

GIF EMWG Financing Taskforce Workshop

WORKSHOP SYNOPSIS AND FINDINGS

Tuesday, October 15, 15:00-18:00 (3 hrs)
The Dilly, London, UK (In person only)



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Workshop Overview and Key Findings

Workshop Overview

Generation IV International Forum (GIF) Economics Modelling Working Group organized the Financing Taskforce Workshop on October 15, 2024, in London, UK. The aim of the workshop was to highlight:

- the clear difference between a company developing and selling its technology (a Technology Company) and a Capital Project Development Company (a Project Company)
- the business case for each including revenue and potential IRRs;
- the importance of risk allocation, mitigation and management;
- different investor strategies; and
- the role of governments (particularly in a FOAK), regulators, planning authorities etc.

The workshop involved generic role-playing between a nuclear technology developer, a project developer, and the various types of investors, followed by an exchange of questions and comments from the audience. The session involves two role-playing scenarios with a brief interlude in between.

- **Scenario 1:** A technology company pitched to government investors, seeking funding and support. The focus was on the company's technological developments and its progression towards creating technology ready for production.
- **Interlude:** A brief segment, where the technology company transitions to selling its technology to a project company.
- **Scenario 2:** The project company (looking to develop, build, own and operate a nuclear power plant) engages with the technology company. The challenges and industry-specific issues related to this collaboration will be discussed.

The role play was designed to simulate the multifaceted challenges and opportunities associated with financing, developing, and deploying advanced nuclear technologies. It brought together key stakeholders to navigate the complexities of nuclear project development.

The role play was set in an established nuclear company with an established nuclear regulator.

Key Findings

Key findings from the role play includes the following:

- **Government Support is Crucial:** The role of government in financing, regulating, and supporting nuclear energy projects was emphasized throughout. Mechanisms like CfDs (Contracts for Difference), RAB (Regulated Asset Base), and government guarantees are critical for providing investor confidence and bridging the funding gap for first-of-a-kind (FOAK) projects. Government backing also plays a vital role in de-risking construction and operational phases.
- **The Challenges of FOAK Projects:** First-of-a-kind projects face significant hurdles, including technology risk, long lead times, and high capital costs. These factors make them unattractive to many investors without mechanisms to mitigate risk. The importance of FOAK success as a foundation for subsequent projects (next-of-a-kind or NOAK) was noted, but success requires clear pathways for reducing costs and risks over time.
- **Investor Concerns:** Investors, including pension funds, private equity, and venture capital, highlighted their need for predictable returns, stable revenue streams, and clear risk-sharing structures. While there is interest in nuclear as part of a broader energy transition, many investors remain cautious due to regulatory, construction, and operational risks.
- **Technology Companies financing – high risk high return:** Financing for technology companies is likely to come from Philanthropists or Venture Capitalists (and potentially Private Equity for the later TRL development). While Philanthropists may invest for philanthropic and benevolent reasons most investors are looking to high returns. The money by milestones approach has been deployed successfully for a number of fission and fusion companies. These investors are taking significant risk as a number of technologies will fail which justifies the high returns.
- **Project Companies financing – lower risk, requiring predictability and government support:** Capital projects which are established well, have significant support from Government (particularly for the FOAK) and have predictable funding support will appeal to institutional investors from

private equity to pension funds. The returns are likely to be lower than the returns expected by investors in technology companies. Institutional investors are looking for long term predictable returns.

- **Regulatory and Licensing Challenges:** Regulatory hurdles, including the generic design assessments and site-specific approvals, were highlighted as significant barriers. These processes require substantial time and resources but are necessary for ensuring public safety and building trust. Countries without established nuclear regulatory frameworks face additional delays and complexities.
- **Supply Chain and Fuel Security:** The importance of secure supply chains for components, fuel, and waste management was emphasized. Governments and companies must address fuel sourcing, spent fuel disposal, and decommissioning in their project planning, as these factors significantly impact project feasibility and ESG considerations.
- **ESG and Public Perception:** While nuclear scores highly on decarbonization, concerns around waste management, biodiversity, and water usage remain barriers to its acceptance in ESG frameworks. Addressing public and investor skepticism is crucial for integrating nuclear into sustainable investment portfolios.
- **Non-Electrical Applications:** There was interest in exploring non-electrical uses of nuclear energy, such as hydrogen production and industrial heat, but these applications were deemed premature. The focus should remain on successfully deploying nuclear for electricity generation before expanding into additional markets.
- **International Collaboration:** The role play underscored the importance of international efforts to develop nuclear technologies, particularly for global decarbonization. Countries without established nuclear industries can benefit from "copy-pasting" regulatory frameworks and leveraging expertise from more experienced nations. Reference was also made to the work being undertaken to change the approach of the World Bank – its current approach to nuclear is a major barrier in making nuclear available to all.
- **Technology Consolidation:** With many AMR and SMR designs under development, the market is expected to consolidate around a few proven technologies. Companies must focus on delivering reliable, cost-effective solutions rather than competing to be first.
- **Balancing Risks and Returns:** The discussion highlighted the delicate balance between attracting private capital and managing risks. Investors want high returns but are wary of the uncertainties associated with nuclear projects. Mechanisms like RAB and CfD can help bridge this gap, but aligning public and private sector interests remains challenging.

Conclusion

While nuclear is seen as a key component of achieving Net Zero, stakeholders must address significant challenges to unlock its full potential, in particular in the realm of financing. The role play highlighted the complexity of financing, developing, and deploying advanced nuclear technologies. Success hinges on robust government support, investor confidence, secure supply chains, and effective regulatory frameworks. The involvement of a dedicated project company is critical to bridging the gap between technology development and large-scale deployment, ensuring effective management of risks and responsibilities.

Introduction of Speakers



Facilitator

Fiona Reilly, Co-chair of EMWG and CEO of FiReEnergy Limited

Fiona Reilly is an international nuclear expert with over 25 years of experience in the energy sector, specializing in nuclear, oil and gas, renewables, and thermal power. She is the CEO of FiRe Energy Ltd., providing strategic and project advisory services focused on low carbon energy including nuclear development. Fiona holds several key positions, including UK Strategy Lead at Xlinks Ltd., Senior UK Representative and Co-Chair for the Economic Modelling Working Group at the Generation IV International Forum, and Non-Executive Director at Ansaldo Nuclear.



Role players

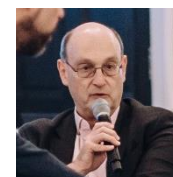
Technology Company - Tristram Denton, Moltex Energy



Tris introduced himself as the Commercial Director for Moltex, an Advanced Modular Reactor developer, and also as the UK Director for the Fusion Industry Association. He has worked closely with various technology developers in the nuclear space. Tris expressed his hope to bring the learnings from his experience into the role play.

Government and Regulator - Huw Williams, UK DESNZ

Huw introduced himself as working for DESNZ, focusing primarily on financing for new nuclear projects, including SMRs and Sizewell C project. He clarified that his comments would not represent policy of the UK Government, but he is here today to represent a generic government and regulators in a role play. He looked forward to a productive session.



Investment Bank - Gayatri Desai, CIBC



Gayatri introduced herself as the Head of the Energy Transition and Sustainable Finance team at Canadian Imperial Bank of Commerce (CIBC) London branch, focusing on new markets, technologies, and supporting decarbonization and energy transition efforts. She stated that today she would be representing a lender to potential new technologies and supporting project finance in the context of the upcoming discussion. She also clarified that her views did not represent those of CIBC.

