

# An Autopsy of Nuclear Power: Examining the Industry's Decline



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## About the Author

Joshua A. Tolbert, Ph.D., P.E., is a seasoned engineer with four engineering degrees, including a doctorate in mechanical engineering. He has extensive experience in power generation, including coal, natural gas, biomass, and nuclear, as well as leadership roles such as CTO and VP of Engineering for a commercial developer of small-scale nuclear power plants. Dr. Tolbert has worked with nuclear regulators domestically and internationally, including the UK ONR, Poland's PAA, Argentina's ARN, Romania's CNCAN, and Turkey's NDK.

In the private sector, Dr. Tolbert has identified the major obstacles to nuclear power development, including regulatory, technical, and economic challenges. He has a deep commitment to participating in the revitalization of the nuclear industry by implementing practical solutions to these obstacles.

His technical expertise includes the full design of a small-scale pressurized water reactor (PWR), encompassing the primary loop, secondary loop, and auxiliary systems, all utilizing advanced modularization techniques to enhance constructability and reduce costs. This hands-on experience positions Dr. Tolbert to offer unique insights into the challenges and opportunities facing the nuclear industry today.

## Introduction

For many Americans, the story of nuclear power's decline begins and ends with the early morning hours of March 28, 1979, when equipment malfunctions and operator error at Three Mile Island led to the partial meltdown of Unit 2. The incident became a cultural and political landmark, cementing an image of nuclear energy as inherently risky and shaping public perception for generations. But history is rarely so convenient. The truth is that nuclear power in the United States had already been mortally wounded long before Three Mile Island, and the forces that brought the industry to its knees were structural, economic, and regulatory—not cinematic.

To understand why the U.S. nuclear industry collapsed, we must examine the decades-long sequence of decisions, incentives, and institutional realignments that pushed nuclear power from a rising technological marvel to an economic liability. The autopsy reveals a patient that died not from a single traumatic event, but from a slow and chronic set of conditions that metastasized throughout the 1960s, 1970s, and early 1980s.

The story that emerges is not just one of policy failure, but of institutional drift, regulatory imbalance, economic miscalculation, and an industry caught between conflicting mandates. This paper examines that history, not to mourn the past, but to understand what must be corrected if nuclear power is ever to play a meaningful role in America's energy future.

## The AEC and the Promise of Early Nuclear Power

The Atomic Energy Commission (AEC), created after WWII, was entrusted with two missions that were, in retrospect, both synergistic and contradictory: regulate the safety of nuclear technology and promote its civilian development. The Atomic Energy Act of 1954 formally opened the door to civilian nuclear power and directed the AEC to encourage its “widespread participation.” This mandate made nuclear energy not merely permissible but explicitly desirable.

Within this environment, the AEC's dual role—regulator and promoter—created an unusual but highly productive era. The Shippingport reactor, the world's first commercial-scale nuclear plant, demonstrated technical viability. Within a few years, reactors such as Dresden-1 showed that privately funded nuclear plants could succeed without direct federal construction.

The early success was staggering. Plants breaking ground in the early 1960s averaged roughly \$1.35 million per megawatt in today's dollars, and construction timelines routinely

fell under five years. This period, sometimes called the “bandwagon market,” represented what a productive regulatory environment can look like when agencies have both the authority and the mandate to identify and remove obstacles to deployment.

But within that same period, seeds of challenge were already being sown. The AEC was criticized for its inherent conflict of interest, leading to structural changes that would have far-reaching consequences.

## The Slow Rise of Regulatory Burden

By the mid-1960s, public scrutiny of nuclear technology increased, sharpening attention on the AEC’s dual role. Congress expanded the responsibilities of the Advisory Committee on Reactor Safeguards (ACRS) and required greater transparency, including public hearings and published reports. These reforms, while well-intentioned, slowed the licensing process and expanded the scope of regulatory review.

Even so, utilities pressed forward, initiating nearly 40 new reactor projects between 1969 and 1974. But these new plants were not the same as those built earlier in the decade. They were larger, more complex, and—importantly—more expensive. Average construction costs more than tripled compared to the previous era.

The industry’s response to rising regulatory expectations was to design larger and larger reactors, attempting to dilute compliance costs over greater electrical output. This decision had the opposite effect: increased thermal output drove more complex safety analyses, larger containment structures, and more stringent engineering requirements. Construction timelines began to stretch, and the financing burden on utilities grew heavier with each passing year.

