

# Japan's energy-saving policy and first ESCO Project on private fund undertaken by local government

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Japan, ESCO, energy-saving policy, legal issues, scheme, contract, energy saving technology

## Abstract

Initiatives for ESCO projects in Japan started in 1996 with the establishment of the ESCO Review Committee in the Ministry of International Trade and Industry. The ESCO Promotion Council was established in 1999 as a private organization. This ignited each company's full-fledged participation in ESCO projects.

Based on an Osaka Prefectural hospital as an example, which is the first ESCO project on private fund adopted by any local governments in Japan, this report discusses Japan's energy saving policy and legal issues in applying an ESCO project to public buildings. The report also introduces the project scheme, contract terms along with the outline of energy saving technologies and energy-saving effects actually achieved between April and November 2002.

The subject case is hospital had spent approximately 2 620 thousand Euro per year for utility bills. Our energy saving targets were reduction of 598 thousand Euro or 23% in the utility costs, 25% reduction in energy consumption, and 31% reduction in CO<sub>2</sub> emission.

Achievement of 75% of the target reduction in utility costs was guaranteed to the client. The ESCO system came into operation in April 2002. The survey results after eight months showed that the energy-saving effects had exceeded the target values.

Energy-saving technologies were applied to the cogeneration system, the inverter control of the pumps and fans, water-saving equipment, drag reduction technology of

surfactant for chilled and hot water pipes, and high-efficiency lighting equipment. Furthermore, the remote control monitoring system using the Internet has been applied in order to save operation costs.

## Introduction

Initiatives for ESCO (Energy Service Company) projects in Japan started in 1996 with the establishment of the ESCO Review Committee under the Agency of Natural Resources and Energy of the Ministry of International Trade and Industry (now the Ministry of Economy, Trade and Industry). In 1999, the ESCO Promotion Council, a private organization, was established, triggering full-scale participation in ESCO projects by private enterprises.

This report looks at a case study of an Osaka Prefectural hospital, which is the first ESCO project under private funding adopted by any local government in Japan, to discuss Japan's energy saving policy and the legal issues involved in applying an ESCO project to a public building. The report also discusses the project scheme, contract terms, an outline of the energy saving technologies used and the amount of energy savings between April and November 2002.

## Outline of energy-saving policy in Japan

In Japan, public awareness of the need to conserve energy was ignited by the first oil crisis in 1972. Following the second oil crisis, the Law Concerning the Rational Use of Energy (Energy Conservation Law) went into force in 1979. With the later easing of supply-demand conditions and lowering of oil prices, however, the trend lost momentum. In an

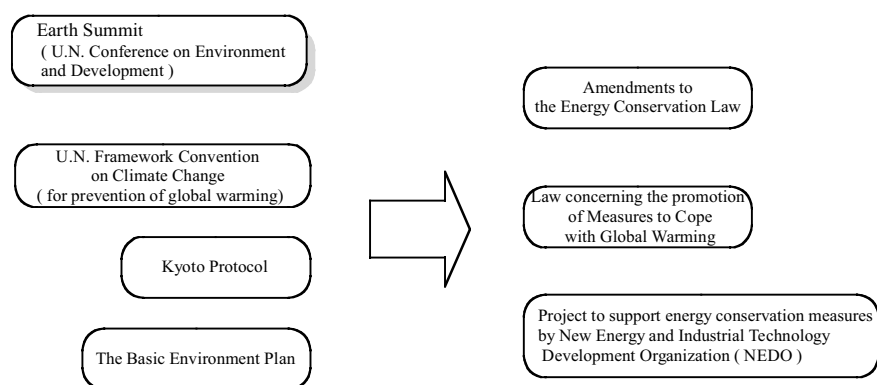


Figure 1. Japan's energy conservation policies.

