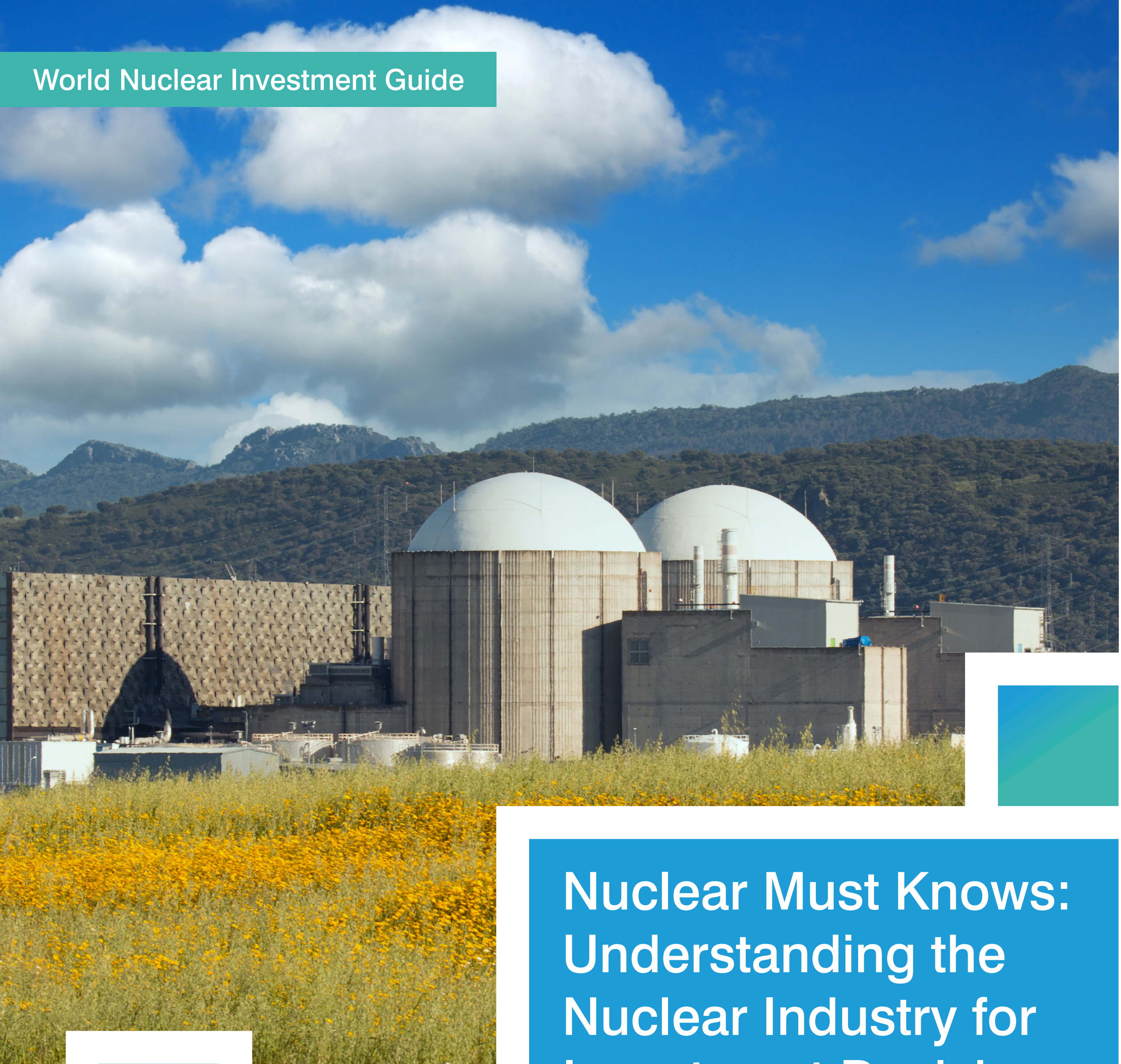
World Nuclear Investment Guide



Nuclear Must Knows: Understanding the Nuclear Industry for Investment Decisions

A structured briefing for financial institutions, governments and other stakeholders offering a new lens for evaluating nuclear assets and making financial decisions.

WORLD NUCLEAR ASSOCIATION

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World Nuclear Association is the international organization that represents the global nuclear industry. Its mission is to promote a wider understanding of nuclear energy among key international influencers by producing authoritative information, developing common industry positions, and contributing to the energy debate.

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Purpose

This module provides the foundation for evaluating nuclear as an infrastructure investment. It covers: the drivers of nuclear economics and risk; commonly held misconceptions about nuclear power; the structural changes in the industry; as well as the financing landscape over the past decade. This module will equip financial institutions to engage with the sector on today's terms, by translating decades of nuclear delivery experience into the conventional cost, risk and value categories finance typically uses.

This module focuses on nuclear power plants, not the wider nuclear value chain.

