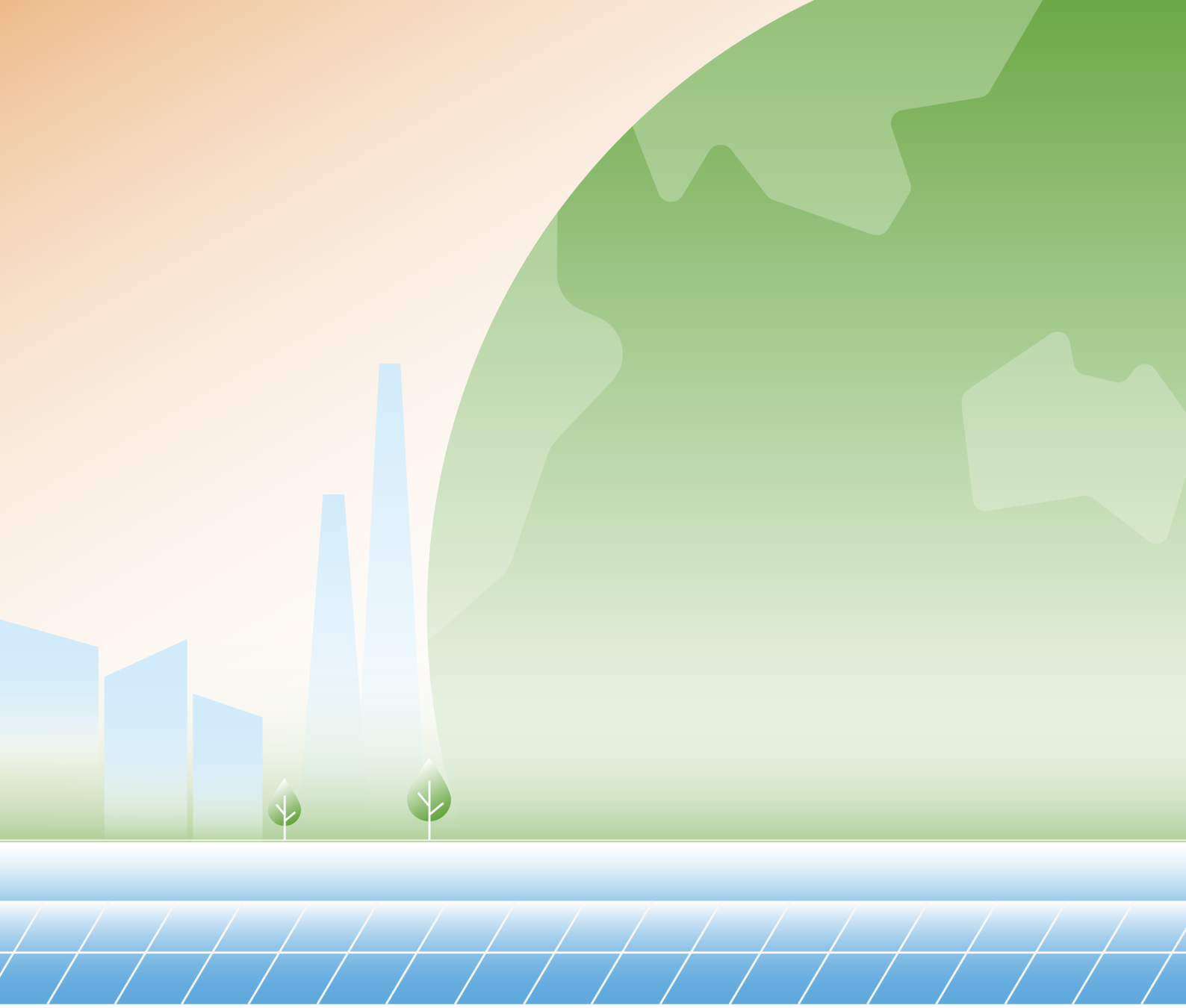

From Lab to Real-world Deployment:

Building an Innovative Financing Ecosystem to Help Climate Tech Startups Cross the Critical Breakthrough Stage

IMPACT HUB Shanghai

MAKEABLE

气候创新实验室

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About the Organization

About Impact Hub Shanghai

Impact Hub has been a catalyst for entrepreneurial action and collaboration since 2005. It is a locally rooted, globally connected network driving environmental and societal change in 120+ locations across 67+ countries. Every Impact Hub is established and operated by a local team, allowing them to reach deep into local markets and communities, while linking global innovation resources to create global impact in addressing the Sustainable Development Goals (SDGs) set by the United Nations.

