# Demystifying a Contract: Why Contract Price is not the Cost of the Project

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**Abstract**

Cost-overruns is one of the primary concerns for the stakeholders in the new nuclear power projects: owners, contractors, and investors. Frequently, the projects are described in terms of a price of a contract, referencing a specific number. However, referring to a “price of a contract” to describe the financial cost of a project is misleading. The price of a contract is likely a reflection of a certain budgetary ceiling as estimated by a project owner, a project price tag as hoped for by a contractor or some combination of both. That number is at best an approximation - and at worst wishful thinking - until the precise allocation of risks between an owner of a new nuclear power project and a technology vendor/contractor is worked out during contract negotiations. The paper establishes a foundation of what is meant by “risk allocation” in a contract, identifies a few examples of common contractual provisions that contain “hidden costs”, and explores their implications for the Small Modular Reactor (“**SMR**”) projects. The paper is developed based on the author’s legal practice and attempts to contribute practical insights to benefit those that may be drafting and/or negotiating contracts for new nuclear power projects, including those based on SMR technology.

## INTRODUCTION

In the midst of a procurement process for a nuclear power project, the immediate focus of negotiating parties seems to be “getting to yes” and getting that prime construction contract signed. An owner - which is likely a nuclear energy programme implementing organization (“**NEPIO**”) that will become the “Owner” of the project/plant - is under a timeline to begin construction, execute the project, and begin transmitting electricity through power lines by a certain date. Under a competitive pressure, depending on the selected procurement approach, contractor or a consortium of contractors and vendors (“**Contractor**”) may also be eager to obtain that legally binding commitment from an Owner. On both sides, there is also a target amount that each is aiming for. Owner, likely restricted by certain budgetary considerations, is aiming to obtain the deal within those restrictions; and a Contractor is likely to aim beyond those restrictions to maximize profits from the work to be done. For both sides, success may look like a signed contract of a certain price.

The paper suggests that a signed contract of a certain absolute amount may be a misleading metric of success, or even description of a transaction. While signing a contract is an achievement, contract itself is not the end goal. Rather, a contract is a roadmap that provides for various eventualities on the path toward that objective of electricity through the power lines; and toward an even larger objective of transformation of society and economy of a country embarking on a nuclear power journey. This roadmap allows each side to estimate potential costs that may arise as a result of certain eventualities. Unless considered in advance, the roadmap may contain “hidden costs” that may undermine the estimation and even lead the project off the path.

First, the paper explores what is the purpose of concluding the contract for a nuclear power project or a nuclear power program. Second, the paper provides a brief overview of a prime construction contract model most frequently utilized for a new nuclear power project. Third, the paper analyzes a few illustrative provisions that are frequently seen in the nuclear prime construction contracts that, if not carefully drafted, may lead the project off the path financially; and how the risks, which these provisions balance, change in a transaction based on SMR technology. Finally, the paper concludes that a realistic cost of a contract is unlikely to be contained in just the cost and pricing provisions of a contract.

## Contracts: the Foundations

Contracts are at the core of the nuclear industry. Whether the transaction encompasses a new nuclear power project based on SMR technology, or whether it contemplates transport of fresh nuclear fuel or return of spent nuclear fuel, or refurbishment for extension of lifetime operations of a large nuclear power plant, a commercial contract is the foundation of such an operation. Unlike the memoranda of understanding, which frequently headline nuclear news, contracts go further than creating a framework for cooperation toward a certain goal. Contracts are legally binding agreements that formalize the relationship between two parties, in this case a Contractor and an Owner. Contracts provide a record of obligations, which each party undertakes to accomplish a certain goal; and of rights, to which each party is entitled. These rights and obligations can be enforced within the jurisdiction and through the process as are specified in the contract. In practice, an Owner – in an English court or through an arbitral proceeding - would compel a Contractor to ‘make good on a promise’ to deliver a certain product or service by a particular date; or to pay for the costs resulting from the delay of delivery. In turn, if an Owner is delinquent in meeting payment obligations, a Contractor may compel an Owner to pay for the delivery of the product or service based on the agreed upon pricing, as well as any additional costs resulting from delay in payment.

