

ESCO Projects for Energy Conservation

May 26, 2004

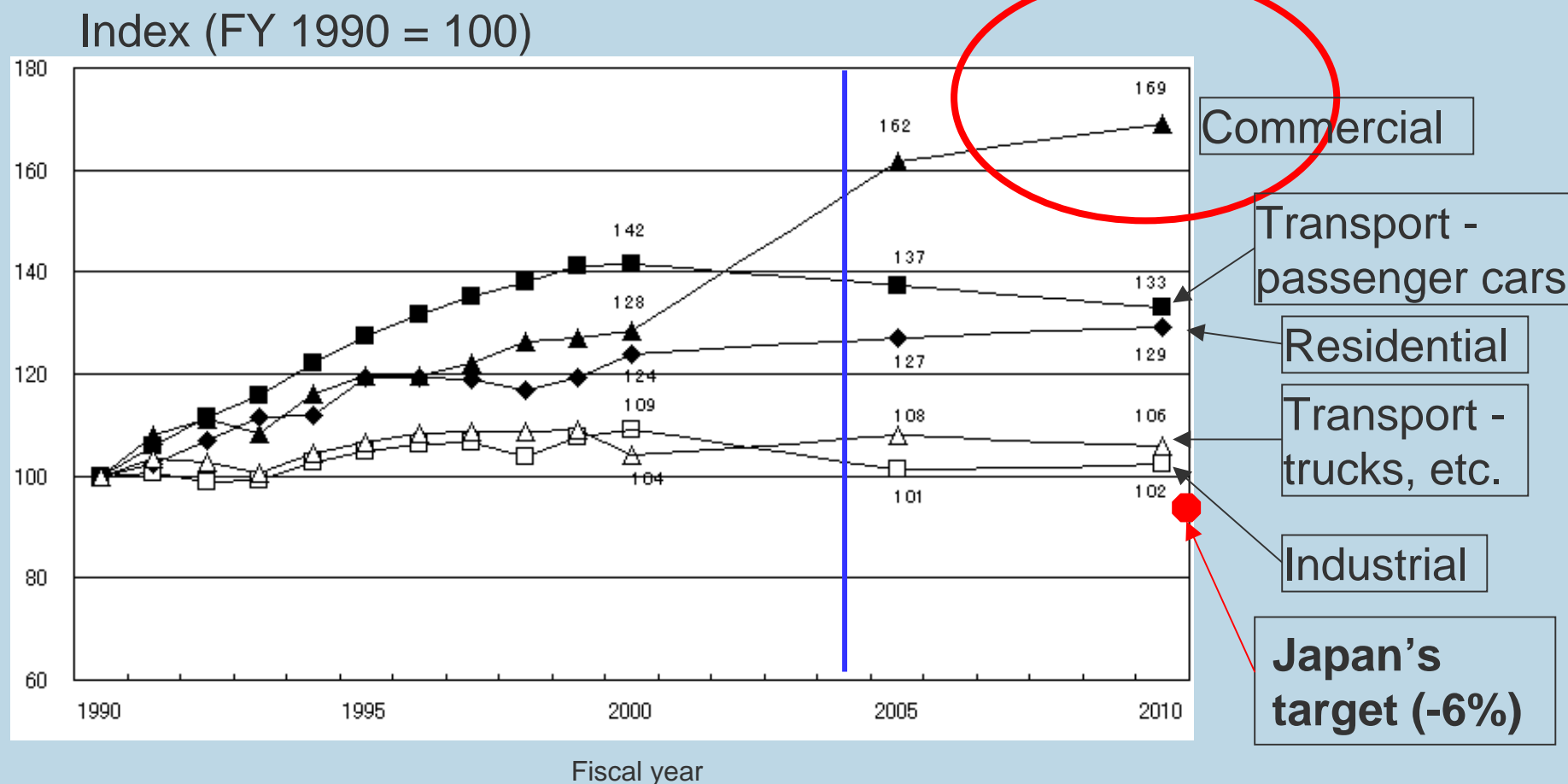
**ESCO Promotion Office
Energy Conservation Center of Japan**

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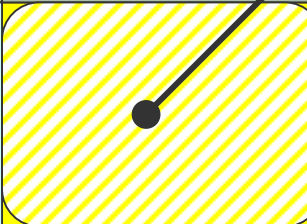


Final Energy Consumption and Energy-oriented CO₂ Emissions Past Records and Forecasts



Measures applying to
operation and
management stage

Classification of Designated Energy Management Factories and Regulatory Changes resulting from Amendment of Energy Conservation Law

Annual energy consumption		Industrial categories	
Fuel (heat)	Electricity	Following five industries: - Manufacturing - Mining - Electricity supply - Gas supply - Heat supply	All industries other than those listed at left (examples: office buildings, department stores, hotels, schools, hospitals, government offices and amusement parks)
3,000 kL	12 million kWh	Class 1	
1,500 kL	6 million kWh	Class 2	
0 kL	0 kWh		

Old regulatory requirements

- ☆ Appointment of an energy manager
- ☆ Recording of energy consumption, etc.

New regulatory requirements

Tighter control of residential and commercial sector

- ☆ Preparation and submission of mid to long-term plan
- ☆ Participation of a certified energy manager in the preparation of mid to long-term plan
- ☆ Regular reporting (instead of recording)

Old regulatory requirements

- ☆ Appointment of an energy manager
- ☆ Recording of energy consumption, etc.

New regulatory requirements

Regular reporting (instead of recording)

Old regulatory requirements

- ☆ Appointment of an energy manager (a certified energy manager - i.e. a holder of an energy manager's certificate - only)
- ☆ Preparation and submission of a mid to long-term plan
- ☆ Regular reporting



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Overview of Energy Conservation Measures

Sector	Main measures	Energy saved (crude equivalent)
Industrial	○Keidanren Voluntary Action Plan on the Environment	10,000 kl
	○Energy conservation measures at medium-size factories, etc. High-performance industrial furnaces	2,050
Residential and commercial	○Improvement of equipment efficiency through top-runner control Dissemination of top-runner compliant equipment Accelerated dissemination of high-efficiency equipment Reduction of standby power consumption Popularization of home energy management systems (HEMS) for homes	10,000 kl 1,860
	Popularization of building energy management systems (BEMS) for commercial buildings	1.6 million kl
Transport	○Improvement of equipment efficiency through top-runner control	10,000 kl
	○Popularization of clean energy vehicles Accelerated introduction of motor vehicles compliant with top-runner standards	1,690
Cross-sectoral	○Technological development High-performance boilers	10,000 kl 100
	High-performance lights	
Total	○Existing measures 50 million kl	10,000 kl
	New measures 7 million kl	5,700

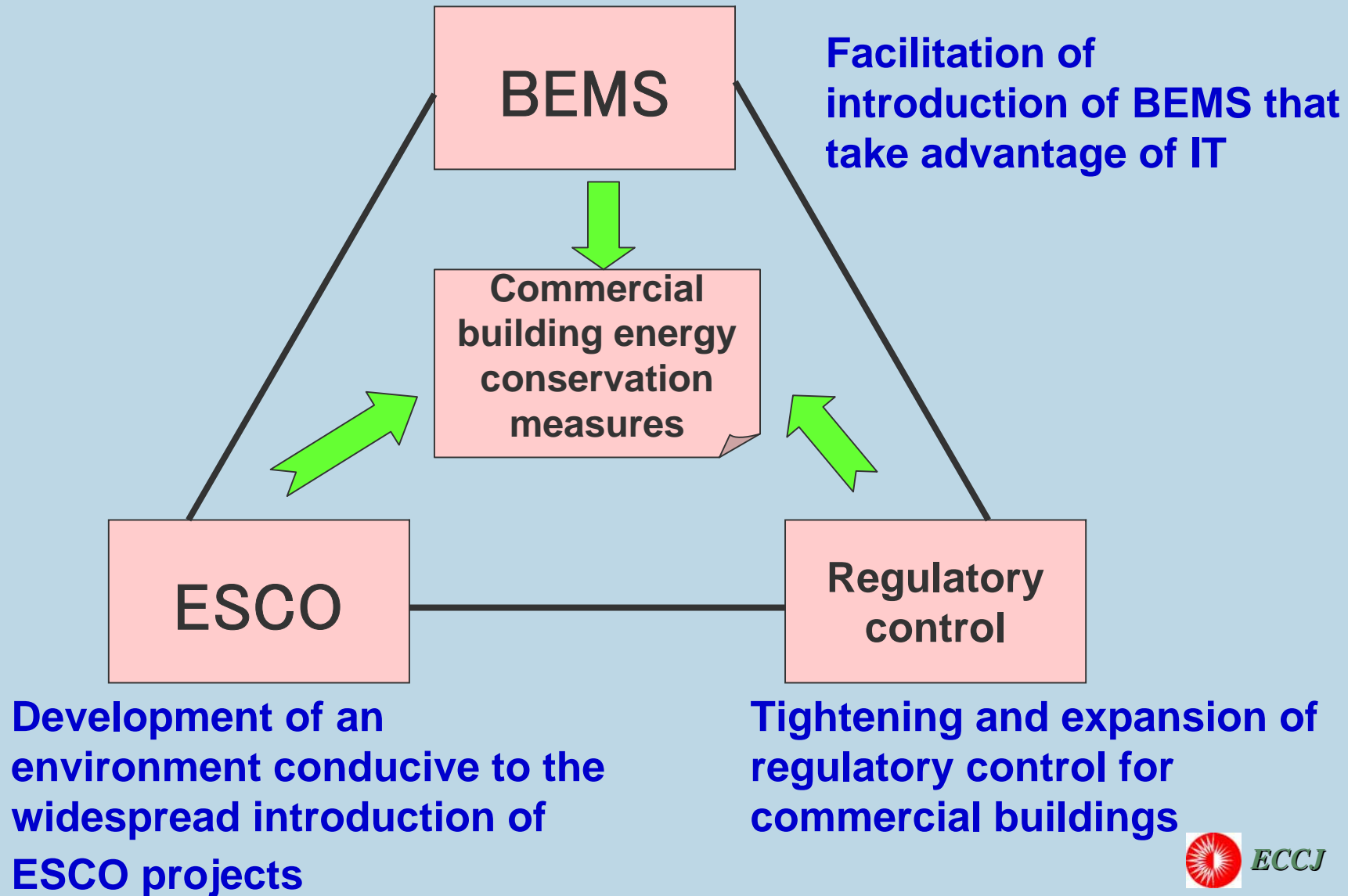
Of this, 1 million kl is to be achieved through utilization of ESCO projects.

Source: Coordination Subcommittee and Energy Supply and Demand Subcommittee of Advisory Committee for Natural Resources and Energy (June 2001)



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Energy Conservation Measures for Commercial Buildings



**Widespread recognition of
ESCO projects**

**Example-setting introduction
by the public sector**



**Facilitation of the introduction of
ESCO projects**



**Facilitation of
financing**

**Formulation of
guidelines**

**Government
assistance**

**Improvement of the environment
surrounding the ESCO market**



What is an ESCO Project?

