# From Proof-of-Concept to Proof-of-Profit

## Bridging the Risk-Expectation Gap in Climate Tech Scaling

May 2026

Global Climate Finance Accelerator

The Global Climate Finance Accelerator (GCFA) is a not-for-profit organization that helps climate and energy transition projects become investment ready. We operate adjacent to the University of Toronto, supported by the Lawson Climate Institute and connected to the Rotman School of Management, giving us the best of both worlds: academic depth with real-world agility.

GCFA convenes partnerships across business, finance, government, and academia to identify, investigate, and propose the policies, procedures, and tools required to finance the deployment of technologically viable climate solutions. We focus on the critical front end of climate finance turning ideas, pilots, and first-of-a-kind projects into structured, analyzable, and investable opportunities while acting as an extension of our clients' teams and providing economical, high-caliber support.

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Any errors of interpretation in this paper are ours, not theirs.

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# Foreword

The conditions in which climate ventures must now operate are more challenging than they were even two years ago. Capital is tighter, criteria are more demanding, and the policy backdrop in many jurisdictions has become less predictable. Yet the investment required for Canada and the world to meet climate goals continues to grow, and so does the urgency of getting promising technologies from the lab into commercial-scale deployment.

The 2025-26 cohort of the Global Climate Finance Accelerator Fellows spent the year working on a question that sits at the heart of this challenge: why is it still so hard to finance climate technology at the scale the energy transition requires? A few themes emerged consistently from that work. Funding a first-of-a-kind project takes a far wider range of skills, perspectives, and counterparties than most ventures plan for, and the technology is rarely the hardest part. Translating unit economics into an investor-ready financial model is one of the highest-leverage things a founder can do, and one of the most consistently underdeveloped. And there are fundamental building blocks such as offtake structures, execution certainty, counterparty quality, and insurability that every venture must address to de-risk its projects and unlock the next pool of capital.

This paper, From Proof-of-Concept to Proof-of-Profit: Bridging the Risk-Expectation Gap in Climate Tech Scaling, brings those themes together into a framework the research team calls the Risk Pivot. Whether it shifts how founders, investors, and policymakers approach this transition remains to be seen. What is clear is that by working together with practitioners across the ecosystem to identify and address these bottlenecks, the GCFA has given another group of Canada's future leaders the tools to accelerate progress against society's pressing climate goals.

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# Executive Summary

**The pathway from a working climate technology to a financed, operating commercial project is the hardest stretch in the growth of a climate venture.**

The science has been demonstrated, and the business case is plausible, but the capital required has outgrown what early-stage investors can provide, and the project has not yet matured into something infrastructure investors recognize. It is the stretch in which most ventures stall, and where climate technologies either reach commercial scale or do not.

The 2026 market has made this transition materially more demanding than it was in 2021 and 2022. Capital is tighter, investor criteria are more demanding, and the policy backdrop in many jurisdictions has become less reliable. Climate-tech equity funding fell 40 percent in 2024, the third consecutive year of contraction, and investment in emerging climate technologies fell 23 percent to $155 billion even as mature categories grew 14.7 percent to $1.93 trillion. The capital required to meet climate goals continues to grow, but it is moving selectively toward assets and companies with recognizable demand, credible counterparties, mature economics, and executable deployment pathways.

The Risk Pivot, a framework developed through GCFA's research, is the moment when a climate venture's success ceases to depend on the strength of its technology and begins to depend on the counterparties who will finance, contract for, insure, and build the first commercial project. Crossing it requires demonstrating to the next pool of capital that the venture's risks can be priced, allocated, and absorbed. Bankability is the bar that must be cleared to do so.

Five risks consistently emerge as the dimensions on which ventures fail to meet the bankability standard: offtake and market risk, execution risk, supply chain risk, regulatory and geopolitical risk, and intellectual property risk. They are distinct categories for the purpose of analysis, but in practice they are deeply interconnected.

A weakness in one tends to expose weaknesses in others. An offtake agreement with a weak counterparty creates revenue risk, but it also undermines the financing structure that would absorb execution risk. A fragile supply chain raises both execution and unit-economic concerns. Capital flows when these risks are addressed in combination, and stalls when they are addressed in isolation.

The five dimensions feed into the Bankability Framework, GCFA's three-test diagnostic for evaluating whether a venture has crossed the Risk Pivot: a Revenue Certainty Test, an Insurability Test, and a Project Structure Test. A venture that passes all three has crossed the Risk Pivot.

Our research identified five structural gaps in the current financing ecosystem that prevent capital from reaching ventures that are otherwise ready: insufficient pre-FID capital for feasibility and engineering work, blended finance designed to subsidize returns rather than absorb risk, an underdeveloped Series C to project finance handoff, limited performance insurance for novel technology, and the absence of standardized project structures for emerging asset classes. These gaps are deficiencies of design, not of volume. Closing them requires institutional responses that the private market cannot provide on its own.

Ventures that succeed at the Risk Pivot are not necessarily those with the strongest technology. They are those whose founders understand, earlier than their peers, what the next pool of capital needs to see, and who build toward it while the technology is still being validated.

# 1 Introduction

**Success in the current climate market belongs not to the ones with the best science, but to those who can translate technology into a bankable asset.**

The pathway from a working climate technology to a financed, operating commercial project is, by most accounts, the hardest stretch in the growth of a climate venture. The science has been demonstrated, and the business case is plausible, but the capital required has grown beyond what early-stage investors can provide, and the structure of the project has not yet matured into something infrastructure investors recognize. It is the stretch in which most ventures stall, and where most climate technologies either reach commercial scale or do not.

Climate technology was, for most of the last two decades, evaluated primarily on whether it could work. The companies that attracted capital were those that could solve a technical problem with elegance and credibility. Capital itself was patient, increasingly available, and underwritten in part by a broad public expectation that the transition was coming and that policy would help carry it. In the 2026 environment, those assumptions no longer hold in the way they once did. The market has tightened, investor criteria have become more demanding, and the policy backdrop is less reliable than it was two years ago. Investors and lenders are asking commercial and structural questions earlier in a venture's life than they used to. The threshold for attracting growth equity, project finance, or strategic capital has risen, and founders are being asked to demonstrate readiness against criteria that did not previously apply to them at this stage.

What this means is that the difficult part of building a climate venture is no longer the science. It is the translation. A founder must take a technology that works and convert it into a project that lenders can underwrite, customers will contract for, insurers will cover, and partners will deliver on schedule. Each of those translations involves distinct counterparties and a different definition of what readiness means. The companies that succeed are not always the ones with the best technology. They are often the ones that understand, earlier than their peers, what the next pool of capital needs to see.

This paper is GCFA's attempt to describe that translation. It is written for the founders making the transition, the investors deciding whether to back them, the public-sector institutions that shape the conditions under which both operate, and the accelerators and intermediaries who sit between them. The goal is to give those actors a shared vocabulary for a moment in a company's life that is currently treated as a series of disconnected problems, when in practice it is a single, integrated challenge of moving from proof-of-concept to proof-of-profit.

## 1.1 Research Methodology

The findings in this paper come from a series of semi-structured interviews with industry professionals, conducted during the 2025-26 Accelerator In-Residence year. Interviewees included investors across the climate-tech capital stack, alongside intellectual property counsel, ecosystem intermediaries, and operators experienced in financing first-of-a-kind (FOAK) projects. The comments and observations of the interviewees have been aggregated and interpreted across the research team, and no specific finding or quote in this paper is attributed to any individual.

Interviews were structured around what venture, what they have seen fail, and how their criteria have shifted in recent years. Recurring themes emerged as the interviews progressed, and the team worked through them collectively to identify the patterns that shape this paper's analysis.

The paper also draws on secondary literature, market data, and case studies of ventures that have succeeded or failed at the deployment threshold. Case studies are included throughout to illustrate the dynamics interviewees described. The Risk Pivot framework emerged from this combined body of research.

### The Risk Pivot

**The Risk Pivot is the transition a climate venture undergoes when its path to commercial scale stops depending on its own engineering and starts depending on the people who will finance, contract for, insure, and build the first commercial project. Each of these counterparties underwrites a different risk and applies a different standard of evidence. Crossing the Risk Pivot requires demonstrating to the next pool of capital that the venture's risks can be priced, allocated, and absorbed.**

# 2 Market Context: 2026

**Climate ventures are operating in a fundamentally different market than the one that defined 2021 and 2022. The market has tightened, and the standard of evidence investors require before they commit has risen sharply.**

## 2.1 What has changed since 2023

The 2026 climate finance environment looks different from the one that existed two or three years ago, and the difference is more than cyclical. Two structural forces have reshaped the market. The first is the macroeconomic tightening that began in 2022. Interest rates rose, the investor base became more disciplined, and the policy backdrop in many jurisdictions became less predictable. The second is the rapid acceleration of capital into AI and the energy infrastructure required to support it, which has both intensified competition for institutional capital and reshaped what climate-tech investors are willing to fund. The result is a market that is not necessarily smaller in aggregate, but one that has become more selective and more demanding in what it requires before committing.

The contrast with the 2021 to 2022 period is sharp. Climate-tech venture and growth investment peaked at roughly $46 billion in 2022 before falling 30 percent in 2023 to $32 billion. This was the first annual decline the sector had seen since 2020 (Sightline Climate, 2024). The drop reflected both the broader correction in venture capital and a tightening of investor expectations specific to climate. Companies that had raised on technology promise during the low-rate years began to encounter harder questions about commercial traction, unit economics, and time to revenue. By 2025, the market had stabilized on more disciplined terms, with investors applying greater scrutiny to commercial traction, unit economics, and deployment readiness.

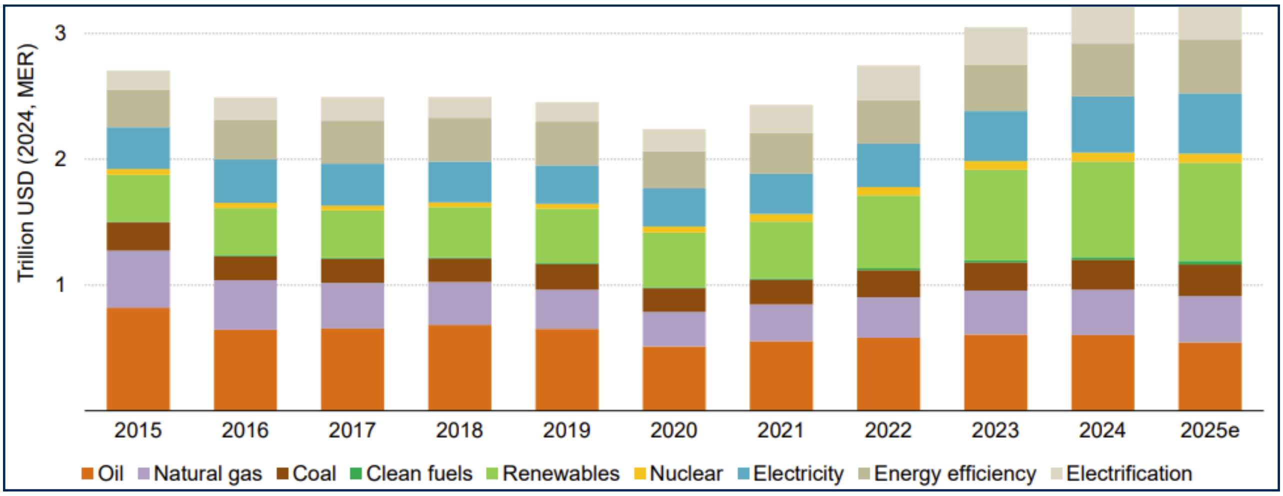
The reshaping is visible in the kinds of technologies now attracting the most capital. The largest climate-tech deals in 2025 concentrated heavily on energy security and resilience, alongside the broader build-out of low-carbon power infrastructure (Sightline Climate, 2026). This shift is a direct response to a structural increase in demand for reliable, low-carbon electricity, driven in significant part by the build-out of AI infrastructure and the data center capacity required to support it. BloombergNEF estimates that data center investment alone reached approximately $500 billion in 2025, larger than total global solar investment and second only to electrified transport in scale (BloombergNEF, 2026). Capital is flowing toward climate technologies whose commercial case has become clearer, because the demand for what they produce has become more concrete.

This selectivity is also visible across the technology-readiness spectrum. BloombergNEF tracks a sharp divergence between investment in mature climate technologies, which include renewables, energy storage, electric vehicles, and grids, and investment in emerging technologies that still require first-of-a-kind deployment. In 2024, mature categories drew $1.93 trillion, growing 14.7 percent year-on-year. Emerging categories, which include hydrogen, carbon capture and storage, electrified heat, nuclear, clean industry, and clean shipping, drew just $155 billion, a 23 percent decline (BloombergNEF, 2025). Climate-tech equity raising itself fell 40 percent in 2024, marking the third consecutive year of contraction (BloombergNEF, 2025). The selectivity runs along the technology-readiness axis. Capital is flowing toward proven business models with established scale and away from the emerging technologies that the energy transition ultimately depends on.