By definition – and human psychology – negotiations of commercial contracts are adversarial. In a simple sale and purchase transaction – just like one that may occur at a market - a buyer is trying to obtain a certain product for as little cost as possible; and a seller is trying to sell the same product for as much profit as possible. In more complex transactions, such as one for a new nuclear power project, including those based on an SMR technology, contracts anticipate certain eventualities and allocate responsibility for the consequences of these eventualities to a certain party. For instance, if a defect in a turbine is discovered upon installation and within a warranty period, it is likely that a Contractor, which designed, procured, and/or installed the turbine, would be responsible for fixing the defect or replacing the turbine; and likely at their own cost, depending upon the negotiated contractual arrangements.

During negotiations the two parties are likely to adopt antithetical positions trying to accept less responsibility for various eventualities and, in turn, to compel the other party to accept more of such responsibility. Each party, based on internal calculations of financial capacity, risk appetite, and other factors, is likely to be reluctant to accept responsibility for various eventualities. Such responsibilities likely carry financial consequences; and ultimately either reduce profits (in the case of a Contractor) or increase costs (in the case of an Owner). Indeed, in some commercial - including nuclear – negotiations, such naturally antithetical positions may manifest into adversarial negotiation dynamics, where the goal is to get the other party to sign a contract where the risks are borne by the party exclusively.

However reasonable may be the internal calculations, organizational culture, or other motivations giving rise to an antithetical approach to contract negotiations, the true purpose and goal of the contract are likely to get lost in such dynamics. The two – the goal and the purpose of a contract – differ when it comes to contracting for a new nuclear project, including those based on an SMR technology. Contract is only a mechanism to achieve a larger goal. In the short-term, for both a Contractor and an Owner, the common goal is a successful implementation of a new nuclear power project. For both parties, in the short-term, a successful implementation of a new nuclear power project is likely to look like an operating nuclear power reactor providing electricity to the grid on schedule, within budget, as well as in a safe, secure and sustainable manner. In contrast, in the long-term, a Contractor’s goal is that new business opportunities are generated through the successful demonstration of project implementation and the product itself; and an Owner’s long-term goal is that electricity through power lines enables socio-economic transformation of a country. Both long- and short-term goals of each, a Contractor and an Owner, are more likely to be achieved if negotiations are focused on the common objective of a successful project implementation and are carried out with the mindset of a long-term partnership, rather than a zero-sum game.

Distinct from the goal, the purpose of a prime construction contract between an Owner and a Contractor is to formalize such a partnership for achieving that larger goal in a most efficient manner. Contract is a legal/commercial mechanism that provides everything each party – each partner – in the transaction needs to do and know (in terms of consequences of eventualities) in order to achieve the common goal. Within the ‘four corners’ of the document, the contract provides a complete representation of intent of both parties, including in cases of certain eventualities. Contract is not – and should not be – a manual of potential damage claims to be filed in court. Rather, a contract is roadmap that anticipates “what if” scenarios that may derail the project and attempts to pre-emptively resolve these scenarios as well as address potential disagreements in the areas and on the issues where they are most likely to come up. During contract drafting and negotiations stages, the parties pre-emptively allocate responsibilities (i.e. risk) in case of certain eventualities, so they can estimate their potential financial and legal liabilities in advance of making a legally binding commitment; and so when the contract is in the implementation stage and the project is in progress, likely disputes can be resolved without allocation of fault and the implementation of the project can proceed efficiently.

