

---

# Research on Project Management for EPC Mode in Power Transmission Project

Fuwei Zhang <sup>a</sup>, Wenjing Wang <sup>b</sup>

School of North China Electric Power University, Beijing 102206, China

<sup>a</sup>zfw@ncepu.edu.cn, <sup>b</sup>807694235@qq.com

---

## Abstract

At present, power transmission and transformation projects in EPC Contract are still in the pilot phase of construction in China, general contracting management model that meet the domestic actual situation requires in-depth exploration and research. This paper, by analyzing and comparing of EPC contract model with traditional project management, summarizes the special advantages of EPC mode, describes the project management key points in EPC mode and various aspects of the management and all elements after the signing of the contract in the implementation phase, which provides a reference for the forthcoming EPC mode in the construction of power transmission engineering contracting enterprises.

## Keywords

EPC mode, Project management, Management model, Contract

---

## 1. Introduction

EPC contracting projects usually refers investor only select a general contractor or a consortium. In the EPC mode, general contractor is responsible for the entire project design, procurement of equipment and materials, construction and commissioning, as well as the project' safety, quality, schedule and cost, and finally they provide a complete and deliverable projects. EPC mode can reduce the risk of the owner's implementation of the project, and alleviate their work pressure. Meanwhile, contractors can use the professional advantages to achieve the design and procurement, shorten the construction period, reduce investment and transfer risks in bidding price into profits as possible.

On the one hand, EPC mode can take advantage of experience of project contractor in engineering construction, and liberate unit owners from their familiar with construction projects, greatly reduce the pressure on the owners and construction management units, reducing staffing in infrastructure management positions. On the other hand, drawing on extensive construction experience in the construction unit, EPC mode can combine the design, procurement, construction and commissioning to give full play of scale advantages in purchasing, as well as the leading role of the designer in the construction process. In project management, general contractor, at the core position, can monitor and coordinate the various units that project is located. They integrated design, procurement, construction and commissioning related implementation units to achieve the full cooperation of all units in the project life cycle, and eventually achieve a reasonable balance of safety, quality, cost and schedule goals. In a broad sense, , the design units review design scheme during design phase, and equipment and materials suppliers and construction units verify correctness and feasibility of construction and pattern. In the equipment procurement phase, the purchasing department and design institutes should closely cooperate to strict prepare equipment and materials inventory, requisition, solicitation documents and other related documents, and appropriately control the technical parameters and quantity of the procurement of equipment and materials under the premise of fully meeting the needs of owners.

During the construction phase, the progress of the design drawings and supply of equipment and materials should regard construction schedule as a reference. In the experimental stage, under the unified leadership of the general contractor, the units actively cooperate with the owners to carry out the work.

## 2. Comparison of EPC Project Management with the traditional mode

### 2.1 EPC Project Management Model

EPC model project participants are Design Institute, equipment and materials procurement units, the construction unit, commissioning unit, and equipment and materials suppliers. Under EPC Mode, general body involved in the project include owners, the owner's representative, dispute adjudication Board, general contractors, design institutes, equipment and materials suppliers, construction and test operation units. The general contractor is the core of the industrial chain and project management.

### 2.2 Traditional project management model

In the traditional model, the owners themselves have functions of project management, procurement of equipment and materials and commissioning. The general contractor is the core of the industrial chain and project management. Therefore, the owners require a lot of manpower, material and financial resources for project management and coordination of project-related units, thus resulting that unit owners are in very large management pressure. In addition, after project completed, a large number of managers cannot be arranged, which led frequent movement of personnel and team instability In the construction management department. Business level management is hard to sophisticate, and ultimately weaken owners' project management level.

### 2.3 Comparison of the two project management model

Comparison of project management feature in two models is shown in table 1.

Table 1 Comparison of project management feature in two models

Feature	The traditional model	EPC mode
owners agencies	Medium	small in owners, big in contractors
tender form	mainly Open tender	Invited tender or proposed standard
Leading role of design	Difficult to fully play	fully play
Coordination of EPC	Isolated, external coordination	Unified management, internal coordination
Project management experience	accumulated	franchise, Rich experience
Project Management Technology	High level	High level
schedule	Coordination and control are difficult	Realize depth Cross
Expense	High, difficult to control	Low, active control
quality	Quality management respectively	Total Quality Control
Investment Benefit	Relatively poor	good
risk	small in contractors, big in owners	small in owners, big in contractors
owners' effect	Tedious work, poor efficiency	Save time, money, and effort

## 3. Project management during project implementation

At present, in the implementation phase of power transmission project for EPC mode, project management focuses on various aspects of post-management elements after won the tender and signed

the contract. Among them, the main links include: design (including design preparation), equipment and materials procurement (including procurement lead), construction (including construction preparation), power transmission commissioning, warranty and other projects. The main management elements of project management controls are safety, quality, schedule, cost, field, contracts, information, risk and other aspects. Therefore, the core of project management is to control the various management elements in accordance with relevant regulations, standards and program objectives in every aspect. Power transmission project for EPC is in the pilot phase domestically, therefore, management practices and processes still need to be explored and dynamically adjusted.