Against this reshaped landscape, the broader pools of capital available for the transition have continued to expand in aggregate. Global energy transition investment reached a record $2.3 trillion in 2025 (BloombergNEF, 2026), and global climate finance more broadly reached $1.9 trillion in 2023, with private climate finance exceeding $1 trillion for the first time (Climate Policy Initiative, 2025). The capital required to meet climate goals continues to grow, and so does the pool of capital available to invest in it. However, BloombergNEF estimates that current investment levels are only 37 percent of what is required to get on track for net zero by 2050 (BloombergNEF, 2025), a gap that requires unlocking capital for the emerging technologies where investment has been falling. International Energy Agency (IEA) data reinforces this point at the energy-system level. Clean energy investment has grown substantially since 2015 and now exceeds fossil fuel investment by a wide margin (IEA, 2025a).

The defining change is the higher standard of evidence that capital providers require before committing. Transition capital is expanding, but it is moving most readily toward assets and companies with recognizable demand, credible counterparties, mature economics, and executable deployment pathways. This is the market context in which the Risk Pivot has become more difficult to cross.

**Figure 1: Global energy investment in clean energy and fossil fuels, 2015 to 2025**



Source: International Energy Agency, World Energy Investment 2025

# 2.2 Capital concentration around strategic and financeable themes

Climate capital in 2026 is concentrating around sectors that sit within broader strategic investment themes. Energy, nuclear, data center power demand, grid resilience, critical minerals, defense-adjacent technologies, robotics, and industrial competitiveness are attracting the most active interest. The common thread is that each of these themes connects decarbonization to a system-level priority that capital markets already recognize and know how to price. Climate impact remains central to the investment thesis, but capital providers are increasingly evaluating that impact through the lens of commercial urgency. Technologies that reduce emissions while also improving reliability, lowering operating costs, strengthening energy security, or solving a procurement constraint are better positioned to attract deployment capital than technologies that rely on climate impact alone. Table 1 sets out the principal themes shaping climate-tech capital allocation in 2026 and the technology categories most directly aligned with each.

This pattern shows up clearly at the deal level. Sightline Climate reported that climate-tech venture and growth investment reached $40.5 billion in 2025, an 8 percent increase over 2024, while deal count fell 18 percent year-on-year (Sightline Climate, 2026). The data points to a market that is consolidating around fewer, larger opportunities. The concentration runs deepest in mega-deal activity: of the ten largest climate-tech deals in 2025, six clustered in energy security and resilience, together accounting for $7.2 billion of $10.1 billion in mega-deal value (Sightline Climate, 2026).

**Table 1: Strategic themes shaping climate-tech capital allocation in 2026**

| Strategic theme | Relevance for climate technology | Relevant technology categories |
|---|---|---|
| **AI and data center power demand** | Creates demand for reliable, low-carbon electricity and grid flexibility | Grid software, storage, nuclear, geothermal, demand response |
| **Energy security** | Frames decarbonization as resilience, supply independence, and exposure management | Distributed energy, clean fuels, long-duration storage, critical minerals |
| **Industrial competitiveness** | Links climate technology to productivity, cost control, and domestic manufacturing | Industrial heat, electrification, carbon capture, advanced materials |
| **Critical supply chains** | Prioritizes domestic or allied supply of strategic inputs | Battery materials, recycling, graphite, lithium, rare earths |
| **Defense and resilience** | Positions climate-adjacent infrastructure as strategic dual-use capacity (e.g. civilian/defense use case) | Microgrids, resilient power, water systems, climate risk analytics (autonomous systems/satellites - agriculture drones, climate/wildfire monitoring) |

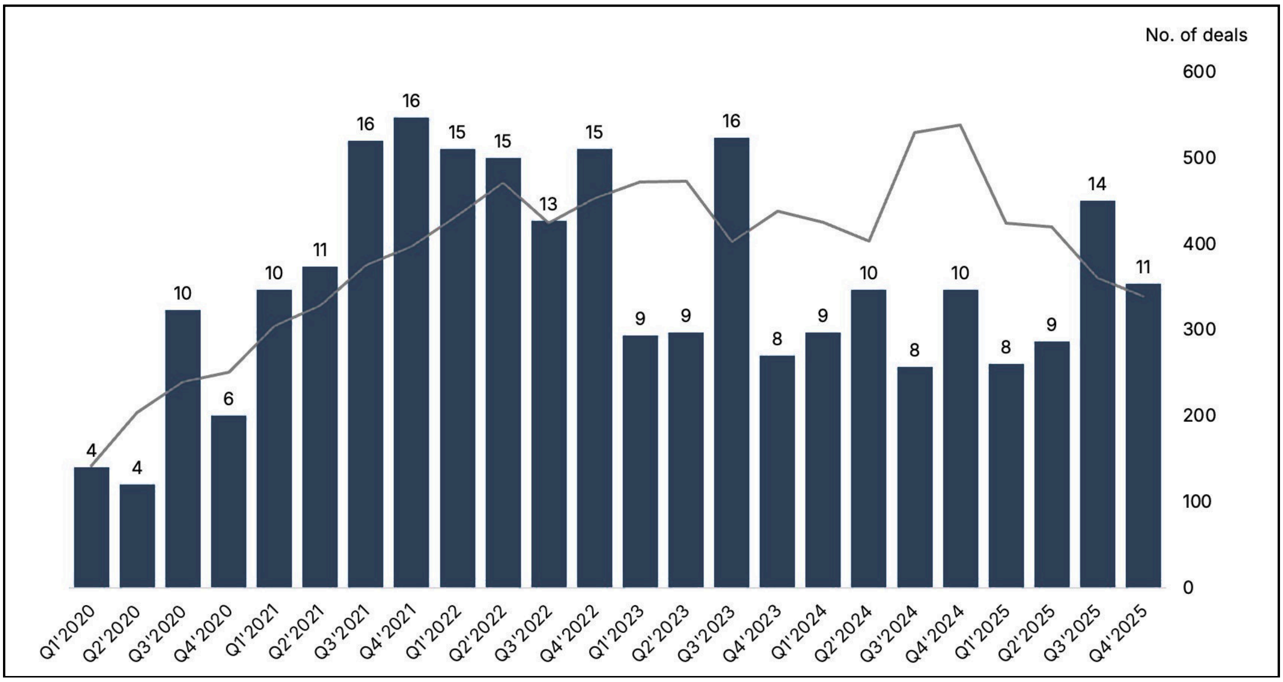
Source: GCFA analysis, drawing on BloombergNEF (2025), BloombergNEF (2026), IEA (2025a), IEA (2025b), and Sightline Climate (2026)

This concentration has direct implications for ventures positioning for later-stage capital. Market positioning has become part of financeability. A venture's ability to explain its relevance to current capital allocation priorities shapes the depth of investor interest, the quality of strategic partnerships, and the likelihood of assembling a viable capital stack.

Data center growth illustrates the shift in concrete terms. IEA projects that electricity generation required to supply data centers will rise from 460 TWh in 2024 to more than 1,000 TWh by 2030, with renewables, natural gas, coal, and nuclear all contributing to the supply response (IEA, 2025b). For climate technologies, this kind of demand creates a more favorable market context wherever the technology connects to firm low-carbon power, grid flexibility, demand response, storage, or digital energy management.

**Theme alignment may open the door, but it does not get a venture funded. Capital providers ask a further set of questions before they commit, and those questions cannot be answered by positioning alone.**

**Figure 2: Climate-tech capital is concentrating on fewer, larger deals**



Source: Sightline Climate, 2025 Climate Tech Investment Trends

# 3 Crossing the Risk Pivot

**The Risk Pivot is the moment at which technical viability stops being enough. From this point in a venture's development, the question investors ask is not whether the technology works but whether the project surrounding it is bankable.**

Bankability is the standard climate ventures must meet to cross the Risk Pivot. It is the test that determines whether deployment capital flows, and the framework against which every other element of the Risk Pivot can be measured. The 2026 market context has not changed what bankability means in finance. It has changed what bankability requires of climate ventures, and at what stage in their development those requirements apply. A venture that would have been considered bankable on the strength of its technology and pilot results in 2021 may now face a materially higher bar. The new bar is contractual rather than technical, and it is applied earlier in the lifecycle than founders typically expect.

## 3.1 The Bankability Standard

The central question for any climate venture moving toward commercial deployment is one of capital translation. Earlier-stage capital can support technology development, pilot validation, and initial market formation. Later-stage capital requires something different: evidence that deployment risks have been identified, allocated, and mitigated through credible contracts, counterparties, project structures, and financing instruments. This is the gap that defines the Risk Pivot, and bankability is the bar a venture must clear to close it.

Bankability is the bar a venture must clear before institutional capital will commit. A venture is bankable when its project can attract external capital on terms it can repay, with risk allocated to counterparties capable of bearing it. The bar is not fixed. It rises as a venture moves toward bankability may involve credible technical commercial deployment.

At the pilot stage, bankability may involve credible technical performance, early customer validation, and a plausible route to scale. At FOAK and early commercial stages, the bar rises sharply: revenue must be contracted or near-contracted, counterparties must be credible, project economics must be defined, and risk must be allocated clearly across the parties involved.

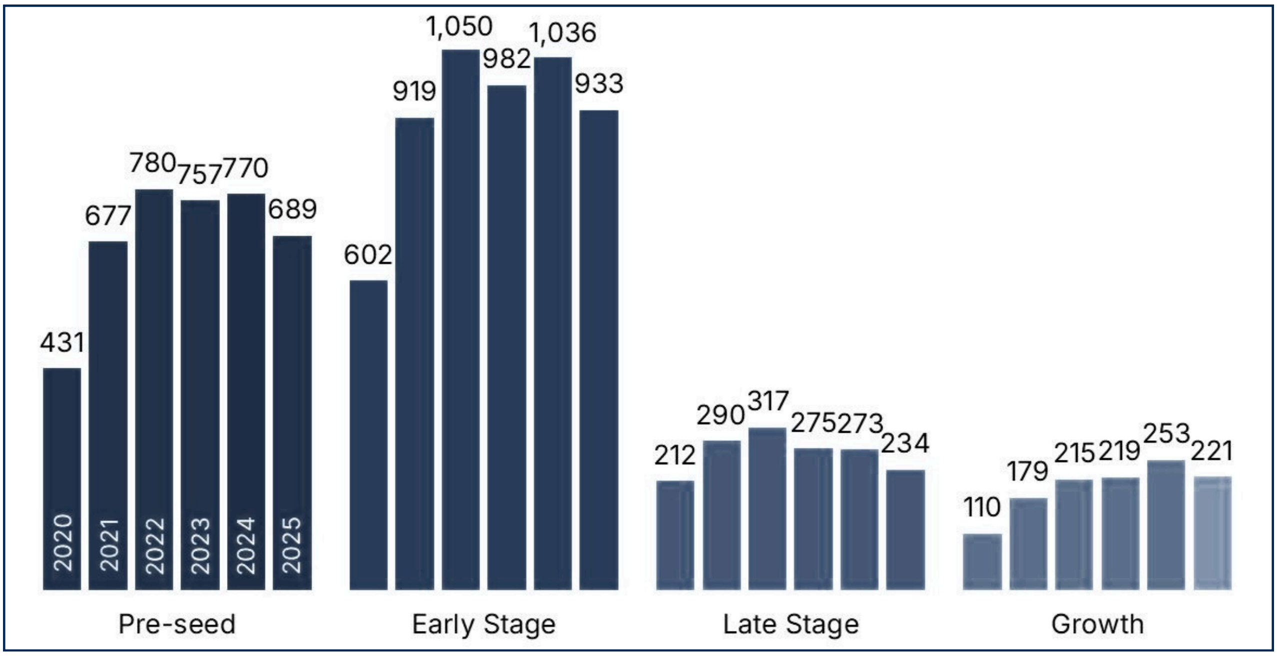
## 3.2 The Transition from Technology Capital to Project Capital

At the Risk Pivot, a venture becomes dependent on external counterparties for commercial proof. Its value proposition must be validated by customers, offtakers, host sites, Engineering, Procurement, and Construction (EPC) partners, insurers, lenders, and strategic investors. The technology must demonstrate that it can be embedded within a project, supply chain, customer operation, or procurement process in a way that supports long-term financial commitments. This is a materially higher threshold than technical validation. A pilot result establishes that a technology can work under defined conditions. Whereas, a financeable project establishes that a technology can generate predictable value under commercial conditions, with counterparties capable of absorbing, allocating, or mitigating the relevant risks.

