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RECHTSANWÄLTE

SERIES: SMRs IN EUROPE — THE LEGAL AND CONTRACTUAL LANDSCAPE

Essay 3 of 6

From Turnkey to Modular: How SMRs Are Reshaping Nuclear Construction Contracts

Nuclear construction has long required hybrid contracts — standard forms tailored heavily to the realities of licensing, long duration, and complex interfaces. SMR projects inherit that requirement and extend it, through serial production, multi-module deployment, factory-completed reactors, and cross-border supply chains, each of which reshapes the contractual architecture in ways standard forms were not designed to address.

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The first two essays in this series have addressed the construction logic of Small Modular Reactors (Essay 1) and the fragmented European licensing landscape (Essay 2). This essay turns to what is, from a construction law perspective, the heart of the matter: the contracts under which Small Modular Reactor projects will be built.

We draw here on themes Jens Bürkle addressed in a keynote in Belgrade at the Society of Construction Law Serbia on 27 April 2026, and in the regional panel discussion that followed with colleagues from Bulgaria – Adriana Spassova, Romania – Cristina Olariu, Türkiye – Huseyin Karanci, Poland – Nicolas Bouchardie, Hungary – Károly Bagócsi, and Serbia – Frank Thomas. The starting observation of the keynote on *Tailored Risk Allocation in Nuclear Construction – Adapting Standard Forms to Project Realities* applies equally to Small Modular Reactors: the underlying

contractual challenges in nuclear construction are more familiar than they may first appear. The real question is what happens when project reality starts to move away from the assumptions built into the contract, and Small Modular Reactor projects will have to answer that question before construction begins.

The Familiar Starting Point: Why Nuclear Has Always Required Hybrid Contracts

Standard form contracts – the FIDIC Silver Book, the Yellow Book, NEC, and other EPC templates used in industrial construction – are built on a set of implicit assumptions: a sufficiently defined project scope, a regulatory environment that is demanding but broadly stable, responsibilities that can be allocated in relatively clean lines between owner and contractor, and changes that are exceptions rather than the rule. Nuclear construction challenges every one of these assumptions.

Licensing requirements, safety culture rules, elevated quality regimes, and international nuclear liability conventions overlay everything. Regulation does not stand still. In response to new findings or significant safety-related incidents, regulators may impose new safety requirements, sometimes retroactively, including on plants already under construction or in operation. And the line between construction risk and operational responsibility is rarely clear-cut: only the licensed entity can become operator, which means the owner assumes regulatory responsibility well before contractual take-over.

The lesson of large-scale European nuclear projects – Olkiluoto 3, Flamanville 3, Hinkley Point C – is that pure lump-sum turnkey structures cannot absorb the realities of first-of-a-kind nuclear construction. The only workable model has consistently proved to be a hybrid: EPC at the core, with substantial special conditions on licensing, regulatory change, interface management, and phased handover. The question this essay takes up is what Small Modular Reactor technology adds to that already-tailored starting point.

What Small Modular Reactors Add: Five New Contractual Dimensions

Several features of SMR projects create contractual challenges that go beyond those familiar from large-reactor construction. They do not replace the existing tailoring requirements, but sit on top of them.

1. Serial production and the standardisation premium.

The economic case for SMRs depends on serial production: a standardised design, repeatedly deployed, with cost and schedule learning effects across the fleet. The contractual implications are significant. A contract for the first unit (FOAK) carries a different risk profile from a contract for the tenth unit (NOAK), while the design itself is supposed to remain stable across all of them. Where regulator-driven changes during construction of the first unit affect the standardised design, every subsequent unit is potentially affected, so the contract must distinguish between modifications that apply only to the unit under construction and design changes that propagate across the fleet – with very different implications for cost allocation, performance guarantees, and warranty obligations. Standard forms have no native concept for this. The

French standardised series and the German Konvoi achieved meaningful design replication, but in contractual terms each plant was still procured as a substantially individual project; SMRs pursue standardisation more systematically, and the contractual framework has to follow.

2. Multi-module phased deployment.

Most SMR projects envisage multiple modules deployed sequentially on a single site – ORLEN Synthos' plans for up to 24 BWRX-300 units in Poland, NuScale's six-module VOYGR concept, Last Energy's contracted units across multiple sites. This raises questions that single-reactor contracts do not address. Milestone payment schedules must accommodate phased completion across multiple units. Liquidated damages provisions must reflect the realistic possibility that some modules deliver successfully while others face delays. Performance guarantees and warranty periods run on staggered timelines. Take-over and operational handover happen module by module while the wider installation continues to evolve. And the regulatory classification question identified in Essay 2 – whether a six-module installation is one nuclear facility or six – carries direct contractual consequences for liability limits, insurance, and milestone definitions.

