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Critical success factors in construction or rehabilitation contracts regarding dams

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Abstract

Constructing or rehabilitating a dam, be it for hydro power generation or other purposes such as flood control, drinking water supply or irrigation, is a complex project. Drafting adapted contracts taking into account and balancing the mutual interests of the contractual parties (the - future - owner as the “Employer” of the contract and the Contractor) and aligning them with the requirements of other stakeholders of the project is a challenging task.

The critical success factors are:

- a clear-cut, unambiguous definition of the **Scope of Works**: this is *the* key provision of the contract and the benchmark, whether the works have been performed in compliance with the contract;
- comprehensive rules regarding interface responsibilities and the **interface management**, be it between several Contractors, be it between the Employer and the Contractor; determination of the “rely upon information” to be provided by the Employer;
- a carefully drafted provision regarding the **allocation of typical risks** in case of unforeseen events during the erection phase;
- **quality assurance**: an accurate documentation, the Employer’s approval-, inspection- and instruction rights and an adapted project organisation;
- extensive **reporting obligations** to be complied with by the Contractor.

1. INTRODUCTION

Constructing or rehabilitating a dam, be it for hydro power generation or other purposes such as flood control, drinking water supply or irrigation, is a complex project. Drafting adapted contracts taking into account and balancing the mutual interests of the contractual parties (the - future - owner as the “Employer” of the contract and the Contractor) and aligning them with the requirements of other stakeholders of the project is a challenging task.

Critical success factor no. 1 of those contracts is a clear-cut, unambiguous definition of the Scope of Works. This is *the* core clause in the construction & erection contract.

The Scope of Works – including the quality requirements and a clear definition of the requested technical parameters – is the reference for evaluating whether the plant has deficiencies or not. And, it is the benchmark in disputes between the Employer and the Contractor if the latter asserts a claim for “EOT” (extension of time) and compensation of additional costs, alleging that works requested by the Employer are “extra work” requiring a so-called “Change Order”.

Critical success factor no. 2 are comprehensive rules regarding each of the parties’ responsibility in view of interfaces and the interface management. In complex projects with various lots there are a lot of interfaces and usually a great dependency between the works to be performed by different Contractors. The paper shows adapted contractual solutions.



Critical success factor no. 3 are provisions regarding an allocation of risks resulting from typical, but in the particular project unforeseen (and thus perhaps not calculated), events occurred during the erection phase such as bad quality of the rock, on which the foundations are built.

Quality assurance is the critical success factor no. 4: in complex projects it is of utmost importance to closely monitor the progress of the construction works in order to avoid bad performance and to be able to react quickly in case of discovered deficiencies. Usually the Employers reserve themselves the right to approve the design documents, the engagement of subcontractors for major components or services and to exercise broad inspection and sometimes as well instruction rights. Furthermore the establishing of an efficient project organisation combined with qualification requirements for the key personnel is substantial for the performance of the works in time and with the requested quality.

And last, but not least are ample reporting obligations by the Contractor essential. Only this will enable the Employer to closely monitor the projectⁱⁱ.

2. DEFINITION OF THE SCOPE OF WORKS

The definition of the Scope of Works is the core of the contract. Even in Turnkey Contracts where there is one single point of responsibility and the risk of incomplete supplies is much lower than in a multi-contracting structure, a precise definition of the Scope of Works together with the limits of supply and – as far as applicable – the definition of the parties' responsibility with regard to the interfaces is of utmost importance.

There are different approaches to define the Scope of Works. In countries with a long-standing experience in coordinating and supervising dam – and if applicable: hydro power plant - projects, state utilities seem to prefer to specify their requirements for the whole plant down to the smallest detail, e.g. down to the properties of the construction material to be usedⁱⁱⁱ, whereas in World Bank-financed projects Employers seem to prefer a more functional description of the plant to be delivered - leaving it up to the Contractor how to achieve this. An example are the JSCE specifications, which have developed in the past 20 years from rather prescriptive type specifications to more performance based specifications^{iv} (cf. *JSCE Guidelines*). A certain caution is appropriate: an Employer stipulating detailed specifications risks bearing the responsibility that the specified parameters are “fit for the intended purpose.” In those cases, a Contractor might be released from its responsibility for the functioning of the equipment if he fully complies with the requested specifications.

