THAILAND
CLIMATE TECH STARTUP GUIDE

Navigating Growth, Investment & Innovation

Department of Climate Change and Environment
Ministry of Natural Resources and Environment

beacon venture capital
GGGI

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Foreword

Thailand stands at a critical juncture in its climate and economic transition. The urgency to decarbonize our industries and shift toward sustainable growth presents both a challenge and an opportunity. At the heart of this transition are climate technology startups—agile, innovative, and capable of driving the solutions we need to combat climate change and achieve our sustainability goals.

Recognizing the potential of climate tech startups to accelerate our decarbonization journey, the Department of Climate Change and Environment (DCCE) has collaborated with the Global Green Growth Institute (GGGI) and Beacon Venture Capital (BVC) to develop this Thailand Climate Tech Startup Guide: Navigating Growth, Investment & Innovation. This guide is designed to serve as a practical resource for aspiring entrepreneurs, investors, and policymakers who are shaping Thailand's climate tech landscape.

This guide provides a comprehensive overview of the current climate tech ecosystem in Thailand, including funding mechanisms, policy frameworks, and practical steps for startups to grow and scale. It draws insights from consultations with investors, government agencies, incubators, and leading climate tech startups to present real-world recommendations for strengthening Thailand's innovation ecosystem.

While Thailand has made significant strides in advancing green growth, the ecosystem for climate tech startups remains nascent. Entrepreneurs in this space face critical challenges, such as access to finance, regulatory complexity, and the need for deeper collaboration between public and private sectors. A thriving climate tech ecosystem is not just an economic necessity—it is an imperative for our planet and future generations. By fostering a robust support system for climate startups, Thailand can position itself as a leader in sustainable innovation, contributing both to national prosperity and global climate action.

We appreciate all contributors and partners who have supported this initiative and hope that this guide will serve as an essential tool for entrepreneurs, investors, and policymakers alike in shaping a resilient and green future for Thailand.

Department of Climate Change and Environment (DCCE)
Ministry of Natural Resources and Environment, Thailand

Acknowledgment

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The authors sincerely thank the key informants and stakeholders from government, venture capital firms, investors, incubators, accelerators, development partners, academic institutions, and startups for the insightful perspectives to inform this document, which explores a critical lever for climate action and decarbonization. We are grateful to GGGI, DCCE, and BVC for the kind collaboration and support. We hope that this Guide will provide invaluable insights to stakeholders within the climate tech startup ecosystem and serve as an inspiration for the next generation of climate entrepreneurs, driving forward Thailand's sustainability and climate resilience agenda.

Abbreviations

ABS	Asset-Backed Security
ADB	Asian Development Bank
Ag tech	Agricultural technology
Agrifood tech	Agricultural and food technology
AI	Artificial Intelligence
AIS	Advanced Info Service
B2B	Business-to-Business
BAU	Business as usual
BCG	Bio-Circular-Green
BCGeTEC	Bio-Circular-Green Economy Technology and Engineering Center
Biotech	Biotechnology
BOI	Thailand Board of Investment
BVC	Beacon Venture Capital
CCUS	Carbon Capture, Utilization, and Storage
CDx	Corporate Decarbonization Exchange
CEO	Chief Executive Officer
CEST	Centre of Excellence for Energy Storage Technology
CFNT	Climate Finance Network Thailand
CIO	Climate Innovation Office
CMU STEP	Chiang Mai University Science and Technology Park
CO_2	Carbon dioxide
COP	Conference of the Parties
CTCN	Climate Technology Centre and Network
CTO	Chief Technology Officer
CU iHub	Chulalongkorn University Innovation Hub
CVC	Corporate Venture Capital
DCCE	Department of Climate Change and Environment
DEPA	Digital Economy Promotion Agency
DIP	Department of Intellectual Property
DIPROM	Department of Industrial Promotion
ESG	Environmental, Social, Governance
EV	Electric Vehicle
eVTOL	Electric Vertical Take-Off and Landing
GCF	Green Climate Fund
GGGI	Global Green Growth Institute
GHG	Greenhouse gas
GIZ	German Agency for International Cooperation
iNT	Innovation and Technology Department, Mahidol University
IoT	Internet of Things
IP	Intellectual Property
IPPU	Industrial Processes and Product Use
IRL	Innovation Readiness Level
KPI	Key Performance Indicator
KX	Knowledge Xchange Startup & Innovation Ecosystem
LCA	Life Cycle Assessment
MAI	Market for Alternative Investment
MAS	Monetary Authority of Singapore
MCI	Mandiri Capital Indonesia
MEF	Massive Earth Foundation

MHESI	Ministry of Higher Education, Science, Research and Innovation
MoAC	Ministry of Agriculture and Cooperatives
$MtCO_2e$	Million tons of carbon dioxide equivalent
MTEC	National Metal and Materials Technology Center
MVP	Minimum Viable Product
NAP	National Adaptation Plan
NDC	Nationally Determined Contribution
NDE	National Designated Entity
NEP	National Energy Plan
NIA	National Innovation Agency
NSTDA	National Science and Technology Development Agency
NXPO	Office of National Higher Education Science Research and Innovation Policy Council
ONEP	Office of Natural Resources and Environmental Policy and Planning
OSMEP	Office of SMEs Promotion
P2P	Peer-to-Peer
PMUC	Program Management Unit for Competitiveness
PPP	Public-Private-Partnership
RU	Research Utilization
SAF	Sustainable Aviation Fuel
SAFEs	Simple Agreements for Future Equity
SAM	Serviceable Addressable Market
SDGs	Sustainable Development Goals
SEC	Securities and Exchange Commission
SEACEF	Southeast Asia Clean Energy Facility
SET	Stock Exchange of Thailand
SME	Small and Medium-sized Enterprise
SPV	Special Purpose Vehicle
SOM	Serviceable Obtainable Market
STEM	Science, Technology, Engineering, Math
TAM	Total Addressable Market
TAT	Tourism Authority of Thailand
T-BAN	Thailand Business Angel Network
TDPK	True Digital Park
TED Fund	Technology and Innovation-Based Enterprise Development Fund
TGO	Thailand Greenhouse Gas Management Organization
THB	Thai Baht
ThaiCBN	Thailand Climate Business Network
ThaiCI	Thai Climate Initiative Fund
TRL	Technology Readiness Level
TSA	Thailand Startup Association
TSRI	Thailand Science Research and Innovation
TVCA	Thailand Venture Capital Association
UNEP	United Nations Environment Programme
UNESCAP	United Nations Economic and Social Commission for Asia and the Pacific
US	United States (of America)
USD	United States Dollar
VC	Venture Capital
VISTEC	Vidyasirimedhi Institute of Science and Technology
YoY	Year on Year

Executive Summary

Thailand Climate Tech Startup Guide (the "Guide"), a collaborative initiative by the Department of Climate Change and Environment (DCCE), the Global Green Growth Institute (GGGI), and Beacon Venture Capital (BVC), aims to provide an overview of the market potential of climate innovations, key players, challenges and opportunities, as well as recommendations on strengthening Thailand's climate tech ecosystem and empowering startups to address climate change effectively. The Guide is based on desktop research and in-depth interviews with 35 key informants (including, but not limited to, climate tech startups, investors, government agencies, and supporting organizations) and 9 consultations with relevant stakeholders at the end of 2024.

This executive summary provides a concise overview of the key findings and recommendations outlined in the Guide. It serves as a call to action for policymakers, investors, academia, startups, and other stakeholders to collaborate on climate innovations, driving Thailand toward greater sustainability and climate resilience.

Startups, unlike larger corporations, can swiftly pivot and respond to new challenges and opportunities, allowing them to experiment with novel ideas, develop cutting-edge technologies, and scale solutions rapidly. Climate tech startups, in particular, have the potential to significantly impact sustainable development by introducing disruptive innovations that reshape markets and encourage established companies to adopt more sustainable practices. Globally, climate tech startups play a crucial role in driving innovation and accelerating solutions to mitigate climate change. Climate tech ranges from technology that helps to reduce or prevent greenhouse gas (GHG) emissions in energy, transport, food & agriculture, industrial processes & manufacturing, retail & lifestyle, to digital platforms for tracking emissions and trading carbon credits.

Thailand's climate tech sector has the potential to significantly contribute to the country's Nationally Determined Contributions (NDCs) towards Net Zero GHG emissions by 2065. However, challenges such as limited access to funding, a lack of clear support pathways, and a scarcity of early-stage investment need to be urgently addressed to unlock Thai climate tech startup growth and contribution to the country's decarbonization.

The Guide emphasizes the importance of robust policies for GHG emissions reductions overall, as well as a strong and supportive ecosystem for climate tech startups to help key players in the achievement of Thailand's climate goals.

The Key Findings include the following:

- **Limited access to funding:** Early-stage funding is crucial for climate tech startups to scale, but many lack clear pathways to access necessary resources.
- **Inadequate support:** Climate tech startups often lack access to tailored support, guidance, and mentorship, hindering their growth and development.
- **Policy gaps:** Current policies and regulations may not adequately support the growth and development of the climate tech sector.

The Guide presents recommendations in four key areas for strengthening the Thai climate tech ecosystem: Policy, Funding, Capacity Building, and Monitoring & Evaluation.

The key policy recommendations include the following:

1. **Boosting the Startup Ecosystem:** Enhance support for the overall startup ecosystem, including improving ease of doing business, promoting networking events, and providing access to shared services. Specifically for climate tech, allocate funding opportunities, establishing climate tech-focused competitions and incubation programs, and creating forums for climate tech startups to connect with investors.
2. **Mindset Shift:** Foster a mindset shift among key stakeholders, emphasizing the importance of climate action, long-term investments, and a culture of innovation.
3. **Climate Tech Integration in NDC Targets:** Integrate climate tech solutions into Thailand's Nationally Determined Contributions to drive decarbonization across the five industry sectors: Energy, Transport, Agriculture, Municipal Waste Management and Industrial Wastewater, and Industrial Processes and Product Use (IPPU).
4. **Develop a Five-Year Plan:** Implement a strategic plan with a substantial budget to accelerate climate innovation research and development, involving universities, research centers, and the private sector.
5. **Establish a Climate Innovation Office:** Create a dedicated office, reporting directly to the Prime Minister, spearhead climate innovation efforts, provide expertise, oversee capacity building and knowledge transfer, as well as foster international collaboration.
6. **Establish a PPP Venture Builder:** Create a Public-Private Partnership (PPP) to support climate tech startups, including research scouting, venture building, and establishing regional startup innovation hubs throughout Thailand.

Climate tech startups possess unparalleled potential to transform diverse industry subsectors by equipping businesses to drastically reduce costs, optimize energy efficiency, and lower their carbon footprints. Energy, as the cornerstone of both industry and the economy, underscores the critical importance of cost reduction, technological advancement, and energy efficiency in ensuring national competitiveness. Thai climate tech startups should not be confined to the narrow label of high-risk ventures; instead, they must be championed as exponential growth drivers—scalable and innovative enterprises that empower corporations, SMEs, and the broader economy to thrive sustainably.

By uniting key stakeholders around the game-changing potential of climate tech startups and their essential role in achieving Thailand's decarbonization goals, while implementing strategic measures to support them, the nation can foster a thriving climate tech ecosystem. This will not only fuel innovation and accelerate sustainable development but also position Thailand as a global trailblazer in tackling the pressing challenges of climate change.

1. Introduction

Innovation is a cornerstone of addressing climate change, and startups play a pivotal role in driving this transformation. Unlike larger corporations, startups can pivot and respond to new challenges and opportunities more swiftly. This agility allows them to experiment with novel ideas, develop cutting-edge technologies, implement, and scale solutions at a faster pace. In particular, climate tech startups thus have the potential to significantly impact sustainable development by introducing disruptive innovations that reshape markets. Their advancements not only foster industry-wide shifts but also encourage established companies to adopt more sustainable practices.

According to PwC's *State of Climate Tech 2021* report, **climate tech** is defined as technologies that are explicitly focused on reducing greenhouse gas (GHG) emissions or addressing the impacts of climate change. Climate tech applications can be grouped into three broad, sector-agnostic groups:

Those that directly **mitigate** or **remove** emissions

Those that that help to **adapt to the impacts** of climate change

Those that enhance understanding of climate change

PwC further identifies **eight** challenge areas within the climate tech landscape.

1. Energy
2. Mobility and transport
3. Industry, manufacturing, and resource management
4. Built environment
5. GHG capture, removal and storage
6. Financial services
7. Climate change management and reporting
8. Food, agriculture, and land use

In Thailand, climate tech is gaining momentum as the country strives to address climate change and achieve its sustainability goals. By fostering a dynamic ecosystem for startups, the climate tech sector can play a transformative role in mitigating climate impacts and fostering a more sustainable future. However, despite this growing potential, Thailand's climate tech startup ecosystem faces a series of complex challenges that hinder the growth and scalability of innovative solutions aimed at addressing climate change.

One major obstacle is the scarcity of early-stage funding, which is crucial for startups to scale their operations. Many Thai startups lack clear pathways to access essential resources and guidance, leading to inefficiencies and delays in their growth. This lack of direction, coupled with limited access to tailored support, hampers their ability to secure the necessary funding and expertise to scale their innovations. These barriers collectively hinder the sector's progress in addressing climate change effectively.

In response to these challenges, the Department of Climate Change and Environment (DCCE), in collaboration with the Global Green Growth Institute (GGGI) and Beacon Venture Capital (BVC), is leading the development of the **'Thailand Climate Tech Startup Guide'**. This initiative brings together key stakeholders to provide support and practical guidance, aiming to strengthen Thailand's climate tech ecosystem and address barriers to innovation and growth.

The objectives of the Thailand Climate Tech Startup Guide (the 'Guide') are to provide a **comprehensive overview of the current climate tech startup ecosystem** in Thailand, highlighting its strengths, opportunities, and challenges. Targeting diverse readers, ranging from **policy makers, investors, educators, aspiring entrepreneurs, students, and the general public**, the Guide seeks to offer actionable **policy recommendations** to create a dynamic and supportive environment **for climate tech startups to thrive**. In particular, Chapter 5 is designed to guide climate tech startups in navigating the Thai ecosystem, identifying opportunities, and overcoming barriers, enabling them to scale their innovations and contribute to the country's sustainability and climate goals.

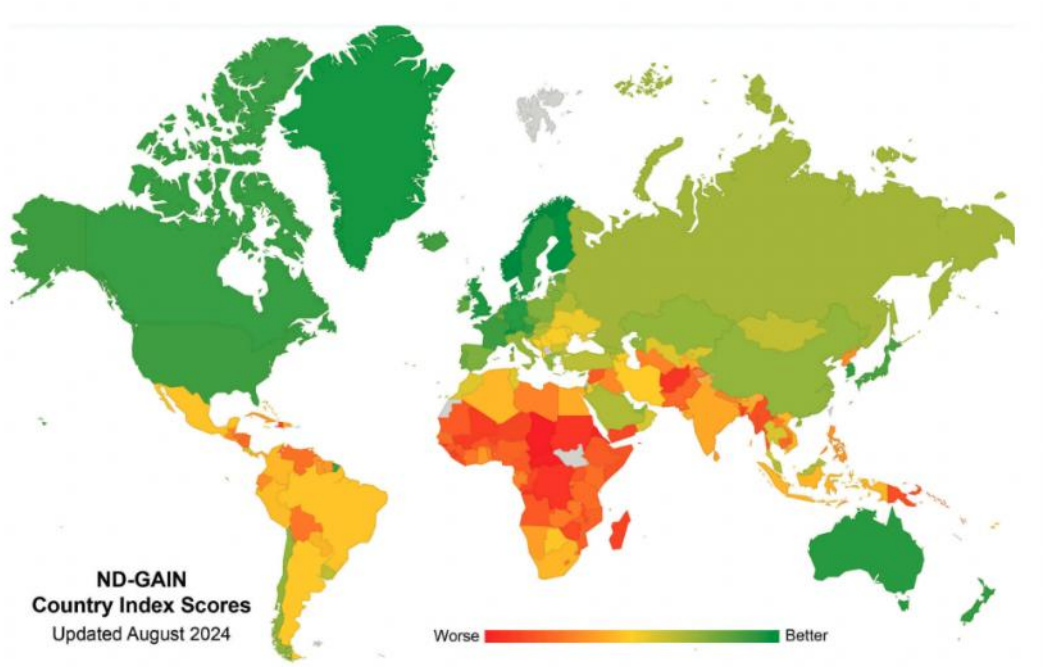
The Guide is developed on a foundation of thorough research and extensive stakeholder consultations, incorporating insights gathered from thirty-five in-depth interviews with diverse key informants, including climate tech startups, investors, supporting organizations, public sector entities, and academic institutions in Thailand. These interviews shed light on the ecosystem's challenges and opportunities, offering diverse perspectives from key actors driving innovation and sustainability. In addition, nine consultations were conducted with other relevant stakeholders, broadening the scope of understanding and incorporating a wide array of expert opinions. This inclusive approach ensures that the Guide reflects the collective expertise and experiences of the ecosystem's key players. The list of key informant interviews and stakeholder consultations can be found in the Annex section.

2. Climate Tech Landscape in Thailand

2.1 Overview of the Climate Tech Landscape

Southeast Asia is fast becoming a hub for climate tech innovation due to the region's vulnerability to climate change and its commitment to transitioning toward sustainable economies. Many international reports, such as those by *the Global Climate Risk Index* and *the Notre Dame Global Adaptation Initiative (ND-GAIN)*, consistently highlight Southeast Asia's high vulnerability to climate impacts, often ranking countries in the region among the most at risk globally. Thailand, ranked 61st, has taken significant steps to develop a robust climate tech ecosystem, positioning itself as a key player in the region's efforts to address climate challenges.

Figure 1: ND-GAIN Country Index Scores



Source: Notre Dame Global Adaptation Initiative 2024

Thailand is committed to the Paris Agreement in reducing GHG by 30-40% from business-as-usual by 2030, achieving carbon neutrality by 2050, and net-zero emissions by 2065, which has spurred investments in green technologies. Key industries such as energy, agriculture, and waste management are seeking innovative climate tech solutions to meet these goals. With a growing emphasis on sustainability and environmental protection, the Thai government has introduced several incentives and policies to support the development of climate tech, including the feed-in-tariff scheme and tax breaks for renewable energy projects, reimbursement grants, and subsidies for electric vehicle production. Despite these efforts, significant challenges remain, including regulatory hurdles, a shortage of skilled talent, and limited access to funding, which continue to impede the sector's full potential.

