

Common Nuclear Project Risks: A Reference Table

This table captures the Level 1 risks most consistently identified across World Nuclear Investment Guide modules and by industry and financial experience, as impeding investability in nuclear new-build projects. It is a starting reference, not an exhaustive list.

Scope

The table covers reactor new-build risk only (large reactors and SMRs); fuel cycle segment risks are addressed in the segment leaflets. It is neutral as to reactor design, country, site, owner, vendor, contractor and technological maturity.

Reference point

Risks are defined relative to FID, the point at which a project's business plan and financial structure converge to the satisfaction of external commercial financiers and all parties become legally committed. External finance requirements are not a single fixed standard; some projects reach FID without meeting them in full.

A note on use

Mitigation options are illustrative and not prescriptive; none is recommended over another, and their applicability depends on each project's circumstances. This table is designed to be read alongside the rest of the Investment Guide, its modules, and the case studies and leaflets.

How to read each row

For each risk, the table sets out why it matters to financeability, which party is typically best placed to bear it, how it can be mitigated, and precedent illustrating that mitigation. As a general principle, risks are allocated to the party best placed to control or mitigate them; residual risks that are systemic, uninsurable, or government-controlled may need to be shared. Allocation should preserve delivery incentives and affordability.

Investment model component: Investment Model sub-model to which the risk primarily relates.

Risk category: Broad grouping under which the Level 1 risk sits.

Interfaces & sub-categories: Related Level 1 risks, adjacent risk categories, or downstream/upstream dependencies that interact with this risk.

Level 1 description: Top-level, investment-grade risk category. The level at which investors, lenders, and rating agencies typically size exposure, allocate contractual responsibility, or make a financeability judgment at FID. Each Level 1 risk aggregates a cluster of related sub-risks (specific triggers, mechanisms, or failure modes) sharing a common bearer, mitigation toolkit, and financial treatment.

Deployment maturity: Technology and/or market maturity stage driving elevated risk, where applicable.

FOAK (First-of-a-Kind): A reactor design with no or minimal prior commercial operating history, unproven from a financier's due-diligence standpoint, with no reference plant data to benchmark against.

FFOAK (First-Few-of-a-Kind): The first several units of a design following FOAK. Reference plant experience is starting to accumulate, but cost and schedule are not yet de-risked by repeatable, fleet-level learning.

NOAK (Nth-of-a-Kind): A mature, repeatedly deployed design with an established operating and delivery track record, benefiting from learning-curve cost and schedule efficiencies.

First-in-a-while market: A country or developer that has built nuclear before, but not recently and where institutional knowledge, domestic supply chain, and regulatory muscle memory have eroded, even where the technology itself is NOAK elsewhere.

Newcomer market: A country or developer undertaking its first-ever nuclear power project, with little or no domestic regulatory, workforce, or supply chain track record to draw on.

"All": The risk is generic and applies across all maturity levels, although its likelihood, impact and appropriate mitigation may vary materially by technology, project and market.

Project stage: Phase(s) of the project lifecycle during which the risk is live and material.

Development: Pre-FID, from project inception through FEED, licensing groundwork, and financial structuring, ending at FID.

Construction: FID to COD (Commercial Operations Date), the delivery/build phase.

Operations: COD through end of licensed operating life, including any life extension.

Decommissioning: Post-final-shutdown dismantling, waste management, and site restoration, through to licence termination.

Financial risk owner & underwriter (by order of priority): Ordered list of the parties typically in line to absorb the risk, from first exposure through ultimate backstop. The sequence reflects standard market practice for allocating the risk, not a description of who pays after every mitigation is applied to a specific deal.

Illustrative risk mitigation options: Examples of instruments, contractual mechanisms, or structuring approaches used in practice to reduce, transfer, or price the risk. These are illustrative only, not prescriptive or advice, and no option is favoured over another; applicability depends on each project's circumstances.

Key case studies: Projects where this risk, and its allocation or mitigation, can be observed in practice.