The industry entered the 1970s with momentum but recognized too late that its economic foundations were eroding.

## The NRC, the End of the Dual Mandate, and the Turning Point

When the AEC was dissolved in 1974, its promotional functions were transferred to ERDA (and later to the Department of Energy), while a newly formed Nuclear Regulatory Commission (NRC) assumed sole responsibility for safety regulation. This institutional restructuring severed the crucial feedback loop that had once kept nuclear regulation aligned with deployment feasibility.

The NRC had a single mission: guard public safety. It no longer had a mandate to consider whether the regulatory environment made nuclear development viable.

The practical result was predictable. Safety expectations continued to rise, but with no agency empowered to balance those expectations against cost, constructability, or broader energy policy. Equipment qualification requirements expanded. Redundant systems grew more elaborate. Licensing reviews became longer and more resource-intensive. Every step was justifiable in isolation, but collectively the requirements pushed nuclear construction into an economic spiral.

By the mid-1970s, reactors already under construction were facing extended timelines, ballooning budgets, and design revisions that were difficult to incorporate midstream. The wave of plants initiated during the late 1960s and early 1970s entered a labyrinth of escalating requirements that compounded delays and made financing nearly untenable.

## Construction Slowdown and the Impact of Interest Rates

Even without Three Mile Island, the math had already stopped working. The cost of capital—an often overlooked but essential factor—became a silent killer of the nuclear industry. Interest rates in the late 1970s and early 1980s rose to double digits. For capital-intensive projects with long construction timelines, the financial consequences were severe.

A project that might once have been financed at 5% over five years could survive cost drift. But the same project at 15% interest over ten or more years becomes economically ruinous. This is precisely what happened. Financing costs ballooned, often adding billions in present-day dollars to the price of a single plant.

Even before Three Mile Island, the U.S. had already broken ground on only two reactors in the two years leading up to the event. The industry was not waiting for a disaster—it was already immobilized by economic conditions.

Had interest rates stayed moderate and regulatory demands stabilized, the industry might have found equilibrium. Instead, the late 1970s produced a perfect storm: evolving safety standards, prolonged construction, and punishing financing costs converged to crush nuclear development.

## Three Mile Island: A Catalyst, Not a Cause

The TMI partial meltdown did not cause the decline of the U.S. nuclear industry. It cemented it. The accident hardened public skepticism, triggered additional layers of

regulation, and intensified political opposition. Many of these regulatory reactions were reasonable in principle, but they compounded the economic pressures that had already pushed most projects to the edge.

In reality, TMI ended any faint possibility of a regulatory or financial rebound. It froze new construction, amplified public concern, and gave state-level regulators and utilities political cover to abandon nuclear projects that were already financially strained.

By the early 1980s, the American nuclear program was not simply in slowdown—it was in collapse.

## The Final Blow: Vogtle and the Modern Era

The modern era's most prominent nuclear construction attempt, Vogtle Units 3 and 4, demonstrated with painful clarity that the underlying issues of the 1970s were never resolved. Initially budgeted at \$14 billion, the project ballooned to \$37 billion and came online seven years late. Vogtle's struggles revealed the lasting consequences of inconsistent design standards, incomplete supply chains, and the lack of a streamlined regulatory path.

Rather than being a symbol of nuclear revival, Vogtle became a case study in why nuclear construction remains so difficult in the United States. It exposed the same structural vulnerabilities that the AEC split and the regulatory expansions of the 1970s created nearly half a century earlier.

## Conclusion: Lessons From the Autopsy

The decline of American nuclear power was not an accident. It was the result of structural misalignment—between regulation and deployment, between design ambition and constructability, and between financial reality and political expectation. The industry did not collapse overnight; it unraveled over decades due to compounding pressures that were left unaddressed.

Yet, the autopsy is valuable not because it describes a failure, but because it reveals what can be corrected. Nuclear power in the United States did not die from lack of technical capability. It died from a system that rewarded regulatory escalation without balancing the consequences. It died from financing structures unsuited to long construction timelines. It died from a lack of standardization and repeatability. Above all, it died because no single institution remained responsible for ensuring that nuclear energy stayed economically viable.

If nuclear power is to be revived, the lessons are clear. A modern regulatory environment must be coupled with a deployment strategy that emphasizes standardization, constructability, and economic realism. The United States must restore the alignment between safety, policy, and practical engineering that once made nuclear power possible—and could again.