development and Promotion (Thailand)
DFID	Department for International Development (U.K.)
DNA	Designated National Authority
DOE	Department of Energy (Philippines)
DSM	Demand-Side Management
ECEP	Energy Conservation and Environmental Protection Project (Egypt)
ECF	Energy Conservation Fund (Sri Lanka)
EEI	Excellent Energy International Co., Ltd. (Thailand)
EER	Energy Efficiency Ratio
EGAT	EGAT Public Company Limited (Thailand)
EMC	Energy Management Company (China)
EMCA	Energy Management Company Association (China)
EMS	Energy Management Services Emirates LLC (EAU)
ENCON Fund	Energy Conservation Promotion Fund (Thailand)
EPC	Energy Performance Contracting
ESCO	Energy Service Company
ESMAP	Energy Sector Management Assistance Program
ESPC	Energy Savings Performance Contract (U.S.A.)
EU	European Union
EVN	Electricity of Vietnam
FICCI	Federation of Indian Chambers of Commerce and Industry
FS	Feasibility Study
ECCJ	Energy Conservation Center, Japan
GDP	Gross Domestic Product
GEF	Global Environment Facility
GSC	Guaranteed Savings Contract
GTZ	Gesellschaft für Technische Zusammenarbeit (Germany)
ICICI	Industrial Credit and Investment Corporation of India
ICPEEB	Indian Council for Promotion of Energy Efficiency Business
IDBI	Industrial Development Bank of India
IEEN	Industrial Energy Efficiency Network (Kenya)
IPMVP	International Performance Measurement and Verification Protocol

IREDA	Indian Renewable Energy Development Agency Limited
IRP	Integrated Resource Planning
JAESCO	Japan Association of Energy Service Companies
JBIC	Japan Bank for International Cooperation
JETRO	Japan External Trade Organization
JICA	Japan International Cooperation Agency
KAM	Kenya Association of Manufacturers
KONEBA	PT Konservasi Energi Abadi (Indonesia)
LFM	Land Fill Methane
M&V	Measurement and Verification <i>or</i> Monitoring and Verification
MESITA	Malaysian Energy Supply Industry Account
METI	Ministry of Economy, Trade and Industry (Japan)
MIEEIP	Malaysian Industrial Energy Efficiency Improvement Project
MTI	Ministry of Trade and Industry (Kenya)
MUSH	Municipal, University, School, Health
NAESCO	National Association of Energy Service Companies (U.S.A.)
NDRC	National Development and Reform Commission (China)
NECIDC	NDRC Energy Conservation Information Dissemination Center (China)
NEDO	New Energy and Industrial Technology Development Organization
O&M	Operation and Maintenance
ONEP	Office of Natural Resources and Environment Policy and Planning (Thailand)
PCRA	Petroleum Conservation Research Association (India)
PFI	Private Finance Initiative
PMO	Project Management Office (China)
PTM	Pusat Tebaga Malaysia (Malaysia Energy Center)
RIKEN	The National Energy Conservation Plan (Indonesia)
SGF	Sustainable Guarantee Facility
SME	Small and Medium Enterprise
SSC	Shared Savings Contract
TPC	Technology Performance Contracting
TPF	Third Party Finance
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNF	United Nations Foundation
UNIDO	United Nations Industrial Development Organization
USAID	United States Agency for International Development
VAT	Value-Added Tax
WB	World Bank

1. Objective and Methodology of Research

1.1 Research background

Under the situation of prolonged increase of crude oil cost and deterioration of global environmental problems, promotion of energy conservation is attracting international attention as a sustainable and effective counteraction against various global issues such as energy security, global warming and reinforcement of the basis for economic activities. Among many energy conservation methods, the promotion of energy saving based on positive utilization of ESCO (Energy Service Company) has been expected as a rational strategy that utilizes market mechanism. Active utilization of ESCO has started already in Western countries as one of the basic strategies for promoting energy conservation. Meanwhile, there is a growing interest in utilization of ESCO among people in developing countries. For instance, many concerned parties of developing countries participated in the First Asia ESCO Conference in Bangkok that was held last October.

In this trend, international support organizations such as The World Bank have drastically increased the support in funding and in technical areas for promoting energy conservation businesses including ESCO in developing countries.

JICA also has been aware of this trend and is reinforcing its approach for energy conservation by, for instance, compiling Thematic Guidelines “Energy Conservation” in February 2005. Nevertheless, effects of ESCO or energy conservation on the national economy of a country, possibility of creation/expansion of ESCO market in developing countries, or the methodology of timely supports by JICA to energy conservation have not been clearly established so far.

1.2 Objective of research

As the objective of this research, the current status of ESCO business, issues regarding the expansion of ESCO business and energy conservation-related policies in each country centered on Asia are investigated and analyzed so as to use the data for proposal “Proposal of ESCO-Type Energy Saving Promotion” as a supplementary measure of JICA’s approach in the field of energy conservation.

1.3 Implementation agenda of research

Implementation agenda of the research is described below. Figure 1.3.1 shows the outline of the overall research.

1.3.1 Domestic research

Insufficient areas of information were confirmed after summarizing specific models of ESCO type energy conservation promotion in each country. An research based on documentation was conducted to elucidate the information that was insufficient prior to research on site.

Based on the results of literature research prior to research on site and the results of research on site, models of ESCO type energy conservation promotion were analyzed and consultation was conducted for reinforcement policies to address the field of energy conservation to be implemented by JICA.

1.3.2 On-site research

Field research was conducted in 5 countries: i.e. in China, India, Malaysia, Thailand and the Philippines. In China, India and Malaysia, multi-aspect research was conducted including the hearings for concerned organizations. In Thailand and Philippines, specific research that focused on collection of supplementary information about ESCO was conducted.

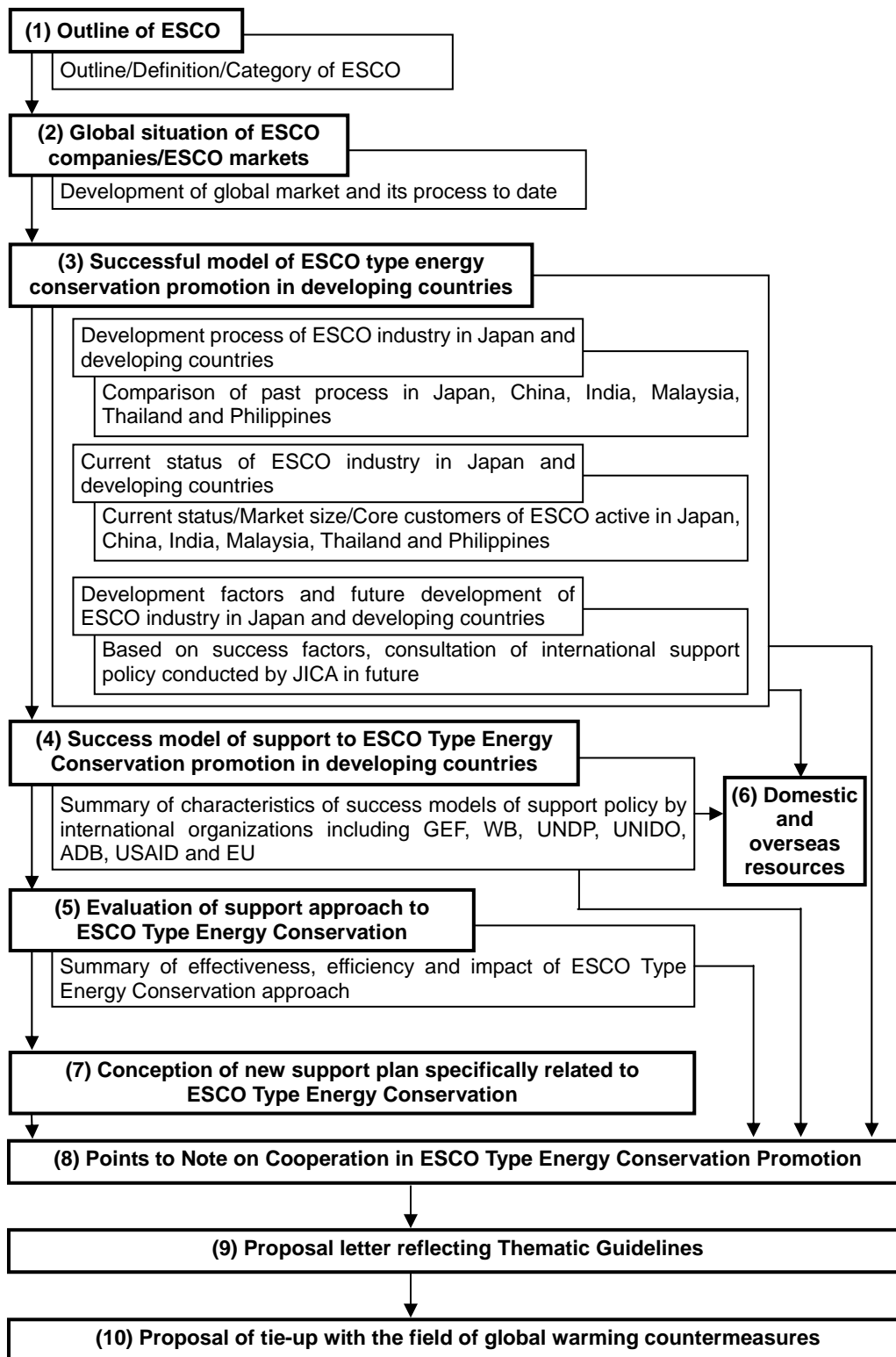


Figure 1.3.1 Research project implementation flow

2. Results of Research

2.1 Outline of ESCO

The following five points are the features of ESCO business: [1] All the costs are offset by the reduction in utility cost (no new financial burden is imposed); [2] The energy saving effect is guaranteed by ESCO (guaranteed through a performance contract); [3] Comprehensive services are provided; [4] The energy saving effect is exhaustively validated; and [5] The financing environment is not based on assets. The most important point in these five is the “performance contract” and it has a considerable cause-and-effect relationship with other features. The features [1] through [5] are explained below mainly from the relationship with the “performance contract” and the basic definitions of ESCO business are clarified.

In the meantime, a new business that takes an ESCO concept more flexibly has been growing particularly in the U.S., and a similar trend is seen in Japan as well. Therefore, an explanation is given here on the basic form of ESCO business which is implemented based on the performance contract and its derivational form which is implemented as a form of business that provides a wide variety of energy services.

Providers of these energy services are often classified by their business origin, like manufacturing, engineering, utility, or independent. As an example, Japanese ESCO providers are classified by their business origin and the features of each group described.

2.1.1 Features of ESCO business

- (1) All the costs are offset by the reduction in utility cost

The first of the features of ESCO business shown above, which is [1] All the costs are offset by the reduction in utility cost, is the most well-known feature among the five features. This shows that the energy efficiency renovations handled by ESCO prioritize the economical efficiency and contribute to the increase of client’s profits. The capital for investment payback is usually gained from the reduction in utility cost, but sometimes gained from the reduction in service water cost and the operation and management cost. Basically, the energy saving guarantee period is up to the completion of payback of initial investment. However, if the reduction in utility cost is stabilized, the saving guarantee period may be sometimes shortened to reduce the overall costs.

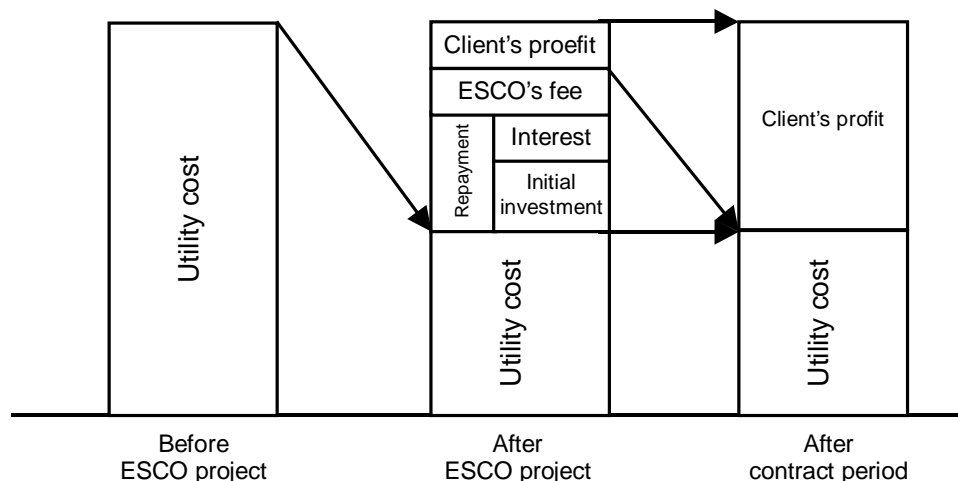


Figure 2.1.1 Reduction of utility cost and allocation of profit

- (2) Guarantee of energy saving effect by ESCO

The biggest feature of ESCO business (as compared with other energy efficiency renovations) is [2]

the energy saving effect is guaranteed by ESCO. Energy efficiency renovations implemented only within the economically-acceptable range are not much different from ordinary energy efficiency renovations. In the case of ESCO business, ESCO conclude a contract with clients that they provide an energy saving guarantee and pay a penalty if the promised saving is not materialized. The penalty is often paid in the monetary form, but sometimes paid in the form of additional work at no charges to fully realize the promised energy saving effect. Provision of energy saving guarantee has an effect to maximize the profits of both clients and the ESCO providers. It is exactly this point that ESCO business is said to be capable of building the “win-win relationship”.

(3) Provision of comprehensive services

With the provision of energy saving guarantee, the period from planning to the payback of investment becomes the period of ESCO’s responsibility, and hence they will not make proposals which may be disadvantageous to their clients. Also, the maximum profits of clients will result in the minimum performance risk of ESCO. On the other hand, since the projects with a large construction cost are profitable to ESCO providers, they try to identify potential renovation locations as much as possible within the economically acceptable range. They include renovations that need no investments, renovations that can reduce service water cost and operation/management cost, etc. Renovations with a short payback period are regarded as strategic renovation items to be implemented to attain renovations with a long payback period. Furthermore, since operation and management as well as maintenance are important in realizing long-term energy savings, they are included in the plan from the very beginning. Financing is also included in the proposal as a vital item that determines the overall economy of the project. Providing a series of services like this is the business model of ESCO business.

(4) Exhaustive verification of energy saving effect

To verify that the energy saving guarantee is being attained, the energy saving performance is measured at a certain interval and its results reported to the client. During this process, energy consumption and the management system are also checked regularly. This is very important for ensuring continuation of energy saving performance.

(5) Financing environment not based on assets

Asset-based loans are preferred by financial institutions from the viewpoint of risk hedge. However, in the case of ESCO business, financial institutions can avoid this kind of risk because the energy saving guarantee contributes greatly to the accumulation of a capital for repayment. Therefore, the biggest risk of financial institutions is the risk of client’s bankruptcy; they are not required to take the performance risk of energy efficiency renovation. In other words, financial institutions can decide on loaning only by evaluating the track record of ESCO providers and the credit of clients. As a result, provision of finance not based on assets becomes possible.

2.1.2 Target market of ESCO business

ESCO businesses in most developing countries seek a short-term investment payback. However, this kind of projects with an investment payback period of 1-2 years can be implemented with the clients’ own capital, and hence ESCO providers are not necessarily able to gain an advantage in this market. This kind of projects is sometimes called cream skimming (the lion’s share). It means that if short-payback type renovations are taken up precedently, the remaining work becomes economically disadvantageous and will never be chosen as the target of investment again. On the other hand, investments with a long payback period (greater than 10 years) are inappropriate as the target of ESCO because it puts pressure on the economical efficiency. Therefore, the target of ESCO should mainly be the renovations with an investment payback period of 2 to several years. And, energy efficiency renovations with a payback period of less than 2 years should be considered as the strategic renovation items whose role is to contribute to the economy of technological introduction which needs a long investment payback period. If

this kind of renovations (investment payback period: 2 to several years) is targeted and their market opened up, quantitative expansion of energy savings as well as market expansion will be enabled.

2.1.3 Contract types of ESCO business

The contracts of ESCO business are roughly classified into two types: guaranteed savings contract (hereinafter referred to as GSC) and shared savings contract (hereinafter referred to as SSC). In the case of GSC, the client undertakes procurement of finance and assumes the risk of repayment. The ESCO provider concludes a performance contract with the client and accepts the risk of energy saving guarantee. In some cases, the ESCO provides financing-related know-how or arrangements. In the case of SSC, the ESCO provider undertakes procurement of finance and assumes both the repayment risk and performance risk. Therefore, the client does not have to accept risks other than the risk arising from the bankruptcy of the ESCO provider. Financial institutions must assume risk of bankruptcy of the client and the ESCO provider in both GSC and SSC cases. The larger risk of them is the suspension of ESCO business due to the bankruptcy of the client.

In Japan and also in developing countries, ESCO business in the form of SSC often precedes. This is because, in the dissemination stage of ESCO business, business goes smoothly if financing is provided, because the details of an ESCO business are not yet well understood. Also, as financing methods are often limited in developing countries, clients sometimes rely on financing provided by ESCO providers. Because of this, ESCO business is sometimes mistaken for a “financing method”. However, since the feature of ESCO business lies in the “energy saving guarantee”, being viewed as the financing method can be a restraint to the expansion of the ESCO market over a mid- to long-period.

In the case of GSC, the risk of the client is generally large, but most of it can be covered if an excellent ESCO provider is selected. Also, as the financing risk is taken up by the client, it is possible to reduce the total investment amount. In contrast, in the case of SSC, the risk of the client is small, but the payment to the ESCO provider is large and hence the profit of the client becomes small. Also, in the case of SSC, the resulting energy saving effect is sometimes limited because ESCO providers seek a short-term payback of investment. Accordingly, in terms of ESCO business as a whole, GSC has a higher possibility of growth than SSC. In the case of Japan, the contract period of SSC is very long, but this is possible only when both the client and the ESCO are excellent enough. Because this kind of market has a limitation in growth, developing the ESCO market of the GSC type is considered necessary. Similarly, in developing countries, it is considered necessary to start with SSC and then move on to the GSC-type market over a mid- to long-period term.