1 Nuclear in Investment Terms

A system value challenge

The core financing challenge for nuclear is not primarily a technology problem. It is a valuation problem. Nuclear creates value beyond the revenues earned by an individual project. Its contribution to grid reliability, decarbonisation, energy security, price stability, industrial capacity, and the wider economy can benefit the power system and society. This broader contribution is often referred to as 'system value'. Project economics, however, typically do not capture this value. Investors primarily price the project's revenues, costs, risks, and liabilities, while many of the wider benefits accrue to consumers, governments, other market participants, and society. This system value gap is not unique to nuclear; other infrastructure asset classes with large upfront costs and long asset lives, such as roads, railways, and utility networks, face the same divide between project economics and wider public value.

As with other industries, this creates a central challenge for nuclear investment. The parties that finance and bear the risks of a project are not necessarily the same parties that capture its wider system value. Recognising this distinction matters when determining how nuclear projects should be financed, how risks should be allocated, and where public and private capital can each play a role.

Much of nuclear's contribution to date has been delivered through government planning and utility vertical integration and has sat outside the investment and market frameworks that price and capture value today. Although these contributions are well understood within the sector, they have not been systematically measured or packaged into transactions and therefore are less familiar to the financial community. For private capital to take on a larger share of nuclear financing, this history needs to be translated into terms the financial community already prices and incorporated into investment and market frameworks.

What drives the economics

Nuclear economics is driven far more by the cost and structure of financing than by fuel or operating costs. Because the costs associated with the upfront capital investment represent most of the lifetime cost of a nuclear project (fuel typically accounts for only 15-20% of total generating cost),[1] the cost of capital is the single largest determinant of a project's levelized cost of electricity. A 1% reduction in weighted average cost of capital (WACC) can lower nuclear's levelized cost of electricity (LCOE) by roughly \$10 to \$20/MWh.[2]

WACC reflects the market's perceived risk of a project which is why discount rates rise when development and delivery timelines are long, and when key risks such as completion, remuneration and policy change are borne by financiers rather than by the owner and its commercial and government project partners. Risk allocation and policy design matter because they shape these underlying investment risks, and therefore the cost of capital. Where risk reduction and allocation mechanisms are in place, financing costs fall accordingly. Nuclear's 'cost problem' is, in most cases, a financing structure problem.

Nuclear's value proposition

Investors building energy transition portfolios commonly indicate that some characteristics that drive system value are underweighted in their investment choices and portfolios. Nuclear's contribution to the power and broader system spans three broad categories of value. It delivers energy value through the characteristics of the electricity it produces; strategic and policy value through its role in energy security, industrial capacity, and long-term national planning; and economic value through its effects on price stability and the wider economy.

Category	What it delivers
Energy value	Dispatchable baseload at competitive system cost; capacity factor global average above 80%; 60+ year operating lifetime; small land footprint; grid frequency and stability services; non-electric applications (heat, hydrogen, desalination).[3]
Energy security value	Energy security and supply diversification (~30 tonnes of fabricated fuel/year, which can be easily stored, for a reactor versus 2.5.million tonnes of coal for a power plant generating the same amount of electricity);[4] industrial base and high-skilled employment (roughly 200,000 job-years per 1,000 MWe built; about 25% more employment per unit of output than wind);[5] alignment with net-zero portfolio commitments; resource and material efficiency.
Economic value	Price stability and decorrelation from fossil-fuel and weather-driven price cycles; low and predictable operating cost; larger macroeconomic multiplier than any clean energy source; positive impact on trade, current account, and balance of payments as well as on skilled labour force development and job creation.

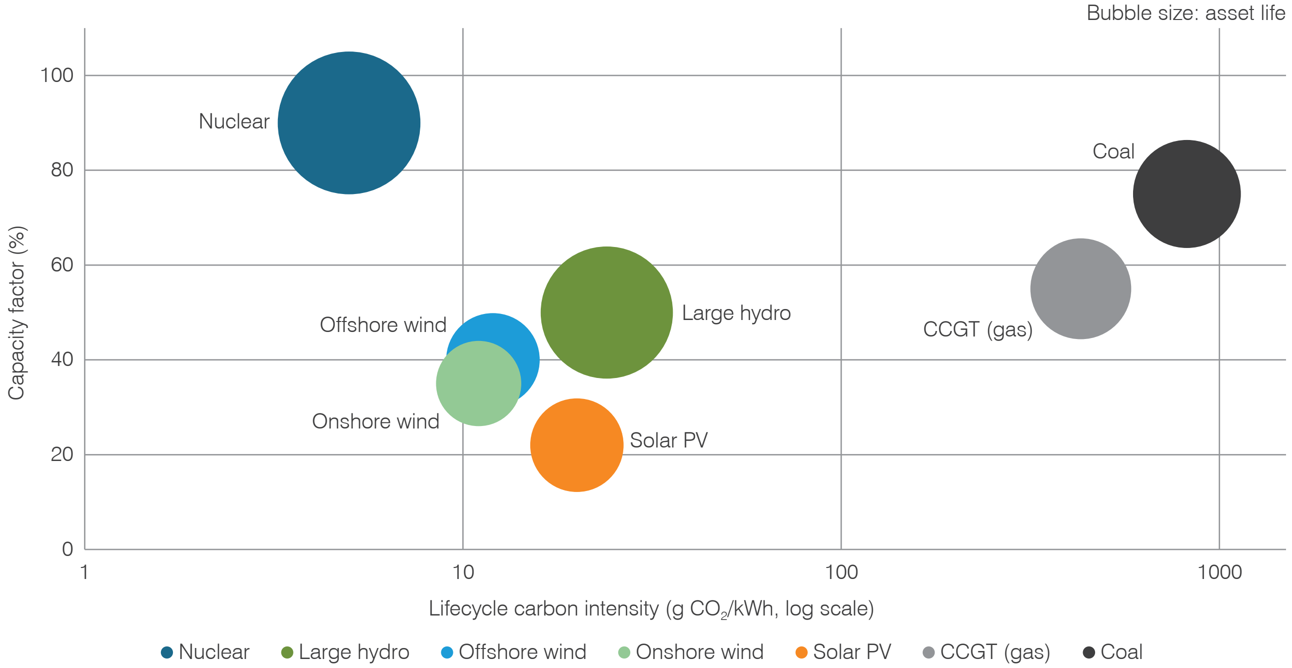
Note: A more complete list of the benefits that nuclear brings is presented in Annex 1.