Annual Energy Consumption		Sector		Current Measures
Fuel (Thermal)	Electricity	Five sector -Manufacturing -Mining -Power Supply -Gas Supply -DHC	All sector except those on left (office buildings, department stores, hotels, schools, hospitals, public agencies, amusement parks)	+ Assign energy management staff + Record energy consumption amount, etc.
3,000 kL	12,000 MWh	Category 1	Category 2	<b>Amended provisions</b> Tougher regulations for consumer-related operations + Draft and submit a 10- and long-term plan + Hire a qualified energy manager in drafting plans + Regular reporting (instead of recording)
1,500 kL	6,000 MWh			
0 kL	0 MWh			<b>Current Measures</b> + Assign energy manager + Record energy consumption amount, etc. <b>Amended provisions</b> + Regular reporting (instead of recording)
		<b>Current Measures</b> + Assign energy manager (must be qualified for energy management) + Draft and submit a 10- and long-term plan + Regular reporting		

Figure 2. Scope of the amended Law.

effort to prevent the potential negative effects of global climate changes, the country adopted the U.N. Framework Convention on Climate Change (for prevention of global warming) in May 1992, and the Kyoto Protocol in 1997. Accordingly, relevant laws were formulated and the Energy Conservation Law was amended. Figure 1 illustrates Japan's energy conservation policies.

### THE BASIC ENVIRONMENT PLAN

The Basic Environment Plan lays out the basic course to be followed by environmental protection measures into the early 21st century in order to promote these measures in a comprehensive and systematic manner in accordance with the Basic Environment Law decided on by the Cabinet in December 1994.

### LAW CONCERNING THE PROMOTION OF MEASURES TO COPE WITH GLOBAL WARMING

The first law in Japan designed to prevent global warming. In response to the targeted 6% reduction in greenhouse gas emissions from 1990 levels imposed on Japan by the Kyoto Protocol (adopted in December 1997), in April 1998 the Environment Agency of Japan submitted a bill to the Diet which it hoped would lay the foundation for future measures to achieve the numerical target and prevent global warming. The Law details the roles the national and local governments, businesses and the people are expected to play in

controlling emissions of all six greenhouse gases subject to numerical targets in the Kyoto Protocol, including carbon dioxide. The Law calls for large-scale businesses and others to draw up emissions control plans and to publish the status of their progress in implementing them. However, some critics argue that the Law is ineffective, since it does not bind businesses to control emissions. Because of this, when the government drafts a law that ensures achievement of the Kyoto Protocol targets, criticism may arise for imposing emissions reduction quotas on businesses and introducing a carbon tax.

### AMENDMENTS IN THE ENERGY CONSERVATION LAW

In the past, only factories and new construction were regulated by the Energy Conservation Law. The amended Law obliges existing office buildings to implement energy conservation measures comparable to those imposed at factories. To ensure energy conservation, enterprises that fail to fulfil their obligations are fined. Figure 2 shows the scope of the amended Law.

### EXPANDING THE SCOPE OF GOVERNMENT SUBSIDIES

To push forward measures to save energy and prevent global warming, the national government has extended subsidies to a greater number of ESCO businesses and businesses that have installed energy conservation equipment. Despite the budget deficit, the government has expanded the scope of its subsidies in order to promote energy conservation, development of small and medium enterprises and exploitation of new demand by way of the ESCO scheme. Table 1 lists government subsidies to support energy conservation measures in fiscal 2002.

### ESCO's energy conservation effects in public buildings and legal bottlenecks to the introduction of ESCO schemes

In the past, when a local government introduced a shared ESCO scheme to its buildings, several issues had the potential to infringe on the Local Autonomy Law. It was therefore necessary to sort out the legal status of ESCO projects and interpretations of related laws. As far as ESCO projects by local governments in Japan are concerned, a guaranteed

**Table 1. Government subsidies to support energy conservation measures in fiscal 2002**

Subsidies	Size (Euro in millions)	Scope	Descriptions
Project to support businesses promoting rational use of energy	72	Existing factories and business establishments	Subsidizes 1/3 of cost of cost-effective energy conservation measures
Project to promote introduction of efficient energy systems to buildings and housing	97	Existing and new housing and buildings	Subsidizes 1/3 of cost of introducing efficient energy systems
Project to formulate regional visions for energy conservation	5	Local governments and investing corporations	Subsidizes 100% of cost of formulating visions to promote energy conservation measures, including feasibility studies
Project to promote regional diffusion of energy conservation	30	Local governments	Subsidizes 1/2 of cost of mounting public appeal energy conservation projects at local government facilities
Project to support regional measures to prevent global warming	5	Local governments and NPOs	Subsidizes 1/2 of cost of introducing equipment for new energy and energy conservation

ESCO scheme was introduced before Osaka Prefecture embarked on Japan's first shared ESCO scheme in 2002, which triggered a nationwide diffusion of shared ESCO schemes.

