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RECHTSANWÄLTE

SERIES: SMRs IN EUROPE — THE LEGAL AND CONTRACTUAL LANDSCAPE

Essay 1 of 6

Small Modular Reactors: A New Construction Logic, A New Legal Challenge

SMRs are intended to follow a different construction logic than conventional nuclear plants. Modular fabrication, serial production, and decentralized siting do not simply change the engineering — they challenge the legal and contractual architecture that has governed nuclear construction for decades.

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What Are Small Modular Reactors?

Small Modular Reactors are nuclear reactors with an electrical output of up to 300 MWe and a thermal capacity of up to 1,000 MW – roughly one-fifth the output of a large conventional reactor such as the 1,600 MWe EPR. But the reduced scale is not simply about generating less power. It is the starting point for a different approach to how nuclear plants are designed, manufactured, and built.

Conventional nuclear plants have, for most of their history, been bespoke construction projects – each reactor designed, engineered, and built largely on site, with all the cost escalation, schedule risk, and interface complexity that entails. There have been notable efforts to change this: the French and German convoy programs of the 1970s and 1980s sought to achieve cost reduction and schedule discipline through series construction of standardized reactor designs. But even the convoy approach remained rooted in large-scale, site-intensive construction.

When Europe returned to nuclear construction decades later, the experience at Olkiluoto 3, Flamanville 3, and Hinkley Point C demonstrated how quickly the benefits of standardization erode when designs are modified, regulatory requirements evolve, and first-of-a-kind construction challenges reassert themselves.

SMRs follow a different approach. Their components are designed for serial fabrication in factory conditions, with standardized modules transported to site for assembly. The analogy can be drawn to shipbuilding or aerospace manufacturing, controlled environments, repeatable processes, and learning-curve effects that should, in theory, reduce cost and schedule variance with each successive unit. Or to offshore platform fabrication, where large modular structures are manufactured in specialist yards and transported to site for installation under stringent regulatory oversight – a model that brings its own well-documented interface and integration challenges.

The International Atomic Energy Agency (IAEA) currently tracks 98 SMR concepts worldwide at various stages of development (IAEA, Advances in SMR Technology Developments, 2022). Of these, only four are operational: two Russian floating reactors (the Akademik Lomonosov) and two Chinese high-temperature pebble-bed modules at the Shidaowan plant, which reached criticality in 2023.

In the Western world, no SMR has yet been built. Several designs are, however, progressing through pre-licensing stages. These include light-water reactor concepts – the GE Hitachi BWRX-300 (a simplified boiling-water reactor), the Rolls-Royce SMR and EDF Nuward (both pressurized-water designs of European origin), and Westinghouse's AP300, which builds on the proven AP1000 technology.

Alongside these, advanced-concept designs such as Kairos Power's molten-salt reactor and X-energy's Xe-100 high-temperature gas-cooled reactor are attracting significant private investment, particularly from the technology sector (OECD/NEA, SMR Dashboard, 2024). The most advanced Western project is in Canada, where the government approved in 2025 the construction of four BWRX-300 units at the Darlington site, with grid connection targeted for 2030.

What Makes SMRs Technically Different?

Several technical features distinguish SMRs from conventional large-scale nuclear plants. They rely on passive safety systems and smaller fissile inventories, which significantly reduce their risk profile. Their components are designed for factory fabrication and modular on-site assembly, shifting construction risk from the site to the manufacturing process. And most SMR projects envision clusters of multiple reactor modules on a single site – NuScale's VOYGR concept, for example, comprises six modules totaling 462 MW.

Each of these features raises distinct legal and contractual questions. Factory-based production changes the allocation of construction risk. How are factory quality assurance regimes integrated into nuclear licensing requirements that were designed for site-based construction? Where does the boundary of responsibility lie when standardized modules must be adapted to site-specific conditions – and who

bears the cost and delay risk when that adaptation proves more complex than anticipated?