Characteristics driving project value

Nuclear energy has several characteristics that directly influence risk pricing, cashflow predictability, and long-term investment performance.

At the project level, some of these characteristics translate directly into attributes that financial institutions look for when assessing an individual investment. Reliability, low-carbon output, asset life, and revenue predictability are characteristics that directly shape a project's economics, and that financial institutions consider when pricing and structuring nuclear investments. A high and stable capacity factor supports predictable cashflow and debt serviceability; low carbon intensity affects ESG eligibility and access to green finance; and a long asset life extends the duration of the income stream, which matters for investors seeking long-duration assets, such as infrastructure funds.

Project value drivers



Sources: International Atomic Energy Agency PRIS database (capacity factors, 2024); Chapter 6 (Energy Systems) of Climate Change 2022: Mitigation of Climate Change, Contribution of Working Group III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change (lifecycle emissions); OECD Nuclear Energy Agency and International Energy Agency, Projected Costs of Generating Electricity, 2020 Edition

Capacity factors are global fleet averages or typical ranges. Carbon values are median lifecycle estimates including construction and fuel cycle.

Nuclear: output per dollar invested

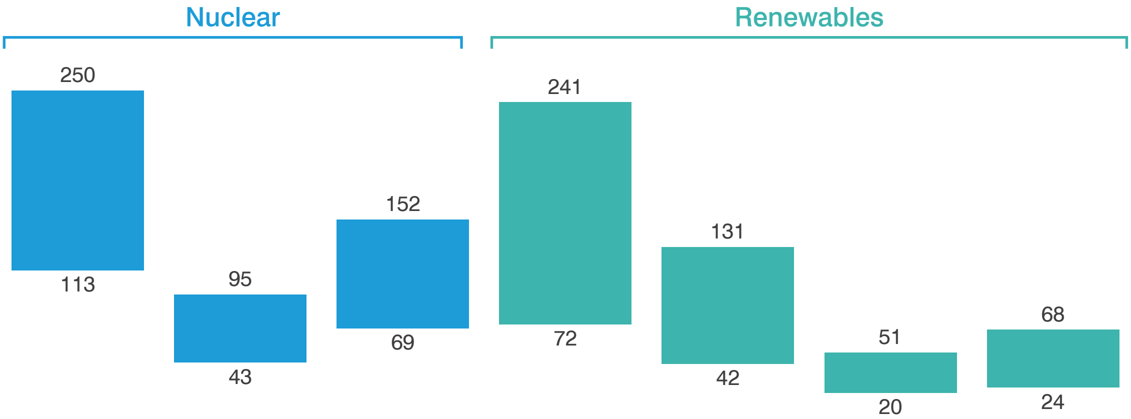
Nuclear's high project costs can obscure how much electricity that investment ultimately delivers over the life of the asset.

A recent analysis by BloombergNEF estimates that, in its net zero scenario, nuclear cumulative investment between 2026 and 2050 would amount to 2.2% of global cumulative investment in clean energy; total nuclear installed capacity would represent 1.7% of the total global installed generating capacity but would produce 9.5% of global electric output by 2050.[6]

A 2025 analysis by EY reaches a comparable conclusion finding that nuclear plants, because of their long operating lifetimes and high capacity factors, generate more lifetime electricity output per dollar invested than other major energy sources.[7]

Lifetime electricity generated per unit of investment, by technology

kWh generated per $1 invested, minimum to maximum range observed across countries.