Investment Model Component	Risk Category	Interfaces & sub-categories	Level 1 Description	Deployment Maturity	Project Stage	Financial risk owner & underwriter (by order of priority)	Illustrative risk mitigation options				Key Case Studies / Examples	References
							Financial / Risk Transfer	Legal / Contractual	Structural / Operational	Government / Policy		
Delivery model	Completion risk	Construction delay & cost overrun risk Owner/EPC interface risk Funding shortfall risk Equity return risk Debt sizing & debt servicability risk Public acceptance risk Government support risk	Inaccurate estimating, insufficient contingency, under-estimated delivery-partner interfaces can cause cost overruns and schedule delays. Missing a long stop completion date can trigger revenue-contract termination and lender remedies (see Completion delay risk -Revenue model-).	First-of-a-kind, First-few-of-a-kind, First-in-a-while, Newcomer markets	Development / Construction	1. Delivery partners, including contingency 2. Owner/equity (base equity) 3. Owner/equity (contingent) 4. Sub debt (if possible) 5. Senior debt (only within limited pre-agreed tolerances) 6. End-users (if possible) 7. Government (potential funder of last resort)	Contingency reserves; cost overrun facility (equity & debt); delay in Start up (DSU) insurance; indirect cost cap or payment-in-kind (PIK) facility structure; performance bonds; construction all risk (CAR) insurance. Delay risk is increasingly allocated through contractual incentives rather than insurance alone.	Fixed-price / date-certain EPC (could lead to contractor financial distress); milestone-based EPC with liquidated damages; parent company guarantees; step-in rights for lenders; direct agreements; dispute-resolution and arbitration mechanism; alliancing (e.g. NEC4 model in the UK) or cost-plus-incentive models with shared risk/reward.	Series build and NOAK learning; complete bankable feasibility study/ FEED before FID; owner technical and management capability from development phase; clear interface between management, oversight, and governance; owner's engineer; independent monitor; advance long-lead procurement	Government support package including delivery support (e.g. coordinated public approval pathways), remuneration framework support (e.g. RAB, CFD, carbon credits, capacity market), risk allocation (e.g. market failure, high-impact low-probability events), and financial backstops for funding gaps.	Barakah delivered four APR1400 units on schedule using a repeat-build, fixed technology approach. Sizewell C uses a RAB model in which construction risks are shared among the government, investors, and consumers.	1, 2
Delivery model	First-of-a-kind (FOAK) technology risk	Licensing risk Estimating risk Development phase funding adequacy risk Construction funding adequacy risk Government support calibration risk Public acceptance risk	FOAK technology risk reflects the completeness and stability of a reactor design, including validation and testing status, manufacturability, licensability, performance guarantees, and reference-plant evidence. Design changes introduced during construction can further affect cost, schedule, and licensing. Separately, FOAK-type exposure can arise from owner/delivery-partner interfaces, development-stage estimating, change-in-law, and market risk, regardless of design maturity. FOAK risk is material for the emerging SMR segment, which includes non-water-cooled designs.	First-of-a-kind, First-few-of-a-kind	Development / Construction	1. Vendor 2. Delivery partners 3. Owner 4. Strategic equity partners (if possible) 5. Government (if possible) 6. Senior debt (only within very limited pre-agreed tolerances)	Designer/ vendor equity and guarantees; technology escrow; performance bonds; vendor credit support; FOAK government grant/cost-share; fleet-level risk-sharing structures smoothing costs and benefits across multiple units.	Vendor warranties and indemnities; technology licence; reference plant costs, schedule and unit performance data.	Pre-licensing completed pre-FID; bankable feasibility/ FEED; independent technical advisor; reference plant benchmarking; maximum design reuse from proven technology; prototyping, testing and demonstration; owner capability to translate pilot/ demonstration plant specifications into site-specific design with assessment of financial impact.	Government FOAK support programmes; design standardization policy; early and iterative regulatory engagement; first-of-a-fleet frameworks providing visibility to market of government targets and pre-conditions for fleet build-out support.	Darlington's BWRX-300 is live test of design built on an established design reducing FOAK exposure relative to fully novel designs.	3, 4, 5
Delivery model	Supply chain & procurement risk	Construction delay & cost overrun risk EPC contractual structure & contracting risk Owner/EPC interface risk Funding shortfall risk	Project economics and financial sustainability can come under strain when supply chains are not pre-qualified, tendered, procured, and licensed in line with the business plan agreed at the relevant financing gateway, exposing the project to cost, schedule, and quality risk from suppliers.	All	Development / Construction	1. Vendor and delivery partners 2. Owner/equity (100% for owner scope) 3. Strategic equity (if possible) 4. Government (if possible) 5. Senior debt (only within limited pre-agreed tolerances)	Supply chain finance facilities; advance payments with bonding; early, multi-year contracting; options and capacity reservations; procurement contingency reserves.	Back-to-back subcontract terms; supplier qualification frameworks; long-lead item contracts signed pre-FID; deliberate multi-sourcing strategy; competitive tendering for optimized discovery.	Detailed pre-FID supply chain mapping and capability surveys; fleet programme supply chain development; modular/factory fabrication; domestic content strategy.	National industrial policy for nuclear supply chain; export controls monitoring; geographic supply chain diversification support.	EDF's EPR2 programme explicitly structured around fleet-level procurement to pre-qualify and commit suppliers across multiple units. China and South Korea's serial domestic fleets demonstrate the same principle. OPG structured Darlington NNP around an alliance agreement (Integrated Project Delivery model) bringing owner, technology vendor, EPC, and constructor into one team. GE Hitachi's pre-qualified supplier group for the BWRX-300 SMR shows the same procurement-risk logic applied at the vendor level.	6, 7, 8, 9, 10, 11

