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Financial Community Perspectives on Nuclear Energy

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INTRODUCTION

With the world’s population expected to rise by 1.7 billion people by 2050,¹ and global electricity demand set to increase by as much as 75 percent over that same timeframe,² nuclear energy is increasingly recognized around the world and in the United States as a reliable, zero emissions solution that is critical to meeting society’s current and future energy needs and greenhouse gas reduction goals.³

Underscoring that trend, and recognizing nuclear’s role as a clean, dispatchable source for energy security and the opportunity surrounding next-generation nuclear reactor technologies, 25 nations including the United States, Canada, France, Japan, South Korea, Poland, and the United Kingdom recently committed to work together to triple nuclear energy capacity by 2050 and mobilize investments in nuclear power.⁴ At the same time, media coverage of other recent announcements, particularly in the United States, might lead some to question the viability of new nuclear projects and the attractiveness of nuclear as an investment.⁵

To better understand the financial community’s investment posture toward nuclear energy, including opportunities to facilitate investment through innovative financing mechanisms and nuclear industry-financial community engagement, Cornerstone conducted outreach with entities including major global commercial banks and project finance institutions, private equity firms, and institutional investors including asset management firms, insurance companies, and university endowments, among others.

The sections below highlight key findings from those engagements, including key takeaways and related recommendations that could help facilitate future financing for nuclear energy projects.

¹ See U.S. Census Bureau, “World Population Estimated at 8 Billion,” November 9, 2023, *accessible at* <https://www.census.gov/library/stories/2023/11/world-population-estimated-eight-billion.html>; and United Nations, Population, *accessible at* <https://www.un.org/en/global-issues/population#:~:text=Our%20growing%20population&text=The%20world's%20population%20is%20expected,billion%20in%20the%20mid%202080s>.

² See U.S. Energy Information Administration, “EIA Projections Indicate Global Energy Consumption Increases Through 2050, Outpacing Efficiency Gains and Driving Continued Emissions Growth,” Press Release, October 11, 2023, *accessible at* <https://www.eia.gov/pressroom/releases/press542.php#:~:text=EIA%20projects%20global%20electricity%20demand,come%20from%20renewables%20and%20nuclear>.

³ See e.g., “Swedish Government Will Help Finance ‘Massive’ Nuclear Expansion,” Bloomberg, November 16, 2023, *accessible at* <https://www.bloomberg.com/news/articles/2023-11-16/swedish-government-will-help-finance-massive-nuclear-expansion?embedded-checkout=true>; “EDF Energy Aims to Extend Life of UK Nuclear Power Plants,” Reuters, January 9, 2024, *accessible at* <https://www.reuters.com/business/energy/edf-energy-aims-extend-life-uk-nuclear-power-plants-2024-01-09/>; “France, Czechia Defy EU Sceptics on Nuclear Power, Euractiv, January 9, 2024, *accessible at* <https://www.euractiv.com/section/energy-environment/news/france-czechia-defy-eu-sceptics-on-nuclear-power/>; “Mission Accomplished: Belgium Signs Off its Nuclear Energy Future,” The Brussels Times, December 13, 2023, *accessible at* <https://www.brusselstimes.com/837150/mission-accomplished-belgium-signs-off-its-nuclear-energy-future>; “New Nuclear Reactor in India Reaches First Criticality,” Power-technology.com, December 20, 2023, *accessible at* <https://www.power-technology.com/news/a-new-nuclear-reactor-in-india-has-reached-first-criticality/?cf-view>; and “China Starts Up World’s First Fourth-Generation Nuclear Reactor,” December 8, 2023, *accessible at* <https://www.reuters.com/world/china/china-starts-up-worlds-first-fourth-generation-nuclear-reactor-2023-12-06/>.

⁴ See “At COP28, Countries Launch Declaration to Triple Nuclear Energy Capacity by 2050, Recognizing the Key Role of Nuclear Energy in Reaching Net Zero,” U.S. Department of Energy, December 1, 2023, *accessible at* <https://www.energy.gov/articles/cop28-countries-launch-declaration-triple-nuclear-energy-capacity-2050-recognizing-key>.

⁵ See e.g., “Nuclear Power’s Landmark Project Stumbles Across the Finish Line,” POLITICO, July 31, 2023, *accessible at* <https://www.politico.com/news/2023/07/31/vogtle-u-s-nuclear-energy-00106597>; “NuScale Ends Utah Project, In Blow to US Nuclear Power Ambitions,” Reuters, November 9, 2023, *accessible at* <https://www.reuters.com/business/energy/nuscale-power-uamps-agree-terminate-nuclear-project-2023-11-08/>; and “US Nuclear Start-Ups Battle Funding Challenge in Race to Curb Emissions,” Financial Times, December 12, 2023, *accessible at* <https://www.ft.com/content/c0700a01-c1e8-4e5e-8300-ac264bd25293>.