	Nuclear - past	Nuclear - 2024	Nuclear - 2036	Hydropower	Wind (onshore)	Wind (offshore)	Solar
CapEx intensity (US$ per kW)	2,369	9,353	5,861	2,267	1,041	2,852	691
Load factor (min-max)	77-92%	77-92%	77-92%	31-73%	24-44%	32-52%	12-23%
Lifespan (years)	40	60	60	60	20	20	15

Source: EY, Making Investment in the Nuclear Value Chain Attractive (2025), p.13 • In US$ 2024, inflation not forecast, worldwide average. Ranges are the minimum/maximum rates observed across countries, depending on the preferred energy mix. Costs of storage and grid reinforcement for renewables are not taken into account, which could negatively affect their kWh per unit of investment.

Nuclear as a financial asset class

Nuclear is a large infrastructure investment. Its core investment characteristics are shared with other large infrastructure assets: substantial upfront capital requirements, long development and construction periods, complex project delivery, and long operating lives. Despite operating under a uniquely rigorous regulatory and compliance regime regarding safety, security, and safeguards, nuclear projects do not require a fundamentally different approach to investment analysis. The OECD Nuclear Energy Agency (NEA) highlights that many of the financing challenges facing nuclear, such as electricity-market risk, construction risk, project management and risk allocation, are challenges that arise across other large infrastructure and energy projects.[8]

Nuclear does not need to be treated as a fundamentally different asset class. It can be assessed with the same infrastructure investment frameworks and tools financial institutions already use to evaluate other sectors like LNG terminals, toll roads, large hydropower, and offshore wind, with adjustments for its specific risks, regulatory requirements, and revenue structures. The core characteristics that nuclear shares with other large infrastructure projects include:[9]

- Higher upfront capital requirements
- Longer development and construction period
- Long operating life
- Complex project delivery and supply chains
- Strong regulatory and policy framework
- Long-term revenue requirements
- Multiple potential sources of debt and equity
- Potential for institutional investment once risks are appropriately structured

The investment lifecycle is also familiar and not unique to nuclear.

2 Demystifying Nuclear: Common Questions

Nuclear projects have characteristics that require investors to consider specific risks, particularly around capital intensity, longer development periods, and project delivery that are difficult to price using conventional infrastructure frameworks.

The following table addresses some commonly raised criticisms and misconceptions using evidence to clarify where the risks are real, where they can be managed, and where perceptions may not reflect current experience. For a more detailed description of nuclear project risks, see Common Nuclear Project Risks: A Reference Table, which maps the principal nuclear project-specific financial risks by project stage, typical bearer, and primary mitigant.

Issue	Answer	Evidence	Trajectory
1. *"Nuclear always goes over budget and over schedule."*	Construction and completion risks are real, but it is a programme-design problem.	Overruns concentrate in FOAK projects without recent build experience. Repeat builds show materially better performance. Owner and vendor optimism bias and lack of reference plants or established track record can lead to unrealistic cost and schedule assumptions from the outset. A lack of fleet-level visibility to capture learning curve effects, and insufficient upfront planning and project design work prior to FID can impact cost and schedule. Barakah's four APR1400 units were delivered largely on time;[10] China starts construction of six-to-eight reactors per year.[11] The UK's Sizewell C is expected to cost less than Hinkley Point C (on the same design) and take less time to build.[12]	The industry is moving from FOAK projects towards repeatable designs, stronger supply chains, and more experienced delivery teams, which should improve cost and schedule predictability.
2. *"Nuclear can't attract private finance without government support."*	Government involvement enables private and institutional capital. Government support allocates and reduces risks that private investors are not well positioned to bear on their own often acting as a backstop for specific risk categories such as construction delay, political risk, or liability. By taking on risks, governments make projects financeable at a cost of capital private investors can accept.	At early stages of industry and financial maturity, policy support and finely calibrated tools help lower and share risks among stakeholders and reduce a project's capital cost and its cost of capital. Government support today spans a spectrum, from direct procurement and underwriting to a more enabling role. The role and scale of government support will evolve according to risk allocation and market structure in each jurisdiction. In Finland, the Mankala structure enabled existing nuclear build through joint ownership between power offtakers and state-backed utilities. Under the rate base approach, US and Canadian projects have relied on funding from privately owned or listed utilities. Sizewell C's equity consortium, for example, includes institutional capital alongside the UK government.[13] KEXIM provided $2.5 billion in debt for Barakah.[14] Sweden's first new nuclear project vehicle VKAB is owned 20% by industrial consortium of private companies.	Government support calibrated for FOAK units is expected to ease as additional units are ordered and delivery experience builds. However, the scale of capital required means most projects will still need state funding, and off-balance-sheet structures to avoid overburdening any single sponsor. Separately, as governments' capacity for direct fiscal support narrows, catalytic capital providers such as MDBs and philanthropic funds take initial steps to fill financing gaps traditionally covered by government support. Some developers are also building larger balance sheets, which may reduce reliance on government backing to reach financial close over time.