Pension fund - Darryl Murphy, Aviva Investors

Darryl is the Managing Director, Head of Infrastructure at Aviva Investors. He has extensive experience in lending and financial negotiations. He mentioned that today he would be representing a pension fund investor, aiming to offer insights into how the industry approaches investments. He clarified that his views did not represent those of Aviva.



Bank - Allan Baker, Societe Generale Corporate and Investment Banking



Allan is the Global Head of Energy Transition and Project Finance business in the Energy Group+ at SGCIB. He has background focused on project finance and has broad understanding of nuclear financing. He clarified that his comments are not attributed and that he is representing ECAs (Export Credit Agencies) and investment banking today.

Lenders Lawyers - Nicky Davies, Norton Rose Fulbright

Nicky is a partner at global law firm Norton Rose Fulbright, specializing in construction energy projects globally. She mentioned that today she would be representing the perspectives of lenders lawyers, particularly focusing on the lending side and the different types of lending interests involved. She will be identifying risk problems and where might be concerns throughout the role play.



Philanthropic - Tom Reynolds, Madano



Tom is a Director in the Net Zero Transition team at Madano, a strategic communications consultancy company. He works with clients across the energy sector, from corporate communications to digital communications. He mentioned that he will be playing the role of a philanthropist today and looks forward to the discussion.

Project Company - Harold Fairfull, Consilium Advisory Services

Harold is the Founder & Managing Director at Consilium and highly experienced financial professional in the energy, utilities and infrastructure sectors. He is a financial advisor in both government and project company side, with 20+ years of experience. He will be talking about the insights as a project company representative.



Private Equity/ Venture Capital - Richard Werner, BCLP



Richard is a corporate lawyer and a partner at BCLP, a global law firm. He mentioned that his firm represents technology companies and project companies. Today, he will be playing the roles of both a venture capital investor for the technology company scenario, and a private equity investor for the project company scenario.

Workshop Summary

The participants in the roleplay were playing generic roles and not representing the views of their individual organisations.

Fiona warmly welcomed participants to the workshop, outlining its structure and objectives while emphasizing the importance of collaboration in addressing the challenges of nuclear financing. She highlighted the diverse panel of experts from the finance and policy sectors, bringing a wealth of experience to the discussions. Fiona encouraged active participation from the audience, inviting questions and fostering an interactive environment to maximize engagement and knowledge-sharing. Fiona guided each segment with expertise and enthusiasm to ensure clarity and focus.

Scenario 1: Corporate Financing for Technology Company

1. Technology Company Pitch

Overview of Presentation Tris presented his fictitious company's mission to address the global energy crisis by developing scalable, cost-effective nuclear technology to replace fossil fuels. Highlighting the critical need for 50 terawatts of installed capacity by 2050, Tris emphasized the unique potential of his company's Advanced Modular Reactor technology to contribute to this goal through innovative design and economic efficiency.

Company Background Founded five years ago, the company has advanced to Technology Readiness Level (TRL) 4 and aims to achieve TRL 7 within five years. Early funding was secured from friends, family, and angel investors, leading to a current valuation of approximately £30 million, with a potential tenfold increase anticipated by TRL 7.

Technology Overview The AMR is designed to provide energy at low costs while mitigating common challenges in nuclear projects, such as lengthy development timelines, high financing costs, and complex safety cases. By relying on commercially available components, the reactor reduces risks and expedites deployment. The technology is targeted at various energy needs, including decarbonizing industries, powering data centers, and supporting heavy industries like shipping and metals production.

Investment and Regulatory Strategy Tris outlined the company's focus on transitioning from startup to scale-up through equity investment. He emphasized the importance of securing visionary investors aligned with the company's mission. Regulatory engagement is a critical priority, and Tris acknowledged the significant costs and challenges associated with pursuing a generic design assessment with a regulator such as the UK's Office for Nuclear Regulation (ONR). He explained that assessment would only be pursued if multiple clients and projects in the UK made it a viable investment; otherwise, a faster site-specific approval process would be prioritized.

Spent Fuel Management and Lifecycle Considerations Addressing the handling of spent fuel, Tris emphasized the company's commitment to a responsible back-end management plan. He noted that the technical process of disposability assessment is straightforward, with support from authorities like the UK's Radioactive Waste Management Directorate (RWMD). However, he highlighted inefficiencies in securing disposal contracts, advocating for more generic agreements to streamline access for technology companies. Collaboration with government bodies remains a key part of this strategy.

While not seeking direct government funding, Tris highlighted disparities in financial incentives, contrasting the robust tax credits offered to industries like film with the limited incentives available to clean energy projects. He stressed the importance of improving loan guarantees and tax credits to encourage private investment. Tris clarified that they have not launched a project yet, and he is looking for equity investment into his business to develop a product.

2. Technology Company and Government

Regulatory Strategy and Design Assessment Process Huw acknowledged the interest in comparing Tris's advanced nuclear project to several others that had been presented recently, noting that it was at a similar stage to those also seeking to progress toward commercial operation. Huw asked whether Tris intended to apply for design assessment at that stage or planned to pursue it later.

Tris emphasized the company's understanding of the regulatory requirements and their importance. He acknowledged the high costs and challenges of pursuing the design assessment process but stated that it would only make sense for the company to undergo it if there were confidence in securing multiple clients,

multiple project companies, and multiple sites in country. Under such circumstances, the design assessment would be a valuable investment due to the broad applicability of the approval.

However, Tris explained that if there were only one customer and one site, pursuing a generic approval would not be justified. Instead, he suggested a case could be made for directly pursuing a site-specific approval, which he believed could be achieved more quickly than transitioning from a generic to a site-specific safety case. Tris reaffirmed the company's commitment to working with the government, regulators, and their customers to make investment decisions that align with their business goals.

Spent Fuel Management and Lifecycle Considerations Huw noted the government's ongoing commitments to developing more advanced fuels within the country and asked whether Tris had considered the handling of spent fuel, particularly given the novel aspects of the technology and the use of high-temperature salts. While recognizing that this is an early-stage project, Huw emphasized the importance of understanding the end-of-process considerations and how spent fuel would be managed, signaling the government's interest in the full lifecycle of the technology.

Tris emphasized the company's commitment to being responsible and mature by having a back-end management plan for spent fuel. He stated that the disposability assessment process itself is not technically complex, citing the UK's Radioactive Waste Management Directorate as an accessible and capable authority for confirming the technical disposability of fuel. However, Tris pointed out that the challenge lies not in the technical process but in securing disposal contracts with the government.

Tris called on the government to consider streamlining this approach by making disposal contracts more generic, thereby easing access for technology companies. He also underscored the shared goal between the private sector and the government to drive private investment into nuclear projects to meet energy needs. Tris expressed a willingness to collaborate closely with the government to address these issues and advance the sector.

Financial Strategy and Government Involvement Huw asked for clarification on whether the company was seeking government funding for the early-stage process or if they intended to remain self-funded. The question aimed to understand the company's financial strategy and the level of government involvement they anticipated or required at this stage.

Tris emphasized the importance of aligning the technology company's efforts with a clear and supportive framework from the government. He acknowledged that while the company has immense confidence in its technology—based on its inherent strengths and capabilities—it cannot guarantee success due to external factors like the regulatory and deployment environments. These areas, he noted, fall outside the company's direct control.