While drafting the Scope of Works clause and setting up the Employer's Requirements, the parties need to avoid ambiguous expressions such as “of superior quality”, which can be interpreted in many ways. Other expressions like “state of the art” have – among experts – a clear meaning and can thus be used.

As far as the Contractor shall adhere to specific *technical standards*, guidelines or norms of national/international standardisation bodies such as ICOLD or DIN (e.g. the German DIN 19700, part 10 and 11) or the widely used USACE - US Army Corps of Engineers - standards, which are not legally binding, or to put it differently, do not directly result from the applicable laws^v, those norms should be explicitly listed in the Employer's Requirements. I recommend this in order to avoid a dispute whether certain standards, which the Employer wants to have observed, are already “state of the art”, a general requirement, which each Contractor is obliged to comply with, or not. It is important to make reference to a specific edition (year) of an applicable standard and to avoid as far as possible contradictions while declaring various standards applicable – even if the contract provides for an order of precedence regarding the different annexes (*see figure 1*).

The Scope of Works

- Detailed specifications vs ...
- Laws to comply with
- Agreed technical standards (e.g. ICOLD Bulletins)



Photo: B. Geisseler : Lac et barrage de Cap de Long - Usines hydro-électriques de Luz Pragnères/ Pyrénées

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- functional requirements („fit for its intended purpose“)
- guaranteed parameters

„state of the art“

✓

✗

Components of „superior quality“

✓

„fit for a reliable & safe operation“

Figure 1. The definition of the Scope of Works

3. COPING WITH INTERFACES

Coping with interfaces first of all requires both from a technical point of view as well as from a contractual point of view to identify the interfaces.

In particular in multi-contracting projects there are many interfaces between the different lots. However there are also interfaces between the Employer and other stakeholders of the projects, and last, but not least the interfaces between the Employer and the Contractor. The role of the contract is to clearly attribute the respective responsibilities and to define the mutual obligations regarding the interfaces. Besides the definition of the Scope of Works the interface *management* is one of the most critical success factors of the project execution. While the Scope of Works determines the limits of supply, and thus determines which components found at the interfaces fall within the Contractor’s responsibility, the interface management relates to the question of which of the parties is responsible for coordinating the different lots. The parties need to decide who shoulders the risk if one lot upon which another lot is dependent is performed poorly or delivered too late.

Regarding interfaces, usually the Employer tries to minimize his risk by stipulating in a contract two obligations, which the Contractor has to fulfil: (i) the Contractor must deliver – within the limits of his Scope of Works - a complete work and he is obliged to perform all supplies and services which are necessary for the functioning of the plant even if they are not explicitly mentioned in the Employer’s Requirements; and (ii) the Contractor has to cope with the interfaces. It should be noted, that in case (i) this clause still requires Employers to clearly stipulate the limits of supplies or, differently spoken, the “Excluded Works” and that regarding case (ii) I would recommend to be much more specific. In such cases it can make sense to establish a detailed “Interface Matrix” in the annexes to the contract.

As shown below (*see figure 2*), one of several Contractors has no direct contractual relationship with anyone of the Employer’s other Contractors. Thus he cannot exercise and enforce any rights vis-à-vis his Co-Contractors. Unless specifically otherwise agreed upon in a contract, the respective rights and obligations only exist between

the contracting parties. Therefore it is typically - or should be, from a Contractor's perspective - the Employer or his engineer ("Owner's Engineer") who assumes the interface *management* responsibility.

But of course other contractual solutions are possible: the Employer-friendliest I have ever seen in tender documents was: all Contractors had to organize the handling of the interfaces among themselves by guaranteeing all together the success of the works – though they were neither in a consortium nor another contractual relationship. It seems hard to imagine that one contractor accepted that clause!