Issue	Answer	Evidence	Trajectory
3. *"Transaction cycle times are too long to complete."*	Nuclear transactions can take time partly because there are limited repeat transactions and therefore limited standardisation of deal terms, risk allocation, and financing templates requiring substantial project-specific due diligence and documentation.	The proliferation of nuclear designs and markets is producing more differentiated developer, owner, and sponsor organisations. As programmes mature from concept to delivery, owner strategies are expected to converge towards tangible, verifiable deliverables, with investor alignment and resource depth improving in parallel. This is already visible in delivery timelines. At Barakah, the time from fuel load to commercial operation fell by over four months between units 2 and 3, as operating teams applied experience from earlier units.[15]	Competent-organization capability will strengthen as owners engage more with financial institutions. More open tendering should produce more reliable benchmarks as the market expands, transactions become more replicable and secondary markets gain in confidence.
4. *"Nuclear carries unmanageable risk: unlimited liability, unfunded waste, and catastrophic accident potential."*	Nuclear liability is legally channelled to the operator under international conventions, with the residual risk covered by a mature liability insurance market. Waste management and decommissioning are pre-funded obligations through dedicated funds accumulated over the plant's operating life.	Liability is legally channelled under international frameworks, protecting investors directly. Waste is funded from the outset via per-kWh levies in segregated funds, and decommissioning assurance is a licensing precondition, removing both from the investor's balance sheet. Nuclear safety, security, and safeguards are governed by independent national regulators, operating within a framework of international treaties and IAEA standards. Nuclear remains among the safest sources of electricity generation on a deaths-per-unit-of-energy basis.[16]	The strength of the international nuclear liability regime is anchored in the Paris and Brussels Conventions, which guarantee up to €1.5 billion for public compensation. Finland's Onkalo facility, funded through the country's segregated waste levy, is on track to become the world's first operational deep geological repository for high level waste in 2026, demonstrating that disposal is a solvable engineering and financing problem, not an open-ended liability.
5. *"Nuclear is too expensive. The levelised cost of electricity (LCOE) is not competitive."*	Nuclear's competitiveness is highly sensitive to financing costs because of its high upfront capital requirements. LCOE therefore varies significantly with the cost and structure of financing.	The OECD Nuclear Energy Agency and International Energy Agency have reported that at a 3% discount rate, nuclear has the lowest LCOE of any electricity source studied. At 7-10%, its competitiveness erodes sharply.[17] System cost analyses[18] reinforce nuclear's cost-effectiveness since they consider the additional integration, transmission, and balancing costs that variable renewables require, as well as the environmental externalities associated with fossil generation.	As delivery experience increases, project risks become better understood and financing structures become more established, which can reduce the risk premium and, in turn, the cost of capital. Standardised term sheets and financial structures across repeat projects reinforce this effect. Secondary markets and syndication capacity are expected to further lower financing costs over time.
6. *"The SMR cost data is alarming. The business case has already collapsed."*	The investment thesis was always NOAK-at-scale, not the FOAK unit.	China provides a relevant precedent. Construction costs have halved between the 1960s and 2000s.[19] LWR-based SMRs (BWRX-300, NuScale, Rolls-Royce SMR) build on 60 years of proven reactor physics. In Canada, OPG's own cost estimates for its planned Darlington SMR fleet project a cost reduction for units 2-4 compared to unit 1.[20]	Early projects generate the learning needed to establish credible NOAK costs and reduce technology, construction, and delivery risk. As these risks are lowered and repeatability improves, the financing mix could shift from predominantly equity towards greater use of debt and project finance.

