No.

PROJECT STUDY
ON
ENERGY CONSERVATION
BY
UTILIZING ESCO

FINAL REPORT

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JAPAN INTERNATIONAL COOPERATION AGENCY
(JICA)

ELECTRIC POWER DEVELOPMENT CO., LTD.

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Preface

In the midst of global surge of crude oil price as well as the increase of electricity price linked with it, and in advent of the first commitment period of the Kyoto Protocol, promotion of the energy conservation is attracting international attentions as a sustainable and effective measure to address all the global issues including energy security, countermeasure against global warming and reinforcement economic activities of each country. Having such a situation as background, ESCO (Energy Service Company) type energy conservation promotion is regarded as a rational policy that utilizes the market mechanism. In Japan, European countries and in the United States, utilization of ESCO is positioned as one of the basic policies for promoting energy conservation and it begins to attract interests of many developing countries. Giving consideration to this movement, international cooperation organizations such as the World Bank, GEF and USAID are expanding their extent of cooperation for the promotion of energy conservation including that of the ESCO type in the developing countries.

Having noticed this trend, Japan International Cooperation Agency (JICA) is reinforcing its approach to the energy conservation including the formulation of Thematic Guidelines on Energy Conservation in February 2005, while providing some developing countries with its support to form programs that contribute to promote energy conservation. However, the influence of ESCO or energy conservation on a national economy as well as the possibility of creating and propagating ESCO market and the method of providing timely supports to energy conservation in a developing country have not been clearly identified yet. Thus, it is an important challenge for JICA to analyze support measures to promote energy conservation in developing countries including ESCO type energy conservation, and to expand its approach for promoting efficient energy conservation measures as well as to establish practical measures to organize projects for this purpose.

This research has been planned to collect and analyze information about ESCO type energy conservation promotion based on actual cases and to improve JICA's ability to expand its supportive approaches and to implement cooperation in the field of energy conservation.

Among 23 countries within the scope of the research, China, India, Malaysia, Thailand and the Philippines were chosen as the countries of the main emphasis. Field research was implemented in these 5 countries. Further, in conducting the research and analysis, special efforts were placed in evaluating successful cases and failure cases of ESCO projects that other international organizations are involved with, proposing new cooperation plans that are dedicated for ESCO type energy conservation to be conducted by JICA and in constructing close tie-up with CDM. We hope that the current report will be of any help for JICA in implementing cooperation activities in the future.

While this research was commissioned to Electric Power Development Co., Ltd. by JICA, it may be appropriate to indicate that the contents of the current report are based on the results of research and analysis conducted by our researchers, which do not necessarily represent opinions of JICA.

June 2006

Kimio Yoshida

Electric Power Development Co., Ltd.

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Abbreviations and Acronyms

3-CEE	3-Country Energy Efficiency
ADB	Asian Development Bank
AECo	Ahmadabad Electricity Company (India)
AFD	Agence Française de Développement
ASTAE	Asian Alternative Energy Program
BAESCO	Brazilian Association of Energy Service Companies
BCSDM	Business Council for Sustainable Development Malaysia
BEE	Bureau of Energy Efficiency (India)
BESCOM	Bangalore Electricity Supply Company (India)
CCU/EEAA	Climate Change Unit of the Egyptian Environmental Affairs Agency
CDM	Clean Development Mechanism
CEM	Contract Energy Management (U.K.)
CER	Certified Emission Reduction
CFL	Compact Fluorescent Lamp
CHP	Combined Heat & Power
CII	Confederation of Indian Industry
CNA	CDM National Authority (Vietnam)
CNI&G	China National Investment & Guaranty CO., Ltd.
COMEGEI	Comite Mexicano para Proyectos de Reduccion de Emisiones y de Captura de Gases de Efecto Invernadero
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)
DENR	Department of Environment and Natural Resources (Philippines)
DFID	Department for International Development (U.K.)
DISCOM	Distribution Company
DNA	Designated National Authority
DOE	Department of Energy (Philippines)
DSCL	DSCL Energy Services Company Ltd. (India)
DSM	Demand-Side Management
EB-CDM	Egyptian Bureau for CDM
EBRD	European Bank for Reconstruction and Development
EC-CDM	Egypt Council for the CDM
ECEP	Energy Conservation and Environmental Protection Project (Egypt)
ECF	Energy Conservation Fund (Sri Lanka)
ECO	Energy Conservation and Commercialization Project (India)
EEAA	Egyptian Environmental Affairs Agency
EEI	Excellent Energy International Co., Ltd. (Thailand)
EER	Energy Efficiency Ratio
EGAT	EGAT Public Company Limited (Thailand)
EMC	Energy Management Company (China)
EMC	Energy Management Center (India)
EMCA	Energy Management Company Association (China)
EMCAT	Energy Management Consultation and Training
EMS	Energy Management Services Emirates LLC (EAU)
ENCON Act	Energy Conservation Promotion Act (Thailand)

ENCON Fund	Energy Conservation Promotion Fund (Thailand)
ENEX	Energy and Environment Exhibition (Japan)
EOC	Energy Operation Contracting
EPC	Energy Performance Contracting
EPU	Economic Planning Unit (Malaysia)
ERI	Energy Research Institute (China)
ESC	Energy Supply Contracting
ESCO	Energy Service Company
ESCOCC	ESCO Conference Community (India)
ESCOPhill	ESCO Philippines
ESMAP	Energy Sector Management Assistance Program
ESPC	Energy Savings Performance Contract (U.S.A.)
EU	European Union
EVN	Electricity of Vietnam
FAMPE	Guarantee Fund to Micro and Small Size Enterprises (Brazil)
FGPC	Guarantee Fund for Competitivity Promotion (Brazil)
FICCI	Federation of Indian Chambers of Commerce and Industry
FS	Feasibility Study
GBC	Green Business Center (India)
ECCJ	Energy Conservation Center, Japan
GDP	Gross Domestic Product
GEC	Global Environment Centre Foundation (Japan)
GEF	Global Environment Facility
GEF-TAP	Global Environment Facilities-Technical Assistance Program
GSC	Guaranteed Savings Contract
GTZ	Gesellschaft fur Technische Zusammenarbeit (Germany)
HEECP	Hungarian Energy Efficiency Co-Financing Program
ICICI	Industrial Credit and Investment Corporation of India
ICPEEB	Indian Council for Promotion of Energy Efficiency Business
IDBI	Industrial Development Bank of India
IEEFP	International Energy Efficiency Financing Protocol
IEEN	Industrial Energy Efficiency Network (Kenya)
IFC	International Finance Corporation
IGES	Institute for Global Environmental Strategies (Japan)
IIEC	International Institute for Energy Conservation
IPMVP	International Performance Measurement and Verification Protocol
IREDA	Indian Renewable Energy Development Agency Limited
IRP	Integrated Resource Planning
IRR	Internal Rate of Return
JAESCO	Japan Association of Energy Service Companies
JBIC	Japan Bank for International Cooperation
JEMA	Japan Electrical Manufacturers' Association
JETRO	Japan External Trade Organization
JI	Joint Implementation
JICA	Japan International Cooperation Agency
JKAP	Japan Kyoto Mechanisms Acceleration Programme
KAM	Kenya Association of Manufacturers
KOMNAS MPB	Komisi Nasional Mekanisme Pembangunan Bersih / KN-MPB (Indonesia)
KONEBA	PT Konservasi Energi Abadi (Indonesia)
LFM	Land Fill Methane

M&V	Measurement and Verification *or* Monitoring and Verification
MAESCO	The Malaysian Association of ESCOs
MEMR	Ministry of Energy and Mineral Resources (Indonesia)
MESITA	Malaysian Energy Supply Industry Account
METI	Ministry of Economy, Trade and Industry (Japan)
MIDF	Malaysian Industrial Development Finance Bhd
MIEEIP	Malaysian Industrial Energy Efficiency Improvement Project
MOEF	Ministry of Environment and Forests (India)
MONCES	Ministry of Non-conventional Energy Sources (India)
MONRE	Ministry of National Resources and Environment (Vietnam)
MOP	Ministry of Power (India)
MOPNG	Ministry of Petroleum & Natural Gas (India)
MSEB	Maharashtra State Board of Electricity (India)
MTI	Ministry of Trade and Industry (Kenya)
MUSH	Municipal, University, School, Health
NADB	North American Development Bank
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
NEPO	The National Energy Policy Office (Thailand)
NEXI	Nippon Export and Investment Insurance (Japan)
NPC	National Productivity Council (India)
NRE	Ministry of Natural Resources and Environment (Malaysia)
NREL	National Renewable Energy Laboratory (Egypt)
O&M	Operation and Maintenance
OECC	Overseas Environmental Cooperation Center, Japan
ONEP	Office of Natural Resources and Environment Policy and Planning (Thailand)
PC	Performance Contract
PCRA	Petroleum Conservation Research Association (India)
PDD	Project Design Document
PFI	Private Finance Initiative
PLN	PT. PLN (Philippines)
PMO	Project Management Office (China)
PROCEL	National Electricity Conservation Programme (Brazil)
PTM	Pusat Tebaga Malaysia (Malaysia Energy Center)
RESCO	Retail Energy Service Company
RIKEN	The National Energy Conservation Plan (Indonesia)
SBI	State Bank of India
SETC	State Economic and Trade Commission (China)
SGF	Sustainable Guarantee Facility
SME	Small and Medium Enterprise
SPC	Special Purpose Company
SSAE	Shri Shakti Alternative Energy Ltd. (India)
SSC	Shared Savings Contract
STEA	Science Technology and Environment Agency (Laos)
t-ce	ton coal equivalent
TERI	The Energy and Resources Institute (India)
TMB	Thai Military Bank
TNB	Tenaga National Berhat (Malaysia)

TOR	Terms of Reference
TPC	Technology Performance Contracting
TPF	Third Party Finance
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNF	United Nations Foundation
UNFCCC	United Nations Framework Convention on Climate Change
UNIDO	United Nations Industrial Development Organization
UNOPS	United Nations Office for Project Services
USAID	United States Agency for International Development
VAT	Value-Added Tax
WB	World Bank

Chapter 1

Objective and Methodology of Research

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 Research schedule

Figure 1.3.2 shows the research schedule.

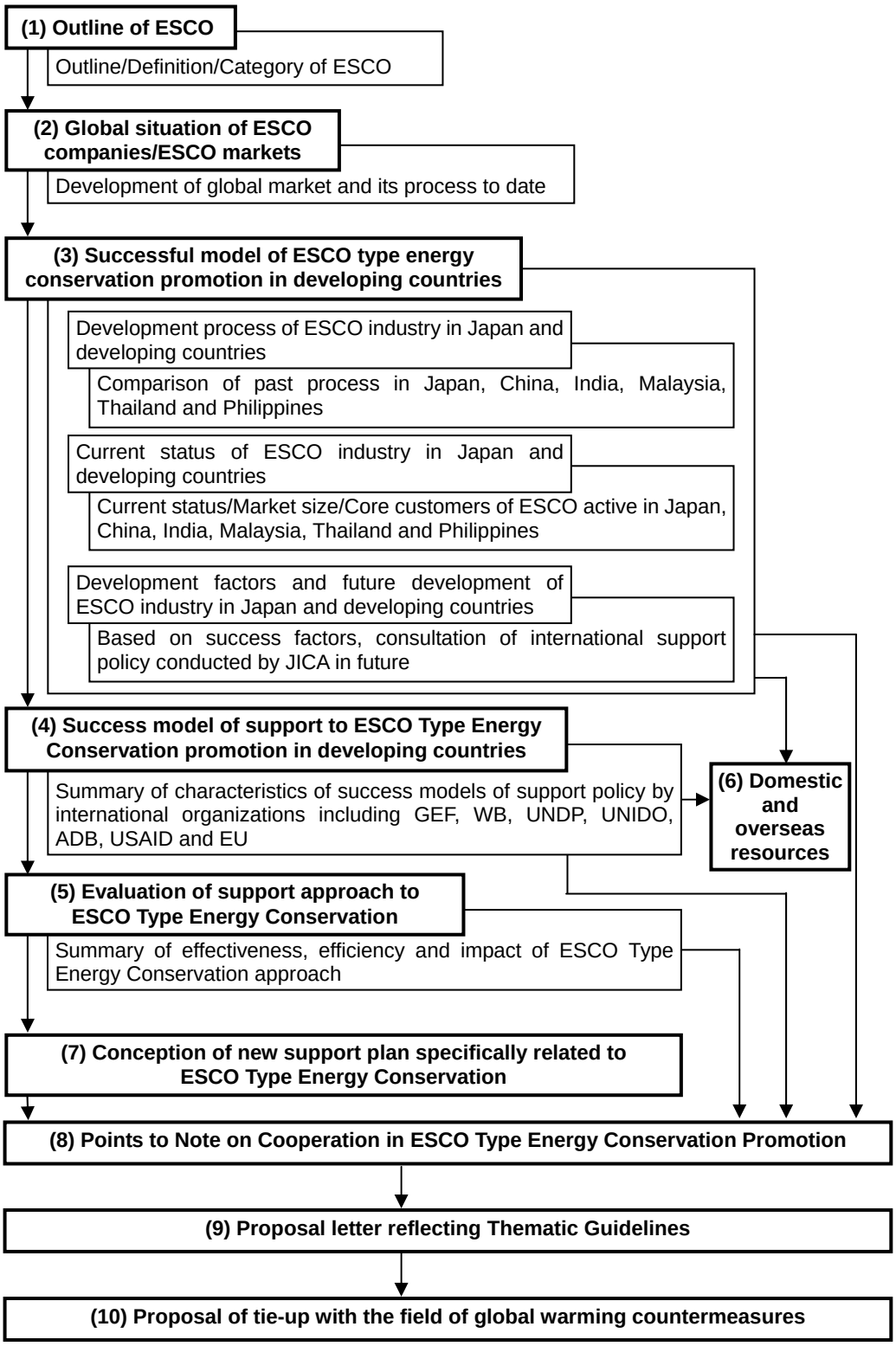
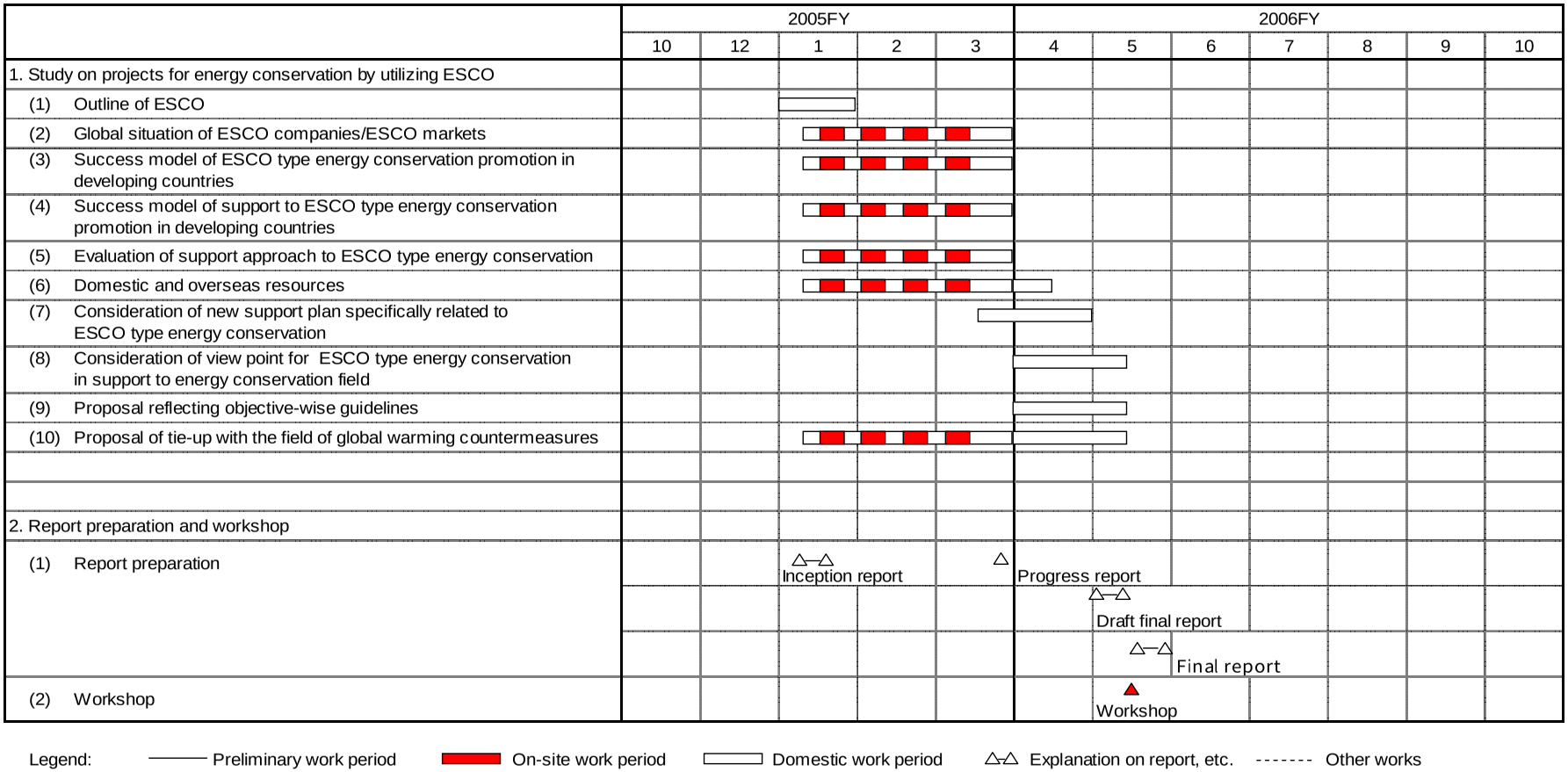


Figure 1.3.1 Research project implementation flow

Figure 1.3.2 Work Schedule



1.3.2 Research system

Composition and the field in charge of the research team for the current research are shown below:

Table 1.3.1 Composition and the field in charge of the research team

Name	Field in charge	Assignments
Kimio Yoshida	General control/ ESCO Type Energy Conservation/CDM	- General control for overall research - Control and coordination of job progress - Research / Analysis of ESCO Type Energy Conservation models - Research / Analysis on status of approach for CDM
Chiharu Murakoshi	ESCO Type Energy Conservation/Energy conservation policies	- Research / Analysis of ESCO Type Energy Conservation models - Research / Analysis of energy conservation policies - General control for opening workshops
Takashi Mimura	Energy conservation policies	- Research / Analysis of energy conservation policies - Research / Analysis on DSM policies of electric power companies - Research / Analysis on status of energy demands
Yoshio Shibata	Energy conservation technologies	- Research / Analysis of promising energy conservation technologies - Evaluation of energy conservation potential - Summary of domestic and overseas resources to be used for JICA energy conservation promotion project
Satoshi Oinuma	Finance/ Renewable energies	- Research / Analysis on structure of finance in ESCO scheme - Research / Analysis on financial institutions - Research / Analysis on energy conservation and renewable energy tie-up program

1.3.3 Domestic research

Insufficient areas of information were confirmed after summarizing specific models of ESCO type energy conservation promotion in each country with each team member. 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.

1.3.4 On-site research

On-site research was conducted in five countries; China, India and Malaysia that are specified by JICA, Thailand and Philippines where ESCO promotion was realized by different ESCO promoters and circumstances from those in the former three countries. 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. Organizations that cooperated to on-site research are shown in Table 1.3.2.

Table 1.3.2 List of local organizations visited (1/2)

Country visited	Organization	Name of organization visited
China	ESCO	Beijing Shenwu Thermal Energy Technology Co., Ltd.
		Liaoning Nengfa Weiye Group-China
		Shanghai Deyue Technology Energy Conservation Develop Co., Ltd.
		Mitsubishi Corporation
	ESCO Association	Committee of China Energy Conservation Association
	Public organization	Project Management Office of NDRC/World Bank/GEF China Energy Conservation Project
		Energy Efficiency Center, Energy Research Institute, National Development and Reform Commission
		Shanghai Energy Conservation Service Center
		Shanghai Municipal Construction Engineering Safety Quality Supervisory Center
	Japanese organization	Japan-China Economic Association
		JBIC Beijing Office of Resident Representative
		NEDO Beijing Office
		JETRO Shanghai Center
	Domestic financial institution	China National Investment & Guaranty Co., Ltd.
India	ESCO	DSCL Energy Services
		Mitsubishi Corporation
	ESCO Association	The Indian Council for Promotion of Energy Efficiency Business
	Industry association	Federation of Indian Chambers and Industry
	Public organization	Ministry of Power
		Bureau of Energy Efficiency
		Indian Renewable Energy Development Agency Limited
		Petroleum Conservation Research Association
	Private research institute	The Energy and Resources Institute
	CDM accreditation organization	CDM Authority, Ministry of Environment and Forest
	CDM consultant	MGM International
	International financial institution	The World Bank Office-New Delhi
Malaysia	ESCO	Zet Corporation
		VY COGENERATION
	ESCO Association	The Malaysian Association ESCOs
	Public organization	Pusat Tenega Malaysia
	Domestic financial institution	Malaysian Industrial Development Finance Bhd
	Japanese organization	JBIC Kuala Lumpur Office of Resident Representative

Table 1.3.2 List of local organizations visited (2/2)

Country visited	Organization	Name of organization visited
Thailand	ESCO	Excellent Energy International Company Limited
		Sumitomo Corporation
	Public organization	Department of Alternative Energy Development and Efficiency (DEDE), Ministry of Energy
	Power company	Energy Efficiency and Energy Service Business Promotion Project, EGAT Public Company Limited
	Japanese organization	JETRO Bangkok Center
		NEDO Bangkok Office
	Domestic financial institution	Thai Military Bank (TMB)
	Others	Mitsubishi Corporation
Philippines	ESCO	Geosphere Technologis
		CIP Energy
		Cepalco Energy Service & Trading Corporation
		Meralco Energy INC.
	ESCO Association	ESCO Philippines
	Public organization	Energy Utilization Management Bureau, Department of Energy (DOE)

Chapter 2

Results of Research

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.

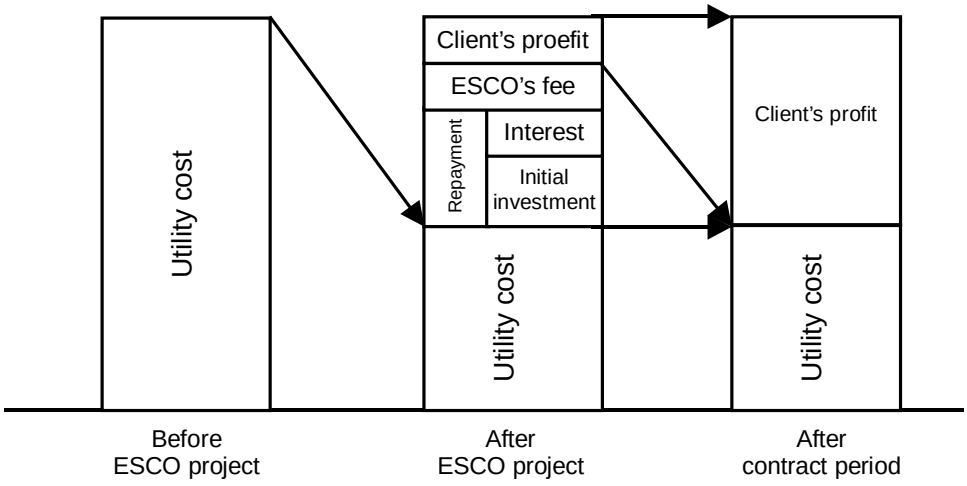


Figure 2.1.1 Reduction of utility cost and allocation of profit

(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". Through the guarantee of an energy saving effect, ESCO providers provide several services as shown below to their clients.

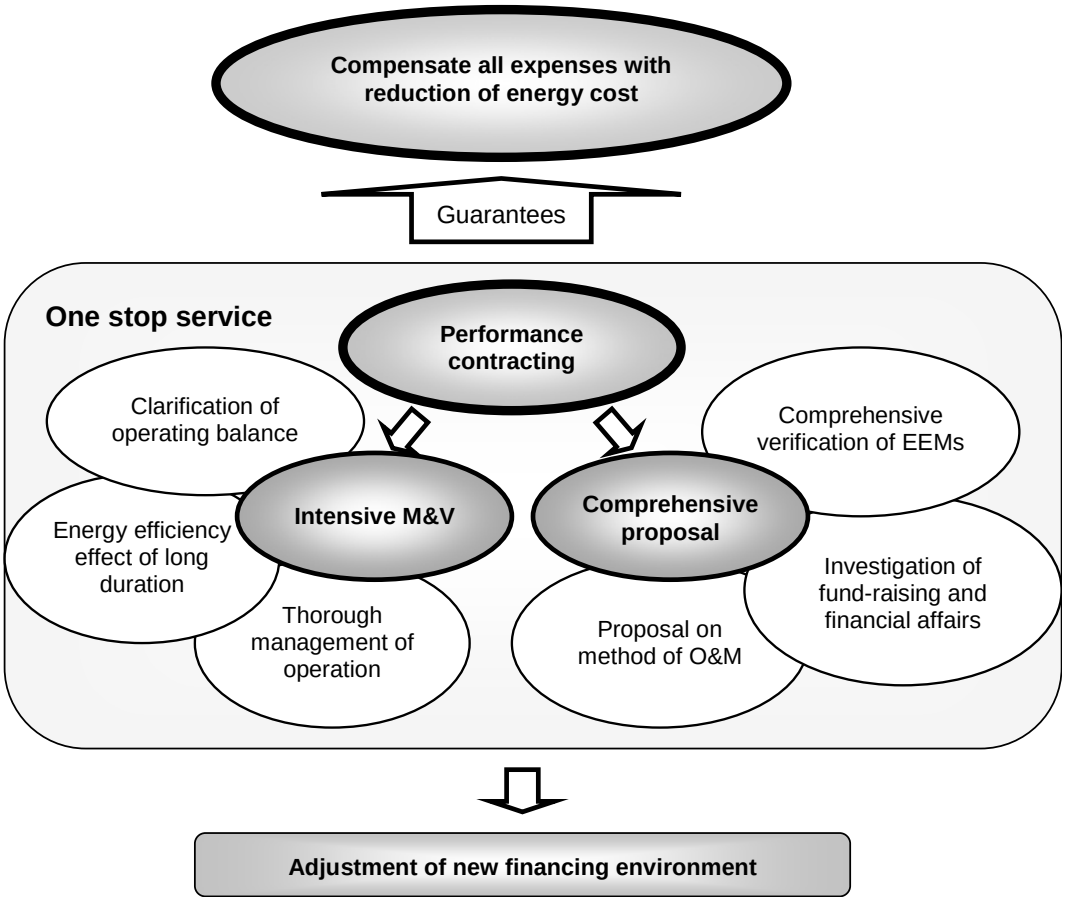


Figure 2.1.2 Concept of ESCO business and performance contract

(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. In ordinary energy efficiency renovations, the initial energy saving effect does not necessarily continue for a long time because of reasons such as; no responsibility is assumed for operation and management, performance evaluation entails costs, and pressure to reduce maintenance costs emerges. However, provision of measurement and verification makes it possible for ESCO business to maintain their energy saving guarantee for a long term.

(5) Financing environment not based on assets
The reason that energy efficiency investments are yet to be popularized is that, because most loans are based on assets, company executives tend to concentrate investment decisions on core businesses like production facilities, and hence energy efficiency investments that contribute to an increase in profits is given a low priority. 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. A matured ESCO market will be materialized only after this concept is shared by the financial institutions and the demand/supply side of the service. Provision of incentives, such as favorable treatments in tax, subsidies, and low-interest loans, will also contribute to the expansion of the market. On the other hand, underdevelopment of the financial environment becomes a major constraint to the growth of the market.

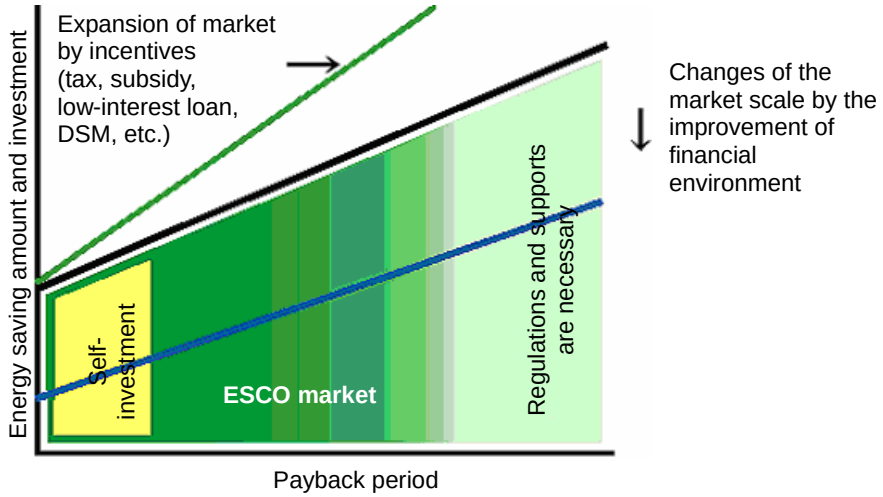


Figure 2.1.3 Investment payback period and scale of ESCO market

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.

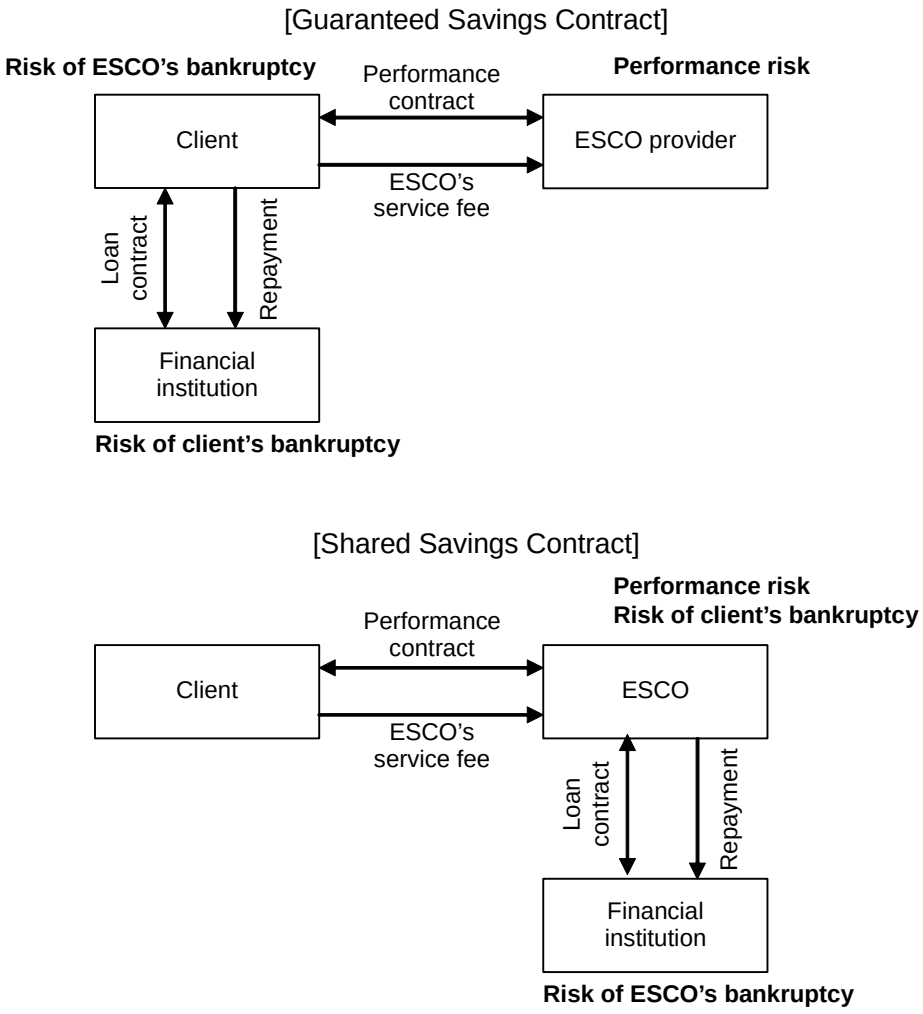


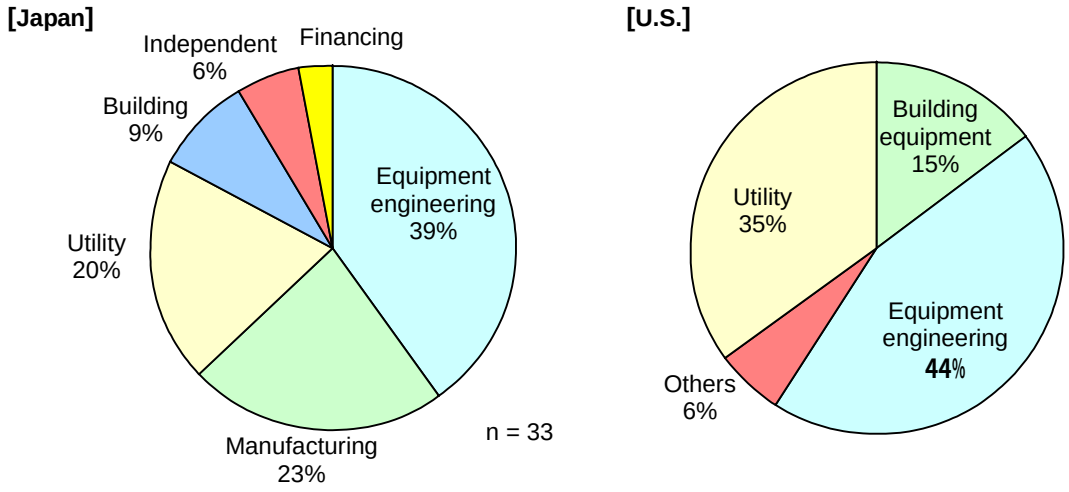
Figure 2.1.4 Typical contract types of ESCO

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 tying 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 seen in the figure below.