The Employer himself has various other contractual/ legal relationships to other stakeholders of the project. He must comply with the conditions of the compulsory state permits and, as the case may be, the requirements of a hydro power plant or the possibility for ships / boats to be able to bypass the dam. He is well advised to pass on the requirements of these contractual relationships individually to each of his Contractors constructing the dam and make them an integral part of the respective contracts.

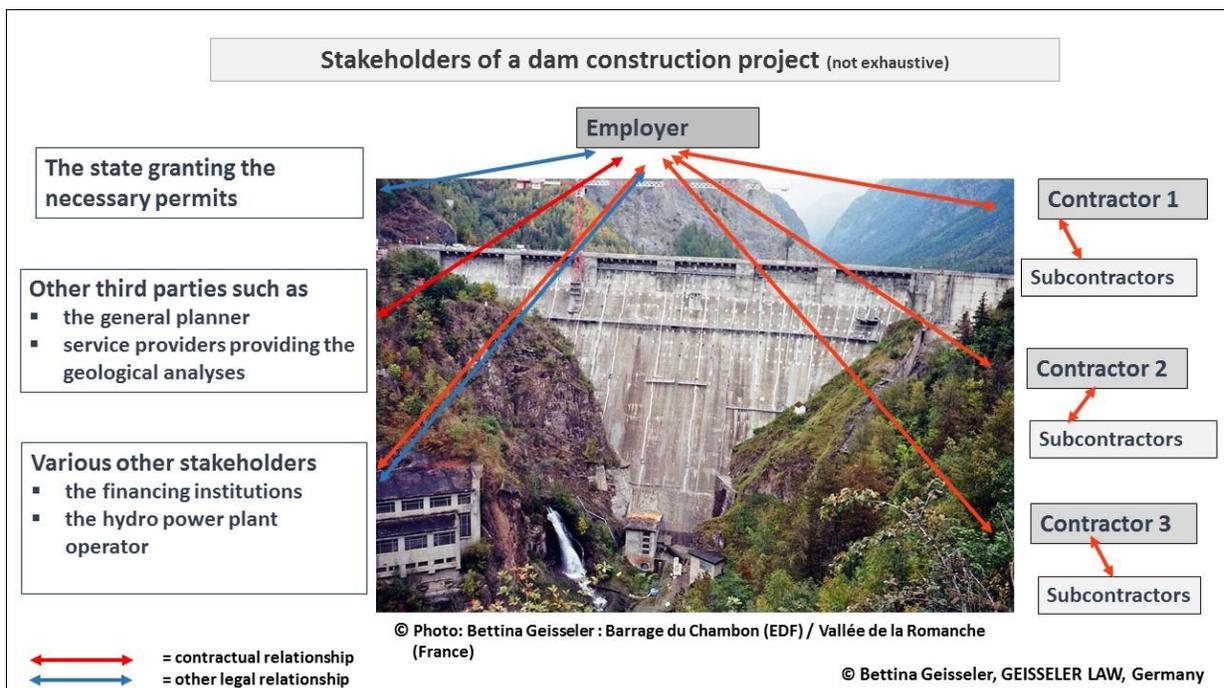


Figure 2. Interfaces – the stakeholders of a dam construction project

4. ALLOCATION OF TYPICAL RISKS – UNFORESEEN EVENTS

The more complex a project is, and the more stakeholders in the project exist, the more difficult it will be to balance the risks because the provisions of all the other related agreements have to be taken into account and aligned with each other.

In "BOT" (build – operate – transfer) schemes with the participation of the private sector the lending institutions and consequently the Employer want to have cost certainty. The financing banks have a vital interest that the Owner/ Employer does not assume risks which would endanger his possibility to comply with his obligations under the terms of the financing agreements and thus jeopardize the whole project.