Issue	Answer	Evidence	Trajectory
7. *"SMRs do not have an established route to market. The corporate PPA is untested."*	Corporate PPAs are a well-established financing mechanism, but their use to support new nuclear projects is still emerging. The counterparties are familiar, creditworthy energy buyers, even if the application to nuclear is new.	Hyperscalers drive large-scale SMR deployment. Their high-power loads, strong balance sheets, and long-term clean energy goals make them premium partners. A 20-year take-or-pay commitment from an investment-grade hyperscaler provides the same revenue stability as a utility offtake. Tech companies signed over 10 GW of nuclear agreements in 2025 alone covering existing or restarting large reactors as well as new SMR developments.[21]	The number of direct offtakers is growing beyond utilities to include industry, hyperscalers, and other large energy users. Revenue models are shifting towards market purchasing power and commercial terms alongside traditional cost-recovery mechanisms.
8. *"The ticket size is too large. It exceeds concentration limits, with no secondary market."*	Large reactor finance plans are often multi-sourced and structured for syndication. There is an increasing variety of financial instruments available to the market at any ticket size.	Sizewell C's equity consortium (UK government, EDF, Centrica, La Caisse, Amber Infrastructure) is a live model for how concentration risk is managed through syndication.[22] Beyond large reactors, the nuclear value chain offers a continuous spectrum of ticket sizes and risk profiles: long-term operation, restarts, and uprates at existing plants; supply chain investment in manufacturing and components; exploration and mining; fuel cycle facilities (conversion, enrichment, fabrication); SMR and advanced reactor vendor equity (X-energy, NuScale, GE Hitachi, Rolls Royce among dozens of others) and dedicated nuclear funds (Brookfield Infrastructure Partners, PFYN, Nucleation, Segra Future Energy Fund) which allow entry through pool vehicles that spread capital across multiple projects.	The debt and equity toolkit is expected to expand, with support from non-traditional lenders, to include development-phase debt, more flexible construction debt, greater multilateral development bank capacity, and deeper secondary markets for syndication and risk participation, widening the range of achievable ticket sizes over time.
9. *"Policy risk is too high. Governments change and support could be withdrawn."*	Policy risk cannot be eliminated, but it can be reduced through durable contractual, regulatory, and legislative frameworks that provide greater certainty around revenues and cost recovery.	Government commitment to announced policies can be reinforced through standard contractual arrangements and, where necessary, legislation. PPAs, CfDs and RAB frameworks include government-backed contracts and are examples of mechanisms designed to reduce exposure to changes in political administration. As with all heavy infrastructure, government actions can improve or reduce project economic efficiency and financial confidence. See *Developer and Investment Models* for details on government's role.	Government support structures are expected to meet value-for-money tests, such as EU state aid rules, as government and investor familiarity with nuclear improves. As programme design and economic oversight mature, support structures are likely to become more durable and less exposed to political discretion.
10. *"Newcomer countries lack the regulatory and institutional infrastructure to give private capital confidence."*	Some newcomer countries do face an institutional and regulatory gap, but this can be addressed through established international regulatory, institutional, and financing frameworks as national capability develops.	The financing architecture for newcomer markets typically combines export credit agency support, development finance institution and multilateral development bank structuring, and sovereign-backed guarantees. This tends to work alongside the broader capabilities that give investors confidence: a credible regulator, a clear legal and liability framework, a competent owner, a well-defined government programme, and an appropriately structured financing package. MDBs are broadening the available financing toolkit for nuclear.[23] Commercial institutions typically enter through advisory work, political risk insurance, supply chain finance, and later-stage participation as markets mature. Global philanthropy is planning strategies to complement legacy institutions, improving best practices, and accelerating access to nuclear energy.	Owner, developer, and sponsor organizations in newcomer markets are likely to become increasingly differentiated by their organizational capabilities as competent-organization capacity builds up. Government bodies' capacity to enable and evaluate nuclear programmes is also improving as familiarity with the sector improves. Both trends are expected to narrow the institutional gap over time.

Spotlight on nuclear liability, insurance, and legal frameworks

Nuclear liability, insurance, and legal frameworks: what investors must know

Nuclear projects involve certain liabilities and legal requirements with no direct parallel in conventional infrastructure. These relate to nuclear liability in the event of radiological release (nuclear safety), physical plant protection (nuclear security) and the accounting and management of fissile material (safeguards). Over multiple decades of continuous improvement, including through private sector participation, the industry has also developed and implemented frameworks for the management, treatment, and disposal of used nuclear fuel, and for plant decommissioning.[24]

These unique accountabilities sit with the nuclear operator/licensee and government, and can be, and have been, efficiently ring-fenced from external financiers without any degradation to the project's safety profile. Decades of international legal work, alongside policy and finance partners, have produced a dedicated, mature framework that channels and caps investor exposure, mandates funded provisions for long-tail liabilities, and clearly assigns where liability resides. Together, these provide a familiar, investable set of legal preconditions for financial close.[25]

Third-party liability	Insurance	Long-tail liabilities
Channelling principle: all third-party claims flow to the licensed operator only. Lenders and equity investors bear no direct nuclear liability.	**National insurance pools** (NRI, NEIL, EMANI, ASSURATOM) aggregate capacity for nuclear risks. A mature market with 60+ years of operating history.	**Decommissioning:** mandatory financial assurance required in all major jurisdictions. The best assurances ring-fence liability from investor balance sheets.
Liability frameworks (Paris, Vienna, CSC, US Price-Anderson) establish minimum financial security requirements and a mandatory state backstop above the minimum.	**Pool capacity is finite.** Early engagement (at technology selection, not at FID) is required to confirm cover.	**Used fuel:** interim dry cask storage is proven and low-cost. Government bears ultimate permanent storage liability in all major jurisdictions.

Known gaps in the framework

Geographic coverage is incomplete Some emerging countries do not have ratified conventions or national liability law. IGAs substitute bilaterally but do not bind third-country claimants.	**Convention minimum financial security requirements may be inadequate** Residual liability above the minimum financial security requirements falls on government. Structurally equivalent to government indemnity in aviation and offshore petroleum. It can impact sovereign credit risk.	**Decommissioning funds coverage is uneven** Not all markets have mandatory funding regimes, leaving liability unprovisioned on the operator's balance sheet where none exists. Where they exist, they are generally considered adequate, and long-term operation extensions can strengthen this further, as funds continue accruing for decades beyond the plant's original design life.