ESCO : Energy Service Company

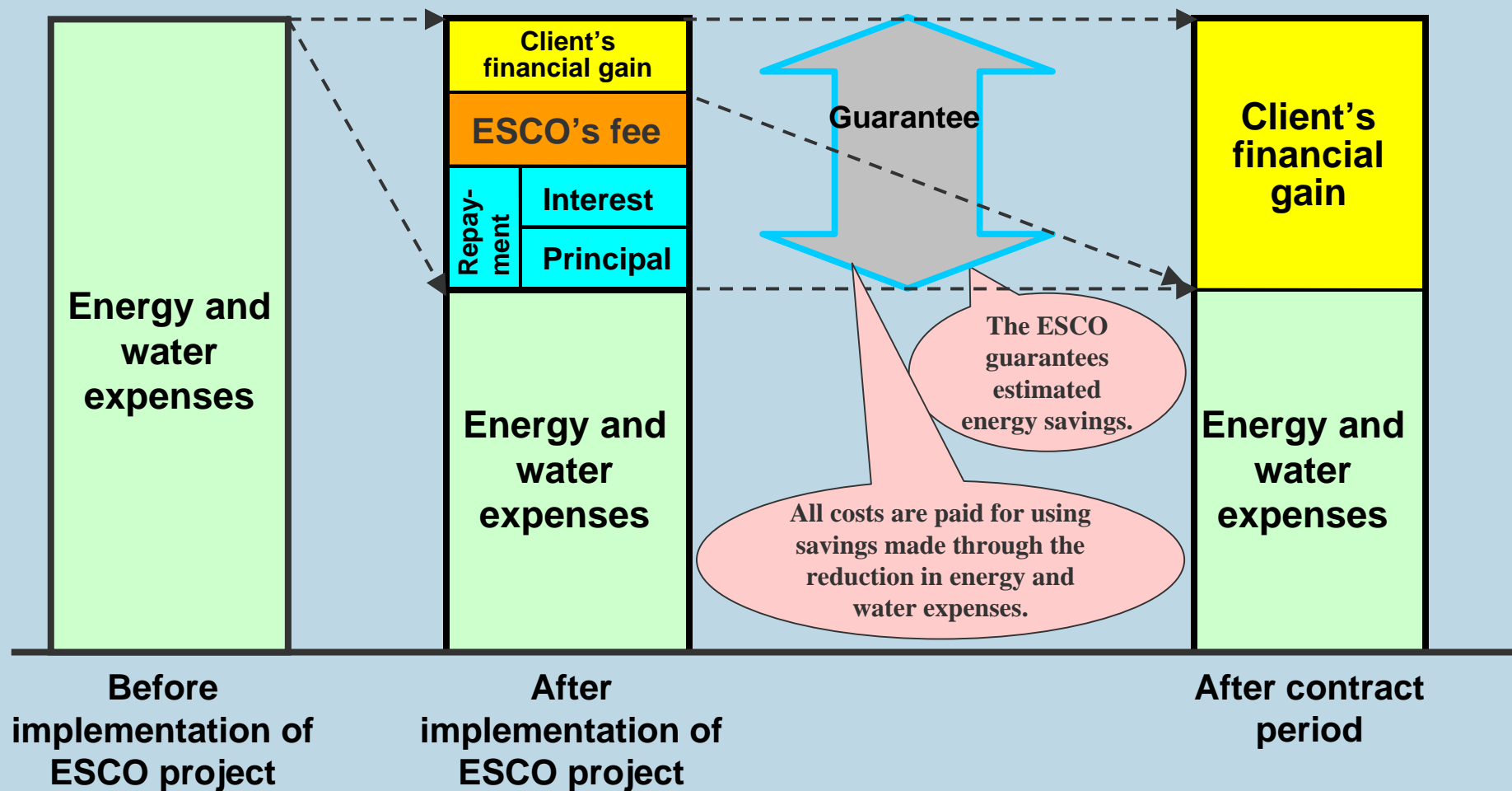
An ESCO project is an energy conservation project undertaken as “a business activity of a private enterprise (ESCO)”.

An ESCO provides comprehensive energy conservation services for factories, buildings and other establishments - encompassing energy audits, the designing and implementation of conservation measures, the maintenance, operation and management of the introduced facility and procurement of project funds - to help achieve reductions in energy consumption without damaging the environment, while guaranteeing the expected energy savings.

ESCOs raise their revenues from fees paid by clients using a part of the financial gain achieved through energy savings.



Cost and Profit Breakdown of ESCO Project



Characteristics of ESCO Project

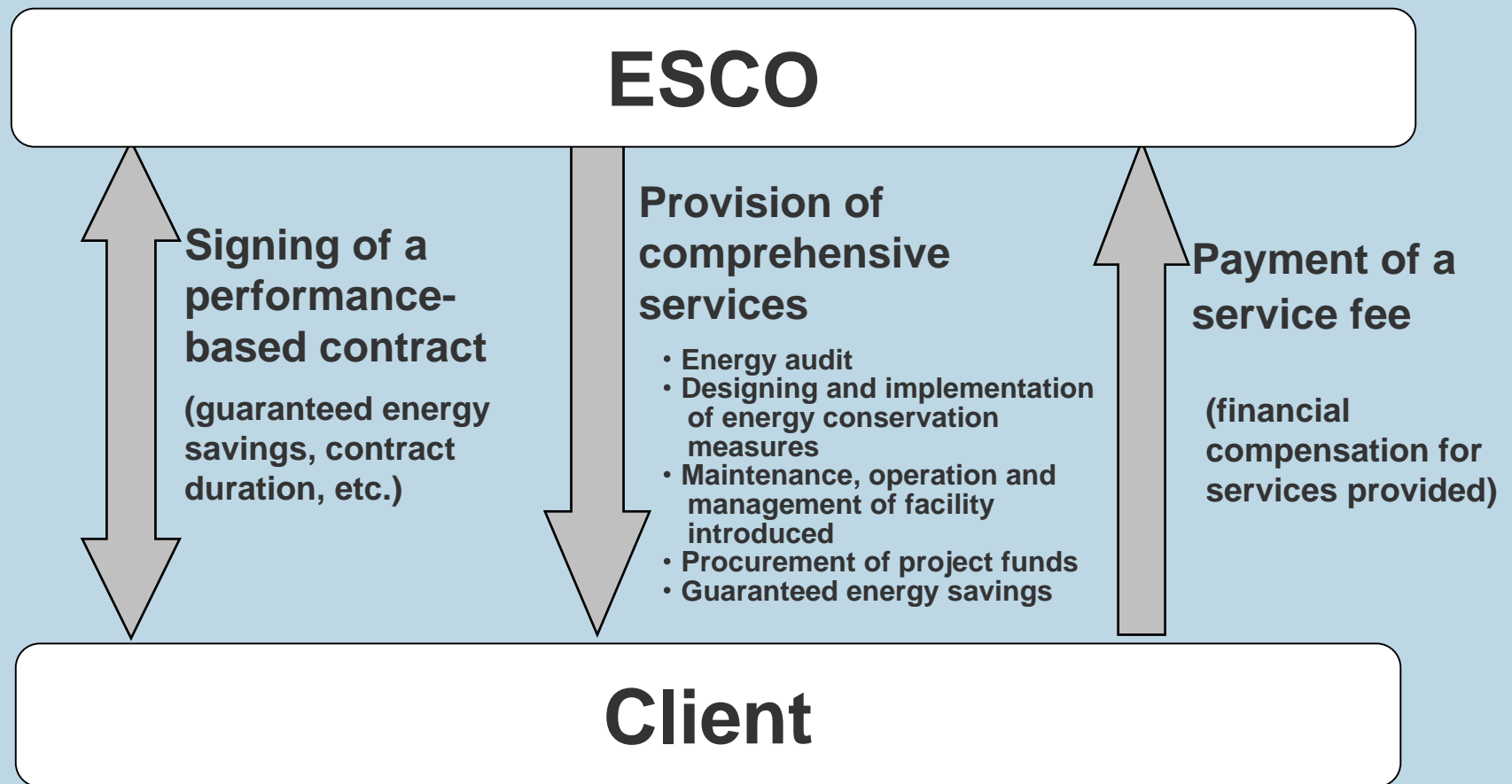
- ① The ESCO guarantees estimated energy savings (benefit).
- ② All costs are paid for using savings made through the reduction in expenses, such as energy and water bills.
- ③ Comprehensive services are provided.

A rigorous verification of energy savings is undertaken.

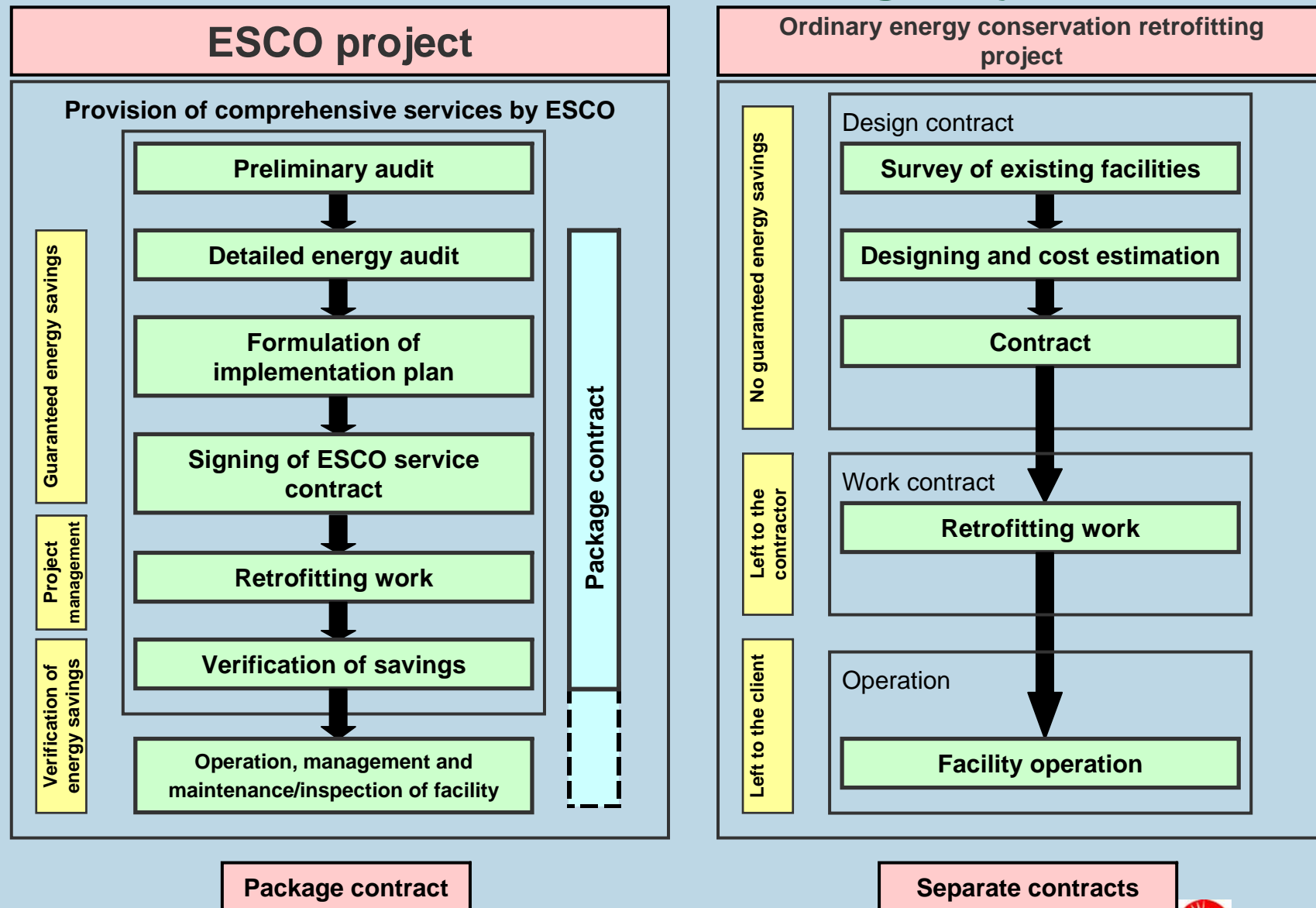
Project financing not tied to assets available (off-balance sheet financing).