The allocation of risks between the Employer and the Contractor and the balancing of the risks in view of the calculated and offered contract price is one of the most challenging and difficult tasks while drafting and negotiating a dam construction contract. Not only might it be difficult to clearly identify the potential risks and evaluate the risk exposure; sometimes it seems that the contractual parties do not have a clear idea of the legal

consequences of a clear risk allocation, and in particular the cross-influence with a typical Force Majeure clause or, respectively, Force Majeure event. A Contractor who accepts a clearly identified risk (a) cannot claim EOT and / or compensation for higher costs in case of hindrances during the project execution due to the occurrence of that risk, and (b) still has the responsibility for “care and custody” of the plant. In the worst case the Contractor is obliged to rebuild parts of the already erected plant in the event that the risk materialises and leads to the (partial) destruction of the plant (*see fig.3*).

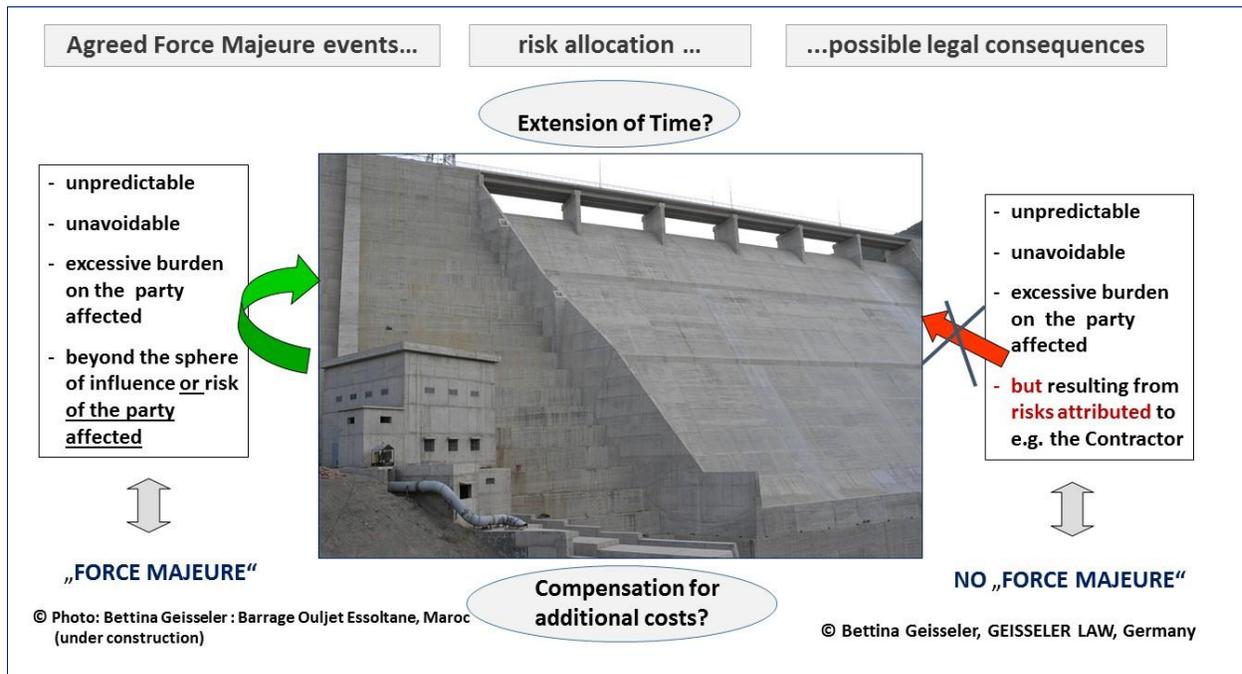


Figure 3. Allocation of risks – unforeseen events during the erection phase

There are typical risks in dam construction projects – or to put it differently: unforeseen conditions, where the risk that they materialise is considerable high. The materialisation of these risks might lead to considerable delays and in consequence considerably higher costs.