Tris outlined two potential approaches the government could take in supporting this market:

1. Open Approach: Independent progress by projects, financiers, and technologies seeking licenses and other necessary approvals.
2. Centralized Approach: Government actively organizes and backs specific projects, fostering competition within government-supported initiatives.

He suggested that both approaches could work but stressed the need for clarity regarding government financial commitments. This clarity would provide the necessary guidance for companies and investors, enabling them to navigate the market effectively and contribute to advancing nuclear projects.

Challenges in Funding and Incentives Tris clarified that the company was not seeking direct government funding for its product but raised important considerations about the broader funding and incentive landscape. He highlighted the disparity between incentives provided to industries like film, which receives a 53% tax credit for its contributions to entertainment, compared to clean energy projects, which receive only a 16% tax credit that is becoming increasingly difficult to access. Tris questioned whether national resources were being allocated to their most critical areas, emphasizing the importance of prioritizing sectors like clean energy.

He expressed his commitment to basing the company's supply chain in the UK, praising the country's skilled workforce, strong employment industry, and stable regulatory environment. However, he noted that other jurisdictions offer more attractive incentives, such as loan guarantees, to encourage such commitments. Tris called for greater government support, including ensuring regulators are adequately resourced. He also emphasized the need for timely access to reconnections and funding for project companies, rather than delays of decades.

Concluding Remarks Tris concluded by pointing out that resourcing issues and process improvements could be further explored in subsequent discussions. He underscored the importance of these measures for the UK to remain competitive and foster long-term investment in the clean energy sector.

Huw acknowledged that the company had a primary technology in development and noted that Tris indicated no immediate desire for government investment at this stage. He suggested that the next step might be to hear from the financial community to understand their perspective on whether government involvement or investment would be beneficial for advancing the political and economic viability of the technology.

3. Technology Company and Investors

1) Pension fund

Pension Fund Perspective Darryl, representing a public-sector pension fund, began by emphasizing the origin of their investment funds—individuals and the population at large—which necessitates careful and responsible investment decisions. He highlighted the fund's growing interest in infrastructure as an asset class, particularly due to its reputation for long-term, stable income. Although new to the sector, infrastructure investments appeal to the fund for their predictability and lower risk profile, especially when supported implicitly or explicitly by government policies.

Darryl explained that their pension fund is committed to achieving net zero by 2040, which makes investments aligned with this goal particularly attractive. While heavily invested in renewable energy, the fund is now exploring emerging technologies. He noted that large-scale nuclear projects are generally too capital-intensive for their level of investment but expressed interest in smaller-scale nuclear technologies that are more flexible, manageable, and aligned with their investment profile.

Operational Assurance While acknowledging the company's technology as a sensible proposition with strong management of technological risks, Darryl asked whether the technology was currently operational, seeking reassurance by asking, "Can I see one working?"

Tris responded that while the technology would not be operational for some time, a system prototype would be available in five years in a laboratory environment, offering detailed insights into its functionality.

Government Involvement Darryl asked if the government was supporting the company and sought clarification on the level of government backing for the technology.

Tris expressed confidence in government support, noting that their technology fits well within existing policy frameworks and aligns with the government's vision for advancing nuclear projects. He highlighted that the government has shown a clear desire to see more nuclear projects move forward but clarified that, as a rule, the government does not take equity stakes in new technology companies. Instead, its role is to act as a facilitator and policymaker.

Sustainability and ESG Alignment Darryl raised a specific question regarding the alignment of Tris's technology with Environmental, Social, and Governance (ESG) criteria, which are central to his fund's investment decisions. He noted that nuclear energy remains divisive among his colleagues, particularly due to concerns about construction and waste management. He asked Tris to clarify how the company's technology addresses environmental concerns, mitigates risks, and contributes to sustainability goals.

Tris asserted that nuclear energy is on the "right side of history" in the fight against climate change. He highlighted commitments made by nearly 30 nations at COP28 in the UAE to triple their nuclear capacity to reduce carbon emissions, with over 20 additional countries planning to initiate nuclear programs for the same purpose.

He also addressed concerns about nuclear waste, framing it as a policy issue rather than a technological one. Tris emphasized that the nuclear sector has decades of experience in effectively managing waste through methods such as immobilization, geological disposal, and reprocessing for reuse. He argued that nuclear waste is not an environmental crisis but a matter of implementing robust policy and management.

Tris underscored the urgent need for low-carbon energy to meet the growing demand for electrification, including local transport, aviation, and shipping. He concluded by stating that, given the scale of the low-carbon energy challenge, there is no ethically defensible argument against increasing the role of nuclear energy in the global energy mix.

Investor Response Darryl expressed appreciation for Tris's insights, noting that they were helpful in strengthening his ESG arguments. He acknowledged that Tris's points provided valuable context for considering nuclear energy as part of the fund's broader investment strategy.

2) Investment Bank

Investment Bank Perspective Guy, representing the investment bank, acknowledged Tris's detailed pitch but highlighted significant challenges from a lender's perspective when financing technology at this stage of readiness. She identified key concerns and posed a series of critical questions:

- **Track Record:** Guy addressed the company's five-year history, emphasizing that lenders typically look for longer commercialization track records and successful technology deployment. She asked why Tris believed the company had established enough legitimacy within this relatively short timeframe to bring a product to market.
- **Competition:** Guy raised the issue of competition, asking Tris to explain how his technology is positioned relative to competitors offering alternative solutions. She sought clarity on the company's unique advantages in a crowded and rapidly developing market.
- **Future Resilience:** Guy expressed concerns about the resilience of the technology over the next ten years, questioning whether faster-moving technological advancements could render the company's solution obsolete. She inquired about the company's plans to address such risks.
- **Risk Mitigation:** Guy touched on the potential for technology failure, asking whether the company could provide guarantees or security packages to ensure lenders or funders could recover their capital. She emphasized that senior lenders require repayment security and are not positioned to take upside risks.

Her questions underscored the cautious approach lenders must take with high-risk, early-stage technologies, focusing on assurances of repayment and risk management. She then paused to allow Tris to address these pressing concerns.

Tris acknowledged the challenges raised by Guy and provided detailed responses:

- **Track Record:** Tris challenged the notion that a longer track record is essential for technology companies to succeed. He cited industries such as electric vehicles and smartphones, highlighting Tesla and the rapid proliferation of smartphones as examples of transformative progress achieved within five to ten years. He argued that the nuclear industry's historically slow pace does not need to define its future. Over the past five years, his company has demonstrated the viability of its technology and is confident in their ability to bring a product to market on an accelerated timeline.
- **Competition:** Tris emphasized the unique value of his company's product, particularly its transformative price point for the industry. While he acknowledged the importance of competitor analysis, he suggested that such evaluations are more appropriately conducted by those considering investments, acquisitions, or government support. He asserted that his product stands strong on its own merits and is positioned to meet customer needs effectively.
- **Future Resilience:** Tris addressed concerns about future resilience by pointing to undeniable trends: the growing demand for energy, the necessity of decarbonization, and the limitations of renewable energy without consistent storage solutions. He highlighted the nuclear industry's proven track record of delivering secure, sustainable, and reliable low-carbon energy, arguing that his technology is an integral part of the solution.
- **Risk Mitigation:** Tris acknowledged the inherent challenges of technology companies, where assets often have less immediate value compared to the capital required to bring a product to market. While the company does possess static assets that could secure debt, he emphasized that the real value lies in the potential of their technology and business model. Tris maintained that this potential, combined with a clear path to market readiness, makes the company a strong investment opportunity.

