

# Research on the Development of ESCO Energy Technology Services in the Public Electricity Sales Industry

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## Abstract :

The objective of this project is to study and analyze the development strategies of domestic and foreign energy technology service industries and the current status of technical services. The data collection and analysis of domestic and foreign energy strategy research is aimed at the current status of domestic energy technology service industry and foreign electricity sales industry to invest in ESCO energy technology services, including operation mode, operation type, service scope and operation effectiveness, so as to understand the issues that Taiwan Power Company (TPC) may encounter when running ESCO business. The research results of this project may serve as an important strategic reference for Taiwan Power Company to engage in energy technology services.

## Background and purpose

This study collects and analyzes the development trend of service models of the electricity sales industry in the United States and Japan to see how power supply services evolve into comprehensive energy services. Moreover, to study how the industry expands the ESCO energy technology service industry, along with stabilizing the customer source and providing diversified services to enhance the competitiveness of customers. The specific approach is to assist customers to engage in load management and create demand-side resources, so as to slow the demand for new power plants, and to be in line with the energy conservation and carbon reduction policies. Therefore, the public electricity sales industry is involved in the ranks of energy technology services with professional power capabilities. In addition to sustainable business expansion and deepening of existing services, it is also in line with national policies and other benefits.

## Results and Applications

### 1. Research and analysis of foreign power sales industry investing in energy technology services

As Table 1 shows, the United States of America by means of the "Federal Energy Management Plan" (FEMP) and administrative requirements request the public utilities sector to improve energy efficiency. On the other side, Japan's private power companies are to establish one-stop ESCO service systems, in addition to energy (electricity, natural gas)

sales, it also provides energy-saving services, energy-saving performance assurance and other ESCO businesses. Besides, it also provides equipment solutions, such as the operation and maintenance, such as electricity and air conditioning equipment.

### 2. The feasibility analysis of ESCO service development for Taiwan Power Company

#### I. The overview of ESCO Industry's development in Taiwan :

According to the survey, there are 324 members of the ESCO industrial association in Taiwan, and the industrial output value in 2019 was 16.11 billion NTD. Currently there are large-scale well-known enterprises have developed energy-saving work items by themselves or established energy-saving companies, to involve in ESCO services and extended energy-saving projects (such as Delta, Tatung, BenQ, etc.). Among them, companies with capital exceeding 100 million NTD accounted for 41%, and companies with capital exceeding one billion NTD 16%. The implementation of energy-saving projects is still dominated by large enterprises.

#### II. Analysis of the status of ESCO service development for Taiwan Power Company

and The aspects of the analysis of Taiwan Power Company's ESCO service development model include operational, technical, human resources, financial and environmental factors :

##### i. Operation

The development of ESCO services by Taiwan Power Company, such as the establishment of subsidiaries or merger of existing ESCO companies is less flexible than private ESCO companies, and it is apt to trigger the issue of competing with private enterprises for profit. Therefore, considering the current legal system in Taiwan, it is recommended to develop the ESCO service model by investing in private ESCO companies (with a shareholding of not more than 50%). The relevant SWOT analysis and schematic diagrams are shown as Table 2 and Figure 1.

##### ii. Technology

At present, there are many domestic ESCO service providers, and many large enterprises have involved in this field. Therefore, in addition to investing in

traditional energy-saving improvements of the applications of related technologies, the advantages of Taiwan Power Company may include power grid management experience and demand dispatching energy. Moreover, it should integrate current energy visualization management and intelligent control technologies to provide users a full-scale energy-saving integration solution and to develop the SUPER-ESCO business model to differentiate the market and create advantages.

iii. Human resource

Because the SUPER-ESCO service model provides users comprehensive integration solutions including energy-saving projects, demand response, intelligent control and management,

cross-disciplinary talents are required. In addition to accelerating the development of current energy-saving diagnostic technologies, the human resources training plan also needs to cultivate talents with enhanced marketing skills to develop integrated system talents.

iv. Finance and Environment

Th supporting measures include: (1) supply system, (2) selection of equipment, engineering, IT suppliers, (3) good cooperation model, such as project division, responsibilities and obligations, legal contracts, (4) capital and long-term relationship with the banks, and healthy financial system, through the cooperation with leasing companies to reduce long-term receivables.

