

Development Suggestions of EPC Based on Electric Power Industry

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Abstract—With the further advance of energy conservation and emissions reduction, the energy performance contracting (EPC) has been widely used and promoted, as it is an effective energy saving way under the market mechanism. While the utility industry is the basic industry and main energy sector of national economy, the low carbon development is imperative. Therefore, in order to achieve the propose of promoting EPC application in electric power industry and accelerate the development of electric power industry's technology independent process, we proposed two suggestions that build the EPC e-commerce system of the power industry and blend EPC in the enterprises energy management system through the link of e-commerce, by analyzing the advantages and application obstacles of the EPC.

Index Terms—energy management contracting, e-commerce, utility industry, energy saving and emission reduction

I. INTRODUCTION

In order to realize the goal assignment of the plan that the energy intensity unit GDP reduction by 16% and the carbon dioxide emission reduction by 17% in the 12th Five-year Plan period, and unit GDP carbon dioxide emission reduced by 40% to 45% in 2020 compared with 2005, perfecting the mechanism of marketization of Energy-saving and promoting the implement of contract energy management and power demand side management is stated clearly in the Twelfth Five-Year Plan [1]. As the microcosmic subjects of the power production, the thermal power enterprise is the subject of energy saving and environmental protection. In 2010, 55.1% of the nationwide coal is consumed by power enterprises and the carbon dioxide emission accounts for 50% of the total emission in the process of energy conversion. Therefore, it has great significance for energy saving and emission reduction in the electric power industry and even the whole country, to promote the application of the energy performance contracting and improve the energy efficiency in power enterprise.

II. ADVANTAGES AND APPLICATION OBSTACLE OF EPC

Energy performance contracting (EPC) is a kind of commercial operation mode that the energy services

company (ESCO) made arrangement with energy consumption unit by the format of contract in the energy saving projects. The Contract energy management mode of operation shown in Fig. 1, ESCO provides a series of service (the energy audit of the energy saving projects, project design, construction, equipment installation and debugging, personnel training, and energy saving confirmation), and makes the profit from the energy-saving benefit after the modification, and the customer could save the energy cost [2].

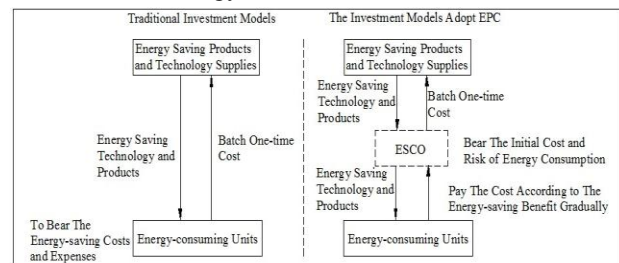


Figure 1. Contract energy management mode of operation.

A. The Development of EPC in China

The energy services industry grew rapidly and the ESCO continued to expand during the period of “11th Five-Year Plan” in China. According to statistics, by the March 2011, the number of the ESCO that approved by the state for the record is 984, and Beijing headed in the field has 176, and Shanghai has 63. Compared with 2005, the number of employees has increased from 16000 to 180000, the scale of the energy services industry has increased from 47 billion to 84 billion Yuan, the investment of the EPC project has increased from 13 billion to 29 billion Yuan, and the capacity of the annual energy-saving has increased from 60 million tons to 130 million tons of standard coal. During the period of “11th Five-Year Plan”, the social investment accumulated more than 1800 billion that stimulated by the energy services industry [3].

Although the energy performance contracting has made a lot of development, but there are many problems. Additional revenue can be yielded from the energy savings with EPC mode, however, due to the duration of the project is long, a number of risk issues from policy, market, financing, operation and efficiency have to be faced during the implementation process. According to literature [4], financial barriers, policy barriers and technical barriers turn to be the major factors restricting

the development. According to incomplete statistics, the number of the energy-saving service enterprise for the industrial and commercial registration is more than 3000 from 2009 to present. Therefore, the EPC developed rapidly in our country, but the whole scale is small, and the projects especially in conformity with the national policy incentives are less.