The financing architecture itself reflects this transition. Capital requirements rise sharply as ventures move from Series A through Series C and into project finance, and the diligence standard becomes more institutional at each step. Sightline Climate's 2025 data shows where the pressure is concentrated. Series A deal counts fell 22 percent year-on-year, as investors largely finished placing bets in crowded categories and pulled back from new entrants. Series B held up better, propped up by a handful of mega-deals.

Series C is where the strain is sharpest: deal counts reached an all-time low in 2025 and investment fell 32 percent, even as growth investment jumped 78 percent over 2024 (Sightline Climate, 2026). This pattern reveals a market dynamic that is increasingly backing companies it sees as stronger candidates for scaled deployment. However, a growing number of ventures are stalling at the stage where the diligence bar shifts from technology risk to project risk.

**Figure 3: Annual climate-tech investment by stage, 2020 to 2025**



Source: Sightline Climate, 2025 Climate Tech Investment Trends

## 3.3 Unit Economics and Stage-Specific Evidence

Unit economics are the numbers that decide whether a venture is fundable. The unit varies by sector: a ton of carbon removed, a kilowatt-hour delivered, or a kilogram of clean fuel made. Investors expect to see how much revenue each unit can generate, what it costs to produce, and how those numbers will improve as the venture scales. Previously, this expectation arrived late in a venture's life. It now arrives at Series A and becomes central through Series B, Series C, and at FOAK scale.

These numbers do not only matter to investors. Customers use them to decide whether the technology will pay for itself. Lenders use them to assess whether the venture can repay debt. Strategic partners use them to figure out whether the technology can scale inside their own operations. Public funders use them to decide whether their support will produce a durable market or just subsidize a single project. The clean-tech categories that have attracted the most capital are those where the unit economics are already familiar: solar PV, batteries and EV-related manufacturing. Together, these drew most of the $235 billion in clean-technology manufacturing investment (IEA, 2024).

For a FOAK venture, unit economics are a trajectory, not a snapshot. The current numbers are rarely good enough to attract project finance on their own. What matters is the case for how they will get better. A credible case identifies the current cost structure, the specific drivers of cost reduction, the milestones required to validate each assumption, and the relationship between technical performance and commercial value. The strongest ventures can describe how each deployment makes the next one cheaper to underwrite, and how each technical improvement translates into measurable commercial value. The weakest ones cannot, and market reads the difference.

The bar rises at every step. Clearing the pilot stage does not by itself prepare a venture for demonstration, and clearing demonstration does not prepare it for FOAK. Each stage adds new counterparties, new contractual requirements, and a new definition of what readiness means. Where ventures fail to clear those rising bars determines whether they cross the Risk Pivot.

**Table 2: Finance-readiness indicators by stage**

| Stage | Primary evidence | Investor question |
|---|---|---|
| **Pilot** | Technical performance, early customer feedback, operating data. | Does the technology work under defined conditions? |
| **Demostration** | Paid pilots, site integration, early cost data, customer validation. | Can the solution operate in a real commercial environment? |
| **FOAK** | Contracted demand, project budget, EPC plan, permitting pathway, warranties. | Can the first commercial project be financed and delivered? |
| **Replication** | Repeatable project template, lower unit costs, broader customer base. | Can the model scale across sites and counterparties? |

Source: GCFA analysis, drawing on the interviews

# 4 Five Dimensions of the Risk Pivot

**The Risk Pivot is not a single risk. It is the moment when a venture's success ceases to depend on the strength of its technology and begins to depend on a broader set of counterparties who will finance, contract for, insure, and build the first commercial project.**

Each brings its own set of risks, which must be addressed before the next pool of capital will commit. A venture that resolves one or two of these risks, but leaves others unaddressed, does not cross the pivot. It stalls in front of it.

Five risks surfaced consistently across the interviews as the dimensions on which ventures fail to meet the bankability standard. These are not the only risks a climate venture faces, but they are the risks that capital providers, lenders, insurers, infrastructure investors, and strategic counterparties examine most closely when deciding whether to commit. They are also the risks that founders most frequently underestimate, because each requires capabilities and counterparties outside the venture itself.

The five dimensions are offtake and market risk, execution risk, supply chain risk, regulatory and geopolitical risk, and intellectual property risk. They are presented in this paper as distinct categories for the purpose of analysis, but in practice they are deeply interconnected. A weakness in one tends to expose weaknesses in others. An offtake agreement with a weak counterparty creates revenue risk, but it also undermines the financing structure that would absorb execution risk. A fragile supply chain raises both execution and unit-economic concerns. The pattern that emerges from the interviews is that capital flows when these risks are addressed in combination and stalls when they are addressed in isolation.

## 4.1 Offtake and Market Risk

Climate ventures rarely fail because of the underlying science, technology, or engineering. They fail in the transition from pilot and demonstration to commercialization, when market interest does not convert into durable, financeable demand. This is the central finding of the interviews: climate ventures do not just have innovation risk. They have offtake risk, the inability to convert market interest into long-term contracted revenue.

Much of the capital flowing into the energy transition continues to move toward mature and lower-risk sectors such as energy infrastructure, energy storage, and transport.

More nascent and emerging climate technologies continue to face significant commercialization barriers despite strong climate interest and policy support (BloombergNEF, 2025).

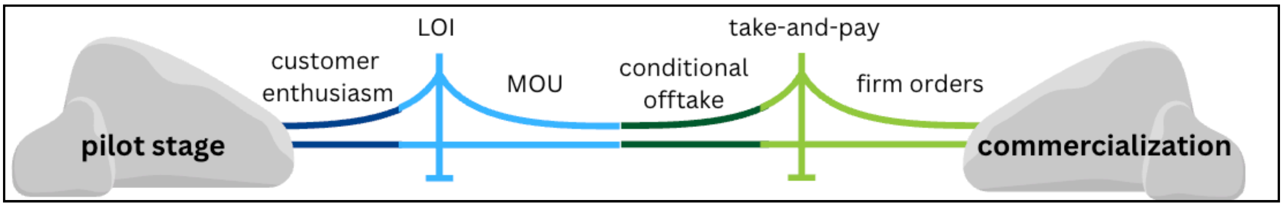
The pattern is consistent. Ventures demonstrate technical performance, generate pilot partnerships, and attract customer interest. They then fail to secure the long-term procurement commitments required to support infrastructure-scale financing. As a technology moves from pilot and demonstration toward commercialization, technical risk declines and market and offtake risk become more prominent. The challenge shifts from technical validation to mitigating offtake and market risk.

**Climate ventures do not just have innovation risk. They have offtake risk.**

Offtake risk often shows up first as an endless demonstration loop. Several interviewees described the pattern of climate ventures continuing to run pilots, demonstrations, and performance optimizations without ever progressing into recurring procurement or commercial deployment. Technical refinement becomes a substitute for commercial progress. The venture is busy improving its product when the work it should be doing is securing anchor customers, contract structures, and durable revenue streams. Letters of intent, demonstration partnerships, and sustainability collaborations may validate climate interest, but they do not provide the contractual certainty that lenders and infrastructure investors need to underwrite a project. Pilot success and climate visibility do not produce bankable demand.

Part of the problem is who the venture is talking to. Unlike software startups, FOAK climate ventures need large upfront investment in manufacturing, infrastructure, and operational deployment, and early customer conversations frequently happen with innovation, sustainability, or R&D teams. These teams sponsor experimentation but do not allocate procurement budgets. As a venture moves from pilot toward commercial deployment, the relevant counterparty inside a customer organization shifts. Procurement, finance, and operations ask different questions: about pricing certainty, operational continuity, and risk minimization. A venture that engages only with innovation departments may have customer interest but no commercial path. Engaging procurement early begins building the contracts that lenders will eventually need to see.

**Figure 4: From customer enthusiasm to firm orders**



Source: GCFA analysis

A signed offtake agreement is not, by itself, enough. The structure of the offtake matters as much as its existence. As one investor put it, never put all your eggs in one basket. Agreements can be delayed, renegotiated, or fall through entirely, particularly in emerging climate markets where procurement processes and customer demand remain immature. Investors evaluate not only whether offtake agreements exist, but also the diversity and resilience of the underlying customer base. Engaging multiple offtakers across different points of the value chain, including the *offtakers' offtakers*, reduces exposure to demand-side shocks and to shifts in any single buyer's commercial position. A concentrated revenue base is itself a risk, even when contracted.

Climate interest does not guarantee customers will pay the price climate technology actually costs. Many climate ventures need customers to absorb a premium price for the lower-carbon attributes of the product. Sometimes that premium is supported by subsidies or by sustainability commitments. Sometimes it depends on buyers acting on principle. In a tight economy or a thin-margin industry, the premium is often the first thing customers cut.

## Climate interest is not willingness to pay.

Willingness-to-pay is one of the most consequential bankability risks, and it often surfaces too late. Sustainability commitments and net-zero targets generate early interest, but procurement decisions get made under different constraints: operating margins, commodity volatility, shareholder expectations, and competitive pressure. Customers can agree that decarbonization matters and still decline to pay extra for it. The problem is sharpest in hard-to-abate industrial sectors. Steel, cement, chemicals, and heavy industry all face cost premiums of 30 to 70 percent for low-carbon production routes compared to conventional ones, and customers in these sectors operate on margins that cannot easily absorb that difference (IEA, 2024). Even modest premiums materially shift adoption.

The problem compounds when capital is constrained. Lenders and infrastructure investors need predictable revenue to underwrite long-duration FOAK deployment. Predictable revenue depends on contracts customers will actually sign at prices the venture can actually charge. Ventures that depend on policy incentives, green premiums, or carbon market revenue to make the economics work are exposed to a different problem: those revenue sources move. Subsidies get weakened or withdrawn, carbon prices fluctuate, and energy markets shift. A project that looks viable under one set of policy assumptions can become unfinanceable when the assumptions change.

### Case Study: AeroFarms

AeroFarms emerged as one of the most prominent vertical farming ventures, raising more than USD $300 million to commercialize large-scale indoor aeroponic agriculture. The company positioned itself as a leader in sustainable food production through automated, resource-efficient vertical farming systems designed to reduce land and water use while enabling localized food supply chains.

Despite strong investor backing, sustainability visibility, and retailer interest, AeroFarms struggled to achieve profitable commercialization at scale. The company's business model depended on operating highly capital-intensive and energy-intensive infrastructure that required large and predictable offtake volumes to offset operating and financing costs. While there was strong interest in sustainable and locally grown produce from investors, grocery retailers and consumers could not justify the green premium of AeroFarm's products. As a result, this did not translate into the long-term procurement commitments necessary to support infrastructure-scale deployment and stable cash flow. The challenge became increasingly acute as energy prices, operating costs, and financing pressures increased. AeroFarms has declared bankruptcy a number of times and is currently in a period of financial instability, requiring ongoing investments to keep the company afloat.

Ventures that match what customers are already willing to pay for are better positioned. Technologies that integrate into existing infrastructure, retrofit existing operations, or solve a procurement constraint customers were already paying to address face less adoption resistance. They are not asking customers to pay extra for the climate benefit. They are selling something customers already wanted, with the climate benefit as a structural by-product. This is part of why grid-supporting technologies, energy efficiency retrofits, and battery storage have scaled more quickly than greenfield industrial decarbonization.

Offtake risk reshapes how climate ventures get financed and which ventures can scale at all. It is one of the primary determinants of bankability for FOAK climate ventures. Financeability comes from contracted demand, not from technical proof alone. A venture becomes financeable when it can sell what it produces on terms that support debt repayment and infrastructure-scale capital.

> **Many climate ventures end up trapped between two pools of capital that were not built for them.**

Venture-stage capital can absorb technology risk but not the size of cheque a FOAK facility requires. Infrastructure capital can absorb the cheque size but not the commercial uncertainty that comes with unproven offtake. This is what the Risk Pivot looks like: the moment when a venture has outgrown technology capital and is not yet ready for project finance, and when the absence of contracted demand is the constraint that prevents the transition. The IEA estimates that emerging climate technologies face financing costs roughly two to three times higher than those applied to mature renewable infrastructure (IEA, 2025a).

Utility-scale solar and wind scaled rapidly not just because technology costs fell, but because long-term power purchase agreements created bankable revenue streams that infrastructure lenders recognized and knew how to price. Mature procurement structures made the financing possible. Emerging climate sectors have not yet developed the equivalent contracting standards. Global energy transition investment exceeded $2.3 trillion in 2025 (BloombergNEF, 2026), but most of that capital continued to flow toward categories where contract templates, counterparty conventions, and risk-allocation standards are already established. Emerging sectors like hydrogen, sustainable aviation fuel, and industrial decarbonization continue to attract smaller portions of institutional capital, likely because the contract templates and risk-allocation standards that make a deal bankable do not yet exist for these sectors.