As of 2023, the global climate tech startup market is driven by increasing investments in clean energy, sustainable technologies, carbon reduction, and climate-resilient solutions. Climate tech funding has been slow globally, except for Asia (+19% YoY) with a total funding of USD 72.9 billion. (*Net Zero Insight, 2023*). Looking ahead, green businesses present a staggering USD 280 trillion investment opportunities by 2050. Despite this potential, the current climate tech journey and the associated capital allocation process remain fragmented and inefficient. This underscores the need for a structured framework to streamline climate tech fundraising and accelerate investment flows (*McKinsey, 2024*).

Figure 2: 2023 Startup Funding by Continent

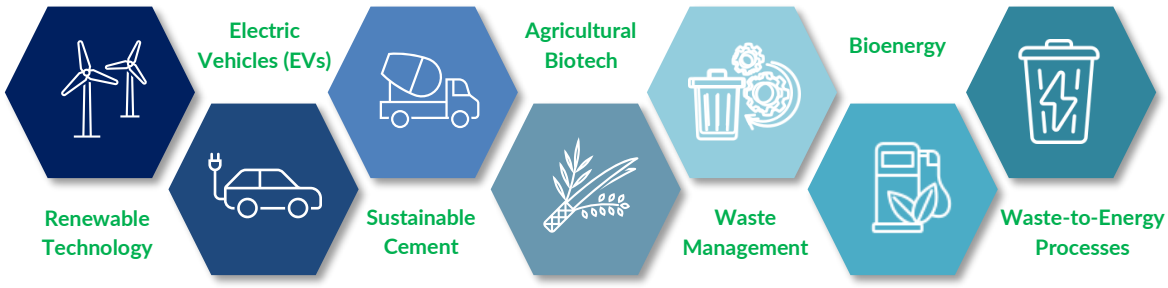
Source: Net Zero Insights 2023

According to the Net Zero Insight's *State of Climate Tech 2023* report, globally, the share of funding in the energy sector has been steadily growing since 2020 and now accounts for 35% of climate tech funding in 2023. Nonetheless, the report also highlighted a persistent challenge for startups globally – the so called "**the valley of death**", which sees a significant drop in investment for Series A and Series B funding, creating a major hurdle for startups attempting to scale their innovations.

Globally, emerging trends in climate tech are shaping the startup landscape and include carbon accounting and trading platforms, carbon capture and sequestration (CCS), long-duration energy storage, agriculture and food tech, and artificial intelligence (AI)-driven environmental insights, green hydrogen, clean ammonia production, low-carbon manufacturing and construction, and sustainable packaging. These trends highlight the opportunities for Thai climate tech startups to align with global innovation and drive the country's sustainability agenda forward.

Climate tech is a recent term in the Thai startup scene, and **climate tech startups** today were previously associated with "green tech" and "clean tech". Despite this evolving terminology, the core focus remains consistent—driving sustainable innovation to address climate challenges. As the climate tech ecosystem in Thailand begins to take shape, the spotlight has shifted to decarbonization solutions within the green and climate tech sectors. BCG published

a report in 2023 that is also in line with the PwC's *State of Climate Tech 2021* report. *Getting ready for business: Firming up Thailand's startup ecosystem, December 2023*, highlights climate tech as a key pillar of Thailand's sustainability efforts and include several strategic areas of focus for innovation and investment as follows:



Although exact figures for Thailand's climate tech startup market value are unavailable, the sector is steadily gaining momentum as the country pivots toward sustainability. The market is expected to grow, driven by increasing investments in areas such as clean energy, sustainable agriculture, and waste management. According to the *Net Zero Insight*, the clean energy sector alone in Thailand is projected to attract billions of dollars in investments over the next decade, particularly in solar energy and smart city development.

Moreover, the Thai government's commitment to reducing GHG emissions, achieving carbon neutrality by 2050 and net zero by 2065 is driving both public and private investments in climate tech. These investments range from infrastructure development to green financing initiatives. The Bio-Circular-Green Economy (BCG) model, which is part of Thailand's national strategy, is expected to further stimulate climate tech innovation across sectors like agriculture, waste, and renewable energy.

Yet, the current Thai startup ecosystem has not fully recovered its dynamism since the pandemic, despite growing global demand for decarbonization solutions. According to the stakeholder consultations conducted for this Guide, only two climate tech startups have been founded in the past 5 years (as of 2024). Accelerators and incubators subsided alongside early-stage funding for startups. University Research & Development (R&D) spinoffs are not adequately incentivized, despite the need for climate tech startups to develop deep-tech-based ventures.

In terms of low-emission vehicles, while the Thai government has facilitated foreign companies in their electric vehicle (EV) market expansion, there has been insufficient focus on for jumpstarting new domestic ventures or addressing regulatory barriers and bureaucratic processes that prevent climate tech startups from scaling or securing proof of concept (POC) funding. Thai Corporate Venture Capital (CVC) investments in local climate tech startups remain rare, with many CVCs prioritizing investments abroad for higher return.

2.2 Key Stakeholders

The development of a thriving climate tech startup ecosystem in Thailand relies on the active participation and collaboration of diverse stakeholders, each playing a critical role in driving innovation, investment, and sustainability. These stakeholders include startups, investors, supporting organizations, academic institutions, and research bodies, all of whom contribute uniquely to the ecosystem's growth and resilience.

2.2.1 Startups

Startups form the backbone of the climate tech ecosystem, driving innovation across various subsectors. In Thailand, startups are emerging in fields such as agri-food tech, energy management, carbon accounting, clean and renewable energy, mobility and transport, waste management, and water conservation. These ventures are not only addressing pressing climate challenges but are also leveraging advanced technologies like IoT, AI, and biotechnology to create impactful solutions.

Table 1 below highlights Thai climate tech startups across eight subsectors that are currently active and showing significant potential based on desktop research and stakeholder consultations. This list is not intended to be exhaustive but provides an overview of key climate tech trends shaping the Thai startup landscape. Notably, some startups address multiple climate challenges and may span more than one subsector, reflecting the interconnected nature of climate tech solutions. A comprehensive list of climate tech startups is available in Annex V of this Guide.

Table 1: Notable Thai Climate Tech Startups

Climate Tech Subsector	Description	Thai Climate Tech Startups
Agri-Food Tech	Focused on sustainable farming practices, waste upcycling, smart farm management, and biotech innovations to improve productivity and reduce environmental impact.	Advanced GreenFarm (FLO Wolffia), Distar Fresh, Full Circle Biotech, HydroNeo, ListenField, Ricult, Thai Carbon, Wongphai
Energy Management	Developing smart energy solutions for efficient building operations, energy-saving technologies, and innovative coatings to reduce energy consumption and environmental impact.	Alto Tech, PAC Corporation, TIE Smart Solutions, Nano Coating Tech
Carbon Accounting and Climate Analytics	Platforms leveraging AI and IoT for carbon accounting, emission management, carbon trading, and environmental data analytics.	Carbonwize, GideonOne, Varuna, Vekin
Clean and Renewable Energy	Specialized in renewable energy technologies like green hydrogen and distributed renewable energy systems.	Enapter, ION Energy

Climate Tech Subsector	Description	Thai Climate Tech Startups
Mobility and Transport	Focused on electric vehicles, charging infrastructure, and innovative mobility solutions like on-demand electric ridesharing.	CHOSEN Digital, ETRAN, Evolt, Ginka EV, TOP Engineering Corporation, Urban Mobility Tech (MuvMi)
Waste Management and Circular Economy	Addressing waste management challenges with circular economy approaches, including upcycling, waste-to-energy solutions, and sustainable materials development.	CIRAC, GEPP Sa-Ard, Get2Green, LightBlue Environmental Consulting, Moreloop, Nornnorn, PEEL Lab, Recyglo Thailand, UPCYDE
Water Management and Conservation	Providing solutions for efficient solid waste and wastewater management.	Inno Green Tech
Shopping and Lifestyle	Platforms aimed at reducing food waste and promoting affordable, high-quality, and sustainable consumption.	Onela Market, Yindii

2.2.2 Investors

Investors play a critical role in driving the growth and scalability of climate tech startups by providing capital, strategic guidance, and market access. In Thailand, the investor landscape for climate tech startups is evolving, with contributions from domestic venture capital (VC) firms, corporate venture capital (CVC), international impact investors, and regional funding platforms.

2.2.2.1 Venture Capital and Corporate Venture Capital (CVC)

VC provides equity funding to early-stage, high-potential startups, with a focus on innovation and growth. CVC, on the other hand, involves investments by large corporations in startups that align with their strategic goals, such as accessing new technologies or advancing sustainability efforts. Thai CVC and VC firms are increasingly recognizing the potential of climate tech, although investments remain relatively modest compared to other sectors. Notable examples include **Beacon Venture Capital**, affiliated with Kasikornbank, which actively supports sustainability-driven innovation and green technologies. Similarly, **BanpuNext**, the innovation arm of Banpu, focuses on clean energy and circular economy ventures. **AddVentures**, Siam Cement Group (SCG)'s corporate venture arm, has also expanded its investment strategy to include decarbonization and advanced materials. These players are paving the way for domestic climate tech investment while signaling opportunities for other financial institutions to follow suit. This dual approach helps create a more supportive investment ecosystem for climate tech startups, combining financial backing with strategic collaboration.

The table below lists CVC and VC firms in Thailand that invest in climate technology. It should be noted that some of the VC firms may currently be inactive since the COVID-19 pandemic. However, they have not officially closed and may become active again in the future.

Table 2: CVC and VC

Corporate Venture Capital (CVC)	Affiliation	Focus
ADB Ventures	Asian Development Bank (ADB)	Early-stage technology companies with climate and impact-focused solutions
Addventures	Siam Cement Group (SCG)	Renewable energy, building energy efficiency, Circular Economy
Bangchak Initiative and Innovation Center (BiiC)	Bangchak Corporation	Green energy and bio-based innovations.
BanpuNext	Banpu	Clean energy, energy storage systems, e-mobility, smart city, energy management systems
Betagro Ventures	Betagro	Early-stage foodtech and agritech startups
Beacon Venture Capital	Kasikornbank	Strategic investments in sustainability technology, including climate tech.
CPF Ventures	Charoen Pokphand Foods (CPF)	Foodtech, Biotech, Sustaintech, AI
Krungsri Finnovate	Bank of Ayudhya (Krungsri)	Investments in fintech and sustainability technologies
Max Ventures	PTG Energy	Food logistics, retail, wellness, healthtech, foodtech, skincare, insuretech, agritech, renewable energy, and edtech
ND Rubber	ND Rubber	Mobility tech, energy tech
Orzon Ventures	PTT Oil and Retail	Investments in innovative technologies, including climate tech
PTT ExpresSo	PTT Group	Cleantech, decarbonization ecosystem
True Incube	True Corporation	Investments in tech startups, with a growing interest in sustainability and climate tech
Venture Capital (VC)	**Focus**	
500 TukTuks	High-potential seed-stage startups across Thailand and the Mekong region, providing Silicon Valley insights and resources.	
A2D Ventures	Bangkok-based venture capital firm dedicated to supporting early-stage startups across Southeast Asia.	
Astanor Ventures	Investing in entrepreneurs who are transforming the food, agriculture, and blue ocean economy sectors.	

ECG Venture Capital (ECG Redefine)	Innovative startups and businesses across various sectors supporting companies that drive positive change and create sustainable value.
EfraStructure Co	Infrastructure projects in various sectors, including energy, transportation, and urban development.
Expara Venture Capital	An impact fund, founded with a vision to bring new technology and business model concepts to grow in the most suitable market outside Thailand
GreenRocket VC	Focuses on scaling Greentech solutions globally to accelerate sustainability and planetary change.
InnoSpace (Thailand)	A public-private collaboration supporting Thailand's startup ecosystem, with investment interests in Medical and Pharmaceutical, Food and Biodiversity, and Industry 4.0.
Nvest	Support startups addressing environmental challenges and promoting sustainability.
Openspace Ventures	Leverages its strong local presence, market understanding, and ecosystem partnerships to bridge the gap between early-stage climate tech startups and late-stage capital providers.
The Radical Fund	Early-stage startups driving climate resilience across Southeast Asia through mitigation and adaptation.
SeaX Ventures	Early-stage companies developing groundbreaking exponential technologies.
Vertex Ventures	An early-stage investor and one of Southeast Asia's oldest venture capital funds, Vertex Ventures has invested in more than 80 startups at their seed, series A/B round.

2.2.2.2 Impact Investors

Impact investors play an important role in driving Thailand's climate tech ecosystem by aligning capital deployment with measurable environmental and social outcomes. Unlike traditional investors who focus solely on financial returns, **impact investors prioritize investments that deliver tangible positive change**, such as reducing GHG emissions, improving resource efficiency, and enhancing climate resilience. By supporting startups that address critical climate challenges, impact investors help bridge funding gaps, accelerate innovation, and enable solutions that contribute to both sustainability and economic growth.

These investors are particularly valuable in early and growth-stage climate tech ventures, where the need for patient, purpose-driven capital is critical for scaling innovations. Their support not only catalyzes financial resources but also provides expertise, mentorship, and access to global networks to help startups succeed in achieving their climate and impact goals.

Table 3: Impact Investors

Impact Investors	Description

Asia Sustainability Angels	A community that invests in start-ups and early-stage businesses in Asia that are focused on creating solutions that mitigate climate change or improve the environment.
Bamboo Capital Partners	An impact investing platform which provides innovative financing solutions to catalyze lasting impact.
Katapult	An investment company, focused on highly scalable impact tech startups.
Planet Rise	Provides patient capital and support to sustainable companies using tech to make the world a better place.
Southeast Asia Clean Energy Fund (SEACEF)	Provides funding for startups in the clean energy and climate tech sectors.

2.2.2.3 Angel Investors

Angel investors are individuals who provide early-stage funding to startups, often at a critical stage where other sources of capital, such as VCs or institutional funding, are not yet available. These investors play a key role in nurturing Thailand's climate tech ecosystem by offering not just financial support but also mentorship, industry knowledge, and strategic connections. Angel investors are **typically motivated by a combination of financial returns and the desire to support innovative solutions that address pressing challenges**, such as climate change and sustainability.

In Thailand, initiatives have been launched to further develop the angel investor network and provide targeted support to early-stage startups, enhancing their ability to attract funding and scale. Notable examples include the following.

- **Angel Investor Network in Action:** This project is led by the National Innovation Agency (NIA) in collaboration with the National Science and Technology Development Agency (NSTDA), aiming to create a new generation of investors and develop a network of investors in the startup ecosystem. Focusing on Bangkok, Khon Kaen, Songkhla, Chiang Mai and Chonburi, it has the objective to develop the capacity of startups and connect them with early-stage Angel Investors, engaging the Young Entrepreneur Chamber of Commerce, the Thai Chamber of Commerce, and the Federation of Thai Industries.

- **Delta Angel Fund:** Launched in 2021 by Delta Electronics Thailand, in collaboration with the Department of Industrial Promotion (DIP), the fund provides financial backing and business training to startups. In addition to financial support, the fund facilitates a business boot camp where entrepreneurs can refine their business models and prepare pitches for potential investors. Additionally, winning teams from this initiative have opportunities to present their projects on "Shark Tank Thailand," further increasing their chances of securing investments.

- **Thailand Business Angel Network (TBAN):** TBAN is a gathering of angel investors who use their personal wealth to invest in startups. TBAN was established by participants in the Qualified Angel Investor Certificate course of the World Business Angel Investment Forum Business School and Thailand's Software Park.

2.2.3 Supporting Organizations

Supporting organizations play a critical role in nurturing Thailand's climate tech ecosystem by providing essential resources, mentorship, and platforms for collaboration. These organizations, including government agencies, accelerators, incubators, and collaborative networks, bridge the gap between startups and their access to funding, knowledge, and strategic connections. By fostering a conducive environment, they help climate tech startups overcome barriers to growth and scale their innovations effectively.

2.2.3.1 Government Agencies

Government agencies are at the forefront of promoting innovation and sustainability in Thailand, offering financial incentives, policy support, and capacity-building programs to drive climate tech development. The Thai government has started to support the climate tech ecosystem by creating policies and programs that support innovation and sustainability. The policies and regulatory framework are summarized in Section 2.3. The following are the key government agencies that support innovation, startups, and climate change-related policies.

Table 4: Government Agencies

Government Agencies	Focus and Role
Department of Climate Change and Environment (DCCE)	DCCE is a department within the Ministry of Natural Resources and Environment that plays a central role in coordinating and implementing **climate change policies.**
Thailand Board of Investment (BOI)	Offers **tax incentives, grants, and investment privileges** to companies in climate tech sectors such as renewable energy, sustainable agriculture, and green technologies, attracting foreign investment and promoting sector growth.
Ministry of Higher Education, Science, Research and Innovation (MHESI)	Oversees programs fostering scientific research, innovation, and higher education. Through agencies like NSTDA and NXPO, MHESI drives **technology transfer and commercialization of research** in alignment with Thailand 4.0 goals.
National Innovation Agency (NIA)	A public organization under MHESI, NIA provides **financial support, incubation programs, and resources** to startups and research institutions working on climate tech solutions, fostering innovation and entrepreneurship in Thailand's climate tech ecosystem.
National Science and Technology Development Agency (NSTDA)	Operating under MHESI, NSTDA focuses on **research and innovation for sustainability**, partnering with international organizations and companies to advance clean energy and climate tech. Programs like the NSTDA Spinoff Program support **commercialization of research innovations**.
Office of National Higher Education Science Research and Innovation Policy Council (NXPO)	Under NSTDA, NXPO is responsible for **formulating policies and strategies** to enhance the country's higher education, science, research, and innovation systems. Their goal is to drive Thailand's development towards becoming an **innovation-driven economy**, in line with the Thailand 4.0 policy. NXPO serves as Thailand's National Designated Entity (NDE) for the Climate Technology Centre and Network (CTCN) under the Paris Agreement, **facilitating climate technology transfer and innovation**.