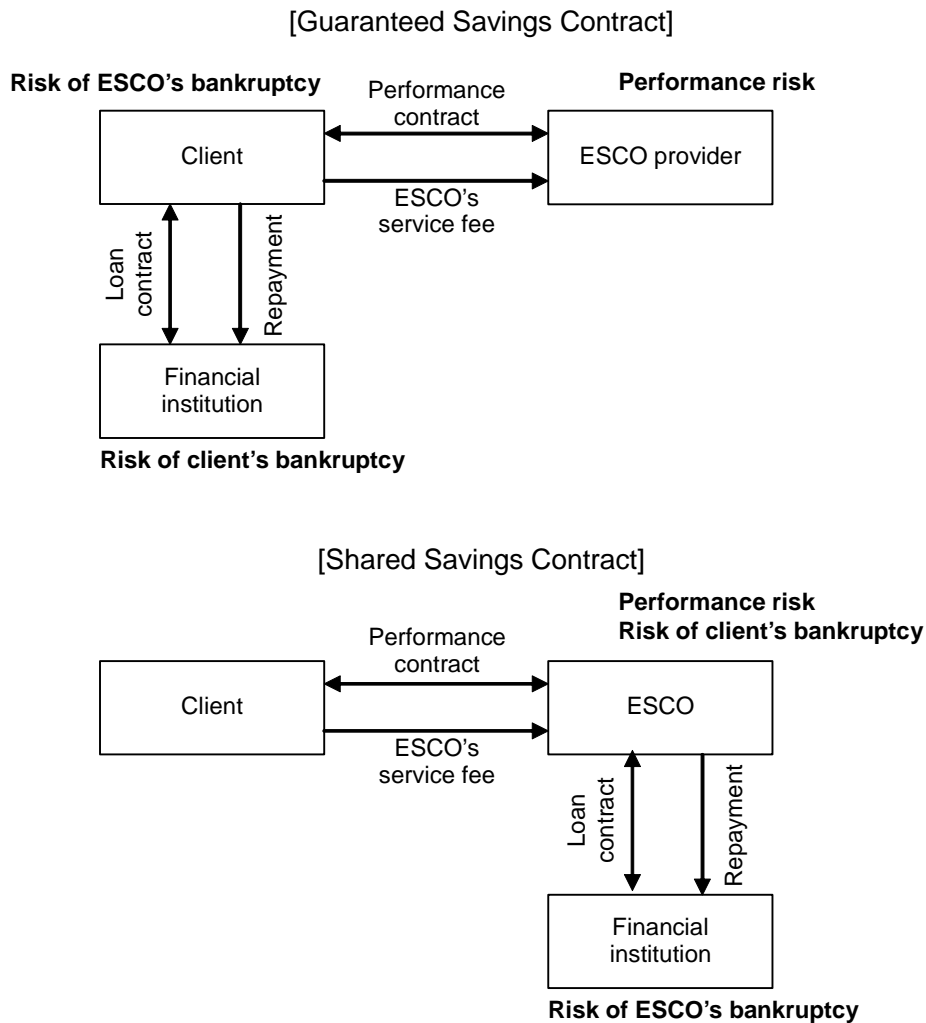


Figure 2.1.2 Typical contract types of ESCO

When a lease contract is utilized, the contract becomes [1] GSC type if the lease contractor is a client, and [2] SSC type if the lease contractor is an ESCO. In the case of GSC with a lease contract, ESCO sells the equipment to the lease company after the completion of renovation work, and the lease company concludes a lease contract with the client. Other business types are also available which include: an establishment of a special purpose company which is administered primarily by ESCO; and ESCO provides an energy saving guarantee to the financing environments of the special purpose company, client, and financial institution.

The definitions of GSC and SSC given above are those that the traditional concept born in the U.S. took root in Japan and other Asian countries. However, the definitions have somewhat changed in the U.S. now. GSC is considered as the contract type in which the client undertakes procurement of finance and ESCO receives some fixed ratio of the reduced cost. SSC is considered as the contract type in which ESCO undertakes procurement of finance and the resulting profit is divided between the ESCO and the client at some fixed ratio. Thus, GSC and SSC are distinguished by the two factors - financing method and allocation of profit. The contract type in which ESCO undertakes financing and receives a certain amount of fee, like the super energy savings performance contract (Super ESPC) which is adopted by the federal government, is called the ESCO-financed guaranteed savings contract.

2.1.4 Features of ESCO companies

The number of ESCO providers in Japan as of 2004 is about 30. A large ratio is accounted for by the ESCO providers whose business basis is equipment engineering (39%), manufacturing (23%), and utility (20%), and the ratio of ESCO providers whose business basis is building, independent, and finance is small. As to the business scale, ESCO providers which entered into business in the early days have a strong edge, most of whom are manufacturing or independent-based companies, followed by utility-based companies. However, utility-based companies were slightly late in entering into the ESCO business and they are now trying to catch up with the forerunning ESCO group. The number of equipment engineering-based ESCOs is many, but their size of business varies widely. They include a large-scale subcontractor to medium- and small-size engineering companies. They were originally engaged in the design and installation of equipment, a business close to ESCO business.

In contrast, in the case of the U.S., a large ratio of ESCOs is accounted for by equipment engineering-based companies, followed by utility-based companies. Although Johnson Controls, Inc. and Honeywell International Inc. are included in the manufacturing (of building equipment)-based ESCOs, most of ESCOs are medium- and small-size companies. This tendency is particularly conspicuous in the case of equipment engineering-based ESCOs. In the U.S., the attributes of ESCOs were various in the early days, such as independent type ESCOs. However, due to repeated mergers after the deregulation of electric companies, the distribution of ESCOs became as as what it is today.

2.2 Successful Cases of ESCO Type Energy Conservation Promotion in Developing Countries (Important Target Countries)

2.2.1 People's Republic of China

The People's Republic of China (hereinafter referred to as China) succeeded in the initial introduction of ESCO business in a short period of time with the support from the program of Global Environment Facility (GEF)/World Bank (WB). However, to ensure sustainable development of ESCO activities which will be explained later, promotion of understanding and enlightenment of the "inherent concept of ESCO business" is highly needed.

(1) Progress of the ESCO industry

1) Actions for energy conservation

<Energy Conservation Law>

In November 1997, the Energy Conservation Law was established (effectuated in 1998). It prescribed provisions, including setting of energy consumption standards, mandatory adoption of the labeling system, suspension of use of industrial processes and equipment not meeting the consumption standards, and designation of key energy-consuming entities for conservation management.

<Economic support>

In the past, a number of economic and tax incentives existed, which include: a subsidy supplementing half the interest of the loan borrowed for energy conservation of buildings and factory processes, a reduction in the fixed property tax imposed on investments in energy conservation equipment; and, a reduction in the customs duty tariff imposed on advanced energy efficient equipment imported from abroad. However, most of these supports were abolished with a major tax reform in 1994.

<Dissemination of energy conservation information>

The number of energy efficiency centers in China has increased since 1982 and the number as of today is about 130. These centers are undertaking various activities, such as raising awareness for energy conservation and popularizing energy efficient technologies.

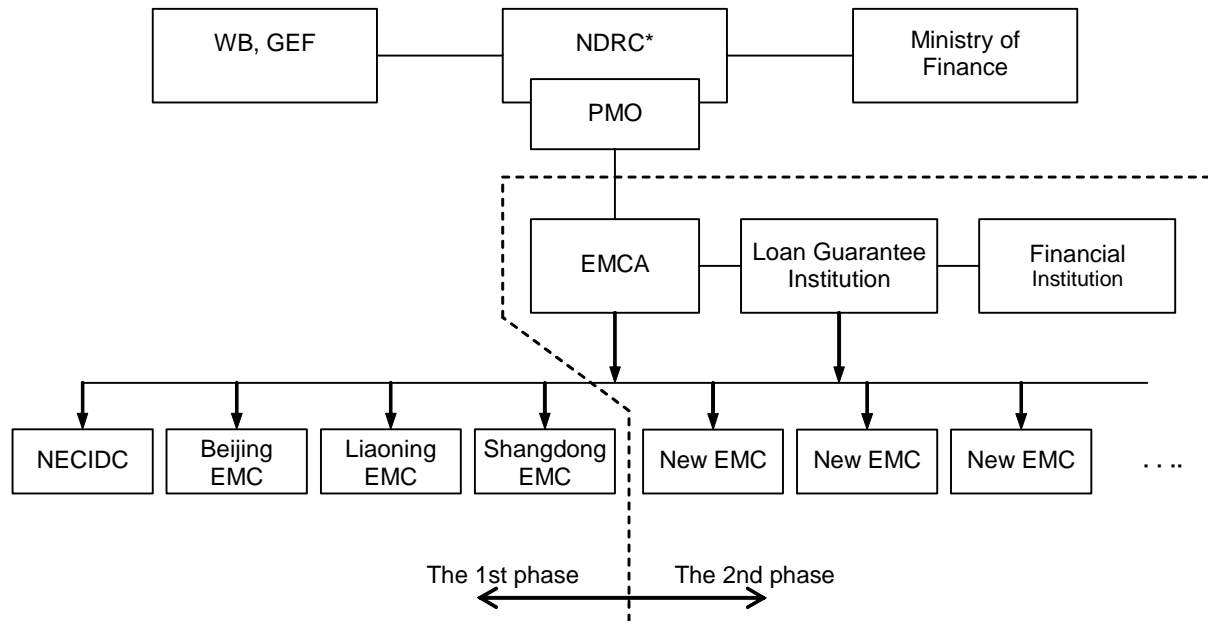
2) Start of ESCO business

Introduction of the ESCO industry in China was started with the survey "China Issues and Options in GHG Emissions Control" which was conducted in 1992 ~ 1994 with the support of the Global Environment Facility (GEF) and the subsequent China's Energy Conservation Project (commenced in 1998) which was undertaken with the cooperation of WB/GEF. During the 1st phase (1998 ~ 2003) of the Energy Conservation Project, three pilot ESCOs (Beijing EMC, Liaoning EMC, and Shangdong EMC) were set up with the funds from GEF, WB, the European Union (EU), and the United Kingdom (UK). The 1st phase is evaluated as a major success and the three ESCOs engaged in a business of about 200 million yuan (RMB200 million) (2.9 billion yen) in 2004. In the 2nd phase (-2009) which started in 2004, the Energy Management Company Association (EMCA) was established and a loan guarantee program was inaugurated to encourage the entry of new ESCO providers and to expand the ESCO market. Today, about 50 ESCO providers exist in the market. However, ESCO providers which are actually working is said to be about half of them. According to the survey by EMCA, 26 ESCOs were found actually engaging in ESCO business. The total investment scale of these 26 companies reached RMB480 million (7 billion yen) in the latest six months (Jiang Yuanfu, the 1st Asia ESCO Conference), and China is rapidly forming the second largest market after Japan.

3) International cooperation

The "3-Country Energy Efficiency (3-CEE)" project was established in 2002 with a collaboration of WB, the United Nations Environment Programme (UNEP), and ESCO-related organizations of Brazil, China, and India. The administrative fund of the project is provided from the United

Nations Fund (UNF), Energy Sector Management Assistance Program (ESMAP) of the World Bank (WB), Asian Alternative Energy Program (ASTAE) also of WB, and the Department for International Development (DFID) of the U.K. This project is aimed at increasing energy conservation investments of domestic financial institutions in those countries through information exchange and cooperation among the three countries.



*: The oversight organization was the State Economic and Trade Commission (STEC) in the past, but changed to the National Development and Reform Commission (NRDC) in 2003 with the reorganization of the People's Committee.
 PMO: Project Management Office.
 NECIDC: NDRC Energy Conservation Information Dissemination Center.

Figure 2.2.1 Organizational structure of WB/GEF-supported China's Energy Conservation Project

(2) Present status of the ESCO industry

1) Scale of the ESCO industry

According to China's ESCO association (EMCA), the total number of EMCA members was 89 entities in 2004, which was comprised of 15 manufacturers of energy efficiency equipment, five energy efficiency centers, four energy conservation investment companies, six foreign companies, seven energy conservation-related other type of companies, and 52 ESCO providers. The number of EMCA members increased to 102 in 2005.

The investment scale in FY2005 of the three pilot ESCOs which were established during the 1st phase of China's Energy Efficiency Project was RMB 270 million (3.9 billion yen). The average investment recovery period was 1.3 years.

The number of ESCO providers is increasing year after. However, many of them are sales companies who are selling energy efficient equipment they themselves have manufactured.

2) China's Energy Management Company Association (EMCA)

The activities of EMCA include: [1] Works consigned by GEF/WB (estimation of CO₂ reductions, etc.); [2] International exchange (training on CDM: 10 persons participated in the last training. An exchange meeting with the New Energy and Industrial Technology Development Organization (NEDO) of Japan is also planned. Although energy management companies (EMCs) have an interest in Clean Development Mechanism (CDM), specific CDM activities and the relationship

between CDM and economic efficiency are unknown) and [3] Provision of services for supporting the development of ESCOs (information collection, policy research, information provision, publication of journals, holding of seminars and training, etc.)

3) Loan guarantee

The number of ESCO projects that used a security mechanism during the 2nd phase of the GEF/WB's Energy Efficiency Project in China was 52 by 23 enterprises. Their total investment was RMB295 million (4.3 billion yen). The financial institution providing a guarantee scheme for EMCs is the China National Investment & Guaranty Co., Ltd. (CNI&G), which is managing the business with the fund of USD21 million provided from GEF. It established a loan guarantee scheme by referring to Japan's loan scheme for small- and medium-sized enterprises.

(3) Factors contributed to the development of the ESCO industry and future trends

The characteristic of the development of the ESCO industry in China is that international organizations (WB, GEF, etc.) have assisted consistently from the initial stage of its development in such aspects as creation of ESCO providers, financial assistance, and establishment of the ESCO association.

In 2003, China's Energy Management Company Association (EMCA) was established (members: about 100) and a loan guarantee scheme for EMCs also set up (undertaken by the China National Investment & Guaranty Co., Ltd. (CNI&G)), indicating that the ground for the development of the ESCO industry in China is being solidly formed. However, it is difficult to say that ESCO business is really in progress, in view of the fact that many ESCOs are doing only the sales of energy efficient equipment or targeting only the projects with a short-term investment payback. Nevertheless, because the Central Government has been strengthening energy conservation measures steadily since the enactment of the Energy Conservation Law in 1998, and because a specific objective to reduce the energy source unit (energy consumption per GDP) by 20% by 2010 from the present-day level is specified in the 11th five-year plan (2006-), the role of the ESCO project will continue to grow significantly. To enable independent growth of the ESCO industry after 2009 when the support from WB/GEF will be terminated, it is necessary to facilitate the cultivation of ESCO business with an investment payback period of several years, which is the most desirable type of ESCO project. For that purpose, it is indispensable to strengthen enlightenment and capacity building of ESCO companies and financial institutions while digging up promising ESCO projects.

(4) Clean Development Mechanism (CDM)

The designated national authority (DNA) for CDM in China is the National Coordination Committee on Climate Change (NCCCC), a committee under the National Development and Reform Commission (NDRC) of the State Council.

Concerning the implementation of CDM projects, energy conservation is designated as one of the priority areas by the Measures for Operation and Management of CDM Projects. The share ratio of the profits from the transfer of certified emission reductions (CERs) is also given a preferential treatment.

2.2.2 India

Formulation of the ESCO industry in India has not necessarily been successful, but achievements are seen in the formulation of related subprograms. The following analysis is made with a focus on those aspects.

(1) Progress of the ESCO industry

From mid-1970s to early 1990s, energy conservation efforts have been promoted by individual agencies, first by the Petroleum Conservation Research Center (PCRA) which, pressed by the oil crisis, pursued energy efficiency in oil, followed by the power-related agency which sought energy efficiency in power. Then, from early 1990s, financing to energy efficiency projects of every energy

type was started by the Indian Renewable Energy Development Agency Ltd. (IREDA), which is a governmental financial institution, and by other industry-related financial institutions, with funds from WB and other international cooperation banks in foreign countries. In parallel with this movement, the United States Agency for International Development (USAID) began to support the creation of ESCO business in India, and ESCO providers came into existence from around 1995. In 2001, the Energy Conservation Act was enacted. In 2002, the Bureau of Energy Efficiency (BEE) laid out an introduction plan of ESCO business into governmental buildings, with the help of the Deutsche Gesellschaft fur Technische Zusammenarbeit (GTZ), an international cooperation organization in Germany. From around the time when the Energy Conservation Act was enforced, the industrial sector represented by the Federation of Indian Chamber of Commerce (FICCI) also began to strengthen its actions towards ESCO business voluntarily, and has since materialized several successful ESCO cases. In 2002, the “3-Country Energy Efficiency (3-CEE) Project” which is an ESCO promotion project among three countries, Brazil, China, and India, was established with cooperation from UNEP and WB. It has since been implementing activities directed towards the development of ESCO industry in each country through the exchange among those countries. Although the scale was small, India successfully held an ESCO international conference (1st International ESCO Conference) in 2005 with cooperation between the industry and the government, and also set up the first ESCO association (ICPEEB (Indian Council for Promotion of Energy Efficiency Business)) in India.