## Engineering, PRocurement and Construction Contracts for New Nuclear Cosntructions

### EPC contract overview

There are many contractual models that could be used as a legal foundation of a transaction for a new nuclear power project, regardless of whether it is based on a large nuclear reactor technology, and SMR, or other advanced reactor technology. While there is no one contractual model that fits every project, all Owner’s requirements, and all Contractor’s capacities or appetite for risk, the Engineering, Procurement and Construction (“**EPC**”) contract is the model encountered most frequently in the nuclear industry. As the name implies, in general terms, the EPC contract allocates to a Contractor the obligations of engineering services of the reactor, procurement of equipment, and overall installation and construction of a new nuclear power plant of a certain capacity. In turn, Owner’s obligations largely focus on providing certain requirements, some of which may be dictated by regulatory authorities; making payments based on an agreed-upon pricing mechanism and costs; granting access to a site; and facilitating licensing and providing other support to the Contractor. Generally, under the EPC contract, a Contractor takes on the responsibility to deliver to the Owner’s specifications and requirements (including timeline) a fully functioning nuclear power plant, which an Owner can operate commercially with a “turn of a key”. Thus, looking within the ‘four corners’ of the document, including numerous pages of technical specifications and requirements, each partner knows precisely what their role is within this partnership and what they need to do to achieve the larger short-term goal of a successful project implementation.

EPC contract has been generally considered in the nuclear industry as the most bankable contract for construction of new nuclear projects (which until now is largely based on the large nuclear power reactor technologies). EPC contract allows a risk management approach which, from the perspective of financial institutions that evaluate whether to fund the new nuclear project, has an optimal potential for return on investment (whether it is equity or debt financing). By shifting the responsibilities of engineering, procurement, and construction to a single point of responsibility, i.e. a Contractor, (or a consortium of contractors and vendors), the contract mitigates the likelihood of certain eventualities that may lead the project ‘off the road’. For instance, if a single Contractor is responsible for design and procurement of equipment, there is less likelihood of interface issues between a product as engineered and as manufactured, and, consequently, as installed, than if each such service were to be undertaken by different contractors.

In contrast, if three different Contractors take on engineering, procurement, and construction of a new nuclear power project each, coordination and interface challenges would likely emerge; thereby increasing the risk of project delays. While an Owner with experience in new nuclear power projects may be willing to take on the coordination role, for an Owner that may not have such an experience (which is more likely), a coordination responsibility would likely amount to an increased risk of cooperation and interface issues; and lead to project delays. By allocating all these responsibilities to a single prime Contractor, an Owner shifts the responsibility of coordination issues and interface challenges to the party that has both the experience and the most control over all aspects of the required services, to the Contractor. Thus, in an eventuality that a design of certain critical equipment conflicts with the equipment as manufactured, it is the Contractor that will likely bear the responsibility for making adjustments (and likely at its own cost). Contractor, negotiating the EPC contract is also best positioned to calculate, based on its own capacities and previous experience, the likelihood of such risks and costs for resolving them. Precise delineation of each parties’ responsibilities, rights and obligations within the partnership, as formalized by the contract, reduces uncertainty that a particular risk may not be allocated or may not be allocated to the party that is best positioned to control or mitigate it. Precise allocation of risks allows both parties to avoid disputes during project implementation that may have consequences for both parties, and thereby reduce the risk to the project overall.

### Mitigation of project risks through risk allocation

Familiarity of the nuclear industry and financial institutions with the EPC contracting model – whatever its advantages and disadvantages may be – comes from its widespread utilization for the large nuclear power projects. However, as SMRs are yet to be deployed at commercial scale, applicability of the EPC model to the SMR-based projects has not yet been tested in practice sufficiently to derive certain definitive conclusions. Indeed, SMRs’ promise of delivery of a fully-designed and pre-manufactured plant that is ready for installation may bypass some of the risks that the EPC model attempts to balance. For instance, large nuclear power plants are likely designed off-site, frequently in another national and regulatory jurisdiction, and delivered in pieces to be assembled, installed, constructed on-site. In contrast, SMRs are anticipated to be delivered to the site in a pre-manufactured, near complete assembly, and ready for installation and operation. Thus, if there may be discrepancies between design and manufacturing or some interface and coordination issues, those may be resolved prior to shipment to an Owner; and result in likely lower potential costs for both parties.

