DE-RISKING NEW NUCLEAR CONSTRUCTION

There is an abundance of enthusiasm for an American nuclear revival, with planned reactors across the United States at varying stages of maturity. For the first time, reactors slated for decommissioning are being brought back online, and plans for new reactors both large and small are taking shape. These developments are exciting and welcome news, but America's nuclear industry must not lose sight of the severe financial challenges experienced during recent nuclear construction projects, which yielded bankruptcy and credit rating pressure. The nuclear industry continues to lack a comprehensive project management framework to address the lessons learned from these projects, prevent issue recurrence, and chart a path forward.

Learning From the Past

The V.C. Summer and Vogtle projects represented significant financial impacts for their owners that are instructive for today's nuclear industry. Vogtle's final cost ballooned from $14 billion to $35 billion (Spangler et al., 2025), and V.C. Summer's expected cost rose from $9.8 billion to $24 billion at the time of abandonment (Spangler et al., 2025). These are not isolated incidents; they highlight deep-rooted challenges in governance, organization, process, and risk management that, if unresolved, will continue to threaten future projects.

The Necessity of Risk Management

New nuclear construction projects can't afford to be caught flat footed by slow-rolling crises. These past experiences show that project success depends on rigorous risk management, rooted in early risk identification and impact valuation that drives ownership and resolution.

Project teams must identify, quantify, and document all known or knowable risks (such as in a project risk register), including those identified during governance, organizational, and process audits. All risks should be vetted during regular challenge meetings and their most likely impacts probabilistically quantified.

Risks must also be reflected in the project schedule. Every risk register entry should be screened for applicability to schedule activities. Probabilistic analyses leveraging quantified risk impacts can then be used to produce a dynamic, risk-adjusted project schedule, reflecting the most likely schedule durations for the current project risk register. This allows the project team to identify forthcoming schedule disruptions, prioritize mitigation of risks threatening critical path, and stay ahead of surprise delays.

Capitol Hill also recognizes the need to de-risk new nuclear construction. The Accelerating Reliable Capacity Act, which is pending in the U.S. Senate, indicates Congress's current thinking toward nuclear project risk management. This bill would establish cost overrun insurance for advanced nuclear projects. Payment of this overrun insurance is contingent on the project completing the following for risk mitigation:

- A contract risk allocation strategy
- A plan for contracted roles and responsibilities
- Project risk analyses
- A resource-loaded, integrated project schedule subject to rolling updates and forecasts
- Quarterly progress reviews with government officials including issuance of corrective actions as needed

Delays and Overruns: The True Causes

Our research identifies 10 high-level causes driving recent nuclear construction project cost and schedule overruns. These causes are grouped under three key focus areas: governance and organization, process, and risk management and schedule.

Governance and Organization

1. Inadequately integrated owner-led project organization that does not leverage mutually beneficial contracting terms.
2. Cultural issues including lack of ownership, bias for action, issue reporting, oversight, preparedness, and fatigue awareness.
3. Project management and leadership decision-making not aligned with project cost and schedule goals.
4. Lack of clear, real-time project status reporting to owners.

Process

5. Lack of a proactive problem identification and resolution program.
6. Process outputs not aligned with overall project cost and schedule goals.
7. Processes not supported by uniform adoption of adequate data management systems.

Risk Management and Schedule

8. Inability to implement a realistic, resource-loaded, integrated project schedule leveraging quantitative risk management inputs.
9. Overly reactive and tactical project management lacking strategic foresight and delegation.
10. Lack of a proactive, rigorous, and continual risk management program.

The Challenging, Yet Rewarding Work of Audits

To address these high-level causes, MCR has developed a framework of methods focusing on the three key project focus areas.

This framework gives project owners the information to proactively address high-level project management issues, both technical and cultural. The goal is to inform owners of project performance in near real time, empower project teams to always be one step ahead of emerging project threats, and dynamically adapt project schedules considering a continually shifting project risk register.

For governance, organizational, and process issues, MCR audits performance and aggregates thousands of unique data points organized under distinct hierarchies. The outputs of this approach are performance heat maps (see Exhibit 1), precise identification of issues in each project organization, and recommendations for resolution. This facilitates unencumbered executive line of sight and implementation of direct initiatives to resolve breakdowns and churn before project cost and schedule are adversely impacted.

Exhibit 1: Sample Governance Performance Heat Map

1 - Detrimental
2 - Needs Improvement
3 - Acceptable
4 - Exceptional

	NEW NUCLEAR PROJECT GOVERNANCE						
PROJECT TEAM ORGANIZATION	Design Changes	Quality Control	Module Fabrication	Construction Management	Project Controls	Risk Management	Procurement
Owner - Regulatory Assurance	2.4	2.7	3.7			3.0	3.3
Owner - Engineering	3.6	3.7	3.4	1.3		2.3	1.9
Owner - Project Management	2.8	3.4	2.4	2.7	2.2	3.4	3.0
Owner - Executive Oversight Committee	2.8	3.5	2.7	1.8	3.8	3.1	4.0
Engineer - Design Engineering	3.2	3.9	2.1			2.9	3.1
Engineer - Field Engineering	3.3	2.7	2.8	4.0		3.2	3.9
Engineer - Licensing	3.0	3.8	2.1			3.9	
Engineer - Commissioning			1.2	3.4		2.4	1.5
Construction - Project Controls	3.8		4.0	2.8	3.9	3.2	2.8
Construction - Field Operations	2.7	2.5	3.0	3.7	2.9	3.2	1.6
Construction - Procurement	3.0	3.4	3.7	2.2	3.5	2.9	1.6
Construction - Work Management	1.9		3.8	2.5	3.9	3.0	2.8
Reactor Vendor - Licensing	1.3		4.0			1.5	
Reactor Vendor - Site Support	2.5	3.5	1.6	2.3		1.8	1.2
Reactor Vendor - HQ Engineering	2.8		2.5			1.6	
Reactor Vendor - Commissioning				1.6		1.3	2.7

Not Just Talk—Real Results

Our methods have already yielded benefits for our clients:

- Reductions of billions of dollars and hundreds of schedule days in project contingency requirements.
- Tens of millions of dollars in identified cost savings via recommendations to improve process execution.

We believe systemic nuclear construction cost and schedule overruns are solvable through rigorous risk identification and management. Our framework to de-risk nuclear construction provides maximum assurance to project executives that all knowable project risks are identified. Additionally, it equips project teams with the tools and culture required to identify and mitigate risks before they yield significant consequences. This reduces schedule delays and pursues the Department of Energy's best practice goal of 35% project cost reduction (Kozeracki et al., 2024; Spangler et al., 2025).

If rigorously implemented, this framework will deliver project cost competitiveness and avoid the worst-case-scenario outcomes of recent construction projects. Any project can implement these approaches—they do not require brand new enterprise-level software, black box third-party solutions, or other services beyond the project team's reach. To learn more about MCR's framework to de-risk the execution of new nuclear construction projects, reach out to MCR's Nuclear Practice Vice President Tim Schlimpert.

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