In 2017，Impact Hub Shanghai broke ground. As the first Impact Hub in Mainland of China, we take the lead to build sustainable innovation ecosystems in China and around the world through innovation consulting, startup support, impact communication, impact investment, and ecosystem research. In 2022, we became a certified B-Corporation.

About Makeable

Makeable is an action research platform focused on sustainable innovation, developed by Impact Hub Shanghai in 2020. It aims to empower the sustainable innovation ecosystem through research, knowledge dissemination and industrial capacity-building, accelerating the realization of the SDGs through innovation.

About 1.5DO Climate Innovation Lab

The 1.5DO Climate Innovation Lab, initiated in 2022, provides systemic solutions to address challenges arising from climate change. Through industry research, technological application and implementation, industrial innovation, data platforms and international dissemination, the lab builds a domestic climate innovation ecosystem, enables the development of climate innovation technologies, and promotes the transformation of key emitting industries and regions, ultimately contributing to the achievement of China’ s dual carbon target and the global 1.5 degree climate vision.

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I. Background

Climate technology innovation is critical to achieving global climate goals.[1] The IEA and McKinsey estimate that meeting the Paris Agreement targets will require around 1,000 climate tech unicorns worldwide by 2030.[2] As of 2022, China had 41[3], roughly half of the global total, yet a substantial gap remains.

Despite supportive policies for low-carbon technologies, early-stage startups in China still face major financing barriers, especially during the **critical breakthrough stage**, the phase between R&D and commercial pilot deployment.

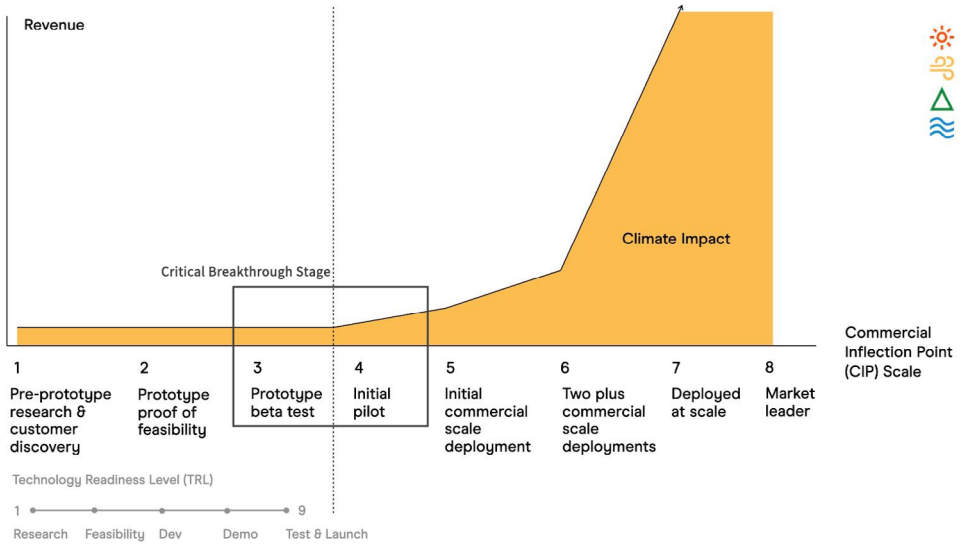

Figure 1. Climate tech commercial inflection point scale | Elemental Impact

At this stage, startups need modest but pivotal funding for technology validation and pilot projects. Without it, many promising companies fall into the valley of death, unable to secure resources to prove their solutions in real-world settings. Industrial partners may be willing to collaborate, but deals often collapse due to lack of financing.

Traditional financing tools, such as government grants and bank loans, rarely fit these needs. Corporate innovation programs offer some support but remain limited in scope and timeliness.

To close this gap, a coordinated ecosystem is essential. Impact Hub Shanghai has been working with governments, science parks, corporations, and research institutions to build platforms that match technology with real-world demand, activate pilot scenarios, and mobilize capital. This collaborative approach aims to help more climate tech startups cross the critical breakthrough stage and accelerate their deployment, injecting lasting momentum into China' s carbon neutrality journey.

II. Why the Critical Breakthrough Stage Matters: Small-Scale Funding to Unlock Large-Scale Investment

The **critical breakthrough stage** is a decisive phase in moving climate technologies from the lab to the market. It determines whether a solution can be validated in real-world settings, and whether it will attract the investor confidence needed for scale-up.