3. Factory-completed reactors and the shifted boundary of acceptance.

Large-scale nuclear plants have always relied on factory-fabricated major components – reactor pressure vessels, steam generators, pressurisers – delivered to site for installation. SMRs extend that principle to a much larger scope: not individual components but the reactor module itself, with some designs envisaging delivery as a substantially complete unit requiring only connection and commissioning. At the microreactor end of the scale, designs such as the Westinghouse eVinci go further still, arriving fully factory-assembled, fuelled, and sealed, with the entire unit returned to the factory after operation for refuelling. This shifts the contractual boundary of acceptance significantly.

Factory acceptance testing, historically a step within a longer site-based commissioning programme, therefore becomes a more decisive milestone in its own right. The contract must define carefully what is being accepted at the factory, what risks transfer at delivery, and how factory quality assurance regimes – historically governed by industrial product standards – integrate with nuclear licensing requirements designed for site-based construction. Where modules are delivered already fuelled, the timing of nuclear liability transfer under the Paris or Vienna Convention raises a structural question for which there is no real precedent.

4. Cross-border supply chains and multi-jurisdictional regulation.

Major components for large nuclear plants have long been manufactured internationally; a Mitsubishi or Doosan reactor pressure vessel installed at a European site is unremarkable. The change with Small Modular Reactors is that the contractual relationship for an entire reactor module, rather than for individual components, may span several jurisdictions at once, each with its own regulatory regime. A module fabricated in one country, transported across borders, and assembled on a site licensed under the law of a third country

creates an interface between industrial manufacturing regulation and site-specific nuclear licensing for which there is no direct precedent. The friction is structural: many SMR components fall within Category 0 of Annex I to the EU Dual-Use Regulation (Regulation (EU) 2021/821) – covering nuclear materials, facilities, and equipment – which implements at EU level the export-control commitments agreed within the Nuclear Suppliers Group. The Commission's SMR Strategy of 10 March 2026 acknowledges this and calls on Member States to simplify and accelerate export control procedures for intra-EU transfers of SMR-related dual-use components.

That addresses an important obstacle for European supply chains, but leaves two questions open. The first concerns modules or major components manufactured outside the EU, whose import remains subject to the full export control regime of the country of origin and to EU import requirements; the intra-EU streamlining does not extend to these flows. This is a live scenario rather than a hypothetical one. Several leading SMR designs originate in the United States or have substantial Japanese parentage, including the GE Hitachi BWRX-300, the Westinghouse AP300, and NuScale's VOYGR. Korean industry is increasingly central to global SMR component manufacturing – Doosan Enerbility is producing major components for NuScale and supplying core equipment to X-energy, and HD Hyundai Heavy Industries has a partnership with TerraPower – while Korean reactor designs themselves, including KAERI's SMART100 and KHNP's i-SMR, are positioning for European deployment. Even the Rolls-Royce SMR, the most European-rooted of the leading designs, includes a UK supply chain that, post-Brexit, sits outside the intra-EU framework.

The second open question is the underlying contractual coordination – governing law, jurisdiction, dispute resolution forum, allocation of regulatory risk between manufacturing and site jurisdictions, and the treatment of design changes that propagate across the fleet – which remains squarely the responsibility of the parties.

5. The industrial off-taker context.

Conventional nuclear projects have typically been procured by utilities or state energy companies – entities that, in established nuclear states, possess deep nuclear experience and long-standing relationships with regulators. Small Modular Reactors bring in a different category of buyer: industrial off-takers, including data-centre operators, hydrogen producers, and chemical manufacturers, several of them with limited or no prior nuclear experience. Recent European examples include Microsoft's SMR partnership in Poland, Equinix's agreements with ULC-Energy and Stellaria for data-centre supply, and the broader emergence of co-location models. For these buyers, the contract has to do more than deliver a plant; it governs a long-term interface between an industrial operation and a nuclear installation, covering power purchase obligations, availability guarantees, allocation of regulatory risk affecting the off-taker's operations, and emergency-planning coordination. Nuclear procurement has had little occasion to develop that kind of structure.