The contractual parties should identify and discuss in detail the major and typical project-related risks, such as the (remaining) risk of different geological subsurface conditions other than those investigated. They should carefully evaluate these risks and then allocate them to one of the parties – considering the provisions of the applicable contract law.

The probably highest risk in connection with the construction of a dam results from the geological conditions and in particular the quality of the subsoil. It should not be taken for granted that according to the applicable legal system it is the Owner/ Employer who bears the subsoil risk! Another typical risk is the flood risk during the construction/ erection phase.

In dam rehabilitation contracts there is a high risk that the condition of the existing dam is different from what one party/ the parties assumed. In this connection it is of importance to define to which extent the Contractor can rely on documents/ information given to him by the Owner/ Employer (so-called “rely-upon information”).

Tender documents quite often contain (Employer-friendly) clauses such as “Contractor is thus deemed to be fully aware of all constraints, incidents, which may result from the natural site conditions (climatic, atmospheric, meteorological...), the nature of the ground and the subsoil and more generally from any elements and circumstances likely to have an influence on the performance of the Contractor’s Works”. According to my experience it will depend not only on the applicable law but very much on the project, the negotiating position of either party, and the course of the negotiations, whether such a “catch-all” clause with a broad wording can



allocate or, respectively, shift the total risk exposure for a majority of (quite important!) project-related risks to the Contractor in a legally valid way.

In a well - negotiated, balanced contract, the taking over of major risks with at least a medium probability of occurrence will normally lead to a proportionate increase of the contract price.

Within this context it should be reminded, that the contract law, i.e. the applicable law governing the contract, sometimes provides for solutions which the contractual parties do not like. In this case they explicitly have to derogate from the otherwise applicable provisions and stipulate provisions reflecting their intentions.

5. QUALITY ASSURANCE

5.1. DOCUMENTATION & SPARE PARTS

Like in all major infrastructure projects an accurate and actual documentation, including the “as built“- drawings is of great importance. Only then will the Owner/ Operator be in the position to maintain & rehabilitate the dam in an appropriate way. Regarding spare parts for critical components I recommend to agree contractually already in the construction contract on the issues that arise: shall the Contractor deliver an amount of spare parts to the site or keep in reserve a stock of spare parts; may the Owner use the construction drawings to have the dam maintained or rehabilitated by, as the case may be, having the spare parts re-constructed by a third manufacturer?

5.2. EMPLOYER’S APPROVAL, INSPECTION AND INSTRUCTION RIGHTS

Usually the Employer reserves the right to approve the design documents. It should be noted that the Employer’s approval in no way relieves the Contractor from his own responsibility to deliver a work in accordance with the contract and in particular without any deficiencies. It should be clear that a non - approval can only be based on reasons of non - compliance of the design documents with the contractual requirements. A well - drafted contract should stipulate the deadlines, until when an Employer has to grant his approval.

Sometimes the Employers explicitly reserve themselves extensive rights to give detailed instructions regarding the execution of the works. Without prejudice to the question whether those instructions might be considered as Change Orders entitling the Contractor to an EOT and a price adaption, some caution is appropriate: in the case that the Contractor considers those instruction to jeopardize the success of the works, he must inform the Employer (I advise: in a written way) about his concerns. Only then he will be released from his responsibility for defects if the Employer insists on his instructions and thus forces the Contractor to follow them.

Typically the contracts oblige the Contractors to seek the Employer’s prior approval for the major subcontractors or suppliers of critical components. This can be done by way of approval in each particular case or by way of a list annexed to the contract establishing a number of pre-approved suppliers. From the Contractor’s perspective a certain caution is appropriate in the latter case. In order not be faced with prices of the pre-approved sub-suppliers far beyond the usual market price, the Contractors should insist on a contractual clause allowing them to deviate in justified reasons from this list (under the condition that the alternatively engaged sub-supplier meets the quality requirements) and to state as one of the possible reasons the fact that the pre-approved sub-suppliers request prices being x % above the worldwide market price.