Conclusion Tris's responses sought to reassure lenders about the viability and potential of his company's technology. By addressing concerns related to track record, competition, resilience, and risk mitigation, he emphasized the company's readiness to meet the challenges of commercialization and deliver value to investors and stakeholders alike.

3) Bank

Funding Requirements and Risks Allan asked Tris how much funding the company would require. Tris explained that the company would need £150 million over four years for development, excluding the capital cost of the first plant, which would be financed through project financing by a project company. He added that the funding could be structured in different ways, such as making a smaller initial investment of £10–30 million or committing a larger amount at a later stage.

Allan raised concerns about the risks associated with early-stage technologies, pointing out that Tris's company is currently at the lab stage and must go through several stages to reach commercial deployment. He noted that the success rate for technologies advancing from this point to market readiness is historically low, with both time and technological challenges playing a significant role.

Tris agreed with Allan's assessment and emphasized that such challenges are not unique to nuclear but are present across the clean energy sector, including renewables. Tris highlighted the broader benefits of investing in technology companies, explaining that such investments often lead to spillover effects, creating valuable expertise and skills applicable in other areas. He cited his company's expertise in specific materials and systems as potentially relevant for a range of technologies beyond their immediate mission.

Tris concluded by stating that while technology companies must maintain a clear focus on their primary mission, the potential for wider applications and benefits is a key aspect of the value they bring. However, he noted that it is the management's responsibility to stay mission-focused rather than divert attention to monetizing these broader capabilities at this early stage.

Government Funding and Collaborative Models Allan asked whether Tris's company had considered seeking grant funding from the government to support its development phase.

Tris responded that securing government funding is not about directly asking for money but about positioning the company to win it when opportunities arise. He emphasized that approaching the government with a plea for funding is ineffective. Instead, his company's strategy is to align with government priorities and demonstrate readiness to win grant competitions and funding schemes. Tris highlighted the positive track record of grant funding programs in the UK and elsewhere, which provide capital for clear, mission-driven strategies. The company focuses on being well-prepared to compete for such opportunities.

Allan also asked whether Tris's company was looking for a passive partner to simply provide funding or if they were open to collaboration, such as sharing development costs and working on project development in parallel.

Tris responded that while project finance would likely play a larger role, particularly involving customers and project companies, the company recognizes the value of engaging with capital partners who bring extensive knowledge and experience. Tris expressed openness to exploring a range of collaborative models, from purely investment-based partnerships to more active roles, such as executive advisory functions or other forms of strategic involvement. He emphasized the company's interest in leveraging the broader expertise of its partners to maximize outcomes.

Challenges of Investing in FOAK Nuclear Technology The Audience asked about the challenges of investing in first-of-a-kind (FOAK) nuclear technology versus established technologies. It was noted that some companies claim significant cost reductions—up to 40%—for subsequent builds of their technology. They wanted to understand, from an investor's perspective, how such claims are evaluated and how the technology company accounts for the difference between proven and unproven systems.

Allan acknowledged that having an operating plant provides a significant advantage when deciding whether to invest capital, as it offers a clear reference point for performance. While claims of cost reductions for future iterations—such as 40% savings—are appealing, Allan emphasized that there is greater certainty with a proven operating system, which makes it a stronger investment proposition.

He explained that investing in FOAK technology involves a different type of capital, typically requiring venture capital or investors with a higher risk appetite to bridge the gap during early development. Investment banks, in contrast, typically engage at a later stage of technology readiness when the risk has been mitigated. Allan expressed skepticism about relying on a 40% cost reduction as a reliable base case, even for second-generation systems. While cost savings may be achievable with experience and refinement, such claims must be critically assessed and are not guaranteed.

Importance of Demonstrated Results The Audience highlighted the importance of demonstrated results, citing the example of Vogtle Units 3 and 4 in Georgia, USA, where costs decreased by 40% from one unit

to the next. They noted that this kind of real-world evidence provides a reliable basis for expectations about future cost reductions, emphasizing the value of proven systems as a foundation for investment decisions.

Allan acknowledged the point but stressed the importance of distinguishing between projects that are genuinely comparable. He noted that some claims of cost reductions are based on references to plants that, while successful, are not directly analogous to the technology being proposed. Allan cautioned against assuming that a derivative technology—if significantly different from its reference—can share in the same cost-saving trajectory. He emphasized the complexity of these assessments, particularly when new variables and engineering challenges are introduced.

Focus on Innovation Tris added to the discussion by emphasizing the context of cost reductions. He argued that a 40% cost reduction is only impressive if the starting cost is reasonable; if the initial cost is excessively high, even a significant reduction may not be sufficient. He pointed out that cost improvements typically come from iterative refinements of fundamentally stable technologies, which is a trend observed across many industries. However, he noted that when the core technology itself changes fundamentally, it opens the door to transformational cost improvements.

Tris suggested that the focus of the small modular reactor (SMR) and broader new reactor community should be on innovation rather than merely refining legacy technologies. While incremental improvements have value, he argued that new technologies are necessary to achieve transformational cost reductions and overcome the inherent limitations of existing systems.

Allan reiterated that the type of high-risk investment required for such transformative technologies is outside the scope of his current investment strategy. He emphasized that such ventures are better suited to investors with a higher risk appetite, who are also prepared for potentially higher rewards.

4) Lender's lawyer

Risk Assessment and Government Support Nicky, as a lender's lawyer, highlighted that while investors are fundamentally seeking returns on their capital, their risk appetites vary widely. For example, Darryl, representing a pension fund, prioritizes long-term stable returns, while others, like Allan, focus on capital security and prefer proven technologies. Nuclear technology, particularly Tris's, presents challenges due to its unproven nature and the absence of a real-world test case. This creates uncertainty about its performance and how quickly it can be commercialized to realize value.

Nicky pointed out that the high CapEx requirements common to nuclear investments compound the risk, particularly given Tris's company is still five years away from having a test case. While the company's intellectual property (IP) is valuable, it cannot be immediately monetized, raising concerns about how and when returns will materialize.

She emphasized the importance of government support in mitigating these risks. Long-term policy commitments, grants, guarantees, and other funding mechanisms could help stabilize the market and provide the assurances lenders need. Nicky also underscored the significance of consistent government policies, as changes in leadership or direction could destabilize the market, further complicating the risk profile for lenders.

Government Perspective on Support Huw responded by acknowledging the discussion around its role in supporting SMRs and AMRs (Advanced Modular Reactors). He emphasized the importance of government involvement in fostering confidence among financial stakeholders. While direct government support might not always be necessary, he highlighted the potential value of undergoing licensing processes. Starting or completing early phases of generic design assessment could provide assurance to the financial community, demonstrating that the technology is making measurable progress toward being proven.

Huw also mentioned that the government, like other nations, has provided matched funding for companies. This approach requires companies to match government contributions after passing a rigorous financial and business case evaluation. The funding model is designed to support early-stage development while encouraging private sector participation. The government's role, through these initiatives, is to help companies advance their projects and provide a foundation for securing additional investment, whether from conventional investors, venture capital, private equity, or lending banks. The response reinforced the government's commitment to supporting nuclear innovation through strategic funding and policy alignment.

Public-Private Partnerships and Reassurance Nicky emphasized that, in major infrastructure projects, there is often a combination of government and private sector support. This dual approach helps bridge the funding gap created by the substantial investment requirements of such projects. Government involvement

can also reduce the cost of capital and boost investor confidence by providing reassurance of long-term support.