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Ownership model	Sponsor & balance sheet risk	Owner “competent organization” risk Developer/sponsor equity capacity risk Market non-confidence risk	Sponsors must commit equity, risk allocation, and management resource and oversight commensurate with other parties’ exposure, and hold balance sheet capacity to plug agreed funding/risk gaps. Sponsors and anchor investors must be aligned on project or program goals, workplan and resources, and entry/exit terms.	First-of-a-kind, First-few-of-a-kind, First-in-a-while, Newcomer markets	Development / Construction / Operations	1. Owner/equity 2. Strategic equity (if possible) 3. Government (if possible)	Shareholder agreement specifying targets, roles and resources provided per anchor shareholder; pre-conditions in equity subscription agreements; standard tools such as Simple Agreement for Future Equity (SAFE), equity bridge facilities, and government grants; shareholder loan capacity sized to the project’s equity-risk profile.	Sponsor support and keepwell agreements; vendor financial health monitoring as an ongoing condition of contract; shareholder undertaking; completion guarantee; change of control provisions.	Clear business plan/ investment case with detailed equity ask and specifications; creditworthy sponsor group as FID pre-condition; government or sovereign wealth/ infrastructure fund co-investment; consortium structure to diversify sponsor concentration.	Government equity backstop; dedicated developer entity (e.g. NEPIO-Nuclear Energy Programme Implementing Organisation) in newcomer markets.	Abu Dhabi’s Department of Finance provided a direct with built-in allowances for construction-period cost inflation. Hinkley Point C funding relied solely on the balance sheet of its 2 equity partners (EDF and CGN) and had no project-level debt. The project was structured so that EDF would fully consolidate the project on its balance sheet, with CGN’s contribution capped by its original contractual commitment.	12
Ownership model	Equity shortfall & capital concentration risk	Completion risk Finance plan capacity & flexibility risk Governance risk	Project partners (especially lenders and guarantors) typically require ongoing visibility on sponsors capacity to fund future commitments (base case, downside, or beyond the financial design-basis) since a shortfall in committed equity, or overconcentration in a single sponsor, can threaten project completion.	All	Development / Construction	1. Owner/equity 2. Strategic equity (if possible) 3. Government (if possible)	Staged equity tranches tied to milestones; convertible development loans; equity bridge facility; pre-arranged standby equity or contingent capital facilities from existing shareholders, including mechanisms for market or government support and entry.	Several provisions govern how the sponsor group is composed, makes decisions, and manages entry and exit: Shareholder agreement; pre-emption rights; “drag-along/tag-along”; consortium governance protocols; sponsor group sized to balance efficient decision-making against concentration risk (founder, vendor, or government).	SPV ring-fencing; multi-investor consortium structures; government equity co-investment; phased investment gateways with go/no-go criteria; competitive tendering of finance.	Government back-stop combining direct equity/debt support for funding shortfalls; risk allocation enabling additional capital raising; remuneration innovations enabling pre-operational cashflow (e.g. RAB, pre-payments); funder-of-last resort mechanisms (e.g. government buy out, investor indemnities, special administration).	Following a successful capital raise in 2025, Sizewell C’s shifted from a two-party structure (EDF/UK Government) to a five-party consortium including public and private investors (Government, La Caisse, Centrica, EDF, Amber Infrastructure) diversifying equity and reducing capital concentration risk. At the time of the capital raise, equity investors and lenders legally committed the funds required to fund the construction of the plant, including a significant buffer or contingency in case of costs overruns.	13, 14
Ownership model	Development risk	Estimating risk Government support risk Public acceptance risk	The pre-FID runway can be under-estimated in cost and schedule as project partners uncover unforeseen conditions to FID, or as market conditions shift, risking sunk development cost if FID is delayed or never reached. Few developers have the capacity to take development risk through the extensive studies required to reach a bankable, FID ready state on their own, a structural constraint on investability and a growing area for specialist development phase funding and financing models.	All	Development	1. Developer/owner/ equity 2. Strategic equity (if possible) 3. Government	Credible investment proposition able to sustain the sponsor’s support and potentially attract co-funding from relevant pools of strategic equity; development equity with return and/or exit at FID; convertible development loan; staged equity tranches tied to milestones & pre-defined ‘kill criteria’; emerging specialist development capital and dedicated development phase funding vehicles designed to expand the pool of sponsors able to reach FID readiness.	Option agreements; development cost reimbursement clause; shareholder agreement; joint development agreements with strategic partners to de-risk development phase and enable each partner to participate in project development upside.	Phased development gateways with go/no-go criteria; bankable feasibility/FEED study; Class 2 cost estimate before FID; early securing of the offtake agreements and iterative regulatory engagement to reduce the probability FID is never reached; testing of developer model parameters to build FID confidence.	Government co-funding (direct government grants or cost-sharing for pre-FID development); NEPIO/developer model entity; bilateral feasibility support; government support of a developer model for nuclear program or projects, including visibility on government enablers to incentivize market participation.	The UK government’s Sizewell C Development Expenditure (Devex) Scheme provided dedicated government funding to cover development costs through to FID, becoming a co-developer alongside EDF.	15

