Contracting for large engineering and construction projects in the oil, gas and petrochemical industry

Contracting strategies and tactics are discussed from an owner’s perspective and in the context of market conditions. This paper is an adaptation of (Berends, 2008).

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Large Engineering and Construction Projects (LECPs) are massive undertakings, involving large capital investments, spanning long development and execution times. During the project life-cycle risk management is the ruling paradigm. Examples of LECPs are the realisation of processing facilities in the oil, gas and petrochemical industry. Here, Engineering Contractors (ECs) play a key role. The contract between owner and EC formalises their relationship, specifying the obligations and liabilities of the parties as well as the allocation of risk. Furthermore, the contracting process (covering the entire project life-cycle) comprises an important governance mechanism.

The project life-cycle

The development of LECPs is a phased process, with an (economic) evaluation at the end of each phase, ultimately resulting in an investment decision. Project execution activities are commonly categorised into detailed engineering, procurement (of materials and equipment) and construction work. A distinct reference point at the end of the project life-cycle is the start-up of the facility when the responsibility is transferred from the project to the operations management organisation (see also Figure 1)
The last phase of LECP development is normally contracted out to an EC, as most owners do not have the required in-house competencies for this (anymore); typically this comprises 1-3% of the total installed cost. Project execution is also in most cases done by an EC (see also figure 2).

**Contracting strategies and tactics**

During the last decades, owners have contracted out the execution of LECPs to a large extent through a (closed) competitive bidding process based on a single Lump Sum / Fixed Price (LSFP) contract for Engineering, Procurement and Construction (EPC). The LSFP/EPC bid prices are composed of a (stochastic) cost estimate of the work, multiplied by a certain mark-up. When establishing this mark-up, bidders have to optimise potential profits with the probability of winning the bidding event. The level of competition is an important consideration in establishing the optimum bid price. Another important factor is that some 80-90% of the work (on a value basis) is not executed by the EC itself but by suppliers (of materials and equipment) and (construction) sub-contractors. Hence, under a (single) LSFP/EPC contract, the EC provides a cost and completion guarantee to the owner. This results in economic inefficiencies because project risks are allocated to the party least well placed (compared with the owner) to carry the consequences of risks materialising.

During the 1980’s and 1990’s there was a high level of EC competition. Owners were able to contract out the execution of LECPs on the basis of a single LSFP/EPC contract at a relatively small premium (mark-up) to ECs in a business environment that displayed the characteristics of a ‘buyer’s market’. The profitability of ECs was low resulting in a global consolidation and reduction in the number of internationally operating ECs. This situation took a dramatic turn after the turn of the century due to an increase in the number of LECPs. Furthermore, with owners pursuing economies of scale, the size of LECPs increased. The procurement market for materials and
equipment became constrained, skilled construction labour became scarce and there was a shortage of experienced EC personnel. The business environment developed into a 'sellers’ market' with high premiums for single LSFP/EPC contracts (Berends 2007a). In this oligopolistic market, ECs were in many cases not willing/able to accept the risks associated with the execution of LECPs on the basis of a single LSFP/EPC contract. As a result, alternative contracting strategies were increasingly used.
**Reciprocal dependency**

These alternative strategies recognize that the coordination role of ECs in the development and implementation of LECPs is crucial to successful project execution. Rather than the procurement of a product (i.e. the processing facility) under a LSFP/EPC contract, the owner engages the EC for Engineering, Procurement and Construction management (EPCm) services. Under a Cost Plus Fee (CPF) remuneration structure, the owner reimburses the EC for the actual costs associated with the project (i.e. materials and equipment as well as construction cost). The CPF contract shields the EC from the market risk during project execution. To align owner and EC interests and to induce the latter to act as the owner’s agent rather than its adversary, payment of the fee can be contingent upon performance through a so-called Cost Plus Incentive Fee (CPIF) contract. Performance criteria can include cost, schedule and quality. The main challenge is to define (a limited number of) ‘robust’ and objective incentive criteria that do not have to be adjusted during execution. A ‘target cost’ is in most cases a key element of the incentive arrangement and it is therefore essential that the owner has the necessary competencies to compile its own stochastic cost estimate of the project.

High quality project development is a pre-requisite for successful execution and it is therefore essential that the last phase of project development is contracted out to a competent EC. The ‘development EC’ participating in the bidding process for project execution will have an information advantage over the other bidders. In a highly competitive market, this may not be a problem but in a market with limited competition, there will in many cases be insufficient interest to bid against the development EC. Exclusion of the development EC is mostly not an option, because competent ECs will in that case prefer bidding for the (potentially more lucrative) execution phase rather than carrying out project development. An advantage of a CPIF/EPCm approach is that in most cases a single bidding process is sufficient as both development and execution is carried out on a reimbursable (hourly rate) basis.

Effective cooperation requires reciprocal interdependencies between contract parties. This is particularly relevant for CPIF/EPCm contracts where the owner relies on the EC acting for and on its behalf. The most effective governance mechanisms to reduce the room for and intent towards opportunistic behaviour are trust, reciprocity, performance monitoring (rather than contract terms) and appropriate monetary incentives.

**Concluding observations**

At the moment the global economy is dominated by the recession. The work backlog of ECs is falling and the business environment appears to be changing into a ‘buyers’ market’ again. When looking for the optimum contracting strategy and pricing structure in this situation, it is tempting to revert back to the situation in the 1980’s and 1990’s. However there are number of fundamental differences. Firstly, some LECPs are so big that not even a consortium of ECs is capable of taking on the financial risks (contracts commonly include ‘joint and several liability’ provisions). Breaking up these mega projects into multiple LSFP/EPC packages introduces interface issues which may require a separate project management contractor. Secondly, the demographic build-up of people working in the industry is skewed with a large number of experienced resources retiring in the near future. A drop in capital projects during the next couple of years will result in limited training opportunities and a shortage of experienced ECs staff is expected during subsequent years.

In the future, contracting will be a core competency of any successful owner organisation involved in the development and execution of LECPs. Owners with the
required in-house project management and contracting competencies, will be able to realise LECPs faster and at lower capital cost than companies that do not possess these attributes. Furthermore, an inability to deploy a range of different contracting strategies and tactics will result in viable projects not being implemented.

References

Berends, T.C., Contracteren bij grote bouwprojecten in de olie, gas en petrochemische industrie, Bouwkostenkunde & Huisvestingseconomie, NVBK, 27/4 (2008), pp. 13-15