Table 1. The USA and Japan to promote the sale of electrical energy technology services industry patterns and operational effectiveness

Country	USA	Japan
Output value	US\$7.6 billion in 2017(approximately NTD\$228 billion).	US\$2.27 billion in 2017(approximately NTD\$6.8 billion).
Main customers	Public sector (85%).	Public sector (38%)、Private sector( 62%).
Main measures	Utility Energy Service Contracts (UESC) under the "Federal Energy Management Program" (FEMP) framework.	Amend the "Energy Conservation Law" and its regulations and supplement the "Promoting the ESCO", the energy use rationalization of the industry support plan and energy-saving investment promotion support subsidies and other plans.
Policy objectives	Federal agencies can be accepted by financial incentives provided by utility companies, goods or services to increase energy efficiency, promote water conservation or management of electricity demand in order to meet federal regulations, equipment operation and maintenance objectives.	Major energy users must consider the performance contracts of ESCO provided by the company to improve energy efficiency. ESCO to provide subsidies for energy-saving operations in support measures, subsidies and corporate funding rate is 1/3 to 1/2. In addition, the government and non-profit organizations and other ESCO funds are subsidized by 1/2 of the total funds, which effectively strengthen the incentives for power companies, ESCO companies and energy users to participate in the development of ESCO.
ESCO members	Energy technology service companies (ESCO): 44 companies; Energy service related companies (including utilities, equipment manufacturers, engineering and design companies,	Three full members and 47 support members. Among them, 14 formal members regard energy performance contracts as their business projects, while supporting members refer to technology

	company risk management and facility management company members, etc.) : 51 companies.	providers and service operators.
Objective	Encourage the federal government to implement effective energy management through executive orders and reduce energy costs by improving energy efficiency and saving water, in order to achieve improvements in public utility management decisions in federal policy, reduce energy costs and environmental impact.	Factories, buildings and transportation departments to provide energy-related specifications, the development of regulatory standards " Judgment of Standards " for the designated energy management factory. Requirements for highly energy-consuming enterprises must make an average annual saving of more than 1% of the long-term energy savings plan, and report to the government's own energy needs and related investment plans each year.
Energy technology services type	Energy users of federal agencies and public utility companies that provide their utility services contract of utility energy service contract (UESC) to provide energy management services under this contract.	Including utility services, ESCO services, energy management services, district heating services, Facility Services and power generation business.
Service Scope	Focused on improving the energy efficiency, renewable energy technologies, alternative fuels (biomass / landfills), cogeneration technology and reduce water consumption.	Cogeneration and electricity symbiosis and ESCO work items (energy diagnosis, energy saving effect guarantee) and operation and maintenance of power, air conditioning and other equipment.
Case description	Take <b>the establishment of the ESCO subsidiary by Florida Power and Lighting (FPL) in the United States as examples</b> , from 2007 to 2017, they had provided UESC services with Patrick Air Force Base (PAFB), the US Coast Guard (USCG) and the US Department of Agriculture. (USDA). The annual power consumption had been reduced by 1.5 million degrees, 3.1 million degrees and 0.84 million degrees corresponding to each unit.	Take <b>Japan Kanden Gasco Corporation and KFM Corporation for the merger of Kenes Corporation</b> as examples, to provide services to the Near Real Estate Corporation, Abeno Harukas Skyscraper, Kansai Medical University Kaori Hospital, and Yamada Food Industry Corporation Central Kitchen, reducing energy costs by about 20% to 30% %