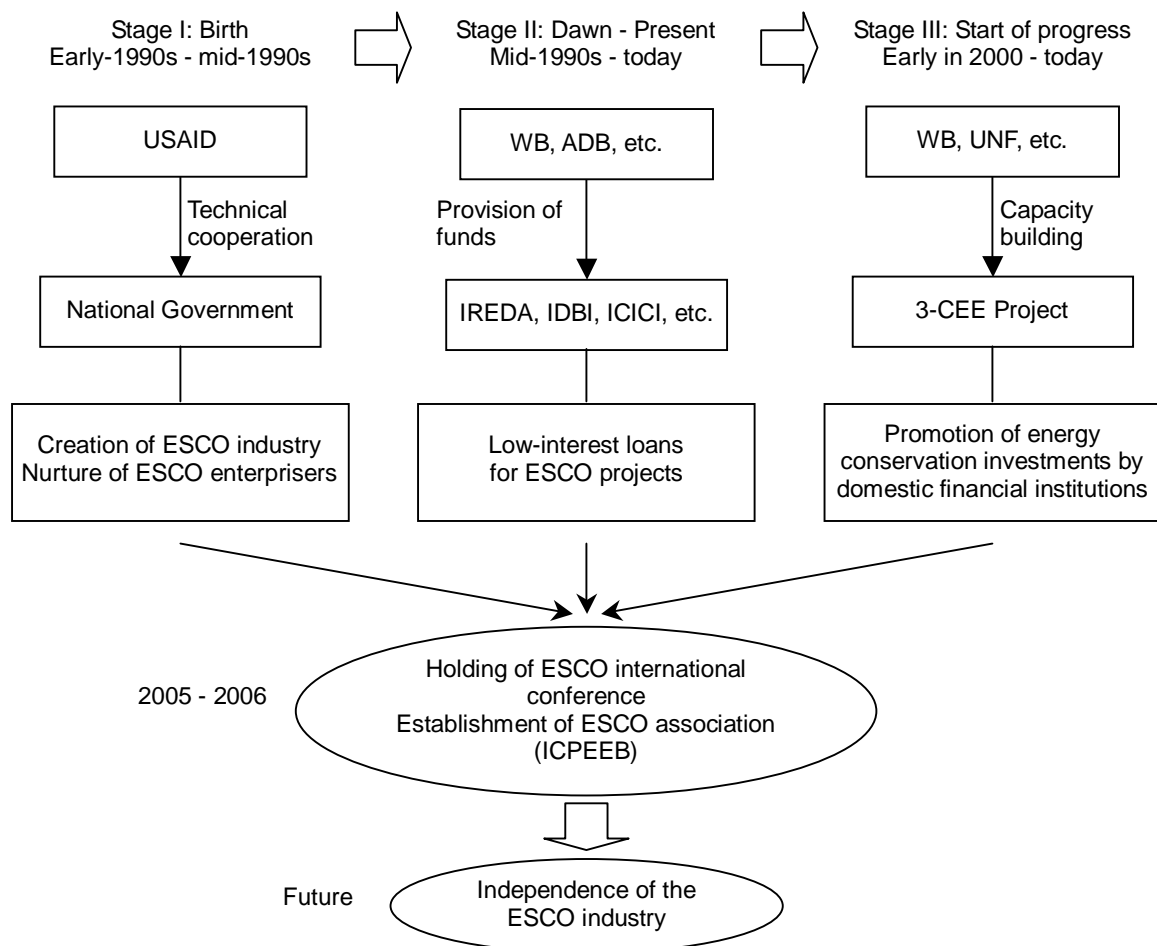


Figure 2.2.2 Support from international organizations for the development of India’s ESCO industry

To sum up, India's ESCO industry has been developed in the following steps: First, the ESCO industry was created and nurtured, with financial and technical assistance from international organizations. With the enactment of the Energy Conservation Law in 2001, the Government also started to promote ESCO projects as an important tool for energy efficiency. Then, self-promotion of ESCO business activities by the industrial sector and multilateral projects with the support from international organizations followed, which gave an impetus to the establishment of the ESCO association.

(2) Present status of the ESCO industry and future trends

As described above, the ESCO industry in India has been nurtured with the help of various activities designed for the development of the ESCO industry which have been implemented by the Indian Government, international cooperation organizations, ESCO providers, the industrial sector, financial institutions, etc. However, it is still premature to say that the ESCO's market environment in India has been fairly developed.

The energy conservation investment potential in India by sector is estimated to be Rs 140 billion (360 billion yen). Although the ESCO market cultivated is small so far, the energy saving potential is large and a significant expansion of the ESCO industry is expected particularly in FY 2006 and later. It is because March 2007 when the five-year dispensation period of the Energy Conservation Act ends is approaching, and because the honorable Prime Minister of India presented a statement that "30% energy saving shall be achieved at all governmental buildings within the next five-year period utilizing ESCO projects".

It is considered that the potential market will be governmental buildings first, then small and medium-sized industrial and commercial buildings. In the case of small and medium-sized industries, replicability of projects should be utilized by bundling the target facilities by business type, which will reduce transaction costs and enable smooth implementation of projects.

The ESCO industry in India has already established the ESCO association, and what must be done next is how to direct the ESCO industry to the path of autonomous progress. The measures for this purpose are shown below.

- Establishment of ESCO working team
- Development of the M&V method and standard contract forms of Indian specification
- Comprehensive approach: utilization of incentives based on market principles and formulation of institutional linkage
- Securing continuity of pilot projects
- Establishment of a core organ for information dissemination
- Establishment of a loan and credit guarantee system
- Promotion of international cooperation at higher organization levels
- Promotion of international cooperation at the state government level
- Promotion of international exchange of energy conservation technologies

(3) Clean Development Mechanism (CDM)

The number of registered CDM projects in India is now the largest in the world. Human resources for CDM implementation in the governmental organizations, including DNA, are already well developed. Interest in CDM projects at the local government level is also high. Private developers and consultants who engage in finding and intermediating CDM projects are also many. India is one of the most promising countries in the world as the CDM host countries, including the sufficiency of human resources and the potential for CDM implementation. Therefore, if cooperation is made with Indian companies, promising energy conservation CDM projects may be found.

2.2.3 Malaysia

(1) Present status of the ESCO market

As of 2005, 72 ESCO providers exist in Malaysia. However, the number of ESCO projects implemented in Malaysia till today is only one, which was implemented by the central government within the framework of the Malaysian Industrial Energy Efficiency Improvement Project (MIEEIP). Hence, the number of ESCO projects implemented on a commercial basis is none at present.

(2) ESCO industry promotion measures

As the ESCO industry promotion measures, the MIEEIP targeting the industrial sector is available. In contrast, the ESCO industry promotion measure targeting the civil sector is none.

(3) Malaysian Industrial Energy Efficiency Improvement Project (MIEEIP)

1) Outline of MIEEIP

This is a project implemented over a five-year period from 2000 to 2004 with the intention of removing barriers to energy conservation promotion, planning of sustainable institutional systems, and establishment of a research framework in the industrial sector in Malaysia. Its total investment was US\$ 20,790,200.

To achieve the above-mentioned objectives, MIEEIP was constituted of the following eight programs.

- Program 1: Energy-use Benchmarking Program
- Program 2: Energy Audit Program
- Program 3: Energy Rating Program
- Program 4: Energy Efficiency Promotion Program
- Program 5: Energy Services Company Support Program
- Program 6: Energy Efficiency Technology Demonstration Program
- Program 7: Local Energy Efficient Equipment Manufacturing Support Program
- Program 8: Financial Institutions Participation Program

2) Accomplishments of MIEEIP

- a) Grasping of energy saving potential through energy audit and encouragement of energy conservation investments through information provision

It was found that the total energy consumption at the 48 factories which received an energy audit accounted for 9.4% of the total energy consumption in Malaysia (as of 2001). It was also found that 22.8% energy saving as well as investment payback within 1.9 years would be possible if energy conservation investments are made for those factories. Consequently, it can be said that MIEEIP played an important role in improving the awareness of the clients who had been skeptical about energy conservation investments and in invoking the potential of those investments.

- b) Improvement of awareness and capacity of ESCO players through the implementation of model projects

An energy efficiency investment model project was carried out at 12 factories which were selected from the above-mentioned 48 factories. Of the 12 model projects, four were conducted by domestic ESCO providers based on the concept of performance guarantee (the remaining 8 projects were implemented by the Pusat Tenaga Malaysia (PTM) (Malaysia Energy Center).

(4) Barriers to the development of the ESCO industry

- 1) Lack of incentives to energy conservation due to government-subsidized low energy price

It is considered that the largest barrier to the development of the ESCO industry is the lack of incentives to energy conservation because the energy price in Malaysia is kept low with the government subsidy. In Malaysia, the Small and Medium Enterprise (SME) Bank is offering low-interest loans at about 5% for small and medium-sized enterprises. Therefore, if the

government subsidy to the energy price is abolished, the present level of financial environment in this country will never be a major barrier to the development of the ESCO industry.

2) Distrust of clients in ESCO business

Of the four model projects implemented in the MIEEIP, only one could succeed in concluding a performance contract. As to the reason why the remaining three did not end in a contract conclusion, it is said that the clients were unable to wipe out a distrustful feeling towards ESCO business as the fee business. In the counties like Malaysia where the ESCO market is not yet formed, it is probably essential to implement model projects repeatedly and make the ESCO players, such as ESCOs, clients, and financial institutions, understand their benefits through experience.

(5) Actions related to Clean Development Mechanism (CDM)

The capacity building in the CDM field in Malaysia is already sufficient and vigorous activities already under way. For the CDM projects in the field of energy, the Pusat Tenaga Malaysia (PTM) (Malaysia Energy Center) is working as the widow for project review, and the actual review is undertaken by the Technical Committee on the upper level. The registered CDM project in Malaysia is still none, and actions to energy conservation projects just started. However, an upward trend is emerging. For example, the Matsushita Electric Industrial Co., Ltd. filed an application of three different types of factory energy efficiency CDM projects for review in February 2006.¹⁾

2.2.4 Thailand

(1) Progress of ESCO business

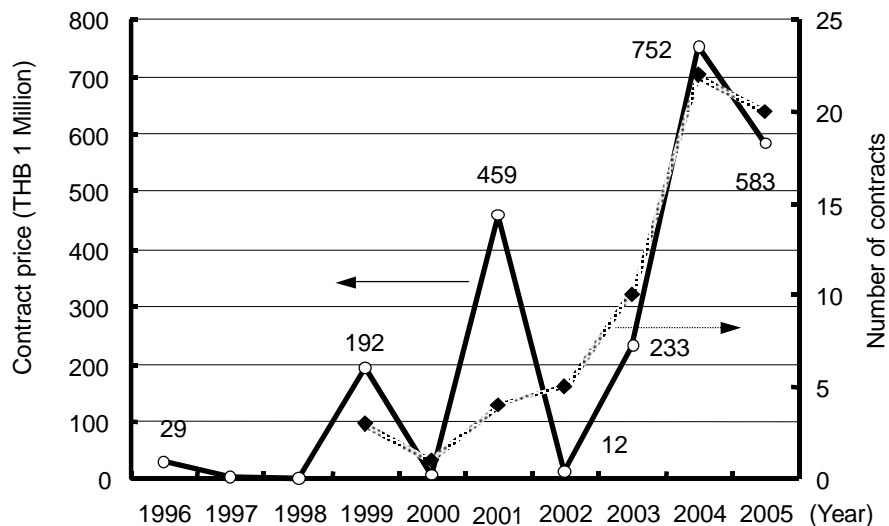
It was in 1996 that ESCO business began to be implemented in Thailand. However, a full-scale start was after March 1999 when an ESCO support project of WB and GEF commenced, with DEDP (presently DEDE) as the receiving body. In the GEF project, an energy audit was performed at four industrial facilities as the pilot project. The receiving body on the Thai side was the Electricity Generating Authority of Thailand (EGAT) (presently, EGAT Public Company Limited) and the project was implemented as part of Demand Side Management (DSM) effort. Of those target facilities, the cogeneration project at the factory of Bangkok Produce Merchandising Public Co., Ltd., whose energy audit was performed by the Excellent Energy International Co., Ltd. (EEI), was developed into an ESCO project in 2002 and received 30% subsidy from the ENCON Fund.

(2) Market scale

The ESCO business in Thailand was started with THB29 million contracts in 1996, but the contracts in the ensuing years fluctuated. However, the contract amounts grew to THB 460 million (1.38 billion yen) in 2001 and THB750 million (2.25 billion yen) in 2004. The number of ESCO contracts was 10 in 2003, but it increased to 22 in 2004. The contract price per project in 2004 was THB34 million (100 million yen). These data were collected by DEDE and the data were limited to the projects of performance contract only.

The potential market scale of energy conservation projects in Thailand is estimated to be THB8.3-18.9 billion (about 25-57 billion yen).

¹⁾ CDM Acceleration Programme with BCSDM, NEDO • BCSDM.



Source: Survey by DEDE (2005)

Note: Values of 2005 are estimated values. Exchange rate: 3 yen/baht

Figure 2.2.3 ESCO contracts in Thailand (Performance contracts only)

(3) ESCO providers

The number of ESCO providers in Thailand is currently about 20, but only 10 of them are actually engaging in ESCO business. Within the ESCO industry, however, it is said that the credible ESCO providers are only about five of them.

(4) Future trends

It was after the soar of crude oil price last year that the development of the ESCO business in Thailand moved to a realistic stage. Before that time, the electricity price was lower than that of Japan and the support from the central government was insufficient. Although GEF provided assistance to the development of ESCO business activities in Thailand, their results were limited.

The rise of crude oil price that started last year further amplified the expectations toward the cultivation of ESCO business potentials in Thailand. It has already caused substantial changes, such as full-scale entry of EGAT into the ESCO business. It is also expected that the central government such as DEDE will strengthen its support to ESCO projects.

Thailand is a country where the largest number of Japanese companies has already been working in its market. This situation is advantageous to Japanese ESCO providers when they seek business chance in the Thai market.

However, the conditions in Thailand for the development of ESCO business are still insufficient. To promote development of ESCO business steadily and reliably, various support measures as shown below must be taken.

- ✓ Policy support: Promotion of ESCO business should be put up as one of the pillars of energy conservation policy of the central government, and then policy support in line with it should be provided.
- ✓ Institutional reform: An institutional reform is needed to enable introduction of ESCO business to governmental facilities.
- ✓ Dissemination and enlightenment: Activities such as the following are need - holding of conferences, presentation at exhibition, consecutive holding of explanatory meetings on the introduction of ESCO business, holding of various seminars, support to the information exchange among ESCO providers, and PR activities through mass media. It is effective to set up an ESCO association as the entity in charge of these activities.
- ✓ R&D: Activities such as the following are needed - conceptual approach to ESCO projects,

development of a standard contract form, development of M&V guidelines, development of guidelines for ESCO introduction, publication of booklets on case studies, estimation of potential market scale, implementation and continuation of market scale research, and grasp of the trend of overseas ESCO projects.

- ✓ Support to financing: The loan guarantee scheme is currently being introduced. This kind of scheme is considered effective and must be expanded. Also, provision of low-interest funds through a soft loan is very effective for the development of the market.
- ✓ Strengthening of regulations: In the case of Japan, various regulations have been strengthened through the three-time revisions of the Law Regarding the Rationalization of Energy Use (1999, 2003, and 2006), which greatly contributed to the promotion of energy conservation. The same applies to the Energy Conservation Promotion Act in Thailand. Namely, strengthening regulations in the industrial and commercial sectors, which are the targets of ESCO, may be very effective for the promotion of energy conservation in Thailand.

(5) Actions related to Clean Development Mechanism (CDM)

The designated national authority (DNA) on Clean development Mechanism (CDM) in Thailand is the Office of Natural Resources and Environment Policy and Planning (ONEP). Although the Thai government is planning to review the DNA's organizational structure, the direction of the new DNA will be determined in May or June this year at the earliest, due to the dissolution of the national parliament and others. The attitude of the Thai government towards CDM was negative in the past, but it is changing to the positive direction recently. Therefore, it is considered that CDM will become an effective strategy in promoting energy conservation.

2.2.5 The Philippines

(1) The current situation of ESCO

The ESCO concept was introduced in the 1990s and the ESCO association was established in October 2004. However, activities to date are still limited to the energy audit level. Hence, an ESCO scheme including introduction of equipment and provision of energy saving guarantee has never been implemented in this country. (It means that projects are not yet reached a bankable project level.) Currently, the Department of Energy (DOE) is mainly supporting the dissemination and promotion of the ESCO industry. The Energy Utilization Management Bureau, which is a division of DOE in charge of energy conservation, is working on the three main areas: [1] renewable energy (biomass, solar power, small hydropower, etc.), [2] energy conversion and [3] energy conservation policy. Although relevant laws are already established for [1] and [2], they are not yet available for [3] and enforcement in 2006 is planned.

As the energy conservation promotion program, the National Energy Efficiency and Conservation Program (alias: E (nergy) C (onservation) way of life²⁾) has been implemented in stages since 2004. In this program, specific targets of energy conservation and CO₂ reduction are set for each fiscal year. This program consists of six individual programs: [1] Enlightenment, campaign, and collaboration with school education, [2] Partnership with primary industries (voluntary agreement), [3] Energy labeling system, energy conservation standards, [4] Government Enercon Program (an executive order on energy conservation promotion at governmental facilities), [5] Energy Management Program (including energy conservation promotion in the industrial and commercial industries and in power generation/transmission/distribution companies, DSM Program, and the energy conservation recognition program) and [6] Promotion of conversion to high efficiency fuel.

However, as this program does not have a compulsory force, it is still a superficial program which is being applied only in a limited range manageable by the human and financial resources of DOE. The biggest problem associated with the energy conservation promotion in the Philippines, as it is pointed above, is that "effective" energy conservation policies are yet to be developed. Concerning

²⁾ The National Energy Efficiency & Conservation Program, DOE.

the labeling, a compulsory labeling system for air conditioners (indicated by Energy Efficiency Rating (EER)) and refrigerators has already been enforced.

(2) Future trends

The largest deterrent impeding the dissemination of ESCO business (including investment factors) in the Philippines is the “100% collateral policy imposed on the loans to small and medium-sized companies which do not have sufficient funds”. As energy conservation support programs by international organizations are unable to touch financing problems directly, they tend to remain in the formulation of indirect circumferential programs other than finance. Therefore, the urgent task is to provide support to the establishment of a guarantee scheme that can activate the current immature financial system. Also, education must be provided to the banks, because their understanding of the ESCO scheme is very little at present.