She noted that lenders seek both moral and financial reassurance from public sector investment. Government backing signals a commitment to the project's success, aligning public and private interests and providing the stability investors need to feel secure in committing their capital. These elements are critical for ensuring the viability of high-cost, long-term infrastructure projects like nuclear development.

Government Funding Principles Huw, representing the government, emphasized that funding is not handed out freely, especially in the nuclear sector. He highlighted the importance of competitive processes and value for money as the government's guiding principles when providing financial support. Companies seeking funding must go through a rigorous and lengthy application and adjudication process before a decision is made. While funding is available, Huw made it clear that it comes with strict requirements and hurdles, ensuring that any investment aligns with government priorities and delivers tangible value. This underscores the structured and accountable approach the government takes in supporting private sector initiatives.

5) Venture Capital

Interest in High-Risk Investments Richard, representing a venture capitalist, expressed interest in Tris's presentation, noting that his firm specializes in high-risk investments in deep technology with a focus on energy transition. He explained that their approach involves a long-term horizon and a willingness to accept significant risk in exchange for potentially high returns, typically expecting a minimum return of ten times the invested capital.

Richard asked Tris to elaborate on the company's plan for commercializing the technology, generating revenues, and providing liquidity for investors. He emphasized the importance of understanding how the business intends to turn its innovations into cash flow, ensuring the high returns required for such a risky investment.

Tris's Commercialization Strategy Tris outlined the company's strategy, which is centered around a sequence of key milestones in the program:

- **Technology Development and Validation:** The first priority is continued technology development and validation. The company is currently focused on reducing technology risk and proving its core innovations.
- **Third-Party Verification:** Within five years, the company aims to achieve a point where third parties can credibly verify the technology's functionality, manufacturing costs, deployment costs, and price of output (electricity). At this stage, an Initial Public Offering (IPO) is anticipated as a significant opportunity.
- **Project Financing and Client Engagement:** Beyond the IPO, Tris projected that within another five years, the company could secure project financing for the first plant with a client. This phase would involve multiple clients already familiar with the company and its technology.

Potential Revenue Models Tris noted that the company understands the various commercialization paths available, such as:

- Engineering, Procurement, and Construction (EPC) delivery.
- Licensing the technology to other operators.
- A direct sale of the technology to entities looking to deploy it differently.

He stressed that the company's primary role is to reduce technology risk through its development program while creating a range of exit options for investors. By collaborating with financiers, clients, off-takers, governments, and regulators, they aim to optimize the timing and structure of investor returns.

Due Diligence and IP Protection Richard emphasized that any potential investment, especially one as significant as £150 million, would require extensive due diligence. He explained that his firm's internal processes include a thorough review by a technologically qualified investment committee to assess the defensibility of the technology and the likelihood of business success. Richard asked Tris to explain how the company's technology is protected, ensuring that it cannot be easily replicated by others who haven't invested the same resources.

Tris acknowledged the critical importance of IP for a technology company, explaining that their approach to protection involves three key components:

- **Patents:** The company has established and protected patents to ensure long-term exclusivity over core aspects of the technology.
- **Proprietary Data:** Years of proprietary studies and data have been conducted to refine the technology and understand how it performs in real environments.
- **Execution Capability:** The company has developed organizational knowledge, supply chain contracts, and relationships that enhance its ability to execute projects effectively and create additional barriers to replication.

Tris expressed confidence that combining these elements provides robust corporate value and defensibility for the technology. He offered to provide detailed information about their IP and business model but emphasized that such disclosures would require a signed non-disclosure agreement (NDA). Once in place, they could establish a data room and share a comprehensive set of documents, including technical, commercial, and market analyses, as well as offer in-depth briefings from the team.

Tris also recognized the importance of building trust through direct engagement, offering to arrange meetings with his team to ensure investors could evaluate their capability to drive the project forward. He mentioned the potential to expand the team as needed to meet project demands and concluded by inviting Richard to explore further collaboration.

Challenges of IP Sharing in Industry Frameworks Fiona emphasized a critical point stemming from Richard's questions: many companies in the industry, particularly those with cutting-edge technologies, are reluctant to engage with initiatives like the GIF (Generation IV International Forum) or similar frameworks. This reluctance arises from the need to protect their IP and the details of their technologies, as sharing such information could undermine the company's value and is often restricted by their investors.

6) Philanthropic

Foundation's Perspective on Impact and Risk Tom, representing a philanthropic foundation, expressed strong interest in Tris's pitch, aligning it with the foundation's commitment to sustainability, Net Zero, and a vision for a better world. He noted the foundation's three funds:

- A **Capital Ventures Fund** for innovative companies.
- An **Energy Catalyst Fund** for cutting-edge technologies.
- An **Energy Fellows Fund** for individuals conducting groundbreaking research.

Tom saw potential alignment with Tris's goals of scaling up with the right partner who shares a forward-looking vision. He emphasized that the foundation evaluates impact and risk when making investments, particularly in competing low-carbon sectors such as clean energy transport, carbon removal, and water sustainability. He posed three key questions:

1. **Quantifying Impact:** Tom asked if Tris could quantify the emission reductions his technology could achieve and outline its pathway to Net Zero. He wanted evidence that the company's impact would surpass other innovative low-carbon technologies competing for investment.
2. **Risk Profile:** Referring to Tris's mention of new fuel and reactor development, Tom asked for an assessment of the company's greatest risks, particularly whether the new fuel was the primary risk or if other significant risks existed.
3. **Existing Investors:** Given the foundation's sensitivity to public perception, Tom requested insight into the company's current investors (e.g., angel investors, friends and family) to ensure alignment with the foundation's values and vision for the future.

Tris's Response to Key Questions Tris expressed delight for the opportunity to speak with Tom, emphasizing his deep personal motivation to create a meaningful legacy for his children and fellow citizens. He highlighted the strong alignment between his company's mission and the values of Tom's foundation, adding that the foundation's expertise and support would be invaluable to their journey.

Tris acknowledged the broader landscape of the energy transition, recognizing the importance of various technologies such as carbon removal and fusion energy. However, he emphasized that nuclear energy has historically been the most reliable decarbonization tool over the last 70 years. He cited France's nuclear expansion in the 1970s as an example of how nuclear power can underpin economic and environmental

success. Tris positioned his company's technology as part of the "Premier League" of solutions for the energy transition, offering scalable generation, flexibility, cost-effectiveness, and employability while competing for limited investment capital.

Addressing Risks and Impact

- On risks, Tris explained that while new fuel development is often perceived as a significant challenge, it is not necessarily the most complex. He outlined critical steps in the journey: proving the fundamental technology works, translating it into a manufacturable, deployable, and licensable product, and creating a robust commercial framework involving finances, customer engagement, and regulatory compliance. He stressed that his company has laid the groundwork to meet these challenges, while acknowledging they are at Technology Readiness Level 4, meaning more work lies ahead.
- On impact, Tris highlighted the scalability of his technology in reducing emissions and its alignment with Net Zero pathways. He emphasized nuclear's unmatched ability to provide reliable, low-carbon energy at scale compared to many other technologies.

Tris expressed confidence in the credibility and strength of their forward plans, stating that the perceived risks are relatively low for their current stage of development. He also emphasized pride in the company's team, founders, directors, and staff, while affirming his openness to due diligence to assess the people and the business. He assured Tom that the company would make itself available to facilitate such assessments, signaling a commitment to transparency and collaboration.