## Case Study: Hydrogen Policy Outpacing Commercial Demand

Exxon's Baytown low-carbon hydrogen and ammonia facility in Texas was announced as one of the largest hydrogen projects in the world, with planned capacity of roughly one billion cubic feet per day. The project carried significant federal support, including hydrogen production tax credits under the Inflation Reduction Act. Exxon invested roughly $500 million in early-stage development.

In 2025, the company paused the project, citing insufficient committed offtake at viable pricing (Dang, 2025). Exxon had scale, capital, and substantial policy support. What Baytown lacked was industrial customers willing to sign decade-long offtake agreements at the prices low-carbon hydrogen actually costs. Exxon could build the project, but it could not contract the demand that would make the project bankable.

The interest was real but the willingness of customers to pay was not. A major energy company with deep capital, technical capability, and substantial policy support still could not close enough offtake to justify continued investment.

Investors increasingly evaluate climate ventures as infrastructure assets rather than technology startups. The diligence questions shift accordingly. Lenders and infrastructure investors look at contract quality, counterparty credit, operational reliability, delivery guarantees, and cash flow durability over the contract term. The bar for what counts as bankable rises with each transition from technology capital to project capital, and the diligence becomes more institutional at every step.

Offtake risk is what causes many climate ventures to fail at first, but it is not the only risk they face. A venture that solves the offtake problem can still stall if it cannot deliver what it has promised, cannot source the inputs to build it, or cannot navigate the regulatory environment its project depends on. The bankability standard rises with every dimension a venture must address. Offtake is the first.

### Case Study: Sublime Systems and Microsoft

In May 2025, Microsoft signed a binding long-term agreement with Sublime Systems to purchase up to 622,500 metric tons of low-carbon cement over a six-to-nine-year period (Ross, 2025). The cement will be supplied from Sublime's first commercial factory in Holyoke, Massachusetts, and from a subsequent full-scale facility. What makes the agreement notable is its structure. Microsoft is buying environmental attribute certificates (EACs) tied to the cement's low-carbon production, while the physical cement is delivered where geographic deployment is practical.

The structure decouples the climate value of Sublime's production from where the cement physically goes. For Sublime, this means contracted long-term revenue based on the climate attributes of what it makes, even before commercial-scale facilities are built in every geography where Microsoft might want delivery. For Microsoft, it means using the EACs against the Scope 3 emissions of its data center construction.

The structure solves a specific problem at the Risk Pivot. Sublime did not have to wait for full commercial-scale deployment to secure a long-term contract. Microsoft did not have to wait for cement delivery to claim the climate benefit. The contract created bankable demand at a stage when most climate ventures cannot yet contract for it.

Sublime's innovation was not only its cement, but it was also the innovative contract that made the cement bankable.

## 4.2 Execution Risk

FOAK climate ventures rarely fail because the underlying science breaks down. They fail in the translation from working concept to commercial operation, and execution is what determines whether they survive it.

The most capital and time intensive stages are demonstration and deployment, when FOAK projects require significant scale-up of new technology that inherently poses performance risk. Processes that are stable and predictable at pilot scale can behave unpredictably when replicated at industrial scale.

Cost overruns can disrupt project schedules, delay completion, and strain relationships among all stakeholders. Such overruns are structural features of FOAK delivery rather than anomalies. A 2025 study of 662 energy infrastructure projects across 83 countries found total cost overruns of 66 percent against budgets, with hydrogen and carbon capture facilities exhibiting some of the highest cost and schedule overruns of any technology class examined (Sovacool and Ryu, 2025). Low design maturity and late-stage rework have historically driven cost overruns and multi-year delays across new energy infrastructure builds.

EPC contracting is a central lever in managing this risk, and one where FOAK developers face an acute dilemma. Bankable project structures typically rely on long-term, fixed-price offtake agreements and fully wrapped EPC contracts managed by a project team with an extensive delivery track record. However, these strategies are only cost-effective for technologies already in late deployment. For FOAK developers, such arrangements are often inaccessible as EPC firms with limited familiarity with the underlying technology may either decline to assume technical risk through commercial operations, or price that risk so heavily as to invalidate the project's financial case.

Creative contracting structures have emerged in response. Time-and-materials contracts between technology providers and EPC firms with a fixed minimum price are increasingly preferred over lump-sum contracts or guaranteed maximum price contracts, which tend to overspend early and lead to overruns later.

If construction and engineering risk is the most structurally complex dimension of FOAK execution, the human and organizational dimension may be the most consequential.

What differentiates successful founders is not necessarily sector background, but the capacity to learn and ask the right questions. What matters

**Successfully executing a FOAK project depends on the quality of the venture's team.**

more are the problem-solving instincts and self-awareness to know when to seek help, a willingness to be coached, and the tenacity to absorb repeated setbacks without losing momentum. The ecosystem around the team matters too: whether the companies or customers that will eventually buy the product are stepping forward to support the transition, and whether commercial commitments are genuinely progressing.

The transition from proof-of-concept to proof-of-profit changes how the company thinks about risk and how its investors think about capital deployment. The team must evolve alongside the project. Early-stage founders raise venture capital from investors willing to take technology risk. As the project moves toward FOAK, they must attract a different class of capital, one that is not taking technology risk at all. The implication is that the management team itself must be capable of that evolution or must be willing to add the functional capacity it lacks. Adding a CFO is a concrete signal of organizational readiness that gives lenders confidence.

What investors are looking for in this context is not simply domain expertise. As one interviewee put it: "A CEO's job is two things, it is to make sure that you have a team that can execute the venture strategy and it is to make sure the venture has enough money to actually conduct that execution." The CEO's job is to manage both the team and the capital.

Organizational maturity has its own execution risk dimension. The journey from startup to scale-up brings complexity that requires putting basic governance infrastructure in place with decision-making processes, financial controls, and operational discipline. These may seem like administrative concerns, but their absence can create vulnerability precisely at the moment when a FOAK startup is trying to attract the institutional investors and lenders who will scrutinize everything.

The financing transition is itself part of execution risk. Venture investors seek returns in five to ten years. Infrastructure life cycles run from ten to twenty years, and a FOAK project takes five to seven years just to develop and build (US Department of Energy, 2024). Cost overruns and schedule slippage make the timing mismatch worse. Every year of delay widens the gap between when the venture's earliest backers need to exit and when the project can credibly generate returns at infrastructure scale. The capital that finances infrastructure, project finance debt, insurance-backed structures, and institutional credit, is not in the business of taking technology risk, and expects debt service coverage ratios of 1.5 to 2.0x and contingencies of 25 to 30 percent on top of mature engineering designs (US Department of Energy, 2024). The team is what stands between those standards and the venture's ability to meet them. A team that has managed the scale-up from pilot to commercial deployment, secured a workable EPC structure, brought in operating leadership, and built governance to institutional standards is the team that can credibly present a FOAK project to the next class of capital. Execution is what makes the financing transition possible.

### Case Study: LanzaJet Freedom Pines

LanzaJet's Freedom Pines Fuels facility in Soperton, Georgia was designed to produce 10 million gallons of sustainable aviation fuel and renewable diesel per year, roughly doubling US SAF production at the time. In April 2021, LanzaJet awarded a fixed-price EPC contract to Zeton, a specialist modular plant builder, to fabricate and construct the facility, and contracted Burns and McDonnell separately for the engineering design of site utilities and infrastructure. The fixed-price wrap was unusual for a FOAK project. It was made possible by more than two years of joint engineering work that LanzaJet and LanzaTech had completed with Zeton before the EPC contract was signed (LanzaJet, 2021).

The modular approach allowed Zeton to fabricate most of the plant in a controlled environment in Burlington, Ontario, with testing and partial commissioning completed before final modules were shipped to Georgia for assembly. The EPC structure held through construction. The facility was fully erected by April 2023, on schedule (LanzaJet, 2023). Startup was delayed by Hurricane Helene in fall 2024, which caused community-wide utility outages, and by equipment issues during commissioning runs that followed. First production of sustainable aviation fuel was achieved in February 2026, roughly two years behind the original schedule (Harrington, 2025).

LanzaJet's EPC structure absorbed the risks it was designed to absorb. The technology and construction risks were wrapped into a single fixed-price contract with a specialist modular plant builder who had been engaged during basic engineering. EPC contracts cannot absorb the commissioning learning curve of a FOAK process or the external shocks that come with operating in the real world. Even with strong execution discipline, the venture's first commercial facility took longer to come online than planned.

# 4.3 Supply Chain Risk

A working technology and a contracted offtake are not enough to build a FOAK climate project. The venture also needs reliable access to suppliers, manufacturing capacity, commodity inputs, and trade conditions that can move against it without warning. Supply chain exposure has become a bankability factor in its own right.

Lenders treat FOAK supply chain exposure as a direct bankability risk, and the financing terms show it. Contingency reserves for FOAK infrastructure run 25 to 30 percent above base project costs, meaning a $100 million project may require an additional $25 to 30 million in reserves (US Department of Energy, 2024). Loan-to-value ratios sit at 20 to 60 percent rather than the 80 percent typical for mature renewable infrastructure. Debt service coverage ratios (DSCR) reach 1.5 to 2.0x, and projects exposed to commodity volatility can carry DSCRs as high as 3.0x.

**Supply chain exposure is concentrated geographically, and that concentration is a commercial risk.**

Moving from pilot to demonstration commonly requires production increases of 10 to 100x (US Department of Energy, 2024). Vendors that can support pilot volumes often cannot support commercial ones, whether the constraint is manufacturing capacity, logistics, or financial strength. Lenders and insurers respond by evaluating supply chain capability as early as technology readiness level (TRL) 6, and by TRL 7 they are reviewing EPC agreements, feedstock contracts, and supplier creditworthiness in detail.

Geopolitics shapes the economics of scaling. China currently controls at least 60 percent of global manufacturing capacity in batteries, solar, and rare earth processing (IEA, 2023). Trade restrictions and export controls in any of these areas can move costs and timelines against climate ventures with little warning.

Supply chain localization has lagged behind policy ambition. Governments in the United States and Europe have introduced industrial policy to bring manufacturing of these inputs onshore, but the localization gap remains substantial. Announced U.S. projects representing approximately $6.9 billion in investment were cancelled in the first quarter of 2025 alone, and domestic polysilicon manufacturing capacity remained roughly 26 percent below what U.S. deployment demand required in 2024 (Clean Investment Monitor, 2025). For FOAK climate ventures, this means the geographic concentration of supply chains is not a problem that policy has solved.

### Case Study: Northvolt

Northvolt was founded in 2015 by two former Tesla executives with the goal of building a European battery manufacturing industry capable of competing with CATL and BYD. By 2024 it had raised over $15 billion from investors including Volkswagen (which held a 21 percent stake), Goldman Sachs (19 percent), BlackRock, and Swedish pension funds. It had secured approximately $55 billion in customer orders from automakers including Volkswagen, BMW, and Scania, and received major institutional support from the European Investment Bank and the Nordic Investment Bank. The flagship Northvolt Ett gigafactory in Skellefteå, Sweden produced its first battery cell in December 2021 and shipped its first commercial cells in 2022 (Billing, 2024).

To meet the demand on its order book and deliver against its automaker contracts, Northvolt depended on imported Chinese cathode active material and Chinese manufacturing equipment. Thousands of tonnes of NMC cathode were shipped from Chinese suppliers to the Skelleftea plant in 2023 and 2024 (Nohlgren et al., 2024). The cell production equipment came from Wuxi Lead, a Chinese supplier whose machines often required Chinese personnel on site to operate them (Murphy & Lagercrantz, 2024). These dependencies created operational bottlenecks that the company could not resolve. By the end of 2023 the plant had delivered less than 1 percent of its planned 16 GWh annual capacity, BMW cancelled a EUR 2 billion order in June 2024, and the company filed for bankruptcy in Sweden in March 2025 (Northvolt, 2025).

Northvolt had the demand and the capital. What it could not control was its supply chain

Northvolt's dependencies are not unique to battery manufacturing. Climate ventures across sectors are exposed to inputs that have become more expensive, more concentrated, or more constrained. Semiconductor shortages have disrupted electric vehicle manufacturing and grid infrastructure deployment. Copper shortages and transformer backlogs continue to delay transmission expansion. Price volatility has compounded the availability problem. Battery material prices surged in 2022, contributing to a nearly 10 percent rise in battery prices after years of continuous cost declines (IEA, 2024). Polysilicon, copper, and steel prices roughly doubled between the first half of 2020 and the first half of 2022.