What is needed secondly is the establishment of “effective energy conservation polices” which was mentioned earlier as the urgent requirement. To achieve it, it is necessary to develop an appropriate system, to invest funds and to facilitate international cooperation. About 70% of electricity in the Philippines is consumed in the Manila metropolitan area and it is probably the prime target area of energy conservation for the time being. The current electricity tariff in this area is extremely high as 8.5 peso/kWh (20.8 yen/kWh) on average. (Due to the 12% price hike in December 2005 with the application of the value added tax (VAT), the electricity tariff for commercial and industrial sectors became more expensive than that of Japan.) Because of this factor and others, investments in the industrial sector as well as those from overseas are hanging low currently, but the energy conservation potential and needs are high.

Table 2.2.1 Electricity tariff level in the Philippines (April 2006)

Customer type	Average unit price of electricity
Household	7.68 peso/kWh (21.1 yen/kWh)
Commercial	7.5 peso/kWh (20.6 yen/kWh)
Industrial	6.56 peso/kWh (18.0 yen/kWh)

(3) Clean Development Mechanism (CDM)

The supervising authority of CDM projects is the Department of Environment and Natural Resources (DENR), but energy conservation and renewable energy fields are co-supervised by DENR and DOE. The number of approved CDM projects is still none, but with regard to the energy conservation, the NEDO of Japan is considering to implement an energy conservation model project at the beer brewery. The Philippines which is lacking in political and social stability and a rational level of financial system is not attractive to foreign countries as the potential investment target, and domestic investments in the private sector are also sluggish presently. Despite of these situations, expectations to the formulation and expansion of CDM projects taking the opportunity of this kind of model project are growing.

2.3 Status of ESCO market in other countries

2.3.1 East Asia

(1) Japan

Introduction of ESCO business in our country has started with the review of ESCO business by “ESCO Review Committee” established in Agency for Natural Resources and Energy in 1996. Since then, the process of introducing ESCO business in our country can be considered as a proliferation model of a new business.

1) Process of introduction of ESCO business in Japan

While ESCO business started in 1996, public agencies and private sectors have jointly implemented regulations, support and promotion measures of the project. Main achievements of them are described below:

Reinforcement of regulations: Through three revisions of The Law Concerning the Rational Use of Energy (in 1999, 2003 and 2006), regulations concerning energy saving procedures in industrial plants and business facilities have been reinforced. Specifically in business facilities, where only limited regulations had been applied conventionally, reinforcement of regulations has been realized gradually. This will result in acceleration of introducing energy saving technologies. Besides, the Law on Promoting Green Purchasing contributes to promotion of introducing energy saving technologies in public-owned buildings.

Policy supports: Promotion of ESCO business is identified as one of the main pillar of Government’s energy policy, for which appropriate policy supports have been implemented. State budgets have been allocated to researches and investigations related to introduction of a series of ESCO business, formulation of various guidelines, and proliferation/enlightenment activities. Further, in 1998, demonstration project is started within the framework of supplementary business, which serves as a motivation of full-scale introduction of ESCO business. The scale of subsidies has been gradually expanding since the project introduction and used to support promotion of ESCO business. From 2005, commendation of excellent ESCO business is started.

System reformation: By improving operation method of the above-mentioned subsidies, full-scale realization of ESCO supplementary project was achieved. Concerning the introduction of ESCO business into local government, various improvements in the operation aspect have been taking place. Although the system reformations were not drastic, they promoted the introduction of ESCO business in public-owned facilities. Further, the implementation of PFI Act serves as an initiative of introducing ESCO business using PFI method.

Proliferation and enlightenment: In parallel with proliferation and enlightenment based on government policy supports, Japan Association of Energy Service Companies (JAESCO) was established under the initiative of private sectors, which plays a positive role in proliferation and enlightenment activities as one of the joint efforts of public and private sectors. Its proliferation and enlightenment programs include opening of conferences, participation in exhibitions, periodical opening of meetings for detailing of ESCO business, sponsorship of various seminars, support to information exchange among operators, and media-based public relation activities.

Research and development: Rationalization of concept of ESCO business, development of standard contract format, development of measurement/verification guidelines, development of ESCO business introduction guidelines, issue of model cases, estimation of potential

market size, implementation and continuation of market size research, and investigation into overseas trends of ESCO business are implemented.

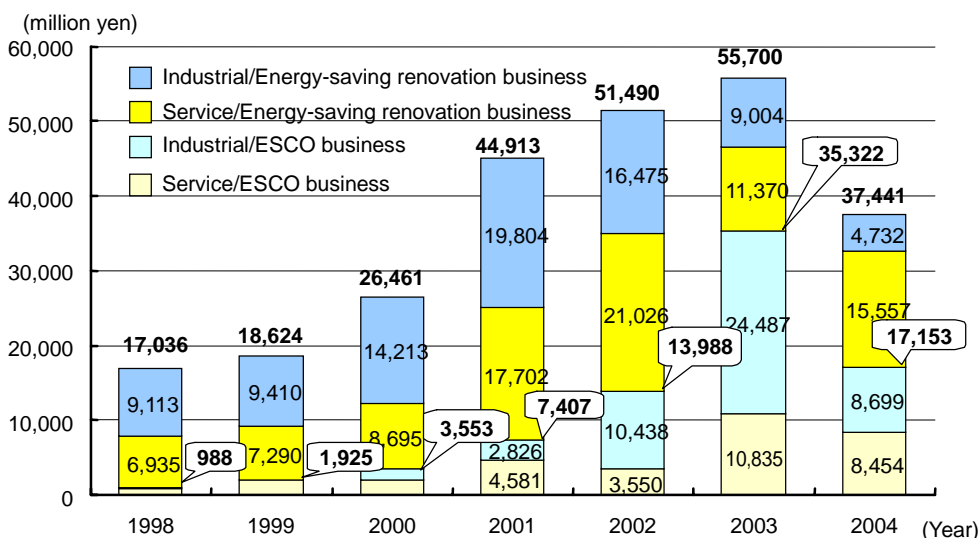
Topics in market development: ESCO demonstration project (1998), establishment of Japan Association of Energy Service Companies (1999), interim report by Energy Conservation Group of General Resources Energy Investigation Committee (2000), full-scale introduction into local government (2001), introduction into states facilities (2005), and commendation of excellent ESCO business (2005).

2) Market size of ESCO business in Japan

The ESCO business in our country started to be active on full-scale after 2000. In 1998, when demonstration project within the framework of NEDO’s supplementary project took place, only 58 cases of “so-called” ESCO business based on the performance contract by seven companies were observed. Since then, while the number of cases fluctuates around 200, the number of ESCO providers has continued to increase to as much as 33 companies in 2004.

Among the energy-saving renovation constructions, if the constructions accompanying performance contract are regarded as ESCO business, the contracted amount of ESCO business has been doubled year by year since 1998. Specifically in FY2003, it shows the growth of 2.5 times versus the amount of the previous year, achieving total contracted amount of 35.3 billion yen. While the contracted amount for FY 2004 decreased to ¥17.2 billion year-on-year, this can be attributable to the decrease in the contracted amount in the industry sector, where a surge of the crude oil price caused significant decrease in the number of oil cogeneration cases. In contrast with the shrinking in industrial sector, the total number of contract shows steady increase from 138 cases in FY2003 to 146 cases in FY2004 in the service sector, while the project amount per case has decreased from that of the previous fiscal year. The sound increase can be seen also in the contracted amount, achieving 8.4 billion yen in FY2004, although some fluctuation may be still observed.

About industrial sector, certain fluctuation of contracted amount is expected depending on the energy cost and the economic situation. In the domestic industrial sector, regulative measures have been taken based on the energy conservation policy from relatively early period. Accordingly, it should be rather difficult to expect significant market expansion through the reinforcement of regulations in recent years. On the other hand, in the service sector, introduction of regulations for energy conservation has just begun, where expansion of market can be expected in future, if taking the influence of reinforcement of regulations into account.



Source: Research by Japan Association of Energy Service Companies (2005)

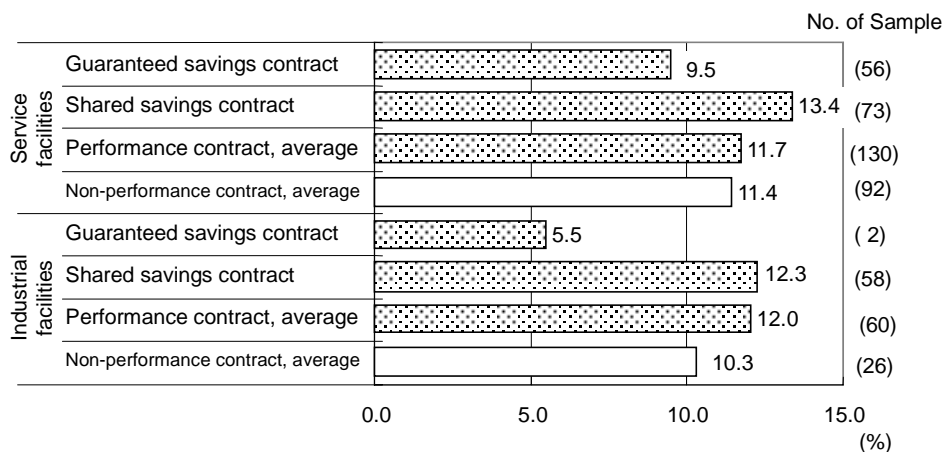
Figure 2.3.1 Transition of market scale for ESCO business in Japan

3) Performance of ESCO business in Japan

Japan Association of Energy Service Companies performs research of the business details based on sampling every year in parallel with the research of the market size. The accumulated number of cases researched between 2001 and 2004 was 892 cases. Among them, 146 cases were about public facilities, while 746 cases were about private facilities. The number of “so-called” ESCO business accompanying performance contract was 379 cases among them, representing 42% versus total number of cases. The outline of the research result is shown below.

For performance contract, the energy-saving rate is about 12%, while it is 10-11% for non-performance contract in the industrial and service sector.

Regarding the simple payback period within the category of performance contract, it is 9.2 years for the industrial facilities and 8.3 years for the service facilities. With the simple payback period in non-performance contract cases, the number for the industrial facilities is lower (5.9 years) compared to the case of performance contract, while the number for the service facilities (9.5 years) exceeds its counterpart of the performance contract. Looking into the types of contract, the number of SSC is greater than the number of GSC both in industrial sectors and service sectors. In general, the energy conservation rate of SSC is low and the number of year spent on simple payback is short, because the ESCO operators tend to set short payback period to avoid risks. Nevertheless, the SSC in our country is characterized by its high energy conservation rate and long simple payback period.



Source: Research by Japan Association of Energy Service Companies (2005)

Figure 2.3.2 Energy-saving rate

2.3.2 South East Asia

(1) Indonesia

In Indonesia, KONEBA (PT Konservasi Energi Abadi) is one and only ESCO provider. KONEBA was established in 1987 by Indonesian government through financial support from WB. However, there has been no actual experience of ESCO project in Indonesia so far.

Issues identified as barriers to the development of ESCO industry are: [1] Inexpensive energy cost, [2] Insufficient engineering skill to improve energy efficiency, [3] Relatively expensive cost for fund expedition, and [4] Unavailability of appropriate legal environment and incentive system for energy conservation.

Energy conservation policy in Indonesia is based on “National Energy Conservation Basic Scheme Master Plan (RIKEN)”, which was established in 1995 under the presidential ordinance. However, partially due to influence of the economic crisis in 1997, no substantial system for energy conservation has been developed, resulting in little progress.

Specifically, “[1] Inexpensive energy cost” has been made possible by subsidies of Indonesian government. This cost shows wide gap from full cost recovery. Accordingly, a part of the said subsidies should be allocated to “[4] Appropriate legal environment and incentive system for

energy conservation”, first of all, to promote energy conservation including the development of ESCO industry.

Because the oil distribution volume in Indonesia has decreased drastically within a short period in recent years, reduction in consumption of oil resources has become an urgent issue to address. In May 2005, “Presidential ordinance on energy conservation” and the related “Guideline for energy conservation” were issued. Having such a situation as background, Indonesian government requested Japan to provide a technical support to promote energy conservation.

2.3.3 South Asia

(1) Sri Lanka

While the demands by government and economic groups for promoting energy conservation are significant and even a dedicated government organization (ECF: Energy Conservation Fund) to promote energy conservation was developed, foundation for promotion is weak. Currently, a possibility to develop a program to support promotion of energy conservation under the tie-up of JICA and JBIC is examined.

The potential size of energy conservation in Sri Lanka in total is approximately 200 billion yen in investment amount (approximately 50 billion yen in cost increment for energy conservation) or more. While the advantages of energy conservation are significant for both country and users, following factors prevent its penetration: [1] Insufficient information and suppliers for determination of investment and [2] Expensive initial investment poses serious barrier.

Further, SGF (Sustainable Guarantee Facility) was established in 2005 to overcome the issues associated with creditability assurance of ESCO with the support of USAID.

In 2002-2003, “low-interest two-step loan program” by JBIC (e-Friends Phase 1) was started “corresponding to the timing of the start of activities by several ESCO providers” in Sri Lanka. Because this loan program is partially applicable to the financing to ESCO, the ESCO business expanded little by little. However, after the completion of this program, ESCO business shrunk drastically. The main industrial organizations and ESCO providers in Sri Lanka are waiting for implementation of new low-interest financing system (JBIC etc.) and technical supports/policy supports (supports by JICA etc.).

Some suggestive success models are available for promotion of energy conservation based on CFL program (ESCO-type energy conservation approach where cost of conversion from glass bulb to <energy conservation type> CFL is born by electric power company at first, and the cost is collected later as installment together with electricity charge) in tie-up with DSM strategy by electric power companies in Sri Lanka, Indonesia, Vietnam, India, etc.

2.3.4 Indochina

(1) Cambodia

Because the electricity rate is of the same level as in Japan, and also the deficit of power supply is serious, the expectation for energy conservation and potential effect of its introduction in the society are very high. Nevertheless, the energy conservation policies and ESCO are yet to be developed in Cambodia. Some lighting appliances manufacturers are currently considering a support for CFL introduction program for Hotel Association, though they are not an international support organization.

The secondary and tertiary industries such as sawing industry and tourism industry play significant role in driving economic development of the country in recent years. However, partially due to drastic increase of energy costs, basis for the industries are being compromised.

Giving consideration to these circumstances, Cambodian government has identified “promotion of energy conservation” as one of its main challenges to address, but actual promotion has not been conducted so far.

To promote energy conservation, establishment of the law concerning the rational use of energy,

labeling system and foundation of energy conservation center as well as introduction of subsidy system are effective, although all of these are currently not available, suggesting insufficiency of the foundation for propagation of energy conservation (the only achievement is the preparation of “energy conservation guideline” within the framework of JETRO project in FY2005). About the activities conducted by the other international cooperation organization, a support program for energy conservation promotion for hotel industry by UNDP is now under consideration.

(2) Laos

While both governmental energy conservation policies and ESCO have yet to be established, the country has a successful model of introducing solar power generation within the framework of ESCO scheme to address local needs for adequate electricity supply.

The scheme to address local needs for adequate electricity supply is comprised of synergetic cooperation among hardware company, rental company, training company, and village community itself to serve the needs of the community, while clearly identifying the mutual roles of the concerned parties in the project. Sunlabob Co., Ltd. is supporting the planning, marketing, equipment erection, maintenance, and the training for the concerned communities. The construction and development of this ESCO scheme is in progress successfully without being subsidized. While the provider in this case is not a so-called “ESCO”, it is an interesting case to suggest a model of developing possibility of supplying regenerative energy within the framework of ESCO scheme³⁾.

Besides, possibility of applying an energy conservation CDM scheme for Lao Beer is being examined by Japanese companies, since Lao Beer is one of mega-consumers of energy in Laos.

(3) Vietnam

Due to rapid increase in energy demands caused by quick economic development, energy demands are far greater than energy supply in Vietnam. Specifically, the demands for electric power shows wide growth, resulting in serious situations such as planned outage during the dry season. Having such a situation as background, Vietnam government announced in September 2003 “the ordinance concerning thrifty and effective use of energy”. While energy conservation policies has been introduced at first to industrial plants that consume high amount of energy, the main target of the next stage is large buildings. Needs for cutting down the energy costs (energy conservation) are growing rapidly also among owners of industrial plants and building owners. Thus, the environment suitable for establishing ESCO begins to take root mainly through following factors: [1] Establishment of governmental energy conservation policies, [2] Growing needs for energy conservation on demand side and [3] Stable political situation. Also, to address shortage of power supply, the Vietnamese public corporation for electric power (EVN) applies a system to charge different electricity rate based on the different time zone for heavy users to promote DSM. EVN itself is also eager to enter ESCO business to take an initiative in implementing DSM⁴⁾. Besides, CFL program is now underway in the framework of DSM by EVN with the support of WB.

2.3.5 Middle East

(1) UAE (The United Arab Emirates)

Because of the year-round high demands for air conditioning (max temperature: 50°C; hours of full-load air conditioning on year-round basis amounts to approximately 2,500 hours/year, which is as 3 times as long as in Japan) and high creditability of the nation and its demand side, some private companies are developing/expanding ESCO business centered on air conditioning and lighting in UAE. EMS (Energy Management Services Emirates LLC) is one of the representative organizations.

³⁾ Rental service for making electricity affordable in remote villages in Lao PDR: The 1st Asia ESCO Conference, Andy Schroeter/Saleumpone Vongsakhamphui, Sunlabob Rural energy Co., Ltd.

⁴⁾ Feasibility research on the project for introducing energy conservation technology / regenerative energy technology in public welfare facilities in Vietnam, Cambodia, Laos, and Myanmar, international project to address rational use of energy, international basic project for promoting effective energy consumption: March 2005, NEDO

EMS is operating ESCO/energy conservation business mainly in UAE besides in Jordan and Bahrain. The characteristics of ESCO contract entered into by EMS are as below:

- Its ESCO contract is the shared service type, where costs of hardware are born by ESCO company (EMS).
- Although standard level of energy reduction by energy conservation is presented, no compensation is made for it.
- Itemization of profits for EMS is as below (the values are based on the default values at standard contract):
 - 1) Income based on EMS income rate determined against energy reduction through energy conservation (5% of reduction)
 - 2) Project management fee
 - 3) Fee for preparing energy conservation reports to be attached to each contract
 - 4) Supervision fee for project implementation (7.5% of equipment costs)
- In addition to the above-listed profits, costs of equipments for energy conservation is collected on monthly installment.