Investor Alignment and Challenges Darryl observed that while Tris's company and Tom's foundation appear aligned in values, their strategies may not naturally fit. Drawing a comparison to "Dragons' Den," he noted that the next step involves negotiating equity for investment, which could lead to dilution for early angel investors and a shift in control to larger backers. He highlighted that companies often delay such funding to retain control but emphasized that alignment between investors and the company is critical for success.

Richard explained that raising investment will involve the company selling shares and negotiating its valuation, which is often difficult to determine and speculative for companies at this stage. He noted that the key negotiation will center on how much equity existing shareholders—founders, angel investors, and friends and family—must give up in exchange for the new investment. This process often leads to significant differences of opinion, making it the primary commercial point to resolve during negotiations.

Scenario 1 summary and bridge into Scenario 2

Technology Company Financing

Fiona explained that Tris's company, as a technology company, focuses solely on designing and developing the reactor, not building it or managing projects. Over the next decade, Tris will repeatedly secure funding to advance the technology to the point where it can be demonstrated, likely requiring government support or wealthy private backers for a demonstration plant. Once the reactor is designed, the goal is to sell the technology to a project company, whose purpose will be to build and operate the power plant.

The Financing of a Nuclear Project

Fiona emphasized that unlike most infrastructure projects, nuclear has historically relied on government funding or large corporates like EDF. Project financing for nuclear, where risks are shared among investors and lenders, has not been done before on this scale. Establishing a project company for this purpose will require extensive due diligence, financial structuring, and careful risk management to make it viable. The key milestone is for Tris to sell his technology to a project company that will take on the challenge of building and operating the plant.

Segway: Technology Company to sell its technology to Project Company

Project Company's Key Considerations Harold, representing a project company, raised key considerations for raising equity and partnership requirements. He asked how Tris's company could assure investors that the technology will meet performance specifications and deliver as promised. He also inquired about the supply chain, including subcontractors and equipment sources, noting that this will directly impact financing and attract interest from export credit agencies.

Harold also highlighted the regulatory timeline, asking how far Tris's company has progressed in site-specific approvals or the full generic design assessment process. He also asked about Tris's ongoing involvement, expecting a partnership with exclusivity and support for technical development, operational planning, and identifying contractors for future operations. These factors, Harold emphasized, are crucial for a successful partnership and for securing project financing.

Tris's Response to Project Company Requirements Tris emphasized that the reactor design is robust, with a decade of development behind it. While some overruns were encountered, they were unavoidable and proportional to the scale of innovation. The zero-power test reactor, operating in a licensed nuclear laboratory, will serve as a demonstration of the technology's reliability and cost predictability, building confidence in its performance.

On the regulatory side, Tris explained that the company has had positive engagement with the regulator over the past five years. While they opted not to pursue a speculative and costly design assessment during development, they are now ready for licensing. Whether to pursue a site-specific safety report or a full design assessment depends on the deployment strategy:

- For one site with exclusivity, a site-specific process is optimal.
- For multiple projects or less exclusivity, a design assessment may be appropriate.

The company is prepared to support either approach.

As a technology company, Tris's organization is not equipped to fully staff a project company but can act as the technical authority during development and support operators in maintaining regulatory compliance. Long-term, the company's goal is to streamline the industry by moving away from bespoke projects toward scalable, modular solutions. Tris also expressed openness to discussing exclusivity, including for multiple projects across several countries.

Scenario 2: Project Company to Approach Financial Institutions for Project Financing

1. Project Company Pitch

Project Fundamentals and Financing Structure Harold outlined the strong fundamentals of the project, emphasizing its location in a host country with a long-standing nuclear track record, a well-regarded regulator, and international treaty compliance. The site is government-provided, previously used, and enjoys local support, reducing risks of planning delays. The technology, while not developed locally, is proven and demonstrated in another country with a strong nuclear reputation.

Harold highlighted the financing structure, acknowledging the high debt service cover ratios (1.85–1.9 compared to 1.2 for conventional plants) and the long-term tail of the project, given its 50–70 year lifespan compared to debt terms of around 27 years. This tail provides comfort to lenders by ensuring future cash flow to address any potential issues.

He stressed the need for robust government policy support, including backing for nuclear power, stable planning frameworks, clear regulatory timelines, and fast, reliable regulatory bodies. Additionally, he noted the importance of fixed-price contracts or a regulated asset base to offer revenue stability for investors. Government equity investment in the project would be a significant signal to unlock local and international investment and encourage lender participation. Lastly, Harold mentioned the expectation of government acting as the insurer of last resort for nuclear third-party liabilities, a standard industry practice.

Discussion on Back-End Fuel Cycle The Audience asked whether Tris's concept requires fuel recycling and who would bear the costs for meeting acceptance criteria for long-term storage and an ultimate repository. She emphasized that while waste management is often framed as a policy issue, there are significant technical and cost considerations for plants without established data on long-term storage.

Harold explained that the project company would bear the cost of waste management through a sinking fund accumulated over the project's lifecycle. These costs would be accounted for in the project's revenue model, such as through the strike price under a Contract for Difference (CfD) or a regulated asset base model, ensuring no sudden financial burden arises decades later.

The Audience clarified asking whether these costs are factored into the consumer's costs, to which Harold confirmed that they are incorporated into the overall financial model.

Discussion on Fixed-Price Contracts The Audience asked about the risks associated with fixed-price contracts in nuclear projects, specifically what happens if a technology vendor goes bankrupt mid-project and how such risks are mitigated.

Harold clarified that a fixed-price contract is unlikely for a nuclear power station due to the complexity and high construction risks. Instead, such projects typically involve multi-party agreements to distribute risk. Mitigation strategies include maintaining high debt service coverage ratios (DSCRs) to ensure ample cash reserves, standby funding, and contingency debt to cover cost overruns. While delays and cost overruns are a risk, these financial safeguards are designed to manage such challenges effectively. Harold also noted that some projects have faced significant cost overruns but emphasized that this is not always the case.

Harold added that under a Contract for Difference (CfD), the revenue stream is structured effectively as a fixed price with indexation, accounting for inflation. This mechanism ensures stability in revenue while adjusting for inflationary changes, helping to manage the financial risks associated with cost overruns and delays in nuclear projects, to some extent¹.

Discussion on Operator and Utility The Audience asked whether the project needs to have clarity on who will operate the technology and who will be the utility purchasing the electricity before any investment is made, given that the vendor is neither the operator nor the utility.

Harold agreed, saying the vendor, with their technical expertise, should already be in discussions with potential experienced operators². He added that while a utility may not be essential, a responsible party would still be needed under the regulatory framework.

2. Project company and the Government

Government Expectations and Project Readiness Huw acknowledged the progress of the project and praised its near-commercial readiness, as well as the effort in securing a site. He stressed the importance of understanding how far the project has advanced with environmental permitting and the Planning Permission which are critical milestones. He reminded Harold that building a nuclear plant involves far more complexity than typical construction projects, requiring clarity on permitting progress before moving forward.

Huw addressed the request for equity funding, explaining that government funds come with conditions. Equity involvement would require detailed financial and business model analysis to ensure the project is well-structured and that other significant investors are committed alongside government support. He noted the government's typical approach of matched funding, which would depend on a substantial level of external investment.