Figure 1. Schematic diagram of the use of equity stake investment for SUPER-ESCO

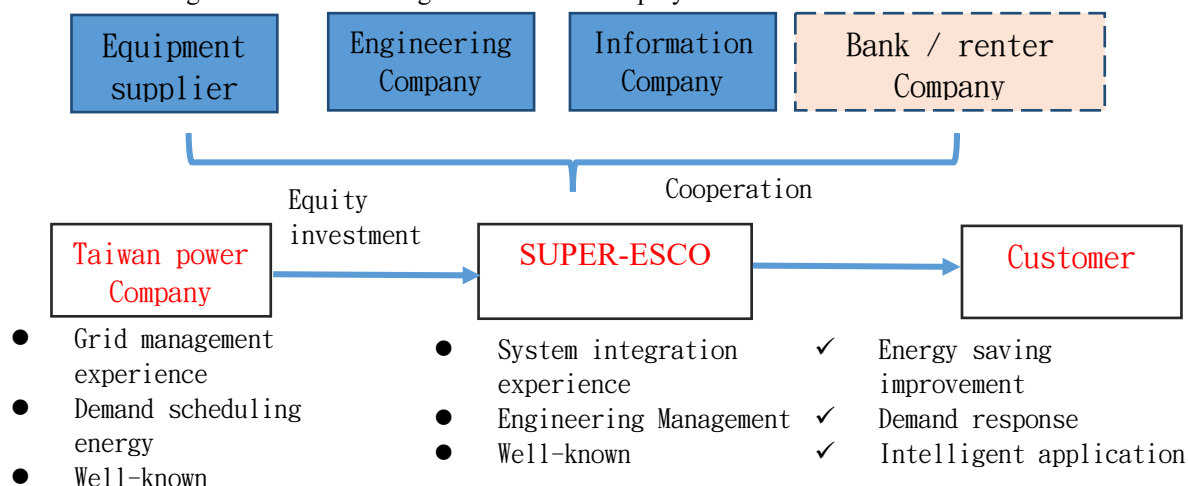


Table 2. SWOT analysis of equity investment to establish SUPER-ESCO company

<b>Strengths</b>	<b>Weaknesses</b>
<ol style="list-style-type: none"> <li>1. It has advantages that other ESCO operators cannot have, such as power grid management experience and demand dispatching energy, and each layer of technology supports each other.</li> <li>2. Companies invested by the Taiwan Electric Power Company are more likely to gain user trust.</li> <li>3. The talents, execution methods and performance of the invested company can be used continually, greatly reducing the time for the establishment of related systems.</li> <li>4. The integration of energy saving improvement and demand response can increase the additional benefits of energy saving projects and become more competitive than other ESCO companies.</li> <li>5. The companies invested by Taiwan Power Company are more likely to obtain credit of financing and leasing, and it is more convenient to obtain funds.</li> <li>6. Already have cooperation experience with other equipment suppliers and engineering companies, easy to obtain cooperation.</li> </ol>	<ol style="list-style-type: none"> <li>1. The development of energy-saving and demand-integrated schemes need to pay more attention to integration capabilities, and it is also more difficult to develop talents.</li> <li>2. Significantly less on the market with an integrated amount of energy and the need for programs. It is required to have a plan of marketing and product design to enhance customer acceptance.</li> <li>3. Because most of the current power grid management experience and the demand for dispatching energy talents are in the hands of Taiwan Electric Power Company, it is necessary to consider how technical support of all levels needs to be run in and tried.</li> <li>4. Because there are so many integrated solution partners and no reference examples of relevant contracts, the parties' responsibilities and obligations need to be continuously adjusted to form a more complete cooperation model.</li> </ol>
<b>Opportunities</b>	<b>Threats</b>
<ol style="list-style-type: none"> <li>1. Energy management and greenhouse gas reduction regulations are being strengthened year by year and there is a pressure to impose mandatory improvements on energy users.</li> <li>2. The government currently has a subsidy program for ESCO service companies to increase the willingness of users to invest in improvement.</li> <li>3. Due to the similarity of geographic market and culture, entering the markets of Southeast Asia and China has a competitive advantage over countries such as Europe, America and Japan.</li> <li>4. Energy users lack professional manpower or expertise to execute energy-saving projects. Customer needs can be easily met through a full range of services.</li> </ol>	<ol style="list-style-type: none"> <li>1. It is necessary to face low-price competition from mainland China, strengthen the added value of services, and develop a service-oriented business model.</li> <li>2. Some well-known domestic ESCO companies, such as Delta and Tatung, already have energy-saving improvement and intelligent energy. They may face competitions from the market participants of the same industry, so they should strengthen their additional demand response services.</li> </ol>