Other than the projects mentioned above, some companies (including Tabreed and etc.) operate their centrally-controlled air conditioning projects that may lead to energy conservation in UAE while trying to expand their business to foreign markets in the same way as EMS does, though they are not one of ESCOs. Thus, UAE can be considered as a Middle Eastern leader in propagating ESCO/centrally controlled energy supply business.

(2) Oman

ESCO business is yet to be established. Because the geographical proximity with UAE, the above-mentioned companies in UAE is seeking for expanding their business in Oman. Oman itself has announced the promotion of energy conservation/environment conservation as national policy. Royal University of Sultan Qaboos has been engaged in a series of many projects in energy conservation study project under the international cooperation. Under a stable political situation, Oman has been involved positively in the projects concerning the study on desalination of marine water, including the sponsoring of water resources working group in the Middle East area and establishment of Desalination Technology Research Center in Oman with the awareness that desalination is the technology that consumes great deal of energy. In the process of these approaches, Oman has established a cooperative relationship with overseas support organizations.

2.3.6 Africa

(1) Kenya

Kenya Government (Ministry of Technology and Industry: MTI) initiated Industrial Energy efficiency Project (GEF-KAM Energy Project) with the support of UNDP/GEF and UNOP, where Kenya Association of Manufactures (KAM) played a leading role. This project is introduced with the purpose of promoting energy conservation by small and medium-size enterprises in Kenya. In this activity, in addition to estimation of energy conservation potential of Kenyan industry as a whole, IEEN (Industrial Energy Efficiency Network) was founded. IEEN was established with the purpose of promoting energy conservation in manufacturing and hotel industries in Kenya, where programs such as promotion of energy conservation, energy audit, and training system have been implemented. The biggest challenge in promoting energy conservation in Kenya is the difficulty in making financing program available for small and medium-size companies. Canadian government has proposed a model for improving economic efficiency of energy conservation project in conjunction with CDM scheme.

(2) Egypt

The ECEP (The Energy Conservation and Environmental Protection Project) has been started in 1998 in Egypt. The objectives of this project are the promotion/enlightenment of energy conservation and the capacity building of the organizations to promote energy conservation. Through this project, the energy conservation measures for various industrial sectors have been summarized by an analysis team, which is based mainly in Cairo University. Centered on government-owned facilities, hotel industry, and textile industry, the energy conservation potential in Egypt is considerably high. While several researches on ESCO business feasibility have been conducted for these sectors after 2000, no actual project has been introduced yet so far.

2.3.7 Central and South America

(1) Brazil

While there are dozens of engineering companies involved in the energy conservation services, about 10 companies are actually implementing ESCO activities. Most of these are the small size enterprises with less than 10 employees and annual sales of lower than 500 million yen. Only few of them are the affiliated companies of a large scale/utility company. Brazil ESCO Association (BAESCO) was established in 1997.

The scale of these energy conservation projects is estimated as 1.5 billion yen/year in 1996, which has grown into 3 billion yen/year in 2000, and 4 billion yen/year currently. However, the cogeneration factor might be excluded from this statistical data.

The payback year of invested finance for ESCO project is 0.5-5 years and it is 3 years on average. The scale of the project per case is 1 million-300 million yen. About short-term ESCO of 1-2 years, the finance is comprised of ESCO, the client and the utility only. Although the needs for loan guarantee are insignificant in such a project based on short-term payback, the ESCO in Brazil is seeking for larger projects with longer payback period that are characterized by: [1] Formulation of the third party finance such as those by banks, etc. and [2] Increasing needs for structuring accessible loan guarantee system.

The limited penetration of ESCO in Brazil is said to be attributable to the difficulty of formulating the third party finance such as those by banks, etc.⁵⁾

To overcome this challenge, various possibilities are being examined about formulation of the third party finance and loan guarantee system in Brazil with the support of international organizations.

(2) Mexico

As of 2005, there are 14 ESCO providers in Mexico. Among them, 4 operators are in active status. Due to drastic increase of energy prices including the oil price in recent years, the number of companies showing interests in entering ESCO business as a promising business solution is growing among the engineering companies and supplies of energy conservation equipments and systems. More than 50% of the ESCO projects in Mexico are for commercial and service facilities including hotels.

Concerning the governmental organization, CONAE (the National Commission for Energy Conservation) is implementing the energy conservation activities including the support to ESCO providers.

Its ESCO support policies so far conducted are as below. CONAC mainly allocates funds from USAID for these activities:

- [1] Implementation of promotions
- [2] Development of pilot ESCO projects

⁵⁾ Analysis of the Viability and Design of a Guarantee Facility for Energy Efficiency Project, Luis Eduardo Alves de Lima etc., Aug. 2005, New financial Intermediation Mechanisms for Energy Efficiency Projects in Brazil, China and India, supported by WB.

[3] Development of finance models that can be utilized by ESCO

2.3.8 The United States

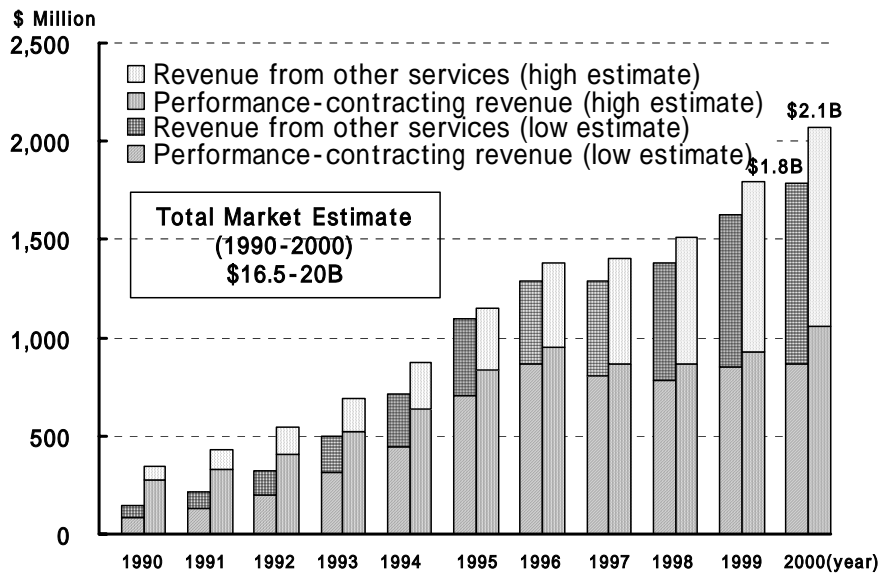
ESCO industry in the United States has been largely impacted by changes of environment during the period from increase of energy costs after the Oil Crisis through development and proliferation of DSM up to the progress of restructuring of utilities followed by confusion. ESCO industry itself has undergone various changes as a main player of energy service provider. The characteristics observed in the recent trends are expansion of the federal market, development of new services based on IT technology and the return to the energy conservation business. After 2000, ESCOs that provide low-cost services without performance contract gradually increased and started to compete with the existing ESCO providers. In a sense, this can be a proof of maturity of ESCO business. The increase of this type of service can be attributable to the following factors:

- Because the customers are beginning to understand the ability of ESCOs, they consider that guarantee and verification are unnecessary.
- IPMVP (International Performance Measurement & Verification Protocol) has penetrated.
- Customers do not want to bear costs of measurement/verification on the continuous basis.
- Even when concluding a 10-year contract, customers tend to limit the contract period for measurement/verification and guarantee to shorter period such as 2 years.
- Penetration of services without performance contract such as “design/build” and “fixed price services” etc.

Namely, because the customers have trust in the ESCO's achievements now, it is possible for the customers to differentiate cases that require guarantee and measurement/verification from those where guarantee and measurement/verification are unnecessary. At the same time, because the measurement/verification is propagated and its methodology and effect are widely acknowledged, the customers can tell the cases that they do not need to be nervous about performance risks. These phenomena suggest the maturity of ESCO business to a certain level.

(1) Changes in market size

ESCO industry in the United States has been growing by 20-25% year by year. Up to 1996, performance contract had driven the market, and thereafter, ESCO business independent of the performance contract is growing based on the maturity of ESCO market. In 2000, its market size was USD2 billion. Of this amount, share of the performance contract was about USD1.2 billion. Recently, an active trend of introducing ESCO in the Federal Government is attracting public attention.



Source: C. A. Goldman, J. G. Osborn and N. C. Hopper, Market Trends in the U.S. ESCO Industry: Results from the NAESCO Database Project, May 2002, LBNL

Figure 2.3.3 Changes in market size of ESCO industry in the United States

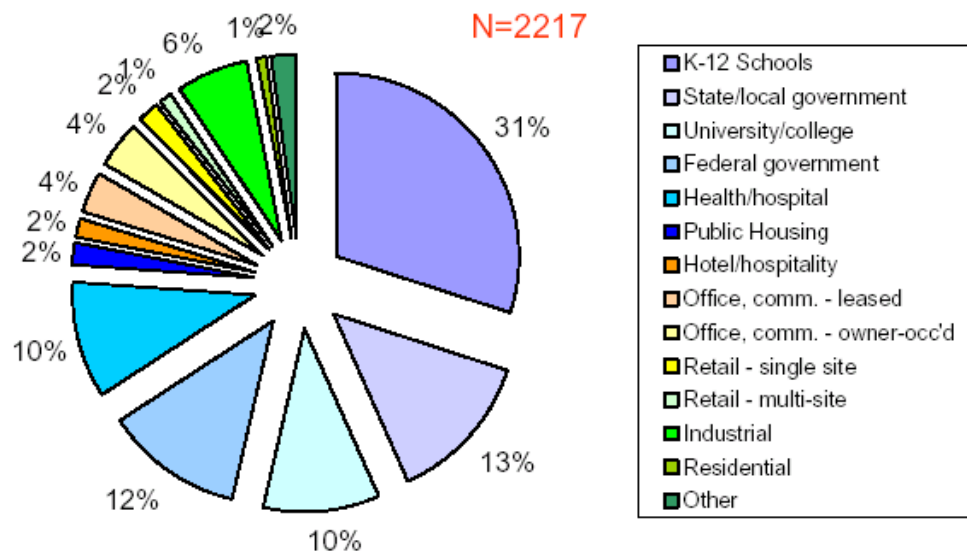
(2) Market characteristics

About 75% of ESCO business in the United States is for public facilities. The biggest market is K-12 schools, which occupies 31% of total. After the K-12 schools, local government (state, county, city, town, village) (13%), federal government (12%), hospitals (10%) and universities (10%) will follow in descending order. In addition to MUSH (Municipal, University, School, Health) market, which is said to be a core part of ESCO market in the United States, the share of federal government is growing. In the respect that the growth of ESCO business in the public facilities drives the market, it is significantly different from the ESCO business in Japan.

The type of contract prevailing in MUSH market is the guaranteed savings contract in most cases, while it is a type of shared savings contract in the case of federal government market. In recent years, service contracts without performance contract are increasing, suggesting the increased diversity in the type of contract.

The numbers of payback are 14.7 years for K-12 schools, 8.5 years for federal government, 7.2 years for local government and 6.8 years for university in descending order.

About the project with federal government, the contract amount is high and the contract period is long. The reasons for it are that many facilities are of large scale and, in the case of super ESPC, long term debt of federal government up to 25 is allowed. In MUSH market, the payback period for K-12 school is specifically long. In the United States, budget allocation method for schools is different from those about ordinary self-government bodies, high percentage of school jurisdictions are getting into the red. Renovation construction for energy conservation is used in many cases as a tool to achieve simultaneous renovations of window frames and loaves in addition to the renovation for energy conservation purpose. Due to this reason, the project costs tend to be expensive and the payback period tends to be long.



Source: C. A. Goldman, J. G. Osborn and N. C. Hopper, Market Trends in the U.S. ESCO Industry: Results from the NAESCO Database Project, May 2002, LBNL

Figure 2.3.4 Composition of ESCO market in the United States

2.3.9 EU

The activities of ESCOs have been observed since long in Europe. In 1990's, the word such as "Third Party Finance (TPF)" was widely used, which was called "Contract Energy management (CEM)" in the United Kingdom. In the late 1990's, ESCO started to activate in Asia as well, when US-based providers began their activities in European and Asian countries. Further, the success of ESCO industry in the United States was known in other countries, and the term "ESCO" has become popular in European countries since this period.

While ESCO activities in Europe are different from country to country, the general characteristics are as below:

- ✓ Many ESCOs are the large-size companies or their affiliated companies (equipment manufacturers, facility management companies, control-related companies, construction companies, and electric power suppliers).
- ✓ The projects are mainly based on the shared savings contract. Recently, the number of performance contract utilizing TPF is increasing.
- ✓ The projects related to cogeneration, street lighting, air conditioning system and ESM occupy large share.
- ✓ Because of relaxation of regulations, CHP (Combined Heat & Power) businesses are developed: Large-scale commercial facilities, hospitals and industrial plants.
- ✓ Many ESCO providers have more interests in the business that sells equipments and energy rather than those that utilizes the finance.

In EU, ESCO business is developed in following countries:

- ✓ 1st league : Germany, Austria, Hungary, France, UK
- ✓ 2nd league : Spain, Sweden, Czech, Italy
- ✓ 3rd league : Other EU countries

(1) Germany

Germany has the most mature ESCO market in EU, just like in Austria. The core market is the public market, where more than 200 performance contracts were implemented since the latter half of 1990's. For instance, in Berlin, 750 facilities underwent renovation. Projects as many as 70,000 cases were implemented by 2000. Their details are as below:

- Installation of more than 50,000 power generation equipments
- Accumulated investment of more than 5 billion Euro
- Accumulated capacity of power source equipments installed : 46GW
- Accumulated capacity of power generators installed: 8GW

(2) Austria

Since 1998, 500-600 buildings have undergone renovation for energy conservation purpose based on EPC. This number corresponds to 4-6% of the buildings in the service sector. The core market is the federal-owned market. This type of projects has been partially implemented also in small and medium-sized self-government bodies. On the other hand, EPC has been scarcely implemented in private buildings. While 35 operators are working now, the number of operators are said to be still not enough.

Austria, Germany, and Spain are the pioneer countries of ESCO in Europe, where public organizations play a significant role in developing ESCO business.

(3) Hungary

While 29 ESCO providers are said to be working now, ESCO concept in Hungary is not always the same as the concept of performance contract. Some ESCO utilize TPF and other operators call themselves as "ESCO" even if they do not provide performance contracts.

The large-scale operators are multi-national enterprises in most cases and more than 2/3 of the market belongs to public market. While many projects are about local heat supply and street lighting, interests in the projects in industrial sector are growing recently. While the street lighting project was popular in the initial stage, CHP (gas turbine) is attracting customers' attention nowadays.

Financial institutes are eager to invest in ESCOs. OTP Bank, the biggest bank in Hungary, has achieved financing of 20 million Euro (2.8 billion yen) to ESCOs. On the other hand, 50-100 ESCO providers provide no financial service and concentrate their activities only on the services from energy audit to equipment installation. About 10 ESCO providers are involved in the business including financial service.

Also, utilities are working positively in developing ESCO business.

(4) France

While energy supply and energy service have been separated in France, this results in the independent development of operation/management industry. Recently, the word "energy service" refers to a wide range of activities in the field of energy. However, various services based on performance contract have been provided since long by different types of company in this country.

In general, small and medium-sized ESCO providers assume responsibility of arranging financing, but they do not provide finance service in most countries. Meanwhile, in France, ESCO providers provide services including the finance service and collect their investments from the profits through reduction of energy costs.

About the contents of construction, EPC project for cogeneration is typical. Customers can receive full-maintenance service and guaranteed service for price reduction by ordering cogeneration. The types of contract are centered on the shared savings contract and the *shofarge* contract. The market in France was developed through involvement of a few large-scale companies.

(5) UK

While 20 providers are working in UK, the core ESCO providers are globally known leading manufacturer of control equipments, oil companies, and electric power companies. The small and

medium-sized ESCOs are providing limited services such as consulting and financing. There is no clear definition for ESCO in UK. While ESCO is referred to as “CEM (Contract Energy Management)”, “TPF company” or “TPC (Technology Performance Contracting) company”, etc., there is no clear-cut difference between each of them. Generally speaking, CEM represents the company that provides comprehensive services and shares risks. Although the market for CEM encompasses wide range of sectors, the business sites that pay more than GBP 50,000 (10 million yen) per year for electricity and heating costs can be within a candidate. To be more specific, the market includes service facilities (office, department store, etc.) and industrial facilities (excluding production process) in the private sectors, while it includes public hospitals, prisons, military facilities, and local government facilities in public sector. Characteristics of the ESCO projects in UK can be grouped in following three categories:

- Renovation on demand side
- Renovation on supply side
- New buildings

2.4 Involvement of international cooperation organizations in promoting ESCO industry in developing countries

Among Asian countries, only limited number of countries such as Japan, Korea, China India and Thailand has ESCO market with a certain size as a result of developing ESCO business. In Malaysia, the Philippines, Sri Lanka and etc., the governments are positive in implementing introduction policy of ESCO business based on a high interest in ESCO, but the formation of ESCO market is yet to be realized. Excluding Japan and Korea, all these countries have undergone support programs by international cooperation organizations with the purpose of developing ESCO business. However, the contents of such support programs are different country-by-country even with the identical GEF, and in many cases, the funds from multiple organizations are allocated in an identical program. For instance, in China, ESCO promotion program (Phase 1) was comprised of the funds from GEF, the WB, EU and UK, while in India, the funds from USAID, WB, GEF and some other organizations are involved. In Malaysia, GEF, UNDP, MESITA Fund (Thailand-based private fund) and MIEEIP comprised of governmental funds have been used to support ESCO, while in Thailand, funds from GEF and WB have been allocated. Besides, funds from JBIC, ADB and the fund established by Mitsubishi Corporation are used although no specific country in scope has been identified. While the outline of these programs was mentioned in 2.2, their characteristics are summarized in this paragraph with focusing on their support details.