Huw highlighted the available support mechanisms, including Contracts for Difference (CfDs)—offering effectively guaranteed prices for power—and the Regulated Asset Base (RAB) model, which provides returns to investors during construction. He explained that CfDs place more risk on the operator for cost overruns, while RAB shifts some of this risk to customers via bills. Given the high risk of first-of-a-kind technology, Huw indicated that government support would likely focus on a guaranteed price rather than RAB.

Finally, Huw emphasized the importance of resolving licensing and environmental permits, which involve complex processes with multiple regulators. He invited further clarification on these points, noting their critical role in the project's viability.

Project Company's Response and Funding Challenges Harold agreed on the importance of securing licensing and environmental permits and mentioned that they have engaged legal advisors and secured initial funding to address these requirements. He highlighted the "chicken and egg" nature of funding, explaining that having government support—whether through debt guarantees or direct investment—would significantly boost their ability to attract investors and lenders. Harold acknowledged that such support isn't free but emphasized the value of involving a major investment bank to strengthen their financial position and credibility.

¹ The Hinkley Point CfD strike price includes a contingency element which is managed through a gain share mechanism (but not a reciprocal pain share mechanism) which supports the management of delays and cost overruns.

² While the technology company could suggest an operator the project company or one of its subsidiaries will hold the nuclear license and is likely to be the Operator under the third party liability regime. As such the project company or its subsidiary is responsible for either developing an experienced operators or contracting with an experience operator to physically operate the plant.

Government's Role in Addressing Market Failures The Audience asked whether the government could play a role in addressing market failures, such as a monopolist controlling prices, that prevent industries like shipping from recognizing the value of nuclear technology. He questioned whether the government could help signal to the market and enable competition by mitigating these barriers.

Huw acknowledged the question and explained that while the government may not directly address monopolistic market failures, mechanisms like the RAB model help mitigate such issues. In the UK, regulatory agencies often set the rate of return on monopoly assets, which helps manage pricing pressures. Alternatively, he suggested a direct Power Purchase Agreement (PPA), where an off-taker bypasses the grid and purchases power directly. For broader market exposure, the RAB model remains the best option to offset monopolistic pricing challenges.

3. Project Company and Investors

1) Lender's Lawyer

Nicky explained that lenders approach projects differently from traditional corporate loans. In this case, the borrower is a special purpose project company without tangible assets or established cash flows, which creates unique challenges. Projects often generate no revenue during the construction phase, making long-term revenue streams crucial for securing loans.

She discussed the reliance on non-recourse funding, where lenders cannot seek additional funds from project sponsors. However, the high risks of first-of-a-kind technology often require some sponsor guarantees, as lenders are unwilling to take on unlimited exposure. Revenue models like the Regulated Asset Base (RAB) are more attractive to lenders because they provide income during construction, whereas Contracts for Difference (CfD) generate revenue only after the plant is operational, exposing lenders to higher construction risks.

Nicky highlighted the importance of regulatory and market stability, as lenders need confidence that changes in regulation or market conditions will not jeopardize future revenue. Government commitments are crucial to ensure a predictable environment for lenders.

She also emphasized that lenders typically prefer turnkey EPC contracts, where a single contractor takes full responsibility for the project. However, with complex nuclear technology, disaggregated contracts are often used, requiring multiple contractors to work together. This makes managing delays and liabilities more challenging, as individual contractor liability caps might not cover overall losses. The project company/ owner will also need a larger and more sophisticated team to manage a range of contracts.

Finally, Nicky stressed that lenders will focus heavily on due diligence, examining how risks are mitigated, how construction is managed, and whether timelines and assumptions are realistic. Detailed contingency plans and strong project management will be key factors in satisfying lenders' concerns during the funding process.

2) Philanthropic

Tom expressed his perspective as a philanthropist, noting that while he appreciated the vision behind Harold's project, it does not align with the foundation's strategy. He explained that their focus is on supporting early-stage, high-risk technologies, particularly those in the development phase, rather than projects at the construction or deployment stage. Tom emphasized that while Harold's project contributes to broader goals like decarbonization, it does not fit within the foundation's forward-thinking strategy of enabling transformative progress for companies still early in their journey. From this standpoint, he concluded that the foundation is not suited to invest in this project.

3) Private Equity

Richard explained that his infrastructure-focused fund typically invests in lower-risk projects with operational cash flows and predictable returns. While the fund can take on higher-risk investments involving construction or technology risk, such projects demand much higher returns to justify the exposure. He noted that Harold's project, being a first-of-a-kind technology with significant policy, planning, and construction risks, is at the edge of what an infrastructure private equity fund might consider.

Richard emphasized that for private capital to participate in such a project, mechanisms like government support through CfDs or a RAB model are essential to provide certainty around cash flows and construction costs. He expressed concerns about the lack of visibility in these areas and the need for a clearly

structured financing package. This would include government involvement and longer-term institutional investors to mitigate risks and alter the investment profile to align with private equity's expectations.

While Richard did not rule out involvement, he stressed that much more clarity is needed on the financial structure and risk-sharing mechanisms before his fund could consider investing. He suggested involving an investment bank to explore how the inaugural financing package could be constructed to attract private equity and other capital sources.

4) Banks

Allan, speaking from the banks' perspective, explained that projects like Harold's typically rely on investment banks not just for financing but also for advisory services. Development companies, often engineering-focused, may lack the financial expertise needed to structure a bankable project. Investment banks step in to assist by advising on commercial structures, negotiating agreements with governments, and finalizing bankable contracts with technology suppliers.

Allan emphasized that investment banks play a key role in aligning the project's financial structure with market expectations, ensuring that risks and rewards are allocated in a way that appeals to all stakeholders. Additionally, investment banks assist in sourcing large equity checks from private equity, strategic investors, or institutional financial backers. They also coordinate with export credit agencies (ECAs), which are vital for securing financing. ECAs support projects by facilitating loans or providing guarantees for commercial bank lending, reducing risk and lowering borrowing costs.

Allan concluded that the role of the investment bank is to bring all the moving parts together—government, technology providers, lenders, and investors—to ensure the project is financially viable and structured for success. He noted that ECAs are often crucial in projects like this, as they promote exports by supporting domestic technology and services, offering significant value to both the project and the host country's economy.

Harold acknowledged that some export credit agencies (ECAs) can provide support without requiring exports, broadening their potential role in the project. He emphasized that the key to success will be leveraging both government support and the relationships that ECAs bring to attract additional investors and resources necessary for the project's progress.

5) Investment Banks

Guy emphasized three key areas of focus for senior debt providers considering Harold's project. First, she highlighted the importance of understanding the equity partnerships and how the project's key players—such as the operator, EPC contractor, and technology provider—are aligned with "skin in the game" to ensure timely and on-budget delivery. This includes clarity on who will lead the project and how responsibilities will be shared among stakeholders to reduce risk.

Second, she stressed the need for clarity around the project's revenue model, particularly how the revenue stream supports debt capacity. Guy expressed a preference for a Contract for Difference (CfD) model over a Regulated Asset Base (RAB), as CfDs offer long-term revenue stability without regulatory reset risks. However, she noted the importance of understanding if other mechanisms, such as corporate PPAs, would supplement the revenue stream and how market risks would be managed.

Third, she addressed construction and operational risks. While acknowledging the increasing acceptance of multi-contract approaches in energy transition projects, she emphasized the need for strong structuring, interface management, contingency budgets, and protocols to ensure timely and coordinated delivery. For operations, she highlighted the importance of ensuring the technology performs as expected, with reliable power generation and supply chain management, especially for fuel.