#### BOTTLENECKS TO THE INTRODUCTION OF ESCO SCHEMES

Introducing a shared ESCO scheme to local government buildings to remodel them for energy conservation gives rise to the following issues that conflict with the Local Autonomy Law:

1. When refurbishing public buildings, it is necessary to use different companies for designing and construction work;
2. Since a local government's budget must be settled within a given fiscal year, no long-term plan is possible except in extreme cases;
3. Since a private ESCO business must install equipment in a public building under the scheme, permission is necessary for use of the site and ownership zones must be defined;
4. Since staff of public agencies are not allowed to operate equipment installed by an ESCO business, operating costs increase; and
5. Ownership of equipment by an ESCO business occasions otherwise unnecessary real estate taxes, negatively affecting the profitability of a project.

With solutions reached for all the above issues except number 5, a shared ESCO scheme was successfully introduced to an Osaka Prefectural hospital.

#### Case study at a public hospital

Below are descriptions of the introduction of an ESCO scheme by an Osaka Prefectural hospital and the amount of energy saved by the scheme. Table 2 gives building data.

#### ENERGY-SAVING TECHNOLOGY

The following policies were laid down for the implementation of energy conservation measures in our project:

**Table 2. The building data**

Name	Osaka Medical Centre and Research Institute for Maternal and Child Health (general hospital)
Floor area	40 164 m <sup>2</sup>
Completion	1981
Main equipment	Gas absorption type: total 2 050 RT Steam boiler: 3.0t x 2 cans
Contract power	2 200 kW
Utility costs( Euro )	2 598 thousand (power: 1 259 thousand; gas: 708 thousand; water: 631 thousand)

- Aim to maximize the amount of energy saved by avoiding 'cream skimming,' but attracting many investors to make energy conservation projects feasible in economy.
- Create compound advantages by exploiting equipment replacement cycles and seizing opportunities for energy conservation.
- Make sure that the ways remodelling work is done and equipment is operated are suited to the actual conditions of the hospital's administration.
- Ensure the ESCO project is operated and maintained in a sound manner.
- Aim to reduce environmental impact.

In choosing energy-saving technologies, priorities were given to those with high cost benefits and excellent performance records.

Energy-saving technologies adopted were: cogeneration systems, inverter-controlled pumps and fans, water conservation equipment, drag reduction technology of surfactant for chilled and hot water pipes and high-efficiency lighting equipment. In addition, a remote control monitoring system via the Internet was applied to save operating costs. Figure 3 describes energy-saving technologies employed.

#### ESSENCE OF CONTRACT

Figure 4 shows the targeted reduction in utility bills for this ESCO project and appropriation of profits from the surplus. The plan envisions an annual reduction in utility bills of