Startups at this stage need more than capital: they also require access to pilot scenarios, early adopters, and supportive policy or regulatory frameworks. Yet targeted financial support often serves as the first trigger, unlocking these additional enablers.

Impact Hub Shanghai' s work shows that many pilot-stage projects require only modest funding: typically between tens of thousands to a few hundred thousand RMB (a few thousand to tens of thousands USD). This can cover prototype testing, initial deployment, or customer co-development. Once a solution is proven, even small investments can significantly boost external investor confidence and lead to commercial adoption.

Case Study 1: $50K Sparked $3.6M — Voltpost (U.S.)

Voltpost retrofits streetlights into EV charging stations using easy-to-install hardware. In 2021, it received $50,000 in non-dilutive funding from New York State' s Venture For Climate Tech program to support product development and validation. After demonstrating technical and market viability, the company secured $3.6 million in seed funding in 2023.

Case Study 2: $20K Unlocked $4M — EnerTrac (U.S.)

EnerTrac provides remote monitoring for propane and heating oil tanks to optimize delivery logistics. In 2010, it received $20,000 in pilot funding from the Green Launching Pad (GLP), a joint initiative by the University of New Hampshire and the State Energy Office. The successful pilot attracted early customers and led to $4 million in Series A funding within a year.

III. Why Financing the Critical Breakthrough Stage Is So Difficult

1. Systemic Barriers in the Global Financing Landscape

1.1 Macroeconomic Headwinds Have Compressed Funding Availability

Geopolitical tensions, high inflation, and rising interest rates have sharply reduced venture capital (VC) appetite. In 2023, investments in the climate sector dropped by 40% year-over-year, with VC and private equity (PE) comprising a shrinking share.[4] The average time between Series A and B rounds has lengthened from 11 months to 26 months,[5] slowing fundraising cycles and leaving startups at the critical breakthrough stage struggling to sustain R&D, pilot deployment, and team expansion.

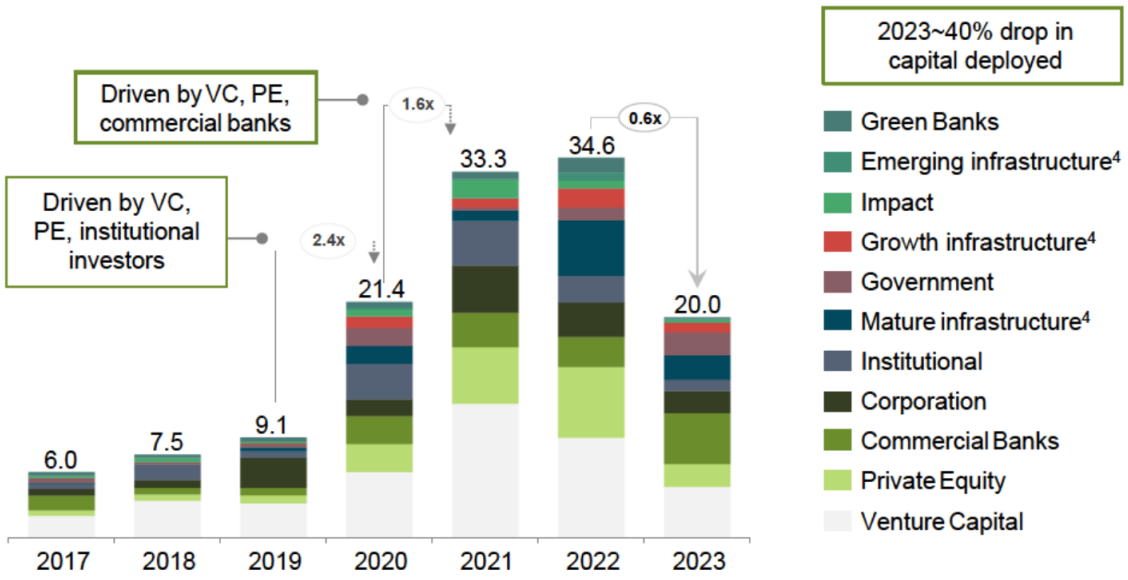

Figure 2. Change in sources and amounts of investment in the climate sector, 2017-2023 | Elemental Impact

1.2 Capital Preference for Asset-Light Models Marginalizes Climate Hardware Solutions

In a tighter funding environment, investors increasingly favors software-driven, asset-light businesses. By contrast, climate tech hardware,especially in sectors like industry, buildings, and agriculture, demands high upfront investment, has longer payback periods, and carries valuation uncertainty. As a result, these high-impact technologies often receive disproportionately little funding despite their significant decarbonization potential.