Some constraints are structural rather than cyclical. PEM electrolysers depend on iridium, a metal whose global production is limited enough that meeting projected hydrogen deployment targets would require iridium intensity to fall 89 to 97 percent by 2050 (Mouton et al., 2025). Under projected clean-hydrogen demand scenarios, the sector would need iridium volumes up to nine times current annual global production by 2030. For hydrogen, the supply chain risk is not a market condition. It is a physical ceiling on how fast the technology can scale.

The relationship between supply chains and unit economics is what determines whether a FOAK venture is bankable. A project finance model gets built on a specific set of input costs, a specific volume of input required per unit of output, and a specific conversion efficiency at industrial scale. Those numbers become the basis for everything that follows. Offtake contracts get signed against them. Debt service coverage and contingency reserves get sized to them. Lenders underwrite the project on the assumption that they will hold.

Supply chain risk is what makes unit economics fragile. A change in input price, a constraint on input volume, or a shortfall in conversion yield each rewrites the unit economics, and a project finance structure built on the original numbers will not survive that revision. The strength of the case, the quality of the team, and the credibility of the technology all become less relevant when the per-unit math underneath them no longer works.

Unit economics can fail on the output side. The assumption that a process will deliver a specific amount of product per unit of input is set at pilot scale and then carried forward into the project finance model, often without enough industrial-scale evidence to support it. KiOR was a biofuels company that built a commercial-scale facility in Columbus, Mississippi to convert wood biomass into transportation fuels using a proprietary catalytic process. The company projected conversion rates of approximately 67 gallons of biofuel per dry ton of wood biomass and financed the project against those numbers (Reichelstein et al., 2013; Wesoff, 2014). Actual yields at scale were consistently lower. The feedstock was available, the technology converted biomass to fuel, but the per-unit math the project was financed against was wrong from the start. For FOAK ventures, the conversion yield assumption is one of the most consequential numbers in the model, and one of the hardest to verify until the project is operating.

**Supply chain resilience is now inseparable from unit economics.**

Unit economics can also fail on the input side. The cost structure that supports a project at financing was set against a specific commodity environment, and that environment can move. Solyndra was a US solar manufacturer that produced cylindrical solar panels using a copper indium gallium selenide (CIGS) thin-film technology. The strategy was a deliberate bet on avoiding polysilicon, the dominant input in conventional solar panels. The bet made sense at the time. Solar-grade polysilicon was trading at approximately $400/kg when the company launched, and Solyndra's cost case depended on prices staying high (Congressional Research Service, 2011). Between 2009 and 2011, Chinese manufacturing expansion drove polysilicon prices down by roughly 89 percent. Solyndra's technology still worked, but its cost case did not. Despite a $535 million DOE loan guarantee, the company became economically uncompetitive because the commodity environment it had been financed against no longer existed (Congressional Research Service, 2011).

### A FOAK venture cannot scale faster than the infrastructure its customers need to use the product.

Supply chain risk does not stop at the factory gate. A FOAK venture that has secured demand, sourced its inputs, and manufactured its product still has to deliver it into a world where customers can use it. That world includes physical infrastructure the venture does not control. When the venture's product depends on infrastructure that has not yet been built, the demand the venture has secured cannot translate into operating revenue. The customer signed a contract because the product matched a future state of the world. Until that future state arrives, the venture is sitting on manufacturing capacity that the market cannot absorb.

For lenders and project finance counterparties, this is a real exposure. The bankability case rests on revenue growing in line with manufacturing capacity. If the operating environment is missing on the customer side, revenue stays flat while the cost structure of producing the product continues to run. The venture burns capital faster than it generates revenue, and the project finance model that was built against the original deployment timeline does not hold. Climate technologies that depend on co-developed infrastructure are especially exposed because the venture's deployment and the supporting infrastructure's deployment are running on separate timelines. The venture cannot bring its product to market faster than the slowest piece of the broader system.

Hyzon Motors was a US hydrogen fuel-cell truck manufacturer that listed publicly through a SPAC merger in 2021. The company projected delivery of 40,000 trucks by 2025 and reached a share price above $850 after listing (Adler, 2024). The trucks themselves were technically deliverable. The hydrogen refueling ecosystem that customers needed to operate them at commercial scale did not exist. By its final quarter, Hyzon generated only approximately $100,000 in revenue (Adler, 2024). The company dissolved in 2025. The venture had built a product that customers could not use, and the financing structure that had supported the company through SPAC valuation collapsed once the gap between manufacturing capacity and operating capacity became visible.

Supply chain risk has moved from operational concern to financing constraint. Lenders and insurers now evaluate geographic concentration, commodity exposure, conversion yield assumptions, and downstream ecosystem maturity as part of the bankability assessment, and they require ventures to demonstrate mitigation against each. For FOAK climate ventures, supply chain resilience is no longer separate from financing or unit economics. It is the precondition for both.

## 4.4 Regulatory Policy and Geopolitical Risk

Policy is, simultaneously, one of the most powerful enablers of climate technology commercialization and one of its most persistent sources of financing risk. For founders and investors navigating the Risk Pivot, the regulatory environment performs a dual function. It can expand the universe of financeable projects by improving economics, reducing demand uncertainty, and signaling strategic relevance to capital markets. It can also contract that universe just as quickly when support shifts, stalls, or reverses. Canadian climate ventures face this tension particularly sharply. They operate in an integrated North American market, where domestic policy gets tested against US trade pressure and supply chains that run through China. As one interviewee put it, policy is both enabling and destabilizing.

Policy support can be a decisive input to financeability. Tax credits, carbon pricing, and procurement mandates each improve project economics or reduce counterparty risk in ways that directly affect a venture's ability to attract growth equity, project debt, or infrastructure capital. The most effective mechanisms do more than improve returns. They create demand certainty, reduce first-loss exposure, and validate strategic markets in ways that allow private capital to commit earlier. Canada's Investment Tax Credits for clean hydrogen, carbon capture, clean technology, and clean manufacturing are examples of policy support structured as statutory entitlements rather than discretionary incentives, which gives them a different bankability profile than support that depends on annual appropriation.

The distinction investors draw is between ventures that are policy-supported and those that are policy-dependent. A venture is policy-supported when incentives improve an already-credible business case. It becomes policy-dependent when those incentives are load-bearing, when the removal of a tax credit or procurement mandate would render the project unfinanceable. That distinction shapes how capital providers assess and price risk.

As one interviewee put it, “we struggle hard with something that is going to need policy.” Others described the same tension in different terms, noting that policy can pull demand forward while making long-duration financing harder. This captures the structural problem at the FOAK stage. Policy can validate market formation, but the conditions it creates, revenue that is partially administered and demand that is partially artificial, introduce uncertainty that complicates long-duration financing. Lenders and infrastructure investors price duration risk. A project whose revenue depends on a policy regime with a political sunset is a fundamentally different proposition from one anchored in contracted demand from creditworthy commercial buyers.

**The distinction that matters to lenders is between *policy-supported* and *policy-dependent*.**

## Case Study: Canada's EV Mandate Reversal

Canada's Electric Vehicle Availability Standard (EVAS) was finalized by the Trudeau government in December 2023. The regulation required zero-emission vehicles to make up 20 percent of new light-duty vehicle sales by 2026, 60 percent by 2030, and 100 percent by 2035. The mandate was the central demand-pull mechanism behind Canadian investment in EV manufacturing, battery production, and charging infrastructure. Federal and provincial commitments of more than CA $52 billion in public support attracted CA $46 billion in private investment, including Volkswagen's CA $7 billion battery plant in St. Thomas, Ontario, the Stellantis-LG NextStar joint venture in Windsor, Ontario, Honda's CA $15 billion four-plant complex in Alliston, Ontario, and Northvolt's CA $7 billion battery plant in Saint-Basile-le-Grand, Quebec (Parliamentary Budget Officer, 2024). Each was structured around the assumption that the mandate would create a sustained domestic market for the vehicles those plants would supply.

The mandate did not survive its first year of enforcement. On September 5, 2025, Prime Minister Mark Carney paused the 2026 target, citing US tariff pressure on the Canadian auto industry, and launched a 60-day review. In February 2026, the government formally repealed the EVAS and replaced it with emissions standards for model years 2027 to 2032 and a new Electric Vehicle Affordability Program offering rebates of up to CA $5,000 (Government of Canada, 2026; Burke & Thurton, 2026). British Columbia followed in November 2025 by scrapping its own 100 percent by 2035 target. Canadian EV sales had already dropped from 14.5 percent of light-duty vehicle sales in 2024 to 8 percent in the first eight months of 2025 after federal and provincial purchase incentives expired (C.D. Howe Institute, 2025).

Canadian climate ventures and the international automakers that committed to building in Canada had structured investment cases against a mandate that no longer exists. The reversal demonstrates how policy commitments that are politically reversible cannot anchor long-duration investment, and how integrated North American supply chains make Canadian climate policy particularly exposed to US trade dynamics. The technology was not the issue. The demand assumption that the financing rested on was withdrawn.

The EVAS reversal is the Canadian version of a pattern visible across multiple jurisdictions. Policy reversal, the weakening or elimination of support mechanisms after a venture has structured its financing around them, has become the dominant near-term risk facing FOAK climate ventures in 2026. The threat is most acute for capital-intensive projects with long deployment timelines, where the financing structure is illiquid and cannot easily be repriced when the policy environment shifts.

The US sustainable aviation fuel sector illustrates the same dynamic in a different policy regime. Investment in SAF grew rapidly under the production tax credits introduced in the Inflation Reduction Act, then stalled when the second Trump administration's Treasury Department rewrote the 45Z tax credit rules in ways that disqualified imported feedstocks. LanzaJet's Freedom Pines facility had been engineered around Brazilian sugarcane ethanol. The rule changes forced a pivot to US corn ethanol to remain eligible, which worked but required engineering changes and added cost. Other SAF ventures with less operational flexibility have stalled or cancelled projects. Approximately $6.9 billion in announced US climate technology investments was cancelled in the first quarter of 2025 alone (Clean Investment Monitor, 2025).

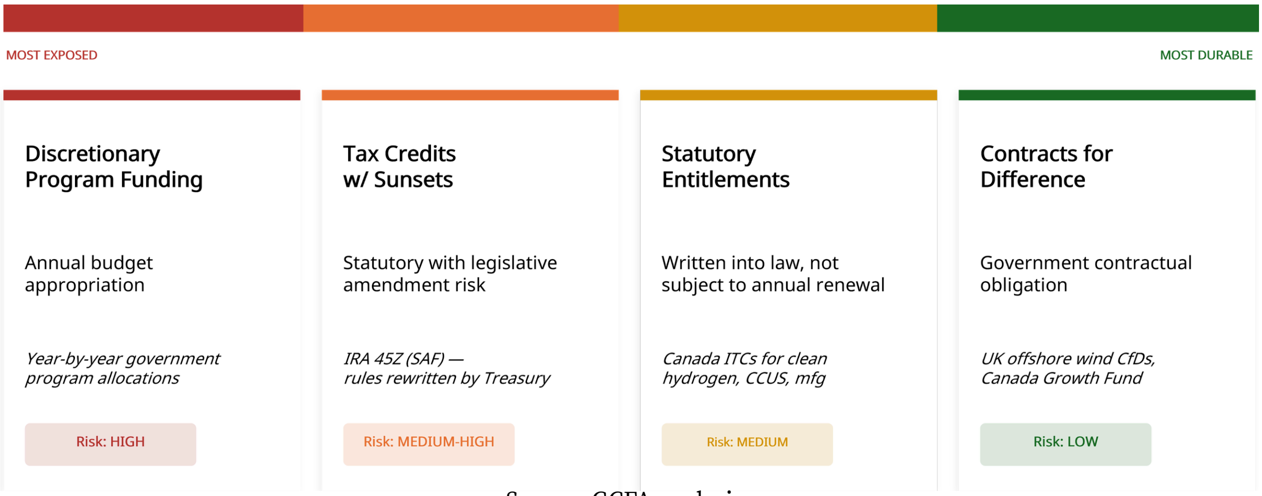
Investors are responding by stress-testing policy assumptions earlier in diligence. The ventures best positioned to withstand this scrutiny are those that can demonstrate a path to commercial viability without requiring a specific policy regime to persist, or that have anchored their support in legally durable mechanisms rather than discretionary incentives. Jurisdictional comparison has become part of this analysis. Investors now distinguish between regulatory environments based on institutional stability and track record on policy continuity. Jurisdictions with independent regulatory agencies, long-standing carbon pricing infrastructure, and a history of honoring long-term contracts attract lower policy risk premiums than those where regulatory decisions are exposed to electoral cycles or executive discretion.