(Source) Japan: Japan Association of Energy Service Companies (JAESCO) (2004).
U.S.: Charles Goldman, Overview of U.S. ESCO Industry: Recent Trends and Historic Performance, Sep. 2003.

Figure 2.1.5 Ownership of ESCO providers in Japan and U.S.

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) Energy Conservation Law

In 1980, the State Council formulated a national energy conservation plan in its 6th five-year plan (1981-1985), and the energy efficiency center began to be set up throughout the country from 1982. The Provisional Decree on Energy Conservation Management promulgated in 1986 developed into the Energy Conservation Law which was established in November 1997 (effectuated in 1998). The outline of the Energy Conservation Law is described below.

- Setting of energy consumption standards for energy-consuming equipment; the labeling system as a legal obligation
- Suspension of industrial processes not meeting the energy consumption standards
- Phase-out of excessively energy-consuming equipment
  - Preparation of a list of excessively energy-consuming equipment to be phased out
- Designation of key energy-consuming entities for conservation management
  - Class I energy-consuming entities

    Entities with a total annual energy consumption exceeding 10,000 tons of coal equivalent (exceeding 7,000*kl* of oil equivalent) are designated as the Class I key energy-consuming entities for conservation management.
  - Class II energy-consuming entities

    Entities with a total annual energy consumption of 5,000-10,000 tons of coal equivalent (3,500-7,000*kl* of oil equivalent) are designated as the Class II key energy-consuming entities for conservation management by the departments/agencies of the Central Government or by local governments, if necessary.
  - Necessary activities
    - Establishment of energy management divisions and appointment of energy conservation managers
    - Regular submission of reports on the status of energy consumption
    - Introduction of energy management methodologies
    - Implementation of energy saving measures
    - Supervision and implementation of on-the-spot entry and inspection
- Promotion of introducing energy saving measures
  - Target technologies
    - Co-generation, district cooling and heating, etc.
    - Efficient operation of electrical motors, fans, and pumping equipment
    - Developing and popularizing clean coal technologies and other general energy efficient technologies
- Energy conservation budget of the State Council, its ministries, and local governments
  - Legally obligating the allocation of a certain amount of budget for energy conservation.

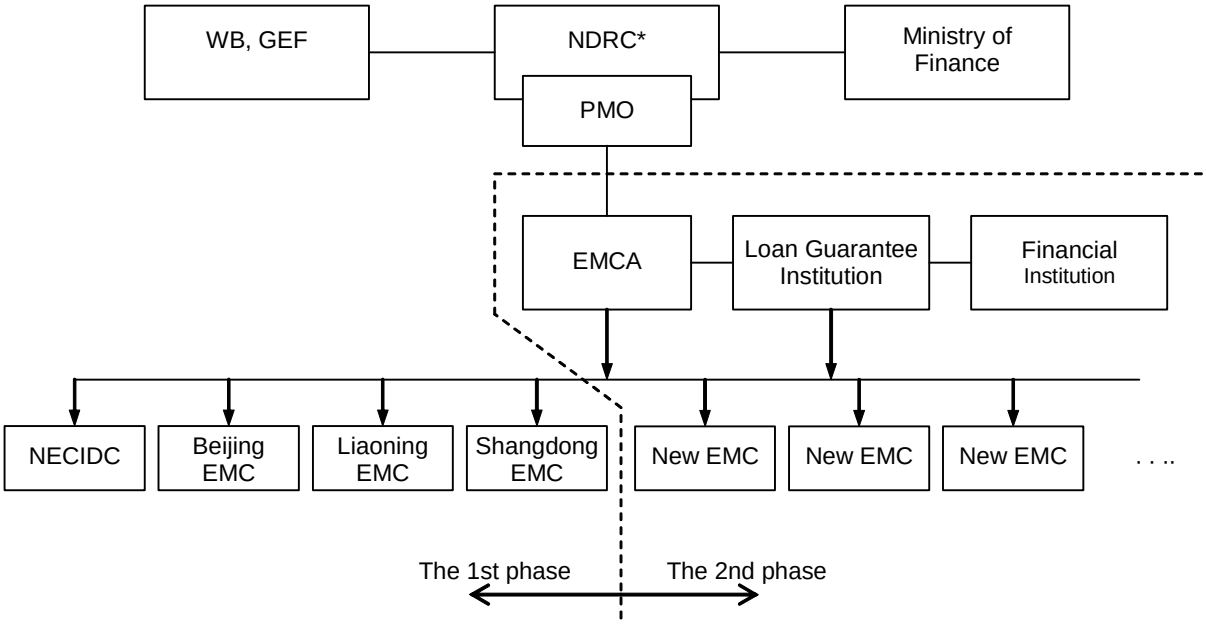
The target growth rate of GDP was set at 7% in the 10th five-year plan (FY2001-2005) and 8% in the 11th five-year plan (FY2006-2010). Focus of energy-related policies is placed on [1] stable supply of energy, [2] refinement of energy demand/supply balance, [3] promotion of energy

conservation, [4] acceleration of energy development in the Western District, and [5] environmental conservation measures.

2) 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 (5.5% out of about 11%); 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.

3) 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. For example, the Shanghai Energy Efficiency Center was established in 2003 with the support from the World Bank (WB). These centers are undertaking various activities, such as raising awareness for energy conservation and popularizing energy efficient technologies.

4) Start of ESCO business
The introduction of ESCO business in China started with the research "China Issues and Options in GHG Emissions Control" which was conducted in 1992-1994 with the support of the Global Environment Facility (GEF). After that, China's Energy Conservation Project Management Office (PMO) was established under the then State Economic and Trade Commission (SETC) (changed to the National Development and Reform Commission (NDRC) in 2003 with the reorganization of the People's Committee). With the cooperation of PMO and WB/GEF, China's Energy Conservation Project commenced in 1998 (Figure 2.2.1). During its 1st phase (1998-2003), three pilot ESCOs (Beijing EMC, Liaoning EMC, and Shangdong EMC) were set up with the funds from GEF, WB, European Union (EU), and the United Kingdom (UK). WB undertook financing and GEF and the remaining two provided funds for establishment. 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.



*: 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

5) 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.

This project will alleviate the barriers of the investment environment such as the establishment of the guarantee fund, which leads financial institutions to promote energy conservation investments and further the growth of ESCO industry in those countries. The members participating in this project from China are EMCA and financial institutions (Table 2.2.1).

Table 2.2.1 Members of the 3-Country Energy Efficiency Project

Brazil	Instituto Nacional de Eficiencia Energetica (INEE) Winrock International Centrais Eletricas Brasileiras (Eletrobras) Associacao Brasileira das Empresas de Serviços de Conservacao de Energia (ABESCO) Federacao Brasileira dos Bancos (FEBRABAN) Ministerio de Minas e Energia (MME) USAID Brazil
China	Energy Management Companies' Association (EMCA) State Development Bank Construction Bank of China Shanghai Bank Huaxia Bank
India	Indian Renewable Energy Development Agency (IREDA) State Bank of India Punjab National Bank Syndicate Bank Credit Guarantee Trust Fund for Small Industries DSCL Energy Services Saket Projects Ltd. Federation of Indian Chambers of Commerce and Industry Technology Bureau for Small Enterprises

Activities of this project are shown below.

- Capacity building of financial institutions
  - Provision and dissemination of information: to enhance the recognition of ESCO business through the provision of information on the evaluation method of energy efficiency performance, case studies, the results of activities, etc., to the financial institutions in each country.
  - Evaluation method: formulation of an evaluation method of energy efficiency performance and preparation of technical guidelines
  - Development of financial products: bundling of small-scale projects, escrow account, lease, purchase system, etc.
- Support to the development of ESCO business
  - Nurturing of ESCO providers: provision of information, trainings, etc.
  - Support to the establishment of ESCO associations and improvement of its functions: accreditation program, information exchange, etc.
  - Promotion of ESCO projects: support to the conclusion of contracts between ESCO providers and clients; this kind of support is particularly important when the clients are governmental buildings, because their procurement guidelines are specific and complicated.
- Study for the formulation of a loan guarantee program
  - Study for the formulation a partial loan guarantee program to overcome low recognition of ESCO business by financial institutions and the credit problems of ESCO providers.
- Support to stock investments
  - Solving problems associated with stock investments in energy saving-related companies.
- Information exchange between the three countries
  - Holding of symposiums and workshops regularly.

(2) Present status of the ESCO industry

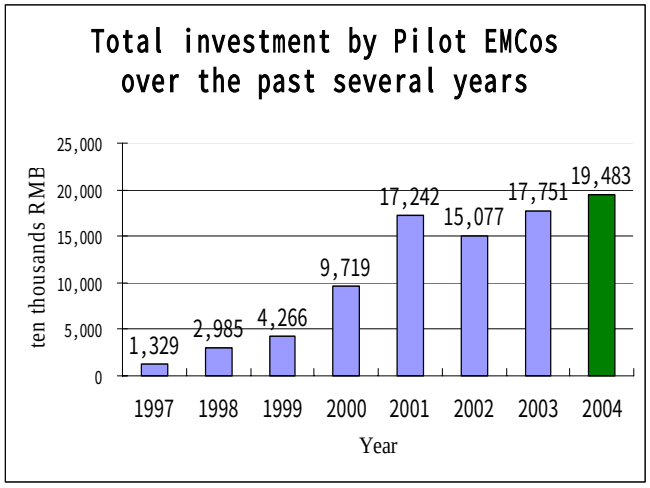
1) Scale of the ESCO industry

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 types of ESCO providers are classified into [1] General (U.S.) type, [2] Equipment manufacturing/engineering company type, [3] Local energy efficiency center type, and [4] Mixed type.

The three pilot ESCO providers which were established during the 1st phase of China's Energy Efficiency Project have undertaken a total of 423 ESCO businesses at 348 enterprises since 1997. The investment scale in FY2005 was RMB270 million (3.9 billion yen) (Figure 2.2.2). The cumulative investment to date is about RMB1.2 billion (17.5 billion yen). The average investment per project is RMB2.6 million (38 million yen), producing a reduction effect of 76.5t-C. The average payback year is 1.3 years and the projects whose investment payback is less than two years account for 90% of all projects. Two types of contract are available: a shared savings contract and a guaranteed savings contract. The internal rate of return (IRR) of the projects is 41.6% on average, which is higher than that of other industries, showing the development potential of the ESCO industry in the future.

The number of ESCO providers is increasing year after year and some say that about 300 such companies exist throughout China today. Actually, however, many of them are sales companies who are selling energy efficient equipment they themselves have manufactured.



Source : Xu Fei, "The status of China's Energy Conservation Service Company (EMCo)" in proceedings of 1st Asia ESCO Conference, Bangkok, October 2005.

(Note) : 1RMB (1yuan) = 14.6 yen (April, 2006)

Figure 2.2.2 Total investments by three pilot ESCO providers in China

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

The activities of EMCA include: [1] Works consigned by GEF/WB (estimation of CO_2 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.

4) Energy saving potential

As shown in Table 2.2.2, energy efficiency in China is lower than that of international standards, leaving a potential of high-improvement. According to the mid-and long-term energy conservation plan of China, the energy saving potential is said to be 300 million t-ce (about 15% of the total energy consumption), which includes 50 million t-ce from commercial buildings and 70 million t-ce from the renovation of industrial boilers (Table 2.2.3).

Table 2.2.2 Comparison of China's energy efficiency with the international level

Index	Comparison with the advanced international level
Energy source unit (Unit production cost)	2.4 times the world average
Energy source unit (Unit production amount)	40% higher than the advanced international level in 8 major industrial sectors
Equipment efficiency	Coal boiler is 15-20% lower than the advanced international level. Electric motor is 5% lower than the advanced international level.
Energy consumption per unit area of commercial buildings	2-3 times that of the advanced country level
Energy efficiency	10% lower than the advanced international level.

Source: Wu Jie, "Target Market Analysis of China EMCo", The 1st Asia ESCO Conference, 2005.

Table 2.2.3 Energy saving potential in China

Sector		Energy saving potential
Commercial		50 million t-ce
Industrial	Renovation of boiler	70 million t-ce
	Cogeneration, district cooling/heating	35 million t-ce
Lighting		30 billion kWh

Source: Wu Jie, "Target Market Analysis of China EMCo", The 1st Asia ESCO Conference, 2005.

(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.

Owning to the support from WB/GEF since 1998, more than 50 ESCO providers are said to be working in China today, in addition to three pilot ESCO providers which were established in the earliest days. 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.
In the meantime, it is known that a variety of problems impeding the development of the ESCO industry exist in technological and financial aspects, and those barriers must be removed. The barriers to the development of the ESCO industry and necessary countermeasures are shown below.

<Barriers to the development of the ESCO industry>

- Banks' recognition of ESCO is low. Formulation of finance is difficult.
- Examination of a security mechanism is very rigorous and therefore the selected projects are few.
- Knowledge of an audit technology and M&V (measurement and verification) is insufficient.
- Small and medium-sized ESCOs have only a single technology. Therefore, they are unable to perform a comprehensive energy efficiency audit or to formulate a project.
- Government's policy to support ESCO is insufficient.

<Necessary measures>

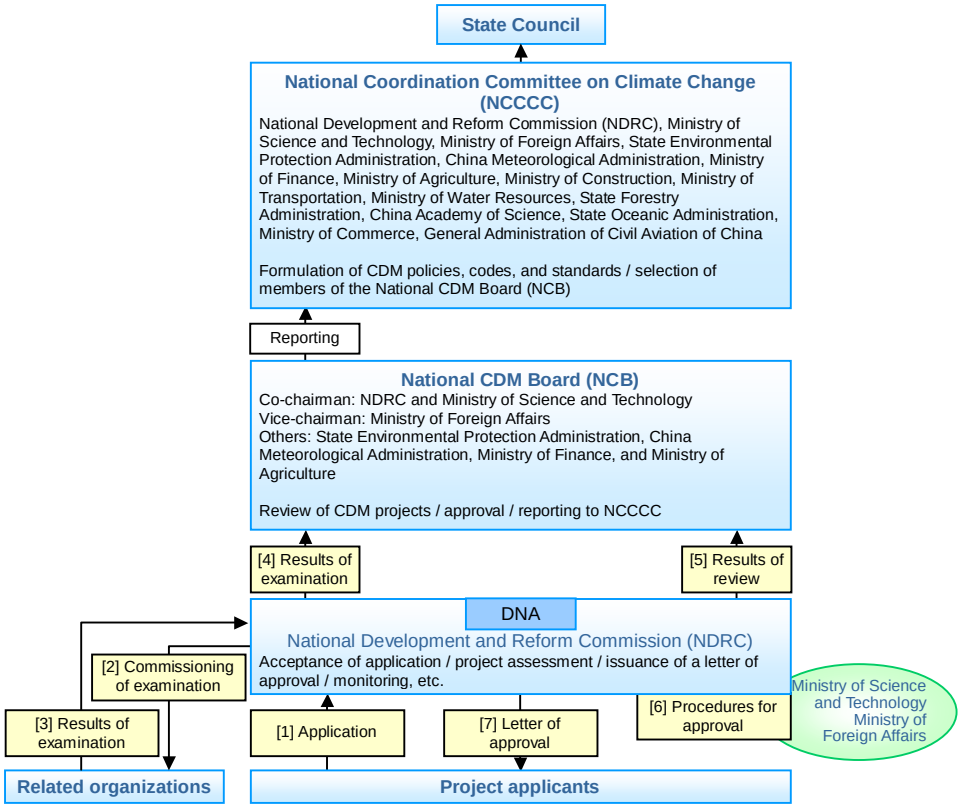
- Training and technical support on energy efficiency
- Expansion of a credit guarantee mechanism
- Support to loans (low-interest loans)
- Support for gaining credibility from clients
- Cooperation for information provision (new technologies, training, market, M&V)
  - In China, the energy efficiency audit technology for commercial facilities (hospitals, hotels, governmental facilities, and schools) is weak in particular.
  - Items related to heat supply conduits (boilers, pumps, valves, meters), which is a promising field
  - Biomass
- Formulation of model projects
- Support to the formulation of a credit guarantee mechanism and a financing mechanism for small and medium-sized EMCs
- Japan-China exchange
  - Technological aspect: In particular, boilers, air conditioners, lighting, heat supply
  - Human aspect: Human resources development, establishment of the place for China-Japan business cooperation
- Formulation of an information network with new EMCs in local areas
- The key to ESCO promotion is to increase its recognition by banks
- Development of a scheme for shouldering a bankruptcy risk (security)
- Exchange of technological information
- Support to the expansion of projects to local governments

Specific proposals to these measures which are included in the JICA program (JICA: Japan International Cooperation Agency) are described in Chapter 3.

(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 in China, the following three priority areas are specified in Article 4 of the "Measures for Operation and Management of CDM Projects".

- Energy efficiency improvement
- Development and utilization of new and renewable energies
- Recovery and utilization of methane gas and coal seam gas



Source: Kyoto Mechanisms Information Platform

Figure 2.2.3 Organizational framework of CDM projects in China

The profits from the transfer of the certified emission reduction (CER) are shared between the Chinese Government and the owners of the project at specific proportions shown in Article 24 of the Measures for Operation and Management of CDM Projects. The sharing ratios specified by the Chinese Government are shown below. It is seen that formulation of CDM projects is given a favorable treatment even within the energy efficiency improvement activities (Article 24 of the Measures for Operation and Management of CDM Projects).

- In the case of hydrofluorocarbon (HFC) and perfluorocarbon (PFC) projects, the Chinese Government receives 65% of the profit from the transfer of CER.
- In the case of dinitrogen monoxide (N_2O) projects, the Chinese Government receives 30% of the profit from the transfer of CER.
- In the case of CDM projects defined in Article 4, such as projects in priority areas and forestation projects, the Chinese Government receives 2% of the profit from the transfer of CER.

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 Sates 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 (See Item 2.2.1 (1) 5)). 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 in 2005 with cooperation between the industry and the government, and also set up the first ESCO association in India.

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.

The details of the development of the ESCO industry in India are described below.

1) Energy conservation by energy source

Pushed by the oil crisis in 1970s, the Petroleum Conservation Research Center (PCRA) was established under the Ministry of Petroleum and Natural Gas in 1976, and it promoted energy efficiency in oil as well as energy efficient technologies of petroleum products, which is the beginning of energy conservation efforts in India. The PCRA is now undertaking energy conservation activities not only in oil but also in other types of energies. It is also expanding ESCO-related activities, such as ESCO projects, energy efficiency auditing, and ESCO seminars.

In the meantime, the Department of Power, Ministry of Energy set up the Energy Management Center (EMC) in 1989 and has planned and implemented power-related energy efficiency programs.

From late 1980s to mid-1990s, in an effort to cover both oil and power disregard of energy source difference, energy conservation services were advanced by the industrial associations like the Confederation of Indian Industry (CII) and the National Productivity Council (NPC), in cooperation with research organizations like the Energy and Resources Institute (TERI).

2) Start of financing to energy efficiency projects by financial institutions

The Indian Renewable Energy Development Agency Ltd. (IREDA) was established in 1987 as the governmental financial institution aimed at promoting dissemination of and financing to the technologies and projects associated with new energy and energy efficiency. IREDA has since provided financing to the introduction of new energies, implementation of energy efficiency measures, and formulation of ESCO finance, with the financial assistance from foreign

governments (Dutch Government: 18 million guilders; Asian Development Bank (ADB): USD100 million: World Bank (WB) (the 1st time): USD145 million; Denmark: USD15 million; Germany: 6,135 euros; World Bank (WB) (the 2nd time): USD135 million). In the early days after its establishment, focus was placed on new energy-related projects, but energy efficiency projects (including ESCO projects) began to be implemented around six years ago. The total number of such projects reached 17 and its total loan amounted to 1.71 billion rupees (Rs) (4.4 billion yen). Also, with the financial assistance from the Global Environment Facilities-Technical Assistance Program (GEF-TAP) (subsidy: USD5 million), it also promoted activities such as: establishment of IREDA's institutional systems, provision of technical assistance, energy conservation marketing, improvement of DSM investments, and encouragement of entry of the private sector into the energy efficiency projects. As part of these efforts, other activities were also taken which include: creation and expansion of the ESCO market; capacity building of ESCO-related enterprisers; implementation of energy efficiency projects in such industries as steel, pulp & paper, textile, and hotel; and preparation of energy conservation investment manuals for energy-intensive companies and small and medium-sized companies.

In addition, other development-related financial institutions, such as the Industrial Development Bank of India (IDBI) and the Industrial Credit and Investment Corporation of India (ICICI) began to lend a loan to energy efficiency projects from around mid-1990s, with their own funds or with financial assistance from international organizations.

3) Start of ESCO projects

India's first ESCO-related program was the feasibility study (FS) of an ESCO project which was undertaken in 1992-1993 with financial assistance from the United States Agency for International Development (USAID). Then, in 1994-1995, an ESCO business promotion program was implemented with the help from the Energy Management Consultation and Training (EMCAT) Program of the USAID, using a subsidy provided from the U.S. agency to the Industrial Development Bank of India (IDBI). In 1995-1996, the USAID organized two ESCO inspection/observation visits, an Indian group to the U.S. and a U.S. group to India. Through these supports by the USAID, several ESCO providers came into existence in India.

In 1999, a four-year Energy Conservation and Commercialization (ECO) project of the USAID started. The primary purpose of the ECO project is to promote creation of the market for energy efficient technologies and energy conservation services in India. It is a project to provide technical assistance and training to the Government for the formulation of highly market-oriented policies, and to help capacity building of utility companies and private companies for the introduction of energy efficient technologies and implementation of DSM, while removing institutional and technical barriers to the dissemination of energy conservation, so that highly market-oriented energy efficiency business emerges in India eventually. In the 1st phase (ECO-I: 1999-2000), several energy efficiency projects, ESCO projects, and DSM projects were implemented. In the 2nd phase, in addition to these projects, activities such as the following are being implemented: support to the Bureau of Energy Efficiency (BEE); DSM projects at utility companies; and preparation of energy conservation building codes (the entire nation is divided into six zones). The organizations associated with the ECO project are consulting firms, ICICI, and the Ministry of Power.

4) Government actions to ESCO projects

The activities mentioned above are all voluntary activities with no administrative authorities. To further strengthen energy conservation, the Energy Conservation Act was enacted in October 2001 (effectuated on March 1, 2002). As the oversight agency, the Bureau of Energy Efficiency (BEE) was established under the Ministry of Power (MOP). Broadly speaking, the Energy Conservation Act contains two types of articles: one for compulsory measures and the other for voluntary measures. The compulsory measures include: establishment of energy consumption standards for equipment, implementation of a labeling program, designation of energy management entities and designation of energy managers/auditors (the 1st state test for the qualification of energy

manager/auditor was taken place in 2004; 800 persons passed the test in 2004, and 1,000 persons in 2005), and establishment of energy consumption standards for buildings. The voluntary measures include: enlightenment for and information provision of energy conservation, formulation of an energy education curriculum, and promotion of financing for energy efficiency projects.

At the International Conference on Energy Conservation Strategies for the Next Century held in August 2002, the honorable Prime Minister of India presented a specific objective that "30% energy saving shall be achieved at all governmental buildings within the next five-year period with the utilization of ESCO projects". Responding to his statement, BEE carried out an energy efficiency audit at nine governmental buildings with the support of GTZ of Germany. For this audit work, a consortium consisting of energy audit consultants, ESCOs, etc. was set up to make judgments on the investment suitability and to establish a baseline. Through these measures, the energy saving potential of those buildings was estimated to be 25-46%. Then, creation of a performance contract suitable for the legal system in India, establishment of a collateral system and a tender evaluation method, and preparation of a proposal request form followed. With all these preparations in place, invitation for tendering began in 2004. During this process, ESCO seminars were held and trainings provided for building owners.

5) Actions of the industrial sector to ESCO business

The Resource Conservation & Management Group which was set up under the Federation of Indian Chamber of Commerce (FICCI) for promoting efficiency improvement of industrial processes, effective utilization of resources, waste management, etc., has consolidated energy conservation activities voluntarily, impelled by the enactment of the Energy Conservation Act in 2001. Specific activities implemented include energy audits; holding of energy conservation seminars, workshops, and meetings; and energy conservation trainings. In 2005, it held the 1st International ESCO conference and a workshop on measurement & verification (M&V) in New Delhi in cooperation with PCRA. It also implemented several ESCO pilot projects.

6) Multilateral cooperation

The 3-Country Energy Efficiency (3-CEE) Project which was created with the support from the WB, UNEP, etc, is under way (See Item 2.2.1 (1) 5)). ESCO business in India has been advanced by a variety of organizations such as: governmental organizations like BEE, PCRA, etc.; banks like IREDA and the State Bank of India (SBI); ESCO providers; and FICCI. It presents one characteristic of India's ESCO business, namely, they are not evolving around some specific governmental line.

7) The 1st International ESCO Conference

The 1st International ESCO conference was held in New Delhi in June 2005, under the joint sponsorship of PCRA and FICCI (with the support from the Ministry of Petroleum and Natural Gas). Active discussions took place on such topics as successful ESCO business practices in foreign countries, barriers to ESCO business in India, and measures for the promotion of the ESCO industry in the future.

8) Establishment of ICPEEB

Soon after the 1st International ESCO Conference, major ESCO providers in India assembled and agreed on the establishment of an ESCO industry association to vitalize the ESCO industry. Deliberations continued, and in January 2006, the Indian Council for Promotion of Energy Efficiency Business (ICPEEB) was established which is comprised of various entities related to ESCO industry, ranging from ESCO providers, BEE-certified energy auditors and energy managers, manufacturers and dealers of energy efficient equipment, to financial institutions. The founding members are 16 ESCO companies. Major activities include: information exchange among ESCO-related providers, seminars, awareness-raising activities, promotion of application of the International Performance Measurement and Verification Protocol (IPMVP), and technical

assistance to relevant governmental organizations.

Table 2.2.4 History of energy conservation and ESCO-related activities in India

Year	Energy conservation and ESCO-related actions	Support and implementation entities	Remarks
1976	Establishment of PCRA	Ministry of Petroleum and Natural Gas	Development of energy efficient technologies for petroleum-related products; Promotion of energy conservation programs
1987	Establishment of IREDA	Ministry of Non-conventional Energy Sources International organizations, such as WB	Financing for new energy projects and energy conservation projects
1989	EMC	Department of Power of the Ministry of Energy	Planning and implementation of energy conservation program in power
1989 -	Promotion of energy conservation by the industry sector on its own	CII, NPC, FICCI	
1992	ESCO's FS project	USAID	
1995	Observation tour to ESCOs in the U.S.	USAID	
1995	Birth of ESCO providers in India		
1995 -	IREDA started a loan for energy conservation projects A similar loan started by IDBI A similar loan started by ICICI	WB ADB, USAID USAID, WB, JBIC	
1999	ECO-I Project	USAID	ESCO/DSM pilot projects
2001	Enactment of the Energy Conservation Act		
2001	Establishment of BEE		
2001	ECO-II Project	USAID	
2002	Enforcement of the Energy Conservation Act		
2002	BEE undertook an energy audit of governmental buildings.	GTZ	Start of ESCO project at governmental buildings
2002	Establishment of the 3 Country-EE (3-CEE) Project	WB, UNEP, UNF, ESMAP	Capacity building of financial institutions
2003	ECO-III Project	USAID	
2004	Start of the EM*/EA* qualification test (1st test)	BEE	800 persons received those qualifications
2005	The 2nd EM/EA qualification test	BEE	1,000 persons received those qualifications
2005	The 1st International ESCO Conference	PCRA, FICCI	Sponsored by MOPNG and MOP
2006	Establishment of ICPEEB	ESCO providers, PCRA	Cooperation from IREDA, etc.

*) EM: Energy Manager, EA: Energy Auditor.

(2) Present status of the ESCO industry

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.

- ESCO providers

  The number of ESCO providers in India was 4-8 in 2003, but the number is said to have increased to 15 or more (ICPEEB members) these days. However, many of them are manufacturers of energy efficient equipment who are utilizing an ESCO scheme as a tool to sell their own products, or the companies who implement energy efficiency audit but do not undertake ESCO business. In addition, ESCO providers are often small in scale with a weak financial base and a low credibility, because of which formulation of ESCO projects is not gong smoothly.

- Clients

  - Government

    BEE is currently planning an ESCO business project at nine governmental facilities (office buildings, hospitals, airport buildings, etc.)

  - Local governments

    ESCO business by state governments are in progress with the support from USAID and WB, which includes street lighting in Bangalore, and lighting at the waterworks bureaus in Karnataka, Tamil Nadu, and Delhi.

  - Industrial sector

    ESCO business has been applied to industries such as paper production, food, steel, ceramics, etc. Large-scale factories do not need ESCO because their own energy auditor can perform an energy audit. Therefore, most of ESCO projects are implemented at small and medium-sized industries. However, if the project scale is small, it is difficult to produce an attractive profit because a transaction cost accounts for a large ratio of the business cost. Because of this, bundling of a similar kind of projects is attempted to make use of replicability of ESCO business.

  - Civil use sector

    Although ESCO business has been implemented for a hotel in Hyderabad and the building of Indira Gandhi International Airport, ESCO activities in the civil use sector are still uncultivated.

- Market scale

  The energy saving potential in India by sector is shown in Table 2.2.5. It is estimated that the potential investment scale is Rs121 billion (310 billion yen) in the industrial sector, Rs5.7 billion (14.8 billion yen) in the commercial sector, and Rs13 billion (34 billion yen) in the local governments, totaling to Rs140 billion (360 billion yen). The potential energy savings is 54.40 million MWh, accounting for 10% of the total power output in India. Also, the potential reduction of energy demand is 9,240MW.

  According to the estimation in the 10th plan drawn up by the Planning Commission of the Indian Government, the energy saving potential including household and commercial facility areas is 95 million MWh. The energy saving potential of street lamps managed by local governments is estimated to be 15 million MWh. For reference, the electricity consumption of lighting and the energy saving potential by sector are shown in Tables 2.2.6 and 2.2.7, respectively.

Table 2.2.5 Energy saving potential in India (Investments, energy savings)

			Energy saving potential			
			Investment (Rs 1 billion)	Energy saving (MWh)	Energy saving (MW)	Unit investment (Rs 10 million/MW)
Industrial sector	General energy saving		42.0	2,370	3,400	1.23
	Process energy saving		79.0	2,530	3,600	2.05
	Total		121.0	4,900	7,000	
Commercial sector	Hotels		1.44	18	53	
	Government	Offices	3.40	76	360	
		Hospitals	0.85	87	140	
	Total		5.69	171	553	1.03
Local governments			13.0	370	1,688	0.77
Total			140	5,440	9,240	1.52

Source: "Market Assessment Energy Efficiency Investment", Consultative Workshop, Financial Products to Promote Energy Efficiency, The Energy Efficiency Enhancement Project, ADB TA No.3885-IND, 2003.

Note: Rs 1 (1 Rupee) = 2.6 yen (April, 2006)

Table 2.2.6 Electricity consumption by lighting (TWh/year)

	Incandescent lamps	Fluorescent lamps	Mercury lamps	Sodium lamps
Household use	7.4	0.3	0	0
Business use	1.2	6.2	0.1	0.1
Industrial use	0.3	6.5	1.2	0.8
Public sector	0.2	0.9	0.2	0.3
Total	9.1	13.9	1.5	1.2

Source: "Demand-side Management from a Sustainable Development Perspective", Quebec Energy Efficiency Board.