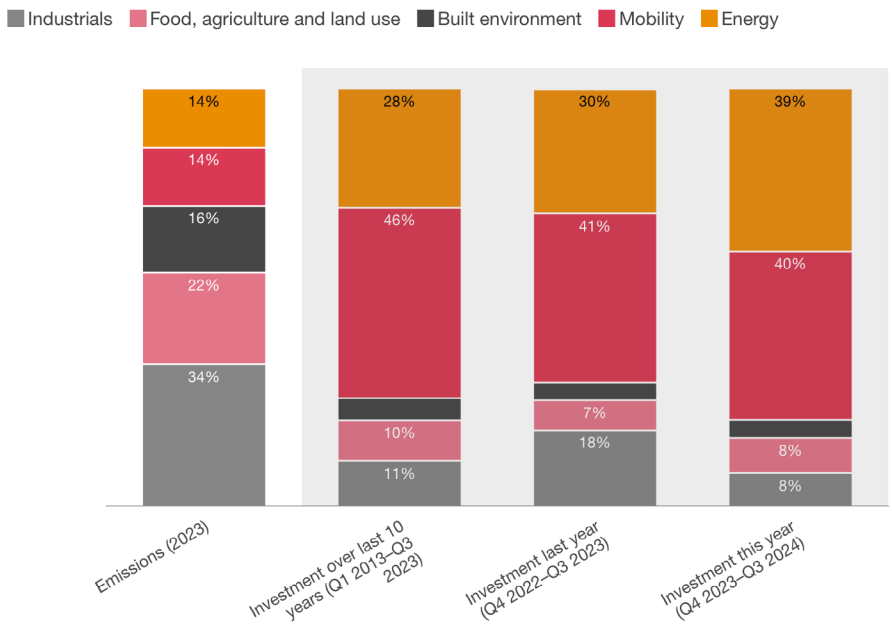

Figure 3: Share of emissions v.s. share of venture capital received by different sectors | PwC[6]

1.3 The Characteristics of Climate Technologies Limit Their Appeal to Traditional Private Investors

Climate technologies typically require high upfront investment, have long payback periods, and offer relatively low returns, making them incompatible with traditional finance-driven investment logic. Their value depends not only on financial metrics but also on carbon reduction impact, environmental externalities, and systemic influence. This requires investors to possess cross-disciplinary expertise in policy, industry, technology, and environmental assessment, which significantly raises the entry barrier.

This challenge is particularly acute during the critical breakthrough stage: companies have yet to achieve commercial validation, their business models remain unclear, cash flow is negative, and there is no clear market pricing reference. As a result, valuations fluctuate, perceived risks are high, and investor willingness to participate remains low.

1.4 Corporate Reluctance to Pilot Unproven Technologies Delays Market Entry

Although some industry leaders actively invest in mature green technologies, many hesitate to pilot early-edge climate solutions. Concerns over operational risks, integration complexity, and internal resistance often lead to prolonged negotiations or outright rejection, slowing the real-world validation that is essential for scaling.

2. Dual Constraints in the Chinese Context

Case Study: A Broken Pilot Agreement

In Impact Hub Shanghai' s **Zero to Future** co-creation initiative, an agri-biotech startup reached an initial pilot agreement with a major industrial partner. Although the partner committed to providing test scenarios and partial funding, internal organizational changes led to the collaboration being canceled. This case reflects a broader challenge: many startups possess deployable technologies and willing partners,but without dedicated funding mechanisms, pilot opportunities often collapse, trapping promising innovations in the breakthrough stage.

2.1 Structural Mismatch Between Policies and Early-Stage Needs

Although national-level support for climate science and technology has strengthened in recent years, the existing policy tools have not yet accurately covered the **critical breakthrough stage**. This has resulted in a misalignment between government support, enterprise needs, and technology maturity. and there is a mismatch between policy support and the needs of enterprises and the stage of technology.

First, climate technology projects primarily rely on government funding and policy-backed loans, yet the scale of public investment remains limited, and a stable, long-term government funding mechanism is still lacking.[7]

Secondly, while China has introduced green refinancing, green MPA (macro-prudential assessment), loan guarantees, and interest rate subsidies for green projects, these instruments mainly benefit projects using mature technologies. Early-stage climate tech startups rarely meet the eligibility requirements and thus struggle to access such support.[8]

Third, although several local governments have launched policies for early-stage technology startups, most incentives focus on semiconductors, chips, and AI, industries tied to national strategic priorities, while climate technologies receive comparatively little attention. For example, Baoshan District in Shanghai introduced an "invest first, share later" program, but no climate tech companies have been selected to date.