Government Agencies	Focus and Role
Program Management Unit for Competitiveness (PMUC)	A research funding unit under NXPO, PMUC aims to enhance national competitiveness by creating **innovations that enable industries to develop high-value goods and services for the global market.** PMUC provides grant funding for **prototyping and product functionality testing**, supporting the startup need for acquiring standards and certifications.
Thailand Science Research and Innovation (TSRI)	TSRI is an independent agency under MHESI, which plans to contribute to the development of **10,000 new technology startups** within 2024-2026 to serve the industries of artificial intelligence (AI), electric vehicles (EVs), and the bio-circular-green (BCG) economy.
Department of Industrial Promotion (DIPROM)	Operating under the Ministry of Industry, DIPROM supports startups and entrepreneurs through initiatives like the **DIPROM Startup Connect Project**, promoting innovation and technologies that align with Thailand's Bio-Circular-Green (BCG) Economy framework.
Digital Economy Promotion Agency (DEPA)	DEPA operates under the Ministry of Digital Economy and Society, focusing on Thailand's **digital transformation** across various sectors, including **smart city** development and industry digitization. While not exclusively climate tech-focused, DEPA empowers startups through **funding, expert guidance, and networking.**
Thailand Greenhouse Gas Management Organization (TGO)	Builds **business capacity f**or sustainable practices and **carbon reduction.** Manages the **Thailand Carbon Credit Registry System**, enabling businesses to participate in the carbon market and encouraging investments in green and climate technologies.
Department of Intellectual Property (DIP)	DIP operates under the Ministry of Commerce and is responsible for managing **intellectual property rights**, including patents, trademarks, and copyrights. DIP provides various services such as electronic filing systems for trademarks and patents, intellectual property consultations, and online resources for IP knowledge.
Ministry of Energy	The Ministry of Energy oversees energy policy and plays a key role in promoting **renewable energy sources and energy efficiency technologies.**
Office of Natural Resources and Environmental Policy and Planning (ONEP)	ONEP conducts **research and policy analysis** on environmental issues, including climate change, and provides **technical support** to other government agencies.
Ministry of Agriculture and Cooperatives (MoAC)	MoAC plays a significant role in advancing climate tech within the agricultural sector through promoting **climate-smart agriculture,** supporting R&D, and providing capacity-building programs for farmers and agricultural extension officers.
Ministry of Transport	The Ministry of Transport is actively involved in promoting climate tech within the transportation sector through promoting the adoption of **EVs, supporting the development and use of biofuels and sustainable transport systems.**

The contributions of these supporting organizations are instrumental in shaping Thailand's climate tech ecosystem. Strengthening partnerships and expanding support mechanisms will be essential to unlocking the full potential of climate tech innovation in Thailand.

2.2.3.2 Venture Builders, Incubators & Accelerators

Thailand's climate tech ecosystem is supported by a range of venture builders, incubators, and accelerators that provide essential resources, mentorship, and funding to startups. These programs play a key role in nurturing early-stage ventures, enabling them to scale their innovations and address pressing climate challenges. Notable programs and organizations include the following.

Table 5: Venture Builders, Incubators & Accelerators

Program/Organization	Description and Focus
AIS The StartUp	An innovation hub and accelerator by Advanced Info Service (AIS), Thailand's leading mobile network operator, offering mentorship, funding, and market access for startups.
LowCarbon.Earth Accelerator	Organized by Massive Earth Foundation (MEF) and United Nations Environment Programme (UNEP), this program provides mentorship, networking, and funding for climate tech startups delivering measurable environmental impacts.
New Energy Nexus Thailand	An accelerator supporting over 30 clean energy startups since 2017 through programs like Decarbonize Sandbox and solar energy accelerators.
She Loves Tech	A global startup competition empowering women-led tech innovations, providing mentorship, networking, and funding opportunities for socially and economically impactful solutions.
SPACE-F	Thailand's first foodtech startup incubator and accelerator, established through collaboration among Thai Union Group, NIA, and Mahidol University to support agri-food tech startups.
The Thailand Accelerator	A program with partners like 500 TukTuks, Amazon Web Services, Beacon VC, and DEPA offering resources and mentorship to foster technology and innovation, including climate tech.
UOB FinLab	UOB's regional accelerator supporting greentech, startups, and SMEs with tailored programs focused on digital transformation, business growth, and sustainability solutions.
Wavemaker Impact	A Southeast Asia-based venture builder partnering with experienced founders to develop scalable climate tech solutions aligned with the UN Sustainable Development Goals (SDGs).

2.2.3.3 Collaborative Hubs and Networks

Collaborative hubs and networks provide access to shared knowledge, resources, and strategic partnerships. These platforms facilitate innovation, foster collaboration among key stakeholders, and help startups scale impactful solutions. Notable hubs and networks include:

Table 6: Collaborative Hubs and Networks

Hub/Network	Description and Focus
Thailand Climate Business Network (ThaiCBN)	Established in 2024, ThaiCBN is a collaborative effort of 25 leading national and international organizations to coordinate the efforts of five key sectors – namely the public, private, education, and financial and banking sectors, to collectively support Thailand's drive towards the net zero goal. The initiative focuses on three key areas: 1) Establishing a climate change network across the supply chain and fostering the exchange of knowledge, research, technology, and best practices; 2) Promoting the real-world use of knowledge and technologies; and 3) Enhancing the capabilities of businesses and industries throughout the supply chain to seize new opportunities in a low-carbon economy.
Climate Tech Club	Founded in 2023, the Climate Tech Club includes key members such as NIA, NSTDA, TGO, Beacon VC, and New Energy Nexus. Its mission is to raise awareness of climate tech, support innovative entrepreneurs, develop domestic and international markets, improve access to financing, and strengthen government support mechanisms.
True Digital Park (TDPK)	Southeast Asia's largest innovation hub, providing a collaborative platform for startups, corporations, and investors. TDPK supports climate tech entrepreneurs with co-working spaces, mentorship, and funding opportunities, focusing on e-mobility, decarbonization, agritech, and energy. It also hosts events like the Decarbonize Thailand Symposium, fostering dialogue on the path to net-zero emissions.
Thailand Startup Association (TSA)	A key player in Thailand's startup ecosystem, TSA advocates for innovation-driven policies, organizes networking events, and connects startups with legal and financial resources. While not climate-exclusive, it supports climate tech startups by linking them with investors and corporate partners to facilitate growth.
Innovation Club Thailand	Established in 2020, the Innovation Club unites public and private sectors with academic institutions to promote Thai startups as competitive global players. Founding members include Ananda Development, Bangchak Corporation, Kasikornbank, SCB 10X, Chulalongkorn University, and DEPA, among others, aiming to drive economic sustainability.
Carbon Markets Club Thailand	Launched in 2021 by Bangchak Corporation, BCPG, and other partners, the Carbon Markets Club promotes carbon credit trading and raises awareness about climate action. It supports Thailand's voluntary carbon market and aligns with national sustainability goals.
Thailand Venture Capital Association (TVCA)	A platform that connects startups with venture capitalists and investors, helping bridge funding gaps and fostering investment opportunities in Thailand's innovation ecosystem.
Thailand CCUS Consortium	Established in 2022, this consortium includes Chulalongkorn University, PTT Group, SCG, BIG, GPSC, and EGAT. It focuses on developing Carbon Capture, Utilization, and Storage (CCUS) technologies to reinforce Thailand's Carbon Neutral and Net Zero targets.
Corporate Decarbonization Exchange (CDx)	Organized and presented by Asia Clean Energy Partners, CDx is a dynamic, year-round community committed to corporate decarbonization in Southeast Asia.
Shark Tank Thailand	The Thai version of the global Shark Tank franchise, airing on Channel 7HD since 2018. The platform enables entrepreneurs, including climate tech startups, to pitch their ideas to a panel of investors ("sharks") for capital, mentorship, and industry connections.

2.2.3.4 Academic Institutions and Research Bodies

Academic institutions and research bodies are key drivers of innovation in Thailand's climate tech ecosystem. They bridge the gap between research and commercialization by providing critical resources, expertise, and infrastructure to support startups and entrepreneurs. Through incubation programs, industry collaborations, and technology transfer initiatives, these institutions help transform cutting-edge research into practical, market-ready solutions that address climate challenges and promote sustainable development. The following are academic institutions and research bodies engaged in startup incubation and/or climate tech.

Table 7: Academic Institutions and Research Bodies

Institution/Center	Description and Focus
Bio-Circular-Green Economy Technology and Engineering Center (BCGeTEC), Chulalongkorn University	Established in 2020 by the Faculty of Engineering, BCGeTEC supports Thailand's BCG Economy Model under the Thailand 4.0 Policy. It serves as a hub for education, research, and industrial collaboration, facilitating the transition to a sustainable bio-circular-green economy.
CMU STEP (Science and Technology Park), Chiang Mai University	CMU STEP acts as a regional innovation hub connecting university research with industry, government, and community stakeholders. It fosters startups through advanced facilities, expert guidance, and commercialization support, driving sustainable development in northern Thailand.
CU Innovation Hub (CU iHub), Chulalongkorn University	CU iHub supports startups across industries with a one-stop ecosystem, offering incubation, mentoring, capital raising, and commercialization services. Initiatives like the Chula Spin-Off Club and CU Enterprise promote technology transfer and startup formation. CU iHub also partners globally, such as through the "Techstyle for Social Good" challenge.
KX Startup & Innovation Ecosystem, KMUTT	Operated by King Mongkut's University of Technology Thonburi, KX incubates deep-tech ventures and connects startups across 11 countries. It supports over 200 startups globally through expert mentorship and partnerships with accelerators like NIA, TED Fund, and DEPA.
Innovation and Technology (iNT) Department, Mahidol University	Mahidol University drives open innovation and technology transfer, particularly in healthcare and research-based startups. The iNT department supports industry collaborations, workshops, and intellectual property licensing to encourage commercialization and startup growth.
Vidyasirimedhi Institute of Science and Technology (VISTEC)	VISTEC is a leader in climate technology research, focusing on advanced catalysts for CO_2 conversion, high-efficiency semiconductors for solar energy, and innovative energy storage technologies. Its Centre of Excellence for Energy Storage Technology (CEST) develops next-generation batteries and supercapacitors. VISTEC also explores biotechnology solutions to convert organic waste into biogas and fertilizers.

2.3 Policy and Regulatory Framework

While Thailand does not currently have policies or regulations specifically targeting climate tech startups, the country has established a robust framework of climate-related policies, strategies, and incentives that create an enabling environment for the growth of climate-focused innovations.

Thailand has yet to achieve the targets set by the 2015 Paris climate agreement. In November 2024, the Minister of Natural Resources and Environment announced at the COP29 climate summit in Baku, Azerbaijan, that Thailand will aim to further reduce its GHG emissions to below 270 million tons of carbon dioxide equivalent by 2035 and boost carbon sinks in land use by 120 million tons by 2037. Despite emitting less than 1% of global GHGs, Thailand is committed to enhancing its mitigation actions and achieving its 2030 goal of reducing emissions by 222 million tons across five sectors: energy, transport, waste, industrial processes, and agriculture in accordance with Thailand's NDC Action Plan on Mitigation 2021 – 2030 (Bangkok Post, 2024).

Table 8: GHG emissions reduction targets by sector

Sector	GHG emissions reduction target ($MtCO_2e$)	Approach
Energy	124.6	Increased use of renewable energy, improved energy efficiency, and Carbon Capture & Storage
Transportation	45.6	Promotion of electric vehicles, public transportation, improved vehicle efficiency, urban mobility, inter-urban transport and green logistics, alternative transport fuels (hydrogen, sustainable aviation fuels), and enhancing transport infrastructure and support
Municipal Waste Management and Industrial Wastewater	9.1	Effective waste management and wastewater treatment
Industrial Processes and Product Use (IPPU)	1.4	Improved production processes and the use of environmentally friendly technologies, including substitute clinker, Refrigeration and Air Conditioning Nationally Appropriate Mitigation Action (RAC NAMA), and proper disposal of waste refrigerants
Agriculture	4.1	Livestock waste management measures, measures to reduce the use of chemical fertilizers, alternate wetting and drying rice cultivation practices

Source: NDC Action Plan on Mitigation 2021-2030

The following key policies and regulations provide opportunities for climate tech startups to align with national priorities and contribute to Thailand's climate and sustainability goals.

2.3.1 Thailand 4.0

Thailand 4.0 is an ambitious economic model designed to transform Thailand into a value-based economy driven by innovation, technology, and creativity. Its objectives include economic transformation, sustainable development, and human capital enhancement. The key sectors targeted are next-generation automotive, smart electronics, medical and wellness tourism, precision agriculture and biotechnology, and food for the future. Two out of the five New S-Curve targets are related to climate tech, including biofuels and biochemical, aviation and logistics. Supportive measures include investment incentives, infrastructure development, and research and development. Thailand 4.0 aims to create a self-reliant, prosperous economy by leveraging the country's strengths in cultural and biological diversity (BOI, Thailand 4.0).

2.3.2 Climate Change Master Plan (2015–2050)

Thailand's Climate Change Master Plan serves as a long-term strategy to build resilience and reduce emissions through three key pillars: climate mitigation, climate adaptation, and the creation of an enabling environment. The mitigation pillar focuses on promoting clean energy, energy efficiency, and low-emission technologies, while the adaptation pillar prioritizes enhancing resilience in agriculture, water management, and infrastructure. Importantly, the plan also highlights the need for innovation and capacity building, creating a foundation for climate tech startups to develop and scale technologies that address Thailand's climate challenges (ISDNRE, 2023).

2.3.3 Bio-Circular-Green Economy (BCG) Model

The Bio-Circular-Green Economy (BCG) Model is a key national strategy to drive sustainable economic development. It focuses on integrating bioeconomy, circular economy, and green economy principles to promote resource efficiency and environmental sustainability. Startups in the climate tech space can align with the BCG model by developing solutions in areas such as biomass utilization, waste-to-energy systems, renewable energy technologies, and circular waste management. This strategy provides a clear policy direction for startups contributing to green growth and sustainable development in Thailand (NSTDA, 2021).

2.3.4 National Energy Plan (NEP) (Draft)

Thailand is in the process of finalizing its National Energy Plan (NEP) 2024, which will combine several existing strategies, including the Power Development Plan (PDP), Oil Plan, Gas Plan, Alternative Energy Plan, and Energy Efficiency Plan, into a single, unified framework. The NEP aims to provide a clear direction for the country's energy transition, focusing on increasing the share of clean and renewable energy while reducing carbon emissions. Key priorities include expanding solar, wind, and biomass energy, improving energy storage systems, promoting electric vehicle (EV) infrastructure, and enhancing energy efficiency across sectors. This aligns with Thailand's goal to achieve carbon neutrality by 2050 and net-zero emissions by 2065 (EPPO, 2021).

A significant feature of the NEP is its emphasis on scaling up investments in clean energy technologies and sustainable infrastructure. With its ambitious focus on integrating renewable energy into the national grid and encouraging energy efficiency innovations, NEP creates opportunities for climate tech startups to offer cutting-edge solutions in areas such as renewable energy generation, smart grids, energy management systems, and EV-related technologies. By aligning with the NEP's objectives, climate tech startups can contribute to Thailand's energy transition while accessing potential investments, partnerships, and government support to scale their innovations (The Nation, 2024).

2.3.5 National Adaptation Plan (NAP)

Thailand's National Adaptation Plan (NAP) serves as a key policy to build resilience in sectors that are highly vulnerable to climate change impacts. These include water resources management, agriculture and food security, urban infrastructure, and coastal protection. The NAP provides a framework for developing climate-resilient technologies and services, offering opportunities for climate tech startups to introduce innovations such as precision agriculture solutions, water-efficient systems, urban adaptation tools, and climate risk monitoring technologies (UNFCCC, 2024).

2.3.6 Electric Vehicle (EV) Policy and 30@30 Target

Thailand's EV Policy aims to make the country a regional hub for electric vehicle production and adoption, in line with the government's 30@30 target—which aims for 30% of all vehicles produced in Thailand to be Zero Emission Vehicles (ZEVs) by 2030. The policy includes fiscal incentives such as tax reductions, subsidies for EV buyers, and investment incentives for manufacturers of EVs, batteries, and related infrastructure. Additionally, the government is investing in EV charging networks and battery technologies to support this transition. Climate tech startups can play a significant role in this ecosystem by developing solutions for EV infrastructure, energy storage, battery recycling, and smart transportation systems (BOI, 2023).

2.3.7 Board of Investment (BOI) Incentives

The Board of Investment (BOI) provides targeted incentives to support technology-driven businesses, including climate tech startups, by reducing financial barriers and promoting innovation. BOI offers tax incentives, such as corporate income tax exemptions for up to 13 years for the A+ category of biotechnology, nanotechnology, advanced material technology, and 8 years for the A1 and A2 categories (R&D that is critical for developing the country's long-term competitiveness), and import duty exemptions on machinery and essential equipment for projects in sectors like renewable energy, energy efficiency, waste management, and circular economy solutions. Non-tax incentives include streamlined work permits and visas for foreign experts through programs like the Smart Visa, facilitating access to skilled talent and international collaboration. Additionally, BOI promotes investment in research and development (R&D), encouraging startups to develop and scale green technologies such as energy storage, waste-to-energy systems, and clean transportation solutions. By leveraging these incentives, climate tech startups can reduce costs, attract investment, and scale their innovations, aligning with Thailand's sustainability priorities and low-carbon transition goals (BOI, 2023).

2.3.8 Carbon Pricing, Emissions Trading, and Opportunities under Article 6

Thailand is actively exploring carbon pricing mechanisms to reduce CO_2 emissions, particularly in the power and industrial process and product use (IPPU) sectors, as part of its upcoming Climate Change Act, which will introduce mandatory carbon pricing instruments. The country

also supports emissions trading through the Thailand Voluntary Emission Reduction Program (T-VER), allowing participants to sell carbon credits in the domestic market under the oversight of the Thailand Greenhouse Gas Management Organization (TGO). In alignment with Article 6 of the Paris Agreement, Thailand is working to engage in international carbon markets by developing frameworks for bilateral and multilateral cooperation on carbon credit trading. These mechanisms enable a country to transfer emission reductions to partner nations or organizations while maintaining environmental integrity and avoiding double counting (SPAR6C, 2023).