Table 2.2.7 Energy saving potential in India by sector

Sector	Type/division	Reference A		Reference B		
		Energy saving potential (MW)	Energy saving potential (%)	Energy saving potential (%)	Energy consumption (100 mil. cal)	Ratio of energy cost to production cost (%)
Industrial	Distilleries	2,900	-	-	-	-
	Fertilizer	850 - 1,000	15	10	112	60
	Paper, Pulp	850	25	20	26	25
	Man-made fiber	523	-	-	-	-
	Cotton textiles	506	25	20 - 25	52.5	13
	Petrochemicals	250 - 500	15	15	5.8	7
	Breweries	250 - 400	-	-	-	-
	Caustic soda	394	-	-	-	-
	Chloric alkali	-	-	15	20.0	30 - 35
	Steel	362	10	-	-	-
	Solvent extraction	220 - 350	-	-	-	-
	Refineries	232	10	-	-	-
	Sponge iron	225	-	-	-	-
	Cokes	200	-	-	-	-
	Tire plants	160 - 200	-	-	-	-
	Sulfric acid plants	74 - 125	-	-	-	-
	Cement	78 - 100	-	10	67	40
	Dairies	70	-	-	-	-
	Aluminum	59	10	15 - 20	30.1	40
	Plywood	50	-	-	-	-
	Sugar	-	20	20	100	12
	Glass, Ceramics	-	20	-	-	-
	Cement	-	15	-	-	-
	Agriculture	-	30	-	-	-
Civil use	Total of business use	175 - 350	-	-	-	-
	Lighting	-	-	20 - 50	-	-
	Cooling	-	-	> 15	-	-
	Air conditioning	-	-	50	-	-
	Heating	-	-	15 - 40	-	-
	Freezing/refrigerating	-	-	15 - 40	-	-
	Hot water supply	-	-	40 - 60	-	-
	Others	-	-	10 - 30	-	-
	Lighting*	-	76	-	-	-

Reference A: S. Padmanaban, “Triggering Markets for Energy Efficiency in India”, International ESCO Conference.
Reference B: “Demand-side Management from a Sustainable Development Perspective”, Quebec Energy Efficiency Board.
*: including lighting for household use.

Figure 2.2.4 shows the relationship of organizations related to energy conservation and ESCOs.

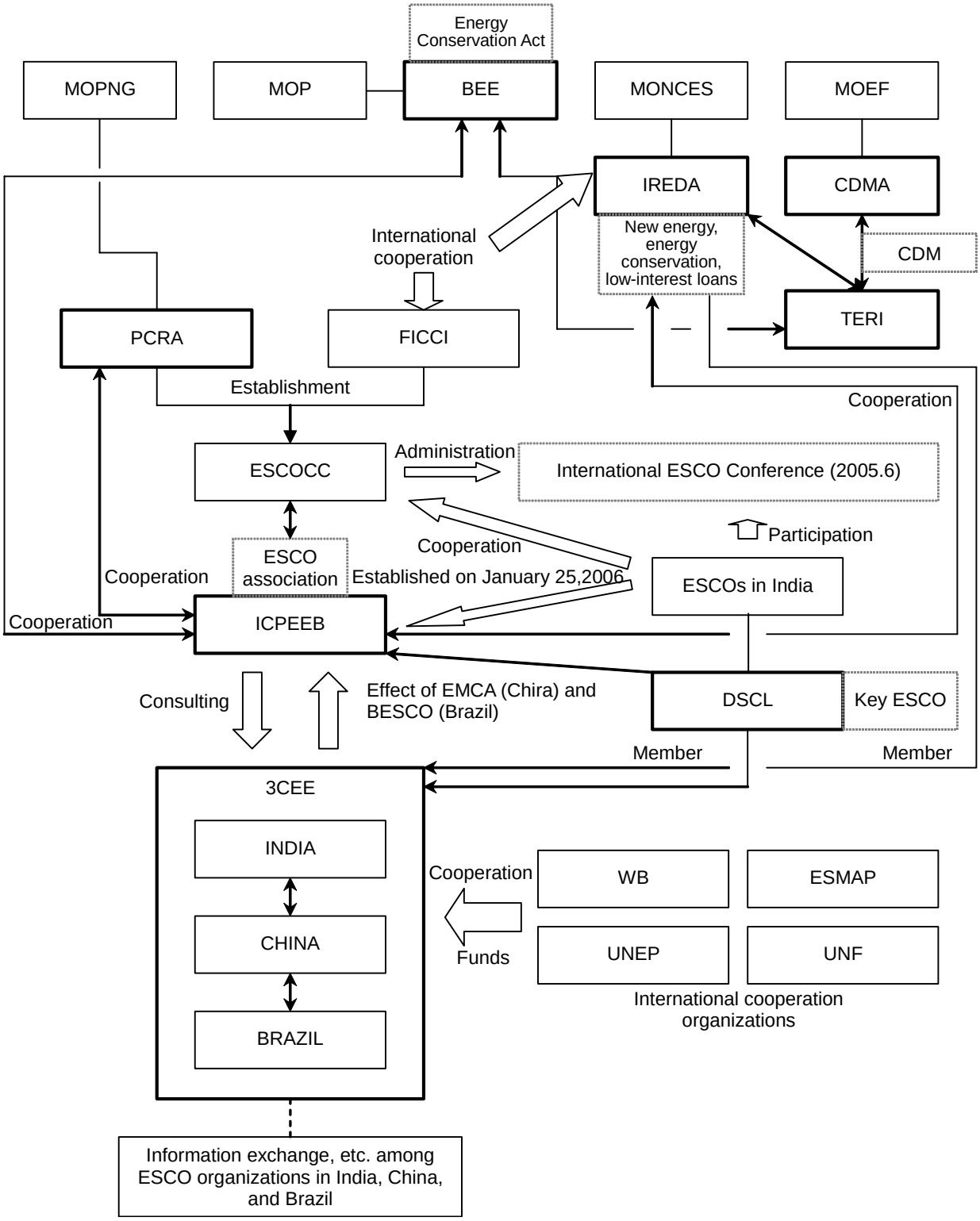


Figure 2.2.4 Relationship of ESCO-related organizations in India

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

The ESCO industry in India has been developed with the supports from international organizations in each key development stages, including: financial assistance to IREDA (India's governmental

financial institution) from WB, ADB, etc.; support from USAID in the form of an ESCO business/industry nurturing program; and creation of a multilateral program with the financial support from WB and the United Nations Foundation (UNF). First, during the creation and nurturing stage of the ESCO industry in early- to mid-1990s, ESCO providers came into existence with the technical assistance from USAID. In those days, ESCO providers were unable to procure funds by themselves. Therefore, from mid-1990s till today, IREDA has been providing low-interest loans to ESCO projects with the financial aid from WB and ADB. Early in 2000, a multilateral project (3-CEE Project) was established with the support from WB and UNF. It is working for capacity building of domestic financial institutions and for increasing their recognition of ESCO projects in order to create an environment to attract their energy conservation investments. Other actions around this time also gave an impetus to the development of ESCO in India, which includes active promotion of ESCO business by the Government (BEE) timed with the enactment of the Energy Conservation Act in 2001, and independent promotion of ESCO business by an industry group (FICCI). These actions were also promoted with the financial and technical assistance from international cooperation organizations. These development processes culminated in the holding of the ESCO international conference and the establishment of the ESCO association (ICPEEB) in 2005-2006.

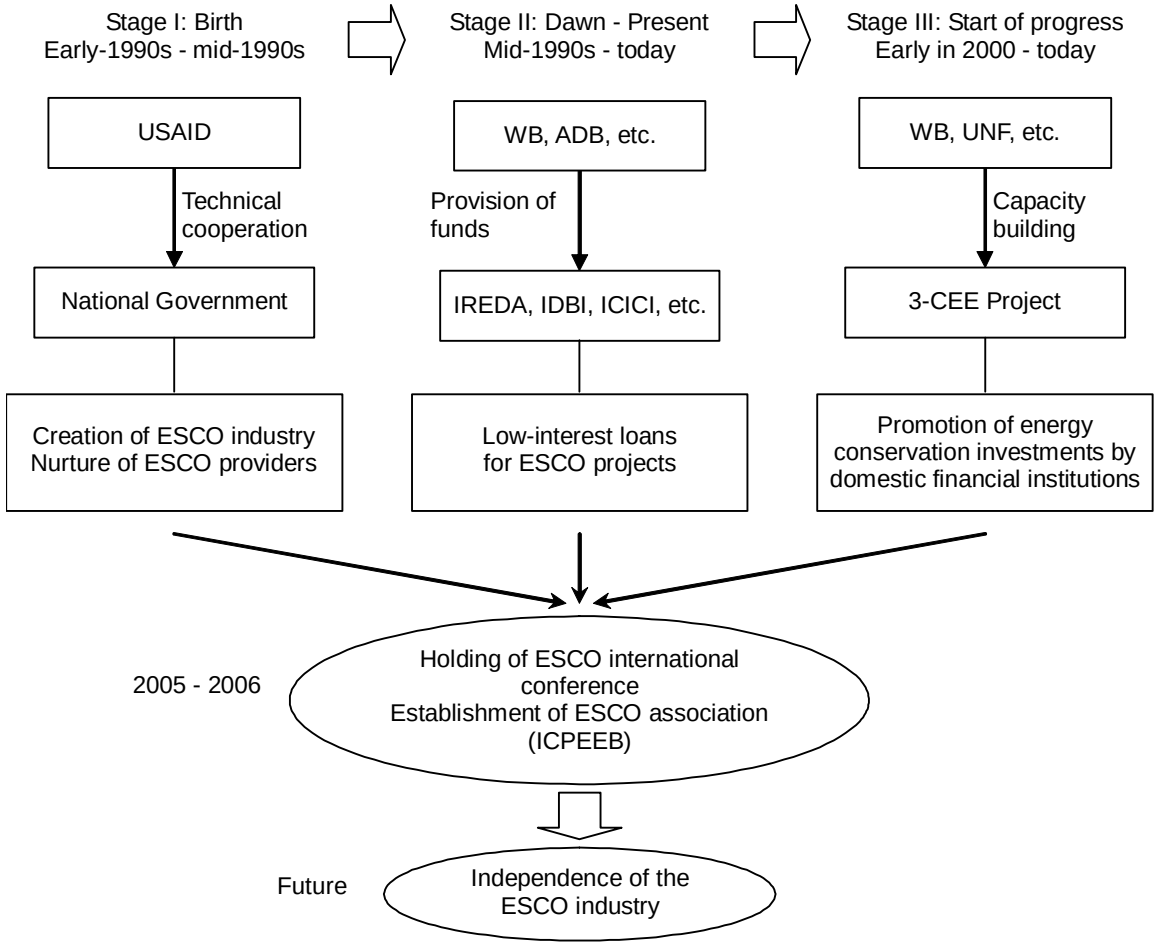


Figure 2.2.5 Support from international organizations for the development of India's ESCO industry

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. Ways to incorporate them into the JICA program are described in Chapter 3.

- Establishment of ESCO working team
  It is necessary to establish an ESCO working team comprised of energy conservation consultants, ESCO providers, and financial institutions in India, and to perform grasping of the present status of financing activities and analysis of excellent financing cases in order to further promote financing to energy conservation projects. The Indian Council for Promotion of Energy Efficiency Business (ICPEEB) is appropriate for undertaking the establishment and administration of such working team.
- Role of the top management of financial institutions
  To promote ESCO projects, a special financing team dedicated to energy conservation projects should be set up within the financial institutions, with the leadership of their top management.
- Development of IPMVP and IEEFP of Indian specification
  For the development of the ESCO industry in India, M&V and the financing system must be standardized by reflecting India's indigenous situations. Tools of the Indian specification should be developed by reference to International Performance Measurement and Verification Protocol (IPMVP) and International Energy Efficiency Financing Protocol (IEEFP).
- Comprehensive approach: utilization of incentives based on market principles and formulation of institutional linkage
  At present, various factors of ESCO business is being implemented individually and dispersedly, which is for example seen in the following: Financing programs for energy conservation projects are not linked with energy conservation enlightenment programs for clients and/or with energy auditors training programs; and, Energy efficiency audit programs are being implemented without development of usable financing programs. Because of these situations, comprehensive institutional support for dissemination and improvement of services is not yet available. Energy conservation programs for dissemination/enlightenment, training, financing, etc., must be the comprehensive programs which are prepared under the strategic planning of the central government. They must also be linked up with the ESCO business in the private sector.
- Continuity of pilot projects
  Although pilot projects and demonstration projects were implemented with international cooperation, they tended to be terminated as just a one-time event. It is necessary to communalize and inherit the technologies and financing knowledge which are obtained though those projects.
- Provision of information
  To provide information on energy conservation projects and to promote dissemination of energy conservation, establishment of energy conservation centers at local and state government levels is necessary.
- Financing and credit guarantee
  Financial institutions in India have surplus funds and they do not need much financial assistance from international cooperation organizations. What is needed is to raise awareness of financial institutions so that they are encouraged to invest their abundant funds in energy conservation

projects. One big obstacle at present is that the financing procedure is very time-consuming. Improvement of the recognition of ESCO business and preparation of guidelines for ESCO financing are necessary.

Many of ESCO providers in India are small and medium-sized companies. Therefore, the biggest task is to establish a scheme that enables a smooth formulation of finance using the credit of those ESCO providers and the credibility of energy efficient technologies as the collateral.

- International cooperation with higher-level organizations

  International cooperation programs in the past tended to be collaboration with the agencies that directly undertook energy conservation projects (implementation agencies). However, because comprehensive and policy-level cooperation will become increasingly important hereafter, it is necessary to seek collaboration with BEE and MOPNG, which are higher-level organizations of the Indian Government, as sell as with other international cooperation organizations.

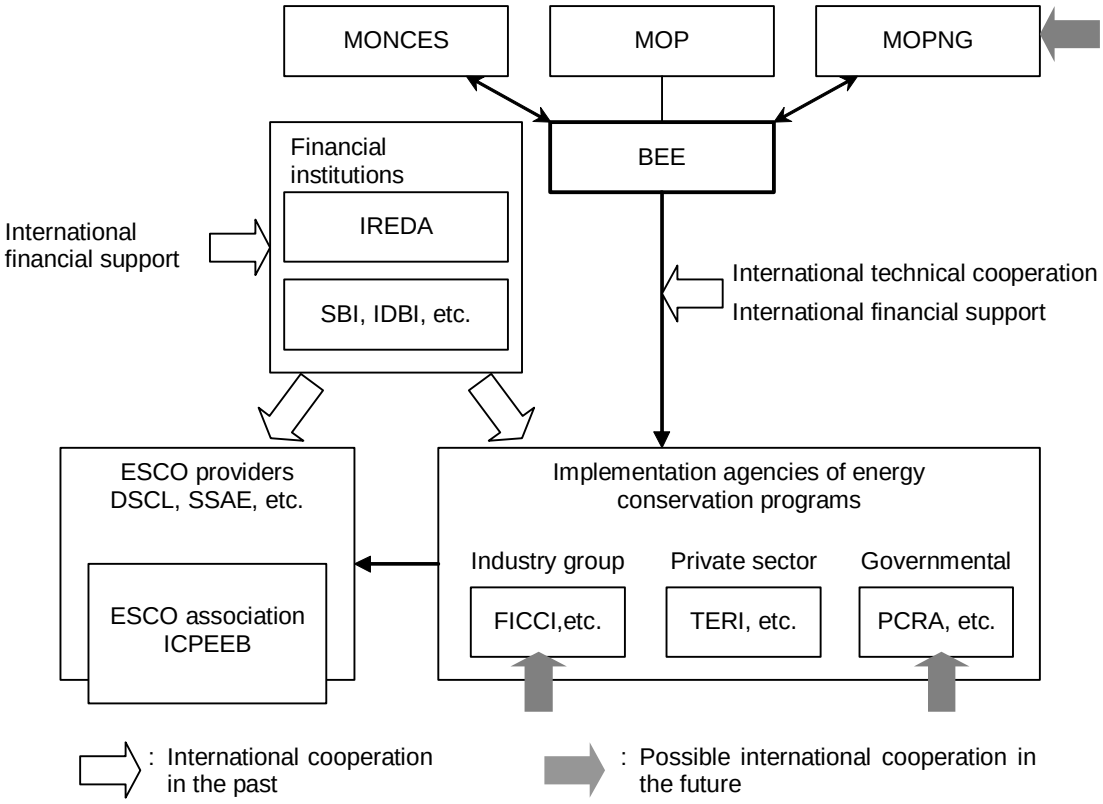


Figure 2.2.6 Organizations for international cooperation in India

- International cooperation at the state government level

  What is mentioned above is the support extended to the central government, but dissemination and direct support to state governments are also necessary. It is because, if energy conservation programs are strongly promoted at the state government level, it will surely enhance the effectiveness of the Energy Conservation Act. Also, if ESCO projects are implemented at the buildings of the state governments, it will lead to the improvement of financial conditions of those governments. In the State of Maharashtra, the subsidy extended by the state government for the elimination of power transmission/distribution loss in FY2002 was Rs28.6 billion, which accounted for as much as 60% of all the subsidies in this state.

- International exchange of energy efficient technologies

  The Green Business Center (GBC) in Hyderabad, the State of Andhra Pradesh, was established in 2004 with the cooperation of the state government, Confederation of Indian Industry (CII), and USAID for promoting the “green” business of the private sector. It is implementing

activities such as: awareness-raising for the environment and energy conservation, exhibition of energy efficient technologies and products, training courses on green business, establishment of a green certification system, exchange meetings and promotion of US-India joint ventures. Establishing a forum for such technical and information exchange is one of the roles international cooperation organizations can undertake.

(4) Demand-side Management (DSM) program by electric companies

At several state electric companies in India, introduction of high-efficiency lighting equipment for households, compact fluorescent lights (CFLs), high efficiency pumps for agriculture, etc., has been attempted, with the support from international organizations. Examples of them are shown below.

1) Maharashtra State Board of Electricity (MSEB)

Capacitors were leased to the users in areas where power stealing and breakdown of transformers were frequent. The lease charges were collected together with the electric charges. As a result, the breakdown rate of transformers reduced and the quality of power service increased.

2) Delhi Vidyut Borad (DVB)

The same program as above was implemented.

3) Ahmedabad Electric Co. (AECo)

Ahmedabad Electric Co. is a private electric company in the State of Gujarat. It implemented a DSM pilot project in 1996-1997 and a full-scale DSM project in 1998-1999, with the help of the EMCAT DSM Program of USAID. The characteristic of these DSM projects was the utilization of ESCOs.

- Management of reactive power

  Capacitors were leased to the clients in the industrial and commercial sectors having a low power factor. ESCO (of the manufacturing origin) did the installation of capacitors and their maintenance. After a lease period of 3-5 years, the capacitors were transferred to the possession of the clients. The electric company collected the lease charges together with the electric charges on behalf of ESCO. However, this project did not end in a great success. It is probably because the electric company imposed a severe penalty on ESCO which failed to fulfill the required performance.
- Lamps

  ESCO leased and sold high efficiency lighting equipment to households. ESCO did the installation of the equipment and users could use the equipment for six months. The lease charges were collected together with the electric charges. 200 households participated in this project. However, this project did not continue because the procured high efficiency equipment was low quality and users showed little interest.
- High-rise apartment buildings

  Introduction of high efficiency equipment to high-rise apartment buildings was attempted. Energy audit was performed at 75 buildings, but only ten of them actually adopted the equipment. It was because ESCOs showed little interest in this project for reasons that each building needed individual arrangements and the market was small. Another cause of failure was that the electric company was unable to provide a long-term loan.

4) Nodia Power

This is a project to replace conventional agricultural pumps with high efficiency pumps. The replacement fee is shared between the users and an electric company by fifty-fifty. The cost per pump is Rs80,000 with a cost payback of 4-5 years. It can achieve 55% energy saving. 50 pumps have been replaced to date and 35 pumps will be replaced in 2004-2005.

5) Power distribution company (DISCOM) in Karnataka

In 2004, the Bangalore Electricity Supply Company (BESCOM), a power distribution company in

Karnataka, planned a DSM program for CFLs, high efficiency irrigation pumps, and solar power water heaters. This program was formulated with the help of the International Institute for Energy Conservation (IIEC) and the support from USAID. BESCOM started to invite tenders for the procurement of CFLs.

Users are required to buy CFLs at the market using a coupon provided by BESCOM. The fee must be paid back when the electric charges are collected.

Users can have two benefits: one is a reduced price of CFLs owning to the bulk procurement by the electric company, the other is a low burden on the side of users because they can pay back from the saving of electric charges. About 1.7 million households are targeted in the program.

(5) Clean Development Mechanism (CDM)

The designated national authority (DNA) on CDM implementation in India is the National Clean Development Mechanism Authority of the Ministry of Environment and Forests. 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 the 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. Thus, human resources of India in this field are one of the richest in the world. India is one of the most promising countries in the world as a CDM host country, including the potential for CDM projects. Therefore, if cooperation is made with Indian companies, promising CDM projects including the projects for energy conservation may be found. A feasibility study (FS) was already conducted for cement factories, steel mills, and fuel conversion projects by the New Energy and Industrial Technology Development Organization (NEDO) of Japan[1)]. CDM projects for these industries combined with ESCO projects for public facilities are probably the key projects to be pursued for the time being.

2.2.3 Malaysia

(1) Present status of the ESCO market

1) ESCO providers

As of 2005, 72 ESCO providers exist in Malaysia.

2) ESCO projects

Presently, there is only one ESCO project implemented in Malaysia, which was implemented at the lumber mill of the Heavea Board Sdn, Bhd. It was a project implemented within the framework of the Malaysian Industrial Energy Efficiency Improvement Project (MIEEIP) which was initiated by the Malaysian Government. Therefore, the number of ESCO projects implemented to date on the commercial base is none. This information was obtained from the hearing of the Pusat Tebaga Malaysia (PTM) (Malaysia Energy Center) and other entities. Besides this, providers not belonging to the ESCO association have implemented a few number of small-scale ESCO business.

(2) ESCO industry promotion measures

As the ESCO industry promotion measures, the MIEEP targeting the industrial sector is available. In contrast, the ESCO industry promotion measure targeting the civil sector is none. At present, the energy consumption in the industrial sector is as much as 40% of the total consumption in this country, but the energy consumption in the civil sector is less than one third that of the industrial sector. Therefore, the Malaysian Government has given a priority to the energy conservation in the industrial sector.

1) Survey Report on Kyoto Mechanism-related Technology Dissemination Projects in FY2004 (Capacity building projects in CDM/JI host countries), March 2005, NEDO.

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

As mentioned above, the ESCO implementation in Malaysia is currently only one which was adopted as a model project, and the ESCO market has not been formed at all. However, thanks to the MIEEIP implemented by the Malaysian Government in 2000-2004, the ESCO concept and its benefits are gradually infiltrating into the related players. Therefore, it can be said that MIEEIP played an important role towards the formulation of the ESCO market in this country. The outline of MIEEIP and the results of ESCO promotion by this project are described below.

1) Outline of MIEEIP

a) Purpose

The MIEEIP project was carried out for a five-year period from 2000 to 2004, with the objectives of removing barriers to the energy conservation promotion, planning of a sustainable institutional system, and establishment of a research framework in the industrial sector of Malaysia.

b) Key industrial divisions

At the start of the project in 2000, eight key industrial divisions were selected, which include wood, food, glass, cement, rubber, pulp & paper, iron & steel, and ceramic. In 2003, plastic, chemical, and textile were added to the list.

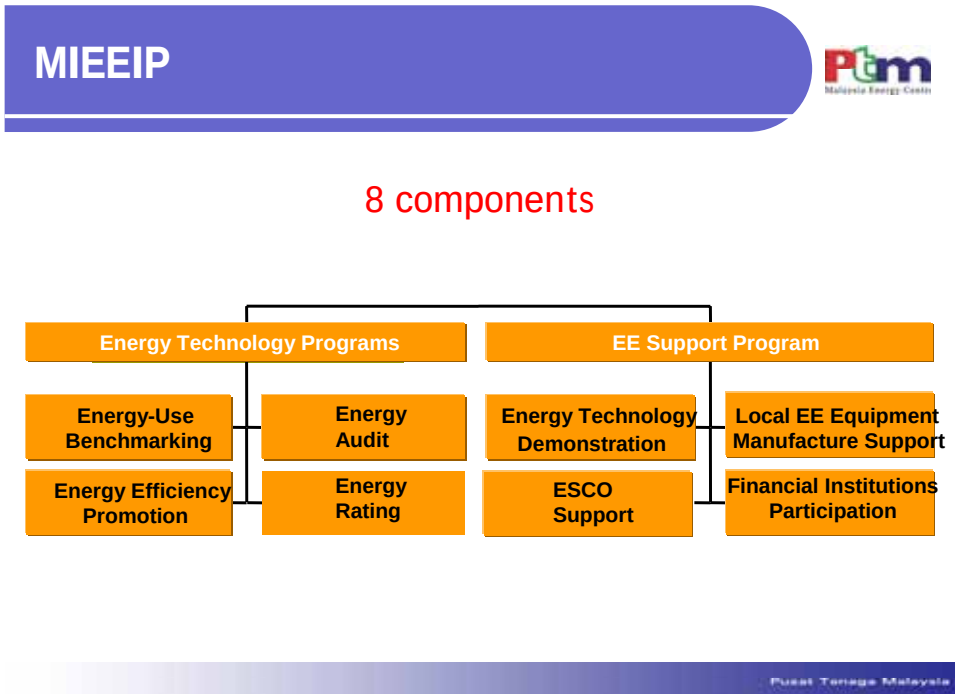
c) Composition of funds

The total budget of this project was US$20,790,200 which was comprised of the following.

- Government: US$ 7.927 Million (in kind)
- GEF: US$ 7.3 Million (cash)
- Private: US$ 5.26 Million (cash)
- UNDP: US$ 0.3 Million (cash)

d) Outline of each program

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



Source: "Energy Management Programs in Malaysia", Pusat Tenaga Malaysia, Aug. 2004

Figure 2.2.7 Components of the MIEEIP program

- Program 1: Energy-use Benchmarking Program
  An energy efficiency benchmark was prepared for each of the eight key industrial divisions mentioned above, and the obtained results were offered for general use. Through this process, the environment that allows evaluation and judgment of energy efficiency of industrial facilities was established.
- Program 2: Energy Audit Program
  Through the energy audit performed mainly at 48 factories of the eight key industrial divisions mentioned above, standardization of energy audit procedures, measurements, and evaluations was attempted.
- Program 3: Energy Rating Program
  Provision of information on the performance, technical specification, and economical efficiency of energy efficient equipment, as well as establishment of performance evaluation/testing organization for industrial machinery such as boilers and high efficiency motors was attempted.
- Program 4: Energy Efficiency Promotion Program
  Information on energy efficiency cases and energy efficient technologies was provided. To be specific, the following were made: publication of a PR booklet "Energy Smart" and a newsletter "MIEEIP News", start of a website, and preparation of reports on excellent ESCOs and the energy professionals' accreditation system.
- Program 5: Energy Services Company Support Program
  As the measures to promote energy conservation without impeding the growth of the industrial sector, promotion and dissemination of the ESCO market were attempted. Activities undertaken include: research and evaluation of domestic ESCOs, provision of information on the overseas ESCO industry, holding of workshops (ESCO business development workshop, comprehensive development workshop on ESCO, ESCO technology workshop, etc.); and support to the establishment of the ESCO association.
  <ESCO Association>
  As the ESCO association in Malaysia, the Malaysian Association of ESCOs (MAESCO) was established in 2000. The number of ESCO companies registered at this association is

72. At present, no major-scale activities are available and hence many of ESCO providers are working as energy conservation consultants individually.

- Program 6: Energy Efficiency Technology Demonstration Program
  To validate applicability and business potential of demonstrated technologies, a total of 12 projects were implemented. Of these projects, four were implemented based on the concept of performance guarantee. However, the number of projects which succeeded in the conclusion of a performance contract was just one , which was the project carried out at the lumber mill mentioned earlier.
- Program 7: Local Energy Efficient Equipment Manufacturing Support Program
  To promote manufacturing and use of low-priced domestic energy efficient equipment instead of high-priced imported equipment, growth of domestic manufacturers was encouraged through the provision of financial and technical support. The specific measures implemented include: capacity evaluation of domestic energy efficient equipment manufacturers, evaluation of energy efficient equipment produced by domestic manufacturers, capacity building of domestic manufacturers, supply of funds to domestic manufacturers and verification of the effect of those funds.
- Program 8: Financial Institutions Participation Program
  Financial support was provided to the implementation of Programs 6 and 7. Establishment of a financing scheme for facilitating the sustainable development of energy conservation activities was also supported.

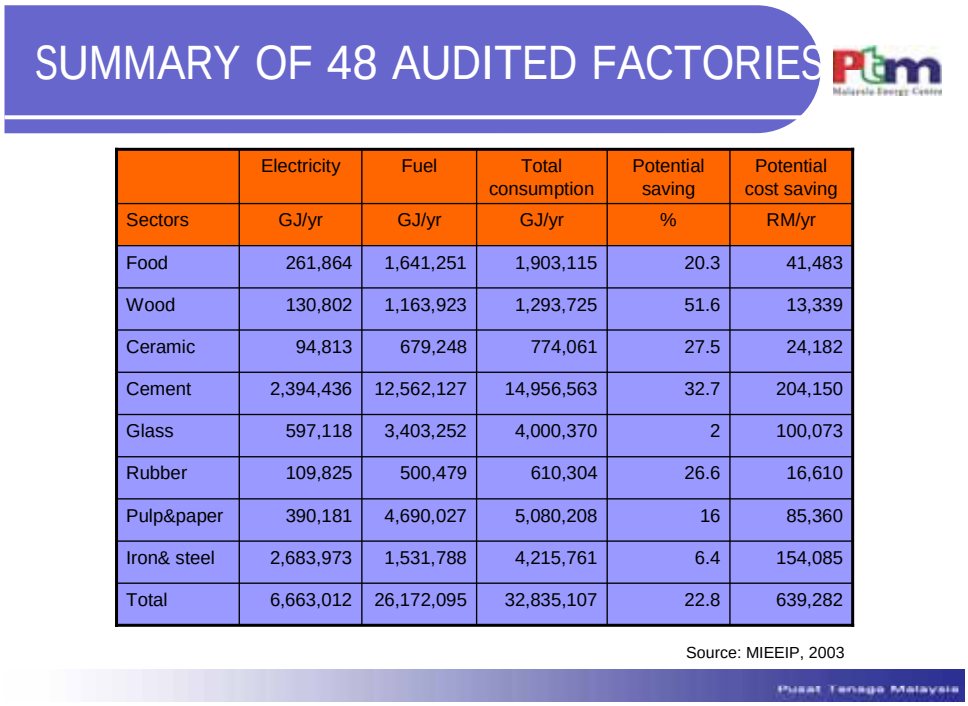
2) Accomplishments of MIEEIP

The MIEEIP project included the Energy Services Company Support Program whose main task was to provide information to improve the capacity of ESCO providers. However, because the ESCO market is not yet built up in Malaysia, what should be done first is probably to invoke the needs of ESCO projects.

In terms of these viewpoints, the measures which appeared the most effective for the creation of the ESCO market were: [1] Grasping of energy saving potential through energy audit and encouragement of energy conservation investments through information provision; and [2] Improvement of awareness and capacity of ESCO players through the implementation of model projects.

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

The results of energy audit conducted at 48 factories which were randomly selected from the 8 key industrial divisions - wood, food, glass, cement, rubber, pulp & paper, iron and steel, and ceramic - are shown in Figure 2.2.8. It was found that the total energy consumption at those factories accounted for 9.4% of the total energy consumption in Malaysia (as of 2001), and that 22.8% energy saving as well as investment payback within 1.9 years would be possible if energy conservation investments are made at those 48 factories.



	Electricity	Fuel	Total consumption	Potential saving	Potential cost saving
Sectors	GJ/yr	GJ/yr	GJ/yr	%	RM/yr
Food	261,864	1,641,251	1,903,115	20.3	41,483
Wood	130,802	1,163,923	1,293,725	51.6	13,339
Ceramic	94,813	679,248	774,061	27.5	24,182
Cement	2,394,436	12,562,127	14,956,563	32.7	204,150
Glass	597,118	3,403,252	4,000,370	2	100,073
Rubber	109,825	500,479	610,304	26.6	16,610
Pulp&paper	390,181	4,690,027	5,080,208	16	85,360
Iron& steel	2,683,973	1,531,788	4,215,761	6.4	154,085
Total	6,663,012	26,172,095	32,835,107	22.8	639,282

Source: "Energy Management Programs in Malaysia", Pusat Tenaga Malaysia, Aug. 2004

Figure 2.2.8 Results of energy audit conducted at 48 factories

This quantitative evaluation on the energy conservation investments made it clear that such investments in the industrial sector were feasible not only from the environmental standpoint but also from the economic standpoint. In that respect, this program 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

To validate the predicted energy saving potential obtained in the above energy audit, an energy efficiency investment model project was carried out at 12 factories which were selected from the 48 factories. Of the 12 model projects, four were conducted by the domestic ESCO providers based on the concept of performance guarantee (the remaining eight projects were implemented by the Pusat Tenaga Malaysia (PTM) (Malaysia Energy Center).

The following financing measures were prepared so that ESCO providers can implement those model projects smoothly.

- Loan limit: 90% of ESCO project cost or RM2 million, whichever the lower
- Interest: annual rate 4%
- Repayment period: 6 years at the maximum (including the period of grace which is 12 months at the maximum)

The source of funds was RM4 million from the Global Environment Facility (GEF) and RM4 million from the Malaysian Energy Supply Industry Account (MESITA). Management of the funds was left in the hands of the Malaysian Industrial Development Finance Bhd (MIDF), one of the domestic financial institutions, with a view to promoting the understanding of ESCO finance by domestic financial institutions.