Fourth, many government subsidies impose stringent thresholds on investment scale, operating history, and technological maturity. For instance, Beijing' s hydrogen energy policy offers interest rate subsidies and other incentives, but it primarily targets companies with completed production lines or proven demonstration projects, leaving breakthrough-stage technologies unsupported.

In addition, market mechanisms have not yet filled this policy gap.

- **Underdeveloped carbon pricing**: China' s national carbon market currently covers only the power, steel, cement, and aluminum industries, and carbon prices remain far below international levels. Weak price signals reduce the incentive for enterprises to adopt low-carbon technologies and fail to create sufficient market demand for climate tech startups.
- **Lack of standardized methodologies**: No unified national framework exists for quantifying and pricing the environmental benefits of climate technologies (e.g., carbon reductions). Without this, financial institutions cannot incorporate these benefits into valuation or risk models, which limits their willingness to finance such projects.

2.2 Information mismatch between government resources and startups

In recent years, local governments have actively explored diversified financial support mechanisms such as "Entrepreneurship Funds" and "Investment-First-Equity-Later" models. For example, the Shanghai Student Technology Entrepreneurship Fund, executed through incubators, provides up to RMB 800,000 in non-dilutive funding over three years for projects with strong innovation potential. The program has low entry barriers, a short approval cycle, and typically disburses funds within three months. Shanghai Huxinlv Electronic Technology Co., Ltd.' s wind turbine intelligent early-warning system is one beneficiary of this fund.

While startups generally welcome such funding, valued for being non-dilutive, low-cost, low-risk, and offering a "signaling effect", its reach remains limited. On one hand, government agencies often face fragmented policy communication and narrow information channels, making it difficult to effectively target the right enterprises. On the other hand, many startups, constrained by limited resources and information, tend to only be aware of straightforward programs like talent subsidies, while lacking knowledge of more critical resources such as startup funding, commercialization grants, and pilot project support. This two-way information gap between government and startups continues to hinder the efficient allocation of innovation resources.

2.3 Bank-led Financial System Fails to Serve Early-stage Technology Enterprises

China' s financial system remains dominated by banks, and bank loans continue to be the primary source of enterprise financing. Yet for climate tech startups, typically asset-light, with unstable cash flows and little collateral, meeting traditional lending requirements is nearly impossible.

Even within green finance, bank credit mainly favors large companies and mature projects. For instance, the central bank' s carbon reduction support tool primarily funds large-scale projects that have already achieved measurable emissions reductions.Although science and technology finance is growing, its scale is insufficient relative to demand. Moreover, banks tend to prefer lending to companies with official certifications, such as "high-tech enterprise" or "specialized and innovative SME" designations, yet most breakthrough-stage startups have not yet reached this level of formal recognition.

2.4 Patient Capital and Impact Investing Ecosystem Not Yet Formed

Climate technology innovation is inherently long-term and high-risk, requiring "patient capital" from investors such as government funds, pension funds, and insurance funds. However, the typical duration of Chinese VC funds is only 3–5 years, far shorter than the 7–10 years[9,10] often required for climate tech development. Many of these funds also rely on debt-like structures and demand quick exits, making them ill-suited for supporting early-stage technologies.

Impact investing, which balances financial returns with environmental benefits, remains nascent in China. The sector lacks a unified definition, clear disclosure standards, and supportive policies. Foundations, one of the main potential players, face high licensing barriers and a shortage of professional talent, while the limited number of credible early-stage projects further constrains deal flow.[11]

As a result, China lacks the long-term financing mechanisms necessary to support climate tech startups through their critical breakthrough stage, leaving a major gap in the current funding ecosystem.

2.5 Ambiguous Role of Industry Players and Untapped CVC Potential

Corporate venture capital (CVC) has inherent advantages for the critical breakthrough stage: it offers long-term capital, [12] access to industry value chains, and the ability to rapidly implement pilot projects. Despite this potential, CVC' s role in China remains underdeveloped.