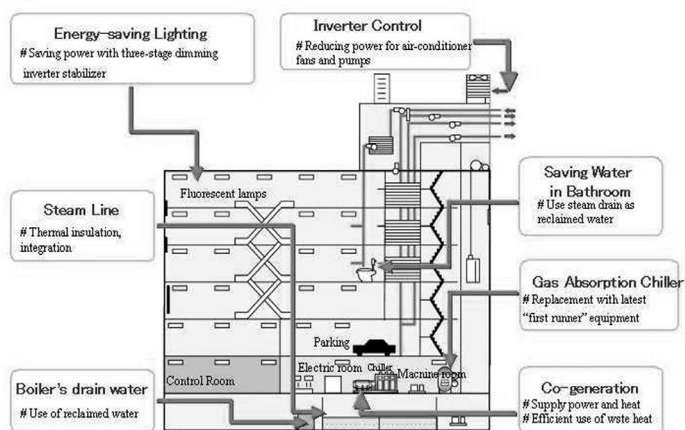


Figure 3. Energy saving technologies employed

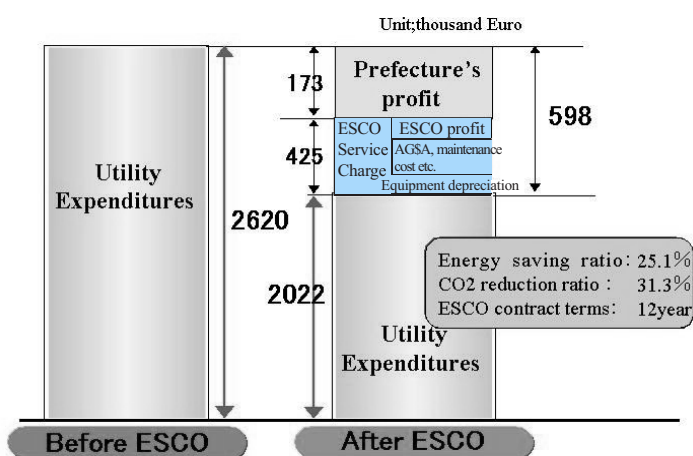


Figure 4. The targeted reduction in bill

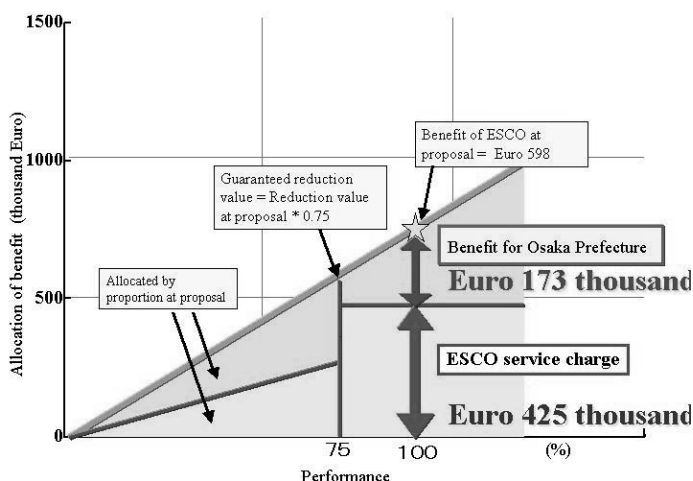


Figure 5. Adjustments to ESCO service charge

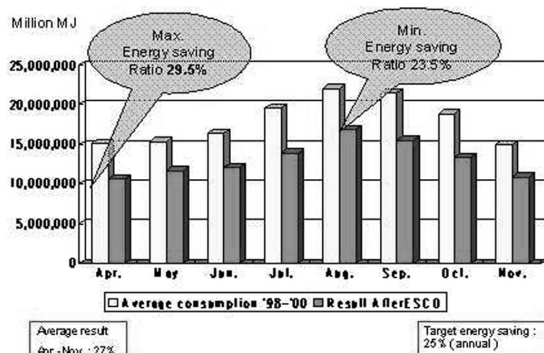


Figure 6. Actual energy savings

598 thousand Euro. Of that amount, 425 thousand Euro goes to the ESCO business and Osaka Prefecture gains 173 thousand Euro in profits. Another invisible profit benefiting Osaka Prefecture is free replacement of heat sources for air-conditioners, which, 20 years after the completion of the building, have reached their replacement period.

Figure 5 shows arrangements for adjustments to ESCO service charges when the value of the energy reduction is below or above the guaranteed amount.

#### AMOUNT OF ENERGY SAVED

This hospital had been spending approximately 2 620 thousand Euro per year for utility bills. Our energy conservation targets were to reduce utility costs by 598 thousand Euro or 23%, energy consumption by 25%, and CO<sub>2</sub> emissions by 31%. Achievement of 75% of the targeted reduction in utility costs was guaranteed to the client.

In April 2002, the ESCO scheme went into operation. Fig. 4 shows the actual savings in energy over the past 8 months. Both figures being above target values, we expect annual targets will be reached.

#### IN CLOSING

The amount of energy saved after introducing an ESCO scheme to the hospital exceeded the target value. This would never have been possible without detailed planning, as well as the generous cooperation of the staff at Osaka Medical Centre and Research Institute for Maternal and Child Health. This first attempt to introduce a shared ESCO scheme to a public building in Japan has triggered the adoption of ESCO schemes by public bodies, with other public organs following suit in 2003. In our capacity as an ESCO business, we will do our utmost to contribute to such causes as energy conservation and prevention of global warming.

#### References

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