ESCO and Client

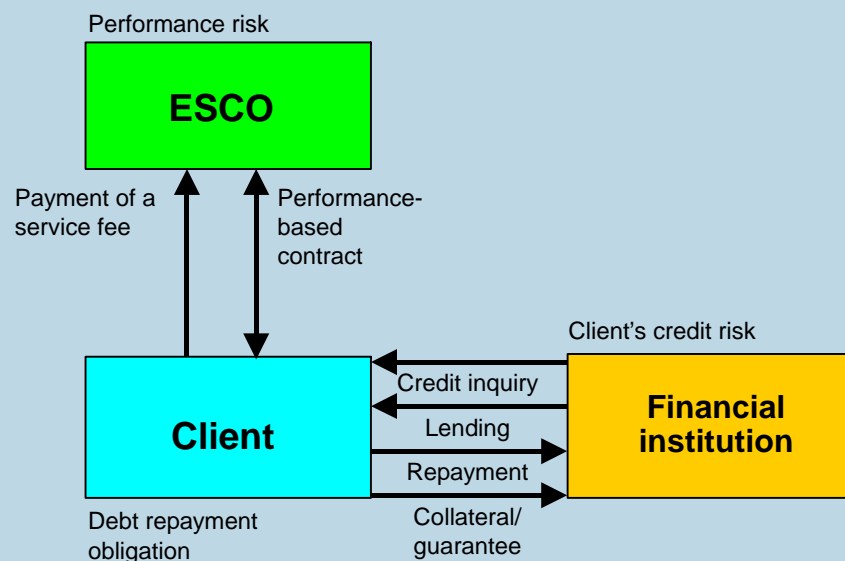


Comparison between ESCO Project and Ordinary Energy Conservation Retrofitting Project

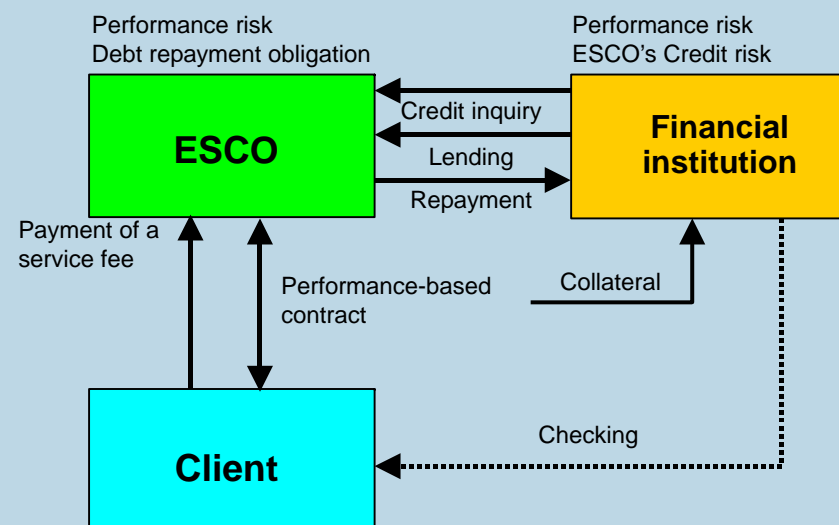


Contract Schemes and Financial Flow

Guaranteed-savings contract



Shared-savings contract



Comparison of Contract Schemes

No.	Comparison parameter	Guaranteed-savings contract	Shared-savings contract
1	Fund flow		
2	Procurer of funds for energy conservation retrofitting work	Client	ESCO
3	Owner of energy conservation facility	Client	ESCO
4	Payment of service fee	Payment of a fixed-amount or fixed-rate fee using a part of the financial gain achieved through the reduction in energy and water bills	
5	Scenario for period after expiration of contract	Every energy savings resulting from its operation will belong to the client.	
6	Benefits for client	1) Energy savings will be guaranteed and surely promoted 2) Since the funds for the initial Investment are procured by the client, the energy conservation facilities are the self-property of the client	2) The client can keep the energy conservation facility off the balance sheet (off-balance sheet financing). 3) Since the funds for the energy conservation facility are procured by the ESCO, the client takes no financial risk.

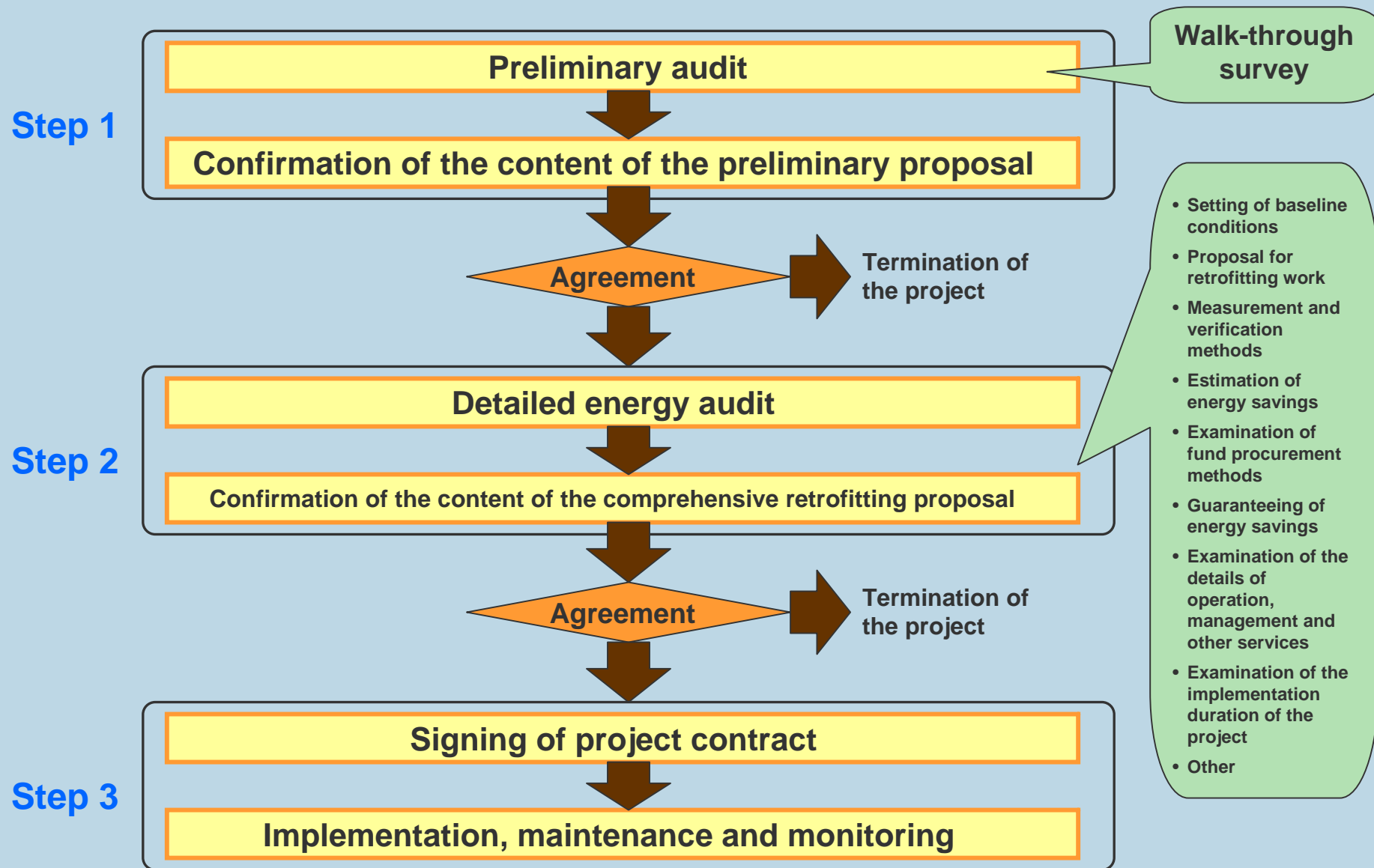


Advantages of ESCO Project

1. The ESCO takes full responsibility for the implementation of the project, so that the client does not need to have energy conservation know-how or arrange for personnel.
2. Off-balance sheet financing is available in the case of the shared-savings scheme.
3. Through a comprehensive investigation, an annual 1% reduction in energy consumption as called for by the Energy Conservation Law can be achieved over multiple years.
4. It can be used as a vehicle to build a corporate image as an environmentally-friendly company.
5. It provides an ideal platform for an energy conservation project that utilizes government subsidies.
6. For commercial buildings, it makes it easier to conform to beefed-up energy conservation requirements.



Common Introduction Process of ESCO Project



Data Needed for Preliminary Audit

1. Building Outline

Completion date, modification date(s), number of stories and floor area

2. Mode of building use

Number of days open for business in a year, business hours, seasonal air-conditioning periods and hours

3. Energy consumption

Monthly energy consumption and cost (for three years)
(electricity, gas, oil and municipal water)

Daily energy consumption

(24-hour data for a typical day in summer, winter and intermediate seasons)

4. Energy parameters

Contract demand, contract type, receiving voltage and unit price of electric energy

Gas type, contract type and unit price of gas

Oil type and unit price of oil



Data Needed for Preliminary Audit

5. Facility/equipment drawings

Building plans (electrical room and machine room layouts), skeleton diagram (electrical), piping system diagram, duct system diagram, and monitoring system diagram

List of main facilities and equipment with specifications (name, capacity, number of units, year of manufacture, etc.)

- Receiving transformers, distribution transformers, power generators, power pumps/fans, elevators, lighting equipment (fluorescent lights), etc.
- Turbo refrigerating machines, absorption water chiller-heaters, chillers, boilers, air conditioners, heat pumps, etc.
- Cogeneration systems, etc.

6. Operation data

Facility operation logs (power receiving and transformation facilities, boiler facility, refrigerating facility, etc.)