Not all policy support is equal in terms of duration and durability. Discretionary incentives subject to annual appropriation, such as program funding that depends on year-by-year government budgets, are the most exposed to reversal. Tax credits with statutory sunset clauses are more durable because they are written into legislation, but they remain subject to legislative amendment, as the SAF sector experienced when Treasury rewrote the 45Z rules. The most durable forms of policy support are those structured as contractual obligations rather than political commitments, where the government has signed a contract that survives changes in policy direction.

The clearest example is contracts for difference. The UK has used contracts for differences (CfDs) to underpin offshore wind deployment since 2014, guaranteeing a strike price that the government pays the difference on when wholesale electricity prices fall below the agreed level (UK Government, 2024). The mechanism creates a contractual cash flow that survives changes in political administration, which gives lenders the duration certainty they require to commit project finance debt. Similar mechanisms are now appearing in industrial decarbonization, including the EU Innovation Fund's grant agreements (European Commission, n.d.) and Germany's Carbon Contracts for Difference for heavy industry (BMWK, 2024). In Canada, the Canada Growth Fund has begun using carbon contracts for difference in carbon capture and clean hydrogen, providing ventures with a contractual floor against future changes to the federal carbon pricing system (Canada Growth Fund, 2024). The instrument is the same. The government accepts a long-term contractual obligation in exchange for the investment certainty that allows the venture to access infrastructure-grade capital.

The regulatory process itself is a material risk at the FOAK stage. Permitting timelines and environmental review processes can add years to a project's development schedule, years during which capital is deployed, and market conditions can shift. For ventures whose financing structures are sensitive to timeline, these delays carry direct consequences for cost of capital, investor confidence, and counterparty commitments.

**Figure 5: Policy durability spectrum**



| Discretionary Program Funding | Tax Credits w/ Sunsets | Statutory Entitlements | Contracts for Difference |
|---|---|---|---|
| Annual budget appropriation | Statutory with legislative amendment risk | Written into law, not subject to annual renewal | Government contractual obligation |
| *Year-by-year government program allocations* | *IRA 45Z (SAF) — rules rewritten by Treasury* | *Canada ITCs for clean hydrogen, CCUS, mfg* | *UK offshore wind CfDs, Canada Growth Fund* |
| Risk: HIGH | Risk: MEDIUM-HIGH | Risk: MEDIUM | Risk: LOW |

Source: GCFA analysis

**Policy support that can be withdrawn is not the same as policy support that is contractually durable.**

Grid interconnection is the most acute example of how regulatory timelines affect FOAK ventures. Interconnection queues in North America have grown significantly over the past five years. Wait times in many US regional transmission organizations now exceed five years, with some queues extending longer (Lawrence Berkeley National Laboratory, 2024). Canadian interconnection queues vary by province, with Ontario and Alberta both reporting multi-year backlogs. Technologies dependent on grid access, including electrolysers, grid-scale storage, and industrial electrification, face permitting pathways that may not align with the timelines required for commercial financing or the milestones embedded in offtake agreements. Investors now treat unresolved permitting exposure as a form of execution risk with direct consequences for bankability, and ventures that can demonstrate a clear regulatory pathway are in a materially stronger position than those that treat permitting as a downstream concern.

Geopolitical risk does not operate only at the level of supply chains. It is embedded in the policy mechanisms that FOAK climate ventures depend on. Trade restrictions, content requirements, and sourcing rules are themselves policy instruments, and they create financing exposures that ventures have to navigate on top of the underlying supply chain dynamics described earlier in this paper.

The Inflation Reduction Act's foreign entity of concern provisions disqualify battery components and critical minerals sourced from companies with material Chinese involvement. The supply chains that dominate global production of those components and minerals are the same ones the provisions are designed to exclude. A venture trying to qualify for the IRA's most valuable incentives faces a sourcing problem the policy itself created and that current alternative supply chains cannot yet solve. Home-market policy and supply chain reality are in direct tension, and the venture has to navigate both.

Canadian ventures face a sharper version of the same problem. Canada applied a 100 percent tariff on Chinese-made electric vehicles in October 2024 and additional tariffs on Chinese steel and aluminum, following parallel US action. The tariffs were designed to protect Canadian manufacturing investment but also raised costs for Canadian climate ventures that depend on Chinese inputs for battery materials, solar components, and electrolyser stacks. As part of the broader EV strategy reset in early 2026, the federal government also signaled it would allow a quota of up to 50,000 Chinese-made EVs into the Canadian market annually to address consumer affordability. Canadian climate policy is being shaped by simultaneous pressure from US trade dynamics and Chinese supply chain realities. The tariffs protect manufacturing on the supply side while the import quotas address affordability on the demand side. Climate ventures financing projects in this environment cannot assume that the policy regime will hold steady against either pressure.

Policy is now one of the central variables that determines whether a FOAK climate venture can cross the Risk Pivot. The ventures positioned to attract project finance capital are those whose financing case does not break when the policy regime shifts, the trade regime tightens, or the geopolitical environment moves. Project finance models built on specific tax credits, specific sourcing assumptions, and specific permitting pathways have to remain viable across multiple variables moving at once. The contractual mechanisms that translate policy support into durable commercial obligations are part of how ventures meet that bar, and the durability of those contracts is itself a dimension of risk that warrants separate treatment.

**Geopolitical risk is now embedded in the policy mechanisms ventures depend on.**

## 4.5 Intellectual Property Risk

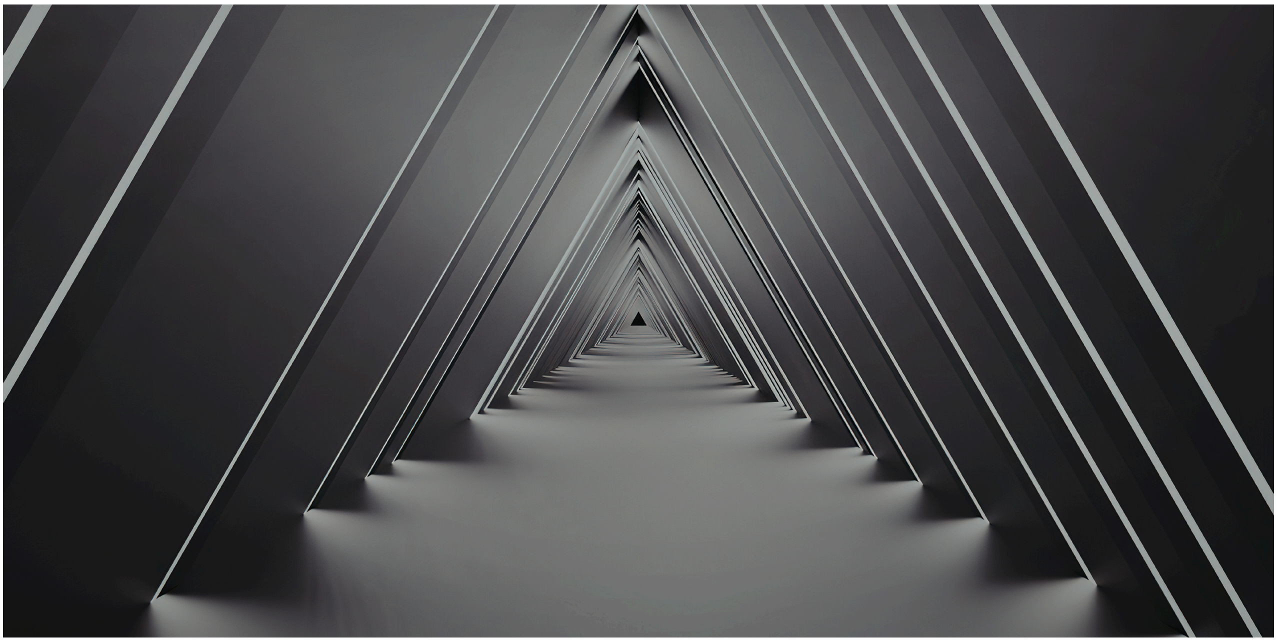
For climate tech ventures, intellectual property risk does not end when the first patent is filed. As the technology transitions from pilot success to commercial deployment, the risk pivots sharply, from "can this work?" to "can this be financed, deployed, licensed, and owned without blocking the company's ability to scale?" IP is not a static legal housekeeping matter; rather, it is an active financing constraint that investors scrutinize at every subsequent round.

Investors who back climate tech ventures at the FOAK stage are willing to underwrite commercialization risk rather than technology risk alone, and IP defensibility is a central element of how they evaluate that risk.

The patent portfolio of a climate tech venture changes function as the venture moves from pilot to commercial scale. At the pilot stage, the portfolio is primarily a defensive asset that establishes priority on the underlying technology. At the commercial stage, it becomes a risk-allocation instrument that investors and customers use to evaluate whether the venture can preserve exclusivity, avoid infringement surprises, and sustain deployment across multiple customer environments and geographies.

The quantitative evidence shows IP defensibility translating directly into financing outcomes. Firms holding green patents are associated with up to approximately 20 percent higher probability of receiving venture capital financing relative to comparable equity-backed firms without green patents (Bellucci et al., 2023). The climate technology invention landscape has also become substantially more crowded, with more than 750,000 inventions published between 1997 and 2021 and a 33 percent rise in clean technology inventions from 2016 to 2021 (European Patent Office and European Investment Bank, 2024). The same survey of European cleantech innovators found that more than 70 percent view patents as very important for preventing imitation, and 54 percent of micro and small firms view IP rights as highly important for securing funding. Clean technologies have scaled unevenly across sectors. Modular, low-cost, infrastructure-light technologies scale fastest. Capital-intensive, system-dependent technologies scale much more slowly, which has direct implications for how their IP can be protected and financed (WIPO, 2026).

**The question is not whether the venture has a patent. It is whether the venture can keep deploying across customers and jurisdictions without renegotiating ownership every time.**



The investor test has shifted accordingly. The question is no longer whether the venture has IP protection but whether the IP is defensible, exclusively owned, and capable of surviving a change of control, a customer insolvency, or a termination of a collaboration agreement. This requires an evolving IP strategy that clearly maps which assets are patented, which are protected as trade secrets, who owns improvements developed through partnerships, and what rights remain with the company if a commercial relationship breaks down.

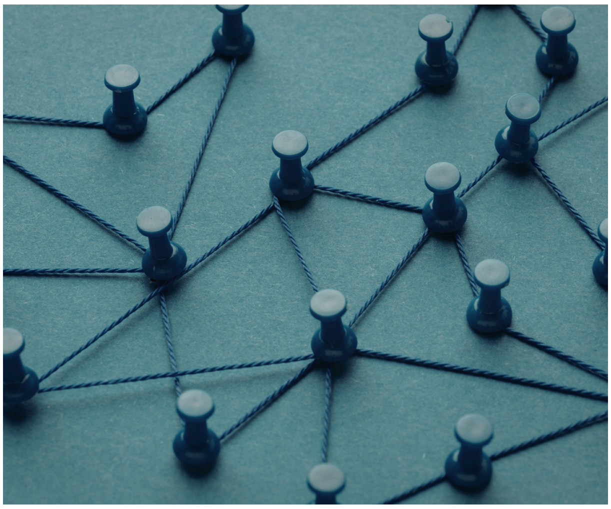
Patent coverage and trade secrets serve different purposes in this assessment. Patents are most valuable for visible or reverse-engineerable hardware, materials, devices, and methods of use. Trade secrets are more appropriate for non-visible know-how, manufacturing parameters, and implementation details, though they require disciplined confidentiality controls. A trade-secret-only approach leaves a venture exposed to independent discovery, reverse engineering, and third-party patent blocking, because trade secrets do not create prior art in the same way patents do.

The most underappreciated IP risk at the FOAK stage comes from the venture's own industrial partnerships rather than from external competition. Climate tech ventures at the FOAK stage routinely test their technologies inside incumbent industrial systems. A green cement additive enters an existing cement process. A low-carbon material is inserted into a customer's manufacturing line. A sensor or software package is adapted to a specific plant configuration. While the venture brings and owns the original background IP, the integration process can create an innovation delta, adaptation or improvement that may itself constitute new, commercially significant IP. The central legal question is who owns the solution created during integration and who can commercialize it with subsequent customers.

**The contractual terms attached to integration IP determine whether the venture can scale across customers.**

Any person who contributes to the inventive concept of innovative improvement may legally be considered an inventor. Generally, patent ownership originates with the inventor(s) which can then be assigned elsewhere under contract. If a venture does not have clear ownership of the innovative improvement required to make the aggregate technology work, then an industrial host, EPC partner, or strategic investor may obtain critical blocking rights. In such a case, the venture's freedom to deploy the aggregate solution with other customers is directly impaired. When ambiguous joint-ownership claims attach to the improvements created during a commercial-scale demo, the venture loses the freedom to deploy the improved technology elsewhere without renegotiating ownership from a position of weakness. This pattern has surfaced repeatedly in primary research with climate tech ventures at the FOAK stage.