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Operator model	Operating cost escalation risk	Equity return risk Debt sizing & servicability risk Tariff adjustment & affordability risk	Over a 40–80 year operating life, unplanned maintenance, ageing-fleet costs, regulatory backfits, and labour/spare-parts inflation can push operating costs above the level recoverable through power and heat sales, eroding project equity and debt economics.	All	Operations	1. Owner/equity 2. Strategic equity (if possible) 3. Senior debt (only within limited pre-agreed tolerances) 4. Insurance (if possible) 5. End-users (if possible) 6. Government (if possible)	Inflation-linked revenue mechanisms; O&M cost contingency in financial model; commercial insurance; business interruption insurance (where applicable and economical).	Strong operator model with clear interfaces with owner, delivery partners and relevant financiers; long-term fuel and vendor contracts; fixed-fee O&M contracts with performance incentives; first outage planning and execution contracts already in place before start-up.	Operational readiness program, including operational excellence targets and resources; WANO peer review; IAEA Power Reactor Information System (PRIS) benchmarking; cost benchmarking against fleet; fleet or multi-unit operational synergies with other owners.	Regulatory, legislative and policy stability; proactive, collaborative engagement across public bodies.	Under its lease agreement with OPG, Bruce Power assumed all costs of operation and life extension for the Bruce Nuclear Generating Station, with those costs recovered through its price of power, contractually isolating the owner from operating cost growth risk.	16
Operator model	Nuclear safety, liability & insurance risk	Equity financial & reputational risk Debt financial & reputational risk Insurance market capacity & cost risk Government support risk	A safety, security or safeguards event can trigger regulatory, reputational and financial fallout, exposing lenders and investors to third-party liability claims unless operator channelling provisions are watertight. Insurance pool capacity or cost mis-estimation can further degrade the financial structure and cost of capital (see Insurance market capacity risk -Financing model-).	All	Development / Construction / Operations / Decommissioning (including a post-closure liability tail)	1. Owner/equity 2. Strategic equity (if possible) 3. Insurance market 4. Senior debt (only within limited pre-agreed tolerances) 5. Government (if possible)	Nuclear liability insurance pool participation (including mutual organizations); operator liability cap insurance; excess-of-loss reinsurance; MIGA "non honouring of financial obligations coverage"; political risk insurance; government backstop for above-pool-limit exposure; owner and operator financing resources sized to sustain ongoing safety, security, and safeguards compliance.	Claims-channelling regime (operator as sole liable party), backstopped by IAEA conventions and international convention ratification; cross-indemnity in consortium structures; insurance in place as a FID pre-condition with pool cover capped under the international conventions and government indemnity above the cap.	Compliance with licence conditions and safety-culture embedding; WANO peer review; IAEA OSART; near-miss reporting systems; pre-FID engagement with nuclear insurance pools; design features reducing insurable exposure.	National nuclear liability framework (including legislative cap on operator liability and pool sizing); international convention participation; government backstop for above-pool-cap and trans-convention claims; regulatory and legislative clarity and transparency.	The claims-channelling principle (operator is the sole liable party) has been tested (liabilities related to the Three Mile Island incident were entirely resolved through the Price-Anderson Act's insurance pools), and adoption is broadening (12 countries have ratified the Convention on Supplementary Compensation for Nuclear Damage and others are considering it).	17, 18, 19

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Fuel cycle & back end	Uranium & fuel supply chain risk	Construction & completion risk Estimating risk Funding shortfall risk Affordability risk	Fuel supply is exposed to commodity and concentration risk (uranium price volatility, a narrow supplier/enrichment base, HALEU supply constraints for advanced designs, and geopolitical disruption) which can strain licensing and commissioning deadlines as well as operating costs if arrangements are not matched to owner and operator strategy, capabilities, and financial resources.	All	Operations	1. Fuel supply partner/s 2. Owner/equity 3. Strategic equity (if possible) 4. Insurance market (as relevant) 5. Senior debt (only within limited pre-agreed tolerances) 6. Government (if possible)	Commodity hedges; long-term supply contracts with price collars; enrichment capacity contracts.	Diversified short and long-term contracts commensurate with risk profiles for equity, debt, offtakers and government in the business plan.	Strategic partnering; on-site inventory buffer; dual-source qualification; supply diversification.	Enrichment capacity investment; national strategic reserve; government-enabled international supply chains and partnerships.	DOE structured its Centrus enrichment partnership in three phases, each matched to a specific risk: Cost-share contract proved the technology worked before any buyer existed; cost-plus contract where DOE stepped in as the buyer before a commercial market existed and taking the demonstration facility's decommissioning liability; and competitive bid, fixed-price contractor ongoing supply once real demand emerged.	20 , 21
Fuel cycle & back end	Long-tail (back-end) liabilities risk	Construction & completion risk Estimating risk Funding shortfall risk Affordability risk	Used fuel treatment and disposal performance and cost, and the nuclear liability regime through final transfer of liability, run over decades to centuries. Actuarial uncertainty and state-backstop dependency must be aligned with the business plan agreed at the relevant funding milestone.	All	Construction / Operations / Decommissioning	1. Operator & owner/ equity 2. Strategic equity (if possible) 3. Insurance (as relevant) 4. Commercial counterpart (at point of transfer, as relevant) 5. Senior debt (only within limited pre-agreed tolerances) 6. Government (if possible)	Segregated waste management and decommissioning funds; annuity products; actuarial review; waste fund and decommissioning contributions; independent oversight of financial arrangements; recognition that fund segregation should not impede any form of external finance for the project.	Decommissioning trust deed; operator contribution schedule; government backstop; transfer of ownership and/or liabilities to state at clearly-defined milestones including plant end of life.	Lifecycle provisioning from fuel-to-site and first power milestones; comprehensive as-built documentation and configuration management; five-yearly actuarial review benchmarked against completed decommissioning projects; dry cask and national interim storage.	Regulated provisioning framework; government ultimate backstop; liability transfer model; national geological repository programme; operator waste fee legislation.	Germany's 2017 reform transferred back-end liability from utilities to the state in exchange for a one-off payment into a public fund. Finland Onkalo DGR is expected to be operational this decade.	22 , 23 , 24 , 25