KEY TAKEAWAYS

Setting the Context: Opportunities and Challenges

The benefits of nuclear energy were roundly acknowledged, including its provision of reliable, dispatchable, carbon-free electricity and the role it could play in supporting industrial decarbonization and meeting the energy needs of data centers and other large energy consumers. Opportunities surrounding investments in the nuclear power supply chain (e.g., fuel and waste/disposal) were also noted, although such interest was not universal. Additionally, one private equity firm shared their view that the announcement terminating NuScale’s small modular reactor project in Idaho⁶ was a project-, site-, and customer-specific decision, rather than a reflection of the technology’s viability and future. The firm added that they expect a domino effect to ensue once capital is provided to a developer for project development, with such an announcement possible in H1 2024.

Costs and project timelines were commonly cited as major considerations in investment decisions related to nuclear energy companies and projects, with a higher inflationary environment serving as an additional headwind. On the other hand, one investment firm involved heavily in the nuclear energy sector noted that hesitation to invest in nuclear among project financiers and traditional infrastructure investors is less about project timelines than it is about concerns regarding customer commitments. Interviewees cited additional challenges including investor angst over perceived risks on safety, waste, proliferation, and reputational and financial liability. An energy technology private equity firm that does not currently have a nuclear-focused investment platform called newbuild facilities a riskier profile that would be ripe for infrastructure funds, and noted their firm’s interest in maintenance, repair, and operations investments as nuclear plants are permitted and expanded.

Views on investing in conventional versus next-generation nuclear technologies varied significantly. Many highlighted interest (and some even a preference) for small modular technologies rather than conventional nuclear, particularly in the United States, while one leading global asset manager questioned the proposition that incremental, new nuclear energy is required for the energy transition and at the same time said that the only hope for a genuine renaissance in nuclear is through advanced reactor technology. One global insurance company suggested that small modular reactors could also benefit from lower delay and startup (DSU) insurance premiums as compared to larger projects, while one major university endowment communicated an aversion to near-term investment in SMR technology due to risks associated with upfront costs and questions surrounding investment returns over the next 5-7 years.

Challenges cited for advanced nuclear technologies included economies of scale, waste disposal, security, Price-Anderson Act fees on reactors, and operational expertise, with one energy private equity firm noting that large engineering, procurement, and construction (EPC) firms have the capabilities and knowledge needed to carry out operational tasks. A multinational investment bank added that renewables and battery storage present growing competition for nuclear in the race to secure investment capital.

⁶ See “Utah Associated Municipal Power Systems (UAMPS) and NuScale Power Agree to Terminate the Carbon Free Power Project (CFPP), NuScale Power Corporation, Press Release, November 8, 2023, accessible at <https://www.nuscalepower.com/en/news/press-releases/2023/uamps-and-nuscale-power-agree-to-terminate-the-carbon-free-power-project>.

Interviewees also shared their views that conventional projects could still attract investment and that large plants would still continue to play a significant role, particularly in light of clean energy goals, with opportunities for conventional nuclear generally seen as being more focused abroad given the time-consuming nature of U.S. regulatory processes and more accommodative stances of certain foreign governments including South Korea, in particular. In that regard, one multinational investment bank said that access to private debt is likely much greater in Europe assuming government guarantees are in place, with conventional nuclear having easier access to debt than equity, and debt access being more difficult for new nuclear technologies.

One private capital provider also suggested that small modular reactor technology deployments would eventually be a stepping-stone back to new large-build plants in the United States.

Sentiment varied widely on the time needed to demonstrate that next-generation nuclear technologies are safe and reliable. For example, while one major investment bank noted that nuclear’s proven track record and strong safety regime in the United States made them less concerned about a demonstration of safety and reliability, one investment bank said that a 5-10 year track record would be needed and an asset management firm stated that advanced nuclear reactor technologies would not likely be investable until at least the mid-2030s.

Notably, a multinational investment bank observed parallels between small modular reactor technologies and LNG in terms of investment return and project timeline misalignment (and how LNG investments are nonetheless financeable within bank markets and private equity infrastructure funds), while a European commercial bank said that the multitude of small modular reactor technologies that are not yet proven makes it distinct from LNG, which was limited to two technologies that were proven. Similarly, an energy private equity firm noted similarities between small modular reactor technologies and traditional oil and natural gas services in that both are subject to conservative growth outlooks, saying it highlights the importance of up-front value and sufficient cash flow.

Lastly, one global investment bank cited a lack of clarity with regard to partners willing to take on the risk involved in making capital commitments to nuclear power plant and technology companies and projects. Similarly, a major asset management firm said that pension fund managers are unlikely to take on risk in nuclear investments absent a mandate to do so. However, a private capital provider shared their view that capital from pension funds should start to flow, specifically citing examples like the Ontario Teachers’ Pension Plan.