Adapting the Familiar Tailoring to Small Modular Reactor Realities

The five areas where standard forms have historically required tailoring in nuclear construction — licensing and regulatory change, design obligation and licensability, interface architecture, testing and phased handover, and dispute prevention — do not disappear in SMR projects. They acquire additional dimensions.

Licensing and regulatory change becomes more complex where the same standardised design is being licensed across multiple national regulators. A design modification required by one regulator may have implications for the licensing position in others. The contract must address how regulator-driven changes propagate, who bears the cost, and what triggers redesign of the standardised module as opposed to modification of the specific unit.

Design obligation and licensability must account for the fact that the design is not bespoke to a single project. The contractor's licensability obligation runs against multiple regulatory regimes simultaneously, and the contract must distinguish between core design integrity, which the contractor must guarantee, and jurisdiction-specific adaptations, which may be owner-side risk.

Interface architecture must extend to the factory-site boundary, which is contractually novel. Where modules are delivered substantially complete, the traditional interface between civil works and mechanical installation is compressed, while a new interface emerges between the factory production schedule and the site readiness schedule, with delays in either capable of driving consequences in the other.

Testing and phased handover becomes layered. Each module passes through its own factory acceptance, site installation, commissioning, and take-over sequence, while the overall multi-module installation continues to evolve. Where modules are delivered already fuelled, the conventional logic in which fuel loading and hot functional tests trigger early operator involvement may apply differently or not at all, depending on the design. The contract must reflect the actual technical sequence of the specific SMR concept rather than assume a standard handover model.

Dispute prevention matters at least as much as in conventional nuclear construction, and arguably more. Multi-module deployment, multi-jurisdictional licensing, and standardised designs whose modifications affect the entire fleet all increase the value of structured early intervention, which strengthens the case for standing dispute boards already familiar from large-reactor projects. Available DRBF data suggests that the large majority of standing-board decisions do not proceed to arbitration. Where parties adopt FIDIC 2017, the 42-day referral bar in Sub-Clause 21.4.1 makes timely engagement with the board correspondingly important.

Change Control: A Strategic Discipline, with New Layers

Change control has always been the operational test of a nuclear contract. The classic dispute pattern — owner says: 'This is not a change, it is required by the regulator, so you must comply'; contractor says: 'If the regulator requires

a redesign, that is owner risk, and it is a Variation' – is familiar to anyone who has worked on a nuclear project. The battleground is scope definition versus licensing obligations.

Where formal change treatment is delayed, design development continues without contractual recognition, and the project gradually loses clarity on what changed, why, and who should bear the consequences. Informal change is one of the most expensive management styles available in nuclear construction.

Small Modular Reactor projects add layers to this familiar challenge. Where modules are produced serially under a standardised design, the point at which a modification to one module becomes a change to the design itself – affecting all subsequent modules – is contractually consequential. Where the same design is being licensed across multiple jurisdictions, the question of whose regulatory feedback drives change to the standardised design becomes structural as much as contractual. And where the change relates to a module already in factory production or in transit, the cost and schedule consequences may compound across the entire production line rather than the specific unit alone. The contract must contain mechanisms that recognise these layers explicitly.

Conclusion: Hybridisation, Reshaped

Small Modular Reactors introduce a different production logic – serial manufacturing, multi-module phased deployment, factory-completed reactors, and a new category of industrial off-taker – and each of these features carries contractual consequences that conventional nuclear procurement has not previously had to address. Standard form contracts and bespoke EPC templates can serve as a starting point, just as they have for large-scale nuclear projects, but the European experience with conventional reactors has shown, at considerable cost, that unrealistic risk transfer does not make risk disappear; it postpones the argument. The same lesson applies to SMRs, with new layers attached.

The hybrid contractual model that nuclear construction has long required therefore has to be reshaped for SMR realities, built in as a structural starting point at contract signature rather than reconstructed once disputes arise. The underlying question remains one of realistic allocation: which risks can be borne by which party, under which mechanisms, and for how long. For Small Modular Reactor projects, that question must now be answered across factory and site, across multiple jurisdictions, and across a fleet of standardised units rather than a single bespoke plant. Allocating that risk correctly at contract signature is the most important contribution contractual drafting can make to the success of an SMR project.

COMINDIS is a highly specialized international boutique law firm for plant engineering, energy and infrastructure projects.

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Next in this series: **Essay 4 — Siting, Co-location, and the New Industrial Campus: Legal Frameworks for Nuclear-Adjacent Infrastructure**

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