2.4 Funding

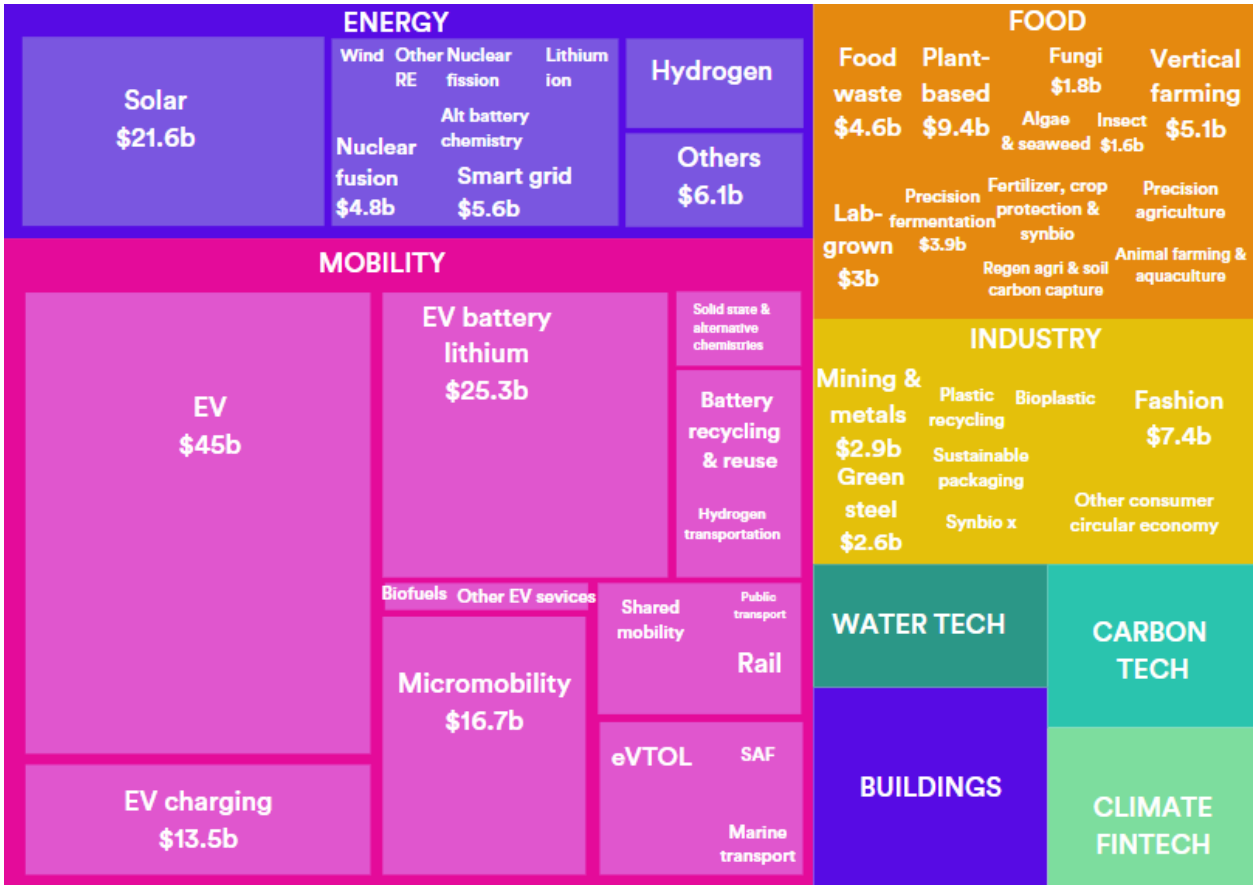
Thailand has experienced three distinct waves of startup growth. **The first wave**, driven by the telecom sector, began in 2011 with the launch of AIS The Startup, followed by dtac Accelerator in 2012 and True Incube in 2013. **The second wave** saw commercial banks, such as Kasikornbank, Krungsri Bank, and Siam Commercial Bank establish venture capital arms, while major corporations like Sansiri, Ananda Development, and Siam Cement Group also entered the ecosystem with CVC funds. **The third wave**, emerging in the post-COVID19 pandemic era, emphasizes climate tech as a priority. Despite this momentum, funding challenges remain, particularly for early-stage startups. CVCs typically focus on Series A and later-stage investments, prioritizing strategic opportunities that align with their parent companies' business goals (Techsauce, 2017).

Several startups acknowledged the limited availability of funding from both VC funds as well as CVC within Thailand. Most investors prefer to invest in climate tech startups outside the country, as climate tech ecosystem remains relatively underdeveloped in Thailand, resulting in minimal investment in this sector. Among a few exceptions, PTT ExpresSo stands out as one of the few CVCs investing directly in climate tech startups. Meanwhile, CVCs that have emerged from the real estate industry, such as Ananda Development and Sansiri, have shown interest in investing in solar energy and other renewable energy solutions, reflecting a growing but still limited focus on sustainability-related investments.

Globally, climate tech startups are experiencing explosive growth, driven by a new wave of innovators disrupting high-carbon industries. However, scaling these businesses presents a significant challenge, particularly securing the funding necessary to bridge the gap between early-stage angel investments and traditional commercial loans. This is where venture capital plays a crucial role in catalyzing the growth of climate tech startups.

Below is a snapshot of venture capital investment in climate tech between 2016 to 2023, consisting of energy tech, mobility tech, agricultural and food tech, industrial tech for materials and processes, water tech, carbon tech, building tech for energy management, and climate fintech.

Figure 3: Global Climate Tech Venture Capital funding by Segment 2016-2023



Source: Dealroom.co (simplified)

While there are relatively few VC firms in Thailand, the broader Southeast Asia region, which faces significant climate risk, is increasingly attracting VC investment focused on climate tech startups. Key players driving investment in the region include the **Asian Development Bank (ADB)** and **Temasek Holdings**, both of which spearhead major funding initiatives for clean energy and sustainable infrastructure. Furthermore, Breakthrough **Energy Ventures** and **BlackRock** are becoming prominent private investors in the area, particularly in clean energy and carbon management startups, signaling growing momentum for climate-focused innovation across Southeast Asia (Climate Insider, 2024).

2.4.1 Government-led Funding Opportunities and Public-Private Partnerships

In Thailand, the government plays an active role in fostering innovation and entrepreneurship, including support for climate tech startups. Through various funding programs and partnerships, the government aims to strengthen the startup ecosystem at different stages of growth, from ideation to scaling operations. This funding is complemented by the participation of public-private initiatives, which help startups develop their technologies, access markets, and attract additional investment. To promote innovation in climate tech, the Thai government offers a range of funding and investment incentives as follows:

1. **The National Innovation Agency (NIA)'s** role in supporting innovative businesses include Groom (capacity building), Grant (innovation development), Growth (scale-up and diffusion) and Global (market access and partnerships) (NIA, 2024). NIA offers several grants and programs to support climate tech startups as follows:

    a) **Climate Tech Acceleration Program** is designed to support startups that focus on developing innovative environmental and climate solutions. Through this program, startups gain access to mentorship, networking opportunities, and financial advisory services. Participants can also test their products or services with target customers, refining their solutions for real-world impact. Additionally, the program provides a platform for startups to showcase their work to potential investors, fostering connections that can drive further growth and success (NIA, 2024).

    b) **Thematic Innovation Program** offers substantial funding to foster innovation among startups and entrepreneurs in strategic industrial sectors. With a total grant allocation exceeding THB 200 million, the program provides up to THB 5 million in funding per business. This initiative aims to empower entrepreneurs to develop groundbreaking solutions while strengthening the industries critical to economic and environmental resilience (The Nation, 2022).

    c) **Workshops and Collaborations** form a cornerstone of efforts to bridge climate finance gaps and advance green projects. By partnering with organizations such as the United Nations Economic and Social Commission for Asia and the Pacific (UN ESCAP), the program fosters dialogue, knowledge sharing, and collective action. These collaborations are instrumental in driving progress on climate-related initiatives and enabling access to resources that support sustainable development goals (UNESCAP, 2024).

    NIA offers acceleration programs in food technology, agricultural technology, health technology, and climate tech. It has partnered with various international organizations to help local startups expand their markets, including collaborations with Japan, Hong Kong, and South Korea. Over the past 15 years, NIA has supported over 3,133 projects worth around THB 3.58 billion, leading to an investment value of around THB 50.3 billion. In fiscal year 2025, NIA is expected to receive THB 70 million for its "recoverable grant" and around THB 100 million for promoting soft power innovation. NIA's corporate co-funding scheme invests in startups at the seed to pre-series A levels, with investments up to THB 10 million. NIA is also collaborating with the BOI on a new matching fund worth THB 1 billion per year (Bangkok Post, 2024).

    Specifically for climate tech startups in Thailand, NIA provides the **Climate Tech Acceleration Program** to support startups developing innovative solutions for climate change mitigation and adaptation in the areas of Clean Energy, Energy Conservation, Data Analytics, and Waste Utilization. It provides funding, mentorship, and access to a network of industry experts (NIA, 2024).

NIA's **Thematic Innovation Program** provides grants of more than THB 200 million to innovative startups and entrepreneurs, with up to THB 5 million per business. It targets strategic industrial sectors, including climate tech (The Nation, 2022).

NIA's "**Mandatory Innovation**" Business Platform aims to support 10,000 innovation-based entrepreneurs, with 1,000 of them reaching the growth stage by 2030. This platform provides financial support and resources to help businesses develop and commercialize their innovative products and services (NIA, 2020).

Additionally, in the **Corporate Spark Program**, NIA also supports Thai corporates in attracting international startups, including those in climate tech, to collaborate with Thai corporates, offering up to THB 5 million in grants for market validation and localization efforts (NIA, 2024).

Snapshots of the Thai government's funding schemes and NIA's financial support mechanisms are included in Annex VI.

2. **The Program Management Unit for Competitiveness (PMUC)** provides funding for research and innovation to enhance the country's competitiveness. PMUC supports projects that align with Thailand's 4.0 policy, aiming to transition the country into an innovation-driven economy. Proposals must have clear objectives that align with PMUC's program and involve industry participation. Proposals are reviewed by experts to assess scientific merit, viability, and utilization. A program board, consisting of experts from the government, academia, and industry, approves proposals requesting less than THB 10 million. Proposals requesting more than THB 30 million undergo additional assessment for impact and business viability (PMUC, 2022).

3. **The Board of Investment (BOI) Incentives** allow climate tech startups to benefit from its tax exemptions, import duty reductions, and streamlined regulations for businesses in sectors such as renewable energy, electric mobility, and green manufacturing (BOI, 2023).

4. **The Technology and Innovation-Based Enterprise Development Fund (TED Fund)** supports innovation and tech startups, especially for recent grads from Thai universities with technical development expenses through reimbursement models. TED Fund also provides mentors, training, and fellowship support for the applicants to create stronger ideas (MHESI).

5. **DIPROM Startup Connect** is a program that aims to help startups develop their business skills and knowledge and connect them with funding and markets. The program is run by the Department of Industrial Promotion's Bureau of Promoting Entrepreneurs and New Businesses (Thai Post, 2023).

6. **FTI Innovation One**, worth THB 1 billion, is a project under the Office of the Science Promotion Commission, Research, and Innovation, promoted by the Thai Federation of

Thai Industries (FTI). The initiative aims to develop Thai innovation-based businesses and enhance the competitiveness of SMEs and industry sectors in Thailand. It allocates investment of THB 20-30 million per deal in seed to Pre-Series A (FTI).

2.4.2 Private Equity Trust

Recently in Thailand, Krungsri Finnovate (KFin) and EfraStructure Co have launched the Finno Efra private equity trust to support local and ASEAN tech startups. The trust aims to raise THB 1-1.3 billion through an IPO in Q3 or Q4, with KFin investing THB 200 million. The fund will focus on fintech, edtech, healthtech, agritech, mobility tech, martech, HR tech, travel tech, and e-commerce, targeting seed to pre-Series A stages. Investment deals will range from THB 8-40 million, with an expected return of 15% per year (Pawoot, 2024).

2.4.3 Sustainability-Themed Bonds

Thailand's Securities and Exchange Commission (SEC) conducted a public hearing on the proposed regulations to allow SMEs and startups to issue sustainability-themed bonds through crowdfunding and private placement channels. The hearing, which took place from March to April 2023, received positive feedback from most respondents, who supported the proposed principles and amendments. Some recommendations were also provided to enhance the proposal. The SEC has taken these comments and recommendations into consideration while drafting the amendments. The proposed changes include revisions to information disclosure rules to ensure investors have accurate and complete information for decision-making, and to increase the credibility of sustainability-themed bonds. The public hearing ended on January 16, 2024 (SEC, 2023).

2.4.4 Blended Finance

Blended finance serves as a strategic mechanism to support climate tech startups in Southeast Asia by combining public, private, and philanthropic capital. This approach effectively mitigates investment risks and enhances the attractiveness of projects, thereby catalyzing additional funding. Below are some notable blended finance initiatives:

- **FAST-P Initiative:** BlackRock and the Monetary Authority of Singapore (MAS) have launched a blended finance debt program to mobilize capital for decarbonization projects in Southeast Asia. This initiative aims to expand access for global investors and explore debt financing solutions for low-carbon transformation (IFC, 2024).
- **NEXCatalyst Climate Tech Fund:** New Energy Nexus Ventures has introduced this fund, a blended finance initiative designed to bridge the "Missing Middle" investment gap for early-stage climate ventures in Southeast Asia, focusing on Vietnam, Indonesia,

and the Philippines. The fund targets climate mitigation solutions and aims to mobilize significant co- and follow-on investments (New Energy Nexus).

- **SEACEF II:** Clime Capital's SouthEast Asia Clean Energy Fund II provides early-stage high-risk capital to support businesses accelerating the region's low-carbon transition. This fund combines philanthropic, public, and private sector capital to drive impactful investments (SEACEF).

2.4.5 Crowdfunding

Crowdfunding is an innovative financing approach that pools small contributions from a large number of individuals to fund projects, businesses, or initiatives. It typically operates through online platforms, enabling direct participation from the public while democratizing access to capital. For instance, crowdfunding allows households, particularly those from low- and middle-income segments, to participate in the clean energy transition.

Equity crowdfunding is a method of raising capital for startups and early-stage companies by offering shares of the business to a large number of investors through online platforms. International platforms include **StartEngine**, **Crowdcube**, and **Fundable**, which are or have funded, for example, **Hylio** (drone systems that automate precision agriculture, more than USD 1 million raised), **Mirico** (laser sensors and proprietary analytics to detect methane emissions, more than USD 600,000 raised) and **MSolar Glass** (solar glass, raising USD 60 million), respectively. Product crowdfunding is a method of raising funds for a new product by soliciting small contributions from a large number of people, typically through online platforms. Debt crowdfunding, also known as peer-to-peer (P2P) lending or crowdlending, is a method of raising capital where individuals or businesses borrow money from a large number of investors through online platforms.

Founded by RMI and New Energy Nexus, **Third Derivative (D3)** is specifically a crowdfunding platform that supports climate tech startups with an ecosystem approach, by rapidly finding, funding, and scaling them globally. Launched in December 2020 with 46 companies, it is the largest cohort of climate tech companies in the world.

The Climate Finance Network Thailand (CFNT) recently organized an event to discuss their latest research on crowdfunding for residential solar energy in Thailand. The report highlights the potential of crowdfunding to overcome financial barriers and boost solar adoption, especially among low- and middle-income households. It explores various crowdfunding models like Pay-As-You-Save and On-bill Financing that can make solar power more affordable to the public. However, the success of these models hinges on supportive policies like financial incentives, net metering, streamlined approvals, and a liberalized electricity market.

2.4.6 International Funding Mechanisms and Impact Investment

International funding mechanisms and impact investments are crucial drivers for climate tech startups. These mechanisms include grants, equity financing, and concessional loans from international organizations, governments, and private investors who prioritize sustainable development goals. Impact investment, on the other hand, channels funds from investors seeking measurable environmental and social returns alongside financial gains. Together, they provide the critical financial resources needed to foster innovation, scale groundbreaking technologies, and address global climate challenges, ensuring a sustainable future.

The Green Climate Fund (GCF) is a United Nations initiative that invests in climate-resilient projects to help developing countries reduce greenhouse gas emissions. GCF has invested in several international climate funds and climate tech startups, including the following:

Table 9: Green Climate Fund Investments in Climate Tech Funds and Startups

Fund/Startup	Description
Sarmayacar	Pakistan's first institutional venture capital firm that received USD15 million from GCF in its Climaventures Fund, which will invest in local startups focused on renewable energy, electric mobility, and sustainable agriculture. Sarmayacar also has an affiliated venture accelerator program that supports early-stage climate-tech startups (iGrow).
India E-Mobility Financing Program	This project will offer tailored financing for EV owners and charging infrastructure, reducing long-term EV ownership costs to be comparable to conventional vehicles. It will also mobilize private sector capital to support India's e-mobility transition. This is GCF's first private sector transport program in the e-mobility sector. GCF financing is USD 200 million in equity, which is 13.4% of the total co-financing (GCF).
Panama, Paraguay, and Uruguay E-Motion: E-Mobility and Low Carbon Transportation	The Programme aims to enhance the e-mobility ecosystem at all levels, offering vehicle fleet financing and technical assistance, including policy advice, business model development, stakeholder management, and capacity building—all with gender mainstreaming. It invests in large-scale e-bus fleets, light electric commercial vehicles, and fast-charging infrastructure. GCF financing includes a USD 9.8 million grant and a USD 66.8 million loan, which are 33.2% of the total co-financing (GCF).
CATAL1.5°T	Vexxel, a climate tech start-up, received support from CATAL1.5°T, a USD 40 million initiative by the Green Climate Fund (GCF) and German Development Cooperation (GIZ). This initiative aids climate start-ups with high mitigation impact in Latin America and West Africa, focusing on women-led ventures accessing venture capital. CATALI.5°T helped Vexxel become more competitive and well-positioned for fundraising. Participating in the CATAL1.5°T accelerator provided essential tools, insights, mentorship, and resources to integrate sustainability into their business (GCF).