3 Structural Development and Trends Reinforcing Nuclear's Value Proposition

The energy policy landscape has changed considerably over the last few years. Nuclear's investment case has been reshaped by concrete changes in the policy, financing and delivery environment that can shift the risk and return profile facing investors. Significant developments include:

- **Policy and institutional support**
  - **National energy strategies:** Countries with competitive energy markets, including Poland, Czech Republic, Sweden, and the Philippines are establishing or accelerating nuclear programmes.
  - **Global Stocktake inclusion:** The COP28 Global Stocktake unanimously agreed by all parties to the UNFCCC, called for accelerating zero- and low-emission technologies including nuclear to meet Paris Agreement goals, the first time nuclear had been specified in a COP decision text.
  - **COP28 Tripling Pledge:** As of mid-2026, 38 countries had endorsed the Declaration to Triple Nuclear Energy Capacity by 2050, alongside over 140 companies and multiple financial institutions.[26]
- **Financing and risk allocation**
  - **Taxonomy inclusion:** The EU taxonomy for sustainable activities recognizes nuclear as a transitional activity contributing to climate change mitigation. Other taxonomies, including South Korea's K-taxonomy, have also recognised nuclear, broadening the pool of ESG-labelled capital potentially available to the sector.[27]
  - **MDB re-entry:** In June 2025, the World Bank Group expressed its support for financing nuclear energy projects, followed by a formal IAEA partnership. The Asian Development Bank amended its energy policy later that year to support nuclear investment for the first time, and other MDBs, including the European Investment Bank and the New Development Bank, have re-engaged with or signalled growing openness to the sector.[28]
  - **Philanthropic support:** major philanthropies are developing intervention strategies to support nuclear accessibility and affordability worldwide, with a focus on newcomer countries. The Global Coalition for Nuclear Philanthropy (GCNP) for example, was announced in May 2026 and will prioritise gaps in education, industry capacity, financing, and governance.[29]
  - **Broadened capital pools:** Most new nuclear projects have historically relied on direct sovereign funding or utility balance sheets, with little commercial finance. Governments, development banks, export credit agencies, and private capital are now creating different structures that allocate risks according to the affordability and balance sheet treatment priorities and attract institutional investors. Examples include RAB models that let projects recover regulated revenues during construction (*e.g.* Sizewell C);[30] government equity and low cost debt reducing operating period power price top up levels (*e.g.* Czech Republic, Sweden);[31] and export credit agencies acting as strategic financiers, offering competitive financing that expand the pool of available debt.
- **Delivery and market maturity**
  - **Series-build cost trajectories:** The industry is shifting from FOAK projects towards standardised, replicable fleets. KEPCO's APR1400 (Barakah and its domestic programme), and EDF's EPR (Finland, China, UK, France's domestic programme), show repeat builds expected to cut installation times.[32] Westinghouse has designated Vogtle 4 as the standard AP1000 reference plant for fleet-scale US deployment.[33] In the SMR market, GE Vernova Hitachi's BWRX-300 is being deployed across Canada, with more units planned in Poland and the UK,[34] and Rolls-Royce SMR is advancing its UK-anchored fleet build-out into new markets including Sweden and the Czech Republic.[35]
  - **Execution and social licence risk:** Local opposition, environmental challenges, and planning processes remain a manageable but material execution risk. For MDBs and DFIs, social acceptance is also a formal safeguard and reputational condition of financing.

Taken together, these developments suggest that the industry is moving away from a model in which each nuclear project is treated as a unique, high-risk megaproject requiring exceptional government support (see Roadmap, Phase 1: Strategic capital) and towards a model seeking to make nuclear more financeable by reducing uncertainty, standardising risk allocation, broadening the investor base, and financing programmes rather than isolated projects (see Roadmap, Phase 3: Mainstream finance). While many of these innovations are still evolving and their long-term effectiveness will depend on successful execution, they represent a meaningful shift in how nuclear projects are being structured for capital markets.

4 Key Takeaways for Financial Institutions

The evolution of the sector warrants a material update on how nuclear projects are assessed for investment purposes

As the sector evolves, investors have more information with which to assess projects. Programme visibility, project maturity, contractual structure, financial design, and repeat-build experience can be increasingly treated as distinct variables in how nuclear investments are assessed, rather than folded into a single, undifferentiated technology risk judgement. As multiple current programmes progress towards FID and completion around the world, a broad set of new criteria and data is emerging to help financial decision-making.

- **Nuclear costs and risks are operationally understood, but not yet financially benchmarked**
  Nuclear costs and risks are increasingly well understood at an operational level, and can be reduced, allocated, priced, and mitigated through well-established programmes and instruments. However, the financial community does not have access to meaningful amounts of independently verified, standardised data to benchmark and price these risks consistently, which makes packaging and pricing key risks difficult in practice (see *Common Nuclear Project Risks: A Reference Table* for additional information).