Nonetheless, many “what if” project scenarios – whether the nuclear power project is based on large nuclear power reactor technology or on one of the myriad of SMR or advanced reactor designs currently in various stages of development – remain the same. Some risks, that may be familiar through the lessons learned acquired during the large nuclear power projects, may even be exacerbated. As a result, the parties and financial institutions are likely to initially look to the EPC-type contracting structure to pre-emptively allocate the responsibilities for familiar risks in a familiar manner i.e. to the partner that is most equipped to control the risk and/or the likelihood of that risk arising. Failure to carry out such allocation efficiently/optimally may lead to “hidden costs” for both Owner and Contractor; and because there are limited, if any, lessons-learned from deployment of SMRs, some of these “hidden costs” may be even greater than could be estimated.

* + 1. *Design*

In an EPC contract where Contractor undertakes engineering and design obligations for either a certain component or an entire nuclear island, the scenario of “what if there are issues with the design” is anticipated in a number of provisions. In addition to the *Contractor’s Obligations* provisions detailing delivery of engineering and design services in accordance with certain performance standards (likely defined in the contract with some specificity), potential issues with design are likely to also be addressed in the *Performance Guarantee* provisions. The *Performance Guarantee* provisions place an obligation on a Contractor to design and engineer a specific equipment, an entire nuclear island, or a module in a way that meets a certain performance standard or a minimum acceptance criteria (which may be defined within the contract in terms of a certain capacity or another technical variable). In case the design and engineering product does not meet such a criteria, an Owner may reserve and pursue a number of remedies to ensure that, at the end, an Owner does have the product it has bargained (and paid) for. For instance, an Owner may request that a Contractor re-perform such a service within a certain time period and at its own cost. If an Owner is not satisfied with either the speed or quality of re-performance (in case the product fails to meet the specified minimum acceptance criteria again), an Owner may then either undertake this obligation on its own or sub-contract it to another contractor; and, in both cases, require a Contractor to carry the associated reasonable costs. Similarly, if the equipment malfunctions due to a design failure during the pre-determined (and usually heavily negotiated) warranty period, a Contractor is likely to bear the responsibility for mitigating the problem by either repairing or replacing that equipment at its own cost.

As the obligation of design and engineering is taken on by a Contractor under the EPC contract, the risks associated with design and engineering are to be borne by the Contractor. Unlike an Owner, which is unlikely to have the benefit of the previous experience of design and engineering of nuclear power reactor equipment, an entire nuclear island or a module, a Contractor is best positioned to mitigate the risk through timely delivery of quality design and engineering services. Furthermore, a Contractor is also better positioned than an Owner to estimate the likely costs associated with re-performance during construction or warranty period. However, a Contractor is likely to negotiate minimization of such a risk to limit its own potential liability as much as possible. For instance, a Contractor may attempt to categorize re-performance for its own failure to meet a minimum acceptance criteria as merely a fulfilment of obligations that should be fully reimbursable by an Owner. If a Contractor is successful in minimizing their risk, an Owner likely takes on the remaining risk, which an Owner may not be best positioned to either estimate or absorb, making the costs thereof “hidden” for an Owner. In such a “what if” scenario an Owner will likely negotiate other remedies to balance out its own risks and minimize these “hidden costs” through other related provisions, for instance those outlining opportunities for a *Contractor Curative Plan* or the *Contractor Default* provisions.