Thai Climate Initiative (ThaiCI) Fund is part of the Thai-German Cooperation on Energy, Mobility, and Climate (TGC EMC) project, funded by the International Climate Initiative (IKI) of the Federal Ministry for Economic Affairs and Climate Action of Germany (2022-2026). GIZ and Office of Natural Resources and Environmental Policy and Planning (ONEP), along with Tourism Authority of Thailand (TAT), NIA, and Office of SMEs Promotion (OSMEP), are providing a THB 2.5 million subsidy per project from the ThaiCI Fund to support GHG

mitigation among SMEs. The pilot focuses on enhancing the capacity of small and medium-sized hotels. NIA showcased eight climate tech startups with potential business matching to support SME hotels in energy efficiency and renewable energy (GIZ, 2024).

Southeast Asia Clean Energy Facility (SEACEF) is a Singapore-based fund managed by Clime Capital Management and supported by leading international foundations and private sector investors to accelerate the low carbon transition in Southeast Asia. SEACEF directs early-stage development capital investment into innovative, high-impact clean energy projects and businesses in critical Southeast Asian markets.

Asia Sustainability Angels was started by a group of Singapore-based investors who believe that companies with strong sustainability missions can also be great investments. Their vision is to have a positive impact on the environment by investing in companies that mitigate climate change. Working together, their community sources potential deals, screens opportunities, conducts due diligence on promising ventures and enables companies to make pitches so that members can invest individually.

Mandiri Capital Indonesia (MCI) is actively investing in climate tech. They have partnered with Australian venture capital firm Investible to launch the Mandiri-Investible Global Climate Tech Fund. This fund aims to identify and invest in climate technology and innovation in the Southeast Asia and Oceania regions. The fund aims to raise USD 35 million in its initial close and up to USD 100 million in its final close, with the goal of mobilizing an additional USD 1 billion in co- and follow-on investments. NEXCatalyst is intended to support early-stage companies developing climate mitigation solutions and contribute to reducing greenhouse gas emissions in the region (MCI).

Plug and Play is a global innovation platform that connects startups with corporations and investors. They have a strong focus on climate tech, supporting startups that address key areas such as carbon reduction, energy solutions, and sustainable manufacturing.

Y&Archer, one of the three largest startup incubators and accelerators in South Korea, is interested in early-stage startups in Thailand with an investment plan of USD 50,000-200,000 per deal (NIA, 2024).

3. Challenges and Opportunities for Climate Tech Startups

3.1 Key Challenges

The Thai climate tech startup ecosystem faces significant structural and operational challenges that hinder its development. One of the most fundamental issues is the lack of widespread understanding of climate change and its implications. The perception of climate tech in Thailand is often limited to renewable energy, battery storage, decarbonization technology, and e-mobility, while overlooking broader opportunities such as agritech, green fintech, and circular economy solutions.

> *Climate change is not widely understood. The common misconception is that our climate tech investment is nonprofit. People think Radical Fund's Climate Tech is a social impact fund when it's not.*
>
> *- Paul Ark,*
> *Venture Partner for Climate & ESG*
> *Radical Fund*

Another critical barrier is the fragmentation of the ecosystem itself. Government agencies tasked with supporting startups often operate independently, with overlapping mandates and lengthy, bureaucratic processes. Stakeholders noted that government grants are neither timely nor appropriate for climate tech startups. Grants are provided on a reimbursement basis, requiring startups to first invest their own capital—a system ill-suited for startups struggling with cash flow.

Funding inadequacy also emerged as a central concern. For instance, some stakeholders from the consultation suggested that government grants of less than THB 1 million are insufficient for startups aiming to achieve scalability, which often takes a minimum of two years. They proposed increasing grant amounts to at least THB 5 million to better address the funding needs of climate tech entrepreneurs.

The lack of coordination extends beyond government support, as corporations often adopt a cautious approach, investing only when startups demonstrate clear scalability. This defensive strategy limits early-stage funding opportunities and creates financial barriers to innovation, where proactive collaboration and shared risk-taking could instead drive progress.

Moreover, the ecosystem lacks the incubation and customer connections needed to translate ideas into viable businesses. While hackathons are common, they often fail to result in functional startups due to the absence of follow-up incubation programs. "Hackathons haven't created startups directly," one stakeholder noted. "A hackathon plus incubation after does help, but we don't currently have that incubation. Without capital, startups remain educational exercises."

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>
> *- Anonymous stakeholder*

Moreover, the ecosystem lacks the necessary incubation and customer connections to transform ideas into viable businesses. While hackathons are common, they rarely lead to functional startups due to the absence of follow-up incubation programs. Without adequate support and capital, startups often remain theoretical exercises rather than evolving into sustainable ventures.

Lastly, Thailand lacks a central platform for effective knowledge-sharing and collaboration. While conferences and seminars are frequent, they often fall short of facilitating meaningful dialogue between stakeholders. A unified platform is needed to promote deeper exchanges and drive collective action on sustainability and climate-related issues.

These findings echo the challenges highlighted in the *Innovation Club Thailand Baseline Study of the Thai startup Ecosystem in 2022* below, with additional insights confirming the persistent structural and financial barriers that continue to stifle innovation and growth in Thailand's climate tech sector.

Table 10: Key Challenges

Key Challenges	Description
Lack of funding	• Lack of early-stage startup investments • While venture capital is becoming more available, many startups still face difficulties in securing seed funding. This is particularly true for startups working on deep-tech solutions, which often require significant upfront capital for research and development. • Government funding is limited and lacks continuity, grants come too late in too little amount to proof of concept (POC) to be able to validate demand and scale and reach their first commercial customer.
Sub-optimal ecosystem for ideation-stage startups	• Lack of inter-university events to encourage founder matching and cross-pollination • Skills gap in viable business plans • Lack of strong incentives and KPIs, particularly for university researchers who are faculty members, to commercialize R&D • Lack of continuity on ecosystem builders
Lack of support for developing technology	• The rapid growth of the climate tech sector has highlighted the shortage of skilled talent, particularly in tech areas like renewable energy, electric mobility, and advanced engineering. • Startup salaries are not competitive against corporate employment
Unsupportive cultural factors for startup ecosystem and investment opportunity	• Founders typically have a limited outlook of a domestic market rather than a regional or global startup potential • Low English language proficiency is often a disadvantage for Thai founders • Tendency to be less resourceful • Relatively risk-averse outlook, typically people prefer stable corporate jobs over risky startups

Key Challenges	Description
Lack of system integrators for the startup ecosystem	• Lack of knowledgeable and well-connected "middlemen" (e.g. investors, venture builders, mentors to help link new founders with essential connections) • Many corporates lack facilitators for the product, technical, and market side
Fragmented regulatory environment	• Startups often face hurdles related to slow bureaucratic processes, inconsistencies in policy enforcement, and a lack of clear guidelines for emerging technologies.
Lack of understanding of climate technology	• Lack of awareness and understanding in the Thai market for opportunities in climate tech leads to a lack of demand for climate tech • Lack of local expertise in climate tech

According to a previous study, cleantech, startups in Thailand face unique challenges due to the need for physical infrastructure, leading to higher costs, longer payback periods, and slower scalability compared to digital services. As a result, most cleantech funding comes from government support or bootstrapping rather than private investors, who are generally less interested due to the sector's high capital requirements. Conversely, agritech has growing interest from both local and international investors, with Thai Union's Space-F accelerator providing support. PTT's ExpresSo accelerator and funding initiatives represent one of the most active corporate efforts to boost cleantech, focusing on partnerships and investment in areas like electric vehicles.

Universities and research institutions have a critical role in driving advancements in climate tech. However, the technology transfer mechanism toward industry and thus players with significant research commercialization are lacking in the current ecosystem.

3.2 Opportunities

Climate technology offers immense opportunities for addressing climate change, a challenge that extends beyond Thailand to the entire globe. For Thailand's climate tech startups, the potential lies not just in targeting the Thai market but in recognizing the hyper growth possibilities at the regional or global level.

While many Thai startups tend to focus on the domestic market, scalable climate tech solutions have the potential for global reach, growing exponentially at rates of 20-100 times per year, unlike SMEs which may grow at 20% annually. This global growth opportunity can be realized if the regulatory, market, and technology development players and conditions support the ecosystem to nurture successful Thai climate tech startups on the world stage. Currently, the landscape suggests that the opportunities, market, and funders are predominantly outside Thailand.

Nonetheless, Thailand presents a fertile ground for climate tech startups, thanks to increasing governmental backing, corporate demand for sustainable solutions, and various key players eager to strengthen the support ecosystem. In Thailand, climate tech represents a business

opportunity to unlock impactful deep tech, requiring a feasibility study to determine the timing of the tipping point for cost-effectiveness. If all key stakeholders in Thailand can align and synchronize the regulatory, technical, and market environment, the opportunity extends beyond the Thai market to the regional or global exponential growth of Thai climate tech startups.

Drawing from insights on market demand and regulatory priorities gathered through desktop research and stakeholder consultations, the following subsectors have been identified as a watchlist of Thailand's climate tech to highlight opportunities for climate tech startups.

Table 11: Watchlist of Thailand's Climate Tech Subsectors

No.	Climate Tech Subsector	Rationale/Opportunities for Climate Tech Startups
1	**Agri-Food Tech**	• Thailand has a diverse agricultural sector, providing a solid foundation for agri-food tech solutions. • Climate tech enables innovative solutions that reduce the environmental footprint of farming, including precision farming, eco-friendly fertilizers, water-efficient irrigation systems, data-driven crop management tools, and alternative proteins.
2	**Energy Management**	• Energy efficiency solutions for buildings, factories, and households are increasingly in demand as energy consumption increases. • Climate tech is also essential in the advancement of long-duration and large-scale energy storage • Smart Grid Integration will enable the optimization of integrating variable renewables through advanced software and hardware. • Climate tech can also enable platforms for consumer participation in demand-side management programs.
3	**Carbon Accounting, Environmental Data, and Climate Analytics**	• Calculating carbon footprint, setting GHG emissions reduction targets, monitoring, and reporting all need to start with carbon accounting. • AI and machine learning can also help to analyze environmental data to predict climate risks, optimize resource management, and inform climate adaptation strategies.
4	**Clean and Renewable Energy**	• Thailand has heavily invested in renewables, especially solar power and biomass. • The country's National Energy Plan for 2024 sets an ambitious goal to reach a 30% renewable energy share by 2037. • Government incentives are fueling projects in solar farming, rooftop solar installations, and waste-to-energy initiatives. • Innovative developments, such as energy storage and grid integration technology, aim to boost the efficiency of renewable sources.
5	**Mobility and Transport**	• Thailand aims to lead Southeast Asia in electric vehicle production, with a target for 30% of all locally manufactured vehicles to be EVs by 2030. • Major investments are underway in EVs, charging networks, and battery technology.

No.	Climate Tech Subsector	Rationale/Opportunities for Climate Tech Startups
		• Although no Thai climate tech startup has been identified in working on alternative fuels for transport and mobility, there is a trend in developing sustainable aviation fuels (SAFs) in Thailand. • Bangchak Corporation and PTT Global Chemical (GC) both announced plans to start producing SAF in 2025. • In 2024, Bangkok Aviation Fuel Service Public Company Limited (BAFS) held an MOU signing ceremony for research and development on sustainable aviation fuel (SAF) with Khon Kaen University and Naresuan University.
6	**Waste Management and Circular Economy**	• The 2nd National Action Plan on Waste Management B.E. 2565-2570 (2022 – 2027) has 5 important targets, including; (1) 80% of municipal solid waste will be properly managed by increasing 36% of separating of household waste and recycling, and (2) 74-100% of waste will be recycled into recycled materials including plastic waste, paper, glass, aluminum packaging waste. • Startups are pioneering circular economy approaches, such as waste-to-energy projects, advanced recycling processes, eco-friendly packaging, and waste minimization.
7	**Water Management and Conservation**	• Water tech ranges from smart irrigation, solar-powered desalination, atmospheric water generator, rainwater harvesting, to leak detection and repair. • Thailand faces water scarcity due to an imbalance between water supply and increasing demand driven by economic and community expansion, as well as climate change. • In 2018, the Thai government launched a 20-year water resource management plan, addressing climate change risks until 2037. • A key action is expanding wastewater treatment plants nationwide, offering opportunities to build or upgrade facilities with advanced technology for wastewater reclamation to meet the needs of a growing population.
8	**Shopping and Lifestyle**	• Ranging from food to fashion, sustainable consumption and production can be addressed by digital technology, online platforms, and marketplaces to provide health and environmentally-conscious alternatives. • Several Thai startups help consumers in reducing food waste, a significant contributor to climate change due to methane emissions from decomposing organic matter in landfills.
9	**Industrial Decarbonization & Sustainable Construction Materials**	• Climate tech for hardware, software, or services, enables decarbonization in industrial processes in the production of raw materials including concrete, steel, mining, and chemicals. • Although the research has not yet identified a Thai climate tech startup working on industrial decarbonization sustainable construction materials, SCG is among the investors of a decarbonized cement technology provider outside Thailand, Sublime Systems, which secured USD 40 million in series A funding. • Additionally, this subsector can also include alternatives to cement in order to reduce GHG in the material production, value chain, and life cycle of construction materials.

No.	Climate Tech Subsector	Rationale/Opportunities for Climate Tech Startups
10	**Carbon Capture, Utilization, and Storage (CCUS)**	• Although there is not yet a Thai climate tech startup working on CCUS, the Thai government, Chulalongkorn University Bio-Circular-Green Economy Technology and Engineering Center at the Faculty of Engineering, and private sector partners including PTT Group, SCG, BIG, GPSC, and EGAT announced the establishment of the "Carbon Dioxide Capture, Utilization and Storage Technology Development Consortium" at the Future Energy Asia event in 2022 with a mission to reinforce Thailand's Carbon Neutral and Net Zero goals. • Therefore, there is an opportunity for R&D and/or a startup to address CCUS in the future.
11	**Climate-Resilient Building & Smart City Tech**	• The increasing severity of climate impact in Thailand and the region is an opportunity for developing technology to create resilient buildings against heat, floods, storms, and earthquakes. • Moreover, the research findings suggest that technology for smart cities could include traffic and pollution monitoring, as well as disaster warning among other functions. • One of the key informants interviewed is a founder in residence at a climate tech VC fund, who is working on a smart city tech startup.
12	**Nature-Based Solutions for Forestry and Ecosystem Restoration**	• This could include remote sensing, mapping, AI and machine-learning to support nature-based solutions to increase and conserve biodiversity and natural environments, directly or indirectly through software and building infrastructure for nature financing, leading to GHG reduction and offset.

Notable climate tech startups are listed in Section 2.2 and described in Annex V. Although climate tech startups under the subsectors #9-12 have not been identified in Thailand, there is an opportunity in the future to address Thailand and the region's climate pain points in terms of GHG emissions in the industry, infrastructure resilience, and forestry.

4. Recommendations for Thai Climate Tech Ecosystem Strengthening

Thailand's climate tech ecosystem stands at a critical juncture, brimming with potential yet challenged by structural and operational hurdles. Startups in this sector are uniquely positioned to drive transformative innovations that align with the country's ambitious climate goals, including its commitment to net-zero emissions by 2065. However, a lack of early-stage funding, fragmented support mechanisms, and limited policy integration continues to impede the ecosystem's full potential. Strengthening this ecosystem requires a multi-faceted approach that addresses these barriers while fostering collaboration across public, private, and academic sectors. The following recommendations aim to create a robust and enabling environment for climate tech startups, empowering them to innovate, scale, and contribute to Thailand's sustainability agenda.

1. **Policy:** Boosting the Startup Ecosystem, Mindset Shift, Climate Tech Integration in NDC Targets
2. **Funding:** New Financial Instruments for Climate Tech Startups
3. **Capacity Building:** Competency Development and Knowledge Transfer for Startups, Financial Institutions, and Key Mechanisms
4. **Monitoring & Evaluation:** Metrics for Climate Tech Ecosystem Development and Startup Impact

4.1 Policy Recommendations to Foster Climate Innovation

The viability and success of Thai climate tech startups depend on a robust startup ecosystem, a shift in mindset to invest in local talent, and the recognition of climate tech as a key contributor to Thailand's net-zero pathway. Climate technology is pivotal in tackling climate change and promoting economic growth by reducing GHG emissions, optimizing resource use, creating jobs, and opening new markets. Significant investments in both proven and emerging technologies are essential, necessitating a mindset shift to embrace innovation and foster a climate tech ecosystem with policy support and stakeholder collaboration. Effective policy creation and implementation requires a fundamental cultural shift to foster innovation, characterized by a willingness to embrace mitigated risk, substantial investment, tolerance for iterative failure, rapid learning, and the cultivation of an entrepreneurial spirit. The policy recommendations focus on strengthening the Thai startup ecosystem, the necessary mindset shift, and integrating climate tech into the path toward NDC targets.

4.1.1 Boosting the Startup Ecosystem

Climate tech startups depend on the wider startup ecosystem in Thailand, which need to be further strengthened to foster all types of startups. Previous studies such as the *Thailand Innovation Club Baseline Study Annual Report 2022* provided policy recommendations to close the gaps in the Thai startup ecosystem as a whole. The following includes those recommendations as well as input from the stakeholder consultations conducted for this Guide.