In 2024, only 193 new CVC funds were filed, one of the lowest levels in the past decade. CVC participation in primary market investment events also declined, representing 13.8% of deals, down 4.9 percentage points from 2023. Domestic CVCs focus primarily on smart manufacturing, artificial intelligence, and healthcare, followed by materials and energy, while investment in environmental technologies remains minimal.[13]

2.6 Lack of Unified Assessment Standards and MRV System

Climate technologies are diverse and highly specialized, making it difficult for investors to accurately assess their feasibility and emission reduction potentials. China currently lacks a unified technology assessment framework and MRV (Monitoring, Reporting, and Verification) system, leading to high due diligence costs for investors,

difficulty in evaluating risks, and exclusion of many promising technologies from the official green catalogue, which limits their access to financing and policy support. This gap in standardized evaluation mechanisms has become a major barrier to the commercialization of climate technologies.

For the evaluation standards of innovative technologies, please refer to the report ***Climate Tech Study: A Mapping of Assessment Frameworks and Evaluation of Stakeholder Needs*** jointly released by Impact Hub Shanghai, Makeable, and the 1.5DO Climate Innovation Lab.

2.7 Startups' Own Capability Gaps Constrain Financing Efficiency

In addition to institutional barriers, many climate tech startups face internal capability challenges that limit their ability to secure funding:

- **Insufficient knowledge of policy resources**: most startups are familiar with talent subsidies but lack awareness of more critical resources, such as technology transfer funds and pilot project support.
- **Weak financing strategy and planning**: no mechanism for cash flow forecasting and financing rhythm assessment, leading to unclear fundraising logic and reduced investors' confidence.
- **Unclear financing objectives**: startups often pursue funding opportunistically without aligning it to long-term growth strategies.
- **Lack of investment and financing knowledge and service support**: lack of understanding of the financing process, unwillingness to invest in professional services such as legal and financial consultants, further amplifying the information asymmetry with investment institutions.

These capability gaps further weaken startups' ability to navigate an already challenging financing environment during the critical breakthrough stage.

IV. Future Outlook: Building a More Supportive Financing Ecosystem for the Critical Breakthrough Stage

As climate tech startups advance toward commercialization, they face persistent funding gaps, deployment delays, and long validation cycles. Overcoming these challenges requires a coordinated ecosystem that integrates policy, finance, industry, and platform institutions. The goal is to improve the alignment between capital and technology, accelerating the transition of high-impact climate solutions from lab to market.

Short-Term Priorities (1–3 years)

- **Refine Fiscal Mechanisms**: Establish dedicated small-scale grant programs for pilot testing and early validation. Streamline approval and disbursement processes to ensure timely, targeted support.
- **Innovate Financial Instruments**: Introduce risk-sharing mechanisms, technology transfer funds, and structured finance tools to attract private capital to high-risk, early-stage projects underserved by traditional bank-led systems.
- **Empower Industry Platforms and cubators**: Leverage industry platforms and incubators to provide matchmaking, capacity-building, and policy navigation services. These organizations can reduce information gaps and help startups accelerate deployment.
- **Activate Corporate CVCs**: Encourage corporations, particularly those with CVC arms, to establish "validation funds" that integrate with internal business units. This will support pilot-stage innovations and speed up commercialization.
- **Champion Strategic Investment Paradigms**: Promote a shift from short-term financial ROI to strategic, long-term value creation. Programs such as Amazon' s Climate Pledge Fund and Tencent' s CarbonX illustrate how early-stage ventures can be supported through funding, pilot environments, and ecosystem partnerships, prioritizing impact over immediate returns.

Medium to Long-Term Vision (3–10 years)

- **Develop Impact Capital Ecosystems**: Foster patient, impact-driven capital through standardized definitions, fiscal incentives, and risk-sharing structures. Establish climate-focused sub-funds or government-backed fund-of-funds to mobilize philanthropic capital, family offices, and other long-term investors. Build localized impact evaluation frameworks and digital matchmaking platforms to channel capital efficiently.

- **Establish Unified Technical Evaluation and Certification Systems**: Develop cross-sectoral standards to assess climate technologies based on emission-reduction potential, scalability, and maturity. Introduce a trusted "technology label" or certification framework to lower due diligence costs, improve visibility, and strengthen investor confidence in early-stage solutions.

Conclusion

Climate tech startups are critical to addressing the climate crisis, yet many stall at the critical breakthrough stage, where modest funding gaps often block real-world deployment. Supporting these startups is not just about helping individual companies, it requires building a coordinated innovation ecosystem. Governments must provide targeted funding, financial institutions need flexible and risk-tolerant tools, industry partners should move from passive procurement to active co-investment, and platform organizations must bridge information gaps and strengthen startup capabilities. Only through this collective effort can we turn promising climate technologies into scalable solutions, and accelerate the transition to a sustainable future.

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