Target Entities for ESCO Projects

- Local governments and national government organizations
- Educational institutions, including primary schools, junior high schools, senior high schools and universities, and research institutes
- Hotels
- Hospitals and clinics
- Large-scale office buildings
- General commercial buildings
- Industrial facilities



Energy Conservation Techniques

Electrical Facilities

- Upgrading to high-efficiency fluorescent lights
- Adjustment of the number of distribution transformers in operation according to load conditions and/or upgrading
- Replacement of incandescent lamps with fluorescent lamps that fit into the same sockets
- Light switching control via movement detection
- Introduction of a demand controller
- Incorporation of high-performance reflectors into lighting fixtures

Air Conditioning Facilities

- Upgrading to high-efficiency motors
- Introduction of inverter control of pumps
- Introduction of inverter control of fans
- Introduction of EMS
- Installation of heat-insulating film
- Introduction of a cogeneration system
- Introduction of chilled ceilings
- Modification of cold/hot water supply routes
- Optimum control of heat sources
- DDC control of air conditioners
- Optimum control of air conditioner temperature settings
- CO₂ concentration control of fresh air intake
- Introduction of thermal-storage heat pumps
- Modification of the ventilation control scheme
- Installation of total heat exchangers

Potential Market Size of ESCO Projects

Potential energy savings in crude oil equivalent : 4.04 million kl/year

Potential size of capital investment : ¥2.4715 trillion

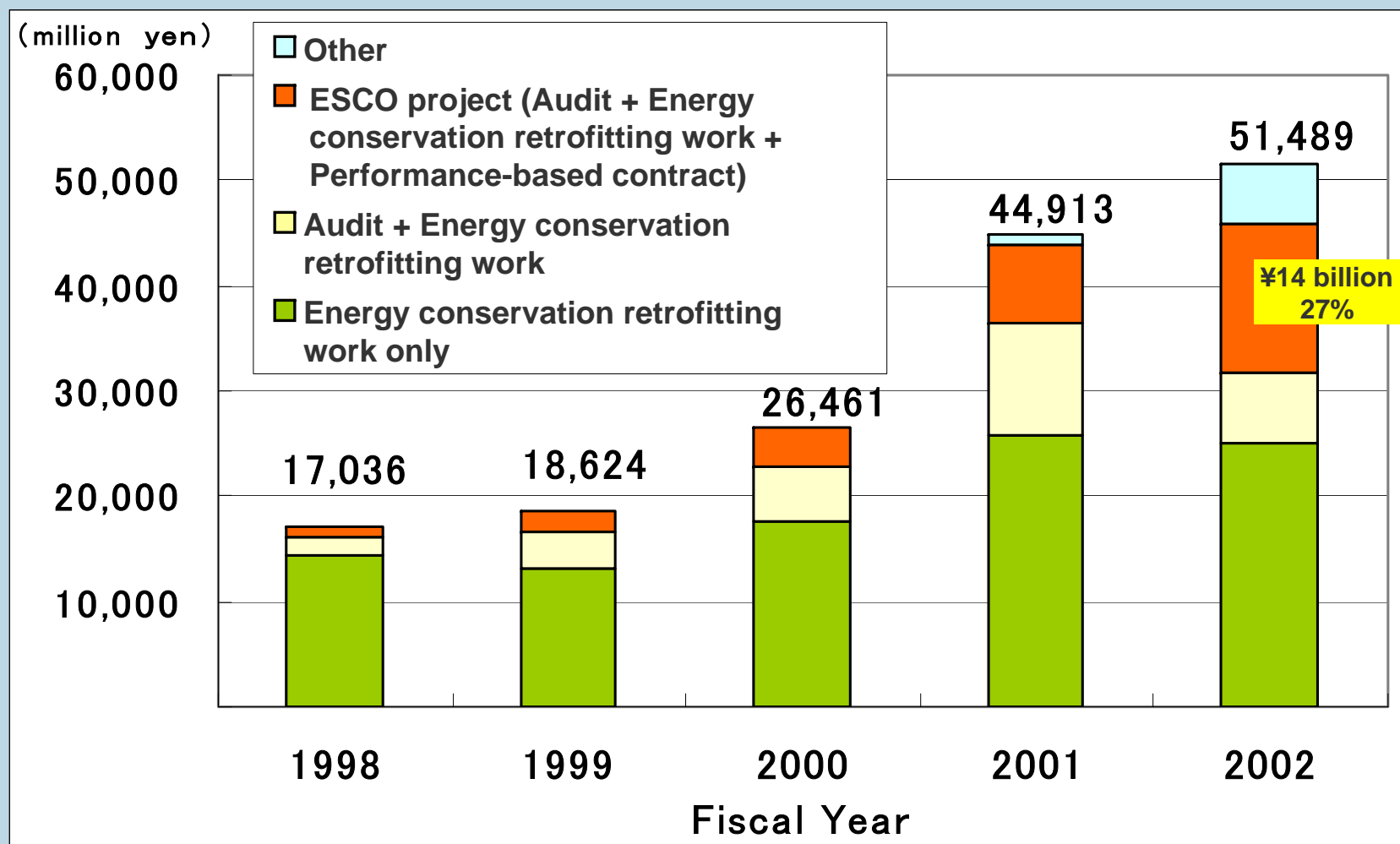
<Breakdown>

Commercial sector: Energy conservation rate 25% and simple payback period 7 years
Energy savings: 1.84 million kl/year
Investment size: ¥2.0475 trillion

Industrial sector : Energy conservation rate 10% and simple payback period 4 years
Energy savings: 2.20 million kl/year
Investment size: ¥424 billion

Source: March 1998 report of ESCO Project Introduction Study Group, Energy Conservation Center of Japan

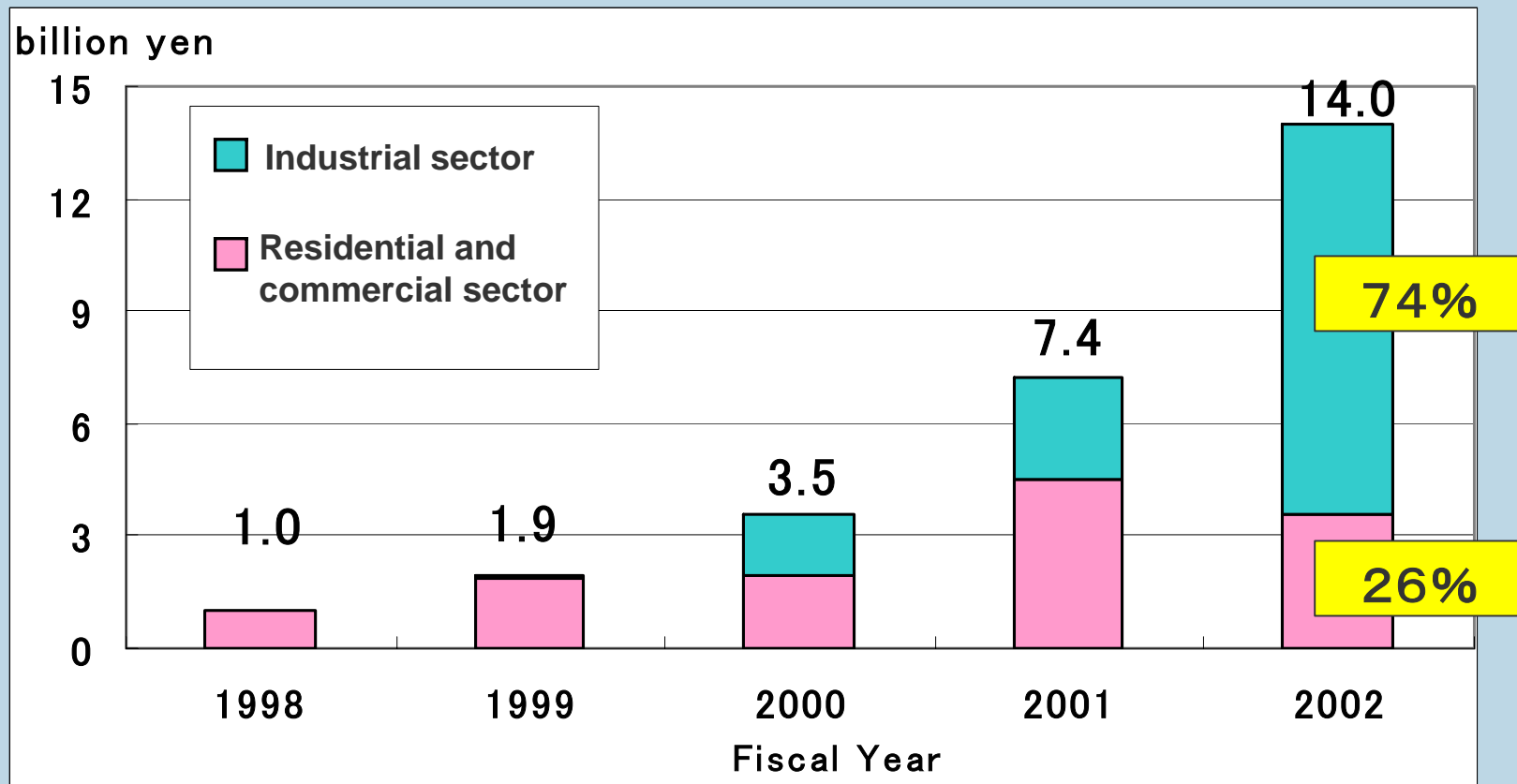
Breakdown of Combined Order Value by Type of Service



Source: Aug 2003 survey of Japan Association of Energy Service Companies
(membership 95 companies)