Multi-module deployment creates a regulatory classification problem: is a six-module installation one nuclear facility or six? The answer has far-reaching consequences for environmental impact assessment, safety zone definitions, liability limits, and insurance requirements. And the compact footprint of SMRs – whether light-water PWRs, simplified BWRs, or advanced-concept reactors – allows siting in industrial clusters, hydrogen hubs, or adjacent to data-center campuses, opening new legal terrain around siting permits, cybersecurity obligations, physical protection perimeters, and emergency planning.

Why Now — And Why It Matters for Construction Law

Two forces have converged to accelerate SMR development in Europe.

The first is energy security: Europe's energy crisis since 2022 has revived demand for firm, dispatchable, low-carbon power that does not depend on weather conditions or imported gas. The second is private industrial demand for reliable baseload electricity – driven above all by the data-center and AI sectors, whose operations require round-the-clock power at densities that grid-connected renewables alone cannot guarantee. The IEA projects global data-center electricity consumption will double to 945 TWh by 2030.

While the largest SMR investments to date have originated in the United States, the demand signal is now reaching Europe directly. In July 2025, Microsoft entered a partnership in Poland to explore SMR deployment for its European operations. In August 2025, Equinix signed a Letter of Intent with Amsterdam-based ULC-Energy for up to 250 MWe from Rolls-Royce SMRs for its Dutch data centers, and a separate 500 MWe pre-order with French molten-salt developer Stellaria. In Poland, ORLEN Synthos Green Energy is leading a consortium of 17 companies across 11 countries for BWRX-300 deployment. And as recently as February 2026, the Norwegian government gave Norsk Kjernekraft approval to begin impact assessment for an SMR plant in Aure and Heim – the first step in the licensing process for nuclear power in a country with no existing nuclear program.

What distinguishes this wave is that private industrial consumers of electricity have emerged as a significant demand driver alongside governments and utilities. This is a new dynamic, and it has direct consequences for how SMR projects will be structured: bankable contractual frameworks, allocation of construction risk between factory and site, performance guarantees tied to modular production, interface agreements between reactor vendors and industrial off-takers, and liability regimes adapted to co-located facilities. In Europe, where these investments must navigate a fragmented regulatory landscape across multiple jurisdictions, the contractual complexity may prove as challenging as the engineering.

The Lessons of Large-Scale Nuclear Construction

Europe's experience with large conventional nuclear projects provides a sobering reference point. Olkiluoto 3, Flamanville 3, and Hinkley Point C all

suffered significant schedule delays and cost overruns. The causes were systemic: first-of-a-kind construction complexity, supply-chain qualification bottlenecks, inadequate risk allocation between owners and suppliers, protracted document review processes, scope changes during construction, and regulatory frameworks that were either incomplete or had not been tested against new reactor construction for decades. These were not failures of nuclear technology. They reflected the structural challenges of resuming large-scale nuclear construction in Europe after a hiatus of several decades – with contractual models, regulatory frameworks, and industrial supply chains that were not adapted to the task.

SMRs are designed to avoid these pathologies. But design intent and contractual reality are not the same thing. The legal and contractual frameworks for SMR projects have yet to be tested at scale. How will EPC and EPCM structures adapt to factory-based modular production? How will cross-border supply chains – modules fabricated in one jurisdiction, assembled in another, licensed in a third – be governed? These are the questions that project developers, investors, and their legal advisors will need to answer as SMR projects move from pilot to deployment.

What This Series Will Cover

This is the first in a series of six essays examining the legal and contractual landscape of SMRs in Europe – from the fragmented licensing regime and the reshaping of nuclear construction contracts, to siting frameworks for industrial co-location, the challenges facing newcomer states, and the financial-legal dimension of cost escalation, liability, and bankability.

The perspective throughout is that of construction law practitioners with direct experience in nuclear projects – including the contractual and regulatory complexities that arise when ambitious technology meets the realities of project delivery.

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 2 — Licensing Without Borders? Europe's Fragmented Approval Regime**

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