(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. Although some domestic ESCO providers say they need low-interest loans, the underlying problem is that the interest rate of loans is higher than the achieved energy saving effect because of the low energy price. 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

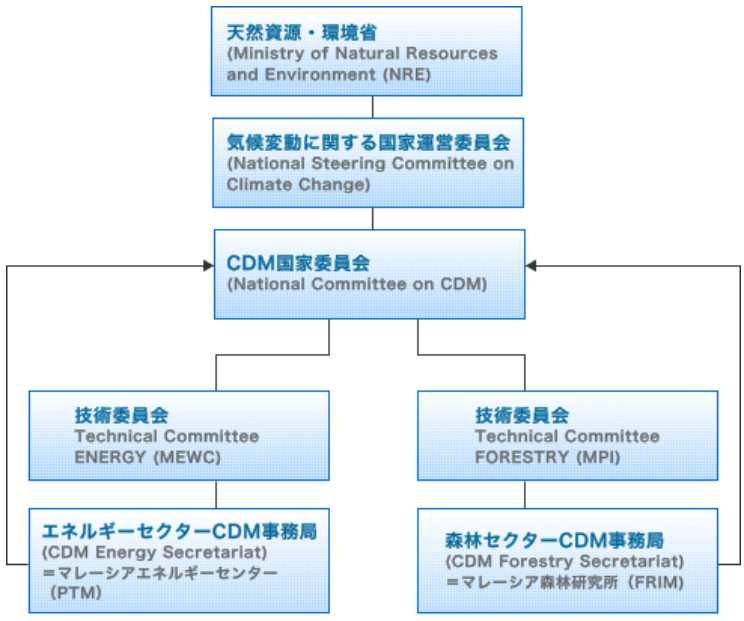
As mentioned earlier, of the four model projects implemented by ESCO providers, only one could succeed in the conclusion of a performance contract. As to the reason why the remaining three did not end in a contract conclusion, it is said that the clients were unable to wipe out a distrustful feeling 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 designated national authority (DNA) on Clean Development Mechanism (CDM) in Malaysia is the Conservation and Environmental Management Division of the Ministry of Natural Resources and Environment (NRE). The capacity building 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, as shown in Figure 2.2.9. Capacity building of officers at the PTM who check project idea note (PIN) is also sufficient.



Source: Kyoto Mechanisms Information Platform

Figure 2.2.9 Organizational framework for CDM projects in Malaysia

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. Also, NEDO of Japan and the Business Council for Sustainable

Development Malaysia (BCSDM) launched the "CDM Acceleration Programme" in 2005, with the support from both governments. The purposes of this programme are: [1] Capacity building of private companies for CDM formulation in Malaysia, and [2] Excavation of CDM projects appropriate for the participation of Japanese companies through [1]. This programme consists of five rounds – R1: meeting with Malaysia's governmental organizations; R2: meeting with Malaysia's industrial sector; R3: round-table talk with the industrial sector; R4: meeting in Japan with private companies; R5: meeting in Malaysia with private companies, and finally the wrap-up meeting (Sept. 2005-Mar. 2006)[2)].

2.2.4 Thailand

(1) Energy Conservation Promotion Act

In Thailand, to promote energy conservation and renewable energy as well as to develop laws and regulations related to their financing, the Energy Conservation Promotion Act (ENCON Act) was enforced in 1992.

Under the ENCON Act, the Department of Alternative Energy Development and Energy Efficiency (DEDE) of the Ministry of Energy oversees the implementation of the Compulsory Program for Designated Factories and Buildings.

At the factories and buildings designated by the ENCON Act (designated facilities), energy management (electricity consumption by lighting, energy consumption by air conditioning, and energy management of the building frame) is made compulsory. An energy audit is also compulsory at the designated facilities, and specific energy conservation objectives and a plan for achieving them must be established.

(2) Energy Conservation Promotion Fund

The financial measures which was established for energy conservation promotion under the 1992 ENCON Act is the Energy Conservation Promotion Fund (ENCON Fund). In the early days in 1992, the budget of the Fund was made up of 1.5 billion baht (THB) transferred from the Petroleum Fund and the tax revenue of THB0.07/liter (0.2 yen/liter) from the petroleum products sold in Thailand. In 2000, the budget from the Petroleum Fund exceeded THB3.0 billion (9.0 billion yen) for the first time and the total annual budget became about THB5.5-6.5 billion (16.5-19.5 billion yen). Recently, the tax rate on the petroleum products is THB0.04/liter (0.12 yen/liter).

The ENCON Fund consists of three programs: [1] Compulsory program, [2] Voluntary program and [3] Supplementary program. The compulsory program includes a subsidy provided to energy audits, introduction of high efficiency equipment, etc. (subsiding ratio: 30%). In addition, the revolving fund with a budget of THB2 billion (6 billion yen) was prepared, and a low-interest loan at a rate of 4% has been lent out to designated factories and buildings which met certain conditions.

Within the budget of the compulsory program, an allocation to designated factories and buildings is the largest. However, as long as the expenditure until 1999 is concerned, only THB385 million (1.15 billion yen) had been spent on those facilities compared with spending on governmental buildings which was THB1.74 billion (5.22 billion yen). Although the ENCON Fund is a strong fund with a budget of slightly less than THB30 billion over the five years, its operation has not been rated highly. It is said that despite of many energy audits the effect has not been duly resulted, and that the application procedures are complicated, indicating the need of operational improvements.

The planning of the ENCON Fund was originally prepared for the period up to 2004, and some said that the Fund entered into 2005 with some of its budget unexecuted. However, in 2006, a new development is unfolding such as resumption of low-interest loans. The outline of the low-interest loan is: [1] Term 1: 2003-2005, handling banks; 6, interest rate for ESCOs; 4%, and interest rate on the repayment from banks to DEDE; 0%. The period beginning in 2006 is the second term and its outline is: [2] Term 2: March 17, 2006- , budget; THB2 billion (6 billion yen), handling banks;

2) CDM Acceleration Programme with BCSDM, NEDO & BCSDM.

increased to 11, interest rate for ESCOs; 4% fixed (market interest rate; 7.5%), interest rate on the repayment from banks to DEDE; 0.5%, allowable loan per project; not more than THB50 million, and repayment period; 7 years at the maximum. About 20% of the fund has already been taken up and it is likely that all the budget of the revolving fund, which is THB2 billion, will be lent out until the end of FY2006.

Table 2.2.8 Budget of the ENCON Fund (2000-2004)

	Investment in 2000-2004 (THB 1 Million)	Ratio
Compulsory program	17,021 (51 billion yen)	58.5%
Governmental building	2,900	10.0%
Existing designated factories and buildings	13,524	46.5%
Factories and buildings under design or construction	145	0.5%
Awareness-raising campaign (DEDP)	453	1.6%
Voluntary program	6,422 (19.3 billion yen)	22.0%
Promotion/dissemination of Renewable energy	1,525	5.2%
Promotion/dissemination of renewable small-scale power sources	2,060	7.1%
Cooperation among industries	741	2.5%
R&D	1,068	3.7%
Existing undesignated factories and buildings	1,028	3.5%
Supplementary program	5,667 (17.0 billion yen)	19.5%
Capacity building	1,688	5.8%
Awareness-raising campaign (NEPO)	750	2.6%
Management and monitoring	3,229	11.1%
Total	29,110 (87.3 billion yen)	100%

Table 2.2.9 Conditions of the EE Revolving Fund

Loan period	7 years or less, simple payback period - 7 years or less
Loan channel	Industrial Finance Corporation of Thailand (now Thai Military Bank), Bank Thai, Bangkok Bank PCL., Sri Ayutthaya Bank, Thai Military Bank, Siam City Bank, etc.
Conditions of loanee	Factories and buildings designated by the 1992 ENCON Act
Limit of loan	THB 50 million per project (150 million yen)
Limit of interest rate	Not more than 4%/year
Project conditions	Energy conservation projects designated in Articles 7 and 17 of the ENCON Act

(3) Progress of ESCO business

It was in 1996 that ESCO business began to be implemented in Thailand. The total investment in that year was THB 29 million. However, ESCO business declined after that year. A full-scale restart of ESCO business was after March 1999 when an ESCO support project of WB and GEF was commenced, with DEDP (presently DEDE) as the receiving body. WB and GEF formulated this ESCO support project for the following reasons:

1) ESCOs can bundle up a number of small-scale energy efficiency components which clients are reluctant to or unable to undertake. Also, they can be implemented as a large-scale turnkey project.
2) ESCOs can acquire a loan for energy conservation projects easily, because they can bundle up small-scale investments, secure a cash flow for each project, and assume a performance risk.
3) ESCOs can utilize the latest energy conservation technologies and also facilitate their improvements.

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. The following four companies undertook an energy audit at those facilities.

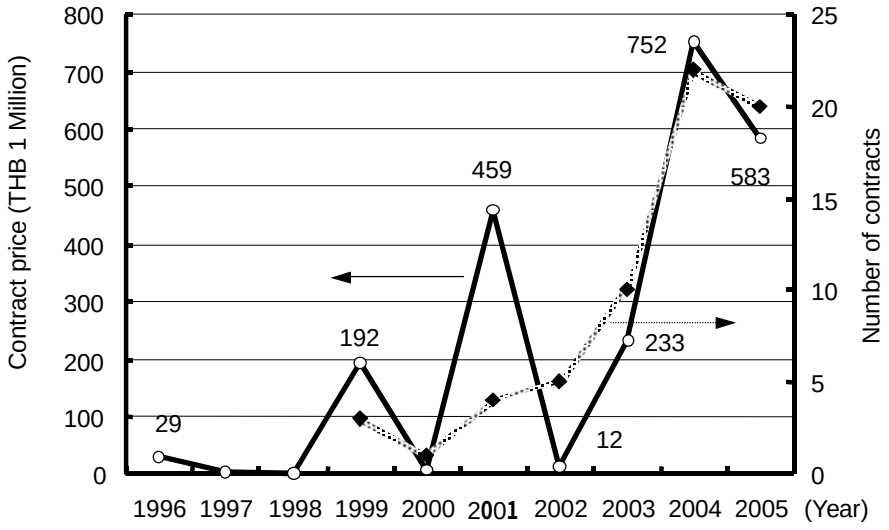
- EMC-EPS Co. Ltd (presently, Thermax EPS (TEPS) (Thailand))
- Energy & Environment International Co., Ltd. (E&EI)
- Excellent Energy International Co., Ltd. (EEI)
- Honeywell Thailand Co., Ltd.

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. The energy audit expense of about THB 6 million (18 million yen) was paid by the aid of GEF and the investment in the ESCO project, about THB190 million (270 million yen), was shouldered by the owner of the factory. The investment payback of this project was 4.9 years.

(4) Market scale

The ESCO business in Thailand was started with THB29 million contracts in 1996, but the contracts in the ensuring 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).



Source: Survey by DEDE (2005)
Note: Values of 2005 are estimated values. Exchange rate: 3 yen/baht

Figure 2.2.10 ESCO contracts in Thailand (Performance contracts only)

Table 2.2.10 Potential energy conservation investment market in Thailand

(Unit: THB 1 million)

Division	Low growth case	High growth case
Industrial	6,603	14,121
Household, Commercial	1,673	4,818
Total	8,276 (24.8 billion yen)	18,939 (56.8 billion yen)

Source: Mr. Arthit Vechakij, "Thailand Energy Conservation Efforts and the ESCO Business", a material presented at the 1st Asia ESCO Conference, Oct. 2005

(5) 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.

- ✓ Excellent Energy International Co., Ltd. (EEI) was established in 1999, with the partnership of Electric Power Research Institute of the U.S., Global Energy Partners LLC also of the U.S., and Univentures Public Company Limited of Thailand. It is reputed to be an excellent ESCO as the undertaker of the only materialized ESCO project which was developed from the four energy audits performed in the GEF-supported pilot project. At first, it did business by the guaranteed savings contract, but now the ratio of this contract and the shared savings contract became half-and-half. The total revenue from ESCO business in 2005 was USD30 million yielded from 15 ESCO projects. The industrial sector accounted for 80% of those projects. The energy saving ratio was 30% or more and the contract period was 4-8 years.
- ✓ Sumi Thai International Ltd. is a Thai-based subsidiary company of the Sumitomo Corporation of Japan. It started ESCO business in 2002, mainly dealing with voltage regulators. Although the business scale is small at present, it is considering to expand into the biomass and cogeneration fields, gaining momentum from the soar of crude oil price.
- ✓ EGAT Public Company Limited has been engaged in the support of ESCO activities in Thailand through the promotion/dissemination of ESCO business and technical assistance, but

it has decided to enter into the ESCO business in full force. At present, the personnel in the ESCO division are 31 and about half of them are engineers. In addition, members specializing in finance and marketing are positioned, including the support staff form the outside. Because the EGAT is a company having a large social impact, it is planning to target only major clients (stable companies, factories, excessively energy-consuming companies, etc.) so as not to compete with other ESCOs. The objective of EGAT is to improve the operating ratio (profitability) of power lines by cutting the peak load by 15% (DSM) through an ESCO project. This company has explored the feasibility of this approach for four years including a pilot study (EE Promoting Program). The primary target field of ESCO business is renewable energy (biogas cogeneration, biomass, and solar power generation). The potential market scale is estimated to be THB2.5 billion in renewable energy and THB4 billion in energy conservation, totaling to THB6.5 billion (19.5 billion yen). The target revenue of the new company is THB320 million (960 million yen) this year and THB480 million (1.44 billion yen) next year. The target business fields are electricity and heat. As the primary target technologies for energy conservation, [1] boilers, [2] energy storage and [3] chillers and air conditioners are considered.

(6) Other incentives

- ✓ Tax exemption: At present, tax exemption is available for the clients who have achieved energy conservation. The current tax rate is 30% for large-sized companies and 15% for small and medium-sized companies, and the savings achieved through energy conservation are exempt from taxation. Besides this, an 8-year corporate tax exemption is available for ESCOs (SPCs). ESCO providers are utilizing these measures actively and hence it can be said that these tax incentives are working effectively.
- ✓ Loan guarantee: Thai Military Bank (TMB) is currently studying the possibility of a loan guarantee program with the support of Agence Francaise Development (AFD) of France, and the program may be started soon. AFD will provide a loan of THB2 billion at an interest rate of EUROLIBOR (London Inter Bank Offered Rate at the Euro Market) minus 2% (minus 0.5% in the case of ordinary loan) to TMB, with a repayment period of 10 years. TMB prepares the balance from the ordinary loan rate (2% – 0.5% = 1.5%) as the guarantee fund, and the share limit of the guarantee risk is set at 50%. If this kind of scheme is put into operation, provision of loans to ESCO projects will expand.

(7) 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.

About 300 persons from the world participated in the 1st Asia ESCO Conference which took place in Bangkok last October under the sponsorship of the Japan Association of Energy Service Companies (JAESCO). About 100 persons attended this conference from Japan. From this big participation, it is known that not only Thai companies but also Japanese companies have large expectations in the development of the ESCO market in Thailand. 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 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. Dissemination, enlightenment, R&D, etc. should be advanced under this policy. Official recognition of excellent ESCO business and selection of best practices are also effective.
- ✓ 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.

(8) 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 details of the new DNA will be consolidated after that, and therefore its actual functioning will be much later. The Thai government is becoming a little positive about the CDM implementation recently, but opposing opinions are also persistent. Therefore, a prudent response may be necessary with regard to the implementation of CDM projects and the capacity building aimed at CDM promotion. Because of such background, CDM-related knowledge and insight in Thailand are still slight compared with active private investments. Preparation of project design documents (PDD) is currently outsourced to EU and others, and hence capacity building in this field is needed. It is necessary to consider how cooperation can be made for CDM-related capacity building from the mid-term viewpoint. Currently, formulation of CDM projects is expected in the fields of energy conservation and renewable energy in the industrial sector[3)]. As to the formulation of CDM projects, the attitude of the Thai government is changing to the positive direction from the negative position in the past. Because CDM projects may become an effective strategy for the promotion of energy conservation, it is necessary to develop an appropriate supporting system.

3) Survey Report on Kyoto Mechanism-related Technology Dissemination Project in FY2004 (Capacity building projects in CDM/JI host countries), March 3005, NEDO.

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.) The member of the ESCO association is 15 now (14 at the time of its establishment), most of which are engineering-based companies. The remaining members are two utility-based companies and a vender, and no members are currently available which are based on finance, manufacturing, and construction. The activities of the association are mainly promotion of ESCO business and holding of seminars. The administration fund is solely dependent on the member fees.

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 life[4)]) has been implemented in stages since 2004. In this program, specific targets of energy conservation and CO_2 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 polices are yet to be developed. A small number of staff at DOE are covering a wide range of work shallowly, which include energy audits in various fields, preparation of energy conservation standards for buildings, advice to power stations on energy conservation promotion, energy patrol at governmental facilities (to be explained later), energy conservation promotion in the field of transportation, and guidance to school education.

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

In addition, an energy conservation check system for governmental facilities, called “Energy Patrol, has been implemented. Visiting more than 120 governmental facilities twice a week or more, their energy conservation levels are evaluated using a 100-point system. For example, the DOE office was rated as 96 points. The highest score gained by a governmental facility was 99. Some facilities obtained a score less than 50. The overall energy conservation target of the entire governmental facilities is to achieve a reduction of 80-100 million peso/month (compared with that of Sept. 2005).

(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

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

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 2.2.11 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.

The designated national authority (DNA) of CDM implementation in the Philippines is the Department of Environment and Natural Resources (DENR).

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. The report "Introducing ESCO business in Japan" formulated by this Review Committee was published in August 1996, where ESCO business in the United States were explained in addition to estimated ESCO market size in Japan and problems to be addressed in introducing ESCO business. In this report, definitions of two important schemes related to ESCO business, guaranteed savings contract and shared savings contract, were introduced. These definitions are gradually taking roots in our country. 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).

The measures and businesses so far implemented are shown below in chronological order:

a) 1996: "ESCO Review Committee" (Ministry of Economy, Trade and Industry)
   Introduction of ESCO in our country was reviewed based on the facts of ESCO in the United States. At the same time, issues to address for proliferation of ESCO were clearly identified based on the estimation of market size in 2010 as 138 billion yen.

b) 1997: "Study Group for Introduction of ESCO Business" (The Energy Conservation Center, Japan)
   Review Committee comprising 233 members was organized. Wide range of review was conducted on various issued related to system, contract, measurement, verification, and case studies so as to identify issues to address in the system aspect, formulation of standard contract format, introduction of measurement/verification methods and implementation of case studies (FS research). Further, potential market size was estimated as 2,471.5 billion yen and the reduction effect calculated as volume of crude oil was estimated as 4.04 million *kl*/year. Because members of the industries concerned were consolidated in this opportunity, the study group made the foundation for promotion of participating ESCO business and establishment of Japan Association of Energy Service Companies in later period.

c) 1998: Implementation of ESCO demonstration project (The Energy Conservation Center, Japan)
   Within the framework of supplementary business "model project for high efficiency energy utilization type building reformation" by New and Industrial Technology Development Organization (NEDO), ESCO business was implemented in four model cases. Energy saving effect and economic aspect of these cases were analyzed. During the period between this project and year 2000, follow-up researches for ESCO business based on NEDO's supplementary project including the above-mentioned four cases were conducted. In the report, review of standard contract format and rationalization of measurement/verification methods were described.

d) 1999: Revision of The Law Concerning the Rational Use of Energy, implementation of the Law Concerning the Promotion of the Measures to Cope with Global Warming (Ministry of Economy, Trade and Industry, Ministry of Land, Infrastructure and Transport, Ministry of the Environment)
   Through reinforcement of The Law Concerning the Rational Use of Energy, energy

conservation standards related to residences and buildings were reinforced together with the reinforcement of energy conservation standards for specific machines and equipment (Introduction of top-runner standard).

e) 1999-2000: Partial review of subsidy system (NEDO)
Basically contractor should be selected by tender, when building owners conduct a subsidized construction. On the other hand, in the case of ESCO business, energy conservation possibility is diagnosed and details of the construction are reviewed prior to application for subsidies. The level of energy saving assurance is determined based on the result of this energy audit. Accordingly, the contractor is automatically specified already in the subsidy application phase, which constituted an inconsistency with the current subsidy system at that time. Further, use of lease was not permitted. To address these issues and to enable more flexible operation of subsidy system, several rules were modified including: [1] approving joint application of building owner and ESCO and [2] approving use of lease.

f) 1999: Implementation of Law relating to Promotion of Realization of Public Facilities by Using Private Funds (PFI Law)
Utilization of private funds for public facilities was approved. Public facilities are considered to be a promising market for future ESCO business. Because PFI approach has some analogous characteristics with ESCO business, it facilitates promotion of ESCO business introduction in the area of public facilities.

g) 1999: Establishment of Japan Association of Energy Service Companies
Japan Association of Energy Service Companies was established with the cooperation of 16 organizations and companies with the purpose of promoting proliferation of ESCO business. Since then, the Association has playing an important role as a private organization in penetration ESCO business. At the same time, it has a role to relay private sector with government with its number of member exceeding 130 in 2005.

h) 1999: Start of reviewing measurement/verification guideline (The Energy Conservation Center, Japan)
Review for developing a measurement/verification guideline was started, in which research based on actual measurement was included. During the review period of three years, interim report was issued in 2001 and the guideline was announced in 2002.

i) 2000: ESCO promotion was identified as the governmental target of energy conservation policies (Ministry of Economy, Trade and Industry)
As a result of review by Energy Conservation Group of General Resources Energy Investigation Committee, it was estimated that reduction effect of 1 million *kl* calculated as volume of crude oil was to be achieved by introducing ESCO business and BEMS. Based on this estimation, Promotion of ESCO business introduction was positioned as one of the main pillar of the governmental energy conservation policies. Since then, promotion of ESCO business has been referred to as one of the policy targets on energy conservation policy by Ministry of Economy, Trade and Industry, Ministry of the Environment and etc.

j) 2001: The Law on Promoting Green Purchasing (Green Purchasing Law) (Ministry of the Environment)
The requirement of the Law is green purchasing in procurement activities by national facilities, while the same requirement has been also applicable to the local government. In this system, implementation of energy audit was requested, which served as a drastic motivation of introducing energy audit in national facilities.

k) 2001: Announcement of research result about market size of ESCO business (Japan Association of Energy Service Companies)
Japan Association of Energy Service Companies continued investigation into the market size of ESCO business for three years and announced its result in 2001. Since then, research result has been announced every year. From 2003 to date, the result of efficacy analysis including energy-saving rate has been announced at the same time.

l) 2001: Nation-wide opening of meeting for explaining ESCO business (The Energy Conservation Center, Japan)
With the purpose of proliferation and enlightenment of ESCO business, the Energy Conservation Center, Japan opened meeting for explaining ESCO business on nation-wide scale. This practice has been continued to date every year. In parallel, brochures and model case report for detailing ESCO business were formulated. They are revised every year.

m) 2001: Entry of ESCO booth in large-scale exhibitions (Japan Association of Energy Service Companies)
ESCO booth appeared in the exhibition to promote energy conservation (ENEX) sponsored by The Energy Conservation Center, Japan. Since this year, ESCO booth is included in the Exhibition every year. The entry served as a motivation for participation in various exhibitions for further publicity of ESCO.

n) 2001: Full-scale introduction of ESCO business into local government was started (Osaka Prefecture)
While introduction of ESCO business into local government was started in 1998, its full-scale introduction had been prevented due to system-related barriers. Osaka Prefecture and Jyukankyo Research Inc. jointly developed and implemented the full-scale ESCO business introduction scheme for local government. Through this approach, the introduction of ESCO business into local government as been accelerated.

o) 2002: Opening of conference on ESCO business (Japan Association of Energy Service Companies)
Japan Association of Energy Service Companies opened a conference focusing on ESCO business. Since then, the Conference has been held every year with the participation of 200-300 people.

p) 2002: Guideline of ESCO business introduction for local government was prepared (The Energy Conservation Center, Japan)
To accelerate introduction of ESCO business into local government, a guideline of ESCO business introduction for local government was prepared and announced. At the same time, meetings for explaining ESCO business for local government were opened on nation-wide scale.

q) 2003: Revision of The Law Concerning the Rational Use of Energy (Ministry of Economy, Trade and Industry, Ministry of Land, Infrastructure and Transport)
Through the revision of The Law Concerning the Rational Use of Energy, energy conservation measures in the area of public welfare services such as office buildings have been reinforced, while expanding scope of industrial plants specified for the target of energy control, resulting in reinforcement of regulations concerned. Further, report of implementing energy-saving measures has become mandatory for the buildings exceeding 2,000m^2. (Effective from April 1, 2003)

r) 2003: ESCO business introduction into local government using PFI approach was started. (Saitama Prefecture)
Full-scale ESCO business introduction into local government using PFI approach was started

in Saitama Prefecture. After this practice, the introduction of ESCO business based on the same model followed in other local government.

s) 2004: The first introduction of ESCO business into an independent administrative institute (National Institute for Environmental Studies)
ESCO business was introduced for the first time to an independent administrative institute, National Institute for Environmental Studies as a state-owned facility. However, the procurement rules of independent administrative institutes are somewhat different from those for national facilities and the actual introduction of ESCO business into national facilities took place in the following year.

t) 2005: Effectuation of Kyoto Protocol
Kyoto Protocol effectuated in February 16, 2005. Also the reduction target of greenhouse gas in our country has come into force as an international commitment, which necessitated further efforts in reduction.

u) 2005: The first introduction of ESCO business into a national facility (Ministry of Economy, Trade and Industry)
ESCO business was introduced for the first time to a national facility (annex building of Ministry of Economy, Trade and Industry). Prior to this introduction, the method of introducing ESCO business into national facilities was reviewed (Jyukankyo Research Inc. conducted the review based on the request by Ministry of Economy, Trade and Industry).

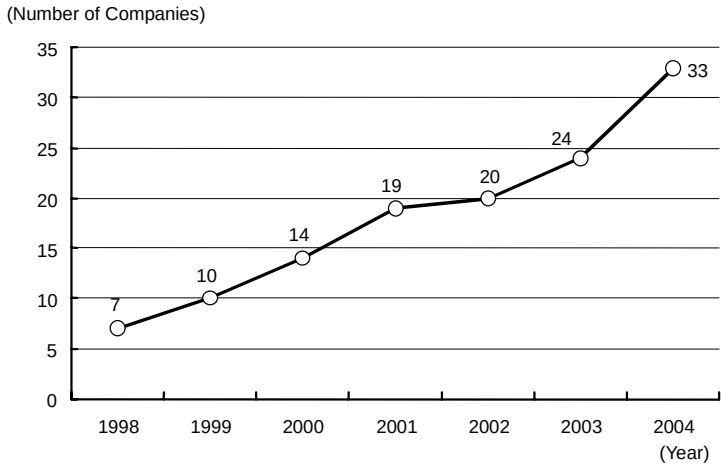
v) 2005: Commendation of excellent ESCO business started. (The Energy Conservation Center, Japan)
With the purpose of proliferation and enlightenment of ESCO business and nurturing of sound ESCO providers, a system to commend excellent ESCO business was started. In the initial year, 10 cases received commendation. This event is to take place every year.

w) 2005: Opening of the 1st Asian ESCO Conference (Japan Association of Energy Service Companies)
Setting promotion of energy conservation in Asian countries, proliferation and penetration of ESCO business and the international development of domestic ESCO business as its target, the 1st Asian ESCO Conference was held in Bangkok under the sponsorship of Japan Association of Energy Service Companies. About 300 people from 25 countries joined the Conference.

x) 2006: Revision of The Law Concerning the Rational Use of Energy (Ministry of Economy, Trade and Industry, Ministry of Land, Infrastructure and Transport)
The 3rd revision of The Law Concerning the Rational Use of Energy took place after Kyoto Protocol was concluded. Through this revision, requirements for specifying industrial plants and offices for which energy control is applicable were changed, which resulted in increasing number of objects to be regulated. To be more specific, while heat consumption and electric power consumption in the industrial plants specified for application of energy control had been regulated independently, the new provision employs an energy control based on a combined consumption of heat and power. At the same time, duty of reporting energy-saving measures to the government is reinforced.

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. In 2000, 143 cases of ESCO business by 14 companies were implemented. 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.



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

Figure 2.3.1
Transition in number of ESCO providers in Japan
(Companies with the experience of performance contract)

Including the renovation for energy-saving without performance contract, while the number of cases in the industrial sector has decreased from 715 cases in FY2003 to 359 cases in FY2004, the number of cases in the service sector has increased from 555 cases in FY2003 to 693 cases in FY2004. Further, the total amount of contracted construction cost for energy-saving renovation was 17 billion yen in FY1998 and 55.7 billion yen in FY2003. In FY2004, it was 37.4 billion yen, which was 30% decrease year-on-year. Regarding the details of the contracted amount for FY2004, 64% was for service sector and 36% was for industrial sector excluding the amount for the other sectors. However, because the abovementioned report is based on the data concerning the members of the Japan Association of Energy Service Companies, it should be noted that the cited number of cases and the contracted amount represent just a part of the statistical fact of the country as a whole. On the other hand, most of ESCO providers of the ESCO business accompanying performance contract belongs to Japan Association of Energy Service Companies, the data for that part is considered to represent the nation-wide market size.

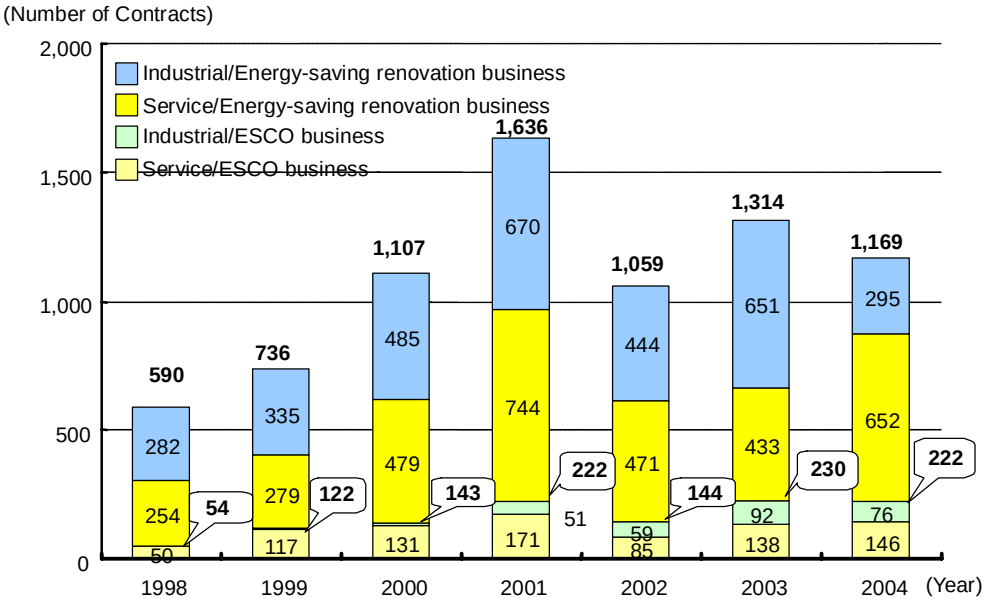
Among the energy-saving renovation constructions, if the constructions accompanying performance contract are regarded as ESCO business, the contracted amount of ESCO business has been doubled year by year since 1998. Specifically in FY2003, it shows the growth of 2.5 times versus the amount of the previous year, achieving total contracted amount of 35.3 billion yen. Such a drastic growth may be attributable to the enhanced recognition for energy conservation among business owners motivated by various environmental issues including global warming combined with the increased interests in ESCO business as an energy-saving measure.

The contracted amount of ESCO business in FY2004 decreased from the previous fiscal year to 17.2 billion yen. This is attributable to the decrease in contracted amount in the industrial sector. It is considered that the main factor of the decrease in contracted amount in industrial sector is the decrease in the opportunities of petrol cogeneration due to drastic increase of crude oil price. Generally speaking, the scale of construction associated with cogeneration is large, the decrease in its number of cases must have given a major impact. Further, in industrial sector, the percentage of cases supported by state incentive program (“support system for operators to promote rational use of energy”) dropped drastically from 27% in FY2003 to only 2% in FY2004, suggesting the fact that the increased difficulty in obtaining the support by incentive system can be a contributing factor of the decrease in contracted amount in FY2004.

