

Comparative Analysis of Nuclear R&D Program and Budgets: A Case study of the U.S. and Korea

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***Keywords:** Nuclear R&D program, R&D investments trend, United States, Korea

1. Introduction

Nuclear research and development (R&D) programs in the United States and Korea stand as compelling case studies, providing insights into national innovation strategies and energy policies. This paper conducts a comparative analysis of the evolution, priorities, and budgetary allocations of nuclear R&D in both countries.

The U.S. stands as a global leader in nuclear technology and holds significant importance in shaping Korea's nuclear R&D policy. With its rich nuclear history, the U.S., and Korea, an emerging force in nuclear technology, offer similar and complementary approaches to nuclear R&D and innovation. This study aims to examine funding trends and technological priorities to distill key insights for policymakers, researchers, and stakeholders.

Through this comparative analysis, we endeavor to illuminate the trends, challenges, and opportunities that shape the nuclear R&D landscape in both nations. Ultimately, this research contributes to the broader discourse on nuclear energy policy and sustainability.

2. Methods and Results

For this study, the methodology involved a comprehensive analysis of the nuclear R&D programs and budget trends outlined within the framework and initiatives of the Nuclear Energy Office of the U.S. Department of Energy. For the Korean case, we analyzed the trajectory of nuclear R&D programs and budget allocations within the Nuclear Energy R&D Action Plan.

2.1 U.S. case

In recent years, the landscape of U.S. nuclear research and development (R&D) programs has witnessed notable shifts. There has been a discernible trend towards the exploration and development of advanced reactor technologies, indicative of a strategic move towards next-generation nuclear solutions reflecting the nation's commitment to global nuclear leadership. Additionally, significant attention has been directed towards improving the economics and reliability, sustaining the safety, and extending the operation of current fleet of nuclear power plants and

advancing tomorrow's nuclear fuel cycle. Moreover, the ongoing efforts in R&D underscore a growing emphasis on developing innovative solutions to crosscutting nuclear energy technology challenges, aligning with broader objectives of innovation and resilience in the nuclear sector [1].

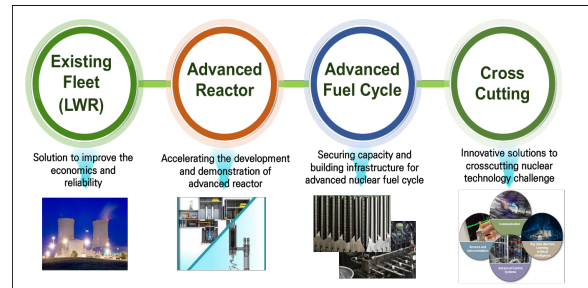


Fig. 1. U.S nuclear R&D main pillar

In a marked departure from previous budgetary allocations, the U.S. has demonstrated a profound commitment to advancing nuclear technology by significantly augmenting its financial resources in recent years. This enhanced commitment is particularly evident in the substantial increase in the nuclear research and development budget, a noteworthy testament to the nation's prioritization of cutting-edge initiatives. Notably, a considerable portion of this augmented budget has been directed towards the development of advanced nuclear reactors and the exploration of advanced nuclear fuel cycle technologies. This substantial investment underscores the nation's strategic vision, positioning it at the forefront of the global nuclear landscape [2].

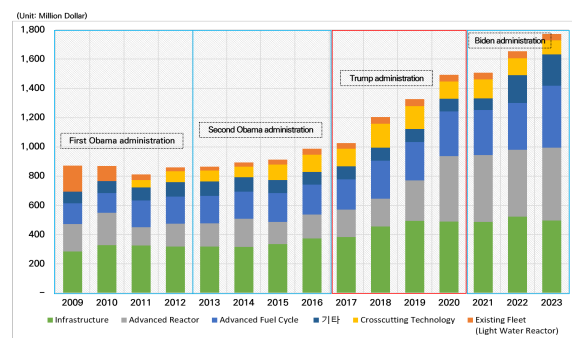


Fig. 2. U.S nuclear R&D Budgetary trends by R&D area

The consistent increase in the U.S.'s nuclear R&D budget, resilient to political shifts, underscores its bipartisan support across Democratic and Republican administrations. From the Obama administration through the Trump administration to the Biden administration, the U.S. R&D budget has more than doubled. This sustained investment, particularly in advanced reactors and advanced nuclear fuel cycle, has cemented the nation's technological leadership and bolstered its competitiveness in advanced reactor development, deployment, and advanced nuclear fuel cycle R&D. [2].

2.2 Korean Case

On the contrasting front, Korea's nuclear R&D budget has exhibited a more fluctuating trajectory, marked by periods of increase and decrease due to various environmental changes. Unlike the substantial growth observed in the U.S. counterpart, Korea's R&D budget has not witnessed a significant increase compared to a decade ago. This pattern reflects the sensitivity of Korea's nuclear R&D endeavors to dynamic environmental factors, including shifting political landscapes, energy considerations, and evolving technical interest and almost fixed Nuclear R&D Fund for several decades. Understanding these trends is crucial for contextualizing the different approaches and challenges faced by Korea in comparison to the more consistent budgetary trends observed in the United States [3, 4, 5, and 6].

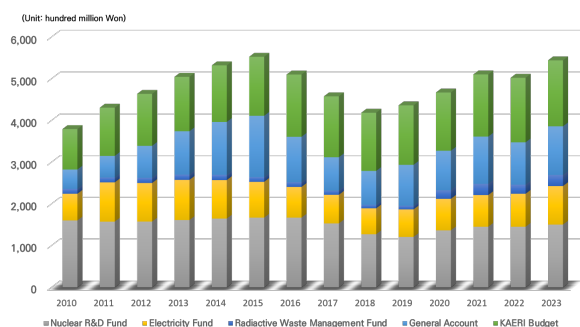


Fig. 1. Korean nuclear R&D Budgetary trends by funding

The discrepancy between the growth of the country's total R&D budget and the stagnation or limited growth of the nuclear R&D budget raises concerns regarding potential challenges in sustaining competitiveness, innovation, and technological advancement within the nuclear sector. Understanding the underlying factors contributing to this disparity is crucial for policymakers and stakeholders to address systemic issues hindering the vitality of nuclear R&D initiatives and ensure sustained progress in the field [3, 4, 5, and 6].

3. Conclusions

In summary, the comparative analysis of nuclear R&D programs and budgets in the U.S. and Korea reveals significant differences in investment trends and budgetary allocations. The U.S. showcases unwavering commitment, evident in increased funding and a focus on advanced technologies. In contrast, Korea faces budgetary fluctuations, potentially impacting competitiveness and innovation. The discrepancy between total R&D and nuclear R&D budget growth underscores challenges, emphasizing the need for strategic interventions to ensure sustained progress in nuclear technology and policy. This study provides crucial insights for policymakers and stakeholders navigating the evolving landscape of nuclear innovation.

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