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Revenue model	Power & heat capacity, volume, & price risk	Equity return risk Debt sizing & servicability risk Affordability risk Construction cost overrun & schedule risk Government support risk	Remuneration depends on the volume of power and heat sold and the price received matching the assumptions in the project's financial structure. Exposure to wholesale price, dispatch curtailment, or unremunerated capacity or dispatchability can leave the project unable to cover its cost of capital. Output can also be constrained by hydrological or climate-related conditions.	All	Construction / Operations	1. Offtaker/end-users/ dedicated buyer/ payor (as relevant) 2. Owner equity 3. Strategic equity (if possible) 4. Insurance (as relevant) 5. Senior debt (only within limited pre-agreed tolerances) 6. Government (if possible)	Power purchase contracts, concession or other framework that supports external finance; revenue hedges; interest rate swaps; floor price instruments; pre-payments; cooperative-style funding support, and other mechanisms adding certainty to price and volumes sold.	Route to market assurance from financial instruments; contractual visibility and security over power and heat sales and terms.	Diversified offtake; ancillary services revenue; sustainable product revenue; portfolio approach.	Government support package that supports power and heat affordability, including revenue support; regulated return; clean energy standard; electricity market design reform to value dispatchability.	Hinkley Point C's CfD locks in a fixed strike price, and shares risks and opportunities with consumers (when wholesale prices rise above the strike price, consumers pay less than the market rate while the developer forgoes the additional upside; when wholesale prices fall below it, the developer receives a top up payment that secures its revenue). TVO's Mankala model eliminates market risk with shareholders taking power at cost in proportion to ownership. Constellation 20 year PPAs with Meta and Microsoft replace merchant exposure.	26 , 27 , 28 , 29
Revenue model	Completion delay risk	Equity return risk Debt sizing & servicability risk Affordability risk Construction cost overrun & schedule risk Government support risk	Revenue contracts typically set target and longstop commercial operations deadlines. Missing them, after relevant tests and notification procedures, can trigger termination and lender remedies (contractual and revenue side of Completion Risk -Delivery model-).	All	Construction	1. Delivery partners, including contingency 2. Owner/equity (base equity) 3. Owner/equity (contingent) 4. Sub debt (if possible) 5. Senior debt (only within limited pre-agreed tolerances) 6. End-users (if possible) 7. Government (potential funder of last resort)	Back-stop funding for downside scenarios agreed across relevant project partners to share risks; IDC capitalization within debt facility; equity bridge loans; construction-phase yield instruments; DSRA.	Drawdown schedule matching construction milestones; IDC cap provisions in loan agreement; pass-through of certain costs in event of construction delay; limitation on offtaker remedies/penalties such as replacement power, liquidated damages and termination beyond the longstop date.	Risk reduction followed by risk allocation and pricing, including appropriately strong delivery, operational readiness and financing programs and strategies, phased construction sequencing to accelerate first-unit revenue; serial build shortening per-unit timeline.	Government backstops to delays including support through the finance model (e.g. additional funding), revenue model (e.g. payment coverage for offtakers and/or capital providers), and delivery model (e.g. changes in ownership/ control/oversight).	Sizewell C's secured committed back-stop funding from equity and debt providers at FID for downside scenarios in terms of cost overrun and completion delays. Moreover, Sizewell C RAB model allows for the sharing of completion delay risks between investors and consumers.	30 , 31
Revenue model	Offtaker & counterparty default risk	Exposure to market price/volume risk Route to market risk Equity return risk Debt capacity & servicability risk	An offtaker counterparty financial strength must remain commensurate with its undertakings at the relevant financing gateway. Deterioration or default exposes the project to revenue shortfall and can trigger claims from lenders and guarantors.	All	Operations	1. Owner/equity 2. Strategic equity (if possible) 3. Insurance (as relevant) 4. Senior debt (only within limited pre-agreed tolerances) 5. Government (if possible)	An independent affordability and competitiveness assessment; contractual offtaker credit assessment; sustainability assessment for cooperative, RAB and concession-like project structures; payment security mechanisms; letter of credit/escrow.	Direct agreement with lenders; step-in rights; payment guarantee.	Diversified offtake portfolio; investment-grade PPA counterparty requirement.	Government guarantee of state offtaker; statutory CfD payment mechanism.	Constellation's 20-year PPA with Microsoft, under which Microsoft will purchase output from the restarted Three Mile Island Unit 1 (renamed the Crane Clean Energy Center) to match consumption at its PJM-region data centers , is structured as a corporate contract rather than a sale into merchant power markets or a regulated utility offtake arrangement.	32 , 33
Revenue model	Grid connection risk	Construction risk Estimating risk Equity & debt return risk Government support risk Power/heat sales and route to market risk	Grid connection arrangements can introduce single-point-of-failure exposure to project economics. This risk typically must be downgraded to a calibrated, mitigated level before FID can be reached.	All	Development / Construction	1. Owner/equity 2. Strategic equity (if possible) 3. Insurance (as relevant) 4. Senior debt (only within limited pre-agreed tolerances) 5. Government (if possible)	Grid delay contingency in financial model; transmission access insurance; curtailment compensation mechanisms; connection-agreement performance bonds from the grid operator.	Grid connection agreement; transmission use-of-system agreement; priority dispatch provisions.	Early grid impact study; connection capacity reservation pre-FID; transmission upgrade co-investment.	Government grid connection facilitation; transmission investment coordination; priority access for firm low-carbon generation.	TRANSCO built 952km of dedicated 400kV transmission infrastructure ahead of Barakah Unit 1 grid connection, , expanding to over 1,100km by Unit 3.	34 , 35 , 36