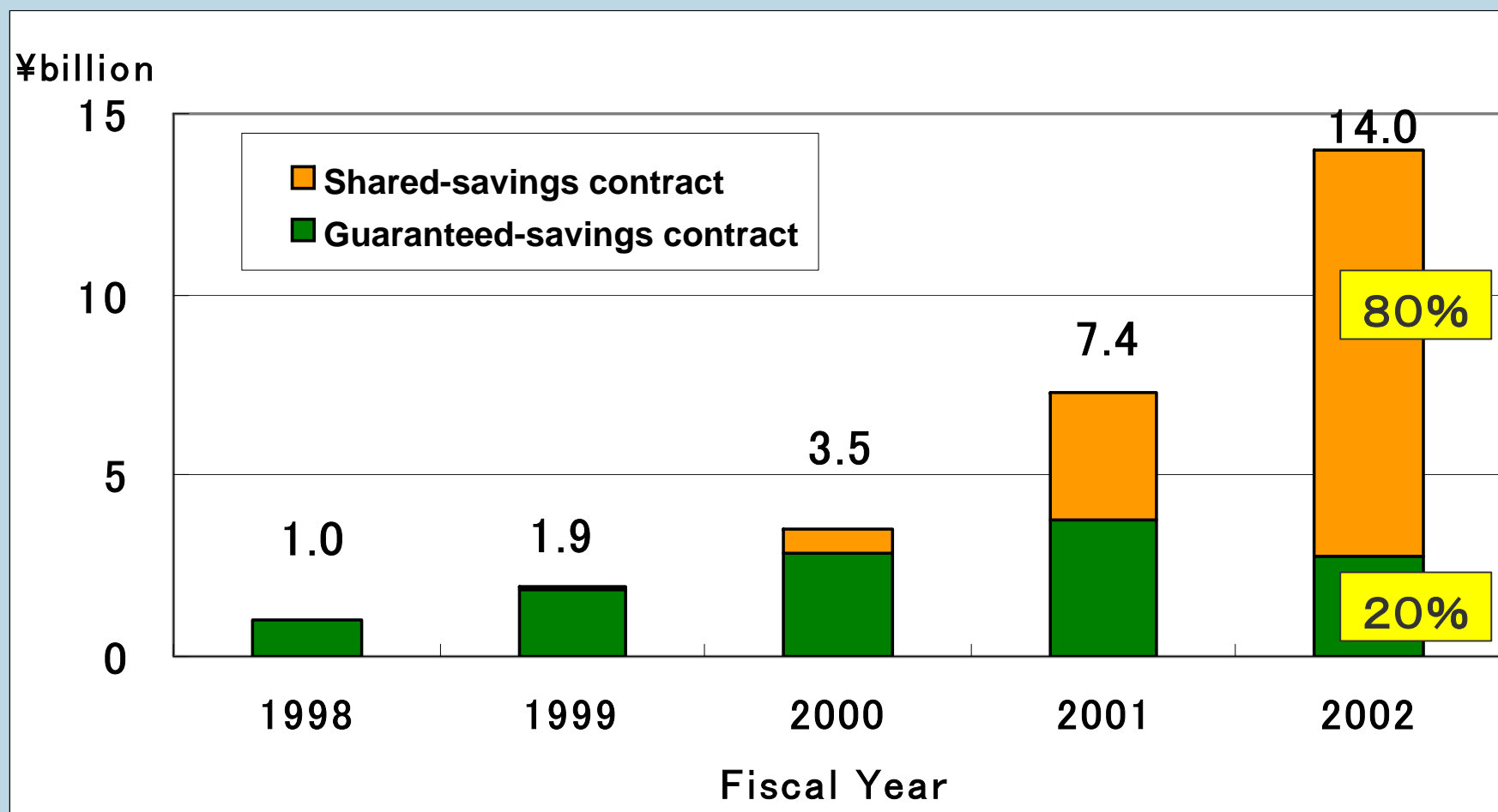


Breakdown of Combined Order Value by Sector (ESCO Projects)



Source: Aug 2003 survey of Japan Association of Energy Service Companies
(membership 95 companies)

Breakdown of Combined Order Value by Type of Contract (ESCO Projects)



Source: Aug 2003 survey of Japan Association of Energy Service Companies
(membership 95 companies)

National Government's Assistance Measures for Energy Conservation and Other Projects

1. Subsidy

- 1) Support program for enterprises of rational use of energy
 - 2) Support program for local government/corporation
- etc.

2. Loan

- 1) Low interest loan system in promotion program for industrial energy conservation
 - 2) Unsecured loan system for energy conservation promotion
 - 3) Loan guarantees by NEDO
- etc.

3. Tax exemption

- 1) Extraordinary depreciation
(Ordinary depreciation + Extraordinary depreciation)
- 2) Extraordinary exemption of corporation tax (income tax) for only small & medium enterprises



National Government's Assistance Measures for Energy Conservation and Other Projects (FY 2003)

Applications sought by New Energy and Industrial Technology Development Organization (NEDO) through public advertisement

- Local Energy Conservation Vision Development Assistance Program
¥710 million ← 680 million (FY 2002)
- Local Energy Conservation Effort Promotion Program
¥3.62 billion ← 3.76 billion (FY 2002)
- Local Global Warming Prevention Effort Assistance Program
¥700 million ← 600 million (FY 2002)
- Enterprise Energy Use Rationalization Effort Assistance Program
¥12.3 billion ← 9.1 billion (FY 2002)
- High-Efficiency Housing/Building Energy System Introduction Promotion Program
¥5.74 billion ← ¥5.74 billion (FY 2002, ①+②)
 - ① High-efficiency energy systems for housing and buildings ¥2.12 billion
 - ② Building energy management systems (BEMS) ¥3.62 billion
 - ③ High-efficiency water heaters
 - <CO₂ heat-pump water heaters> Applications sought by Heat Pump & Thermal Storage Technology Center of Japan through public advertisement
 - <Latent heat recovery water heaters - city gas> Applications sought by Japan Gas Association through public advertisement
 - <Latent heat recovery water heaters - LPG> Applications sought by Liquefied Petroleum Gas Center through public advertisement



National Government's Assistance Measures for Energy Conservation and Other Projects (FY 2004)

(ESCO Projects, Ministry of Finance Informal notice)

- Local Energy Conservation Vision Development Assistance Program
¥500 million ← ¥710 million (FY2003)
- Local Energy Conservation Effort Promotion Program
¥2.81 billion ← ¥2.81 billion (FY2003)
- Local Global Warming Prevention Effort Assistance Program
¥890 million ← ¥700 million (FY2003)
- Enterprise Energy Use Rationalization Effort Assistance Program
¥13.81 billion ← ¥12.28 billion (FY2003)
- High-Efficiency Housing/Building Energy System Introduction Promotion Program
¥5.74 billion ← ¥5.74 billion (FY2003, ①+②)
 - ① High-efficiency energy systems for housing and buildings
¥2.12 billion ← ¥2.12 billion (FY2003)
 - ② Building energy management systems (BEMS)
¥3.62 billion ← ¥3.62 billion (FY2003)



Enterprise Energy Use Rationalization Effort Assistance Program

The program is designed primarily to subsidize the cost of introducing an energy conservation facility with great energy-saving and cost-benefit effects under a comprehensive energy conservation project planned by a business enterprise.

In providing assistance, preference will be given to projects with great policy significance, such as those conceived along the lines of the report of the Energy Conservation Subcommittee of the Advisory Committee for Natural Resources and Energy.

- **Eligible applicants:** Any business in any industry. However, in cases where an [ESCO \(shared-savings contract\)](#), leasing company, or the like wishes to apply, the application must be filed jointly with the business at whose premises the facility is to be installed.
- **Eligible projects:** Projects designed to introduce energy conservation facilities at existing factories and other establishments and considered to be high in the energy saving effect and at least reasonable in the cost-benefit effect. Preference will be given to energy conservation projects earmarked in medium to long-term plans as called for by the Energy Conservation Law, those specified in the Keidanren Voluntary Action Plan on the Environment, etc., high-performance industrial furnace introduction projects proposed by small and medium businesses, [ESCO projects targeting commercial buildings](#) and waste heat utilization facility introduction projects based on natural gas cogeneration systems.
- **Subsidization rate:** 1/3 (limited to ¥500 million)



High-Efficiency Housing/Building Energy System Introduction Promotion Program

(High-efficiency housing/building energy systems)

The program is designed to subsidize the cost of introducing high-efficiency energy systems for housing and buildings. Research and investigation geared towards the promotion of energy conservation is also to be undertaken.

● **Eligible applicants:** Housing/building owners and others introducing a high-efficiency housing/building energy system consisting of an air conditioning system, hot water system, ventilation system, heat insulation system, etc. (hereafter referred to as “such a system”) at an existing, new or extended/renovated housing unit or building.

● **Conditions:**

- Such a system will actually be introduced. In the case of housing, only systems designated by NEDO are applicable.
- Ongoing reporting on energy savings will be possible for three years from the introduction of such a system.
- Energy consumption in the new or extended/renovated housing unit or building concerned can be reduced by about 10%. Besides, the following performance level must be achieved in accordance with the Law concerning the Rationalization of Energy Use: that specified in the “Judgment Criteria for Housing Owners regarding the Rationalization of Energy Use in Housing” for housing ; and one similar to that specified in the “Judgment Criteria for Building Owners regarding the Rationalization of Energy Use in Buildings” for buildings.
- Energy consumption in the existing housing unit or building concerned can be reduced by about 20%.

● **Subsidization rate:** 1/3



High-Efficiency Housing/Building Energy System Introduction Promotion Program (Building energy management systems)

The program is designed to subsidize the cost of introducing building energy management systems (BEMS) geared towards an optimum control of energy demand. Under this program, a BEMS means a system designed to reduce energy consumption in a commercial or other building through the monitoring of the indoor environment and energy consumption and the operation/management of equipment, facilities, etc. according to the indoor environment. A BEMS consists of a measuring/metering system, control system, monitoring system, data storage, analysis and interpretation systems, and the like.

- **Eligible applicants:** Building owners and ESCOs introducing a BEMS in an existing, new or extended/renovated building
- **Conditions:**
 - ① A BEMS will actually be introduced in an existing, new or extended/renovated building.
 - ② A reduction in energy consumption can be achieved through the introduction of a BEMS. Besides, a performance level similar to that specified in the “Judgment Criteria for Building Owners regarding the Rationalization of Energy Use in Buildings” (Ministry of Industry and International Trade/Ministry of Construction Notification No. 1 of March 30, 1999) must be achieved in accordance with the Law concerning the Rationalization of Energy Use.
 - ③ Energy management is possible for each segment of the system, such as the heat sources (refrigerators, heat pumps and cooling towers), pumps, lights/power points, or the like.
 - ④ Measurement/metering data can be collected and stored.
 - ⑤ An energy management structure has been established.
 - ⑥ Energy savings data can be stored and reported on for three years from the introduction of the BEMS.
- **Subsidization rate:** 1/3 (limited to ¥100 million per application)



Local Energy Conservation Vision Development Assistance Program

The program is designed to subsidize the following costs to facilitate energy conservation efforts at the local level: the cost of **developing an “energy conservation vision”** needed by a local government and others to promote energy conservation in its local area; and the cost of **conducting a feasibility study** for project development.

- **Eligible applicants:** Local governments and corporations in which they have invested
(implementers in the case of feasibility studies for project development)
- **Eligible activities:**
 - ① **Initial study (including an ESCO project)**
 - ② **Study geared to the development of a detailed vision for priority themes**
Priority themes include the utilization and promotion of ESCO projects.
 - ③ **Feasibility study for project development**
This includes a study into an ESCO project or a PFI project
- **Activity duration:** 1 year
- **Subsidization rate:** Fixed amount (100%)



Local Energy Conservation Effort Promotion Program

The program is designed to subsidize the cost of introducing an energy conservation system with a great demonstration effect at a government office, hospital, community hall, sewage treatment facility, municipal water supply facility, or the like under an energy conservation promotion project in which the local government plays the leading role.

- Eligible applicants: Local governments

- Eligible projects:

 - ①Local energy conservation promotion project

 - ②Local energy conservation promotion and awareness project

- Project duration: Up to 4 years for ①

 - In principle 1 year for ②

- Subsidization rate: 1/2 or 1/3 for ①

 - Fixed amount for ②



Local Global Warming Prevention Effort Assistance Program

The program is designed to assist potential model projects for locally-based global warming prevention efforts that are progressive and with great spin-off effects, as well as involving the implementation by a local government or a local community, environmental NPO or business enterprise considered to be in a collaborative relationship with it of multiple schemes based on the introduction of new or renewable energy or an energy conservation facility. By doing so, it aims to establish model cases for such efforts and spread them to wider areas.