- **Capital structure has a disproportionate impact on cost**
  Because a large share of nuclear's lifetime cost is incurred upfront, the cost of financing that capital is the single largest determinant of a project's LCOE. Achieving the lowest possible cost of capital requires close partnership between the nuclear and financial industries as well as governments to develop financing structures and risk allocations aligned with nuclear learning curves and industrial scaling.

- **Completion risk is a programme design problem**
  Cost and schedule overruns are concentrated in FOAK projects and in markets without series build experience. Korea and China demonstrate that repeatable programmes with stable supply chains substantially mitigate this risk category. Programme visibility and project maturity, not technology type, is the stronger vector for construction and completion risk mitigation and pricing.

Annex 1: Nuclear System Value

Energy value

- Firm, dispatchable electricity at competitive cost: Nuclear provides continuous, on-demand power that is unaffected by daily weather variability. Because system costs for nuclear are far lower than for variable renewables, nuclear energy can be cost-competitive at the plant level and highly economical on a whole-system basis as well.
- High capacity factors: The global nuclear fleet is running at record output levels, with an average capacity factor above 83% in 2025,[36] higher than any other electricity source, and over 60% of reactors achieving a capacity factor above 80%, with individual mature units capable of annual capacity factors above 90%.[37]
- Long operating lifetime (60+ years) with no age-related decline in performance: Reactors originally licensed for 30-40 years of operation are now routinely licensed to 60 and increasingly 80 years. Historical data show no age-related decline in reactor capacity factors.[38] This makes nuclear one of the most durable and predictable infrastructure asset classes available to investors.
- Frequency regulation and grid services: Beyond baseload supply, nuclear plants can actively support grid stability. As grids absorb more variable renewables, this flexibility becomes an increasingly valuable, monetizable service.[39]
- Non-electric applications: Nuclear energy is an excellent source of process heat for industrial applications including desalination, synthetic fuel production, and oil refining. For most major industrial heat applications, nuclear is a credible low-carbon option. This diversifies the revenue base that can underpin project financing beyond a single power purchase agreement.[40]
- Small land footprint: Nuclear requires little land to generate large quantities of electricity. A large two-unit nuclear power plant can provide electricity for 4-5 million people from a generating footprint of just 2 square kilometres.[41] For land-constrained sites or brownfield redevelopment, this is a material siting and permitting advantage.

Energy security value

- National energy security, energy independence, and diversification of supply: Nuclear strengthens supply security through both reliability and fuel logistics. Nuclear power plants provide large amounts of electricity predictably and reliably, directly displacing fossil fuels and reducing import dependency, while uranium's energy density means only around 30 tonnes of fabricated fuel are needed annually for a 1,000 MW plant, compared with 2,5 million tonnes of coal, making it an intrinsically portable and tradeable commodity. This also means that a nuclear plant's fuel needs can be economically stockpiled years in advance, giving operators and governments a buffer against short-term supply disruption.[42]
- Industrial base, including reindustrialization, and high-skilled employment creation: Nuclear projects generate substantial, long-duration, well-paid employment. For each 1,000 MWe of nuclear capacity constructed, around 200,000 job-years of employment are created, with nuclear sector pay tending to be higher than average given the specialist skills involved.[43] It anchors durable domestic industrial capability rather than one-off construction activity.

Environmental value

- Climate commitments and net zero portfolio alignment: Nuclear is now formally recognized within global climate frameworks. the COP28 Global Stocktake called for accelerating zero- and low-emission technologies including nuclear, with countries recognizing the need for a tripling of nuclear energy capacity to achieve global net zero by mid-century, giving financiers a policy-anchored rationale for including nuclear in net-zero-aligned portfolios.[44]

- Resource and material efficiency: Because of its very high energy density, nuclear requires far less bulk material input (steel, concrete, copper, critical minerals) per unit of energy delivered over the plant's lifetime than most alternative generation technologies, reducing exposure to future critical-minerals supply constraints as global demand for these materials is expected to more than double by 2050.[45]
- Broader environmental performance: Nuclear also compares favourably with most other electricity sources across other environmental indicators, including land use, water use, and ecological and human toxicity, over its full lifecycle.[46]

Economic value

- Price stability: Because nuclear's operating costs are dominated by fixed and capital costs rather than fuel, its output price is far less exposed to commodity swings. While new construction is capital-intensive upfront, this front-loading brings decades of stable, low-cost electricity largely shielded from the volatility of global energy markets.
- Low-cost energy: The operating cost of nuclear plants is lower than many other electricity sources, with a very low risk of operating cost inflation.
- Price decorrelation with fossil fuels: Nuclear generation cost is largely insulated from fuel price cycles, offering a way to stabilize power prices in deregulated markets.
- Macro-economic multipliers: Nuclear investment has an outsized ripple effect through the wider economy. IMF research has found that investments in nuclear power produce a larger economic multiplier effect than any other clean energy source.[47]
- Trade, current account, and balance of payments: By displacing imported fossil fuels with a domestically operated, long-lived asset, nuclear power reduces recurring energy import bills and can convert countries into net technology and fuel services exporters over time.[48]

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