Whether the nuclear power reactor is based on a large nuclear reactor technology or one of the emerging SMR or advanced reactor designs, the risks associated with design remain the same. The dynamic of balancing such risks, however, may differ due to the novelty of SMR designs. Because there is no SMR design that is currently manufactured at commercial scale, the risks are exacerbated for both – a Contractor and an Owner. For a Contractor, which will likely carry the most burden for the failure of the module (whether due to design, manufacturing, or another variable) to meet a certain performance standard, the costs of re-performance (and even re-design) may be extensive. As a result, a Contractor is likely to attempt to pass on some of those risks to an Owner either through higher up-front costs or contractual provisions allowing fully-reimbursable costs. While an Owner is likely to resist taking on the full burden of such a risk, it is likely that the risk may have to be shared because the alternative could be no SMR deployment at all. The precise magnitude of the costs for either a Contractor or an Owner is currently challenging to estimate due to lack of industry’s experience with SMR deployment as a whole. Thus, each Contractor and Owner would have to engage in meticulous, even if somewhat speculative, estimation of costs for the “what if scenarios” related to designs that are yet to be put in practice by the global industry.

* + 1. *Variations*

Despite the most meticulous project planning by Contractors and Owners, a new nuclear power project is likely to encounter circumstances that may necessitate changes to the work scope of a Contractor, the timeline, or the budget. One of the mechanisms by which a contract anticipates and pre-emptively resolves potential disagreements between partners about certain changes is the *Variation* mechanism. For instance, an Owner’s governmental authority may be delayed in providing its required approval or documentation, which, in turn, may prevent a Contractor from meeting a certain contractual project milestone. Under such circumstances, a Contractor will likely submit a variation request for an extension of time and/or for an additional cost. As Owner’s governmental authority delay is an externality and a commercial risk that cannot be controlled by either a Contractor or an Owner, the risk, i.e. the financial consequences of such delay, will likely be shared. Thus, the *Variation* provisions, anticipating such possibility of delays in regulatory approvals, may explicitly enumerate this eventuality as a circumstance that entitles a Contractor to submit a variation request and to have it approved by Owner, which will likely carry the financial consequences of additional time and potential costs for both.

*Variation* provisions allow for integration of eventualities, both internal and external, into the project implementation. While some broad categories of eventualities, like delays in regulatory approvals may be anticipated, the *raison d’etre* for including the *Variation* provisions in the contract is to also allow for eventualities that may not be anticipated, including those that do not fall into the category of a *Force Majeure*, but may be a consequence of a *Force Majeure Event* (for instance extension of construction time due to human resource shortages during the COVID-19 pandemic). The *Variation* provisions are heavily negotiated during the contracting process, as these provisions may “hide” enormous commercial risk, along with its financial and legal/contractual consequences for both an Owner and a Contractor. This commercial risk is compounded because, by their very definition, the *Variation* provisions anticipate general occurrence of changes, but cannot predict all eventualities or probabilities of their occurrence. Because it is extremely challenging for both sides to estimate potential financial exposure, the *Variation* provisions should be drafted in a manner flexible enough to allow for allocation of anticipated risk (from an unpredictable event) to either or both parties, and the process for integrating the variation in the parties’ responsibilities in the project implementation plan. However, the language of the *Variation* provisions cannot be so general as to allow for shifting or sharing of risk in circumstances where such reallocation would be inappropriate, unnecessary or simply an attempt by a Contractor to maximize their own profit or by an Owner to reduce their own costs.

As the SMR designs mature and manufacturing processes continue to develop, the demand, and variation, amongst the potential customers will also increase. Each customer is likely to have their own technical specifications and regulatory requirements that will necessitate a variation that can be anticipated in a contractual risk balancing. However, similar to the design risks, lack of industry’s experience with SMRs, including adjustments to local site conditions or other eventualities that may not be anticipated, will likely exacerbate the risk approximation at least in the short-term. An Owner and a Contractor both are likely to engage in some tough negotiations of the *Variation* provisions to ensure that the costs, which are so “hidden” that they may not even be able to anticipate and estimate at this point, are borne by the other party or, at least, shared in a way that may be sustainable for the project.