In contrast with the shrinking in industrial sector, the total number of contract shows steady

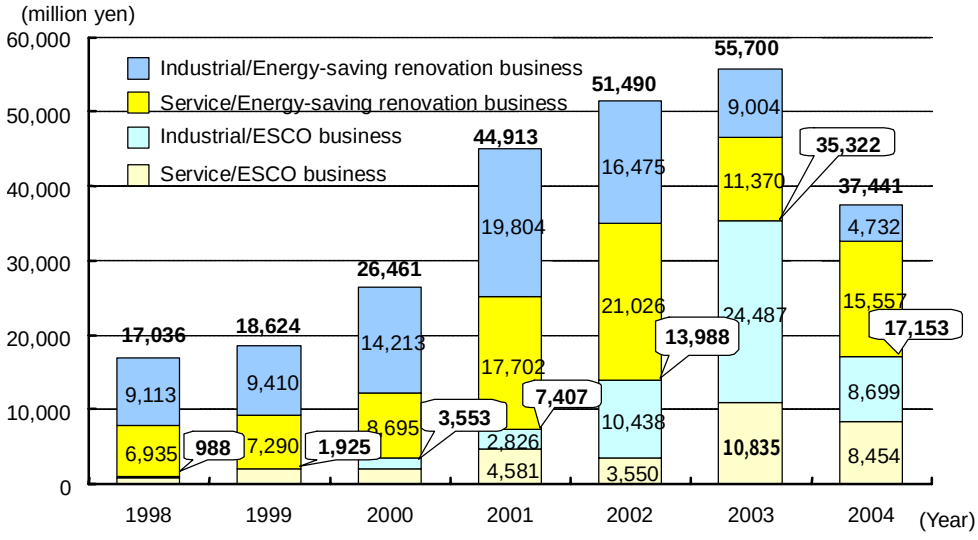
increase from 138 cases in FY2003 to 146 cases in FY2004 in the service sector, while the project amount per case has decreased from that of the previous fiscal year. The sound increase can be seen also in the contracted amount, achieving 8.4 billion yen in FY2004, although some fluctuation may be still 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. Thorough enlightenment for ESCO business is necessary in this sector. 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)

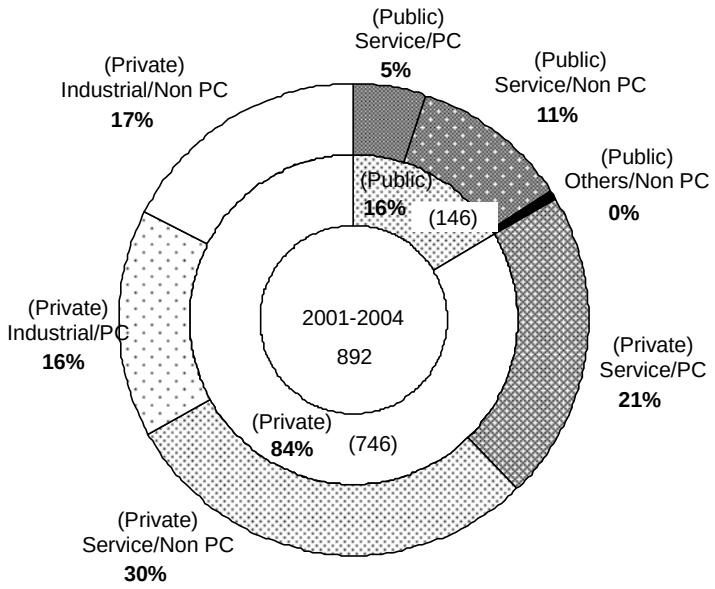
Figure 2.3.2 Transition in number of contracts cases for ESCO business in Japan



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

Figure 2.3.3 Transition of market scale for ESCO business in Japan

3) Performance of ESCO business based on sampling research 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.

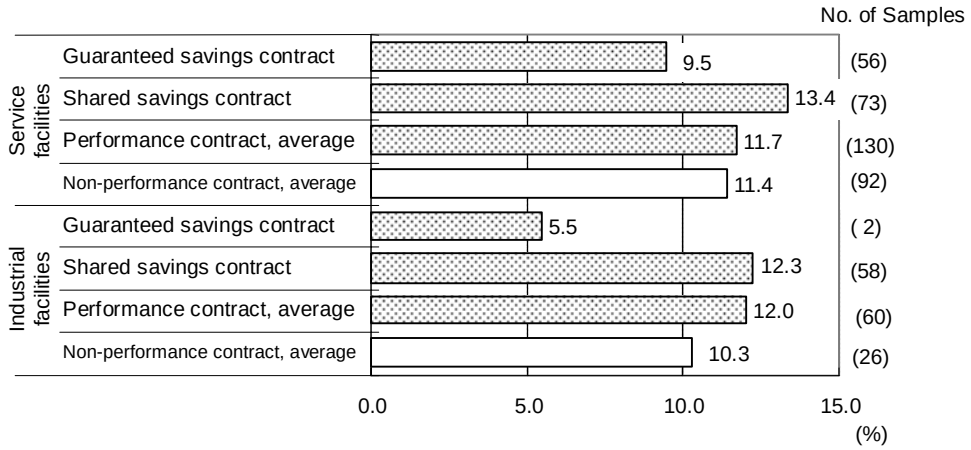


Source: Research by Japan Association of Energy Service Companies (2005)
PC: Project accompanying performance contract
Non PC: Energy-saving renovation construction in general

Figure 2.3.4 Composition of samples in the scope of sampling research

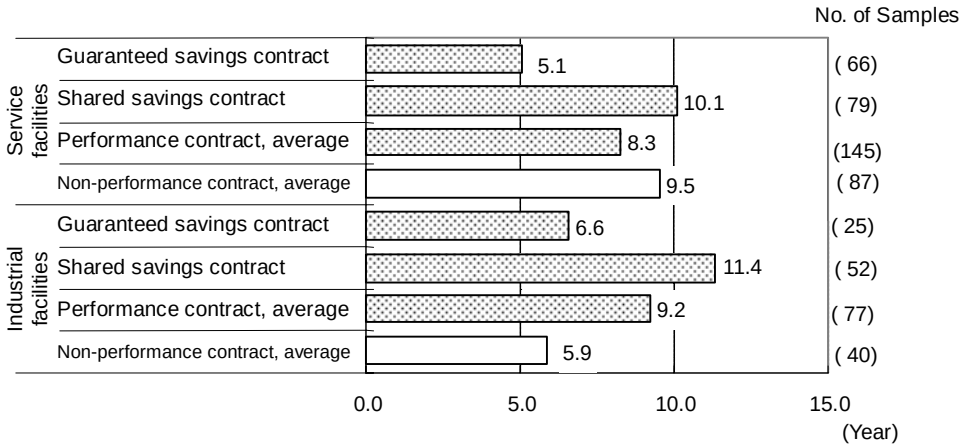
For performance contract, the energy-saving rate is about 12%, while it is 10-11% for non-performance contract in the industrial and service sector. Comparing the guaranteed savings contract (GSC) with the shared savings contract (SSC) for service facilities, the saving rate for GSC was 9.5% while it was 13.4% for SSC, indicating that SSC enables higher saving rate. Also in industrial facilities, the saving rate is higher in the case of SSC with 12.3% compared to the saving rate for GSC, which was 5.5%.
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.
Generally speaking, in the case of SSC, energy saving rate tends to be lower and the number of simple payback tends to be smaller because the concerned ESCO provider tries to finish the payback in shorter period to avoid risks. Nevertheless, in this research result, the energy saving rate is higher with SSC and the length of simple payback period with SSC is almost double time longer than in the case of GSC. These phenomena may be attributable to the fact that the customers of the ESCO business in our country are the companies with excellent performance. Besides, because most of ESCO providers are large-scale enterprises or its daughter companies/ affiliated companies, both customers and ESCO providers have high credibility, which makes it easier for them to obtain financing from financial institutes. This is a significant difference from the ESCO business in other Asian countries, where ESCO business is centered on the short-term

payback.
The contracted amount per case is approximately 130 million yen for service facilities, while it is 240 million yen for performance contract and 79 million yen for non-performance contract with industrial facilities. However, this research result is different from the result based on the marketing research. Examining the marketing research result in 2004, it is 58 million yen/case for service facilities and 114 million yen/case for industrial facilities with performance contract, while it is 24 million yen/case for service facilities and 16 million yen/case for industrial facilities with non-performance contract, where contract amount for performance contract is higher. Because the marketing research is based on the comprehensive data and the sampling research is based on the data reported by business owners on voluntary basis, it is considered that the average contract amount obtained from the marketing research is closer to the facts of the market.



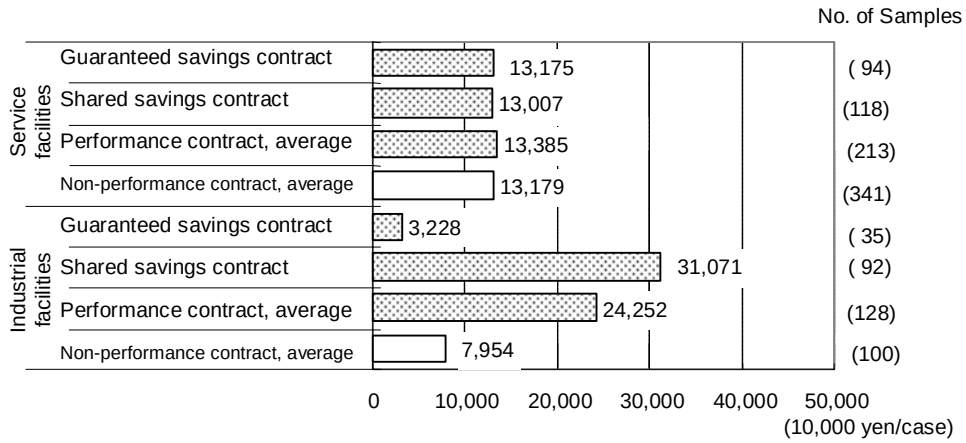
Source: Research by Japan Association of Energy Service Companies (2005)

Figure 2.3.5 Energy-saving rate



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

Figure 2.3.6 Simple payback period



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

Figure 2.3.7 Contracted amount per case

4) Organizations that address CDMs in Japan

The DNA for CDMs in our country is Multilateral Cooperation Department of the Climate Change Division, Ministry of Foreign Affairs.

The other CDMs and the related capacity building are handled by several organizations including Global Environment Affairs Office, Industrial Science and Technology Policy and Environment Bureau, Ministry of Economy, Trade and Industry, NEDO, and Office of International Strategies on Climate Change, Global Environment Bureau, Ministry of the Environment, IGES. Details of the approaches to energy conservation CDM in our country are to be described in 3.6.

2.3.2 South East Asia

(1) Indonesia

1) Current status of ESCO market

a) ESCO provider

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.

The main activities of KONEBA are as below:

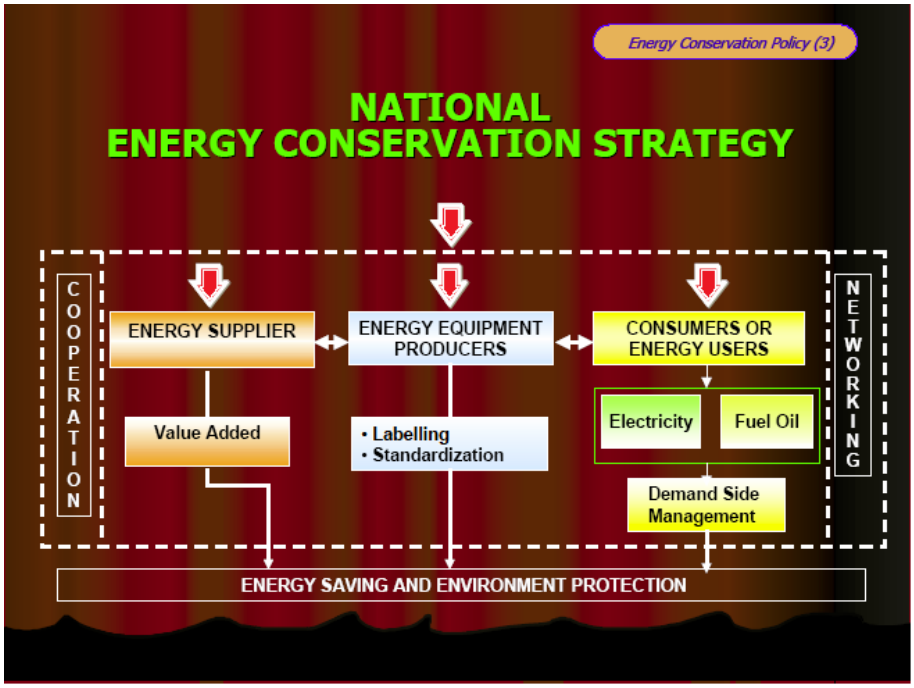
- Consulting including energy conservation research and energy audit
- Various utility designs and their engineering
- Construction management including utilities
- Utility maintenance
- Sponsorship of various studies for promotion of energy conservation

b) ESCO project

So far, there has been no actual experience of ESCO project in Indonesia.

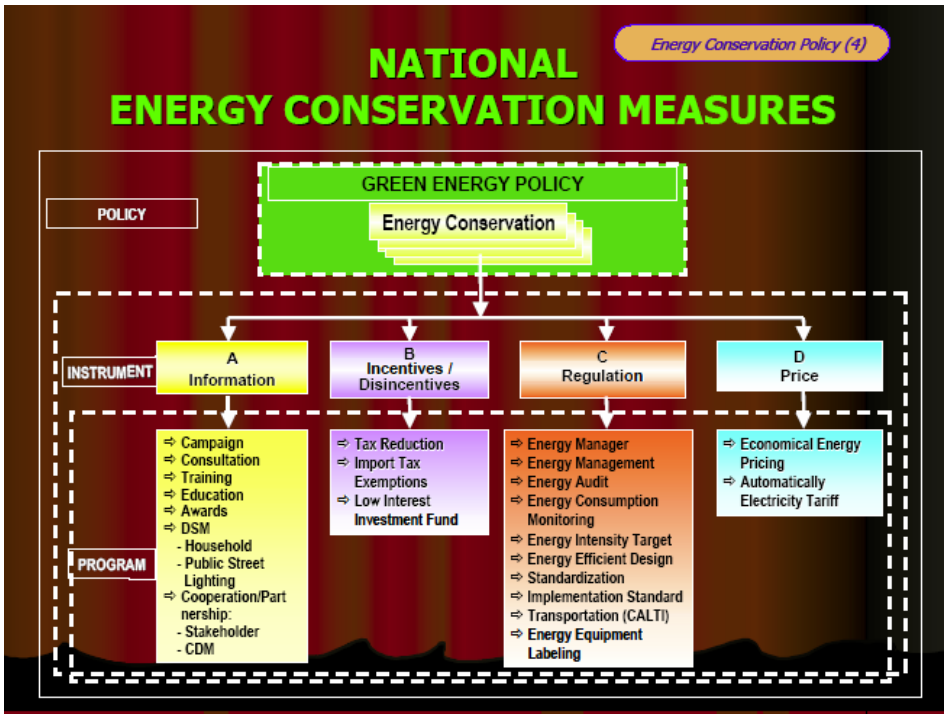
2) Current policy to promote ESCO industry

Energy conservation strategy and its measures in Indonesia are as below. No specific measure to promote ESCO industry is available. However, the illustrated measures will become very important to develop ESCO industry in Indonesia in the future.



Source: Implementation of Energy Efficiency Program in Indonesia, Ministry of Energy and Mineral Resources Republic of Indonesia, CTI Industry Joint Seminar on Technology Diffusion of Energy Efficiency in Asian Countries, Feb. 2005.

Figure 2.3.8 Energy conservation strategy in Indonesia



Source: Implementation of Energy Efficiency Program in Indonesia, Ministry of Energy and Mineral Resources Republic of Indonesia, CTI Industry Joint Seminar on Technology Diffusion of Energy Efficiency in Asian Countries, Feb. 2005.

Figure 2.3.9 Energy conservation measures in Indonesia

Among these measures, outlines about [1]campaigns, trainings and education, [2]DSM (Demand Side Management), and [3]Partnership Program are described below for your reference.

[1] Campaigns, trainings and education

Under the initiative of PLN (the National Electric Company), implementation of energy conservation campaigns through TV, radio, web site, etc., preparation and distribution of brochures about energy conservation and opening of energy conservation workshop in big cities (Bandung, Semarang, Denpasar) are conducted.

[2] DSM (Demand Side Management)

In 1992, PLN formulated a DSM action program to control drastic increase of electric power demands. Following table shows DSM targets determined by PLN at that time. This project was conducted with the support of USAID (the United States Agency for International Development).

Table 2.3.1 Energy conservation / DSM target (at formulation in 1992)

Fiscal Year	Energy Savings Target	Peak Load Reduction Target
1994/1995	40.3 GWh	9.0 MW
1995/1996	93.7 GWh	20.2 MW
1996/1997	173.9 GWh	36.1 MW
1997/1998	316.5 GWh	61.8 MW

Source: Energy Efficiency Program in Developing and Transitional APEC Economies, Asia Pacific Research Center, 2003

However, because the reduction in power consumption at October 2002 was only 6.7 MW actually, PLN revised this target as below.

Table 2.3.2 Energy conservation / DSM target (at revision in 2002)

Sub Program	2002 Target	2003 Target	2004 Target	2005 Target
Efficient Lighting	26.7 MW	44.0 MW	97.2 MW	152.0 MW
TOU/IC Tariff	174.7 MW	325.4 MW	796.1 MW	1,403.4 MW
Total	201.4 MW	369.4 MW	893.3 MW	1,555.4 MW

Source: Energy Efficiency Program in Developing and Transitional APEC Economies, Asia Pacific Research Center, 2003

The other DSM programs includes introduction of 100,000 CFLs and the replacement of 60,000 lamps with stabilizers that were realized through support of USD8 million by ADB in 1994.

[3] Partnership Program on Energy Conservation

Indonesian government provides free services of energy conservation research and consulting with the purpose of energy conservation in the fields of industrial facilities and commercial/service facilities.

To date, more than 20 facilities underwent researches and audits. Based on these research results, it is acknowledged that, in large-scale industrial plants, 10-30% of energy conservation potential is available, while it is 5-40% for medium and small scale commercial / service facilities.

3) Barriers to development of ESCO industry

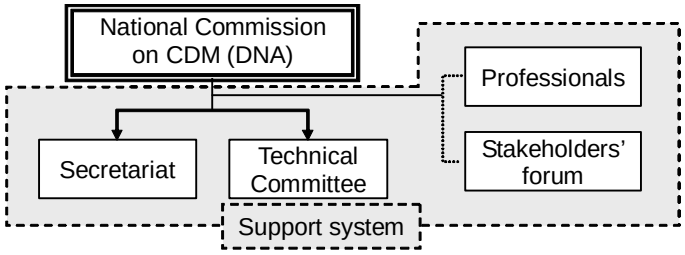
Issues identified as barriers to the development of ESCO industry are: [1] Inexpensive energy cost, [2] Insufficient engineering skill to improve energy efficiency, [3] Relatively expensive cost for fund expedition, and [4] Unavailability of appropriate legal environment and incentive system for energy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

4) Trends in recent years
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.
The counterpart organization for JICA technical support program is the Ministry of Energy and Mining Resources (MEMR).

5) Organizations that address CDMs in Indonesia
The DNA for CDMs in Indonesia is National Commission on CDM (KOMNAS MPB).



Source: Research Report for Kyoto Mechanism-Related Technology Proliferation Project in FY2004 (capacity building project at CDM/JI host countries), March 2005, NEDO

Figure 2.3.10 Organization framework for CDM project in Indonesia

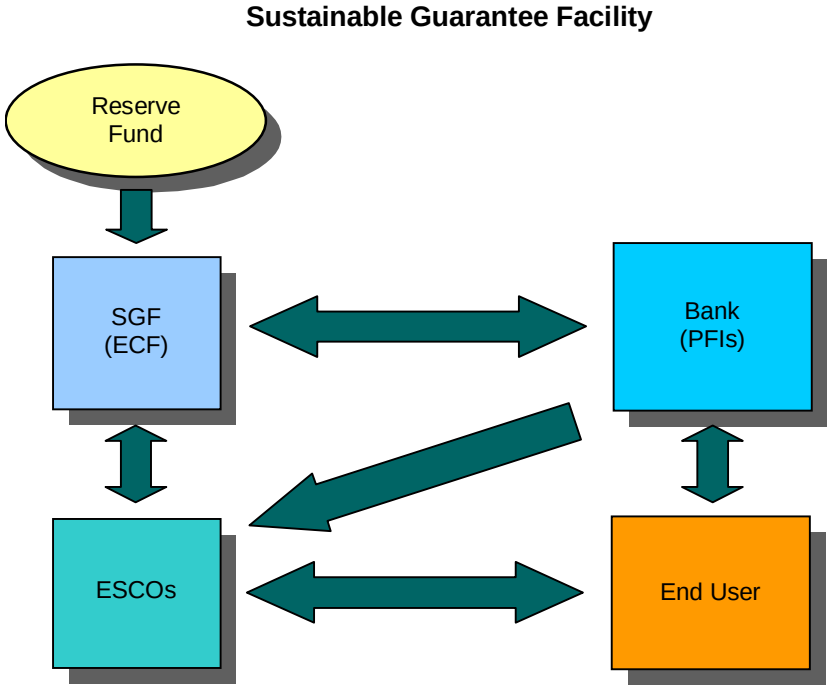
2.3.3 South Asia

(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.
Energy sector in Sri Lanka are characterized by: [1] Energy resources are highly dependent on import (85% of energy resources for commercial purpose are imported) and [2] Expensive energy cost.
Due to these negative factors: [1] Sustainment of domestic industrial competitive power and invitation of direct investment from overseas are negatively affected and [2] Public welfare sector has to bear increasing costs caused by expansion of energy consumption.
Based on the these facts, it is important for future energy policy in Sri Lanka to realize economically advantageous energy conservation measures one by one, while promoting capacity expansion and efficiency of supply side. By realizing the energy conservation, following merits can be expected: [1] In the level of each company, reduction of production cost and improvement of competitive

power can be achieved through reduction of energy consumption and [2] In macro level, relaxation of acute energy demands and stabilization of energy supply can be achieved.
To name the major energy resources in Sri Lanka: [1] Biological resources centered on firewood, [2] Diesel oil and [3] Electric power are listed in the order of volume. Considering the potential and management possibility, electric power is the main focus in energy conservation.
The promising energy conservation technologies are: high efficiency lighting, AC chiller, refrigerator, motor, motor inverter VSD, etc. The industrial sectors with large energy conservation potential are: industry (tea, ceramics, textile, chemical), residence, service (governmental facilities, infrastructure, private office) etc.
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.
The needs for effective technical support to promote ESCO/energy conservation in Sri Lanka are listed below:

- ✓ Expansion of labeling system (preparation of standards, installation of test equipment, etc.)
- ✓ Enlightenment/Popularizing activities (general public relation, trainings for specific target group, etc.)
- ✓ Development of energy conservation database (identifying current status of use, supplying technical information, successful models, etc.)
- ✓ Development of energy conservation pilot models to accumulate successful experiences
- ✓ Introduction of energy manager system
- ✓ Introduction of qualification system for energy conservation technician
- ✓ Reinforcement of ECF organization/Development of human resources

In parallels of technical support programs, Sri Lanka government made request for arrangement of JBIC two-step loan to promote ESCO in 2004.
Also, to promote bankable energy conservation project, SGF (sustainable guarantee facility) was established in 2005 with the purpose to overcome the guarantee barrier for ESCO. This was a proposal by USAID, and ECF (Energy Conservation Fund) was nominated as an implementation body of the fund (a pilot project is being introduced currently).
The maximum guarantee rate is 75% of the total loan (10 million Rupees at maximum), which is to cover risks caused by both technical and financial factors (max. for 6 years). The interest level in employing this scheme is the market interest minus 2%.



Source: A Way to overcome Barriers for Commercial Energy efficiency Project, M. S. Jayalath, Energy Solve International (Pvt) Ltd., The 1st Asia ESCO Conference Oct. 2005

Figure 2.3.11 Scheme of sustainable guarantee facility

Although it is not a successful model, the history of "expansion and reduction" of ESCO business in Sri Lanka gives some suggestion in considering approaches for international support programs related to ESCO promotion in future.

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 ESCOs 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.

The DNA for CDMs in Sri Lanka is Ministry of Environment and Natural Resources. The Ministry shows considerably active involvement.

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. So far, no actual activities for propagating energy conservation have been practiced other than preparation and distribution of brochures by Ministry of Industry, Mining and Energy.

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).

Because more than half of the total power generation is dependent on diesel generation, and, because both electricity rate and diesel oil cost are rapidly increasing currently, the introduction of ESCO business or the ESCO model based on solar power generation (which is to be described in details in “Laos” section) are considered fairly high. 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.

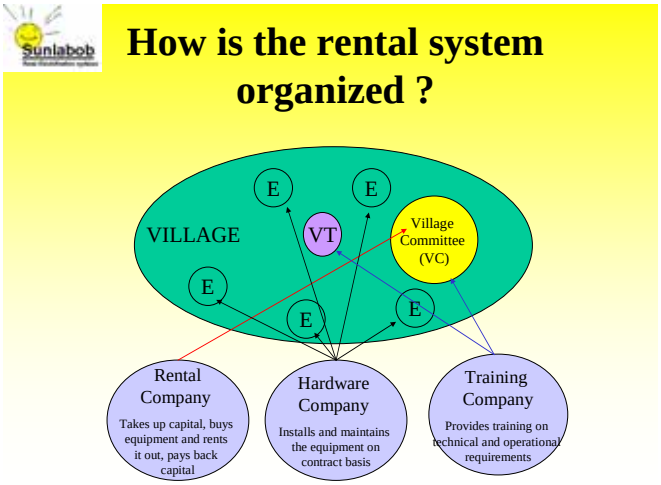
The DNA for CDMs in Cambodia is Ministry of Environment, Climate Change Office.

(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. Outline of the model is described below.

As shown in Figure 2.3.12, 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 scheme[5)].

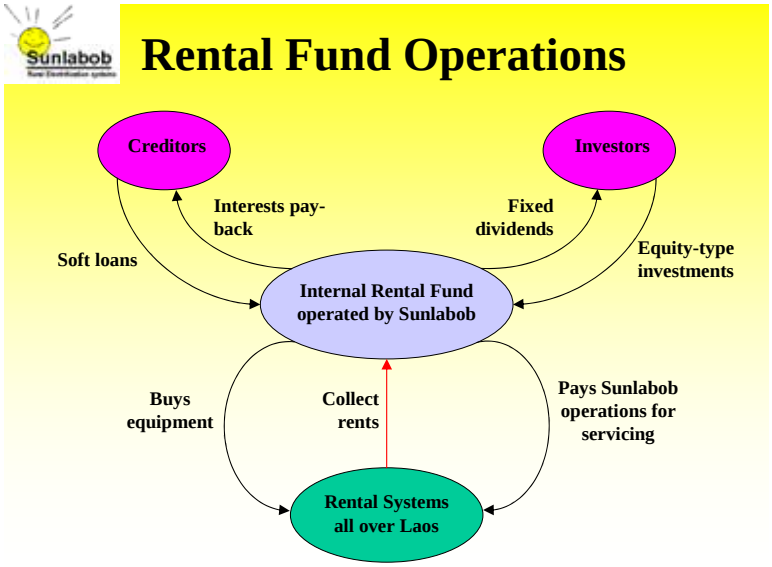
5) Rental service for making electricity affordable in remote villages in Lao PDR: The 1st Asia ESCO Conference, Andy Schroeter/Saleumpone Vongsakhamphui, Sunlabob Rural energy Co., Ltd.



Source: 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.

Figure 2.3.12 Solar Power Generation Rental Scheme in Laos

Figure 2.3.13 shows the concept of operation fund (Rental Fund). The fund income consists of initial finance/investment, rental charge and service fee. While main investment body is Sunlabob, expedition of necessary funds has become increasingly difficult with the progress of the scheme propagation in the country. Commitments of the other investors are now being requested.



Source: 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.

Figure 2.3.13 Rental fund operations for solar power generation in Laos

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. The DNAs for CDMs in Laos are Science Technology and Environment Agency (STEA) and Prime Minister's Office.

(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 DSM[6]. Besides, CFL program is now underway in the framework of DSM by EVN with the support of WB.

The DNA for CDMs in Vietnam is International Cooperation Department (ICD) of The Ministry of National Resources and Environment (MONRE), which is often called CNA (CDM National Authority). The willingness for promoting CDM in governmental organizations including DNA is high, which makes Vietnam one of the most important host countries for Japan. Also in the field of energy conservation, a model project for energy conservation is ongoing in a beer plant (2005/NEDO). In the field of energy conservation CDM, an energy conservation initiative in industrial plants in Ho Chi Min City and product CDM are listed as promising projects[7].

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. EMS is operating ESCO/energy conservation business mainly in UAE besides in Jordan and Bahrain. Furthermore, DANWAY, a company dealing in equipments for energy conservation and water saving, shows interests in ESCO scheme, although it has no experience in actual contract. 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

6) 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

7) Research Report for Kyoto Mechanism-Related Technology Proliferation Project in FY2004 (capacity building project at CDM/JI host countries), March 2005, NEDO

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.

At the first sight, the profitability of EMS appears to be low because it collects only 5% (default) of the achieved energy conservation. However, its project management fee is fixed and no ESCO minimum guarantee is available, while the basic rate is ensured. Further, the supervision fee for project implementation (7.5% of equipment costs) and the fee for preparing energy conservation reports are charged separately, and the costs of equipments are collected in installment. In addition, there is no guarantee for energy reduction through energy conservation (as a consequence, there is no penalty for failure to achieve it). Due to these factors, only payment risk and bankrupt risk on customer side constitute the risks on EMS side.

On the other hand, actual measurement is used as a scale of measuring energy reduction through energy conservation. In addition, ESM is eager to expand its business to the other Middle East countries and started a positive use of internet for managing information about customer-wise energy consumption from early stage.

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.

The DNA for CDMs in UAE is Environment Agency - Abu Dhabi.

(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. In several years ago, introduction of gas cogeneration system in hospitals, schools, and governmental facilities based on the tie-up with Enron Corporation has been examined in Oman. However, because of the collapse of Enron, this type of project has been slowed down. To promote renovation of facilities for energy conservation in Oman, the cooperation with two leading general contractors (Bahwan Engineering Co. LLC and Galfar Engg. Contg. LLC) is essential.

While Oman ratified Kyoto Protocol, no DNA for CDM has been established.

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.

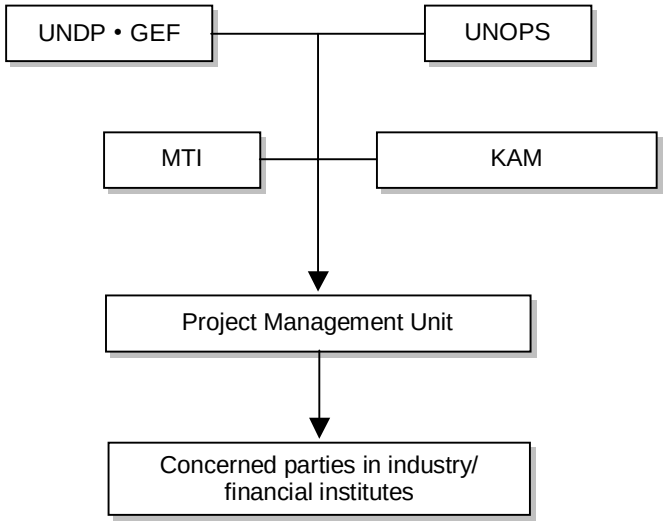
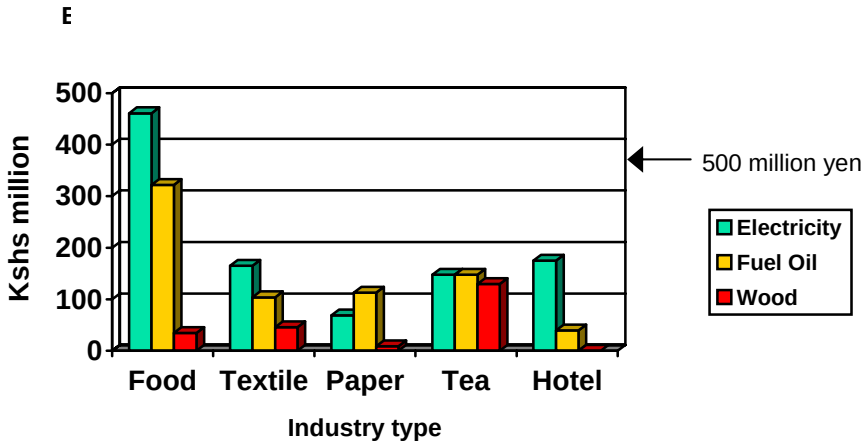


Figure 2.3.14 Kenya GEF-KAM Energy Project Scheme



Source: GEF-KAM Energy Project HP

Figure 2.3.15 Industry-wise annual energy conservation potential in Kenya

While ESCO industry is yet to be developed in Kenya, Kenya is the only country that dispatched two organizations to the 1st Asia ESCO Meeting from Africa. Currently, no DNA for CDM is available in Kenya.

(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. Besides, although an energy conservation research by IEE was conducted in 1982 and energy audits for industrial plants by Energy Conservation Center have been conducted during the period 1998-1999, no energy conservation business has been established yet. However, NREL (National Renewable Energy Laboratory) has an experience of implementing renovation construction for oil refining unit as ESCO.

The DNA for CDM in Egypt is The Egypt Council for the CDM (EC-CDM), and Egyptian Environmental Affairs Agency (EEAA). The DNA is comprised of the double-structured unit as below:

[1] Egypt Council for the CDM (EC-CDM)
In domestic level, EC-CDM formulates plans and policies within the country and supervises all of the CDM processes.