1. Promote startup-related and **networking events** for founders and university students, both at national and international levels
2. Create a **centralized website** that indexes government support agencies, grants, and schemes
3. Introduce roles of facilitators (**system integrators or 'middlemen'**) at different touch points in organizations to connect startups with customers, partners, mentors, and markets
4. Close the gaps in **ease of doing business for startups**, including providing accessible and affordable shared services for critical functions like HR operations, legal, and accounting for startups to leverage, to reduce their cost, and support their growth. Streamline and modernize existing regulations to ensure they are not overly burdensome for startups.
5. Facilitate **immigration** process for foreign talents
6. Include 'innovation capability' as an **indicator for listed companies** in SET/MAI to promote developments
7. Establish an organization to **coordinate with other Southeast Asian countries** to enhance technological development and expand businesses through maturity
8. Enhance **incentives for innovative startups and attract investment** in high-growth startups through effective tax incentives for startups, such as reduced corporate tax rates, research and development tax credits, and capital gains tax exemptions. Encourage angel investing by providing tax incentives to individuals who invest in early-stage companies.
9. **Unlock and consolidate rules and regulations** to create a regulatory environment that fosters innovation and **minimizes barriers to entry for startups**, including regulatory **sandboxes** that allow startups to test innovative products and services in a controlled environment with limited regulatory oversight. Foster collaboration between regulators and the startup community to identify and **address regulatory challenges.**

4.1.2 Mindset Shift

Achieving sustainable growth and fostering innovation in Thailand's climate tech ecosystem requires more than just financial and policy interventions—it demands a fundamental shift in the collective mindset of key stakeholders. For climate tech startups to thrive, it is essential to

build a culture that values long-term investments, prioritizes sustainability, and embraces risk-taking in pursuit of transformative solutions. This mindset shift must occur across all levels of the ecosystem, including policymakers, investors, academia, and the broader public. The following are the key changes needed to shift the perspectives of key players in strengthening the Thai climate tech startup ecosystem.

1. GHG Reduction is Borderless and Inevitable

Recognize that reducing GHG emissions is a global necessity. Emphasize the need to reduce carbon emissions to improve quality of life, protect the environment, and boost the economy. This presents an opportunity to develop local capacity, reduce dependency on foreign technology, and promote Thai climate innovations in the international market.

2. Longer Development Duration and Patient Capital for Climate Tech Startups

Acknowledge that climate tech startups require longer development periods and patient capital. These startups are capital-intensive but also have the potential for hypergrowth. Support mechanisms should be put in place to provide the necessary financial backing and time for these startups to mature.

3. Dynamic Space for Innovation

Create an environment where startups can fail fast and learn fast. Innovation thrives in spaces where experimentation is encouraged, and failures are seen as learning opportunities. Policies should support a culture of rapid iteration and continuous improvement.

4. Advocacy for Supportive Policies

Key players in the ecosystem, including government agencies, private sector leaders, and academic institutions, need to advocate for policies (both incentives for decarbonization and disincentives for carbon emissions) that support achieving carbon targets and promoting Thai climate tech startups globally. Collaborative efforts are essential to create a unified front in addressing climate change and positioning Thailand as a leader in climate tech innovation.

5. Stakeholder Engagement on GHG Emissions and NDC Targets

Enhance the effectiveness of Thailand's NDCs by increasing awareness among key stakeholders about Thailand's business-as-usual GHG emissions and reduction targets per the NDC. This will help ensure that all relevant parties understand the importance of reducing emissions and are committed to achieving these targets.

6. Leverage Mass Media in Climate Change Communication

Utilize mass media to disseminate information about climate change and climate tech. By engaging in more media outlets, accurate and engaging information can reach a broader audience, raising public awareness and support for climate action.

7. Promote Integrated Learning on Climate Innovation in Education

Integrate sustainability, climate change, and climate technology at all levels of the education system. This will equip future generations with the knowledge and skills necessary to address the climate crisis and foster a culture of sustainable lifestyles, practices, and innovations for climate mitigation and adaptation.

In conclusion, fostering a mindset shift across Thailand's climate tech ecosystem is not merely about changing perceptions—it is about building a foundation for long-term, sustainable growth. By embracing innovation, prioritizing collaboration, and recognizing the economic potential of climate solutions, stakeholders can transform challenges into opportunities. This collective shift in mindset will enable Thailand to position itself as a leader in climate innovation, driving progress toward its sustainability goals while inspiring confidence in the transformative power of climate tech.

4.1.3 Climate Tech Integration in NDC Targets

Thailand announced revised NDC targets at COP29 in November 2024, aiming to reduce GHG emissions by 270 million tons by 2035, this ambitious target is part of the national commitment to achieving carbon neutrality by 2050 and net-zero emissions by 2065. The revised NDCs, known as NDC 3.0, include action plans across five industry sectors: Energy, Transportation, Municipal Waste Management and Industrial Wastewater, Industrial Processes and Product Use (IPPU), and Agriculture. Climate tech presents a major contribution to achieving Thailand's NDC targets. The following are the essential approaches to supporting the national decarbonization efforts with the strategic integration of climate tech solutions.

1. Robust Policies for Net Zero & Climate Tech

Climate innovations need to be an integral part of Thailand's NDCs, supported by streamlining robust policies to incentivize GHG emissions reduction and disincentivize emissions effectively.

- **Sectoral Net Zero Transition Pathway:** Formulate a detailed transition pathway and progress checkpoints for each of the five industry sectors in NDC 3.0.
- **Carrots & Sticks:** To effectively drive decarbonization, a robust policy framework is essential. This necessitates a balanced approach, incorporating both significant disincentives (sticks) for GHG emissions and compelling incentives (carrots) for decarbonization efforts.
- **Consolidate Financial & Carbon Accounting:** Strengthen and streamline regulatory frameworks, including the consolidation of financial and carbon reporting requirements, to ensure accountability and deter GHG emissions, while providing clear standards for measuring emissions and reductions.
- **Climate Tech Integration and Incentives:** Integrate national climate tech goals with the decarbonization agenda in each of the five industry sectors in NDC 3.0.

Strengthen policies and regulations that encourage innovation and investment in climate tech startups, such as subsidies, climate change acts, and liberalization of the energy market. Besides the private sector, the public sector also has a significant role in being the demand side for climate tech and supporting climate tech startups in public procurement. Implement structural policies and key enablers to support climate tech startups, including government agency support, collaboration with committed companies, and fostering Thailand as a global hub for trading and startups. Ensure robust incentives to encourage the adoption of cleaner technologies, sustainable practices, and innovative solutions across all sectors of the economy, as well as to foster effective behavioral change throughout Thai society.

2. Five-Year Plan

Create a strategic plan to accelerate climate innovation research and development (R&D) across the economy, supported by a substantial budget (e.g., THB 3-5 billion) to send a signal to the world that Thailand is committed to foster a tech startup ecosystem with a focus on climate innovation.

- **Influential Policy Support:** The Prime Minister should be the lead spokesperson for Climate Innovation as an integral part of NDC 3.0 and the Five-Year Plan to ensure collaboration across the public and private sectors towards common NDC goals and targets.
- **Integral Education Agenda:** Make science, technology, engineering, and math (STEM), entrepreneurship, sustainability & climate change education, and tech transfer a national agenda with strong government and private sector support and funding, leveraging academic institutions to focus on R&D, patents and innovation, with progressive KPIs for the faculty to spin out climate tech ventures.
- **Capacity Building and Knowledge Transfer:** Facilitate international collaboration to access global expertise and markets. Enhance provisions for easier visa regimes to attract international entrepreneurs and experts to upskill/reskill the Thai workforce in climate tech focus areas such as transport, agrifood, energy, waste management and circular economy. Bring in experienced startup dealers and climate tech validators to help with the transition towards locally developed Thai talent.

3. Boost the Climate Tech Startup Ecosystem

The success of Thai climate tech startups relies not only on the overall startup ecosystem but also on specific requirements tailored to nurture the climate tech sector. Below are the recommended key enablers.

- **Startup Financing:** Allocate substantial funding opportunities specifically for climate tech startups through grants, loans, and equity investments. Simplify the process for a climate tech startup to submit a proposal and have a chance to get a lower interest for financing. Support climate tech startups by eliminating the traditional requirement to demonstrate revenue as a condition for financing.
- **Competition:** Establish an annual climate tech startup competition and incubation program to encourage the development of new climate tech solutions for specific climate challenges for the startups to solve.

- **Innovation Forum:** Establish forums for startups to showcase their innovations and connect with potential investors and partners.

4. Establish a Climate Innovation Office

To spearhead the nation's climate ambitions, establish a dedicated Climate Innovation Office (CIO) that functions as a high-level think tank. Reporting directly to the Prime Minister, the CIO should comprise distinguished Thai and international experts in climate solutions and technologies. The CIO's mandate will encompass the following.

- **Capacity Building:** The CIO experts would become the main pool of expertise on climate innovation for key organizations driving climate solutions in Thailand. They would first upskill/reskill themselves, then disseminate the knowledge among and key organizations to drive climate solutions and technologies.
- **Global Engagement:** The CIO experts would represent Thailand at various sustainability and climate change-related stages and events around the world, foster international collaborations, bringing in global expertise and best practices in climate innovations.
- **Ecosystem Development:** The CIO experts would support the process of policy advocacy for climate innovation and Five-Year Plan implementation to create a supportive environment for climate tech startups to thrive, including access to resources and networking opportunities.

5. Establish a PPP Venture Builder

Thailand should establish a private-public partnership (PPP) Venture Builder for climate tech startups. Climate innovation needs to be a national agenda, and therefore requires a collaborative effort between the public and private sectors. The right personnel with substantial experience and capabilities in R&D, venture building, and supporting startups throughout Thailand should be selected from a range of experts in the academic, public, and private sectors to carry out the following main tasks.

- **Research Scouts:** Search and identify promising climate tech research and innovations at universities and research centers in and outside Thailand.
- **Venture Builder:** Provide resources and support, such as mentors, system integrators, and markets, to help startups grow and scale their operations.
- **Regional/Provincial Startup Hubs:** Establish hubs throughout the country to support startups at the local level with a focus on climate innovation. The hubs around the country would support local talent and business development, leading to greater wealth distribution and closing the urban-rural gap for livelihood and innovation.

By implementing these policy recommendations, Thailand can effectively integrate climate tech solutions into its NDC targets, drive GHG emissions reduction, and foster a thriving innovation culture by way of a strong climate tech ecosystem. Furthermore, Thailand (i.e. via the Climate Innovation Office) should leverage Search Engine Optimization (SEO) strategies to enhance Thailand's online visibility as a leading hub for climate innovation, ensuring that the nation consistently ranks at the top of search results for relevant keywords.

4.2 Enhancing the Startup Financing Ecosystem

Despite growing investor interest, early-stage climate tech startups face significant funding challenges. Long development timelines and the need to demonstrate both environmental and financial returns can deter traditional venture capital. This necessitates exploring alternative funding avenues. The following are new financial instruments to be considered in enhancing the climate tech startup financing ecosystem, based on international examples and preliminary studies in Thailand. It should be noted that new financial instruments for enhancing the climate tech startup financing ecosystem should not be viewed as a one-size-fits-all solution for every type of climate tech startup. Instead, the type of financing should be tailored to match the specific needs and developmental stage of each startup. Additionally, to raise venture funding in later stages, startups should prioritize developing a capital-efficient business model and explore additional sources of non-dilutive funding.

- **Green Bonds:** Governments, corporations, banks, financial institutions, and international development organizations can issue green bonds to fund projects that demonstrably benefit the environment. Third-party verification and robust reporting mechanisms are often used to ensure the funds are used for their intended purpose and to maintain the integrity of the green bond market.

  After the drafting of regulations to open up funding opportunities for SMEs and startups, the Securities and Exchange Commission (SEC) of Thailand conducted a public hearing to gather comments on proposed amendments. Despite being a powerful tool for financing climate tech startups, the issuance of green bonds face challenges like greenwashing, opaque reporting, and difficulty in tracking funds. To address these issues, it is recommended to use internationally standardized frameworks, third-party verification, robust reporting, investor education, and stricter regulations.

- **Venture Debt:** Venture debt is a form of financing for startups that have already raised equity, often as bridge financing before the next round of equity financing. It allows startups to raise capital without diluting equity, retaining control and ownership. Venture debt can be provided by both banks specializing in venture lending and non-bank lenders.

  Specialized venture debt providers offer financing to high-growth climate tech startups that may not yet be profitable. Notable providers include traditional banks like Barclays Europe, Bank of America and Credit Agricole CIB, venture capital firms that offer debt to their portfolio companies, and specialized lending institutions such as peer-to-peer lenders, neobanks, and crowdfunding platforms.

- **Simple Agreements for Future Equity (SAFEs):** SAFEs are hybrid instruments for venture investments that have gained popularity among VC investors in Thailand. They are neither strictly equity nor debt but give investors the right to future equity in a company, similar to a warrant. The valuation is determined during a future liquidity event, often with a specified "valuation cap." SAFEs are quick and simple, making them

ideal for early-stage fundraising, allowing companies to access capital without the delays of traditional equity or debt investments.

A SAFE can play a vital role in a company's growth since it does not accumulate interest like a loan and is relatively simple to structure and implement. However, SAFEs only convert into equity when a specific trigger event occurs, such as an acquisition or a future financing round. These trigger events are typically detailed in the agreement.

- **Crowdfunding:** Crowdfunding is a way of raising money to finance projects and businesses. It enables fundraisers to collect money from a large number of people via online platforms. Supportive policies like financial incentives, net metering, streamlined approvals, and a liberalized electricity market would unleash climate tech acceleration in Thailand. Crowdfunding for residential solar energy in Thailand could help to overcome financial barriers and boost solar adoption, especially among low- and middle-income households. Various crowdfunding models like Pay-As-You-Save and On-bill Financing can make solar power more affordable.

- **Investment Token:** An investment token is a type of digital asset that represents ownership or participation in an investment project, typically issued through blockchain technology and can be traded on various digital asset exchanges. The Thai SEC has introduced a regulatory framework to balance investor protection with innovation, lifting investment restrictions on retail investors and setting new rules for digital asset companies. This has led to a surge in investment applications, particularly in the digital sector, including data centers and cloud services. For example, Token X, a subsidiary of SCB X Group, offers investors to own fractions of high-value assets like real estate without needing substantial capital, thereby increasing accessibility and liquidity in the market.

  In terms of climate fintech around the world, companies are utilizing cryptocurrency and blockchain technology to issue tokens to fund climate projects such as renewable energy and tree planting. Investment token need to be explored further as a new financial instrument for funding climate tech startups. Usually due to a lack of collateral or operating history, SMEs and startups with climate-related solutions may not be able to obtain funding from the traditional banking system. To help fundraising from climate finance investors for climate tech startups, the Bank of Thailand and the SEC could develop criteria and regulations for climate finance.

- **Facilitating Exit Strategies:** Additionally, the BCG report "Firming up Thailand's startup ecosystem" also made a recommendation for the Thai government to enable more successful exits for startups by exploring alternative exit strategies like direct listings, dual-class shares, and special purpose acquisition companies (SPACs). It remarked that while Thailand already boasts one of the most active and largest stock exchanges in Southeast Asia, efforts should be made to make this financial resource more accessible to startups.

4.3 Capacity Building and Knowledge Transfer

Capacity building and knowledge transfer are crucial for fostering a thriving climate tech startup ecosystem and enabling financial institutions to effectively fund these ventures. The following are the essential areas of capacity building for climate tech startups and financial institutions, as well as key mechanisms for capacity building and knowledge transfer that should be organized by key government agencies. The Climate Innovation Office could be designated to oversee capacity building and knowledge transfer.

Table 12: Capacity Building for Climate Tech Startups

Technical Skills Development	Business and Entrepreneurial Skills	Access to Mentorship and Networks
• **R&D Expertise:** Training in areas like renewable energy technologies, energy storage, carbon capture, AI for climate modeling, and sustainable materials. • **Engineering and Prototyping:** Hands-on experience in designing, building, and testing climate tech solutions.	• **Market Analysis and Strategy:** Understanding market trends, identifying customer needs, and developing go-to-market strategies. • **Financial Modeling and Fundraising:** Creating business plans, conducting financial projections, and pitching to investors. • **Intellectual Property Protection:** Navigating patents, trademarks, and other legal aspects of innovation. • **Foreign language skills:** Communicating effectively with foreign investors, development finance institutions, and potential customers.	• **Industry Experts:** Connecting with experienced entrepreneurs, scientists, and investors for guidance and support. • **Incubators and Accelerators:** Participating in programs that provide mentorship, resources, and access to potential investors.

Table 13: Capacity Building for Financial Institutions

Understanding Climate Tech	Green Finance Principles	Building Investor Networks
• **Technology Assessment:** Developing the capacity to evaluate the technical feasibility, market potential, and environmental impact of climate tech solutions. • **Risk Assessment:** Understanding the unique risks and rewards associated with investing in climate tech startups. • **Impact Measurement:** Developing frameworks to assess and track the environmental and social impact of climate tech investments.	• **Integrating ESG Factors:** Incorporating environmental, social, and governance considerations into investment decision-making processes. • **Developing Green Financial Products:** Creating innovative financial instruments like green bonds, impact funds, and blended finance mechanisms to support climate tech.	• **Connecting with Climate Tech Hubs:** Fostering relationships with incubators, accelerators, and research institutions to identify promising investment opportunities. • **Collaborating with Impact Investors:** Partnering with organizations focused on sustainable and impact-driven investments.

Facilitated by the Climate Innovation Office, the following mechanisms should be advocated and implemented by key government agencies (such as MHESI (including NXPO, NIA, TSRI, NSTDA), DCCE, TGO, BOI, DIPROM, DIP, DEPA), universities and research institutions, and the private sector, partnering with experienced entrepreneurs, investors, and industry experts in climate tech.

Table 14: Key Mechanisms for Capacity Building and Knowledge Transfer

I. Workshops and Training Programs
Targeted training sessions on specific skills: ● technical ● business ● financial
II. Mentorship and Coaching Programs
Pairing startups with experienced ● entrepreneurs ● investors ● industry experts
III. Knowledge Sharing Platforms
Creating online platforms and communities for sharing ● best practices ● research findings, and ● investment opportunities
IV. Research and Development Collaborations
Drive innovation by fostering partnerships between ● universities ● research institutions ● industry
V. Policy Advocacy
Supporting policies that ● incentivize investment in climate tech and ● promote the development of a robust climate tech ecosystem ● enable regulatory reforms for decarbonization

By investing in capacity building and knowledge transfer, key stakeholders in the Thai startup ecosystem can unleash climate innovations from university R&D, empower climate tech startups, equip financial institutions to make informed investment decisions, and accelerate the transition to a low-carbon economy.