Innovative Financing Mechanisms

Recognizing these challenges, ***interviewees identified a series of mechanisms that could help mitigate risks and thereby accelerate financial community investments in nuclear energy***, including the following:

- Government support, including through:
 - Cost-overrun insurance
 - Net-zero policies/commitments
 - U.S. military nuclear power procurement with private sector and deployment at U.S. military bases

- Direct purchase and direct funding to Tennessee Valley Authority for small modular reactor development
- U.S. Department of Energy loans
- National green bank
- Offtake agreements, including fixed price with an escalator (disagreement exists about their effectiveness in light of recent experiences in other sectors such as offshore wind)
- Regulated Asset Base model, particularly for conventional nuclear facilities outside of Asia
- Preferred stock issuances
- Preferential right to finance future projects for those that finance first-of-a-kind projects
- Consortium approach by utilities (with government support), which would enable risk-sharing
- EPC guarantees
- Carbon credit eligibility for small modular reactors replacing coal/natural gas generation

As to government support in particular, one overseas private equity firm underscored *the need for a more enabling U.S. regulatory framework and government posture*, including a more accommodative Export-Import Bank approach that relaxes requirements for sovereign nation commitments of capital for nuclear projects overseas. In the absence of such framework and posture, one private equity firm identified private financing for early pre-construction phase as an opportunity to fill a key gap in the project development cycle, and a global investment bank said that backing for nuclear would likely only otherwise occur on a fully recourse basis and following a credit team assessment that the developer could withstand a doubling of both cost and construction timeline.

Another multinational investment bank and a large European commercial bank also noted the *importance of credit quality and utilization of proven developers*, with the European bank also noting the *significance of securing well-known EPC providers and experienced operational teams*.

In terms of how some in the financial community are currently seeking to secure investments in nuclear, one firm that is engaged in capital raising efforts for an advanced nuclear project in the United States noted their brick-by-brick approach (*e.g.*, \$10-20M tranches from multiple investors) that includes multiple off-ramps to address investor hesitance to decades-long commitments.

Additionally, although their initial efforts are focused on evaluating opportunities related to carbon capture, biogas/biofuels, and geothermal, one global insurance company that provides debt capital noted that key factors in their screening criteria include emissions profiles, a clear benefit of nuclear, while other criteria relate to offtake commitments, revenue line of sight, sufficient equity, pilot project successes, risk/reward ratios, and geopolitical risks (including the degree to which subsidies are relied on).

Lastly, intellectual property-backed lending is a growing industry that could be a potential opportunity for nuclear, but one global insurance company said financing would be unlikely for technologies that are unproven or subject to market commodity risk, and that many questions would likely surround any potential lending for nuclear.

Nuclear Industry's Engagement with the Financial Community

In addition to various financing mechanisms, and recognizing effective efforts to date through groups such as the Nuclear Energy Institute and Institute of Nuclear Power Operations, interviewees identified additional actions that industry and others could take in an effort to enhance the investment climate for nuclear, including the following:

- Greater involvement of original equipment manufacturers and utilities in more aggressively making the public case for investing in and adopting nuclear technology, and utilities clearly articulating their commitment to nuclear
- Leveraging third party voices that provide thought leadership, including Energy Futures Initiative President and CEO and former U.S. Energy Secretary Ernie Moniz
- Presenting a unified and coherent industry message that presents clear investment opportunities, including by educating the financial community on the nuclear technologies that exist and the financing models that are available to support them, with an emphasis on private financing and how financing gaps can be met without government support
- Engaging the financial community by focusing on how to finance nuclear energy broadly, without focusing on one particular technology like small modular reactors
- Taking on expected questions in a proactive and forthright manner (*e.g.*, safety, fuel cycles/sources, proliferation risk)

RECOMMENDATIONS & CONCLUSION

In light of the feedback provided, the following actions are recommended:

- Accelerate U.S. government support for nuclear energy, including through potential nuclear power procurement and deployment at military bases, direct loans for grid and industrial-level (*e.g.*, SMR) nuclear power projects, provision of cost-overrun insurance, a green bank capital allocation strategy that includes nuclear energy, and a broader federal funding approach that recognizes nuclear as a clean energy source, including a potential national program to establish regional hubs for next-generation nuclear energy technologies and provide demand-side support for them
- U.S. government policy support for nuclear that provides a regulatory framework that fosters the effective and efficient deployment of nuclear energy technology through increased certainty and predictability for licensing and permitting processes and clarification that advanced nuclear is not a new technology, in a manner consistent with nuclear's critical role in meeting national security objectives
- Establish a U.S. national commission of experts- including representatives of industry, the financial community, government, and academia- to assess the impediments to wide-scale deployment of nuclear energy technology and identify solutions to address them, including a comparative analysis on how other governments are successfully supporting nuclear energy deployment
- Consider financing tools that could encompass offtake agreements with fixed price escalator provisions, preferential stock issuances, preferential rights to finance future projects for investments in first-of-a-kind projects, engineering and procurement company guarantees, and carbon credit eligibility for nuclear power projects



- Reduce cost concerns by establishing a price premium for electricity based on reliability performance
- Convene utilities for consortium-level discussions to reduce the level of risk aversion
- Improved alignment and enhanced participation across the value chain regarding industry communications with the financial community in a manner that clearly highlights investable technologies and the various financing models available to support them
- Better leverage third parties to increase awareness of the benefits of and support for nuclear energy, including voices representing academic, national security, and environmental perspectives

Implementation of these recommendations could help enable the conditions that serve to increase the financial community's investments in nuclear, and in turn support efforts to achieve national, state, and global energy and climate goals.

The recommendations included in this report reflect the views and perspectives of the authors and do not necessarily reflect the views or positions of Cornerstone.