[2] Egyptian Bureau for CDM (EB-CDM)
EB-CDM is the standing secretariat of EC-CDM, which is operated by Climate Change Unit of the Egyptian Environmental Affairs Agency (CCU/EEAA) in Ministry of the Environment (Ministry of State for Environmental Affairs)[8].

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 annuals sales of lower than 500 million yen. Only few of them are the affiliated companies of a large scale/utility company. Although a few started their commitments in the field of energy conservation services before 1990, majority of them started their approach only after 1995. 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.[9]

8) Kyoto Mechanism platform

9) 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.

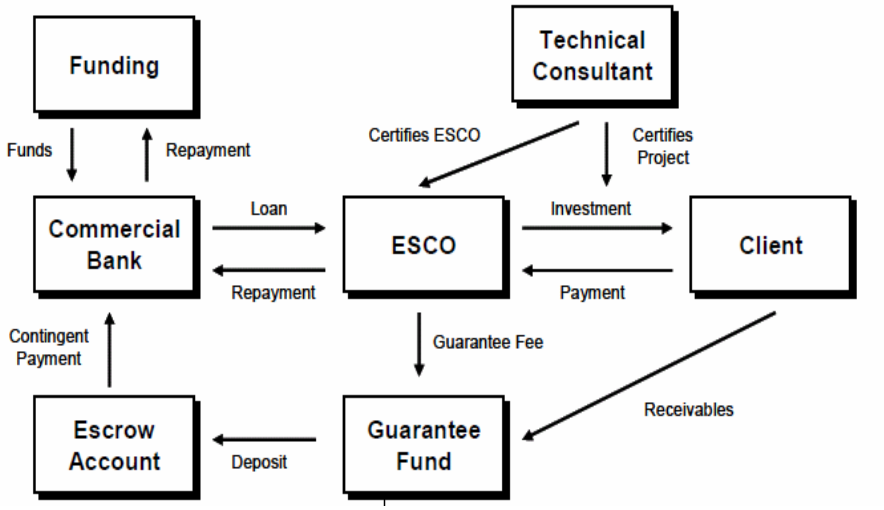


Figure 2.3.16 Basic model for ESCO with involvement of guarantee fund

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. In this trend, two guarantee systems as below have been formulated:

[1] FGPC: Guarantee Fund for Competitivity Promotion established in December, 1997.
[2] FAMPE: Guarantee Fund to Micro and Small Size Enterprises[10].

Other than those mentioned above, several approaches for energy conservation have been conducted in Brazil since long. In December 1985, PROCEL (National Electricity Conservation Programme) was established with the purpose of promoting electricity-related energy conservation. It is a program applicable for both demand side and supply side, which has its focus mainly in the fields of energy saving of refrigeration system, air conditioning, and lighting. Steady progress of the initiative has been observed in a series of achievement such as development of measurement technology in 1980's, voluntary labeling program in 1986, energy efficiency standard in 1994, commendation system of top-rank models in 1995-1998, rebate program of top-rank models in 1996-1997, and establishment of labeling system in 1999[11].
Brazil is counted among the countries with the most advanced approach to CDM, which rivals India in its advanced status of CDM. DNA for CDM is Comissão Interministerial de Mudança Global do Clima. Both approval system and competent human resources are available in this country. The promising field of CDM in future is the regenerative energy that utilizes bio-mass.

(2) Mexico

1) Current status of ESCO market

a) ESCO provider

As of 2005, there are 14 ESCO providers in Mexico.
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.

b) ESCO project

More than 50% of the ESCO projects in Mexico are for commercial and service facilities including

[10] Financing Energy Efficiency Projects in Basil, Antonio Marcos Duarte Junior etc., Ibmec Educational S. A., Sept. 2003

[11] Energy Efficiency Policies and Indicators, WEC Report 2001, Annex-1 Case Studies on Energy Efficiency Policy Measures

hotels. This situation is considered to be attributable to the financing environment for ESCO in this country, which will be described in details later.
Following table shows the past achievements of four representative ESCO providers in Mexico.

Table 2.3.3 Achievements of the representative ESCO providers in Mexico

Project	Annual Economic Saving (1,000USD)
Diram	43.5
	21.0
	96.0
	10.8
Empresas ESM	61.6
	120.0
Optima	500.0
	200.0
	95.0
	500.0
	210.0
Ecotherm	120.9
	72.0
	175.1

Source: ESCO Work in Mexico - Status of the Market and Barriers, CONAE, COP9, Dec. 2003

2) Current ESCO industry promotion policy

a) CONAE (the National Commission for Energy Conservation)

CONAE was set up in 1989 by Mexican government. Since then, energy conservation activities as below have been implemented, mainly:

- Evaluation of electric power consumption in public facilities called “100 Public Buildings”
- Development of energy audit tool for facility administrators
- Support to ESCO providers
- Development of guideline concerning zero-cost energy conservation methods for facility administrators (method of energy reduction based on operation improvement)

b) ESCO support policies by CONAE

As mentioned above, CONAE supports ESCO as a part of the energy conservation promotion policies in Mexico. Its ESCO support policies so far conducted are as below. CONAC mainly allocates funds from USAID for these activities:

[1] Implementation of promotions

- 11 events and 29 site visits for ESCO providers, customers, and concerned parties from financial institutes
- Introduction of ESCO scheme to Chamber of Commerce etc.
- Preparation of brochures about ESCO
- Preparation or ESCO business model report (15 types of successful models)
- Introduction of ESCO in CONAE website

[2] Development of pilot ESCO projects

- Two pilot projects were implemented in commercial/service sector (hotels). The project cost was USD3.4 million and USD3.3 million respectively. In both cases, performance contract of 10 years was concluded.
- One pilot project was implemented in industrial sector. The project cost was USD4.5

million. Performance contract for seven years was concluded into in this case.

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

- Financing environment in Mexico

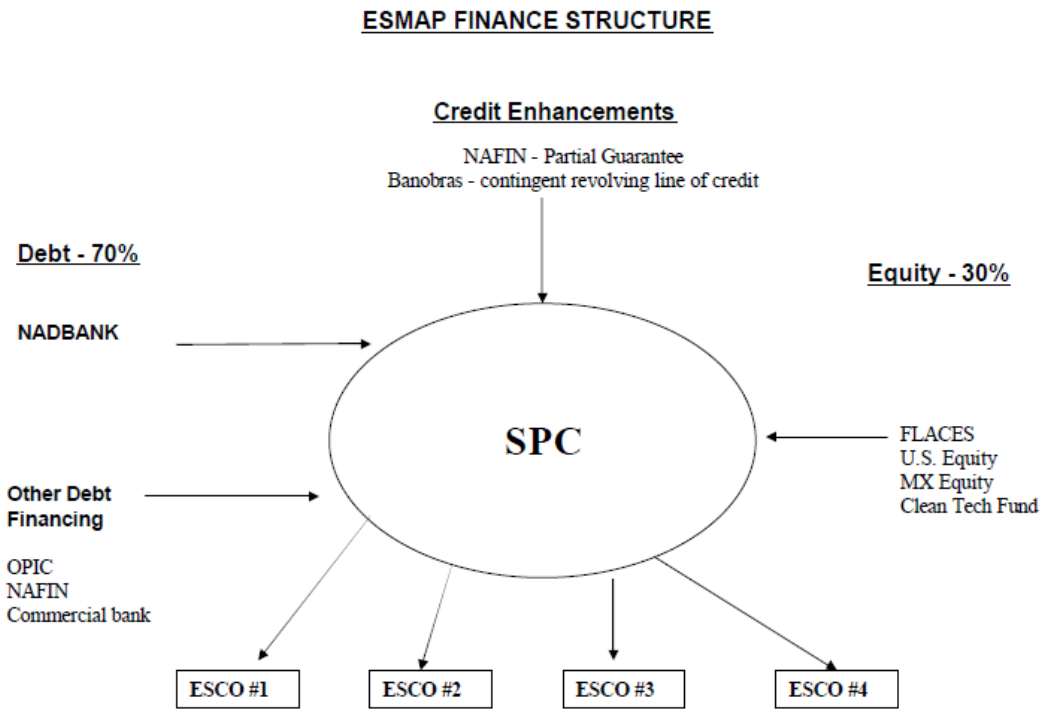
  The financing environment in Mexico is poor, where average interest rate of loans by financial institutes is as expensive as 20%. Also, because they regard balance sheet as the most important factor, financing based on cash flow is hardly approved. To get financing from the financial institutes, applicants should provide collateral corresponding to 150-200% of the amount of the loan.

  Being influenced by such a financing environment, the scale and profit rate of ESCO projects tend to be limited. Due to this reason, most of the achievements of ESCO business in Mexico belong to the projects for commercial and service facilities.

  Generally speaking, the barriers for growth of ESCO industry in developing countries in economic aspect are insufficient promotions, poor credit standing of ESCO providers, unavailability of fee business as a commercial custom, and unavailability of financing system that can be used by ESCO. In Mexico, unavailability of financing system that can be used by ESCO is considered to be one of the biggest barriers.

- Development of finance models by NADB, The World Bank, and CONAE

  NADB (the North American Development Bank), WB and CONAE have jointly developed a finance structure as below that can be used by ESCO.



Source: Sustainable Financing Systems for Energy Efficiency Projects, APEC, 2005

Figure 2.3.17 ESMAP finance structure

The characteristics of this structure are as below:

- SPC (Special Purpose Company) is established, for which finance is provided. It is possible to minimize transaction costs because, when handling the similar types of projects, the transactions with the identical SPC can be bundled.
- With the limit of max. 50% of the total debt, NADB provides low interest loan: annual interest 9% (Peso-based loan), annual rate 5-6% (USD-based loan)
- 30% of the project costs are supplemented by equities such as fund.
- Local banks provide financing for the remaining costs. Financing for ESCO by local banks has become available thanks to the significant relaxation of the level of collateral requirements based on the above-mentioned structure.

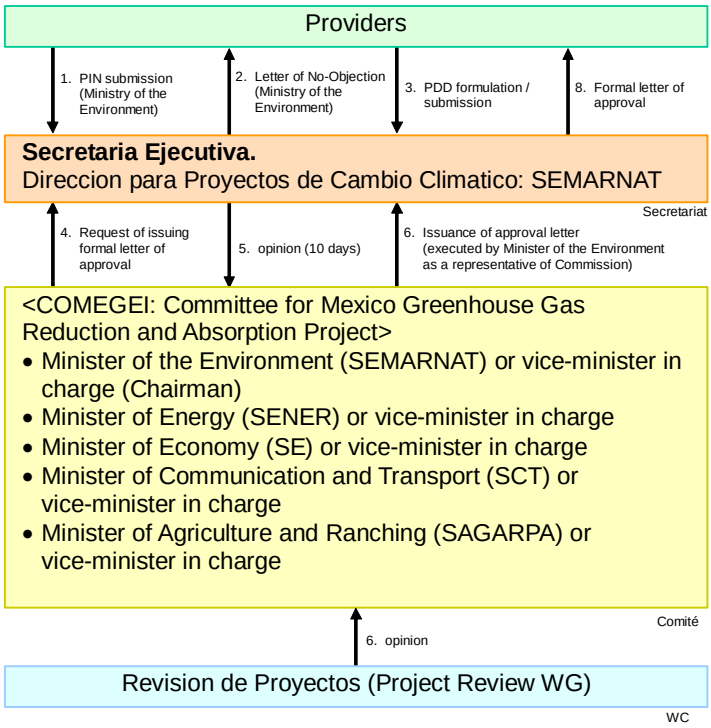
The 1st ESCO project (ESCO provider was Optima) using this structure was implemented in 2005. The applicable facility was a hospital in Monterrey, for which USD2 million was spent as the project cost.

3) DNA for CDM in Mexico

DNA for CDM in Mexico is Comite Mexicano para Proyectos de Reduccion de Emisiones y de Captura de Gases de Efecto Invernadero (COMEGEI: Committee for Mexico Greenhouse Gas Reduction and Absorption Project). While the Committee belongs to Ministry of the Environment, it is a multifunctional committee with involvement of multiple ministries, being called “Comite (Committee)” usually.

While the approach to CDM is relatively slow, the potential of CDM projects is high. It is important to excavating existing projects in parallel with implementing capacity building for CDM in the promising fields. Energy conservation/fuel conversion/utilization of reusable energy in industrial plants such as food plants is identified as a promising field for CDM[12)].

12) Research Report for Kyoto Mechanism-Related Technology Proliferation Project in FY2004 (capacity building project at



Source: Kyoto Mechanism information platform

Figure 2.3.18 Flow chart of CDM approval procedure in Mexico

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.

(1) History of ESCO industry in the United States

ESCO business in the United States started as a venture business appeared under the influence of high crude oil price due to the 1st Oil Crisis in 1973 and the 2nd in 1979.

The ESCO providers in the initial phase were engineering consultants who offered energy audit service. They proposed improved energy system and improved energy management based on the details of the energy audit results. However, this was not established as a business. The origin of ESCO is the providers whom developed mere consulting services into project development services. In this process following approaches were taken: [1] business opportunity was expanded by performance contract that transferred investment risk from customer side to the provider, [2] proposal was made to allocate profits by reduction of costs through energy conservation to project cost. In 1980's, building management companies and control system manufacturers set up their energy service divisions that offered performance contracts and participated in ESCO business. In the same period, ESCO providers who took part in utility DSM programs started to be involved.

In 1990's, 5 categories of ESCO providers as below were seen:

CDM/JI host countries), March 2005, NEDO

[1] Vender ESCO: ESCO that have their origin in control system companies/building management companies. Johnson Control and Honeywell are the typical companies of this type.
[2] Equipment engineering ESCO: Companies that perform design and construction. Performance contract is provided based on the necessity.
[3] Utility ESCO: ESCO mainly funded by utility operators such as electric power companies. Active involvements with DSM programs are seen.
[4] Energy Consultant ESCO: Companies in ESCO industry who operate energy-related consulting services mainly
[5] Others: Companies in ESCO industry who are developers, IPP operators, etc.

The relaxation of regulations for utility business that started in California in 1998 caused significant changes also in ESCO business. While the orders for energy conservation renovation based on performance contract, a core business for ESCO, increased, its market share dropped, which necessitated the development of various services including energy supply. A characteristic change was the foundation of RESCO (Retail Energy Service Company). Especially in California, Pennsylvania, and New England, electric power companies founded RESCOs that take care of energy conservation and power supply with the purpose to address electricity rate collapse and market competition caused by relaxation of regulations. Acquisition of customers and expansion of business were the targets of these RESCOs.

While ESCO providers and utility operators can construct cooperative relationships such as those in DSM programs, ESCO providers could be rather bothersome for utility operators sometimes when ESCO providers intervene between customers and utility operators. This situation often happens when customers trust ESCO provider more than utility operator. The motivation of establishing RESCO may be attributable to the intention of utility operators who wanted to overcome such a situation and to address relaxation of regulations.

However, the pace of regulation relaxation was retarded and more and more electric power companies withdrew from RESCO business. During the period between 1998 and 2000, such drastic changes in the RESCO industry configuration was observed that totally new industry map was seen every 3 months due to consolidation, merger, and affiliation of RESCOs.

RESCO appeared in late 1990's with the relaxation of regulations. Enron Corporation is the typical company of this type. The Enron entered into many long-term contracts with customers, providing power/gas supply and energy conservation services for both industrial and service sectors. Enron was different from the conventional ESCOs in the point that its main market was outside the public market. At the beginning of relaxation, there were about 50 RESCOs providing commodity/billing services, though only about 10 of them have remained to this day.

As a result of escalated competition in retail market caused by relaxation of regulations, parties concerned returned to the performance services in these states (e.g. Texas, New Jersey, Massachusetts, New York), where their activities are focused on the public sectors.

Also, due to economic stagnation, majority of the 50 states has run into deficit, which leads to the situation where schools and universities are forced to cut down the funds. In such a trend, ESCO providers are forced to reduce their employees. On the other hand, necessity of investment in energy conservation, especially the necessity of the third party finance for securing the initial investment is recognized more than ever.

The energy conservation renovation with performance contract is still a core service in ESCO business. However, from around 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:

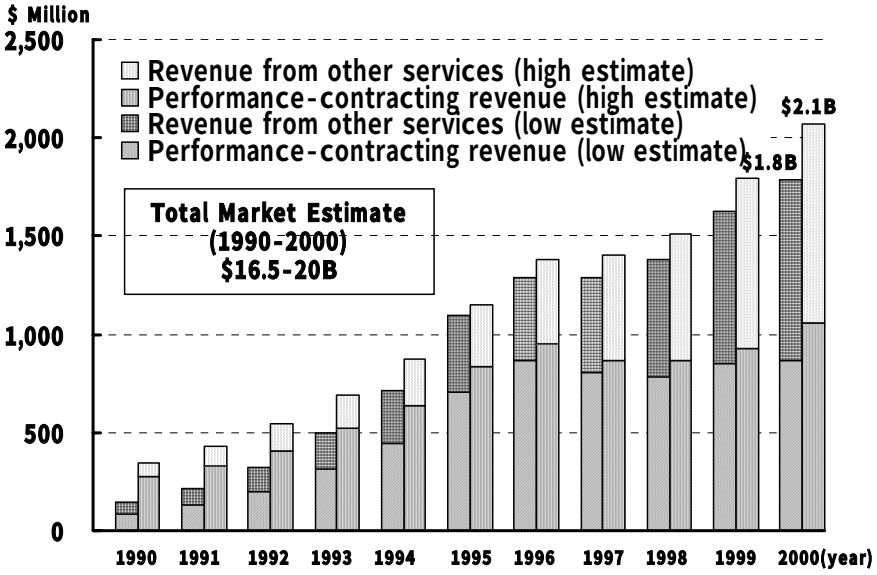
- Because the customers are beginning to understand the ability of ESCOs, they consider that guarantee and verification are unnecessary.
- IPMVP (International Performance Measurement & Verification Protocol) has penetrated.

- 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.

(2) 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. While no analysis result is available about the situation after 2000, the growth rate is slowing down. This can be attributable to the bankrupt of Enron and energy crisis in California, etc. Since the relaxation of regulations is suspended, customers find it difficult to tell the future of energy industry, which tends to cause hesitation in making judgment on investment. Further, while the size of the federal government market for ESPC (Energy Savings Performance Contract) was USD300 million in 2000, ESPC was suspended temporarily in September 2003 because it was based on the regulation effective only in limited time period. Although the effective period of ESPC was extended to end September 2006 in October 2004, there has been no project meanwhile (about 1 year), providers are pessimistic about the future of the federal market. Regarding the federal market, not only the market size but also its positioning in the federal laws has significant impact.



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 2.3.19 Changes in market size of ESCO industry in the United States

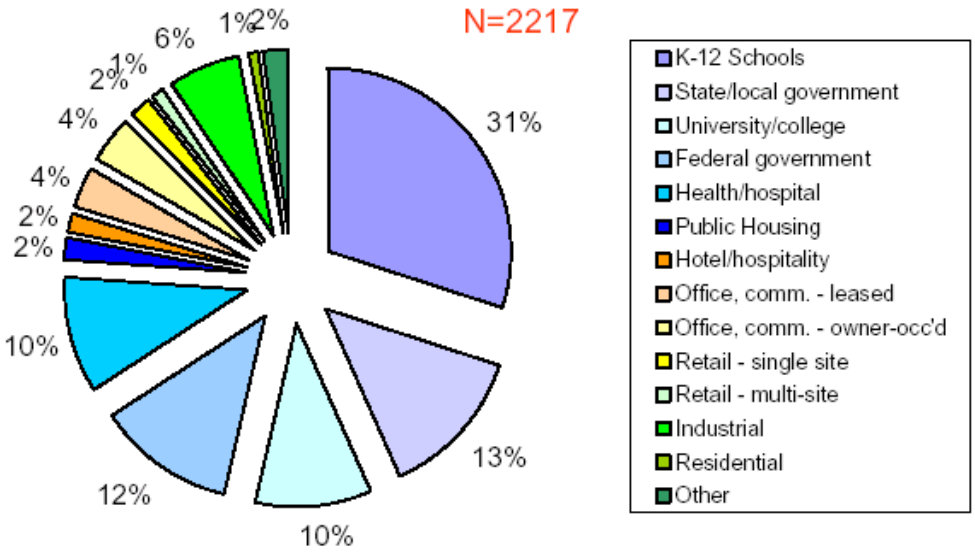
(3) Market characteristics

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.

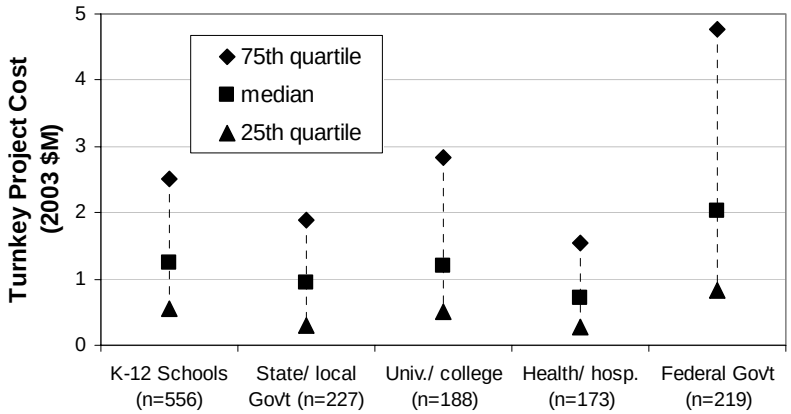
Comparing the median values of project costs in MUSH and federal market, the project cost for federal government is as high as USD2.04 million, followed by K-12 schools with USD1.25 million, healthcare and welfare with USD0.72 million. Further, the numbers of payback are 14.7 years for K-12 schools, 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. However, in the case of local government, each state needs to establish a system to allow introduction of performance contract. If no such a system is available in a specific state, it is difficult to close a performance contract itself. Even if such a system is available, some states allow long-term debt of up to 10 times. Due to such a system-related restriction, the payback number in MUSH market is short in comparison with that in federal government market.



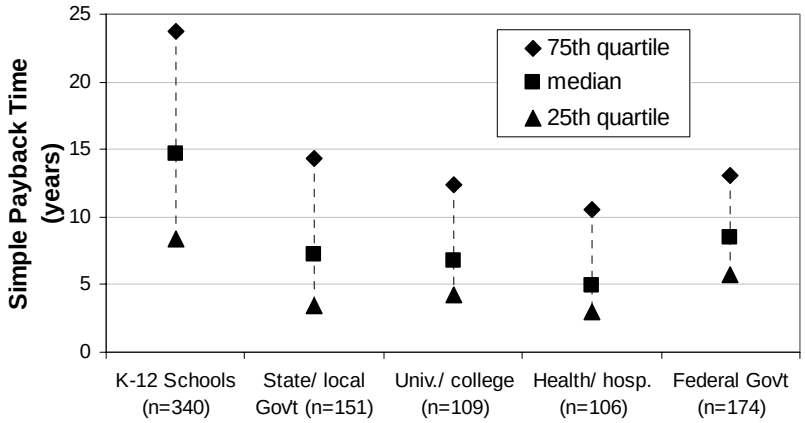
Source: C. A. Goldman, J. G. Osborn and N. C. Hopper, Market Trends in the U.S. ESCO Industry: Results from the NAESCO Database Project, May 2002, LBNL

Figure 2.3.20 Composition of ESCO market in the United States



Source : N. Hopper, C. Goldman and others, Public and Institutional Markets for ESCO Services: Comparing Programs, Practice and Performance, March 2005, LBNL

Figure 2.3.21 Turn-key cost for MUSH and federal markets



Source : N. Hopper, C. Goldman and others, Public and Institutional Markets for ESCO Services: Comparing Programs, Practice and Performance, March 2005, LBNL

Figure 2.3.22 Number of payback in MUSH and federal markets

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

The DNA for CDM in EU is the Directorate General Environment.

(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

In recent years, about 500 ESCO providers are engaged in activities and the accumulated amount of cost reduction is 3 billion Euro/year (more than 400 billion yen). Energy services have been introduced to 120,000 sites, which corresponds to about 9% of the potential market in Germany.
About the financial support to energy conservation, role sharing is observed in private sectors, where Eco-Bank is responsible for credit program, Energy Agency is responsible for efficiency check and power companies are responsible for renovation of boilers, etc. The government provides R&D programs, loan/funding schemes, and incentive programs for reusable energy.
Energy services in Germany is well developed, where contracts are comprised of three factors such as [1] contract for energy supply (ESC: Energy Supply Contracting), [2] performance contract (EPC: Energy Performance Contracting) and [3] contract for operation and management (EOC: Energy Operation Contracting). The contents of the services provided are exactly the same as those suggested in their names and nothing needs to be added. Among these three factors, the Energy Supply Contracting is the largest in number, occupying 80% of total number of contracts. The percentage of the performance contract is as low as 15% and the remaining 10% is for Energy Operation Contracting. Energy service business in Germany is expanding its market size. However, its core service is the energy supply, actually, and the performance contract is just a fraction of it.
The DNA for CDM in Germany is Umweltbundesamt-Deutsche Emissionshandelsstelle.

(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.
The DNA for CDM in Austria is Federal Ministry of Agriculture, Forestry, Environment and Water Management.

(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. In Hungary, there are six districts to which regulations are applicable. Within these districts, each electric power company is under control and prevented to develop the business in the field of energy services. Accordingly,

electric power companies will establish their ESCO outside the restricted districts in an attempt to expand their business in the field of energy services.

In Hungary, ESCO supports projects have been conducted so far by various international organizations including EBRD (European Bank for Reconstruction and Development), IFC/GEF (International Finance Corporation/Global Environment Facility), European Commission, and USAID (U.S. Agency for International Development), etc. Among them, HEECP (Hungarian Energy Efficiency Co-Financing Program) by IFC/GEF is a program that provides guarantee to the finance for energy conservation projects. This scheme provides the guarantee for a part of finance to private ESCOs, where 50% is guaranteed in the pilot project phase, and 35% is guaranteed thereafter. The objective of the scheme is to avoid credit risks and the reduction in procedural costs in the small and middle-sized projects. In Hungary, supports to develop ESCO have been conducted from various standpoints, in which economic stability and reinforcement of financing system are the important factors.

DNA for CDM in Hungary is not available yet.

(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. Cogeneration is called “a Trojan horse” for expanding market size. 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.

The DNA for CDM in France is Mission Interministérielle de l’Effet de Serre.

(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:

Outer wall of buildings, insulation of local heat piping, control, high-efficiency lighting, renewal of boiler, periodical check/maintenance, expedition and management of fuels, finance, guarantee of performance

Renovation on supply side:

Renovation of boiler room, fuel conversion, renovation of local heat and steam supply system, middle size CHP, expedition and management of fuels, periodical check/maintenance, finance,

guarantee of performance

New buildings:

Expedition of construction fund, turn-key service, operation/management, facility management

While a part of large scale ESCO providers expedite financing by themselves, ESCO providers tend to utilize TPF in general. In case of using TPF, customers negotiate only with ESCO instead of directly negotiating with finance provider to make the business feasible.

The DNA for CDM in UK is The Department for Environment, Food and Rural Affairs.

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.

Besides, energy price has significant relationship with the promotion of energy conservation. In some developing countries, energy is supplied with the price far lower than the market price because of the financial aids by the government. While it constitutes a part of given conditions, we do not refer to the manipulation of energy price here.

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 industry[13)].

(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

13) 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.

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 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.

Chapter 3

Discussion and Suggestion Based on Research Results

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

Development of the energy conservation market in the developing countries in Asia has just begun, and arrangement for the basic conditions has lagged behind. Tight power supply and skyrocketing crude oil prices led to growing needs for energy conservation. Efforts to address tight power supply are strongly asked by macro economy (e.g. decreased production efficiency). Movements towards energy conservation by the supply side are gradually being developed, but have not taken a clear form of specific actions yet. Soaring oil prices in recent years contribute to greater needs for energy conservation from the demand side. However, the current situation is that the market enjoying continuous economic growth puts the investment priority on the expansion of production, placing a possible increase in return on investment obtained by energy conservation in the secondary position. In other words, positive factors in promoting energy conservation are gradually increasing, but political leadership, intervention and assistance are essential to develop these trends into specific actions.

Under these circumstances, the ESCO is an effective approach to develop and lead the energy conservation market because it can offer a new financial scheme and provide a long-term credit business. It is critical to vitalize the overall energy conservation market, focusing on development of the ESCO industry. Fortunately, as this market in the developing countries in Asia is still so small that a new scheme such as the ESCO can be introduced at an early stage of creation and preparation of the market.

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 (regarding ESCO CDM, it is necessary to trace the results of the ongoing “Future CDM” projects discussed in 3.6).

(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.

Viewing from the mid-term perspective, we can undertake various programs while sequentially enrich their contents to develop the market.

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 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. The feature lies in continuous financial supports as described below:

[1] Phase 1 of WB/GEF
Achievements: creation of the ESCO providers, growth of the ESCO business
[2] Phase 2 of WB/GEF
Achievements: establishment of the ESCO Association, creation of new ESCO providers, development of the loan guarantee scheme

Generally, promotion of energy conservation largely depends on political supports and soaring energy prices. Supported by these factors, the energy conservation industry will be developed as the private business in equipment sales, construction, factory process and others. In most of the developing countries in Asia, however, the energy prices are politically controlled to be lower than those in the market, and development of energy conservation policies has been slow. Therefore, energy conservation in terms of the private business has not been progressed. On the contrary, the ESCO business differs significantly from other energy conservation businesses in that it makes the use of the technology and know-how and fund in the private sector. It is the performance agreement that realizes this. The ESCO business avoids performance risk by technology and know-how. This is an incentive for attracting investment in energy conservation. However, it will take a considerable time to understand this mechanism in the market and arrange the financial environment. China made a success in significantly reducing this period by providing financial supports 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. Exploitation of the ESCO industry in India features rather comprehensive programs conducted by the USAID and, at the same time, supports given by various international cooperation organizations, focusing on financial aids. As discussed before, a variety of programs should be implemented at the time of exploitation of the ESCO market. In India the USAID plays a critical role, while constructing cooperative relations with many related organizations. This will help prepare the environment allowing the necessary multiple programs to be developed in the future.

[1] Support by the USAID to create the ESCO industry
Achievements: establishment of ESCO providers
[2] Financial aids to IREDA, low interest loans to the ESCO project by WB, ADB and others
Achievements: 17 cases totaling 1.71 billion rupee (4.4 billion yen) in loans

3.1.4 Evaluation on Approaches in Malaysia

As discussed in 2.2.3, 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.
It should be noted that the ESCO type energy conservation promotion in Malaysia will be very prospective if such government aids are abolished. This is justified by the facts that (1) in Malaysia the SME (Small and Medium Enterprise) Bank provides low interest loans with an annual rate of some 5% for medium and small size companies, which means financial barriers have already been removed; (2) as discussed before, the MIEEIP contributed to gradual prevalence of the ESCO's concepts, etc.
To promote the ESCO type energy conservation in the future, it is essential to continuously accumulate the experiences gained from the model projects as implemented in the MIEEIP so that the ESCO related players including the ESCOs, clients and financial institutions may learn from the actual experiences of the ESCO project.

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 addition, the energy prices controlled lower result in constraints on the

actual promotion of energy conservation.
The ESCO business was introduced in the 1990s, as in China, India, Japan and others. However, necessity of energy conservation seems to have been strongly recognized since sharp rise in crude oil prices in recent years. Until that time, involvement of the international cooperation organizations in development of the ESCO business was limited. Rather, the ESCO business was probably developed within the scope of the energy conservation policies of Thailand itself.
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. There are strong expectations for the ESCO business, and the capacity development by the operators is beneficial. 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 ESCO Industry Related Resources in Japan and Abroad

The following shows the ESCO related resources in Japan and the important target countries.

Table 3.2.1 List of Main ESCO Industry Related Resources in China

Type	Organization	General
ESCO	Beijing EMC	The pilot ESCO of the WB/GEF. The comprehensive ESCO conducting every business related with the ESCO business. Their main client is the household sector (housing, business) with commercial buildings (hotels, restaurants, shopping malls and office buildings) accounting for 80% of the total. As for housing, the project is implemented on a housing complex basis.
	Liaoning EMC	The pilot ESCO of the WB/GEF, serving as the comprehensive ESCO. Their clients are the industry sector and the business sector, accounting for 70% and 30%, respectively.
	Shangdong EMC	The pilot ESCO of the WB/GEF, focusing on finance. Do not energy audit nor undertake renovation, but selects providers and makes arrangements for funds. The energy audit on a building is contracted to the external entity, and all renovation fitting for energy conservation is outsourced, with selecting the contractor by bidding. The clients are the industry sector and the household and business sector, accounting for 90% and 10%, respectively.
ESCO Association	EMCA	Established in 2004 in the phase 2 project of the WB/GEF. The current membership is about 100. Mainly engaged in the technical support including information exchange and training.
Public Organization	Department of Environment and Resource Conservation, the National Development and Reform Commission	Organization to supervise Chinese energy conservation policies.
	Energy Conservation Project Management Office of China, NDRC/WB/GEF	Administrative head office of the WB/GEF energy conservation projects. Management office of NDRC.
	ERI	NDRC Energy Research Institute engaged in research on energy conservation and the CDM and support for policy development.
	CNI&G	Provides loan guarantee for the ESCO business. The WB gives support.
	National Coordination Office for Climate Change, NDRC	DNA of the CDM in China.
Domestic Financial Institute	Bank of Beijing	Many ESCO loans under cooperation with CNI&G.