4.4 Monitoring and Evaluation

Policy makers, investors, universities and research institutes need to be able to monitor the progress of research & development and evaluate the impact of climate tech in Thailand. The following are the metrics for tracking the development of the climate tech startup ecosystem.

4.4.1 Metrics for Tracking Climate Tech Startup Ecosystem Development

Startups represent a pool of disruptive innovators for the industry. Therefore, in addressing climate change, climate tech startups represent the opportunity to attract investment for the transition to a green economy. Measuring the success of climate tech startups and the overall development of the climate tech ecosystem requires a multifaceted approach. Below are the key metrics to monitor and evaluate the climate tech ecosystem development and startups in Thailand.

- **Policy and Regulatory Environment:** First and foremost, we need to plan the transition pathway and assess how long it would take to achieve the NDC targets. The speed of changes in climate policies, targets, regulations, and incentives determines the enabling conditions for climate tech innovation and investment.

- **Investment and Funding:** Monitoring investment flows, deal sizes, and the number of active climate tech funds, inbound and outbound, can indicate the level of interest, financial support, and progress for the sector.

- **Technological Advancement:** Metrics such as patent filings, research publications, and technology maturity levels in climate solutions are essential to tracking and evaluating the innovation and technological progress in the startup ecosystem and overall, in Thailand.

4.4.2 Measuring the Environmental and Social Impacts of Climate Tech Startups

To accurately measure the environmental and social impacts of climate tech startups, a combination of quantitative and qualitative methods is essential. Key considerations include:

- **Life Cycle Assessment (LCA):** Evaluating the entire lifecycle of a product or technology, from resource extraction to disposal, to assess its overall environmental impact.
- **Carbon Footprint Analysis:** Quantifying greenhouse gas emissions associated with a product or service, including direct and indirect emissions.
- **Third-Party Verification:** Engaging independent organizations to validate claims and ensure transparency in impact measurement.
- **Social Impact Assessment:** Evaluating the social benefits and potential negative impacts of a climate tech solution, such as job creation, community development, and human rights considerations.

- **Data Collection and Reporting:** Implementing robust data collection and reporting systems to track progress and share insights with stakeholders.

These metrics and methodologies can provide a comprehensive understanding of the performance and impact of climate tech startups and the broader startup ecosystem. Moreover, it is essential for key players in the climate tech startup ecosystem to conduct regular reviews and updates of evolving market conditions globally and locally. This should be done via a regular dialogue platform, onsite and online, to share information and experiences in order to collaborate further on leverage points for long-term impact in terms of decarbonization, economics, and social equity.

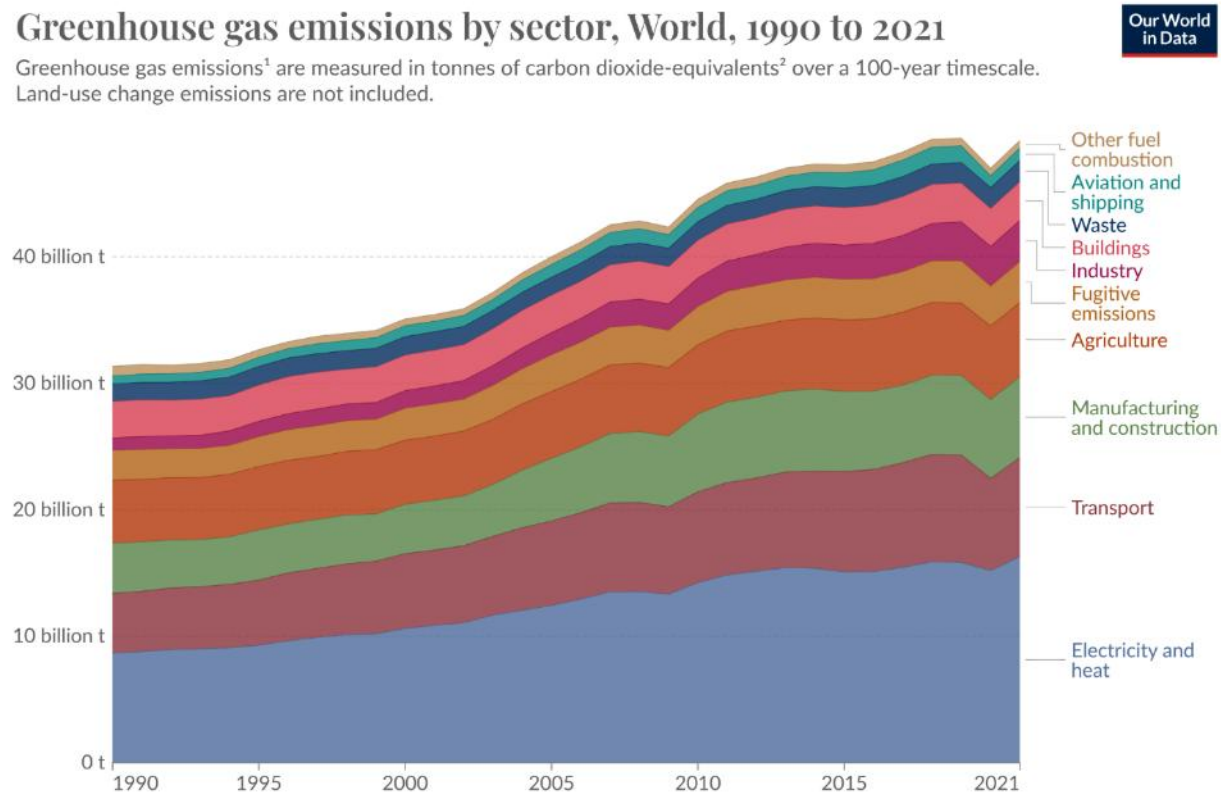
Additionally, the impact of climate tech startups must not be measured only in the environmental and social aspects, but also economically. Climate tech startups present disruptive innovations that aim not only to contribute to decarbonization but also cost savings such as energy savings, energy efficiency improvement, and operational optimization. Successful climate tech startups are those that successfully help their customers to reduce costs and optimize efficiency while lowering their carbon footprint. Therefore, Thai climate tech startups should be embraced as powerful growth drivers—scalable, innovative enterprises that empower corporations, SMEs, and the broader economy to thrive sustainably and achieve greater prosperity.

5. Guidelines for Climate Tech Startup Growth

This chapter is designed to encourage and guide aspiring entrepreneurs who aim to make a difference with climate technology through innovative and disruptive business models that challenge the current norms. It outlines the essential steps and milestones for climate tech startup founders in Thailand and beyond, providing insights into the entrepreneurial journey and what it takes to succeed in this field.

The rapid advancement of climate tech solutions is critical to addressing the global issue of GHG emissions. The image below illustrates the percentage of GHG emissions that each industry sector contributes to the ongoing warming of our planet and the increasing risks to our lives, natural resources, and environment. The speed and innovation that startups can deliver make them potential game changers in the urgent need for climate tech solutions.

Figure 4: Global GHG Emissions by sector (1990 – 2021)



Source: Climate Watch (2024) – with major processing by Our World in Data

While the energy sector is the biggest contributor to climate change, there is no right or wrong choice when it comes to choosing a sector to apply climate technology to reduce or prevent

emissions. The most important thing is to identify a sector that aligns with the entrepreneur's passion and commitment, and to find a scalable business model that utilizes climate technology.

The TED Talk "*The Future of Climate-Tech Is Everything*" provides a comprehensive overview of emerging opportunities in climate technology, highlighting key areas poised for innovation and impact.

> *We need to lay out sustainability and climate challenges then let the aspiring startup entrepreneur choose what problem they want to solve. Create value first, impact will come later. Create more sustainability warriors.*
>
> *- A Thai climate impact startup founder*

> *The more you understand the problems, the more you talk to customers, 9/10 they will say the problem is price. The aim is to plug into the existing system and find a better way*
>
> *- A biotech startup founder*

For founders in the climate tech space, building a sustainable and viable business model means aligning profitability with impactful climate solutions, scaling innovations while maintaining an adaptable and customer-focused approach. The necessary knowledge includes understanding technologies, market dynamics, revenue models, and the regulatory landscape, while the right mindset involves patience, resilience, collaboration, and long-term thinking. By blending these aspects, founders can navigate the challenges of climate tech and contribute to solving the climate crisis.

When starting out, founders should recognize the distinction between hardware and software in climate tech. Hardware, or deep tech, includes innovations like renewable energy systems and electric vehicles. Software solutions encompass platforms that assist organizations with carbon accounting, energy management, and optimizing waste reduction and recycling efforts. Deep tech in climate tech refers to advanced technologies addressing significant scientific or engineering challenges to combat climate change. Examples include advanced solar panels, energy-efficient batteries, and carbon capture devices for hardware, and AI-driven climate modeling, smart grid management systems, and data analytics for software. The journey of a climate tech startup founder can vary greatly depending on the technology being developed. Deep tech hardware presents challenges such as higher development costs, technical complexity, regulatory hurdles, and scaling issues, whereas software like carbon accounting platforms is easier to develop, scale, and maintain.

5.1 Illustrative Guidelines for Climate Tech Startup Growth

This section provides a visual step-by-step guideline on the journey of a climate tech startup in Thailand, from ideation to commercialization. It provides the fundamental concepts in:

- Identifying market needs and developing climate tech solutions
- The importance of a startup's potential to scale up

- Technology Readiness Levels (TRL)
- Piloting, commercialization, and market entry
- Building a sustainable business model through measurable climate impact, customer acquisition strategies, and product-market fit
- Partnerships and co-innovation with corporates, municipalities, and public sector entities

Before embarking on the extensive journey of building a technology-based venture, it is beneficial to gain a comprehensive understanding of the path ahead. Figure 5.1 presents an illustrated climate tech startup journey, providing an overview of the key stages that most founders navigate during the initial years of development.

Figure 5.1: Illustrative climate tech startup journey

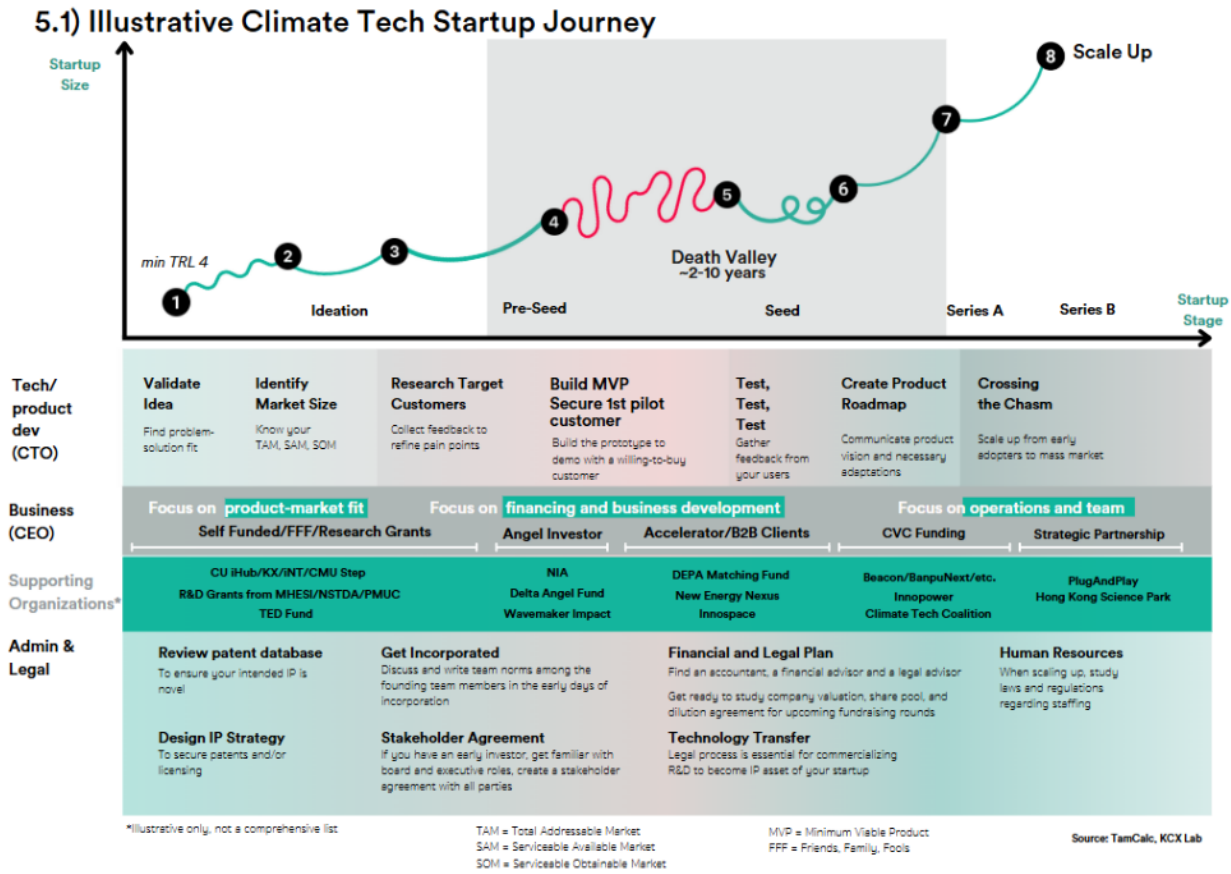


Figure 5.1 presents a three-dimensional framework encompassing technology, business, and administrative/legal aspects. Along the x-axis, key startup milestones are represented by numbers 1 to 8, mapped across four stages: ideation, pre-seed, seed, and scaling (Series A and B funding rounds). The y-axis illustrates the growth trajectory or value of the startup over time.

This framework provides a comprehensive perspective on the journey of building a technology-based venture, structured around three core areas: technology and product development, business development, and administrative, legal, and intellectual property considerations. Each

stage requires a distinct focus from the founding team, progressing from idea validation and market assessment to the development of a Minimum Viable Product (MVP) and, ultimately, achieving exponential business growth. Below are the key milestones that startups typically navigate:

Ideation Stage (Steps 1-3): A business idea is conceptualized based on having a minimum TRL 4 (please refer to the TRL table below) in order to validate the business value to the first customer. Founders brainstorm, identify market needs and size, define the problem their solution will solve after gathering insights from target customers, refining the value proposition and creating a business model.

Pre-Seed Stage (Steps 4-5): The founder begins developing their idea into a tangible business concept. Initial funding (often from personal savings or friends and family) is used to create a prototype or minimum viable product (MVP). Survive "Death Valley" by testing the MVP and securing pilot customers while building a core team.

Seed Stage (Step 5-6): The business gains initial external funding to further develop the product and validate it with the market. Key activities will be refining the MVP based on customer feedback, conducting initial marketing and user acquisition, and establishing early partnerships or collaborations.

Early Stage (Series A) (Steps 6-7): The startup has validated its product-market fit and focuses on scaling operations, expanding its customer base, and growing revenue streams. Startups will be scaling production or services, hiring key team members (e.g., marketing, operations, tech), and securing larger rounds of funding to fuel growth.

Growth Stage (Series B) (Step 8): The startup experiences rapid growth, aiming to dominate its market or expand into new regions. The focus is on refining processes, increasing efficiency, and building brand recognition.

What is your TRL?

The Technology Readiness Level (TRL) framework provides a structured approach to assess the maturity of climate technology. At **TRL 1**, the concept or theoretical foundation of the technology is established. By **TRL 3**, a basic prototype has been developed and tested in a laboratory setting. At the highest level, **TRL 9**, the technology has undergone extensive validation, demonstrating full functionality and reliability in real-world conditions. This framework serves as a progress indicator for innovation, offering a clear understanding of whether a technology remains in the experimental phase or is ready for market deployment.

	TRL Level	Status	What to do	Outcome
Basic Technology Research	1 Scientific research at the lowest level of tech readiness.	Exploring basic scientific ideas – no tangible product yet.	Conduct extensive research to understand the problem. Document fundamental principles and evaluate the feasibility of addressing the issue. Attend conferences or workshops to gather insights into similar technologies.	A documented concept or hypothesis, literature review, related articles.
	2 Technology concept and/or application formulated.	You've framed an idea about how your technology could work but haven't tested it yet.	Develop a rough theoretical model or sketch. Assess the problem-solution fit. Research existing patents and technologies to ensure originality.	A conceptual design backed by theoretical models.
	3 Analytical and experimentally critical function and/or characteristic proof of concept.	You've started testing the concept on a small scale in controlled conditions. Concept demonstrated analytically or experimentally.	Build small-scale experiments or simulations to test core principles. Collaborate with academic institutions or testing support. Analyze risks and unknowns in your technology.	Proof that core idea works, at least in a lab setting.
Technology Development	4 Component and/or breadboard validation in laboratory environment.	You've created a working prototype under lab conditions. Key elements demonstrated in laboratory environment.	Build a functional prototype and run experiments. Identify critical factors such as energy efficiency, durability, and scalability. Begin drafting intellectual property (IP) strategies	A working prototype validated for functionality.
	5 System/subsystem model or prototype demonstration in a relevant environment.	You've tested the technology in conditions similar to where it will operate.	Transition from labs to real-life tests. Partner with industry players for pilot testing. Prepare documentation for regulatory approvals.	Confidence in the technology's performance in semi-realistic settings.
Field Demonstration	6 System prototype demonstration in an operational environment.	The technology shows promise in real-world conditions but is still a prototype.	Develop a larger-scale prototype. Run pilots in operational environments (e.g., a solar farm or industrial sector). Collect detailed data to refine performance and reliability.	Demonstration of technology under near-operational conditions.
	7 Actual system completed and qualified through test and demonstration.	The technology operates under real-world conditions at scale.	Build and deploy a pre-commercial prototype. Collect feedback from stakeholders such as pilot customers or partners. Finalize the system architecture and functionality.	A robust prototype tested in real-world settings.
	8 System completed and qualified for deployment.	Your technology is market-ready but needs certification.	Conduct rigorous testing for regulatory and industry compliance. Establish manufacturing and distribution systems. Engage early adopters for feedback.	A fully validated system ready for commercialization.
Deployment	9 Actual system proven through successful mission operations.	Your technology is successfully operating in real-world conditions.	Monitor performance metrics in live settings. Collect user feedback to identify areas for incremental improvements. Scale operations and marketing for broader adoption.	Commercial success and operations in real-world deployment.