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Government support model	Political risk & policy reversal risk	Development phase risk Equity capacity & return risk Debt capacity risk Cost of capital risk	Unexpected withdrawal, weakening, or retroactive change of government support policy or tools (subsidy, remuneration framework, or programme commitment) can cause project distress, insolvency, or abandonment.	All	All stages	1. Owner/equity 2. Strategic equity (if possible) 3. Government (typically only under specific conditions) 4. Insurance (if possible) 5. Senior debt (only within limited pre-agreed tolerances)	Political risk insurance; stranded asset insurance; partial payment guarantees or non-honouring of financial obligations coverage; government indemnification contract/mechanism.	Intergovernmental agreements (IGAs); Investor-state dispute settlement (ISDS); stabilization clauses; bilateral investment treaties; material adverse change (MAC) clause for lender consent requirement; investor protection clause.	Phased investment with option structuring; legislative lock-in of programme; staged government support package (GSP) calibration.	Cross-party political consensus; statutory nuclear framework; structured GSP including indemnification provisions.	Germany's 2011 accelerated nuclear phase-out forced early closure of operating plants without compensation. Germany's Federal Constitutional Court ruled in 2016 that this violated investors' constitutional rights and ordered the government to legislate a remedy which resulted in a settlement with affected utilities.	37 , 38
Government support model	Regulatory licensing delay & changes risk	Construction & completion risk Estimating risk Funding shortfall risk Affordability risk	The regulatory baseline agreed at the relevant financing gateway may change through independent regulatory action, imposing additional capex/opex or performance constraints at any point in the project lifecycle. This risk must be downgraded to a negotiated, mitigated level before FID.	All	Development / Construction / Decommissioning	1. Owner/equity 2. Strategic equity (if possible) 3. Government (typically only under specific conditions) 4. Insurance (if possible) 5. Senior debt (only within limited pre-agreed tolerances)	Milestone-linked drawdowns; regulatory delay contingency in financial model.	Independent review of the integrated delivery schedule, interfaces and contingencies; regulatory risk-sharing clause; pre-application engagement protocol; regulatory certainty framework; MAC clause for regulatory changes.	Pre-application engagement; pre-licensing completed pre-FID; bilateral design review agreements; design standardization; competent owner organization capabilities.	Fast-track licensing; dedicated regulatory navigation units.	The NRC's 1989 introduction of a combined construction/ operating licenses locks in licensing conditions before construction begins. The UK's Generic Design Assessment (GDA) decouples reactor design approval from site-specific licensing. The UK is developing an integrated design assessment framework, alongside a separate US-UK timing agreement under the 2025 Atlantic Partnership. Finland's proposed Nuclear Energy Act (submitted to parliament in March 2026), would similarly modularize and streamline licensing, including for SMRs. Cernavodă Unit 1's refurbishment package includes a dedicated mechanism protecting the project against regulatory change during construction and operation.	39 , 40 , 41 , 42