Table 3.2.2 List of Main ESCO Industry Related Resources in India

Type	Organization	General
ESCO	DSCL	Key player of ESCO in India. Also involves in the domestic ESCO market research under the ADB project.
	SSAE	Serves as the head office of the ESCO Association (ICPEEB).
ESCO Association	ICPEEB	India's first ESCO Association established in 2006. Fifteen members including the founding member ESCO. Engaged in planning of training, information exchange, standardization of ESCO contracts, M&V protocol and database development, having partnership with BEE, PCRA, FICCI and IREDA in view.
Industry Group	FICCI	Chamber of commerce and industry with more than 2,000 of membership. Has the Energy and Environment Unit. Very proactive with the ESCO business, having a successful experience with the ESCO project targeting the member company.
Public Organization	BEE	Energy conservation board under the control of Ministry of Power. Established in 2001 in accordance with the Energy Conservation Law. Involved in the overall energy conservation policies, but the number of staff is only 8. Actual work is outsourced to TERI and others. Future development is expected.
	PCRA	Research institute under the control of Ministry of Petroleum and Natural Gas. The number of staff is 72. Only covered energy conservation of oil in the early stage of establishment, but now deals with energy conservation of all kinds energy. Actively involved in development of ESCO business, and jointly hosted the 1st International ESCO Conference with FICCI in 2005.
	IREDA	Financial institute specializing in energy as a public limited government company. Provided low interest loans mainly for new energy initiatives as financed by the WB and the ADB from 1987, the year of foundation, to the middle of 1990. Then financed to energy conservation projects including ESCO as well. Key player in the financial area of ESCO business.
	MOEF	Ministry of Environment and Forests. Its National Clean Development Mechanism Authority is the DNA of the CDM.
Domestic Financial Institute	IDBI	Industrial Development Bank. Has operated funds related with the energy conservation projects of the USAID and the ADB. Holds its energy conservation fund as well.
	ICICI	Industrial Credit Investment Company. Operates funds of the USAID, WB and JBIC. Also operates the fund dedicated to energy conservation.
	SBI	The largest state bank in India with 6,000 branches throughout the country. Committed to operation of the UPTECH scheme which finances energy conservation projects of small businesses.
Private Research Institute	TERI	Energy research institute of Tata Group. Have considerable experiences with energy audit. Conducts research on DSM as well.
Electric Utility	AECo	Private electric utility in Gujarat. Has implemented the ESCO type DSM program under support by the USAID.

Table 3.2.3 List of Main ESCO Industry Related Resources in Malaysia

Type	Organization	General
ESCO	Zet Corporation	Key player of Malaysian ESCO. Plays a crucial role in the ESCO Association.
	Gading Kenchana	Company to which the chairman of the ESCO Association belongs.
	VY Cogeneration	Japanese ESCO. Has accomplished the minor ESCO project.
ESCO Association	MAESCO	There are 72 ESCOs registered. No organized activities have been conducted yet.
Public Organization	PTM	NPO in charge of energy conservation policies and review on the CDM related with energy conservation as well. Involved in MIEEIP.
	KTKM	Governmental supervising organization of PTM (Energy Commission).
	EPU	Higher organization of KTKM.
	Conservation and Environmental Management Division, Ministry of Natural Resources and Environment	DNA of the CDM.
	MIDF	Malaysian industrial development bank. Deals with MIEEIP financing to ESCO.
Industry Group	BCSDM	Malaysian International Chamber of Commerce and Industry. Actively committed to exploitation and promotion of CDM projects in Malaysia.

Table 3.2.4 List of Main ESCO Industry Related Resources in Thailand

Type	Organization	General
ESCO	EEI	Key player of ESCO in Thailand. Expected to play a crucial role in establishment of the ESCO Association in the future.
	Sumi Thai	Only one Japanese ESCO with several years of experience.
Public Organization	DEDE	Department of Alternative Energy Development and Efficiency, Ministry of Energy. Engaged in overall energy conservation policies and operation of the ENCON fund. Main body to promote ESCO business.
	ONEP	DNA of the CDM, but will be changed within 2006.
Domestic Financial Institute	TMB	Contact point for low interest loan of the ENCON fund. Directly connected with the market through loan facilitation services to the ESCO providers. Introduction of the loan guarantee system is now under consideration with the AFD.
Electric Utility	EGAT	Has been involved in dissemination and enlightenment activities of ESCO, management of energy audit by GEF, etc. Plans to enter ESCO business fully.

Table 3.2.5 List of Main ESCO Industry Related Resources in the Philippines

Type	Organization	General
ESCO	CPI Energy	Company to which the chairman of the ESCO Association belongs.
	Meralco Energy Inc.	Representative ESCO belonging to the ESCO Association. No actual experience of the ESCO projects.
	Cepalco Energy Service & Trading Corp.	Representative ESCO belonging to the ESCO Association. No actual experience of the ESCO projects.
ESCO Association	ESCOPhil	The number of membership is 15. No organized activities have been conducted yet.
Public Organization	DOE	Department of Energy. In charge of energy conservation, renewables, fuel conversion, etc.
	DENR	DNA of the CDM.

Table 3.2.6 List of Main ESCO Industry Related Resources in Japan

Type	Organization	General
ESCO Association	JAESCO	The secretariats are the Energy Conservation Center, Japan and Jyukankyo Research Institute Inc.
Public Organization	Energy Conservation and Renewable Energy Department, Ministry of Economy, Trade and Industry	All energy conservation policies.
	Global Environmental Affairs Office, Environmental Policy Division, Industrial Science and Technology Policy and Environment Bureau, Ministry of Economy, Trade and Industry	Involved in administration of the FUTURE CDM Project.
	Climate Change Division, Global Issues Department, Ministry of Foreign Affairs	DNA of the CDM.
	Office of International Strategy on Climate Change, Climate Change Policy Division, Global Environment Bureau, Ministry of the Environment	Involved in administration of activities related with the CDM (for Ministry of the Environment).
	Energy Conservation Center, Japan	In charge of enlightenment activities of energy conservation in Japan and abroad, etc.
	NEDO	Committed to assistance of energy conservation model projects; capacity building of the CDM acceleration program (for METI); CO_2 credit purchase.
	IGES	CDM capacity building (for Ministry of the Environment).
	JBIC	Yen loans and untied loans.
	JETRO	Energy conservation demonstration projects (J-FRONT).
Research Institute	Central Research Institute of Electric Power Industry	Energy conservation and research on the CDM.

3.3 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.

3.3.1 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. In the developing countries, the international cooperation organizations currently support some of them. 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, as mentioned in 2.4, 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 targets for which the ESCO type energy conservation promotion program of JICA should seek are described below:

<Project Targets>
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) Integration of the power development program with the promotion policies of ESCO and DSM in terms of the national cost minimum
4) Support for local development of ESCO

<Achievement Targets Corresponding with the above Targets>
1) Creation of programs to disseminate and enlighten the original concepts of ESCO business; benchmarking by sector; development of the related database; capacity building by the government and the ESCO Association; expansion of the related governmental programs
2) Development of measurement and verification guidelines, standard contract documents and technical and human exchanges assistance programs; provision of finance support programs including the CDM
3) Quantification of economic effects by the ESCO and DSM in the power supply program
4) Development of cooperative programs with the local governments and the network system for the ESCO related information

<Contents of Program>
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. This will be further discussed in 3.4. At the same time, the top priority should be put on the leadership based on the recognition by the government on the challenges, development of the master plan that considers the future targets, and fostering of the core human resources for promotion in order to get energy conservation on track.
      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 multidimensionality. 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 CO_2), 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 as seen in the supportive system to deal with the global warming (energy conservation + new energy are covered) in Japan and application of the ESCO type scheme to the solar power generation system in Laos, one of

electrification measures in the local areas, not to create a program specific to energy conservation only.

3) 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. The "DSM *plus* energy conservation/ESCO type" represented by the CFL program which can resolve this problem and promote energy conservation at the same time, that is, the mechanism that the cost required for introducing energy conservation product is recovered via collection of the electricity rates is expected to prevail and expand in the future. In the case of ESCO in relation with the international fund cooperation program to the developing countries, borrower's credit presents a problem. However, if a power generating company, a public power utility close to the government, with having credit worthiness is a borrower, this problem will be resolved in many cases. There are great expectations for expansion of the CFL program that has obtained successful results in some countries in the past and for the model linked with CDM discussed in 3.6. In addition, it is also prospected to develop the program which integrates the DSM program with the load leveling system (heat accumulation) and the electricity rate system (software) package prevailed in Japan and the energy conservation technology capable of contributing to power peak cut in the developing countries.

4) 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. (Chinese and Indian governments often demanded such supports.)

5) Collaboration with the international corporation organizations including JBIC
   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. The following figure is a scheme proposed by Electric Power Development Co., Ltd. as a model project of efficient cooperation with JICA and JBIC to contribute to energy conservation promotion in Sri Lanka:

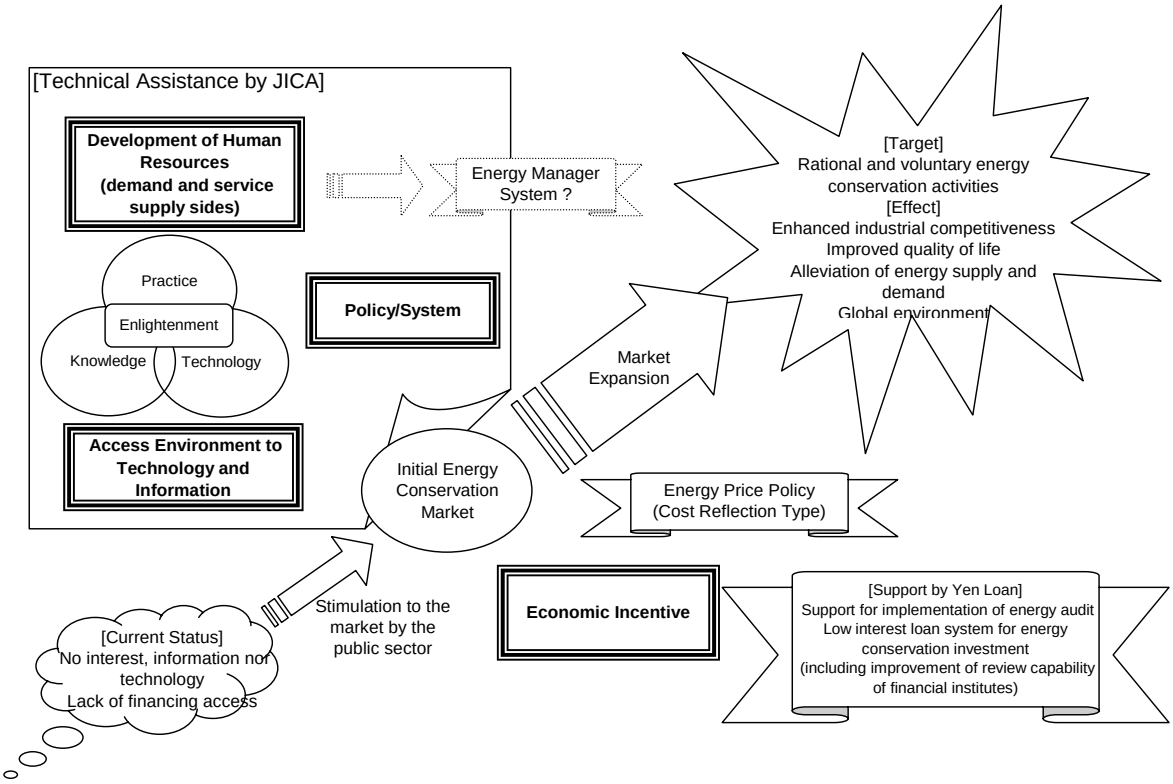


Figure 3.3.1 Example of JICA and JBIC Cooperation Model of Energy Conservation and Promotion Scheme in Sri Lanka

3.3.2 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 programs are proposed to China:

1) Establishment the 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. To meet this purpose, the adequate program will be developed, the brochures will be prepared and explanatory meetings will be held. The focus of these efforts is not limited to the ESCO providers, but owners of buildings or factories, managers of facilities and financial institutes.
   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: this is a major bottleneck in dissemination. With taking into account possible cooperation with JBIC, GEF and others regarding the program, attempts should be made to enhance technical reliability and efficiency in technical review.

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.
Measurement and verification are important to protect the interests of both ESCO providers and clients and to smoothly operate ESCO which is long-term credit business. Development of the guidelines is supported to disseminate and promote the measurement and verification technology.

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.
As the ESCO contract is not sometimes fulfilled, the standard contract document is prepared and published to observe it. At the same time, measures to address the breach of contract are examined.

f) Technical and human exchanges and development of business matching support programs for China and Japan's ESCO providers (Requirements from EMCA).
A several-day forum for China and Japan's ESCO providers and concerned parties is planned for case studies by China and Japan's ESCO business conductors, information exchanges on the current situations of ESCO business, direct information exchanges among ESCO providers and others.

g) Support for establishment of energy conservation CDM projects (ESCO, product CDM, policy CDM, etc.): this is the economic support element for the ESCO scheme as well as support element for Japanese companies to obtain credit. An approach to support development of the product CDM model similar to the ESCO scheme being developed by China and Japan as discussed in 3.6 is also promising.

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

h) 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. This also helps promotion of dissemination of the product CDM (Open type CDM) described in g).
In parallel with these, measures to introduce the DSM effective in promotion of energy conservation are examined (idea of IRP, Integrated Resource Planning).

4) Support for local development of ESCO

i) Reinforcement of project management of new local EMCs including Shanghai and western development area and support for development of the information network system: another promising program is to use and vitalize the local DSM centers or energy conservation centers established with support from UNDP-GEF.

(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. Under these circumstances, which organization should be selected for the JICA counterpart is the issue to be addressed in the beginning. [1] BEE is the governmental organization in charge of promotion of energy conservation, but has insufficient staff (8 at the time of research). They need organizational reinforcement and capacity building for the mid term. It is under jurisdiction of Ministry of Power. If BEE is chosen for the counterpart, support by the related organizations in the private sector such as TERI should be considered as a package. [2] PCRA has a variety of experiences with energy conservation and many personnel (about 70); however, it is not a

governmental organization dealing with energy conservation, but under jurisdiction of Ministry of Petroleum and Natural Gas. [3] The Chamber of Commerce and Industry (FICCI) are actively engaged in development and dissemination of energy conservation and ESCO, seeking for cost reduction and promotion of environmental practices. They have direct channels with the member companies and stand a neutral position against BEE and PCRA. Whichever is selected for the counterpart, BEE or PCRA, a torsional phenomenon might occur. This can be avoided if the Ministry of Industry/the Chamber of Commerce and Industry is determined to be the JICA counterpart. Therefore, as a result of research this time, we propose the Ministry of Industry/the Chamber of Commerce as the JICA counterpart. (Another cases that the chambers of commerce and industry were selected as the counterparts in the international cooperation programs on energy conservation or CDM include Kenya's energy conservation promotion program by GEF/UNDP and Malaysia's NEDO CDM promotion program.) 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)).
   Dissemination and enlightenment of the "Original Concept of the ESCO Business" would be most important. To meet this purpose, the adequate program will be developed, the brochures will be prepared and explanatory meetings will be held. The focus of these efforts is not limited to the ESCO providers, but owners of buildings or factories, managers of facilities, and financial institutes.
   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). Support for development of the related governmental policies: improvement in the energy conservation criteria and the labeling system is also an issue to be tackled with. Development of the building code, etc.
   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: this is the major bottleneck in dissemination. With taking into account possible cooperation with JBIC, GEF and others regarding the program, attempts should be made to enhance technical reliability and efficiency in technical review. Currently, financing processes are very time consuming. It is necessary to improve recognition of the ESCO business and develop guidelines for financing ESCO. The ESCO providers in India mainly consist of small and medium-sized companies. Therefore, the greatest challenge is to construct the scheme for smooth financing by securing credit of these ESCO conductors and reliability of energy conservation technology.
   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. Enhancement of project

creativity (especially, finance and legal knowledge) and support for promotion of success cases or information development. Support to hold conferences, seminars, and exhibitions.

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.
The standard contract document is prepared and issued. At the same time, measures to address the breach of contract are examined.

i) Support for development of measurement and verification guidelines.
Measurement and verification are important to protect the interests of both ESCO providers and clients and to smoothly operate ESCO which is long-term credit business. Development of the guidelines is supported to disseminate and promote the measurement and verification technology.

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

j) 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).

4) Support for local development of ESCO

k) 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. In particular, the local governments are facing financial crunch so that saving of utility costs has become a great subject.

(3) Malaysia

The only ESCO project in Malaysia was concerned with a saw mill. Moreover, this project was conducted in the framework of MIEEIP (Malaysian Industrial Energy Efficiency Improvement Project) implemented by Malaysian government, and 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.

Recently, PTM proposed introduction of the DSM measures to the electricity rates. However, TNB (an electric utility) has not taken any action and this proposal has remained untouched. 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)).
Dissemination and enlightenment of the "Original Concept of the ESCO Business" would be most important. To meet this purpose, the adequate program will be developed, the brochures will be prepared and explanatory meetings will be held. The focus of these efforts is not limited to the ESCO providers, but owners of buildings or factories, managers of facilities,

and financial institutes.

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: this is one of the major bottlenecks in dissemination.
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. Enhancement of project creativity (especially, finance and legal knowledge: joint experience) and support for promotion of success cases or information development. Support to hold conferences, seminars, and exhibitions.

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.

PTM may be suitable for the counterpart of the JICA supported program. The relationship among the related governmental organizations is shown below:

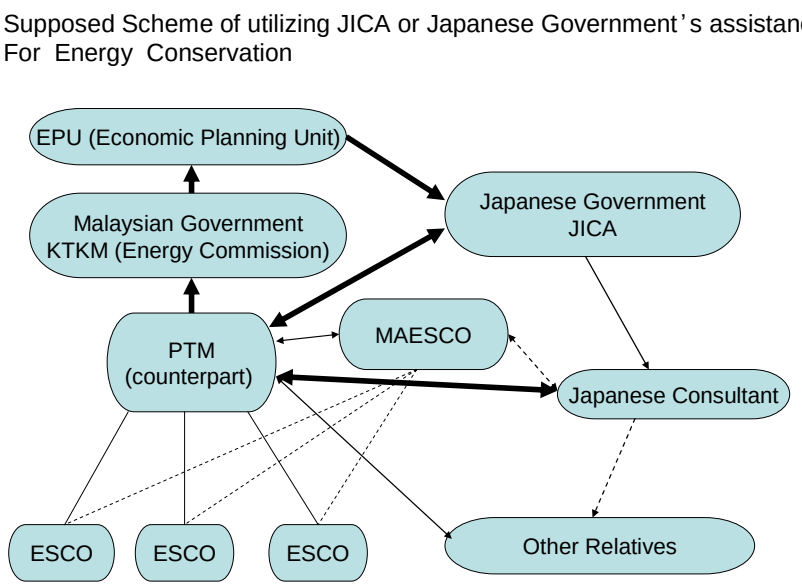


Figure 3.3.2 Proposed Scheme to Promote JICA Energy Conservation Program in Malaysia

(4) Thailand

As described in 3.1, 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)).
      Dissemination and enlightenment of the "Original Concept of the ESCO Business" would be most important. To meet this purpose, the adequate program will be developed, the brochures will be prepared and explanatory meetings will be held. The focus of these efforts is not limited to the ESCO providers, but owners of buildings or factories, managers of facilities, and financial institutes.
   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, development of base activity programs (dissemination and enlightenment, including promotion of a success model (such as introduction of tax systems to support ESCO)), or capacity building of DEDE.

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.
      Measurement and verification are important to protect the interests of both ESCO providers and clients and to smoothly operate ESCO business which is long-term credit business. Development of the guidelines is supported to disseminate and promote the measurement and verification technology.
   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

As discussed in 3.1, 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)).
      Dissemination and enlightenment of the "Original Concept of the ESCO Business" would be most important. To meet this purpose, the adequate program will be developed, the brochures will be prepared and explanatory meetings will be held. The focus of these efforts is not limited to the ESCO providers, but owners of buildings or factories, managers of facilities, and financial institutes.
   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: this is the greatest bottleneck in dissemination. With taking into account possible cooperation with JBIC, GEF and others regarding the program, attempts should be made to enhance recognition of ESCO business and develop the guidelines for financing ESCO. The ESCO providers mainly consist of small and medium-sized companies. Therefore, 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. (The current DOE budget for energy conservation promotion represents only 24 million yen/year.)
   e) Support for development of the base activity program of the ESCO Association (dissemination and enlightenment) or capacity building of DOE/ESCO.

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. Enhancement of project creativity (especially, finance and legal knowledge: joint experience) and support for promotion of success cases or information development. Support to hold conferences, seminars and exhibitions.
   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.
      As the ESCO contract is not sometimes fulfilled, the standard contract document is prepared and published to observe it. At the same time, measures to address the breach of contract are examined.

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).

Table 3.3.1 Summary of New Cooperation Proposal Focusing on ESCO Type Energy Conservation

	Common	China	India	Thailand	The Philippines	Malaysia	Sri Lanka
Support for collection and analysis of current status data on economic background/technology/ finance	AA	AA	AA	AA	AA	AA	A
Support for assumption of energy conservation and ESCO market and determination of governmental target, dissemination and enlightenment of "Original Concept of ESCO Business"	AAA	AAA	AAA	AAA	AAA	AAA	AAA
Promotion of dissemination of success models (to companies, financial institutes and customers)	A	AA	A	A	AA	A	A
Support for establishment of ESCO Association and their activities	A	A	AA	AA	AA	A	A
Support for improvement of the related governmental programs (including enhancement of efficiency of financing technology review)	A	A	AA	A	AA	A	AA
Support for development of success model project and training on consistent processes of audit, contract, M&V, and O&M	A	AA	AA	AA	AA	AA	AA
Support for development of energy conservation CDM methodology	A	AA	AA		A	A	A
Support for development of optimistic benchmark of ESCO	A		A		A	A	A
Support for preparation of standard contract document, legal system and practical training on a contract	A	A	A		A		A
M&V training	A	A	A	A	A		
Support for quantification of economic effects by ESCO and DSM in power supply program and establishment of energy conservation promotion scheme linked with DSM measures (introduction of viewpoint of IRP)	AA	AAA	AA	AA	AA	AAA	A
Support for local development of ESCO		A	A				
Support for establishment of related financial system							
Support for establishment of loan guarantee (credit guarantee system)	A	AA	AA	A	AAA	A	
Composition of low interest finance	A				AA	A	AA

AAA: Most important AA: Very important A: Important

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

The development of the ESCO market in Asia started in the 1990s. Countries like Japan, China, India, Thailand, etc. initiated a study for the implementation of ESCO business roughly around the same time. The estimated market scale at present is: Japan: 30 - 40 billion yen/year; China: 20 billion yen/year; Thailand: 2 billion yen/year; India: several hundred million yen/year; and Malaysia and the Philippines: the market is not yet formulated. Therefore, the total ESCO market at present with all of the above combined is still far from 100 billion yen/year. However, these values should not be compared on the same level, because the values of Japan and China include those of ordinary energy conservation renovation contracts; because the value of Thailand is limited to that of performance contracts only; and because the data of Japan were collected not from the entire nation but from the JAESCO members only. Although grasping of the market scale data is an imminent task, what is clear now is that the ESCO market in Asia has just begun to develop. Various problems must be surmounted as these countries venture into the energy conservation market, particularly energy conservation retrofit of existing facilities, which has been said to be a difficult field.

Particularly, in the developing countries in Asia, emphasis has been placed on the pursuit of economic growth and the development of power sources rather than energy conservation policies. The fact that these countries began to pay attention to ESCO business and put them as the core of energy conservation efforts clearly indicates the advantages of ESCO business, but a wide range of measures must also be taken concurrently for the promotion of ESCO business. Indicators related to energy conservation and ESCO are described in Table 3.4.1. It is known from the table that the underlying environment for the implementation of ESCO business, such as the level of electricity tariff and availability of an energy conservation law, differs in each country. Also, the development level of an ESCO association and the current status of specific measures for ESCO promotion are also different in each country.

Because of a huge population, increase of energy consumption has been a major problem in China and India. Having a very large energy saving potential, these countries are considered as a highly promising ESCO market in the near future. In those countries, a variety of ESCO support programs have been implemented with the support of international organizations. As to their results, ESCO market development programs in China have been successful, whereas those in India have not yet yielded a substantial result.

In the meantime, Thailand has been developing an ESCO market mainly utilizing the country's own systems. The obtained results are not yet comparable to those of China, but ranked ahead of India. In Malaysia, ESCO development programs have been implemented, but the results are not yielded. In the Philippines, the ESCO market is virtually untouched. Although ESCO business is mostly undeveloped in both Malaysia and the Philippines, their reasons differ significantly. In Malaysia, the Pusat Tenaga Malaysia (PTM) (Malaysia Energy Center) exists as the organization in charge of energy conservation promotion and an adequate level of staff and programs are available, but the extremely low energy price is discouraging a motivation of energy conservation. In contrast, in the Philippines, although the ESCO potential is considered rather high because of extremely high energy price, the financial environment is very poor and no effective ESCO support programs available.

Based on such background, the points to be remembered when extending cooperation for ESCO type energy conservation promotion are described below.

For reference, several indicators related to energy conservation and ESCO in various countries are shown in the following table.

Table 3.4.1 Energy conservation and ESCO-related indicators in each country

Country	Population (million)	ESCO market (2004) (million yen /year)	ESCO association	Electricity tariff (commercial /industrial) (yen/kWh)	Energy conservation Law	ESCO-related energy conservation policies	Energy conservation training	Loan guarantee	ESCO market (predicted)	JICA counterpart	Primary international cooperation organization	Response to CDM
Japan	120	30,000 - 40,000	Yes	18	Yes	many	Yes	No	Yes	—	—	—
China	1300	20,000	Yes	10	Yes	Few	Few	Yes	Yes	NDRC	GEF, WB	✓✓✓
India	1100	Several 100	Yes	11	Yes	Medium	Medium	No	Yes	FICCI, BEE or PCRA	USAID, GEF, WB	✓✓✓
Thailand	60	2,000	No	9 or more	Yes	many	Medium	Planned	Yes	DEDE	GEF	✓
Philippines	90	0	Yes	20 or more	No	Few	Few	Planned	No	DOE		✓✓
Malaysia	30	One project (biomass cogeneration)	Yes	6 - 7	No	Few	Few	No	No	PTM	GEF	✓✓
Sri Lanka	20	Several 10	No	16 or more	No	Few	Few	Yes	Yes	ECF	UNDP, WB, JBIC	✓✓
Kenya	30	0	No	7 or more (1999)	No	Medium	Medium	No	No	MTI	GEF, UNDP	✓✓
Cambodia	13	0	No	18 or more	No	Few	Few	No	No	MIME	JETRO	✓✓

3.4.1 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.

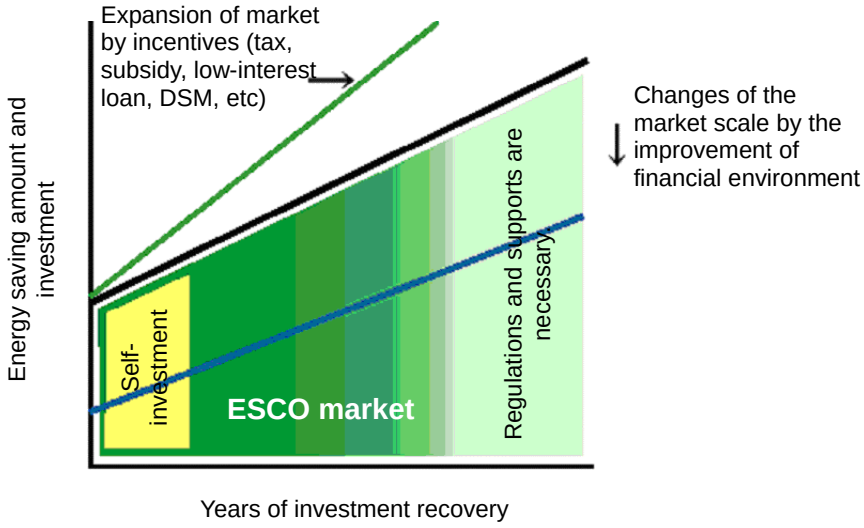


Figure 3.4.1 Market to be targeted by ESCO

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.

In particular, the ESCO market in China is too much inclined to a short-term payback. Although the market can expand with only the projects of short-term payback in the case of initial development stage, it will reach a deadlock sooner or later. Therefore, it is very important to start nurturing the market of a medium-term payback from an early stage.

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.

3.4.2 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 which were mentioned in 3.3.2 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.

3.4.3 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.

3.4.4 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."
- Although the ground for ESCO development is being established, as seen in the promotion of ESCO business through national policies (BEE) and set-up of the ESCO association in 2006, the independent development of the ESCO industry is still impeded by the situations such as: the number of ESCO providers is small (about 15 companies); many of them remain in the level of a retailer of energy efficient equipment; and financial institutions have little understanding of ESCO schemes. Since no problems exist with regard to the technological ability of energy-field companies and the fund availability of financial institutions, it is important to advance their utilization to ESCO business. Although many ESCO projects have been implemented with the support of international cooperation organizations, the actuality is that energy audit programs and financial programs are implemented individually without any coordination between them. Therefore, what is needed from now on is the international cooperation towards the implementation of comprehensive programs.
- 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.
- Large needs exist for the formulation of programs to promote information/human resources exchange between India and Japan.
- 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.
- The ESCO industry in India is still immature. To make it fully functional, it is necessary to strengthen an ability of proposal submission and project management, to support a formulation of finance, and to establish a project model specifically designed for small and medium-sized companies.
- Coordination with other international organizations on the allocation of responsibility is needed. In addition, general coordination with a plural number of organizations in Japan, which are concerned with energy conservation promotion, is needed (Coordination by the Office of International Cooperation Promotion of the Ministry of Economy, Trade and Industry is expected).
- The Indian Government may be intending to submit a request in this fiscal year. Therefore, it is necessary to determine which organization in India, BEE, PCRA or FICCI, should be made central when drawing up programs.
- 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.

3.4.5 Points to note on ESCO promotion in Malaysia

- Although the ESCO association and the Pusat Tanaga 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.

3.4.6 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. Presently, dissemination and enlightenment activities are insufficient because the entities undertaking those activities are few. It is important to vitalize the budding ESCO market by holding events like seminars, conferences, and exhibitions consecutively.
- 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. At present, Japanese companies are still an uncultivated market and therefore active cultivation of this market may be effective. As ESCO providers in Japan are considering to enter into the overseas market, market development mainly with Japanese companies in Thailand may be effective.

3.4.7 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.)

3.5 Matters to be Incorporated into JICA Thematic Guidelines on "Energy Conservation"

The ESCO business realizes the energy conservation renovation of existing facilities and equipment through private business structure based on market principles, an attempt which has been thought difficult to perform. Therefore, it has features different from those of ordinary energy conservation measures. In the current research, JICA's new cooperation projects taking ESCO's features into consideration were proposed. In this division, the matters to be incorporated into the JICA Thematic Guidelines on "Energy Conservation" (the English version) are extracted from the results of the current study and analysis. The matters to be added or revised in the JICA Thematic Guidelines on "Energy Conservation" are shown below.

1-1 Definition of Energy Conservation

- The sentence "April 2006, Law Regarding the Rationalization of Energy Use was revised (3rd time)" is added to the table in P.13.

- Partial revision of the table in P.17

  <Revision> [Type 1 designated energy management factories]: The underlined sentence is added and the double-lined sentences are deleted.

Target: All types of industry ~~Fuel consumption; more than 3,000kl/year (crude oil equivalent)~~ ~~Electricity consumption; more than 12,000,000 kWh/year~~ ~~About 5,200 (as of the end of March 2004) factories and plants~~ Heat and electricity consumption: more than 3,000kl/year (oil equivalent)

- Partial revision of the table in P.18

  <Revision> [Type 2 designated energy management factories] : The underlined sentence is added and the double-lined sentences are deleted.

Target: All types of industry ~~Fuel consumption; more than 1,500kl/yer (crude oil equivalent)~~ ~~Electricity consumption; more than 6,000,000 kWh/year~~ ~~About 6,400 (as of the end of March 2004) factories and plants~~ Heat and electricity consumption: more than 1,500kl/year (oil equivalent)

2-2 Effective Policy Approaches to Energy Conservation

- Comment on the support to the establishment and administration of core entities is added to P. 36.

  <Revision> The underlined sentences are added.