B. Advantages and Application Obstacle of EPC

Compared with traditional energy-saving mode, the EPC mode reduces the risk that the energy-using units suffered in capital and technology, and improves the asset structure simultaneously, so that the savings can be invested in other priority areas. In addition, the energy services company that in charge of all round management of energy could provide the energy saving technology is more professional and more systematic than the general technology institution. The customer makes the improvement of energy saving, while obtaining the specialized consulting and the experience of energy management to promote the scientific management. The energy saving rate of the EPC project is usually 5%~40% [5].

Generally speaking, the industry scale has not achieved the demand of the national economy industry development, although the ESCO is in the accelerated development phase. Almost all of the ESCO are middle-small enterprise. And the energy saving project in power enterprises has the following traits: great investment, tight schedule and high technological content. As it can be seen, the overall strength of EPC is insufficient, under the condition of that, to compensate its own shortcomings, EPC needs to integrate, organize and cooperate with the required institutions to provide series of services. In the process of complex organization, information barriers, financing obstacles, policy obstacles and technical obstacles limits the application of EPC [6].

III. DEVELOPMENT SUGGESTIONS OF EPC BASED ON POWER SECTOR

A. Industry Level: build EPC e-Commerce System in Power Industry by Electricity Group Company

Through the above analysis, the EPC has a larger advantage in promoting energy conservation and emissions reduction work in electric power industry in our country. Meanwhile under the current policy framework in our country its development is still restricted as imported type of energy management mode. The aim to build the power EPC e-commerce system is to promote the application of EPC actively and to extend the EPC as an opportunity of the pressure on carbon emissions, and have effects on energy saving. As the subject, the electrical power system, would make the match actively on energy conservation transformation between power enterprise and ESCO, and help ESCO solve the problems in the process of implementation, to ensure the implemented of new fuel-efficiency technologies successfully in power enterprises. The architecture of e-commerce system shown in Fig. 2 and

the main operation platform of EPC e-commerce system include: information platform, trading platform, the financing platform and other services platform.

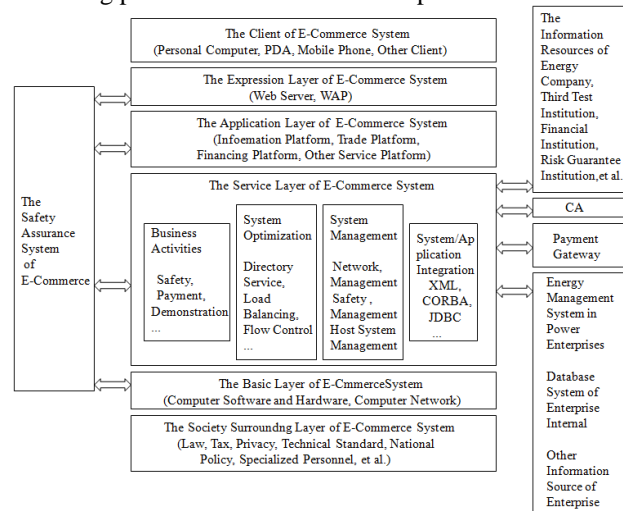


Figure 2. The architecture of e-commerce system.

Information platform's main role is summarizing and screening all kinds of information from the demand side and supply side, meanwhile publishing the valuable information timely. It is aimed at transmitting information between the related subjects involved in the EPC project implementation effectively while providing information query, information summary, information analysis and other related services for the related subjects [7]. Trading platform's main role is to providing a safe, smooth and fair trading environment for the systems participating subjects while expand the diversification and marketization of EPC energy saving renovation project. Financing platform's main role is to broaden the ESCO financing channel, develop energy saving benefits of capitalization financing mode and the third party financing mode [8]. That is regarding electric power industry EPC business platform benefit as EPCP fund, providing financing assurance for ESCO or directly participating in the EPC project financing. The other services platform's main role is constructing ESCO rating system and the enterprise standard system while spreading EPC knowledge and policy guidance and so on.