- **Eligible projects:** Projects involving the implementation of multiple schemes based on the introduction of new or renewable energy or an energy conservation facility according to, for example, a plan formulated by a local government in accordance with the Law concerning the Promotion of Global Warming Prevention Measures
- **Subsidization rate:** up to 1/2 (or 1/3)

Green Purchase Law

- **Target entities:** National Government and independent administrative agencies.
A similar treatment applies to local governments.
- **Type of service:** Energy audit - investigation and analysis of the operational state and energy consumption of target facilities
- **Judgment criteria:** Assessment by a person with a suitable technical qualification or skills or a corporation which employs such a person
- **Target facilities:** Air-conditioning system, lighting system, heat source system, receiving and transformation systems, control system, water supply and drainage systems, and the like
- **Approach to target setting:** Number of energy audit services to be procured in the fiscal year concerned



ESCO Projects Promotion Efforts (Energy Conservation Center)

Committee activities and study projects

ESCO Study Committee — April 1996

ESCO Project Introduction Study Group — 1997

ESCO Project Demonstration Committee — 1998

Energy Conservation Effect Measurement/Verification Technique Study Committee — 1999-2002

- ESCO project introduction manual and baseline estimation techniques
- Formulation of measurement/verification guidelines
- Study Committee on Application of PFI Technique to ESCO Projects
- Study of ESCO projects in United States

Study Committee on Expansion of Fund Procurement Techniques in ESCO Projects — 2002

Establishment of Japan Association of Energy Service Companies — October 1999



ESCO Projects Promotion Activity

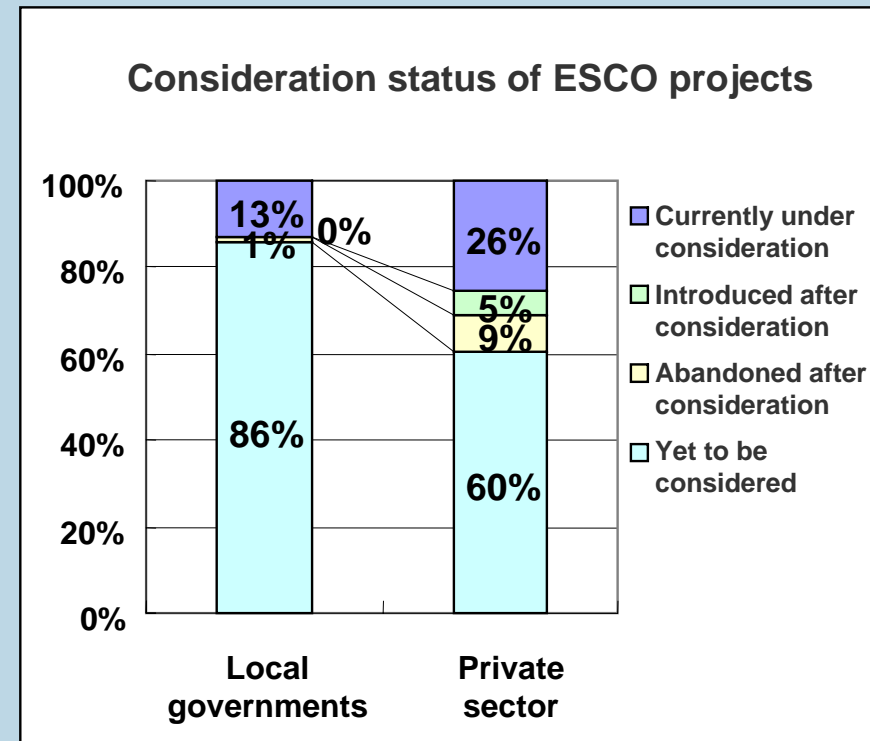
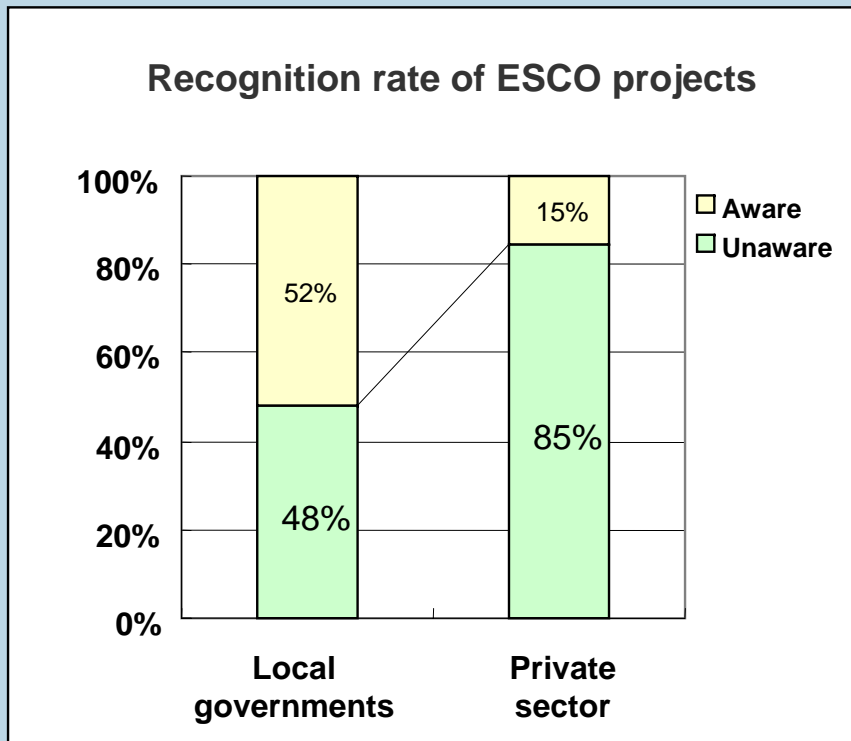
ESCO Project Dissemination Seminars (Subsidy program of METI)

- Purpose:** Dissemination of ESCO projects to clients
- 1. Period:** September-December 2003
- 2. Venues:** Sapporo, Morioka, Sendai, Tokyo, Saitama, Yokohama, Shizuoka, Nagoya, Toyama, Kyoto, Osaka, Hiroshima, Takamatsu, Fukuoka, etc.
- 23 sessions in 21 cities in FY 2003
- Note: 28 sessions in 15 cities in FY 2002**
- 3. Participants:** 3,827 (up about 33% from the previous fiscal year)
- 4. Questionnaire survey results:** Shown on the following page



ESCO Projects Promotion Efforts (Energy Conservation Center)

ESCO Project Briefing Session Questionnaire Survey Results (FY 2002)



Local governments: Approximately 50% recognize ESCO projects, and slightly more than 10% are currently considering or have considered their introduction.

Private sector: Slightly less than 90 % recognize ESCO projects, and 40% are currently considering or have considered their introduction.

ESCO Projects Promotion Efforts (Japan Association of Energy Service Companies)

Purpose of establishment

- ◆ To facilitate the development of the ESCO market and assist in the sound development of the industry
- ◆ To expand the opportunities to receive highly cost-effective comprehensive energy conservation services for clients
- ◆ To improve the efficiency of energy use and help protect the global environment

Founding members: 16 individuals, groups and corporations

(117 individuals, groups and corporations as of May 2004)

- ◆ President: Yoichi Kaya, Professor Emeritus, University of Tokyo



ESCO Projects Promotion Efforts

(Japan Association of Energy Service Companies)

Range of activities

- 1) Education and awareness activities**
(Dispatch of speakers to lecture meetings, posting of advertisements and contribution of articles in professional journals, and the like)
- 2) Release of recommendations on the improvement of the business environment surrounding ESCO projects**
- 3) Hosting of conferences**
- 4) Hosting of seminars aimed at association members**
- 5) Participation in exhibitions (ENEX, etc.)**

WWW site of Japan Association of Energy Service Companies

<http://www.jaesco.gr.jp>

Conceptual Diagram of Introduction of Energy Conservation and Environmental Control Facilities

Ice thermal storage system

- Averaging of terminal load
- Utilization of overnight electricity

Energy-efficient lighting

- Utilization of daylight
- Energy saving through the use of high-frequency inverters

Energy conservation management

- Energy-efficient operation of equipment
- ISO 14001-based support system

Photovoltaic power generation

- Utilization of renewable energy

Refrigeration/heating sources

- Reduction of the power consumption of cooling water and chilled water pumps through the introduction of a large temperature difference design

Inverter control

- Reduction of the power consumption of fans and pumps

Waste treatment facility

- Reduction of waste

Power distribution monitoring system

- Energy saving through the monitoring of electricity use

Flattening of the load curve

- Reduction of peak power demand
- Utilization of overnight electricity

Power receiving and transformation facilities

- Reduction of no-load and load losses

Cogeneration system

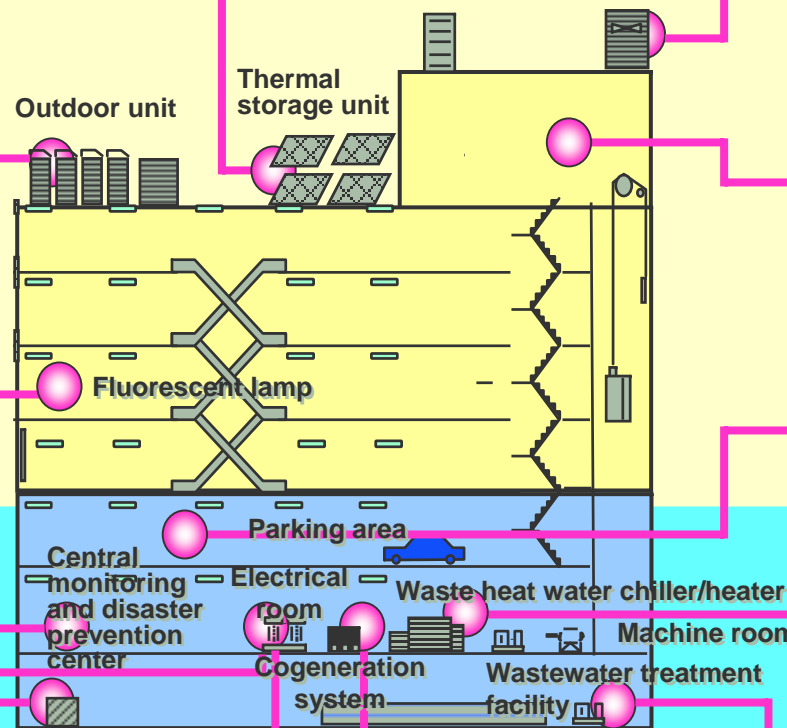
- Simultaneous supply of electricity and heat
- Utilization of waste heat

Waste-heat water chiller/heater

- Utilization of engine waste heat for air conditioning

Utilization of nonpotable water

- Efficient use of water resources



ESCO Project Example (Commercial Building)

1. Name of example **ANA Hotel Tokyo Energy Conservation Retrofitting**
2. ESCO **Yamatake Building System Co., Ltd.**
3. Facility overview

Contract demand	3,600 kW	Receiving voltage	22 kV
Number of stories	Three stories below ground and 37 stories above ground	Air-conditioning facility	District heating and cooling (chilled water and steam)
Total floor area	98,000 m ²	Air-conditioning scheme	Central air conditioning, fan coil unit and packaged air conditioner

4. Energy conservation techniques

Air conditioner inverter control	Inverter control of air conditioner fan according to room thermal load
CO concentration control of parking area ventilation	Inverter control of parking area exhaust fans according to CO concentration
Fresh air intake control based on CO ₂ concentration	Control of fresh air intake according to indoor CO ₂ concentration
Introduction of heat-insulating film	Covering of exterior windows of guests' rooms with heat-insulating film to reduce thermal load component attributable to outside air
Introduction of BEMS	Energy conservation through optimization of operating hours of facilities and equipment and thermal/humidity environment according to load conditions



ESCO Project Example (Commercial Building)

5. Finance Self-financing

6. Utilization of assistance measures

High-Efficiency Housing/Building Energy System Introduction Promotion Program

7. Type of contract and contract duration

Guaranteed-savings, three years

8. Owner benefits - sales points

Although the hotel is open for business twenty-four hours a day all year round, the air-conditioning load fluctuates from season to season and hour to hour. In this regard, the project will make it possible to optimize the operation of the air-conditioning system by automatically changing its output according to load conditions, thus eliminating energy wastage, and this is its greatest benefit.