* + 1. *Delay Liquidated Damages*

The term *Delay Liquidated Damages* is frequently encountered in the vernacular of lawyers and contract management or implementation professionals. However, it may be more challenging for decision-makers or technical staff to infer the substance or consequences of the *Delay Liquidated Damages* provisions than of the *Design* and *Variation* provisions. *Delay Liquidated Damages* clauses are ubiquitous in the commercial contracts, as they are among the primary mechanisms for risk balancing. These clauses provide that a party that is breaching a certain material obligation, the consequences of which may be “impossible or impracticable to accurately estimate”, pays an amount that is either fixed or predetermined during negotiations, and prior to contract execution and project implementation. For instance in the context of an EPC contract for a new nuclear power plant, one likely “what if” scenario that the *Delay Liquidated Damages* provisions anticipate and address is failure to meet the *Date of Commercial Operation* of the nuclear power plant, as provided for in the contract. A delay in commercial operation of the plant is likely to trigger far reaching financial consequences for an Owner, including loss of profits, delay damages under power purchase arrangements with off-takers, or interest on debt repayment based on various arrangements with financial institutions that may have contributed to the nuclear power project. *Delay Liquidated Damages* provide for an Owner’s ability to recoup some of these costs in case of such a “what if” scenario. However, the amount is not likely predetermined to meet all of the consequential costs an Owner is likely to encounter because of a postponement of the *Date of Commercial Operation.* The full extent of financial implications, based on the various other contracts signed by Owner, may be challenging for an Owner to asses and are likely to exceed the full amount of Owner’s payment for Contractor’s services. However, if a Contractor, when bidding for a nuclear power project and negotiating a contract would face the full extent of financial compensation to an Owner for such a loss, no Contractor would ever take on a financial risk that could render the company bankrupt. *Delay Liquidated Damages* is a mechanism that aims to balance the risk an Owner is taking on in case a Contractor fails to meet the predetermined *Date of Commercial Operation* with the risk a Contractor would be taking on if they were responsible for the full financial compensation to an Owner for reasonable reliance on that date. Calculation of an amount that is agreeable to both – that allows both to share the risk of delay in completion – should be considered from the perspective of the residual financial liability an Owner has the capacity to take on and how much loss a Contractor may be able to absorb if compelled to pay out such a financial liability. These amounts are predetermined to facilitate an efficient resolution of this potential issue in advance of it even arising and avoid likely long and financially burdensome process of litigation of such an amount.

Similar to the *Variation* provisions, *Delay Liquidated Damages* are heavily negotiated because they may potentially “hide” significant financial liabilities for both an Owner and a Contractor. In case of nuclear power projects based on an SMR or an advanced reactor technology that has not been proven or demonstrated yet, the *Date of Commercial Operations* is likely to be postponed as some eventualities, already touched upon earlier, may not be anticipated. However, it may be possible to mitigate some of that risk by acquiring an SMR only upon completion of the manufacturing process. Although the benefit of such a mitigation strategy, depending on the contractual arrangements, is likely to be available after deployment of that SMR at scale.

## Conclusion

Contracts are the enabling mechanisms that can facilitate the countries’ fulfilment of their pledge of tripling nuclear energy by 2050. However, while there is a shift in the narrative toward more nuclear power on social and political levels, that shift is yet to change the policies of many financing institutions toward financing new nuclear power projects. One of the primary considerations of these institutions is a prime construction contract, which captures allocation of risk. It is in this allocation of risk between the main parties, an Owner and a Contractor, that a true assessment of costs of a new nuclear project could be estimated. While a Contractor will likely have sufficient construction experience and insight into the contractual mechanisms to estimate such costs from their perspective, potential Owners in new comer countries should carefully consider where costs may be “hidden”. Both should consider how these “hidden costs” may be impacted if the selected technology is an SMR or an advanced reactor and how the risks may be mitigated if shared between the partners in the transaction. A realistic cost of a contract is unlikely to be contained in just the cost and pricing provisions, but in the neutral wording of various other clauses and in the kind of relationship between a Contractor and an Owner.

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