2-2 Effective Policy Approaches to Energy Conservation Based on the experiences of Japan and other countries, this section outlines the effective policy approaches in order to achieve energy conservation in general. In addition, approaches this section deal with is defined as "approaches by policies", which is positively implemented by governments, and energy conservation approaches mainly by the self-help efforts of private sectors are excluded here, unless they are controlled by the policies. The main three points of effective policy approaches concerning energy conservation are as follows. [1] Establishing energy conservation systems Establishing a system to take advantage of human resources inside factories and a system to utilize outsourcing services. [2] Implementation of administrative services relating to energy conservation Implementation of training courses, EA for factories, and activities of publicity, awareness, and dissemination. [3] Promoting the energy conservation business market Promotion of ESCO business and improvement of business environment of the market In regards the aforementioned relationship, the matter in [1] is a framework, and the matters in[2] and

[3] are the individual measures that are positioned in the framework. It should be noted that the methods in [2] and [3] will be fundamentally differentiated depending upon the form of the matter in [1].
To implement these policy approaches effectively, core entities such as an energy conservation center or an ESCO association are necessary. Because such entities may not be established or may not be conducting effective activities due to budgetary constraints or others in some countries, it is effective to provide support for the establishment and administration of such entities.
The systems are roughly divided into two types: the system based on laws and regulations and on market principles. The former is well adopted in Japan and the tendency of the latter is strong in Europe and the U.S. The frameworks of promotion of energy conservation differ depending on countries. Thus, when it comes to a concept of effective policy approaches, the structure of framework for promotion of energy conservation ([1] above) should be conceived first. And then, each measure ([2] and [3] above) concerning implementation of energy conservation services by governments and promotion of activities of enterprises and markets for energy conservation should be reviewed. This particular "order" is important.

2-2 (1) Policy approach 1: Establishing a System for Energy Conservation

- Comment on the coordination between electric power development plans and the promotion policies of ESCO and DSM in terms of national cost minimum is added to P.37.

<Revision> The underlined sentence is added.

(1) Policy approach 1: Establishing a System for Energy Conservation
The most fundamental step for energy conservation is to establish a system to promote energy conservation, so that the government policies are disseminated to all implementing institutions of energy conservation through the system.
The experience of Japan tells us that an energy conservation system functions well when its contents are continuously revised in accordance with the changes in the society. Energy conservation has a close relationship with various elements in society, also. Thus it cannot be achieved only by adopting a single measure (for example, just introducing subsidies for energy conservation investment). It is important to implement mixed measures so that the system of energy conservation for the entire society may function.
As the measures to alleviate a short supply of electricity in developing countries, measures such as quantification of an economic effect by ESCO/DSM in the power development plan and establishment of an energy conservation promotion scheme linked with DSM measures (introduction of an integrated resource planning (IRP) viewpoint) are effective.
The most suitable system for a country varies depending on conditions of each country.
In Japan, improving equipment efficiency by Energy Manager system or by Top Runners, have proved to be highly effective. However, these are not globally common methods.

2-2 (2) 2) Energy Audit (EA)

- Comment on establishing a database of energy audit results and their analysis is added to P.39-40.

<Revision> The underlined sentences are added.

2) Energy Audit (EA)
EA is a service offered to factories to clarify the actual amount of energy consumption and to give advice on consumption practices. The steps to achieve energy conservation are shown in Figure 2-2.

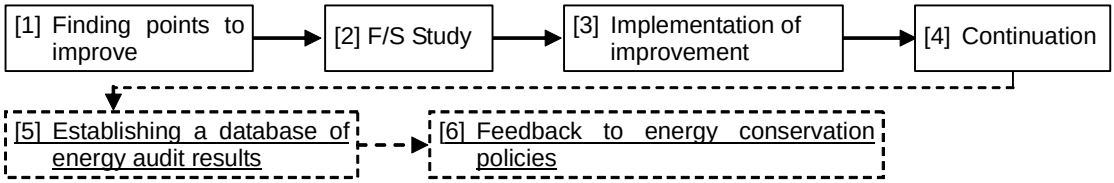


Figure 2-2 Steps to implement energy conservation

One of the points to be improved in [1] can be an appointment of Energy Manager. When a factory is

well managed by an Energy Manager, it is not difficult to find out points to be improved. When an employer wants to cut the cost for personnel and did not hire an Energy Manger, and when the factory does not have suitable technology, nor properly manages, then it will be difficult to find improvement points.
In such a case, an effective approach for promoting energy conservation is to invite external energy auditors. Energy auditors will assess ongoing energy management and define points to be improved. After the factory is visited by an energy auditor, the procedure will be as follows:
[2] feasibility study, a study for financial viability, [3] implementation and [4] continuation.
In addition, establishing a database of energy audit results makes it possible to identify the energy saving potential of the target country. It is also usable for the development of basic data for evaluating the needs of technologies, human resources, and funds, and therefore it can provide an effective judgment base for formulating energy conservation policies.
Implementing procedures of EA are generally as follows.

Table 2-1 Implementing procedures of a diagnosis of energy conservation

Order	Step	Item of implementation
5	Establishing a database of energy audit results	The results of 4 are complied into a database and then used for the analyses of an energy saving potential and the needs of technologies, human resources, and funds.
6	Feedback to energy conservation policies	The results of 5 are utilized for energy conservation policies as a feedback.

(1 - 4 are omitted. 5 and 6 are added.)

2-2 (2) 2) Energy Audit (EA)

- Comments on the characteristics of ESCO business are revised and added in P.41.

<Revision> The underlined sentences are added and the double-lined sentences are deleted.

~~In many cases,~~ ESCO plays an active role in the household sector the most, and then in the industrial sector in the case of the U.S. This is because there is a great deal of energy consumption in the household sectors (specially, in buildings) in general, where there is commonality and simplicity in the technical contents, and because the ESCO market in the U.S. has historically been developed with the public sector as its center. In contrast, the industrial sector uses varieties of facilities and production processes in different business. Therefore, they use different methods of energy conservation for each type of industry. Furthermore, in order to implement detailed EA that covers the production processes, a highly technical level of expertise is required for energy auditors.
Also, normally, the production process of the factory involves a trade secret that should not be disclosed externally. ~~Thus, it is difficult for private sector to gain enough profit only from ESCO business for their survival. Therefore, initially, it would be more effective the government to initiatively provide such services at low costs.~~

But, the primary ESCO market in developing countries is the industrial sector in most cases. This is because the industrial sector has a large energy saving potential even in the utility area such as around the heat source, and because many processes of the utility area can be improved with the know-how of ESCOs, unlike the production processes area which require some special know-how.
~~It should be noted that ESCO's advice specializes in effective energy conservation for the company to make profits in a short run, not in a long run like advice from the government. Thus, important issues to be tackled in mid-to-long term remain unsolved, making the company's policy rather unbalanced.~~
Although ESCOs in developing countries are mostly engaged in the business of short-term payback work, the market to be targeted by ESCOs should be the work of medium-term payback with a payback period of about 10 years. Then, short-term payback work is regarded as the strategic work to improve the economical efficiency of the work having a longer payback period. Since the ESCO market will be limited in development if only the short-term payback work are targeted, it is important to implement comprehensive projects which contain work having a long payback period. It is essential to disseminate this kind of characteristics of ESCO business not only to ESCO providers but also to clients.
Approaches where EA is implemented by a private sector through market mechanism are stated in [3] Policy approach 3 as below.

2-2 (2) 3) Publicizing and Disseminating Information about Energy Conservation

- Comment on the characteristics of ESCO business is added to P.41.

<Revision> The underlined sentences are added.

3) Publicizing and Disseminating Information about Energy Conservation

In order to promote energy conservation, it is effective to establish an energy saving activities' framework. At the same time, it is also important to ensure a change in the attitude of energy consumers and to promote voluntary activities of energy conservation through performing the activities of publicity, awareness, and dissemination of energy conservation.

Especially, publicity such as creation of a web page enables broad promotion of energy conservation to the public at substantially less cost. Therefore, this is highly cost effective approach.

In addition to the above, in the case of ESCO which are a long-term credit business, establishment of a business practice holding contracts at its core for avoiding a financial risk will enable expansion of the market. For that purpose, publicity of the contents of contracts is needed and related dissemination and enlightenment are important.

Note: With regard to a long-term credit business, avoidance of the default risk of clients is also important. Development of a loan guarantee system is effective for this.

2-2 (3) Policy approach 3: Vitalizing Energy Conservation Market

- Comment on capacity development is added to P.43. The world "Malaysia" is deleted from the sixth line of P.43 (The GEF project in Malaysia is not fully successful).

<Revision> The underlined sentence is added and the double-lined word is deleted.

(3) Policy approach 3: Vitalizing Energy Conservation Market

The government extends support to promote the energy conservation activities mainly undertaken by private sectors. Especially, it is important to enable EA to be disseminated through the use of the market mechanism in the private services, with provision of supports from the available policy measures. That is to say, promotion of ESCO business and creation of support for the market are necessary. In order to establish and continue the ESCO market, continuous policy measures are required through the following procedures. The experience of policy adoption for the introduction of the ESCO business into Japan's market has allowed us to review the promotion methods of the business so far. There is more room to cultivate further effective approaches by reviewing the projects of ESCO leading countries in Europe and the U.S. as well as GEF's assistance programs of ESCO, which has been successful in ~~Malaysia and~~ China, etc.

1) Formulation of Policies, Research on Past Cases, Market Survey
   (Omitted.)
2) Introduction of ESCO Business as Model Projects, Research and Survey
   (Omitted.)
3) Capacity Development

It is effective to prepare guidelines and standard contract forms for measurement and verification (M&V) and to disseminate technologies and know-how specific to ESCO business, on the basis of accumulated experience of model projects and of ESCO business in developed countries such as Japan.

3-1-1 (1) 1) Development Research for Master Plan on Energy Conservation System

- Comment on the establishing a database of energy audit results is added to P.44.

<Revision> The underlined sentence is added.

1) Development Study for Master Plan on Energy Conservation System

In development studiesresearch, JICA will perform comprehensive survey of the current situations, backgrounds, and potential of energy conservation in developing countries and formulate a master plan, the countries can utilize as guidelines for their development policies. When governmental agencies such as Energy Conservation Center in the developing countries are dealing with energy conservation, it would be effective to provide the agencies with machines and equipment for Energy Audit, since it would enable the agencies to visit and provide EA for the plants of high energy consumption. Performing EA would generate the following three advantages: [1] The contents of a master plan become more realistic. [2] EA technologies are transferred, [3] the audited institution can save energy as

a result of EA.
In addition, establishing a database of energy audit results and analyzing them can produce positive effects, such as an estimation of energy saving potential and a study of new policy issues to be returned to the master plan as a feedback.

3-1-4 Points to Note upon Cooperation

- Comments on the utilization of CDM and Japanese subsidiaries are added to P.57.
  <Revision> The underlined sentences are added.

(4) Utilization of CDM
Utilization of CDM for energy conservation in developing countries can bring positive effect to the economy. At present, to introduce CDM for energy conservation, several attempts such as Product CDM, Policy CDM, ESCO, CDM, etc. are being performed by various entities, like an international working group including Japan. Therefore, it is highly likely that a more general-purpose model will be laid out in the near future. It is effective to consider the possibility of CDM introduction when energy conservation projects in developing countries are planned.
(5) Utilization of Japanese subsidiaries
Although it is not necessarily true that Japanese subsidiaries in foreign countries are positive about energy conservation, they may be more receptive to the energy conservation incitement from Japan. It is important to achieve overall energy conservation in the target country in the ultimate stage, but as to the initial stage, it may be effective to create a model case with Japanese subsidiaries as its core, because successful cases in developed countries have an impact on energy conservation promotion in that stage.

Note: Related item: P.58, Item 3-2-2 Promotion of Partnerships in the Related Fields, (1) Countermeasures against Global Warming

3-2-4 Establishment of Performance Measurement for Programs and Projects

- Comment on the advantages of ESCO is added to P.59.
  <Revision> The underlined sentence is added.

3-2-4 Establishment of Performance Measures for Programs and Projects
In the past technical cooperation on energy conservation, the evaluation of projects was based on the number of inputs, such as “the number of trainees taking courses and of factories receiving EA”. In recent years, however, the Result-Based-Management is being introduced in JICA, and thus, it is necessary to establish performance measurement for evaluating energy conservation, which, for instance, indicates the unit(s) of energy conserved in a country. The measurement can be applied to programs, which is possibly operated in the long run, while its introduction to projects seems more difficult due to its relatively limited operation period.
In particular, as ESCO projects conduct measurement and verification (M&V) to grasp an energy saving effect, quantitative grasp of this effect is possible.

- Comment on the collaboration with JBIC is added to P.58.
  <Revision>The underlined sentences are added.

(2) Other relating fields of energy conservation
The information of energy conservation projects has not been sufficiently exchanged between JICA and other organizations such as NEDO, the World Bank, and others presented in Chapter 1. JICA is expecting to have partnerships with them. The weak relationship between donor organizations is sometimes seen even in countries where similar types of projects are implemented for the same counterparts (example case is in Thailand). For the promotion of ESCO business, formulation of a low-interest loan from international financial institutions like JBIC is effective. Therefore, it may be useful to provide a JICA technical cooperation program as a packaged program to ensure efficiency of the loan review process. In the future, especially in Asian countries where various types of projects are mixed, building a strong partnership would lead to future success of projects.

3.6 Outlook on the Collaboration with the Clean Development Mechanism

3.6.1 Energy conservation actions related to the Kyoto Mechanism

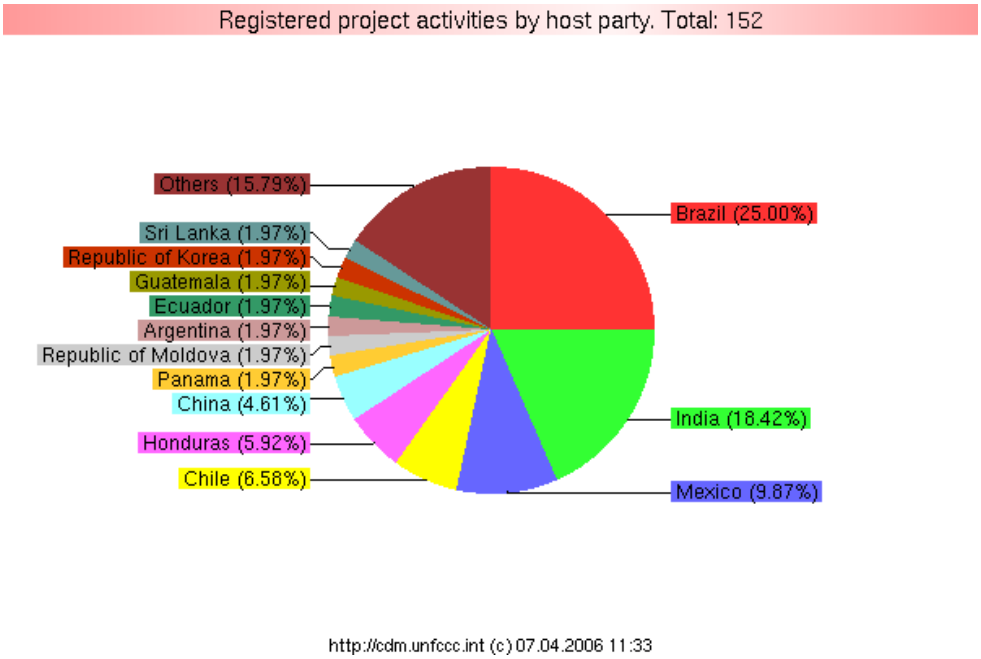
Concerning the Clean Development Mechanism (CDM) in general, international rules have been developed to some extent and the number of CDM projects registered at the U.N. has grown to 152[14] (as of early April in 2006) mainly in the fields of HFC-23, N_2O, and LFM. On the other hand, the number of registered CDM projects in the energy conservation field is still few, only 3 large-scale projects and 6 small-scale projects[15]. 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

Figure 3.6.1 shows the number of U.N. registered CDM projects by host country. Figure 3.6.2 describes expected annual CERs by host country which are obtainable form the registered CDM projects (as of early April 2006). In terms of the number of registered projects, Brazil is ranked first followed by India. But, the ranking of expected CERs is in order of China, Korea, Brazil, and India from the top.
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 CO_2 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. Both Chinese and Japanese governments are strongly expecting the promotion of energy conservation CDM projects.

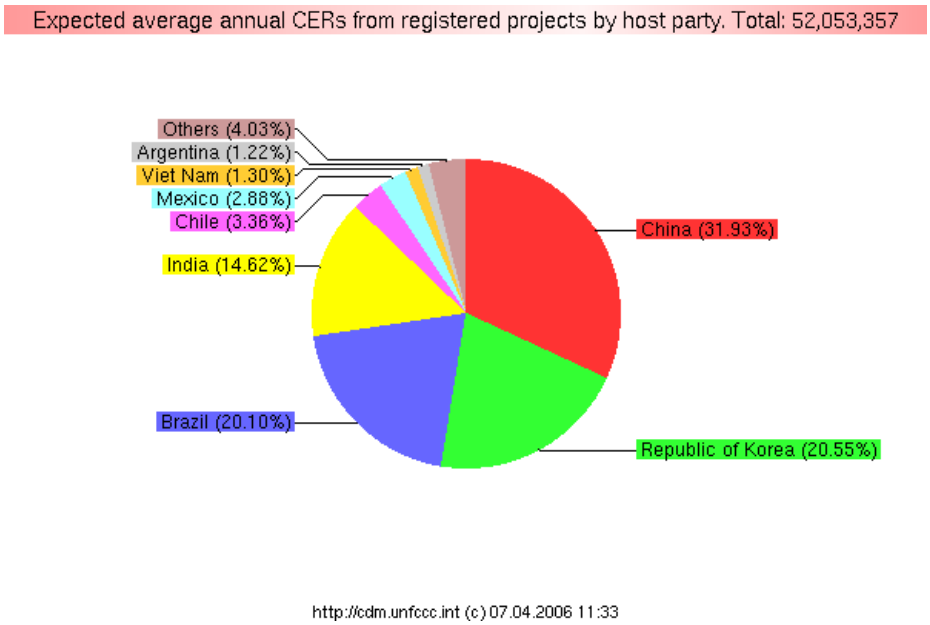
14) The environment around the CDM is constantly changing with an eye on 2010. The latest information as of early April 2006 was described in this report, but see the latest information at the following URL when citing values, etc.: http://cdm.unfccc.int/Statistics/

15) 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).



Source: Website of the United Nations Framework Convention on Climate Change (UNFCCC) on CDM

Figure 3.6.1 Number of registered CDM projects by host country



Source: Website of the United Nations Framework Convention on Climate Change (UNFCCC) on CDM

Figure 3.6.2 Expected annual CERs from registered projects by host country

Some of registered methodologies of energy conservation CDM Projects are shown below.

(1) Steam system efficiency improvements by replacing steam traps and returning condensate (AM0017)
(2) Steam optimization systems-reduction of steam consumption in an industrial process (AM0018)
(3) Baseline methodology for water pumping efficiency improvements in municipal water utilities

(AM0020)

Those shown above are methodologies of large-scale CDM projects. As to the small-scale CDM projects, six methodologies for energy efficiency improvements are registered (AMS II A-F). They are shown below.

(1) Supply side energy efficiency improvements-transmission and distribution of electricity and district heating (AMS II A)
(2) Supply side energy efficiency improvements-generation (AMS II B)
(3) Demand side energy efficiency programs for specific technologies (AMS II C)
(4) Energy efficiency and fuel switching measures for industrial facilities (AMS II D)
(5) Energy efficiency and fuel switching measures for buildings (AMS II E)
(6) Energy efficiency and fuel switching measures for agricultural facilities (AMS II F)

Although not belonging to the energy conservation category, several other energy conservation (CO_2 reduction) methodologies in the fuel-switching and industrial fields are registered. As the example, registered methodologies in cement production which is a typical excessively fuel-consuming industry, are shown below.

(1) Emissions reduction through partial substitution of fossil fuels with alternative fuels in cement manufacture (Consolidated methodology at Indonesian and Indian cement companies, ACM0003, March 3, 2006)
(2) Consolidated methodology for increasing the blend in cement production (Consolidated methodology at Indonesian and Indian cement companies, ACM0005, November 29, 2005)

Although not yet registered, a methodology for energy conservation renovation at beer brewery is now being reviewed (NM0118). In this way, several methodologies have been registered in the field of energy conservation CDM, but no methodologies are registered so far in the field of ESCO. The current status of an approach to ESCO CDM is described in the following division.

3.6.2 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. [16),17)].

(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/bundling [18)] methodologies (WG leader: Netherlands)

16) Because the CO_2 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.
17) 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
18) Bundling means the consolidation of a plural number of technologies/projects which are introduced by

(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 CO_2 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 (applications of those methodologies will be submitted to the U.N. this fiscal year and the projects will start from next fiscal year).

(1) Targeting energy conservation at hotels (lights, air-cooling, boiler, etc.), a CDM methodology is being formulated in a joint effort with Pelangi (a research institute) and the Hotel Association (Twin Plaza Hotel) in Indonesia. With regard to the establishment of a baseline, the relationship with the room vacancy rate, etc. is a key factor. This is a methodology including a baseline/bundling [19].
(2) Concerning ESCO CDM, the DSCL Energy Service Company in India is attempting to formulate a methodology targeting the outdoor lamps and pumps at the water service reservoir managed by the state government (State of Tamil Nadu), under the guidance of Dr. Datta Roy of the DSCL. This is a methodology including a baseline/bundling [20].
The state government (local government) was selected as the target of the ESCO model for the following reasons:
[1] The model is a general-purpose type and therefore can be applied to the 28 states in India.
[2] It has an introduction barrier. Therefore, its additionally is easy to prove and establishment of a baseline is also easy, presenting a potential of standardization.
[3] Many energy audits were performed, but materialized projects are few.
[4] All the projects are eagerly waiting for the economic improvements of ESCO models.
[5] A CDM methodology on the energy conservation of pumps at the water service reservoir has already been registered (AM0020, State of Karnataka, registered at the U.N., September 2005)
ESCO is suitable for CDM schemes because the expected emission reduction can be known from the contract itself. The problem is that the transaction cost is high compared with the achieved emission reduction, indicating the need to simplify this process. As the possible barrier to introduction, the economy plus institutional barriers are considered.

governmental organizations, owners, users, venders, 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).

19) Bundling Hotels Energy Efficiency Project Jakarta, Nyoman Iswarayaga, Pelangi, Indonesia, Future CDM Workshop, Dec. 2005.

20) Development of CDM Methodology for all services energy efficiency ESCO project, G.C. Datta Roy, DSCL Energy Services, India, Future CDM Workshop, Dec. 2005.
Leveraging CDM for ESCO Projects, Paramdeep Sign, DSCL Energy Services, India, Future CDM Workshop, Dec. 2005.

(Concerning ESCO CDM, methodologies are being studied in several other projects with the intention of submitting an application to the U.N.)

(3) Household CFL project

As the product CDM (policy/program CDM), a group of three consisting of the Energy Research Institute (ERI) of Beijing in China, the DSM Center[21] (implementation entity, site operation) which is a lower-level organization of Huabei Power Distribution Company in Shijiazhuang, the provincial capital of the Hebei Province in China, and the Japan Electrical Manufacturers' Association (JEMA) of Japan, are jointly attempting a CDM registration of a switching scheme of household-type incandescent lamps to CFLs (fluorescent lamps). The methodology was submitted to the UNFCCC at the end of December 2005, and is now openly accepting public comments as NM0157 at the date of March 2006. It will be reviewed at the 21st panel meeting in early June. It is a scheme in which the project implementation entity pays back or subsidizes the initial costs the users must pay when they renew incandescent lamps to CFLs, using the up-front CERs (Certified Emission Reduction) or other investments as the capital. Another encouraging factor is the favorable treatment of energy conservation CDM by the Chinese Government, namely, the share of revenues from CER transfer which is collected by the Government is maintained at as low as 2% (65% in the case of HFC-related projects, etc.).

The features of this CDM model project are: [1] the retail route with an open boundary is used (Open type CDM), [2] linked with the CFL labeling system of the Chinese Government (Policy/programmatic CDM), [3] households are targeted, [4] the monitoring method is easy: a purchase certificate of government-approved product and a proof of intactness of old lamps (two lamps must be brought to the DSM center; purchase promotion CDM). To identify a barrier to the purchase of CFLs (as the statistics), a questionnaire is conducted to the households. The expected emission reduction is calculated by: (60W – 13W) (a difference between two types of lamps) multiplied by 6,000 hours (the life time of CFL) (the life time of an incandescent lamp is 1,000 hours) (The target period of credits is 10 years)[22]. Under the current labeling system in China, Chinese-made CFLs of medium quality can enter into this market, while the Japanese products are regarded as having high quality. If the standard is gradually raised during the course of policy operation, energy conservation will be facilitated and Japanese manufacturers can also enter into the Chinese market. Expansion into the products other than CFLs, expansion into other regions in China, and expansion to other developing countries, can also be expected. This scheme is an attempt to build a win-win relationship among the concerned parties by utilizing CERs as a sustainable subsidy for the project. The benefits the concerned parties will gain from this CDM project are described below [23].

- General public [the largest beneficiary]:
  An opportunity to purchase energy efficient lamps at low cost (with added benefits such as low electricity charges)
- Investors in developed countries:
  An opportunity to obtain CERs at low cost. If an investment is made, CERs can be obtained the next year. Hence, the potential is very large.
- The government of the host country:
  Energy security, energy consevation, and alleviation of constraints on power development.
- Lamp manufacturers:
  The sales of good quality products will increase.
- Power companies:
  DSM (peak-cut effect) = an alternative to the power development with a low operating rate

As this is a new project model, the review level at the U.N. may be stringent. However,

21) Established as a result of UNDP-GEF Green Light Project.

22) Methodology Development for Open-DSM type CDM, Kiyoshi Saito, JEMA, Japan, Future CDM Workshop, Dec. 2005.

23) "Product CDM Methodologies - Program-type CDM", Naoki Matsuo, JEAM Study Meeting, April 28, 2006.

expectations for the future development are high as the model case of policy/program/product CDM. The World Bank is also paying attention to the dissemination and expansion of policy/program CDM.

The "CFL Programs" in Indonesia and Sri Lanka are very interesting as a model case in which the initial costs on the side of households are shouldered by a power company using a scheme like ESCO. However, when the financial situation of a power company is not good, the product CDM model as shown above is considered effective.

It is also noteworthy that in China "energy conservation and product/program/policy CDM" are predicted to become the mainstream after 2008 among the CDM projects in this country up to 2010. As to the product CDM using CFLs, Ghana has also submitted an application of a new methodology to UNFCCC (NM150).

As to the policy CDM, a methodology (NM0072) is available which was also proposed by Ghana based on the energy performance standards of room air conditioners and other electrical products.

(4) Based on a project in China, a new methodology is being developed targeting 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. A study of a common baseline and bundling factors is included).

(5) Based on a project in China, a new methodology is being developed targeting the recovery and reuse of exhaust heat and gas in the steel industry (related registered methodology: ACM004).

(6) Based on a project in China, a new methodology is being developed targeting various emission reduction activities in the cement industry (introduction of a variety of energy efficient technologies, an alternative to clinkers, etc.).

(7) A methodology concerning the substitution of supercritical coal-fired power generation for subcritical coal-fired power generation (for the industrial use) is being developed by GTZ (an organization in Germany equivalent to JICA of Japan). It is intended for individual power generation plants.

(8) As to the efficiency improvements of steam boilers, Germany is attempting to establish a methodology targeting industrial boilers, just like (7) above. (As to the steam boilers, a related methodology has already been established.) This is intended for the supply side, not for the user side including monitoring, etc.

3.6.3 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 CO_2 emission of 10kt-CO_2 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. If this is realized, it becomes possible to use various simplified procedures, such as [1] use of simplified methodologies, [2] simplification of environmental impact assessment and analysis and [3] shortening of the project review period, for many energy conservation CDM projects.

3.6.4 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.

3.6.5 Activities of Japanese Government and other international cooperation organizations on the promotion of the Kyoto Mechanism

(1) Feasibility study (FS) of CDM/JI projects
Implemented since fiscal 1998. Implementation entities: the New Energy and Industrial Technology Development Organization (NEDO) and the Global Environment Centre Foundation (GEC). Program profile: feasibility study of energy efficiency- or alternative energy-based CO_2 emission reduction projects to be implemented in overseas countries.

(2) Capacity building in developing countries (Support to the establishment of systems)
Implemented since fiscal 2003 in Asian countries, Russia, and Eastern Europe. Implementation entities: NEDO and the Institute for Global Environmental Strategies (IGES). Program profile: holding of various training seminars, workshops, etc. for government officials and private enterprisers so as to enhance the capacity of Kyoto Mechanism-related personnel in host countries.

(3) Subsidy to CDM/JI projects
Implemented since fiscal 2003. Implementation entities: Ministry of Economy, Trade and Industry (METI) (represented by NEDO) and Ministry of Environment (MOE). Program profile: provision of a subsidy to private enterprisers who undertake CDM/JI projects.

(4) Budgetary measures for the acquisition of CO_2 credits
Earmarked in the fiscal 2006 budget jointly by METI and MOE. Budgetary limit: 12.2 billion yen. (An 8-year program (FY2006-) defrayed by the national treasury.) Implementation entity: NEDO. Program profile: budgetary measures to acquire credits yielded from the GHG emission reduction projects which are undertaken in overseas countries.

(5) Japan Kyoto Mechanisms Acceleration Programme (JKAP)
To promote the Kyoto Mechanism more efficiently and effectively, the Japanese Government, Kyoto Mechanism-related organizations and private enterprisers jointly created the JKAP program in March 2005. Creation of this program aimed at providing a concerted support to various activities shows an active involvement of Japan. The participating organizations of JKAP and their responsibilities are as follows.

1) Capacity building
   Information dissemination, awareness raising, etc: Ministry of Foreign Affairs (MOFA), METI, MOE, GEC, IGES, Japan Bank for International Cooperation (JBIC), Japan External Trade Organization (JETRO), Japan International Cooperation Agency (JICA), NEDO, and Overseas Environmental Cooperation Center, Japan (OECC)
2) Project planning
   Feasibility study, CDM project validation, etc: METI, MOE, GEC, JBIC, and NEDO
3) Project implementation
   Support to project financing: METI, MOE, JBIC, NEDO, and the Nippon Export and Investment Insurance (NEXI)
4) Credit issuance
   Credit accession: METI, MOE, and NEDO

3.6.6 Actions of developing countries over CDM promotion

From our visits at national governments and ESCO-related organizations in overseas countries during the course of this research, an overall trend was found, which is, “although they know the availability of CDM, they lack knowledge of how to utilize it for individual energy conservation/ESCO projects as the tool for improving economy”. It was found that they desired to gain support from JICA especially in the

fields of capacity building and project planning on CDM, and enlightenment on ESCO. It was also found that actions to energy conservation/ESCO CDM in India were one step advanced compared with the actions in other countries. China has introduced a preferential treatment to energy conservation CDM projects as a national policy. China is also attempting to develop a methodology for product CDM (Open type CDM), a field with a high possibility of dissemination and expansion, in cooperation with Japan.

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

A variety of activities in the field of CDM stated in 3.6.1 - 3.6.6 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.

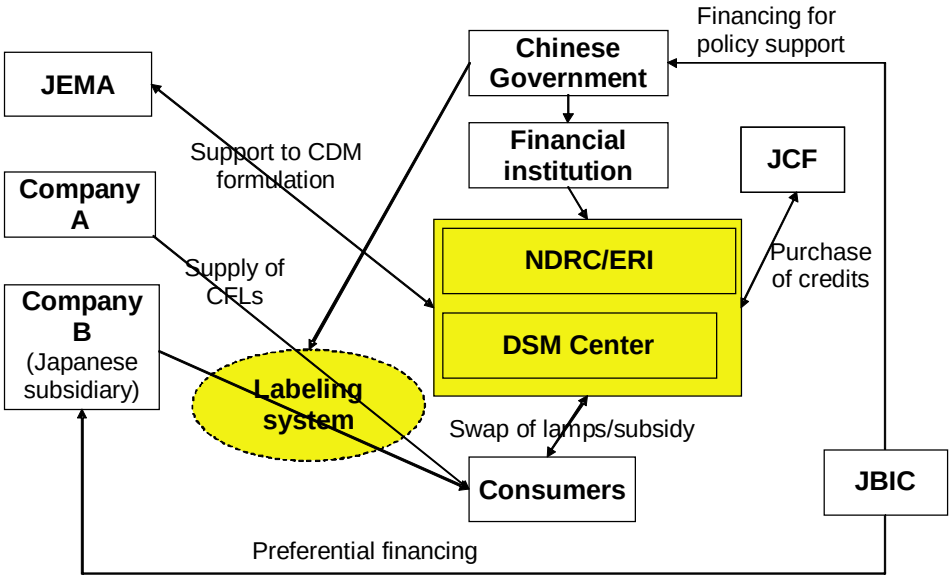
(1) Support to the startup of energy conservation CDM projects which are implemented under government programs in developing countries
Support shall be extended to the “formulation and expansion of CDM projects linked with energy conservation programs of national governments in developing countries” 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.



Source: JBIC's business model for energy efficiency projects, Takashi Hongo, JEMA Study Meeting, April 28, 2006

Figure 3.6.3 Concept of financing to support Product CDM