2.4.1 ESCO industry promotion programs

To nurture ESCO business, it is important to improve its environments in various ways. The items of the environment improvement so far implemented in Japan, the United States and the Asian countries are as below:

<Preliminary review>

- ✓ Basic research for ESCO introduction: Description of ESCO business, issues to address for introduction, review of introduction program

<Development of capability>

- ✓ Preparation of technical guidelines: preparation of guidelines on measurement/verification, standard contract, etc.
- ✓ Preparation of ESCO introduction manuals: manuals for customers to explain method of introducing ESCO
- ✓ Performance development for financial institutes: provision of information, guideline for method of evaluating energy conservation efficiency, support for development of finance products
- ✓ Performance development for ESCO enterprisers: lecture, trainings, technical instruction

<Propagation and enlightenment>

- ✓ Compile and issue of successful models
- ✓ Seminar, conference, exhibition: opening of various seminars and conferences for propagation and enlightenment of ESCO business
- ✓ Provision of information such as news letters, websites etc.
- ✓ Commendation system for excellent ESCO business

<Establishment of project body/operation support>

- ✓ Set up of ESCO association/operation support
- ✓ Support to set up ESCO providers
- ✓ Accreditation system for ESCO providers: Preliminary accreditation system to simplify government expedition procedure (Super ESPC in USA, Australia, etc.) and accreditation system (NAESCO etc.) for nurturing excellent ESCO providers are available.

<Development of business>

- ✓ Implementation of energy audit (corresponding to FS research)
- ✓ Implementation of pilot project

- ✓ Implementation of IRP/DSM programs
- ✓ Introduction of ESCO business into governmental facilities
- <Finance support>
 - ✓ Implementation of low interest finance
 - ✓ Offer of subsidies
 - ✓ Implementation of loan guarantee programs
 - ✓ Advantageous taxation system
- <Reinforcement of policy/system reformation>
 - ✓ Reinforcement of regulations for energy conservation
 - ✓ Reformation of expedition regulations to introduce ESCO in governmental facilities

Almost all of the above-mentioned programs are necessary to promote ESCO business and to formulate ESCO market in a country. Specifically in an initial stage of introduction, most programs are implemented under the initiative of the country, while some of them are conducted under the initiative of private sectors upon formulation of a certain size of ESCO market. In developing countries, some of them are implemented with the support of international cooperation organizations. The programs requiring involvements of international cooperation organizations are those to be conducted under the governmental initiatives in the initial stage of introduction and the propagation and expansion phase. While it is considered that these programs should be introduced in the order of the above list, it may be more appropriate to consider that there is no generally applicable order, since most of these items will bring about the synergy effects when they are conducted in parallel. Needless to say, "Preliminary review" is the program to be conducted at first. However, among the focus countries in the current project, only the Philippines need this item. "Development of capability", "Propagation and enlightenment", "Establishment of project body/administration support" and "Development of business" should be implemented in parallel. However, these should be conducted for long term on continuous basis such as for 10 years. Improvement of "Finance support" is effective in any stage. Because the amount to invest in an ESCO business per case is low (one hundred million to several hundred million yen at maximum), the needs for funds at the initial stage is limited. With the expansion of business, the demands for funds will increase. In the initial stage, it is inevitable to depend on the finance provided by governmental institutes or international cooperation organizations. However, by improving the loan guarantee, it may be possible to get financing from private institutes. Further, if environment for energy conservation CDM is improved, which is being addressed positively under the international cooperation, finance from CDM scheme can be expected. About "Reinforcement of policy/system reformation" at the last of the above list, implementation at an early stage is more effective, because it is a preparation for making basic environment for formulation of energy conservation market.

2.4.2 Relationship between ESCO industry promotion programs and international cooperation organizations

(1) Preliminary review

Preliminary review for introduction of ESCO business is ongoing in China with the support of GEF, and in India with the support of USAID. Based on these research results, WB, as a main body, implements the initial program for ESCO introduction in China, while it is USAID that is responsible for implementation in India.

(2) Development of capability

Within the framework of 3-CEE project (countries in scope are China, India and Brazil) supported by the WB group, programs such as the capability development for financial institutes (provision of information, guideline for the method of evaluating energy conservation efficacy and support to develop finance products), education for enterprisers and the guideline for contracts are provided. Also, in several countries including India, technical trainings are provided by USAID, etc.

(3) Propagation and enlightenment

Propagation and enlightenment programs conducted by international cooperation organizations are linked with the progress of other programs in most cases instead of being conducted independently. Programs included in 3-CEE constitute also a part of the development of capability. In China, EMCA is the main body of enlightenment activities since the establishment of ESCO association was supported by GEF. On the other hand, like in Malaysia or Thailand, government or governmental organization play a main role in these activities, because there is no other body to be involved with enlightenment.

(4) Establishment of project body/operation support

The typical program for it is the supports to establishment of ESCO providers in China by GEF. In the 2nd phase of GEF's program, the supports to establish EMCA was conducted and its operation support is ongoing. The roles of GEF and WB in the development of ESCO business in China were highly comprehensive and effective.

In India, USAID supports operators by supplying supports to ESCO providers in information business. In addition, supports to establish ESCO association is being provided by 3-CEE project.

(5) Development of business

The energy audit is the equivalence of FS research for ESCO business. Combination of an energy audit and a pilot project following the audit constitutes an ESCO business. While the energy audit is conducted by USAID in India, it is conducted by GEF in Malaysia and the pilot project is implemented aided by low interest financing by GEF fund. Further, in Thailand, the energy audit is conducted by GEF and the subsidy from ENCON Fund is allocated for pilot projects. While no pilot project is conducted in China, GEF supports to establishment of ESCO providers and the low interest financing by the WB have sufficiently covered the demands.

The WB and GEF have implemented more than 30 of DSM projects in the developing countries between the period from 1990 to 2005. The contents encompass a variety of programs with substantial success, including financial supports, establishment of coding/labeling system, promotion of ESCO business, energy audit, enlightenment, energy price/load management, fuel conversion, etc. From the standpoint of "Least-cost national energy planning", the WB emphasizes the effectiveness of the total approach targeted for the development of both DSM and ESCO in utility industry⁶⁾.

(6) Finance support

The low interest loan and loan guarantee are the main part of it. About the low interest finance, the WB in China, the program funded by WB, ADB, JBIC, USAID, etc. in India, and the fund by GEF in Malaysia are listed as examples. Loan guarantee is a mechanism to facilitate input of private funds into energy conservation market. In China, this type of program by GEF has been implemented, while in India, possibility of the loan guarantee is reviewed within the framework of 3-CEE based on the model of China and Brazil. Also in Thailand and the Philippines, the similar programs are about to be prepared. While governmental subsidy system is another possibility for finance support, the national fund based on ENCON fund is allocated for this purpose. Besides, advantageous taxation system is available for energy conservation projects in Thailand.

(7) Reinforcement of policy / system reformation

While it is an important factor for promoting ESCO business, there is no program by international cooperation organizations to directly address this issue. However, it is highly effective to provide technical supports for establishing energy conservation policies as well as for developing energy conservation standards and labeling system, as they work as mechanisms to guarantee the secured environment and energy conservation technologies that are necessary to promote ESCO business. Especially in the countries like the Philippines, where the government lacks capability to plan

⁶⁾ A Review of World Bank DSM and Energy Efficiency Operations 1990-2005: Regional Programmatic Trends and Outlook, Grayson C. Heffner, Asia Alternative Energy Program (ASTAE), USA, The 1st Asia ESCO Conference.

appropriate policies, supports in the aspect of governmental policies are considered to be very effective.

Table 2.4.1 ESCO Industry Promotion Program: Status of Implementation

Program		China	India	Malaysia	Thailand	Philippines	Japan
Preliminary review	Basic research for ESCO introduction	GEF	USAID				METI
Development of capability	Formulation of technical guidelines	3-CEE	3-CEE		EGAT		ECCJ
	Formulation of ESCO introduction manuals				EGAT		ECCJ
	Performance development for financial institutes	3-CEE	3-CEE				
	Performance development for ESCO enterprisers	3-CEE	USAID, 3-CEE	PTM	EGAT		JAESCO
Propagation and enlightenment	Compile and issue of success models						ECCJ
	Seminar, conference, exhibition	EMCA	PCRA, FICCI	PTM	DEDE, JAESCO		ECCJ, JAESCO
	Provision of information such as news letters, websites etc.	EMCA, 3-CEE	3-CEE	PTM	DEDE		ECCJ, JAESCO
	Commendation system for excellent ESCO business						ECCJ
Establishment of project body and operation support	Set up of ESCO association/ operation support	GEF	3-CEE	PTM		DOE	ECCJ, JAESCO
	Support to set up ESCO providers	GEF	USAID				
	Accreditation system for ESCO providers						
Development of business	Implementation of energy audit		USAID	GEF	GEF, ENCON Fund	DOE	ECCJ, JAESCO
	Implementation of pilot project		USAID	GEF	ENCON Fund		NEDO
	Implementation of IRP DSM programs		USAID		ENCON Fund		
	Introduction of ESCO business into governmental facilities						METI
Finance support	Implementation of low interest finance	WB	WB, ADB, JBIC, USAID	GEF, MIDF	ENCON Fund		
	Offer of subsidies				ENCON Fund		NEDO
	Implementation of loan guarantee programs	GEF, 3-CEE	3-CEE		(AFD, TMB)	(IFC, GEF)	
	Advantageous taxation system				DEDE		
Reinforcement of policy	Reinforcement of regulations for energy conservation	GEF, UNDP	BEE			DOE	METI
	Reformation of expedition regulations to introduce ESCO in governmental facilities						(JAESCO)

Note: Gray cells represent the area with which international cooperation organizations have involvement. () represents the program still in preparation phase. The blank cells represent unavailability of the corresponding program. 3-CEE is supported by UNEP and funded by UNF, ESMAP, ASTAE and DFID.

3 Discussion and Suggestion Based on Research Results

3.1 Evaluation on ESCO Type Energy Conservation Promotion as Cooperative Approach

3.1.1 Merits and Demerits of Approach for ESCO Type Energy Conservation Compared with Other Approaches

In order to develop the ESCO industry, it is necessary to coordinate the three factors, that is, technology, finance and dissemination/enlightenment (to both the supply and demand sides), and, at the same time, policy assistance. On the other hand, as the current status in Asian nations can be positioned in the early stage of the market development, stepwise coordination of these factors will be efficient, with their mutual relations taken into account.

There are various measures to promote energy conservation other than ESCO, including the governmental regulation, labeling system and introduction of an incentive system such as a supportive system. Merits and demerits of the ESCO type approach against these measures are shown below:

(1) Merits

Coordination of the three factors of policy, technology and finance is most effective in promoting energy conservation through utilization of the private sector, that is, market mechanism. Synergistic effects of the political aspects with the other energy conservation systems are also expected. In addition, the ESCO business has a merit to quantify effects of the energy conservation, which helps to understand the effects brought by the policies. In the market exploitation when coordination among policy, technology and finance is being undertaken, the fact that the ESCO business is in the early stage of introduction may provide an advantage, because preparation can be made step by step. As for coordination with CDM, there is a merit to connect monitoring and verification processes included in the ESCO contract with those M&V processes of CDM.

(2) Demerits

On the contrary, poor coordination among the policy, technology and finance limits activities of ESCO. It is important to organize the basis for the coordination, but the programs in these areas are difficult to be developed in parallel. Taking into account the energy conservation market still remained unexploited in Asian nations, this demerit can be covered if the programs easier to implement in each area are developed step by step. Among other things, as every nation is in the early stage of introduction of the ESCO business, it is practical to exploit the market step by step, looking at the mid-term extending to five or ten years. Exploitation of the ESCO market requires to implement various programs, but the order of implementation will not be a significant problem.

3.1.2 Evaluation on Approaches in China

The Energy Conservation Law of China enacted in 1997 (effective in 1998) mandates designation of the energy manager, preparation and submittal of the energy report, observation of energy consumption criteria and others. These provisions have been successful to a certain degree, though a necessity of further energy conservation is aroused. For example, incentives for energy conservation are considered necessary. However, frequent tax reforms in the past ten years caused gaps between the central and local governments. It seems that tax incentives for energy conservation were difficult to be planned.

Therefore, energy conservation only relying on the administration has its limit. In the phase which a combination of the government support and self-help efforts of the private sector was required, the ESCO industry was created under support of the World Bank (WB)/GEF and the market is expanding rapidly. The process of the ESCO industry exploitation supported by WB/GEF in China is one of the typical success examples of ESCO type energy conservation promotion.

China made a success in significantly reducing this period by providing financial supports to ESCO at first. It is considered that this success resulted in synergetic effects in implementation of other programs

to be prepared.

What is concerned most in development of the ESCO industry in China is whether the market can accept the nature of the ESCO business, that is, long-term credit business. It will be necessary to take the commercial practices accepting the long-term credit business into place, in addition to implementation of other programs, in order to further promote energy conservation and expand the ESCO business in the future.

3.1.3 Evaluation on Approaches in India

The Energy Conservation Law of India enacted in 2001 (effective in 2002) obliges an energy-intensive office to designate the energy manager, prepare and submit the energy report, observe the energy consumption criteria and others. However, partly because of a five-year moratorium, the Law is not so binding as a regulation and the incentives for investment in energy conservation have not been effective at present.

The ESCO business currently does not tend to disseminate or expand, though various achievements were made in development of the related subprograms. It is evaluated that building of future foundations for the energy conservation promotion utilizing ESCO scheme has been very successful.

In India, in its early stage of dissemination of the ESCO project, international cooperation was initiated to stimulate the self-help efforts of ESCO including financing to ESCO and capacity building by the financial institutes. This led to holding of the international conference and establishment of the ESCO Association. With support from the international cooperation organizations, the private organization FICCI (Chambers of Commerce and Industry) actively involves in these movements with the industry. There is strong expectation for the ESCO type energy conservation promotion in the future to vitalize the private sector.

3.1.4 Evaluation on Approaches in Malaysia

The actual ESCO project launched in Malaysia was the only one model project and the ESCO market has not been formed yet. Through the MIEEIP conducted by the Malaysian government from 2000 to 2004 with supports from GEF and others, the concepts and merits of the ESCO have gradually prevailed in the related players. The program can be said to have served for development of the foundation of the future ESCO market.

However, in Malaysia, as also discussed before, lower energy prices due to the government aids contribute to lack of incentives for energy conservation. Therefore, the size of the potential energy conservation market is limited and dissemination of the ESCO industry is considerably inhibited. It may be crucial in the future that, before trapped in such a vicious circle, such as: first, the nation's economical growth, then an increase in domestic energy consumption, third, an increase in the government aids, and finally, financial deterioration of the nation; the target area of the aids should be shifted to the arrangement of the appropriate laws and preferential treatment system related with energy conservation.

3.1.5 Evaluation on Approaches in Thailand

Thailand is one of the nations having the most advanced energy conservation policies in Asia, similar to those of Japan in terms of the system. Especially, there are great expectations for the ENCON fund as the parent organization to promote energy conservation. However, it is pointed out that the level of the energy conservation regulations is low compared with that of Japan, and that the energy conservation system does not function effectively. In this situation, soaring crude oil prices since last year contributed to explosion of expectations for the ESCO business by the government and the private sectors.

It is appropriate to consider that Thailand remained at the first phase of development of the ESCO industry for a long time. However, the market is gradually being established. This is evidenced by the

existence of the preceding ESCO providers. It is worthwhile noting that the groundwork for accepting the commercial customs of the advanced countries has been laid as many Japanese companies are present in the country, and that the favorable environment has been prepared for the operators, especially Japanese ones to enter the market.

As for the policy assistance, the government begins to promote energy conservation in a positive manner, while the TMB exists to play a core role in financial preparation. These factors will benefit development of the ESCO industry in the future.

From now, growth of the ESCO industry can be accelerated by promoting the preparation program focusing on capacity development, dissemination and enlightenment, business exploitation and financial arrangement, accompanied with establishment of the ESCO Association.

3.1.6 Evaluation on Approaches in the Philippines

The energy conservation policies in the Philippines are implemented leaning on the National Energy Efficiency & Conservation Program initiated by the DOE in 2004. The DOE constructed this program using its internal resources and sequentially launched what could be done. Such an initiative is worth appreciation. At the same time, this program is not mandatory, and its operation has been limited to the superficial areas the DOE's internal human and financial resources can cover. The ESCO business has never been implemented. Accordingly, the greatest challenge to promote energy conservation in the Philippines is less development of the effective energy conservation policy itself. The long-term comprehensive supportive measures are required to be conducted, ranging from planning of the effective energy conservation policy to development of the ESCO industry. As the electricity rate is high comparable to the level of Japan, development of the energy conservation business can be expected. In terms of the national cost minimum, ESCO in the power resources development plan and the IRP analysis to quantify effects of promotion of the energy conservation and DSM could provide important approaches to determine the direction of the policy. As for the ESCO business, all the related systems should be prepared, as most of them have not been organized yet. As the financing system is less developed above all (the 100% collateral principle), preparation of the low interest financing (not relying on asset-based financing) and the credit guarantee system is an urgent subject to promote the ESCO and energy conservation.

3.2 New Cooperation Proposal Focusing on ESCO Type Energy Conservation

Based on the analysis on the current situations previously discussed, the following JICA cooperation programs focusing on ESCO type energy conservation are proposed.

3.2.1 Common Program (Draft)

As discussed previously, promotion and dissemination of ESCO requires well-balanced implementation of various programs in the three fields of policy, technology and finance. In particular, at the early stage of introduction, the government leadership will be effective. But after the ESCO market has established to some extent, it is desirable to shift the program promoting entity to the private sector. These organizations support the programs in place of the governmental leadership in both the early introduction phase and dissemination and expansion phase. As the synergetic effects are developed in parallel with progress of most of the programs, it is better to consider no universal order of introduction of the programs exists. In addition, dissemination of ESCO requires multiple approaches in various fields. In this sense, a set of programs required internationally are common to every country. Based on these programs, challenges and surrounding situations specific to each country are weighted and then those already executed/ongoing programs are eliminated to develop the country's own support program.