Protection against this risk requires contracts that define the IP arrangements before deep technical engagement begins. The collaboration, customer implementation, or commercialization agreement should specify the background IP each party brings to the relationship, the ownership and allocation of foreground and derivative IP createdduring it, improvement and sublicensing rights, field-of-use limitations, data and know-how rights, and access rights in the event of a sale, change of control, termination, or insolvency. The objective is not just to protect IP. It is to preserve the venture's freedom to commercialize the complete deployed solution across all intended customer segments. From an investor's perspective, these agreements should be documented and available in the data room at the time of financing.



The IP system creates a temporal problem for ventures that need to demonstrate technology to attract financing. Real-world demonstrations and customer trials are essential for unlocking commercial-stage capital, but they can also trigger patent-law consequences if the venture has not filed for patent protection before a demonstration begins. The risk is most acute for climate tech ventures at the FOAK stage, where the product is often sold or installed at a customer site as part of the commercial demonstration itself. Under US patent law, the on-sale bar starts a one-year clock from the date an invention is offered for sale and ready for patenting (35 USC 102(a)(1)). Missing that one-year window extinguishes the venture's ability to obtain patent rights in the U.S. The relevant threshold is not whether the venture intends to sell. It is whether the activity constitutes an offer for sale in the legal sense, a determination that can be triggered earlier than founders typically expect.

The protective sequence can comprise three steps. First, the venture files an initial patent filing (e.g. a U.S. provisional patent application) prior to any public demonstration or customer trial. Second, the venture disciplines internal teams to limit the subject matter of any disclosures to stay within the scope of what has been filed. Third, the venture negotiates and executes a collaboration or customer agreement defining IP ownership before technical engagement begins.

NDAs alone are not sufficient and can introduce risk if drafted too broadly. Overbroad non-use provisions may prevent the venture from acting on ideas, feedback, or jointly developed know-how that emerge during preliminary discussions. The preferred approach is an NDA containing a feedback clause that preserves the venture's right to exploit derivative technologies suggested by third parties during early discussions.

**The sequence of filings and contracts determines whether IP rights survive commercial demonstration.**

## Case Study: LanzaTech and LanzaJet

LanzaJet appeared earlier in this paper as a case study in execution risk and as an example of policy reversal. Its IP arrangements illustrate how a venture's commercial freedom can become hostage to license terms that worked at the demonstration stage but constrained scaling at the commercial stage. LanzaTech, a carbon-recycling technology company, spun out LanzaJet in 2020 to commercialize sustainable aviation fuel through an alcohol-to-jet pathway. The 2020 license gave LanzaJet exclusive worldwide rights to use LanzaTech's technology within the SAF field. The agreement also addressed improvements: new IP developed in connection with the licensed subject matter would generally be assigned to LanzaJet.

As LanzaJet advanced the Freedom Pines facility and prepared for broader commercial rollout, the original IP arrangements ran into limits that had not been visible at the demonstration stage. In October 2025, the parties amended the license and the broader investment structure. The amendments removed restrictions on third-party sublicensing of LanzaJet technology, eliminated LanzaTech's right to terminate the license for missed commercial milestones by December 31, 2025, and committed LanzaTech to assign the Battelle license, which held underlying technology rights, to LanzaJet directly (LanzaTech Global, 2025).

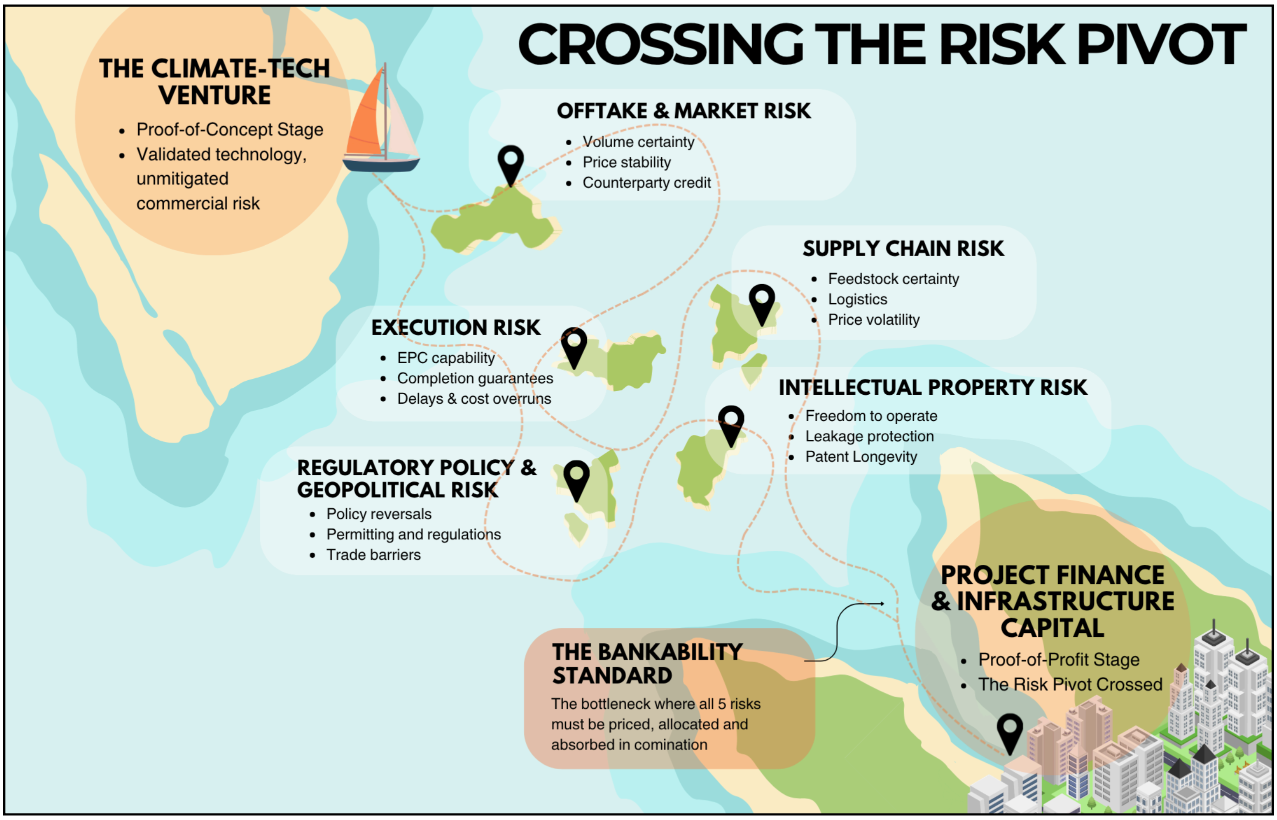
The 2020 structure protected the background IP it was designed to license. It did not anticipate who would own the improvements that emerged in commercial deployment, how sublicense rights would expand as new partners entered, or what would happen if project milestones slipped. The amendments addressed all three at once. The renegotiation was possible because LanzaTech and LanzaJet were related parties with aligned commercial interests. A climate tech venture at the FOAK stage facing the same problem with an independent industrial host, EPC partner, or strategic investor would face a much harder negotiation, or no negotiation at all. At the demonstration stage, IP terms are a standalone legal matter. At commercial scale, they determine whether the venture can be financed and deployed.

The IP diligence that climate tech ventures face at the FOAK to commercial transition is structurally different from the diligence they faced at seed or Series A. At seed and Series A, investors evaluate IP at the level of protectability. They look for patent filings, freedom-to-operate analyses, founder and prior-employer IP assignments, and whether the company's protection strategy matches its technology category. The IP diligence question is whether the venture has a defensible technology position. At the FOAK to commercial stage, investors look at the same items and then go further. They evaluate whether the IP can support deployment across multiple customers and jurisdictions, whether contractual structures around derivative IP and sublicensing rights are documented, whether change-of-control and milestone provisions in customer agreements preserve the venture's commercialization rights, and whether the venture's IP strategy integrates with its commercial deployment plan.

Ventures that present this material in a structured, auditable form are in a materially stronger position than those that do not. A diligence-ready posture means maintaining a current record of core, adjacent, and defensive patent filings, trade-secret controls and access lists, invention disclosure dates, demonstrations and offers for sale, employee, contractor, and collaborator IP assignments, open-source and software dependency audits where relevant, and all collaboration and customer agreements. The sophistication of this function is itself a signal of management maturity, and it affects both the ability to raise capital and the terms on which it is offered.

Intellectual property risk operates at every stage of a climate tech venture's commercial trajectory, but it becomes a financing constraint at the FOAK to commercial transition. The diagnostic that investors apply at this stage is consistent across the interviewees interviewed for this research. As one interviewee put it, the test is whether the venture can "keep deploying the technology without renegotiating ownership every time it enters a new industrial setting." Portable and pre-agreed commercialization rights are what separate climate tech ventures that can attract institutional financing at the FOAK stage from those that cannot.

**Figure 6: Crossing the Risk Pivot**



Source: GCFA analysis

# 5. Framework for Bankability

**Bankability is not a sequence of hurdles that can be cleared one at a time. It is an integrated test that institutional capital applies once, to the whole project, when it decides whether to commit.**

Bankability at the Risk Pivot is only achieved when all five dimensions of risk are resolved simultaneously. A venture that resolves one or two dimensions but leaves others unaddressed does not cross the Pivot. It stalls in front of it.

Offtake agreements without execution certainty produce contracts that buyers hesitate to sign and lenders refuse to recognize. Execution certainty without supply chain resilience creates project plans that cannot be costed or insured. Intellectual property without commercial traction produces legal protection over an asset with no confirmed market. And all of the above elements remain vulnerable to regulatory and geopolitical shifts that can alter the economics of a project before the first dollar of project finance is deployed.

The convergence is visible in the data. Investment in emerging climate technologies fell 23 percent in 2024 to USD 155 billion while investment in mature categories grew 14.7 percent to USD 1.93 trillion (BloombergNEF, 2025). The divergence is not a single-dimension story. Emerging technologies fail to scale not because their technology is unproven but because they cannot simultaneously demonstrate contracted demand, insurable execution, resilient supply chains, durable policy support, and defensible IP. The capital market consolidates around ventures that have crossed the Risk Pivot and pulls back from those that have not. Series C, where the consolidation pressure is sharpest, saw deal counts reach an all-time low in 2025 and investment fell 32 percent year-on-year, even as broader growth investment increased 78 percent over 2024 (Sightline Climate, 2026). The pattern reveals a market that is selectively backing ventures it sees as multi-dimensionally ready, while a growing number of ventures stall at the stage where the bar shifts from technology risk to integrated bankability risk.

This convergence has a direct practical implication. Each of the five risk dimensions can be addressed in isolation, and many accelerators and commercialization programs are organized around doing exactly that. However, addressing them in isolation is rarely sufficient. The ventures that cross the Risk Pivot successfully are those that demonstrate credibility across all five dimensions simultaneously, not technical completeness in one area while commercial, supply chain, or contractual questions remain unresolved. The Risk Pivot is crossed when the whole picture holds, not when the best part of it is strong.

## 5.1 The Bankability Framework

Institutional capital does not assess offtake risk, execution risk, supply chain risk, regulatory risk, and intellectual property risk as five separate things. It assesses whether revenue is bankable, whether the project is insurable, and whether the financing structure is recognizable. The five dimensions feed into three tests, and the three tests are the framework against which bankability is measured.

### The Revenue Certainty Test

The revenue certainty test evaluates whether the venture's revenue can be relied upon. Letters of intent and pilot partnerships are not enough. Lenders require contracted revenue from a counterparty whose credit quality they can assess and whose procurement authority is verified. The commitment must also run long enough to support debt service. Commitment runs along a spectrum from non-binding letters of intent through memoranda of understanding to power purchase agreements and binding take-or-pay contracts, where the buyer pays even when it does not take physical delivery. A $50 million project supported by unrated off-takers or non-binding letters of intent is discounted entirely against the same value supported by long-term take-or-pay contracts with investment-grade counterparties.

Contract existence is not the same as contract durability. Climate tech ventures at the FOAK stage are exposed to cost spikes in feedstock, electricity, and other variable inputs, and a fixed-price contract paired with variable input costs erodes margins even when the counterparty is creditworthy. Investors look for inflation indexing and commodity cost-pass-through clauses. For ventures whose revenue depends on a sustained “green premium” over fossil-fuel equivalents, they also examine whether corporate buyers have embedded these purchases into core procurement or whether they reflect short-term sustainability commitments that may not survive a budget cycle (van den Heuvel and Popp, 2022).