Investment Model Component	Risk Category	Interfaces & sub-categories	Level 1 Description	Deployment Maturity	Project Stage	Financial risk owner & underwriter (by order of priority)	Illustrative risk mitigation options				Key Case Studies / Examples	References
							Financial / Risk Transfer	Legal / Contractual	Structural / Operational	Government / Policy		
Financing model	Capital markets access risk & cost of capita	Development phase risk Equity capacity & return risk Debt capacity risk Affordability risk	The project's investment proposition may not attract capital at a cost, volume or tenor sufficient to reach FID, complete construction or remain affordable, including where financial regulation or sustainable-finance taxonomies restrict or incentivise the pools of capital available to nuclear.	All	All stages	1. Owner/equity 2. Strategic equity (if possible) 3. Government (if possible)	Finance plan tested across capital pools and sequencing; government loan guarantees; ECA debt; blended finance first-loss tranche; nuclear green bonds and ESG-labelled tranches (post-EU Taxonomy); outreach to non-ESG-constrained capital pools.	Government guarantee agreement; ECA loan agreement; inter-creditor agreement; rating agency engagement; standard term sheet templates; EU Taxonomy technical screening criteria compliance documentation.	Rating agency methodology development for nuclear projects (including direct engagement with ESG rating agencies); IAEA PRIS data and safety record as underwriting evidence; lifecycle carbon data; standardised financial templates; proactive ESG narrative; community benefit agreements.	RAB regulated return; EU and national taxonomy inclusion/alignment enabling green bond issuance; MDB/DFI lending, guarantees and dedicated nuclear investment protocols and products.	KEXIM's loan to Barakah was part of a diversified financing package that also drew on Abu Dhabi's Department of Finance and a syndicate of international commercial banks. Palisades' restart used a DOE Loan Programs Office now EDF) loan guarantee offering a lower cost of capital. Cernavodă Units 3&4 draw on a diversified multi-source ECA structure, combining US EXIM Bank direct loan to project company EnergoNuclear with Canadian export financing routed through Canada's government-to-government Canada Account, spreading reliance across more than one export credit system.	43 , 44 , 45 , 46 , 47 , 48
Financing model	Lending conditions, interest rate, & refinancing risk	Equity capacity & return risk Government support risk Affordability risk Public acceptance risk	Lender pre-conditions at the development stage may jeopardize cost of capital targets, while lender conditions at FID can impose costs on equity, offtakers or government that threaten the project's financial sustainability and economic equilibrium.	All	Development / Construction / Operations	1. Owner/equity 2. Strategic equity (if possible) 3. Government (if possible)	Interest rate swaps and caps; fixed-rate ECA debt where available; DSRA; refinancing reserve.	Rate-lock provisions in loan agreement; MAC clause for material rate movements; refinancing option in term sheet.	Base case financial model with rate sensitivity analysis; LLCR and other forward looking covenants; agreed downside testing scenarios .	Government guarantee enabling fixed-rate long-tenor debt (reducing rate risk); ECA fixed-rate programmes; support for MDB participation signalling credibility and catalysing additional capital across the stack.	KEXIM's Barakah original loan was structured with a floating rate term. The facility was later refinanced in full. Cernavodă Unit 1's refurbishment had a financing strategy combining a European Investment Bank's loan with ECA and commercial bank debt.	49 , 50 , 51 , 52 , 53
Financing model	Currency & exchange rate risk	Estimating risk Equity capacity & return risk Debt capacity & servicability risk Government support risk Public acceptance risk	After FID, nuclear newbuild exposed to inflation, exchange rates and commodity price movements across the construction and operations phases. Because nuclear hedging markets are thin and can be expensive or inefficient, the project's financial structure can remain vulnerable to these movements.	All	All stages	1. Owner/equity 2. Strategic equity (if possible) 3. Senior debt (only within limited pre-agreed tolerances) 4. Insurance (if possible) 5. End-users (if possible) 6. Government (if possible)	Currency hedging instruments; cross-currency swaps; local currency revenue matching.	USD-denominated EPC contracts; exchange rate risk-sharing provisions in various contracts; force majeure for extreme exchange rate events.	Local currency debt where available; natural hedging via local content in EPC.	Government exchange rate stabilization mechanisms in emerging markets; local currency bond market development; MDB local currency lending.	Akkuyu's 2010 intergovernmental agreement fixed Türkiye's power purchase obligation in USD terms for the first 15 years of operation, covering 70% of output from Units 1–2 and 30% from Units 3–4. This effectively shield Rosatom from lira depreciation over that period.	54 , 55 , 56
Financing model	Insurance market capacity risk	Equity capacity & return risk Debt capacity & servicability risk Government support risk Affordability risk Public acceptance risk	Nuclear liability insurance pools have finite capacity (availability, not just cost, can bind, particularly for large or FOAK projects) degrading the project's financial structure and cost of capital if mis-estimated (insurance-capacity dimension of Nuclear Safety, Liability & Insurance Risk -Operator model-).	All	Development / Construction / Operations	1. Owner/equity 2. Strategic equity (if possible) 3. Government (typically only under specific conditions) 4. Insurance (if possible) 5. Senior debt (only within limited pre-agreed tolerances)	Nuclear insurance pool participation; excess of loss reinsurance; government backstop for above-pool limits; mutual insurance providers for additional capacity.	Insurance policy as FID pre-condition; pool cover under international conventions cap; government indemnity for above-cap exposure.	Pre-FID engagement with nuclear insurance pools; design features reducing insurable exposure; IAEA OSART.	National nuclear liability framework setting pool size; government backstop above pool cap; international convention participation.	The UK acceded to the Convention on Supplementary Compensation for Nuclear Damage in 2025, extending international liability-pooling coverage to its newbuild programme. India's SHANTI Act (2025) introduced an operator-channelling regime aligned to CSC norms and a dedicated Nuclear Damage Claims Commission, aimed at removing liability uncertainty.	57 , 58 , 59 , 60

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Cross-cutting	Public acceptance risk	Development phase risk Equity capacity & return risk Debt capacity risk Government support risk Affordability risk	Public opinion (the "social license" for nuclear infrastructure) can turn against a project for reasons directly or indirectly related to the investment, affecting planning, permitting, and financing timelines.	All	All stages	1. Developer/owner/equity 2. Strategic equity (if possible) 3. Government	Project delay contingency; reputational risk management budget; property value protection or compensation schemes.	Local benefit arrangements (community funds, employment, economic development partnership); consultation protocols; planning and consenting legal framework.	Community engagement strategy; transparent safety communication; independent information; transparent, accessible communication of both good and bad news; site selection with community consent.	Cross-party political consensus-building; proactive government communications; mandatory community benefit schemes; MDB social safeguard frameworks.	Finland's statutory municipal veto right over repository siting, combined with decades of sustained community engagement secured Eurajoki's formal consent in 2000, leading to Onkalo, the world's first deep geological repository.	61, 62, 63, 64
Cross-cutting	Workforce & regulatory capacity risk	Development phase risk Equity capacity & return risk Debt capacity risk Government support risk Affordability risk	Labour and skills capacity, productivity assumptions, and regulatory-body resourcing can be mis-estimated, causing delivery delays or cost escalation that lead to financial distress.	All	All stages	1. Owner/equity 2. Strategic equity (if possible) 3. Government (if possible)	Workforce development cost provisions in financial model; training programme funding.	Long-term employment contracts; training programme funding agreements; IAEA technical assistance agreements.	University/college nuclear engineering pipeline; operator training programmes; international knowledge transfer.	National nuclear workforce strategy; regulatory capacity building; international cooperation on training.	Vogtle trained roughly 13,000 workers from scratch after a 30+ year gap in US nuclear construction. The UK's National College for Nuclear (established ahead of Hinkley Point C) was intended to build a workforce pipeline before construction started. The ADVANCE Act (2024) gave the NRC new direct-hire authority to address regulatory staffing capacity.	65, 66, 67

References

1.