Other valid approach is to assign an expert for the short term extending from one to two months when the TOR of the support program is generally settled. The expert should organize the basic information on Japan and target countries, as well as further coordinate the TOR regarding development and investigation planned to be conducted next.

The prior targets for which the ESCO type energy conservation promotion program of JICA should seek are described below:

- 1) Establishment of the sustainable ESCO industrial infrastructure
- 2) Reinforcement of an ability to develop the ESCO project, technical capabilities (abilities) and the business exploitation
- 3) Support for local development of ESCO
- 4) Integration of the power development program with the promotion policies of ESCO and DSM in terms of the national cost minimum

Individual programs effective to attain the targets mentioned above are explained:

- 1) Establishment of the sustainable ESCO industrial infrastructure
 - a) Understanding of the current situations of the three areas of the economic background (needs), technology, and finance (collection of data: database and analysis). Assumption of the energy conservation and ESCO markets and support for the target setting by the government based on this understanding. Especially, as the starting point, the government should recognize it is important to focus the target of the ESCO business not only on the market with return of investment within two years, but a project with a payback period of several years, seeking for sustainable expansion of the ESCO market and dissemination of nationwide energy conservation. At the same time, the top priority should be development of the master plan that considers the future targets, and fostering of the core human resources for promotion. As for the developing countries that have not introduced ESCO yet including the Philippines, adoption of "Preliminary Review (Study) of ESCO Business Program", which China, India and Japan have implemented, may be effective.
 - b) Dissemination and enlightenment of success models (to companies, financial institutes, and customers).
 - c) Establishment of the ESCO Association and support for its activities.
 - d) Support for expansion of the related governmental programs (guidelines and laws regarding

energy conservation, labeling system, efficiency criteria, etc.).

To establish a sound basis for dissemination of ESCO, the related energy conservation systems should be constructed multidimensionally. Supportive activities for such construction are also effective. In dissemination of ESCO, timely arrangement of a low interest loan program by the international finance institutes such as JBIC is useful. However, more efficient loan examination is essential to accelerate dissemination. It will also work for dissemination of ESCO to construct a mechanism that will utilize the energy conservation labeling system, for example, in the loan examination criteria, rather than examine the loan proposal individually.

2) Reinforcement of an ability to develop the ESCO project, technical capabilities (abilities), and the business exploitation

- a) Support for establishment of the success model project. Training of consecutive processes of audit, contract, establishment, M&V, and O&M. Technical and human resources exchanges through the joint FS by engineers in Japan and the target country are prospective programs that may offer an opportunity for Japanese companies to enter the ESCO business there, while seeking for the capacity building.

In addition, not only “invisible effects” such as construction of the systems and mechanisms, but technology transfer may be a worth program to be addressed through implementation of the model project which will provide visible successful experiences to recognize benefit of energy conservation (cooperation with the other international cooperation organizations such as NEDO and JETRO is also considered).

- b) Support for development of measurement and verification guidelines.
c) Support for preparation of the standard contract document, arrangement of the legal mechanism in execution of the contract, and training on the practical business regarding a contract.
d) Support for establishment of energy conservation CDM policies (projects) (e.g.: joint activities for product CDM, program CDM, ESCO CDM and policy CDM project FS, etc. In particular, the labeling system has close relationship with development of energy conservation CDM). From the perspective of the global environment problem (reduction in CO₂), it is required in the mid term to develop the program which will also contribute to promotion of the model combining energy conservation and new energy, not to create a program specific to energy conservation only.

3) Support for local development of ESCO

- a) Support for development of collaboration program with the local government and the ESCO related information network system.

In the developing countries, a priority should first be put on expansion of the program in the main cities. However, in the dissemination and expansion phase of ESCO, a program to support development into the local areas is also valid.

4) Integration of the power development program with the promotion policies of ESCO and DSM in terms of the national cost minimum

- a) Quantification of economic effects by ESCO and DSM in the power supply program and support for development of energy conservation promotion scheme linked with the DSM measures (introduction of viewpoint of IRP).

One of the main challenges of energy policies in the developing countries is a measure to cope with difficulties in stable supply of electricity. In relation with prolonged soaring fuel oil prices, the electricity unit price has shown an absolute ascending curve. This problem is becoming a serious concern to all the governments, power utilities and customers. Therefore, dissemination and expansion of the “DSM plus energy conservation/ESCO type” approach that can solve the above problem and achieve energy conservation simultaneously is highly expected.

5) Collaboration with the international corporation organizations

The programs of the other international organizations, not the JICA programs, useful for comprehensive promotion of ESCO are explained:

a) Support for the financial system.

For the developing countries where an ESCO provider has entered the market and the market is in the course of development as the important target countries in which field investigation was conducted this time, adoption of the following programs by the international financing cooperation organization including JBIC and GEF is effective to expand the ESCO market.

- Establishment of loan guarantee (credit guarantee system)
- Composition of low interest finance (two-step loan, untied loan, and other funds by JBIC). This will work better in a combination with technical cooperation for a more efficient loan examination.

b) Support for development of model projects.

As for implementation of the model project, a promising approach is not only the scheme under support by JICA, but cooperation with the model projects of the international cooperation organizations such as JETRO and NEDO.

3.2.2 Program Specific to Each Target Country (Draft)

(1) China

The WB/GEF program has significantly contributed to introduction of ESCO to China. However, as discussed previously, the greatest problem in disseminating ESCO in China is lack of exact understanding of the role of ESCO. If this is left unsettled, the ESCO business will shrink at certain dimensions. Taking into account this fact, some major points of programs are proposed to China:

1) Establishment of the sustainable ESCO industrial infrastructure

a) Encouragement of exact understanding of the role of ESCO in promoting energy conservation and its targets, support for dissemination and enlightenment (dissemination and enlightenment to both the supply and demand sides (focusing on the major customers)).

Dissemination and enlightenment of the "Original Concept of the ESCO Business" would be most important.

b) Assumption of the ESCO market based on a) shown above, support for establishment of (optimistic) ESCO benchmark by sector (organization of the database) - household sector in particular.

c) Credit guarantee to small and medium-sized EMCs and companies, support for development of an efficient financing program

2) Reinforcement of an ability to develop the ESCO project, technical capabilities (abilities) and the business exploitation

d) Support for development of measurement and verification guidelines.

e) Support for preparation of the standard contract document, arrangement of the legal mechanism in execution of the contract and training on the practical business regarding a contract.

f) Technical and human exchanges and development of business matching support programs for China and Japan's ESCO providers (Requirements from EMCA).

g) Support for establishment of energy conservation CDM projects (ESCO, product CDM, policy CDM, etc.)

3) Support for local development of ESCO

h) Reinforcement of project management of new local EMCs including Shanghai and western development area and support for development of the information network system

- 4) Integration of the power development program with the promotion policies of ESCO and DSM in terms of the national cost minimum
 - i) Support for establishment of the energy conservation promotion scheme by the DSM method. Advantage of investment in “energy conservation as minus supply capability” in the power supply program is quantified.
In parallel with these, measures to introduce the DSM effective in promotion of energy conservation are examined (idea of IRP, Integrated Resource Planning).

(2) India

There are great needs for energy conservation promotion on Indian side. However, the problem is which counterpart of JICA should be selected from the Chamber of Commerce of Industry (FICCI: under control of Ministry of Industry), BEE (under control of Ministry of Power) or PCRA (under control of Ministry of Petroleum & Natural Gas). Research this time showed that all the three organizations indicated intent of running for the JICA counterpart in the ESCO promotion program. As a result of research this time, we propose the Ministry of Industry/the Chamber of Commerce as the JICA counterpart. Otherwise, one of the approaches that may be taken to assign the short term expert to BEE to create the appropriate ground before a program focused on ESCO is introduced to PCRA or FICCI. The draft programs for India are shown below:

- 1) Establishment of the sustainable ESCO industrial infrastructure
 - a) Encouragement of exact understanding of the role of ESCO in promoting energy conservation and its targets, support for dissemination and enlightenment (dissemination and enlightenment to both the supply and demand sides (focusing on the major customers)).
 - b) Assumption of the ESCO market based on a) shown above, support for establishment of (optimistic) ESCO benchmark by sector (organization of the database).
 - c) Capacity building (insufficient personnel and leadership) of governmental organizations such as BEE (lack of human resources).
 - d) Support of activities of the ESCO Association (just established in January 2006).
 - e) Credit guarantee to small and medium-sized ESCOs and companies, support for development of a financing program
 - f) Support for establishment of energy conservation CDM projects (ESCO, product CDM, etc.): This is the economic support element for the ESCO scheme as well as support element for Japanese companies to obtain credit.
India is a CDM leading country and shows a high level of program creativity. They are also just ahead of other developing countries in establishment of the methodology of the ESCO CDM project supported by METI. We expect India as the leading model field over other developing countries. It may be significant to support and promote introduction of the product /policy CDM to India, which is now progressively under review in China.
- 2) Reinforcement of an ability to develop the ESCO project, technical capabilities (abilities) and the business exploitation
 - g) Support for creation of model projects for technical or human resources exchanges. Training of consecutive processes including audit, contract, M&V, and O&M.
 - h) Support for preparation of the standard contract document, arrangement of the legal mechanism in execution of the contract and training on the practical business regarding a contract.
 - i) Support for development of measurement and verification guidelines.
- 3) Support for local development of ESCO
 - j) Support for development of local bases (currently there is no local base and linkage between the central and local governments is a subject to be dealt with.): The local government fails to support promotion of energy conservation. Direct support for cultivation of local human

resources by the local government is effective (e.g. support for creation of an ESCO model of a public facility). Support for establishment of the information network system is also effective.

4) Integration of the power development program with the promotion policies of ESCO and DSM in terms of the national cost minimum

k) Support for establishment of energy conservation promotion scheme by the DSM measures. Advantage of investment in “energy conservation as minus supply capability” in the power supply program is quantified. In parallel, measures to introduce the DSM effective in promotion of energy conservation are examined (idea of IRP, Integrated Resource Planning).

(3) Malaysia

They have no actual experience with the ESCO project on a commercial basis. On the other hand, PTM which takes leadership in development of the MIEEIP program and energy conservation policies is rich in human resources. Malaysia enjoys stable politics, security and economic foundation and shows positive attitudes toward CDM. Under these circumstances, the main factor impeding the development of ESCO industry is lower electricity rates of 6 - 7 yen/kWh. Such lower rates achieved by the governmental support largely contribute to stagnant incentives for energy conservation.

It is required first to reestablish the energy prices from mid- and long-term perspective and analyze the electricity rates in terms of IRP. Other programs effective in promotion of ESCO in Malaysia may be rather comprehensive ones as discussed below:

1) Establishment of the sustainable ESCO industrial infrastructure

- a) Encouragement of exact understanding of the role of ESCO in promoting energy conservation and its targets, support for dissemination and enlightenment (dissemination and enlightenment to both the supply and demand sides (focusing on the major customers)).
- b) Assumption of the ESCO market based on a) shown above, support for establishment of (optimistic) ESCO benchmark by sector (organization of the database).
- c) Credit guarantee to small and medium-sized ESCOs and companies, support for development of a financing program
- d) Capacity building of PTM.
- e) Support for activities of the ESCO Association.
- f) Support for establishment of energy conservation CDM projects (ESCO, product CDM, etc.): This is the economic support element for the ESCO scheme. The Malaysian government is also very positive for CDM. It will serve as a support element for Japanese companies to obtain credit as well.

2) Reinforcement of an ability to develop the ESCO project, technical capabilities (abilities) and the business exploitation

- g) Support for creation of model projects for technical or human resources exchanges. Training of consecutive processes including audit, contract, M&V, and O&M.

3) Integration of the power development program with the promotion policies of ESCO and DSM in terms of the national cost minimum

- h) Integrated evaluation of “Power Supply Program, Price Policies and Promotion of Energy Conservation” from the view point of the overall national economy using IRP (Integrated Resource Planning) methodology is the most important to promote ESCO. Relations of determination of the electricity rates (DSM) and promotion of ESCO should be clarified. In parallel, measures to introduce the DSM effective in promotion of energy conservation are examined.

(4) Thailand

With presence of many Japanese companies, Thailand has the sufficient ground for accepting commercial customs in the advanced countries. In particular, the favorable environment exists for Japanese companies to enter.

As for policy support, the government has been gradually positive about promotion of energy conservation. As for financial arrangement, presence of TMB which will play a core role in promotion of ESCO will benefit the future development of ESCO industry.

In the future, accelerated fostering of ESCO industry can be achieved by focusing on capacity development, dissemination and enlightenment, exploitation of business and financial preparation, and then organizing these factors with expected establishment of the ESCO Association.

1) Establishment of the sustainable ESCO industrial infrastructure

- a) Encouragement of exact understanding of the role of ESCO in promoting energy conservation and its targets, support for dissemination and enlightenment (dissemination and enlightenment to both the supply and demand sides (focusing on the major customers)).
- b) Assumption of the ESCO market based on a) shown above and support for establishment of (optimistic) ESCO benchmark by sector (organization of the database).
- c) Support for holding of exhibitions, conferences and seminars, construction of the database and development of the push the market methodology to expand the market (the banks cannot take any action unless the market expands).
- d) Support for establishment of the ESCO Association

2) Reinforcement of an ability to develop the ESCO project, technical capabilities (abilities) and the business exploitation

- e) Support for expansion of the ESCO model project (technology, contract, M&V and project management).
- f) Support for development of measurement and verification guidelines.
- g) Preparation of the program or an opportunity for technical exchanges to help the Japanese companies (technology) entering the Thai market.
- h) Proven technology transfer to the industrial processes.

3) Integration of the power development program with the promotion policies of ESCO and DSM in terms of the national cost minimum

- i) Support for establishment of the energy conservation promotion scheme by the DSM measures.
Advantage of investment in “energy conservation as minus supply capability” in the power supply program is quantified. In parallel, measures to introduce the DSM effective in promotion of energy conservation are examined (idea of IRP, Integrated Resource Planning).

(5) The Philippines

The greatest challenge in promoting energy conservation in the Philippines is that preparation for effective energy conservation itself has lagged behind. It is necessary to implement long-term comprehensive supportive measures ranging from planning of the effective energy conservation policy to fostering of the ESCO industry. As the electricity rates are higher than the level of Japan, development of energy conservation business is very likely. In the perspective of the national cost minimum, analysis in terms of IRP which quantifies effects of promotion of ESCO, energy conservation and DSM in the power development program can represent an important approach for determining the policy direction. The systems related with the ESCO business have been hardly prepared. Therefore, everything should be arranged. As the financial system is particularly lagged behind (the 100% collateral principle), preparation of low interest loan (not depending on asset collateral) and the credit guarantee system is the urgent subject toward promotion of ESCO and energy conservation.

- 1) Establishment of the sustainable ESCO industrial infrastructure
 - a) Encouragement of exact understanding of the role of ESCO in promoting energy conservation and its targets, support for dissemination and enlightenment (dissemination and enlightenment to both the supply and demand sides (focusing on major customers)).
 - b) Assumption of the ESCO market based on a) shown above, support for establishment of (optimistic) ESCO benchmark by sector (organization of the database).
 - c) Credit guarantee to small and medium-sized ESCOs and companies, support for development of a financing program: the greatest challenge is to construct the scheme for smooth financing by securing credit of these ESCO providers and reliability of energy conservation technology.
 - d) Capacity building by DOE.
 - e) Support for development of the base activity program of the ESCO Association (dissemination and enlightenment).

- 2) Reinforcement of an ability to develop the ESCO project, technical capabilities (abilities) and the business exploitation
 - f) Support for creation of model projects for technical or human resources exchanges. Training of consecutive processes including audit, contract, M&V, and O&M.
 - g) Support for training and access to the audit equipment.
 - h) Support for preparation of the standard contract document, arrangement of the legal mechanism in execution of the contract and training on the practical business regarding a contract.

- 3) Integration of the power development program with the promotion policies of ESCO and DSM in terms of the national cost minimum
 - i) Support for establishment of the energy conservation promotion scheme by the DSM measures.

Advantage of investment in “energy conservation as minus supply capability” in the power supply program is quantified. In parallel, measures to introduce the DSM effective in promotion of energy conservation are examined (idea of IRP, Integrated Resource Planning).

3.3 Points to Note on the Cooperation in ESCO Type Energy Conservation Promotion

The points to be remembered when extending cooperation for ESCO type energy conservation promotion are described below.

3.3.1 Status of ESCO in the energy conservation promotion

Most of energy conservation renovation projects in developing countries not only in Asia but also in other regions of the world presuppose a short-term payback of investments. This is because: [1] A large energy conservation effect is obtainable even with projects of short-term payback, because energy conservation is largely undeveloped in those countries; and [2] Long-term payback tends to accompany a large financial risk. However, it must be noted that the real target of the ESCO business is the market with a short to medium payback period.

Projects with a simple payback period of not over 1-2 years can be implemented with the client's own capital. On the other hand, investments with a long simple payback period (10 years or more) are inappropriate as the target of ESCO. Therefore, the ESCO market to be targeted is the market with a simple payback period of 2 to several years. Renovation projects with a payback period of less than 2 years are considered as strategic renovation items whose role is to contribute to the economy when technologies with a long payback period are also introduced together. If the market is cultivated with a focus on this area, quantitative expansion as well as market expansion will be enabled. When this concept is shared between both demand and supply side of ESCO services and the financial institutions, the matured ESCO market will be created for the first time.