### **3.1 Design Management**

Currently, design management for power transmission project In the domestic is divided into preliminary design and construction design phases.

(1)Preliminary design determines the selection of design options and the amount of the project budget. Once program and budget are validated, the technical parameters of the master device cannot be altered. In addition, audited amount also determines the upper limit of the project cost, so the general contractor bear a great risk at this stage. Therefore, the general contractor should fully communicate with the owners of units of engineering design in the design and review stage. After consultations and consensus, meeting minutes, memos and other written materials signed by the parties confirmed will be used as an important design basis for Design Institute.

(2)Construction design and budgeting can refer to the above process, to avoid or reduce the occurrence of passing phenomenon, in strict accordance with the preliminary design approval as the basis. However, in the construction design stage, the general contractor needs to draw suggestions and comments of Construction units and equipment and materials supply units, thus complementary advantages of tripartite collaboration can be well played.

### **3.2 Purchasing Management**

Procurement management involves bidding, contracts, important equipment supervision, reminders, factory acceptance, transport equipment, the scene inspection, construction and operation of on-site technical service and other sectors. Procurement management for large equipment is related to the quality of engineering design and construction phase and affect the duration and cost about the whole project. In the procurement chain, the main control indicators are quality, schedule and cost.

Firstly, purchasing of equipment and materials should choose the legal form that based on national Bidding Law. And quality of equipment and materials is the basis and key to ensure projects safe and stable operation. Secondly, when signing the contract, we should clear focus on scope of contract s supply, quality standards, the contract amount and mode of payment, guarantee on progress, breach of contract and solutions, risk-sharing and the like. In the stage performance of the contract, these aspects are important legal documents and compliance basis that can constrain the supply and demand sides. Thirdly, to transport large and extra heavy equipment is difficult, such as transformers, reactors, etc. Transporting large special equipment will directly affect the construction schedule, so the transportation plan should be comprehensive, scientific. In addition, transport lines require field trips.

### **3.3 Construction Management**

Construction Management Contract Project refers to the management of functional departments and units that General Contract Project located in the construction phase. We need to focus on the following aspects:

(1)Payment of project funds. Since loaning construction capacity of most of the construction unit is limit, delaying the project payment will increase the pressure on cash flow construction unit, which would directly affect the construction schedule, quality and safety.

(2)Schedule arrangement and implementation. Construction phase is an important stage to test equipment design and quality materials. Design units and equipment and materials suppliers should

cooperate fully with the construction unit, to arrange schedule design, supply of equipment and materials and cross-tie nodes.

(3) Technical support. For large-scale key projects, besides construction and technical support of the construction unit, design units stationed on site should be represented, and equipment and materials supplier should send technical service contact person or technical service personnel, so as to guarantee a full range of technical support for the construction.

#### **4. Conclusion**

Project management and control measures in Power Transmission Project combined elements of foreign project management theory with experience in engineering practice in domestic, so it has a wide range of common reference value and a certain practical significance. However, since the general contracting projects is lacking of market cultivation in the domestic, and the government's regulatory policy and relevant legal system is not very sound, the processes and methods need to be adjusted accordingly in practice.

#### **References**

- [1] Lan Bai, Yin Hang. Research on Project Management for EPC mode in Transmission Project [J]. Project Management Technology, 2014 (12): 25-29.
- [2] Liu Jie. Discussion on Project Management for EPC mode in Transmission Project [J]. Low-carbon world, 2015 (07X): 59-60.
- [3] Zhou Fengzhang. Analysis on New Development of International Transmission Project for EPC mode [J]. China economic and trade, 2012 (18): 234-235.
- [4] Yuan Zhiyong. Design Management for Power Transmission Project of International EPC mode [J]. Chinese electrical industry, 2013 (1).
- [5] Shi Fengxiang, Chen Changbin. Practice and Exploration on power transmission EPC Mode [C]. 2014.
- [6] Gao Daqun. Resource Allocation of Power engineering EPC projects [D]. Jilin University, 2013.