World Nuclear Association, [UAE country profile](#)

2.

Sfen, [Sizewell C RAB financing structure](#)

3.

World Nuclear News, [Darlington construction contract awarded](#)

4.

ANS Nuclear Newswire, [workforce/schedule continuity at Darlington](#)

5.

GE Vernova Hitachi, [Darlington BWRX-300 project overview](#)

6.

World Nuclear News, [EDF strengthening relationship with suppliers as it plans new fleet](#)

7.

Roosevelt Institute, [Can China Break Nuclear Power's Cost Curse](#)

8.

POWER Magazine, [BWRX-300 supply chain development](#)

9.

Barchart/GlobeNewswire, [Aecon-Kiewit IPD alliance contract award](#)

10.

World Nuclear News, [EDF teams up with Technip Energies for EPR2 delivery](#)

11.

World Nuclear Association, [World Nuclear Outlook Report](#)

12.

ENEC/KEPCO [financial close announcement](#)

13.

World Nuclear News, [Sizewell C final go-ahead / FID](#)

14.

World Nuclear News , [UK government takes 50% stake, confirms backing for Sizewell C](#)

15.

World Nuclear News, [Devex subsidies announcement](#)

16.

Bruce Power, [Delivering Transparency and Trust](#)

17.

NRC, [Backgrounder on Nuclear Insurance and Disaster Relief](#)

18.

IAEA, [UK accedes to the CSC \(12th Contracting Party, Jan 2026\)](#)

19.

IAEA, [CSC Workshops Strengthen Regional Cooperation](#)

20.

Centrus Energy Corp, [10-Q FY2024 \(SEC\)](#)

21.

POWER Magazine, [2026 commercial contract and competitive framework](#)

22.

European Commission, [official state aid approval](#)

23.

KENFO, [official fund overview](#)

24.

ANS Nuclear Newswire, [Onkalo passes safety assessment \(Aug 2026\)](#)

25.

Finnish Government, [MEAE statement on Posiva operating licence](#)

26.

National Audit Office, [Hinkley Point C deal structure report](#)

27.

World Nuclear Association, [Financing Nuclear Energy](#)

28.

Carnegie Endowment for International Peace, [Beyond the Hype: Assessing Hyperscaler Nuclear Commitments Against U.S. Energy Realities](#)

29.

World Nuclear News, [European Investment Bank agrees to Cernavodă refurb loan](#)

30.

Sfen, [Sizewell C RAB financing structure](#)

31.

Consumer Scotland, [RAB licence mechanics](#)

32.

Constellation Energy Corp, [10-Q FY2024 \(SEC\)](#)

33.

Constellation Energy, [official press release](#)

34.

Nuclear Engineering International, [Barakah Unit 1 grid connection](#)

35.

ENEC, [official press release](#)

36.

SaudiGulf Projects, [Barakah Unit 3 connected to UAE's Grid](#)

37.

World Nuclear Association, [Nuclear Power in Germany](#)

38.

Kluwer Arbitration Blog, [2016 Federal Constitutional Court ruling detail](#)

39.

NRC, [licensing process backgrounder](#)

40.

ONR, [GDA guidance](#)

41.

Stephenson Harwood, [UK–US joint regulatory framework analysis](#)

42.

World Nuclear News, [European Investment Bank agrees to Cernavodă refurb loan](#)

43.

ENEC/KEPCO [financial close announcement](#)

44.

World Nuclear News, [Palisades loan guarantee coverage](#)

45.

[DOE Loan Programs Office announcement](#)

46.

Hogan Lovells, [DOE Loan Programs Office issues a loan guarantee for Palisades restart, Lexology](#)

47.

The Diplomat Bucharest, [RTPR advises US EXIM on EnergoNuclear financing for Cernavodă Units 3 and 4](#)

48.

[Global Trade Review](#)

49.

TXF, [UAE secures \\$24.4bn for its first nuclear power plant](#)

50.

ENEC/KEPCO [financial close announcement](#)

51.

World Nuclear News, [Refinancing of Barakah classed as 'green' loan](#)

52.

EIB, [EIB Group approves over €17 billion in new financing including for Romanian nuclear power and Ukraine-EU border crossings](#)

53.

SN Nuclearelectrica (SNN) [official announcement](#)

54.

Stanford (Dedeler), [Nuclear Energy in Turkey](#)

55.

Jamestown Foundation, [Akkuyu agreement terms](#)

56.

OSW, [Akkuyu financing structure analysis](#)

57.

IAEA, [UK CSC accession \(Oct 2025\)](#)

58.

Norton Rose Fulbright, [SHANTI Act 2025 analysis](#)

59.

The Asia Group, [India opens nuclear sector to private participation](#)

60.

law.asia, [SHANTI Act supplier liability analysis](#)

61.

Frontiers in Nuclear Engineering, [siting timeline and community survey data](#)

62.

Science/AAAS, [Posiva community engagement and benefit detail](#)

63.

ScienceDirect, [comparative Finland/Sweden governance analysis](#)

64.

IAEA, [Finland's Spent Fuel Repository a 'Game Changer' for the Nuclear Industry](#)

65.

Grist, [Vogtle workforce and schedule analysis](#)

66.

UK Government, [official launch announcement \(Feb 2018\)](#)

67.

POWER Magazine, [The ADVANCE Act](#)