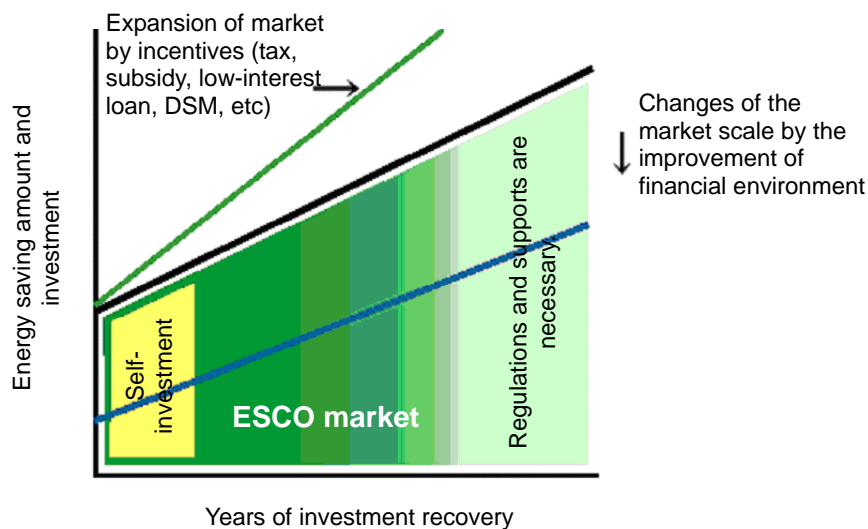


Figure 3.3.1 Market to be targeted by ESCO

The fact that ESCO are a “long-term credit business” is also important. If a business practice allowing a long-term credit business takes root, development of a market centering on a medium-term payback will become possible.

To facilitate the process, it is necessary to instill this basic concept to the ESCO providers. However, reaching a consensus is not easy amid the business trend which considers a short-term payback to be quite rightful. Probably, it is more effective to disseminate ESCO's inherent concept to the clients than attempting to instill the above-mentioned concept. At the same time, it is necessary to establish a system which secures a conformance to the contract and elimination of non-fulfillment of the contract in order to implant a business practice that allows a long-term credit business. Because contracts are concluded between the client and the ESCO provider, it is essential to provide enlightenment on the details of

contracts to both of them.

3.3.2 Formulation of programs in stages and partnerships among international cooperation organizations

To promote ESCO in developing countries, organic collaboration of the three fields - policy, technology, and finance - is very important, as mentioned earlier. Integrated programs covering a wide range of aspects are also indispensable.

Those programs can be implemented simultaneously and it is more effective. However, because some of them may have already been conducted in some countries, it is necessary to organize programs in stages in consideration of the present status of implementation, growth level of the market, etc. of each country. As to the specific procedure, it shall be started with a common support program for developing countries, whose approach is, "to provide support to build a perception that can focus on the market of a medium-term payback with a view to future expansion of the ESCO market and energy conservation on the national level, without focusing only on the market with a payback period of not over two years". This is proposed as the basic form of ESCO type energy conservation promotion programs of JICA/Japanese Government. A combination of this and other several program menus appropriate for each country are proposed as the development study of the first stage (about two years). As described in the "JICA Thematic Guidelines on Energy Conservation", the results of this study will be evaluated and then the JICA development study or technical cooperation program of the second stage will be drawn up by grasping the status at the time and in consultation with the government of the target country. In addition, collaboration with low-interest loan programs of JBIC, etc. shall be sought when the market begins to expand.

An approach which is "staged, sustainable, and considers a partnership with other international cooperation organizations (JBIC, etc.)", as seen in the flow order of "JICA basic program, Evaluation, JICA application program & JBIC loan formulation, Evaluation and Continued support by JICA next stage programs if necessary", is proposed.

Also it is necessary to, not cover everything with JICA's programs, but identify specific fields to which JICA can extend cooperation, by considering the share of responsibility with other international cooperation organizations and Japanese organizations like JBIC, and by incorporating the results obtained from other programs.

3.3.3 Points to note on ESCO promotion in China

- As the counterpart of JICA's support programs, the line from the Energy Management Company Association (EMCA) to the Environment and Comprehensive Use of Resources Department of the National Development and Reform Commission (NDRC) is considered appropriate. Although the needs are available in Shanghai as well, the central government in Beijing should be involved to make the programs expansive.
- The Bank of Beijing is planning the "Small Giant" program: a loan program advantageous to ESCO providers in the developing stage, and "Green Review": a support to the formulation of finance by ESCOs, such as a cut of review period. It is necessary to ensure coordination with this kind of activities and maximize their combined effect.
- It should be noted that energy conservation in China comes under the supervision of two different commissions. Namely, the Economic Commission is responsible for overall energy conservation including the ESCO industry, and the Construction Commission is in charge of energy conservation of public buildings, including the utilization of ESCO schemes.
- Concerning CDM, a written request of support has been submitted to JICA from the China Academy of Science. Coordination with this line is necessary.

3.3.4 Points to note on ESCO promotion in India

- The 3-CEE Program created with the support of WB/GEF is effective as the forum of international information exchange. However, results of many other international cooperation programs are stopped at the level of preparation of ESCO order documents, and hence few projects have been realized.
- A major task to be attained for energy conservation on the national level is the reduction of transmission loss which is as large as 45% at present. One of the causes of energy loss is a large fluctuation (low quality) in the voltage of electricity supplied from power companies. It is also a deterrent preventing the introduction of computer-controlled energy efficient equipment which is highly capable but weak against fluctuations of voltage.
- Although the energy conservation potential in India is large, the problem is that few overseas companies including Japanese companies attempt to enter into the ESCO market in this country. However, encouraging factors towards the energy conservation promotion and ESCO infiltration are available, which include: March 2007 when the five-year dispensation period following after the enforcement of the Energy Conservation Law will end is approaching; and the Honorable Prime Minister of India made a statement that “all the governmental buildings should achieve 30% energy conservation within the next five years by utilizing ESCO projects.”
- The effect of programs directly supporting ESCO schemes is limited. While supporting this kind of programs indirectly, it is necessary to create programs that can systematically support policy developments, like preparation of energy conservation standard/labeling/building code which have an ability to advance energy conservation comprehensively.
- Another big problem is that the policies of the central government do not readily penetrate into or implemented by the 35 state governments. Needs are high for development of human resource in energy conservation promotion at the state governments and several other local key centers for energy conservation.
- India has a technological capability. Therefore, what is needed is not the one-way technical guidance/assistance from Japan but the cooperation in the form of technical exchange.

3.3.5 Points to note on ESCO promotion in Malaysia

- Although the ESCO association and the Pusat Tenaga Malaysia (PTM) are working hard for energy conservation, the national priority of energy conservation is low because the electricity tariff is inexpensive in this country. The effect of the GEF program is also limited.
- The counterpart of JICA's support programs is PTM.

3.3.6 Points to note on ESCO promotion in Thailand

- JICA's counterpart will mainly be the Department of Alternative Energy Development and Energy Efficiency (DEDE) as in the past. As no other entities are available which work for energy conservation promotion, it is necessary to set up an ESCO association or a similar entity and to nurture it as the core body for dissemination and enlightenment activities.
- Although the potential ESCO market is large, it is still immature as a whole. A low-interest loan program at a rate of 4% (market rate is 7.5%) was expanded in March. These days, a favorable wind is blowing for all of ESCOs, banks (expansion of loan menus), and energy conservation promotion efforts due to the soar of oil price and the rise of interest rate.
- It is effective to perform integrated resource planning (IRP) type analyses and a study on the feasibility of demand side management (DSM) as the basic research.
- There are many energy conservation promotion programs. However, ESCO activities are being undertaken only by a small number of companies. Tax incentives for supporting ESCOs are available, but they are difficult to understand. Support is needed for the establishment of a

collateral (guarantee) mechanism (note: A loan guarantee is under deliberation with the support of the Agence Francaise de Developpement (AFD) of France), including a support for the establishments of an ESCO venture capital.

- As to the clean development mechanism (CDM), change of a responsible governmental organization is planned this fiscal year. So, this matter will be handled after the system is fully established.
- Because many Japanese companies are already engaging in business in Thailand, development of the ESCO market in this country may be facilitated if ESCO business is implemented at those Japanese companies.

3.3.7 Points to note on ESCO promotion in the Philippines

- Although an ESCO association exists, ESCO projects have never been implemented. On the other hand, the electricity tariff soared to the level exceeding that of Japan after last December. Hence, the energy saving potential is considered very high. An initial fund and others may be necessary to cover the immaturity of the financial system (an absolute collateral policy). Expectations are also high for the low-interest loan offered by the Japan Bank for International Cooperation (JBIC).
- It is effective to perform integrated resource planning (IRP) type analyses and a study on the feasibility of demand side management (DSM) as the basic research.
- JICA's counterpart is the Department of Energy (DOE). The target for the time being is the Manila metropolitan area (currently, 70% of electricity in the Philippines is consumed in this area.)

3.4 Outlook on the Collaboration with the Clean Development Mechanism

3.4.1 Energy conservation actions related to the Kyoto Mechanism

Concerning the Clean Development Mechanism (CDM) in general, international rules have been developed to some extent and the number of CDM projects registered at the U.N. has grown to 152⁷⁾ (as of early April in 2006) mainly in the fields of HFC-23, N₂O, and LFM. On the other hand, the number of registered CDM projects in the energy conservation field is still few, only 3 large-scale projects and 6 small-scale projects⁸⁾. Hence, it is pointed out that further international actions are needed to promote CDM projects in the energy conservation field as well as in the renewable energy field. With this in the background, the first Conference of the Parties serving as the Meeting of the Parties (COP/MOP 1) to the Kyoto Protocol was held at Montreal, Canada in December 2005, at which the following concrete improvement measures towards the promotion of energy conservation CDM were agreed under the advocacy of Japan.

- (1) Promotion of international initiatives for energy conservation promotion, such as those of the “Future CDM” Committee (Secretariat: the Central Research Institute of Electric Power Industry and the Institute of Energy Economics, Japan), a committee established under the leadership of Japan.
- (2) Review of the definition of small-scale CDM
- (3) Bundling of projects which are undertaken under the government programs, etc. in developing countries as one CDM project

One point that needs attention is that India is taking an active leadership in CDM promotion. In India, 160 CDM projects have already gained an approval from the Government, and this country is also active in the promotion of energy conservation.

In China, the “Measures for Operation and Management of CDM Projects” was enacted in October 2005, in which energy conservation is taken up as a key project area. However, among the 22 CDM projects approved by the Chinese Government, the number of energy conservation project is just one. At present, the Energy Research Institute (ERI) of the National Development and Reform Commission (NDRC) and the Tsinghua University are jointly working to establish the “Standard CO₂ Emission Coefficient” for each power generation network in China. When it is made public, formulation of energy conservation CDM projects will be improved significantly in terms of efficiency.

3.4.2 Promotion of the “Future CDM” initiative

Responding to the voices raised at COP 10 which stressed the importance of CDM project formulation in energy conservation and transportation, an international workshop aiming to materialize CDM in energy conservation and renewable energy fields was held in Tokyo, with the participation of research institutions in various countries in March 2005. To transform the discussions at the Tokyo workshop into concrete actions, the following five working groups were established and the responsibility to develop new methodologies in each priority area were assigned.^{9),10)}

⁷⁾ The environment around the CDM is constantly changing with an eye on 2010. The latest information as of early April 2006 was described in this report, but see the latest information at the following URL when citing values, etc.:

<http://cdm.unfccc.int/Statistics/>

⁸⁾ In the CDM project classification, projects related to cogeneration, heat use, and fuel switching using husks, sugar cane, etc. whose number has been growing in recent years, are classified not as energy conservation, but as “biomass”. However, it must be noted that some ESCO projects in developing countries include biomass fuel cogeneration (fuel switching).

⁹⁾ Because the CO₂ reduction potential of energy conservation is higher than that of renewable energy, the Japanese Government has decided to give a priority to the development of energy conservation methodologies.

¹⁰⁾ Future CDM Workshop, December 3, 2005, Montreal. For bundling and common baseline, see the Methodologies for Bundling Climate Change Technologies/Projects, Jayant Sathaye, LBNL, U.S.A., Future CDM Workshop, December 3, 2005, Montreal

- (1) Consolidated energy conservation methodologies
[1] Development of basic type energy conservation methodologies, [2] development of product CDM methodologies, [3] development of consolidated methodologies combining factors of [1], [2] above and (3), (4) below (working Group (WG) leader: Germany)
- (2) Development of transportation methodologies (WG leader: Japan)
- (3) Development of common baseline methodologies (WG leader: U.S.)
- (4) Development of policy/program/bundling¹¹⁾ methodologies (WG leader: Netherlands)
- (5) Development of ESCO methodologies (WG leader: India)

During the course of these activities, the “Future CDM Committee” was established with the participation of working group leaders and representatives of major CDM investment countries, and their host countries (Brazil, Canada, Chile, China, India, Netherlands, and Japan). Its first meeting was held in Bonn, Germany in May 2005.

The target projects which are taken up in the “Future CDM” for developing new methodologies are a total of 11, consisting of 8 in the energy conservation field and 3 in the transportation field. It is intended to develop and disseminate the calculation method (methodology) of CO₂ emission reduction to be attained by those projects. With the use of easy-to-use and widely-applicable methodologies being developed by the “Future CDM”, a drastic promotion of energy conservation CDM projects which have not been materialized due to the lack of appropriate methodologies despite of their large emission reduction potentials, will be enabled. In particular, the methodologies in (2) and (3) are worth paying attention to their future developments as the “ESCO CDM” and “policy/program/ product CDM”, respectively.

An overview of energy conservation CDM projects which are taken up as the target projects in the “Future CDM” are shown below.

- (1) Targeting energy conservation at hotels (lights, air-cooling, boiler, etc.)
- (2) ESCO CDM
- (3) Household CFL project: the product CDM (policy/program CDM)
- (4) All the emission reduction activities which are formulated by various industries, such as cement and steel industries, based on their voluntary action plans. (policy/program CDM)
- (5) The recovery and reuse of exhaust heat and gas in the steel industry
- (6) Various emission reduction activities in the cement industry
- (7) The substitution of supercritical coal-fired power generation for subcritical coal-fired power generation (for the industrial use).
- (8) The efficiency improvements of steam boilers

3.4.3 Review of the definition of small-scale CDM

According to the present definition, the energy conservation type small-scale CDM projects whose CDM procedure can be simplified are limited to the projects with an annual CO₂ emission of 10kt-CO₂ or less. To raise this emission limit and expand the range of small-scale CDM, review of the definition of small-scale CDM has already been started. It is planned to gain a final decision at the 2nd Conference of the Parties serving as the Meeting of the Parties (COP/MOP 2) to the Kyoto Protocol to be held at the end of 2006.

¹¹⁾ Bundling means the consolidation of a plural number of technologies/projects which are introduced by governmental organizations, owners, users, vendors, or third parties. In the energy conservation CDM, expansion of bundling methodologies is significant because individual equipment/projects are smaller than those of other types of CDM projects. The bundling methodologies currently approved are those related to irrigation pumps, steam boilers, and small-scale CDMs. The bundling methodologies now under review are those related to charcoal production at plural sites (NM0110, Brazil) and a supermarket chain (demand side electricity management program, NM0120, Brazil).

3.4.4 Promotion of CDM under the government programs in developing countries

It was decided at the COP/MOP1 held in 2005 that a plural number of energy conservation projects which are implemented under a government program in developing countries can be admitted as one CDM. With this, it became possible to consider the effects of a subsidy system or tax incentives for the introduction of energy efficient equipment as the CDM. It also became possible to bundle up all the projects such as energy efficient equipment introduction which come under a government program and to implement them using only one procedure. With this simplification, burdens imposed on the project implementers are drastically reduced.

3.4.5 Proposal of CDM-based JICA programs for energy conservation promotion

A variety of activities in the field of CDM stated in this research are summarized as follows.

- (1) The number of CDM registrations is increasing beginning in this year. The countries with large expected CERs are China, Korea, Brazil, and India from the top. The countries having many registered projects are Brazil and India. India is very active in the formulation of CDM projects, including energy conservation projects. The promotion of energy conservation CDM projects in China is highly expected by both Chinese and Japanese governments.
- (2) Energy conservation CDM projects are still few, but the trend towards expansion is growing globally.
- (3) The effects yielded by energy conservation CDM projects that are formulated under government programs in developing countries are drawing attention.
- (4) Development of methodologies for ESCO models is also under way.
- (5) It is predicted that in China “energy conservation and product/program/policy CDM” become the mainstream after 2008 among the CDM projects in this country up to 2010.
- (6) Developing countries hope to gain support from JICA primarily in the fields of capacity building and project planning on CDM, and enlightenment on ESCO.

Based on these findings, the following are proposed as the CDM-based JICA programs for energy conservation promotion.

- (1) Support to the startup of energy conservation CDM projects which are implemented under government programs in developing countries
Support shall be extended to the “formulation and expansion of CDM projects linked with energy conservation programs of national governments in developing countries” which has a high potential of future expansion due to the advocacy of the Future CDM initiative and others. It is particularly effective to provide support to the startup of CDM projects in India, which is a CDM-advanced country and currently striving to create CDM methodologies, and in China, which has placed energy conservation CDM as a key priority area and is attempting to formulate a product CDM project. The product/program CDM has a possibility to lead to a partnership with JBIC as shown below.
- (2) Support to the establishment of an energy conservation labeling system which can lead to collaboration with product CDM or ESCO
A support program shall be formulated targeting [1] electrical products that have a high potential to proceed to the formulation of product CDM, and [2] equipment that can exhibit ESCO’s technological credibility, within the framework of the “energy conservation labeling system” which is effective for energy conservation promotion even as an independent system.

- (3) Capacity building of concerned organizations towards the formulation of energy conservation CDM projects

Support shall be extended to improve the project formulation capacity of developing countries through the provision of FS-related trainings, such as formulation of energy conservation CDM project schemes and preparation of project design document (PDD). Support is also needed to establish a support system on the administrative side of the target country so that it can assist and promote utilization of CDM schemes by small and medium-sized ESCO providers in that country. This is related to (4) below.

- (4) Enlightenment to ESCO providers on the formulation of CDM project schemes

In developing countries, there are some cases in which ESCO providers have cultivated CDM projects by themselves. But, in actuality, many ESCO providers do not have knowledge of CDM schemes. Support is needed to enhance this understanding.