9. Client's comments

The introduction of the energy conservation system has been delivering the expected energy savings. In fact, BEMS-based energy data analysis has brought about an even higher energy efficiency by inducing more energy-conscious building operation.

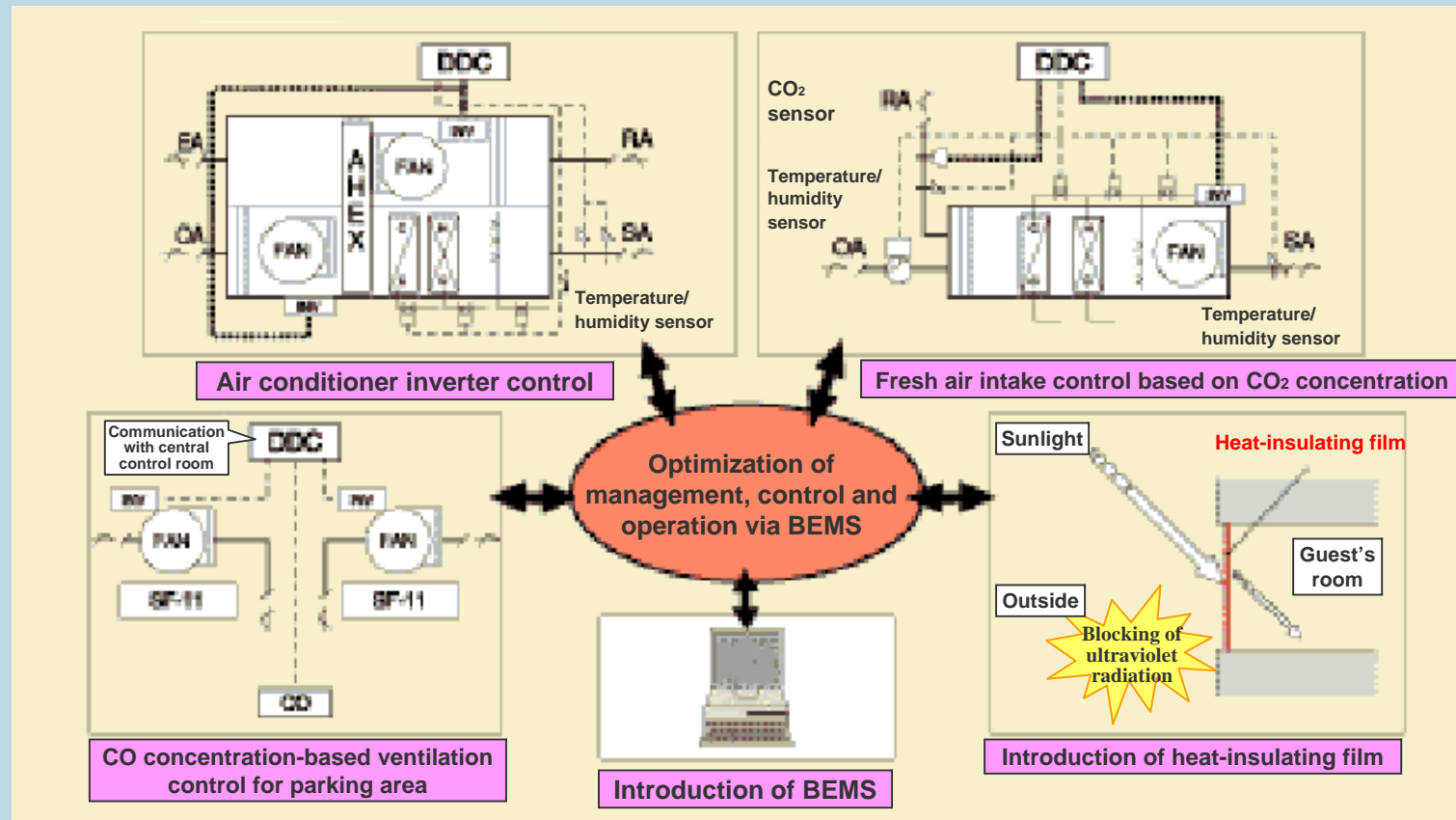
10. Problems encountered at time of introduction and solution measures

As the project was implemented while maintaining normal business activities, close consultations were held in advance regarding the equipment delivery schedule, working hours, etc.



ESCO Project Example (Commercial Building)

11. Energy conservation equipment used



12. Energy savings achieved

Energy consumption before ESCO project 388,669 GJ/year

Energy consumption after ESCO project 307,921 GJ/year

Reduction in energy consumption 80,748 GJ/year (20.8% reduction)

ESCO Project Example (Factory)

1. Name of example Oyama Plant, Komatsu Ltd.
2. ESCO Hitachi, Ltd.
3. Facility overview

Contract demand	22,000 kW	Air-conditioning facility	11 kW air handling unit x 87 units
Receiving voltage	66 kV	Air-conditioning scheme	64,000 m ²

4. Energy conservation techniques

Improvement of air-conditioning system	Adoption of displacement air conditioning (0.55 kW fan coil unit x 174 units)
Introduction of cogeneration systems	Adjustable heat-electricity output, extraction-condensing turbine-generator (1400 kW) Heat-recovery gas turbine-generator (5000 kW)

ESCO Project Example (Factory)

5. Finance Self-financing

6. Utilization of assistance measures

Progressive Energy Use Rationalization Facility Introduction Model
Project Assistance Program (FY 2001)

7. Type of contract and contract duration

Shared savings, 10 years

8. Owner benefits - sales points

Energy savings (9.3%)

CO₂ emission reduction (6.2%)

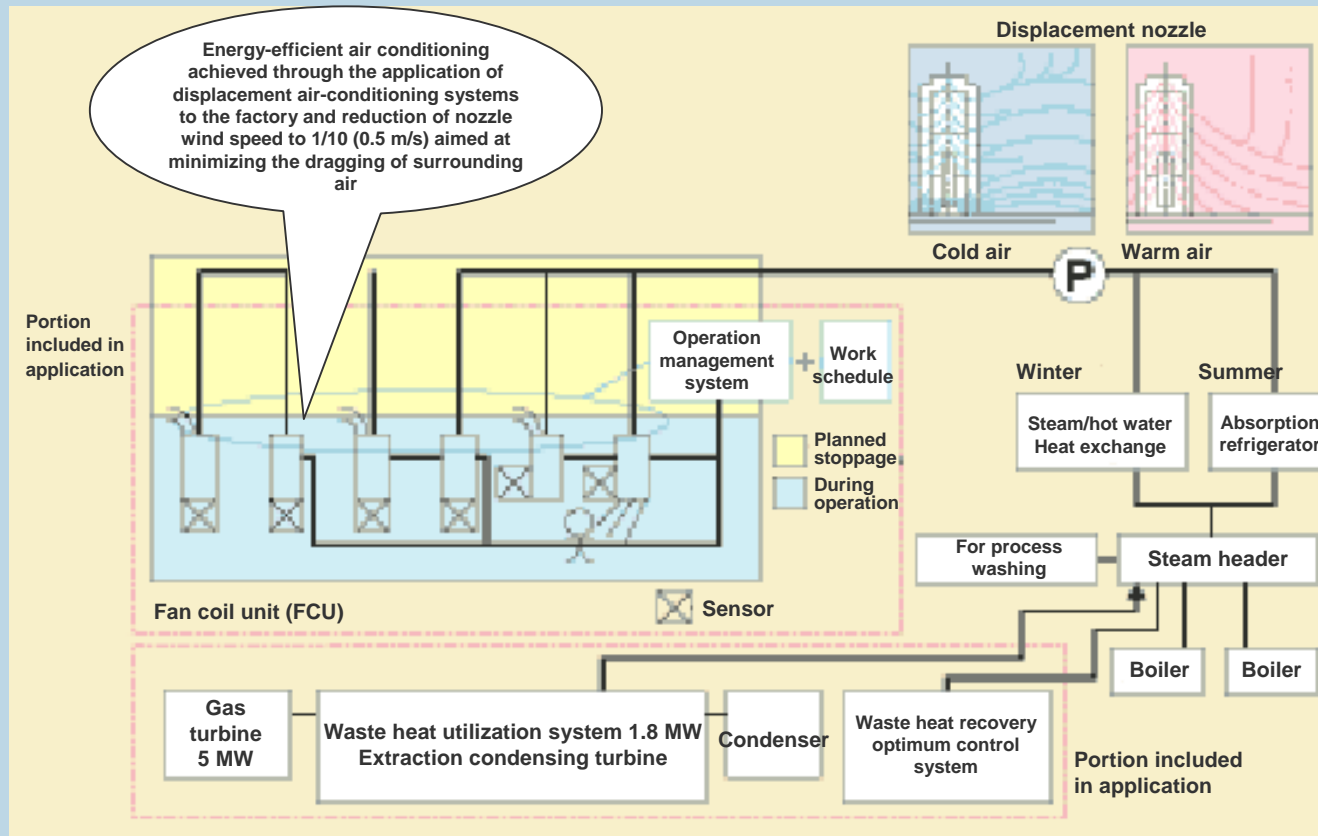
9. Client's comments

Dramatic energy savings can be achieved through the adoption of state-of-the-art displacement air conditioning and introduction of cogeneration systems



ESCO Project Example (Factory)

11. Energy conservation equipment used



12. Energy savings achieved

Energy consumption before ESCO project

951,815 GJ/year

Energy consumption after ESCO project

863,456 GJ/year

Reduction in energy consumption

88,359 GJ/year (9.3% reduction)*

* Ratio calculated on the basis of the figure before ESCO project

ESCO Project Example (Local Government)