Guy concluded by emphasizing that banks must assess all large-scale risks, from construction through long-term operation, to ensure repayment over time. She noted that the project's alignment with carbon reduction goals and broader socioeconomic benefits would also be critical for lenders, as many banks have their own Net Zero targets and sustainability criteria that must be met for projects to qualify for funding.

6) Pension Fund

Darryl explained that his fund is heavily invested in energy transition technologies, including renewables, hydrogen, and carbon capture, but there remains a gap in their portfolio for nuclear investments. He noted

that members of the pension scheme are increasingly scrutinizing investments for ESG compliance, leading to divestments from fossil fuel assets. Nuclear, while fitting into the Net Zero strategy, comes with unique risks that must be carefully assessed.

Darryl identified several key concerns for the fund. Construction risk is significant, though not a complete barrier, as the fund has invested in other technologies during construction when there is sufficient developer-backed risk mitigation or demonstrated delivery track records. Stable, inflation-linked revenue streams are critical for meeting pension obligations, making CfD models appealing. However, operational risks in nuclear are less familiar, and waste management and decommissioning costs, while part of the plant economics, require further reassurance. The "nuclear risk" of low-probability, high-impact events, and the insurance or recourse for catastrophic failures, also requires clarity.

Darryl emphasized the importance of policy stability. If government policy were to shift in 15 years, the fund would need guarantees to recover its investment and returns, regardless of operational changes. While FOAK nuclear assets would be difficult for the fund to consider, he indicated that entering post-construction could be viable if supported by a CfD that includes provisions for extreme events and policy changes.

Alternatively, a RAB model could make the project more attractive. By transferring construction risk to consumers, the project would resemble an operating asset even during construction. This reduced risk profile could allow the fund to invest earlier, potentially at the start of construction, if the financial structure aligns with their low-risk, low-cost capital expectations.

Q&A session on Alternative Scenarios

Following the role play the group was asked some questions on alternative scenarios and broader considerations.

Role of Government Support

Fiona asked why government support is crucial for the first, second, and third nuclear projects of their kind.

Huw emphasized that government support is essential due to the inherent risks and costs involved in nuclear projects, particularly for first-of-a-kind technologies. He explained that the UK is committed to achieving Net Zero by 2050, and nuclear power is recognized as a critical part of the energy mix to meet these goals. Funding is already in place to support both existing and new technologies. He drew parallels with the offshore wind industry, which began with skepticism but became mainstream after government support, including CfDs, provided financial security for developers. Similarly, government backstops are necessary for nuclear to mitigate exceptional risks, such as catastrophic failures, which private investors cannot fully absorb. This role as an "insurer of last resort" is critical to unlocking private finance and ensuring projects become viable. Huw expressed optimism that with government support, nuclear technologies, including SMRs and Gen IV reactors, will follow a similar trajectory to offshore wind, transitioning from early-stage innovation to widespread adoption over the coming decades.

Darryl agreed with Huw's point that government intervention is critical for nuclear projects, noting that such support is not unique to nuclear but common across energy sectors, though the level of intervention may vary. He highlighted the narrow scope of venture capital willing to invest in nuclear, emphasizing that it requires specialized funds rather than generic VC backing. Without these funds, the government's role becomes even more vital, particularly as part of an industrial strategy to foster new technologies. Darryl pointed out the significant funding gap between early-stage investments (millions) and the next phase, which requires much larger sums even before construction begins. He argued that government investment at this stage, if directed to the right technology, could yield both financial returns and broader economic benefits, mirroring the successful cycle of private investors selling their stakes as projects mature.

Huw added that early-stage investors, such as venture capitalists, typically sell their stakes within a 10-year period to other investors. This creates a natural transition where initial backers exit before the project moves to larger-scale development or construction. He emphasized that this handover is a crucial funding bridge, ensuring that capital from early investors is followed by new funding from later-stage investors or institutions to support subsequent phases. Early investors are not expected to remain involved throughout the project's entire lifecycle.

Tris highlighted the importance of considering the strategic value of nuclear technology when engaging with government. He noted that some governments view nuclear skills as a critical national capability and recognize the potential of building an ecosystem around nuclear vendors and supply chains. This leads to the question of what technology is most suitable for national needs and long-term development.

Huw expanded on the importance of addressing the end-of-cycle responsibilities for nuclear projects. He pointed out that deep geological storage for spent fuel remains a challenge not yet fully addressed by most countries, including the UK. Governments will need to lead in developing long-term storage solutions, with above-ground storage likely required in the interim. This, along with decommissioning, represents significant long-term financial obligations. Huw stressed that funds for these responsibilities must be incorporated into project financing, with developers required to set aside resources over the 70-year operational lifecycle to cover decommissioning costs, which could extend for another 100 years post-operation.

Revenue Support Mechanisms

Fiona asked whether revenue support mechanisms, like the UK's CfDs and RABs, are always necessary for large energy projects, including nuclear, or if there are markets with better systems that don't require such support. She also inquired why revenue support is so critical for these types of projects.

Allan responded that there is no better alternative to revenue support mechanisms for large-scale projects like nuclear, particularly for first-of-a-kind initiatives. He emphasized that construction risk and the uncertainty of early projects make it unrealistic to expect commercial banks or private investors to bear the full risk without government support. This is especially true for policy-driven projects tied to Net Zero goals, which rely on governments to provide confidence and stability to investors and debt markets.

Allan noted that government backing is crucial because achieving Net Zero is both a necessity and a policy commitment. While he acknowledged the importance of government support, he expressed no knowledge of a fundamentally better system for financing such projects. Finally, he mentioned that the situation changes in countries without an established nuclear industry, where he is currently involved in projects, adding additional complexity to securing investment and support.

Nuclear Project in a Country Without Relevant Infrastructure

Fiona asked how the situation changes when a nuclear project is set in a country without an established nuclear industry or regulatory framework.

Harold stated that developing a nuclear industry in such a country essentially "resets the clock." A critical first step is establishing a regulatory body that is internationally recognized and accepted, which can take significant time and effort.

Huw added that many countries adopt a "copy and paste" approach to regulation, leveraging frameworks developed by established nuclear nations like the UK, US, or Canada. He also noted examples like the UAE, which built its regulatory system by utilizing international expertise, demonstrating that it's possible to accelerate the process with proper support.

Tris emphasized that resolving regulatory challenges in new nuclear markets is critical for global decarbonization efforts. He stressed that while these hurdles may seem daunting, they must be overcome to achieve a decarbonized world.

Priority of Non-Electrical Applications

Participants discussed whether nuclear energy should immediately pursue non-electrical applications, such as hydrogen production, synthetic fuels, and industrial heat, or concentrate first on establishing its role in electricity generation. While the potential for non-electrical applications was widely acknowledged, concerns were raised about market readiness, integration challenges, and risk management. Some argued the immediate priority should be proving nuclear's value in electricity generation, with expansion into other applications as technologies mature.

Fuel Supply and Advantage of FOAK

The Audience asked about the need for a secure and reliable fuel supply for nuclear projects. Huw emphasized the importance of diversifying sources and strengthening advanced fuel production capabilities, such as those at Springfield. They queried the benefits of deploying a first-of-a-kind (FOAK) reactor, with Tris countering that market viability and reliable delivery are more important than being first.

Concluding Remarks

Fiona wrapped up the workshop by expressing her appreciation for the discussion, describing it as an exhilarating exchange of ideas. She hoped the panel helped clarify key points and contribute meaningfully to the ongoing dialogue.