Ventures whose revenue depends substantially on policy-driven incentives face an additional test. Investors model the venture without those incentives to evaluate whether it has a path to viability if the regime shifts or if foreign entity of concern provisions complicate supply chain eligibility (Ewing et al., 2025). Policy support is an economic accelerator but it cannot be a permanent component of the revenue model.

Supply chain capacity sits inside the revenue test as much as it sits inside the next one. A contract with a creditworthy offtaker is undermined if the venture cannot deliver.

The Running Tide case demonstrated that climate visibility and pilot demand were not sufficient.
The Exxon hydrogen project delay demonstrated that even well-capitalized developers could not reach bankability without customers willing to commit at the pricing levels the cost structure demanded. The relevant signal is whether a buyer has moved from the innovation or sustainability team to the procurement function, from interest to obligation.

Northvolt demonstrated that strong demand and institutional backing cannot produce a bankable project when supply chain execution cannot support commercial-scale production. The Sublime Systems agreement with Microsoft, which separated environmental attribute certificates from physical delivery, found a structure that could make demand bankable before the supply chain was fully mature.

## The Insurability Test

The insurability test asks whether the venture's performance obligations can be priced and absorbed by the insurance market. Insurers will write coverage on bounded risks such as technology non-performance and construction completion, but only when they have a body of operating data, a defined scope of risk, and a project team they can underwrite.

Technology performance insurance is the central instrument. It is a contractual structure, investors call a “wrap” because it covers the project against a specific category of risk. An A-rated international broker audits the venture's pilot data and, if the data supports it, provides a performance floor that pays out the cash flow deficit if the technology falls short of its engineered output targets (Resources for the Future, 2025). If the technology is too experimental for commercial insurers to write the policy, the venture's bankability is materially weaker and lenders demand equity buffers in compensation.

The test extends to the interfaces between the venture's proprietary technology and standard industrial equipment. FOAK facilities rarely fail because of the core breakthrough technology alone. They fail at the integration points where the new technology meets conventional turbines, Investors examine the gaps between vendor warranties, often called interface risk, and look for whether the venture has secured delay-in-start-up and business interruption insurance that accounts for the interconnected layout. A turbine failure that stalls a proprietary carbon-capture reactor produces business interruption losses across the entire facility, not just the turbine.

The venture's own warranties are only worth what its balance sheet is worth. A ten-year performance warranty is meaningful only if the venture is still solvent in ten years. Investors look for warranty backstop insurance, in which an institutional insurer steps into the venture's position to honor parts, labour, or performance warranties if the venture becomes insolvent. This backstop converts an unrated startup's warranty into an investment-grade guarantee.

Insurability is built into the project from its earliest stages. It rests on the quality of pilot data, the structure of EPC contracts, the creditworthiness of suppliers, and the experience of the team. As one interviewee put it, adding experienced project finance and engineering leadership, including a CFO, before approaching lenders is what makes the project executable to a standard insurers can assess.

## The Project Structure Test

The project structure test asks whether the financing structure is recognizable to institutional capital. Risk must be allocated clearly across counterparties, lender protections must be credible, and precedent for the structure must exist in comparable transactions. Solar and wind became asset classes capable of attracting institutional capital not only because their costs fell but because their financing structures became standardized. Power purchase agreements, EPC contracts, and debt service arrangements followed templates lenders could process efficiently. For climate tech ventures at the FOAK stage, that standardization does not yet exist, and creating it is part of the work of crossing the Risk Pivot.

The project must be legally isolated from the parent technology company. It must sit inside a special purpose vehicle that ring-fences the physical asset, its IP licenses, permits, and contracted cash flows from the operating risks of the parent. If the parent runs out of venture runway, the project must remain operational and financeable independently (Woodside, 2023).

Conventional project finance prefers a fixed-price, turnkey, full-wrap EPC contract in which the construction firm guarantees both price and delivery and absorbs any overruns. Major EPC firms often refuse a full wrap on FOAK projects because the technology lacks operating precedent. Investors examine the partial-wrap or split-EPC structure that results, with particular attention to who is legally liable for interface risk where standard utility infrastructure meets the proprietary process (Sightline Climate, 2024; TNO, 2025). How interface risk is allocated determines whether the construction phase is bankable.

The capital stack reflects the project's risk profile. FOAK projects are rarely funded entirely by venture capital or entirely by bank debt. They require blended capital with catalytic or concessional layers in subordinated positions that absorb first-loss exposure. Investors examine how revenue is sequenced within the SPV, with project debt and preferred project equity paid before any cash flows back to the parent. They look for catalytic capital positioned to absorb early performance shortfalls before senior layers are affected. The Canada Growth Fund's role in providing contracts for difference and first-loss coverage is the institutional function this test requires in the Canadian context.

The technology license is the last structural question. The SPV must use the parent's core IP to operate the plant but cannot own that IP outright, because the parent must retain it to build subsequent facilities. Investors examine the license with particular attention to lender step-in rights. If the project encounters financial distress and lenders take over the SPV, the license must grant them a permanent, royalty-free, irrevocable right to continue operating the technology. Without it, lenders can foreclose on the physical facility but be legally barred from operating it (Export Development Canada, 2026). The license is where IP architecture either supports bankability or creates default risk.

### Case Study: Fervo Energy

Fervo Energy's Project Red in Nevada illustrates what crossing the Risk Pivot looks like when each of the three tests is addressed at once. On revenue certainty, Fervo secured Google as a strategic offtaker through a novel Clean Transition Tariff, moving the relationship from a pilot into a long-term contractual commitment that lenders could underwrite against an investment-grade counterparty. On insurability, Fervo compressed completion and performance risk by siting Project Red on existing Cyrq Energy infrastructure, reducing the scope of novel construction and giving lenders a familiar operating environment in which to assess the new technology. On project structure, Fervo assembled a blended capital stack with subordinated catalytic capital from Breakthrough Energy and XRC Ventures alongside conventional project finance, occupying the layers where institutional investors could not yet underwrite the FOAK risk profile.

Even with this structure in place, Fervo's fundraising path included significant rejection. The Risk Pivot is genuinely difficult even for ventures that have addressed all three tests, because institutional capital is conservative about precedent. No single element of the structure was novel. What made Project Red bankable was the combination of investment-grade offtake, brownfield siting, and a blended capital stack addressed at the same time.

## 5.2 Where current instruments fall short

The financial instruments currently available to climate ventures at the Risk Pivot are deficient by design, not by volume. Each deficiency maps onto a specific point where ventures most often fail to clear the threshold.

**More capital deployed through existing instruments will not resolve gaps that are structural in nature. Crossing the Risk Pivot at scale depends on redesigning the instruments themselves, not on deploying more of what already exists.**

**Table 3: Financial instrument gaps**

| Gaps in financial instruments | What is missing? | Why it matters? | What is required to close it |
|---|---|---|---|
| **Pre-FID Capital for Feasibility, Permitting, and Engineering** | Non-dilutive funding for feasibility studies, permitting, environmental assessments, and engineering work in the period before a project's Final Investment Decision (FID), the point at which developers and investors formally commit the capital required to build it. | This work happens before the formal financing window. Without it, ventures arrive at the FOAK threshold technically validated but commercially under-prepared. Offtake conversations lack specificity, and insurance underwriting lacks documentation. | Dedicated pre-FID instrument categories that complement grants and equity, targeted at commercial development rather than technology validation. |
| **Risk-Absorbing Blended Finance** | Capital that takes first-loss exposure on specific identified risks rather than offering concessional debt with lower interest rates. | A venture approaching the bankability framework does not primarily need cheaper capital. Concessional debt reduces the cost of capital but does not reduce the underlying risk profile that excludes institutional investors. | Blended finance instruments designed to absorb risk through first-loss positions rather than to subsidize returns through pricing concessions. |
| **The Series C to Project Finance Handoff** | Institutional capital structured for the transition from technology risk to commercial risk. | Growth equity looks for technology risk. Project finance looks for bankable revenue. Between them lies a capital category with no natural institutional home. Small climate tech assets require the same diligence infrastructure as large infrastructure transactions but generate smaller fee income, so institutions pull back from this layer. | A capital vehicle structured for the Risk Pivot transition, with a diligence model that fits the asset size at this stage. |
| **Performance Insurance for Novel Technology** | Insurance access for ventures that do not yet have operating data. | Ventures need insurance to attract the debt that funds construction but cannot obtain insurance until they have accumulated operating data that only the completed project can generate. | A mechanism for pooling operating data across early-stage FOAK deployments, or government-backed performance guarantees that step in where commercial insurers cannot yet go. |
| **Standardized Project Structures for Novel Asset Classes** | Templates for FOAK financing structures comparable to solar PPAs and wind EPC contracts. | Solar and wind became financeable asset classes when their contracts followed recognizable templates that lowered diligence costs. For FOAK projects that standardization does not yet exist. Every transaction requires bespoke structuring, which is expensive, slow, and opaque. | Industry-wide work on contract templates, IP licensing structures, and risk allocation conventions for FOAK climate ventures. |

Source: GCFA analysis, drawing on the interviews

## 5.3 Three Principles for Crossing the Risk Pivot

Three principles surfaced consistently across the interviews about what successful ventures do differently at the Risk Pivot. They describe how bankability is approached when it is treated as a design objective from the start, how the three tests interact as ventures move through them, and what institutional actors must do to close the gaps that private capital cannot.

### Bankability must be designed, not achieved

Ventures that cross the Risk Pivot are not those that become bankable by accident after a successful pilot. They are those whose founders understood, from an early stage, what the FOAK financing standard would require and built toward it deliberately. As one interviewee put it, a founder's job is to ensure the team can execute the venture's strategy and that the venture has enough capital to conduct that execution. Both require planning against the next pool of capital's criteria,not just the current one.

In practice, this means conducting a bankability assessment at the demonstration stage rather than at Series C and using that assessment to guide decisions about customer engagement, IP architecture, contract terms, team composition, and capital sequencing. The earlier the assessment, the more runway there is to address gaps before the financing pressure becomes acute.

### The bankability journey is non-linear

Progress on one test can unlock or block progress on another. A signed offtake agreement with a creditworthy counterparty improves insurability by giving lenders a basis for assessing revenue risk. A well-structured EPC agreement gives a venture stronger execution credibility when it approaches the offtake conversation. An underdeveloped supply chain undermines the offtake test even when demand is strong.

The tests are interdependent. A venture that works on them in parallel can use progress on one to support progress on the others. A venture that addresses them one at a time loses that advantage.

### Institutional actors must close the gaps that private capital cannot

Each of the five gaps in the current instrument landscape requires institutional responses that the private market cannot provide on its own. Public capital and concessional finance must take first-loss positions where commercial capital cannot. Government procurement and CfDs must provide demand certainty where private offtake markets cannot. Public institutions and ecosystem actors must build the standardized structures, data infrastructure, and pre-FID capital that ventures need before they reach the financing window.

These are not supplementary interventions to a market that would otherwise function. They are the conditions under which the Risk Pivot becomes crossable at scale.

# 6 Conclusion

**The transition from proof-of-concept to proof-of-profit is the central challenge of climate technology commercialization, and the 2026 market has made it materially more demanding than the conditions of 2021 and 2022.**

Capital is tighter and investors are applying a higher bar before they commit while the policy backdrop in many jurisdictions has become less reliable. Climate ventures that have demonstrated technical performance at pilot scale must now demonstrate that their commercial-scale projects are financeable under these conditions.

For founders, the Risk Pivot requires a different kind of company-building than the stages that precede it. Demonstrating technical capability is no longer enough. The commercial, legal, and financial infrastructure of the project must be built alongside the engineering work, not after it. Offtakers should be engaged during development, not at deployment. The financing case must address all five risk dimensions at once. Leading with technology performance and treating the commercial questions as secondary does not work at this stage.

For investors, bankability readiness is a central diligence criterion, not only at the project finance stage. Growth equity investors backing ventures that are approaching the FOAK stage should apply the three tests earlier in their diligence, identifying which tests a venture is closest to passing and giving the venture more runway to close gaps before the financing pressure becomes acute. Catalytic and blended finance investors carry the work of absorbing first-loss layers in capital stacks and developing standardized structures for future transactions to flow through. Series C is the most acute pressure point in the current market. The capital that closes it must underwrite the bankability framework, not the technology alone.

Not all climate ventures will cross the Risk Pivot, and not all of them should. Some technologies that work at pilot scale will not be financeable at commercial scale, and the market is right to be selective. However, ventures with strong technology and viable commercial cases are stalling because the financing ecosystem is not designed for the transition they need to make.

Ventures that succeed at the Pivot are not those with the strongest technology. They are those whose founders understand, earlier than their peers, what the next pool of capital needs to see, and who build toward it while the technology is still being validated. The Risk Pivot is where science gets translated into contracts, contracts into financing, and financing into operating assets. The bankability framework is what makes that translation possible.

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