1. Name of example **ESCO Project for Osaka Medical Center and Research Institute for Maternal and Child Health**
2. ESCO **Maternal and Child Center ESCO**
(Investors: Gas and Power Co., Ltd., DAI-DAN Co., Ltd. and Toshiba Corporation)

3. Facility overview

Contract demand	2,200 kW	Air-conditioning facility	Absorption water chiller-heater
Number of stories	One story below ground and four stories above ground	Cooling capacity	2,000 RT
Total floor area	39,204 m ²	Heating capacity	140 kW (120,000 kcal/h)
Receiving voltage	22 kV	Air-conditioning scheme	Fan coil unit, packaged air conditioner

4. Energy conservation techniques

Introduction of high-efficiency gas engine	730 kW gas engine
Introduction of high-efficiency gas-absorption water chiller-heater	Energy-efficient type (450 RT/200 RT)
Flow control	Inverted control of cold and hot water pumps and air handling units
Improvement of efficiency of lighting equipment	Introduction of three-step illumination control inverter ballast
Introduction of water-saving device for toilet	Artificial flushing sound generator (Some toilet users are known to flush water just to mask the discharge sound.)
Utilization of condensed steam as nonpotable water	Draining of condensed steam into nonpotable water tank for use as toilet flushing water
Heat insulation of steam lines	Reduction of heat loss



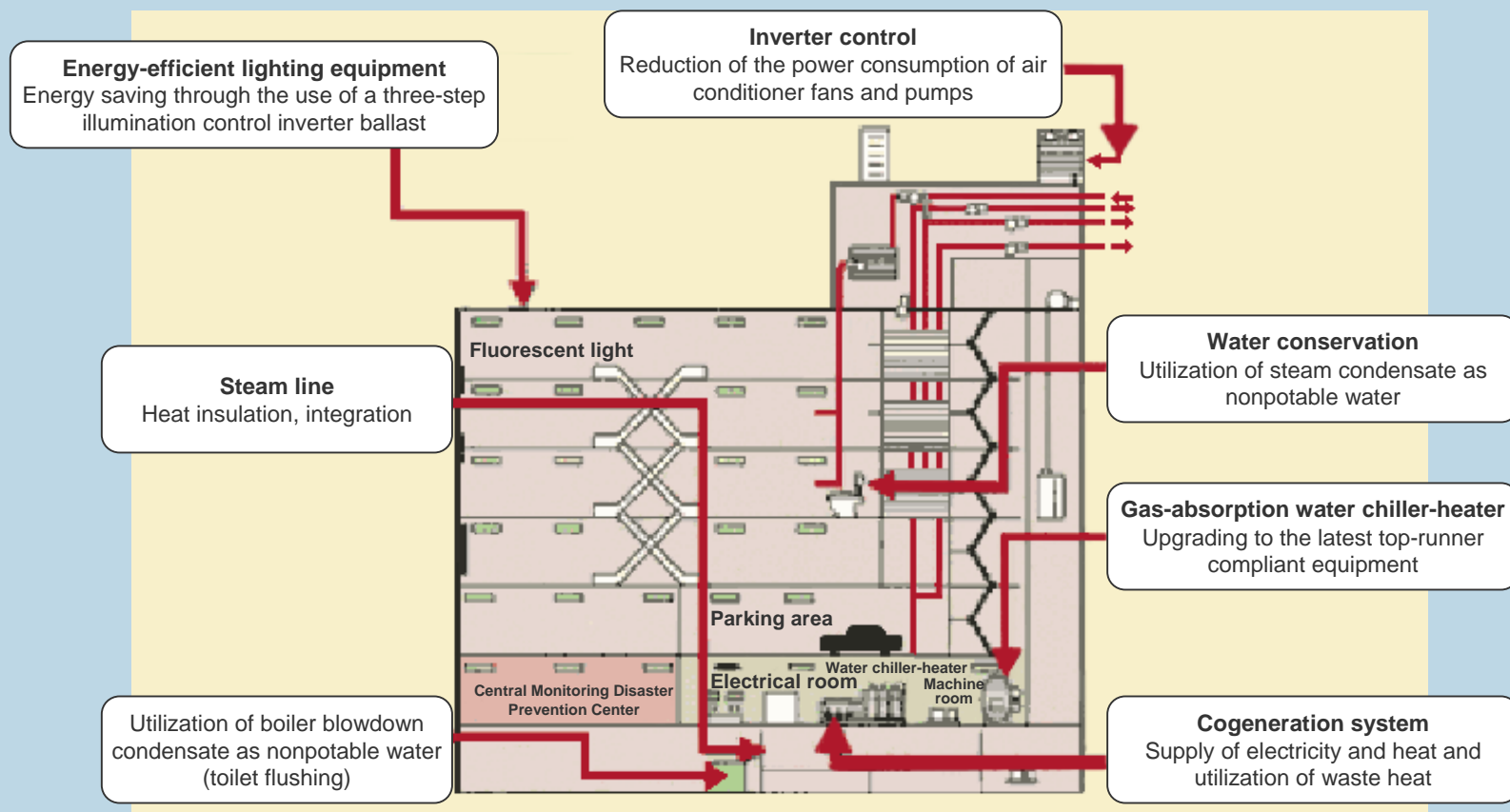
ESCO Project Example (Local Government)

5. Finance Borrowings from financial institution
6. Utilization of assistance measures
 Progressive Energy Use Rationalization Facility Introduction Model Project Assistance Program
7. Type of contract and contract duration
 Shared savings, 12 years
8. Owner benefits - sales points
 - Facility renovation can be undertaken without available funds on hand.
 - Energy savings (CO2 emission reductions) can be achieved.
 - Energy and water bills can be cut.
9. Client's comments
 This ESCO project has been delivering the expected reductions in energy and water bills since it became operational in April. With the annual energy savings target also looking certain to be cleared, the prefectural government is totally satisfied with it.
10. Problems encountered at time of introduction and solution measures
 - The fluorescent light replacement work was undertaken according to a work schedule carefully worked out on a block by block basis, using weekends and nighttime as much as possible so as not to hinder hospital operations or disturb patients.
 - With the cogeneration system, thorough soundproofing measures were taken to minimize operation noise.



ESCO Project Example (Local Government)

11. Energy conservation equipment used



12. Energy savings achieved

Energy consumption before ESCO project

202,664 GJ/year

Energy consumption after ESCO project

151,754 GJ/year

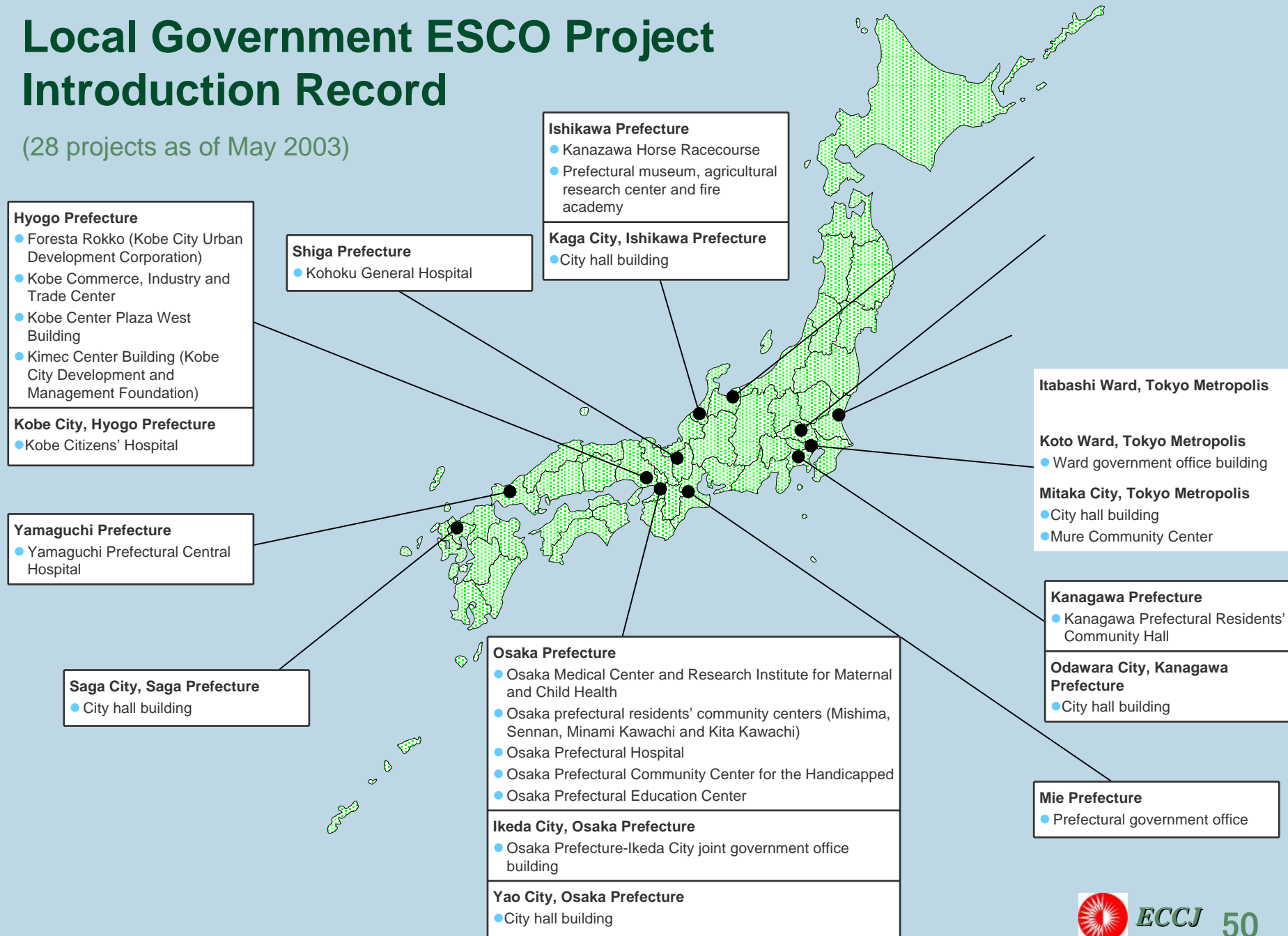
Reduction in energy consumption

50,910 GJ/year **(25.1% reduction)**



Local Government ESCO Project Introduction Record

(28 projects as of May 2003)



Necessity of ESCO Projects

- Provide new business opportunities **for private enterprises**
- Facilitate the fulfilment of Japan's commitment made at COP3 **from the national perspective**
- Provide comprehensive services that make it possible **for energy users** to simultaneously achieve energy conservation and cost cutting
- Provide a vehicle **for financial institutions** to develop a new market



Future Outlook

ESCO projects are expected to grow steadily in the future.

- ✧ An expansion in demand among class 1 designated energy management factories as a result of the amendment of the Energy Conservation Law
- ✧ An expansion in demand among local governments under local energy conservation visions and the Clean Purchase Law
- ✧ Provision of easy-to-use subsidies and other assistance by the National Government
- ✧ Growth in shared-savings contract projects through off-balance sheet financing