B. Enterprise level: Blend EPC in the Enterprises Energy Management System, Set up Affiliated Energy-Saving Company

At the electric power enterprise level, blending EPC into the power company energy management system that aimed at promoting the electric power enterprise better learning advanced contract energy management ideas and technology or forming the affiliated energy saving company directly which would participate in energy saving renovation and learn advanced technology of EPCP better. It has many advantages. Firstly, blending EPC into power enterprise energy management system can make use of EPC ideas to manage the electric power enterprise daily work such as equipment operation, maintenance and overhaul, and to improve the electric power enterprise internal management system. Secondly,

it is beneficial for urging the electric power enterprise internal personnel to learn technology such as energy audit, energy saving equipment operation, maintenance, etc and safe production and energy-saving assessment requirements to participate in EPC energy saving renovation project. At the same time, participating in sharing the energy-saving benefit could encourage personnel to implement contract energy management and guarantee the safety and smooth implementation of EPCP while slowing the pressure of equipment operation and maintenance in the process of implementing EPCP.

IV. ANALYSIS OF EPCP PROCESS BASED ON THE ELECTRIC POWER INDUSTRY

Based on the suggestions above, the electric system group co. LTD, as an organizer of EPC e-commerce system, should actively make a touch with electric power enterprise and the ESCO to reach energy-saving modification agreement, meanwhile actively help ESCO to deal with the difficulties encountered in the process of project implementation, so as to ensure smooth implementation of new energy-saving technology in electric power enterprises.

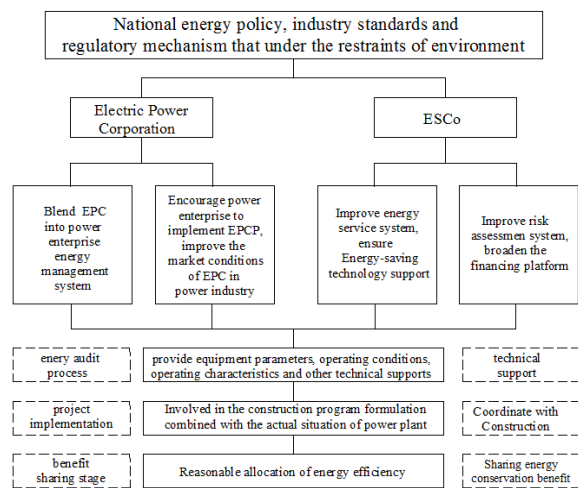


Figure 3. Contract energy management mode of operation in power industry.

Therefore, this paper propose the contract energy management mode of operation in power industry that shown in Fig. 3. In the EPC project preparatory stage, the EPC e-commerce system information platform provides market information support for ESCO, timely releases a variety of information of the demand side and supply side after aggregating and screening. Thus, it can realize the information transfer between ESCO and power enterprise, help to solve the organization channel of ESCO, encourage them to reach a cooperation agreement with power companies. The EPC e-commerce system financing platform helps to broaden the financing channels, the EPC fund from the revenue of EPC business platform in power industry provides financing guarantees for the ESCO, or directly participates in EPC projects financing, and ultimately do not let the EPC market products, fund, technology, and projects be disjointed.

In EPCP implementation phase, the staff of the power company or its subsidiary energy saving companies should provide equipment parameters, operating conditions, operating characteristics and other technical supports in the energy audit process; in the energy saving transformation process, they should make the construction plan and post renovation proposal combining with the actual situation, construct on the basis of the safety insurance in electricity production; in energy-saving equipment operation and maintenance phase, the staff of electric power enterprise and its subsidiary energy-saving company should learn the advanced energy-saving technologies under the guidance of the ESCO; at the stage of sharing benefit, they should participate in making the energy savings validation plan, calculate the benefit of energy savings and have a share in the benefit partly under the premise of objectivity, fairness and accuracy.

V. CONCLUDE

In order to implement the stated objectives in the "Twelfth Five-Year Plan" and commitments of carbon emissions by 2020, it is an inexorable trend to develop the low-carbon electricity. With the arrival of digital information age, the advantages of the electronic commerce system on information transfer and integrating market resources can promote the further application of EPC in power industry, assist ESCO to integrate market resources, solve the information flow problem between ESCO, electric power enterprise and related subjects of EPC project. The final destination is to ensure technically feasible energy conservation project can be favorably implemented in power enterprise.

Blending EPC into power enterprise energy management system, building subsidiary energy saving company of power enterprise can learn the advanced management idea from EPC. Directly involved in the EPC project can master the advanced energy conservation technology quickly, and accelerate the promotion of feasible energy saving technology in the electric power enterprise in our country. At last, it can promote the technology independent process of China's power industry.

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