Other important instruments are broad inspection rights exercised by the Employer and the detailed specification of a quality assurance system/ quality assurance plan, which the Contractors are obliged to comply with and which they are to impose on each single subcontractor/ sub-supplier in the supply chain. A typical example in dam construction projects is the obligation of the Contractor to grant the Employer access to the Contractor’s production sites for the purpose of inspections of the manufacturing process, especially of the manufactured (key) components before they are integrated into the plant during the erection process. Experience shows that it might be in the Employer’s interest not to leave it to his Contractors to inspect the manufactured parts at the sites of their subcontractors, but to make large use himself of his rights and to double-check, even if the components in question are manufactured by a sub-sub-supplier and/ or in production sites ‘at the other end of the world’.



5.3. PROJECT ORGANISATION

The Employer should think about a project organisation on Contractor's side which will ensure an efficient project execution. The contract can and should contain provisions regarding the qualifications of the Contractor's Project Manager bearing the overall responsibility for the project progress.

Furthermore the Employer is well - advised to determine the language skills of the key personal as well as the way of communication between the parties and on site. The same applies for the way in which the requested project - related documents should be delivered by the Contractor to the Employer – without prejudice to the official documents to be submitted to the state authorities.

6. CONTRACTOR'S REPORTING OBLIGATIONS

In complex and large-scale dam, or as the case may be, hydro power plant erection contracts, Employers are well advised to require from the Contractor continuous and regular, prompt, complete and accurate information on the stage of completion of the design, manufacturing and erection process and in particular on the occurrence of hindrances having an impact on the price or the time for completion.

Only such a reporting system will enable the Employer to maintain control over the entire project and to notice at an early stage events having a negative impact on the time for completion and/ or the costs or the contract price. I have seen contracts (governed by a law of a civil law country) providing that the breach of those reporting obligations (e.g. the non-delivery of the requested weekly project reports) shall entitle the Employer to make use of a right of retention relating to due (payment) amounts up to a relatively high amount.

7. CONCLUSIONS

The purpose of a contract is to well balance the mutual interests of the contractual parties in view of potentially arising risks. The Parties are well - advised to carefully identify the typical risks, evaluate their mutual interests and to draft provisions reflecting their commercial intentions.

ⁱ According to legal drafting standards some typical legal terms with an established meaning such as "Owner", "Contractor", "Scope of Works" are written in capital letters in the construction contracts and this paper.

ⁱⁱ The paper can only deal with some important contractual issues. Other important issues such as questions of the *applicable law* (not a "quantité négligeable", because it will e.g. decide upon the available remedies and might contain mandatory legal provisions which the parties must consider while balancing their mutual interests!), or the *dispute resolution mechanism* (state courts vs. arbitration) could not be taken into consideration. The questions of the Employer's remedies in case of delay, defects or other non - compliance committed by the Contractor could not be addressed in this paper. The aim of this paper is to alert Owners / Employers or Contractors of critical issues potentially having a major (financial) impact on the execution of a dam / hydro power project, and to suggest, which critical issues should be considered and taken into account when drafting the contract. In no way shall it constitute and substitute for a specific legal advice, which will depend inter alia on the applicable law.

ⁱⁱⁱ *RWhM Richtlinien für Werkstoffe in hydraulischen Maschinen des Verbands der Elektrizitätswerke Österreichs*, 2009

^{iv} JSCE - Japan Society of Civil Engineers – Guidelines; e.g. the JSCE Guidelines for Concrete, no. 18 'Standard Specifications for Concrete Structures – 2007 "Dam Concrete"

^v As example for legally binding requirements: cf on an EU level the *BREF Documents (Best Available Technique Reference Documents)*, which substantiate the requirements of the *DIRECTIVE 2008/1/EC of the European Parliament and of the Council of 15 January 2008 concerning integrated pollution prevention and control* for the approval practice of the state authorities granting operation permits for industrial installations. The same applies in case of authorisations under the German environmental law: the *BVT Merkblätter* substantiate the "state of the art" requirement, stipulated by the relevant legal provisions.