Another framework referenced by Thailand's National Innovation Agency (NIA) is the Innovation Readiness Level (IRL), which is based on the KTH Innovation Readiness Level™. This comprehensive framework provides a structured approach for guiding idea development and assessing the maturity of an idea across six key dimensions: Technology, Business Model, Intellectual Property Readiness (IPR), Team, Funding, and Customer. Moreover, NIA has also established a guideline for Research Utilization (RU) funding as part of the National Research Utilization Platform and RU ecosystem, which includes various organizations dedicated to advancing research development. Please see the Annex for NIA funding and supporting guidelines.

5.2 How to Be a Climate Tech Startup Founder

Building a venture is akin to taking the driver's seat of a **four-wheel-drive vehicle**, moving forward at full speed into uncertainty. A strong and well-defined purpose serves as the first and most critical wheel—without it, one may abandon the journey too soon. Navigating the continuous uncertainties of a tech-based venture requires persistence, making the underlying '**WHY**' the most essential element in this endeavor.

> *As a founder, you should build something by yourself first before looking for a co-founder. You should be independent, calm, and collected. This is also about leadership, which has not been promoted in Southeast Asia enough.*
>
> *- Anonymous*

Wheel 1: Why Do You Want to Become a Startup Founder?

The first wheel represents your purpose—the driving force that propels your journey forward. Much like an engine power a vehicle, your purpose provides the motivation and resilience needed to navigate obstacles along the way. Without a clear and compelling purpose, progress may stall at the first sign of difficulty.

To define your purpose, ask yourself:

- **Why am I willing to dedicate years of my life to this mission?**
- **What meaningful impact do I aspire to create in the world?**

Your "**WHY**" may range from achieving financial independence to driving meaningful social or environmental change. Whatever it may be, ensure that it is deeply rooted and compelling enough to sustain your motivation, even when challenges arise.

Wheel 2: Builder Mindset

Cultivate the mindset of a trailblazer—one that embraces uncertainty and thrives in uncharted territory. In the rapidly evolving landscape of climate technology, your ability to navigate challenges and leverage opportunities will determine the extent of your success. Your mental resilience and adaptability will be just as critical as your technical expertise.

As a startup founder, embody these key traits:

- **View failure as a catalyst for growth.** Each setback is an opportunity to learn, refine your approach, and build a stronger foundation for future success.
- **Embrace adaptability.** Challenges are inevitable, but those who pivot and innovate in response to obstacles will emerge stronger. Consider setbacks as opportunities in disguise.

- **Lead with empathy.** Understanding the needs of both your team and your customers is essential for developing solutions that create real impact.
- **Prioritize collaboration over competition.** Addressing climate change requires collective action—progress is accelerated when innovators, partners, and stakeholders work together toward a shared mission.

By fostering these qualities, you will not only strengthen your entrepreneurial journey but also contribute to meaningful and lasting changes in the fight for a sustainable future.

Wheel 3: Skill Set

Launching a successful startup requires more than just passion—it demands a mastery of essential skills that drive both innovation and sustainability. While ambition fuels your journey, strategic knowledge and execution will determine your ability to scale and make a lasting impact.

Key competencies for climate tech entrepreneurs include:

- **Climate Science & Sustainability:** Develop a strong understanding of decarbonization strategies, renewable energy solutions, and adaptation technologies to create impactful and scalable innovations.
- **Leadership & Collaboration:** Inspire and guide teams, align visions, and cultivate partnerships that drive progress and amplify your mission.
- **Project & Financial Management:** Optimize resources by budgeting effectively, securing funding, and ensuring financial sustainability to support long-term growth.

You don't need to be an expert in every field—what matters is your willingness to learn continuously and surround yourself with a team whose skills complement your vision. Success is built not in isolation, but through collaboration, adaptability, and a commitment to lifelong learning.

Wheel 4: Tool Set

Every visionary founder requires a set of essential tools—a survival kit designed to navigate the complexities of the startup ecosystem. Just as a well-equipped explorer thrives in the wilderness, a startup founder must leverage the right resources to refine innovations, secure funding, and navigate regulations effectively.

Key components of your startup survival kit include:

- **Product Development Tools:** From prototyping hardware to testing software, these resources enable you to refine, validate, and showcase your innovations with precision.
- **Business & Financial Tools:** Master the language of grants, investments, and market analytics—understanding these elements is crucial for transforming ideas into scalable, high-impact solutions.

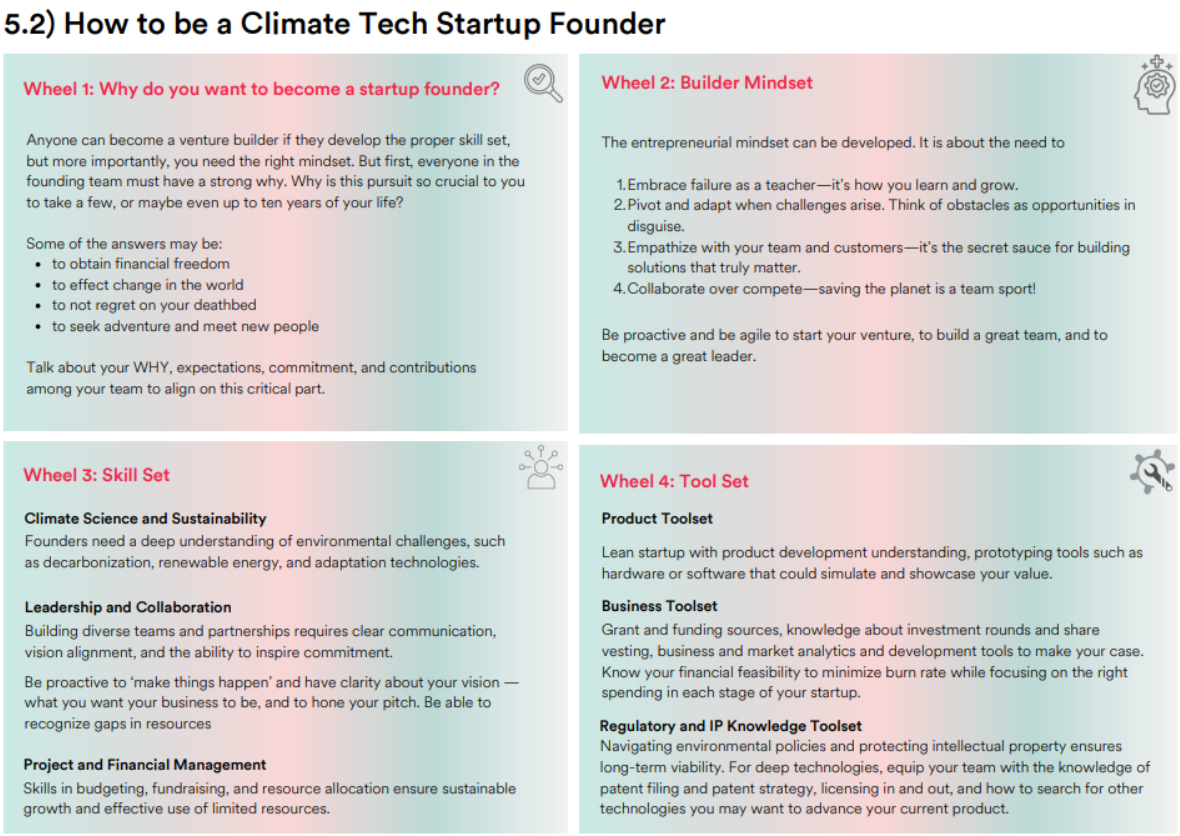
- **Regulatory & Compliance Tools:** Navigate environmental policies, intellectual property protections, and industry regulations to ensure your startup operates with both integrity and longevity.

With the right tools in hand, you won't just survive the challenges of the startup journey—you'll thrive, innovate, and lead the way in building a sustainable future.

The Journey Ahead

With purpose, mindset, skills, and tools aligned, you are now equipped to navigate the journey of building a successful climate tech startup. The path will not always be smooth—unexpected detours and obstacles are inevitable—but with resilience and determination, you can overcome challenges and drive meaningful change.

Figure 5.2: How to be a startup founder



Stay committed to your vision, adapt to new insights, and embrace the learning process. Every step forward brings you closer to making a lasting impact on the world. The future of climate innovation is shaped by those who dare to lead—and that journey starts with you.

5.3 How to Get Started

Embarking on a climate technology startup journey presents an exciting yet complex pathway filled with both challenges and opportunities. The first step into entrepreneurship begins when you critically assess the value proposition of your technology: **What problem does it solve? Who are the primary beneficiaries? How will this value be delivered in the form of a product?** This marks the ideation phase (as illustrated in Figure 5.1), where the fundamental framework of your technology-driven venture is established. At this stage, it is imperative to focus on three key elements:

- **Problem Definition:** Clearly articulating the specific challenge your innovation seeks to address ensures that your solution is both relevant and impactful.
- **Idea Validation:** Conducting feasibility assessments, gathering market insights, and iterating based on feedback are essential to refining your concept and ensuring its viability.
- **Market Understanding:** Gaining a comprehensive understanding of industry trends, potential customers, and commercialization strategies is particularly crucial in the climate technology sector, where many solutions align with a business-to-business (B2B) model.

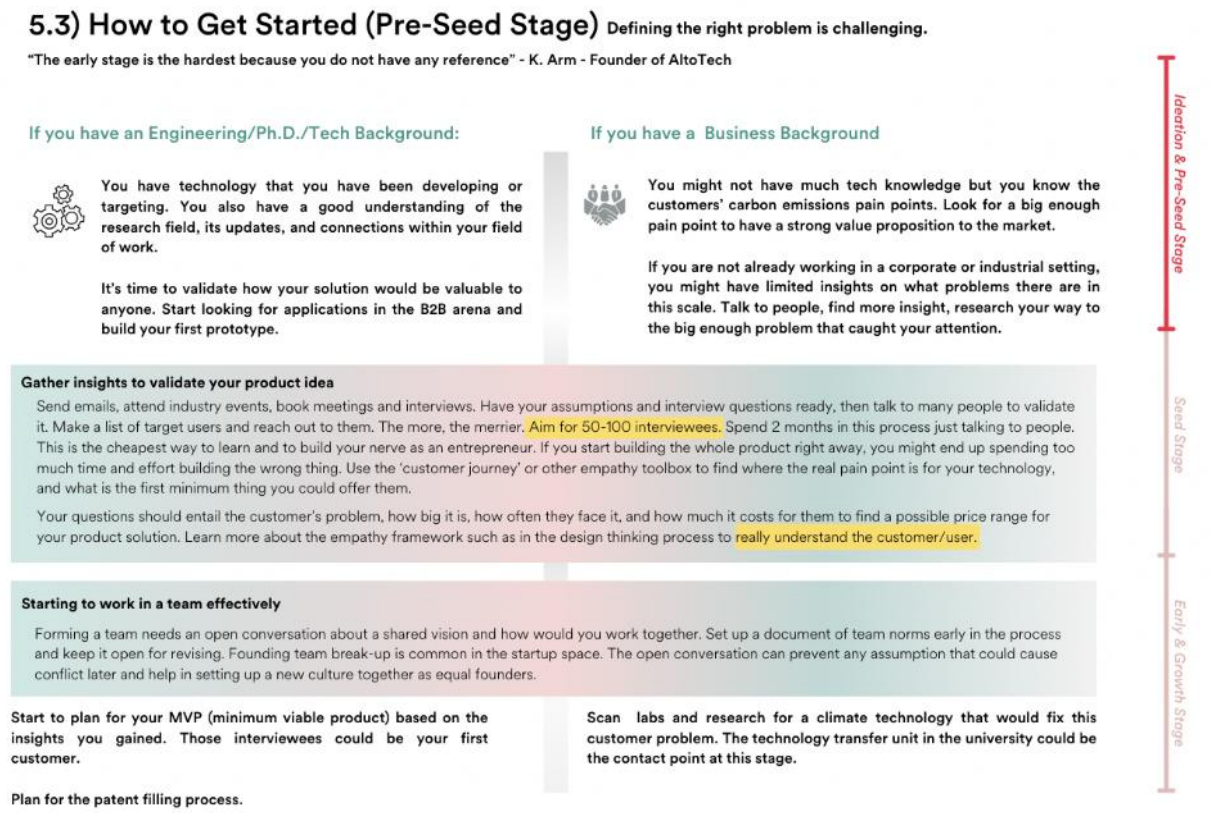
By addressing these foundational aspects early in the process, you can develop a well-structured and strategically positioned startup, ensuring greater resilience and scalability in the evolving climate technology landscape.

Figure 5.3 provides further insights into the initial steps of launching a climate tech startup. At this early stage, assembling a team is not a prerequisite for initiating the validation process. Whether your expertise lies in engineering, business, or another discipline, you have the capacity to begin this journey independently. Waiting to secure co-founders should not be a barrier to progress. Instead, focus on validating your idea, refining your value proposition, and gathering critical insights to establish a strong foundation for your venture.

Your Background Shapes Your Approach

- **For Engineering/Ph.D./Tech Backgrounds**: You've been brewing groundbreaking solutions in your lab, equipped with deep expertise and industry connections. Now, it's time to ask: **"How can my tech solve real-world problems?"** Focus on validating your solution's value in B2B applications and begin crafting your first prototype.
- **For Business Backgrounds**: You're the strategist with a knack for understanding customer pain points. Even if you lack deep tech knowledge, your strength lies in identifying a **big, carbon-related problem** worth solving.

Figure 5.3: How to get started



5.3.1 Gather Insights to Validate Your Product Idea

The challenge of developing deep technology is that it may be too advanced for current market needs. Normally at this point, you would have TRL 4 or higher, but you need to understand the application of it in the real world: what function would work and what would not.

CTOs must prioritize customer discovery and empathy when developing tech products. Engage in 50-100 conversations with potential customers to understand their tasks, current solutions, and pain points. This research will shape your product roadmap and potentially turn interviewees into your first customers. Use empathy frameworks like 'customer journey' or design thinking to grasp your audience's needs, especially for deep tech. Even with a high Technology Readiness Level (TRL), real-world application and customer demand are crucial.

Use empathy frameworks: Apply tools like the “customer journey” or design thinking to truly get inside your audience’s head.

On the business development side, you could identify the **Total Addressable Market (TAM)**, **Serviceable Addressable Market (SAM)**, and **Serviceable Obtainable Market (SOM)** to assess the market opportunity. During this time, you need to use personal funds, support from FFF ("Friends, Family, and Fools") or early-stage grants.

5.3.2 Start Building a Team

While it's possible to embark on the journey alone, having a co-founding team with a shared mission and values can be advantageous. An ideal team would comprise individuals with expertise in business development, product, and engineering, as deep tech startups require a profound understanding of technology and the ability to connect with non-tech investors. Above all, in the climate tech space, a genuine passion for making a positive impact is crucial.

After an open discussion with all team members, it is essential to **document team norms** to establish a strong foundation for collaboration and accountability. These norms should address key aspects of team dynamics, including:

- **Communication Styles:** Defining how team members interact, share updates, and provide feedback.
- **Decision-Making Processes:** Establishing a structured approach for making strategic and operational decisions.
- **Work Ethics:** Setting expectations on professionalism, commitment, and accountability.
- **Time Management:** Aligning schedules, deadlines, and productivity standards.
- **Conflict Resolution:** Developing a framework for addressing and resolving disagreements constructively.
- **Collaboration:** Encouraging teamwork and alignment toward common goals.
- **Meeting Etiquette:** Defining guidelines for participation, agenda-setting, and efficiency during meetings.

Additionally, it is **advisable to delay formal incorporation** until there is sufficient confidence in market demand and idea validation, as incorporation can be a costly and complex process. Ensuring product-market fit and securing early traction before legal structuring can help optimize resources and reduce unnecessary expenses.

Avoid formal incorporation until you have thoroughly validated your market and business idea. Premature incorporation can be a costly and time-consuming process, diverting valuable resources away from refining your product, engaging with potential customers, and securing early traction. Instead, focus on validating demand, testing assumptions, and developing a sustainable business model before committing to legal structuring. This strategic approach ensures that incorporation occurs at the right stage, aligning with the startup's growth trajectory and financial readiness.

5.3.3 Turn Technology into Intellectual Property (IP)

In deep-tech and climate tech, your **intellectual property (IP)** is a cornerstone of your competitive advantage. Strong IP protection isn't just a defensive move; it's a critical enabler

of growth. Without it, scaling globally in industries like climate tech becomes exponentially harder.

IP is an asset that will ensure competitors can't replicate your ideas and disrupt your market position and attract Investors & partners. A solid IP strategy can enhance your credibility and open doors to collaborations and licensing deals.

Begin developing an intellectual property (IP) strategy early in the startup journey to safeguard your technology and maintain a competitive edge. Patent protection is the most robust form of intellectual property security, and it is essential to determine whether a patent should cover the method, product, or both, as well as the number of patents required and the jurisdictions in which protection is necessary to align with the business strategy.

Conduct a thorough review of existing patent databases to confirm the novelty of your innovation and avoid potential conflicts. Additionally, seek guidance from IP strategists or legal experts to explore patent filing, licensing opportunities, and broader IP protection measures. A well-defined IP strategy strengthens investor confidence, enhances valuation, and ensures long-term market positioning. Below is when and why it is important to think about your IP strategy:

1. Early-Stage Product Development

- For engineers or researchers, as soon as you have an idea that could potentially be patented or protected, you need to begin thinking about your IP strategy. In the early stages, your focus should be on protecting your innovations to avoid losing ownership rights to key technologies. Research for novelty and start the patent filing process. Filing patents takes time—up to a year or more—so start early to start planning and safeguard your breakthroughs. You can start with provisional patents or trade secret protection, depending on the nature of your technology.
- For business background founders who don't own research, start by searching for labs, research institutions, and even university tech-transfer units for climate technologies that align with your vision.

2. Before Engaging with Partners or Investors

Once you begin negotiating with potential investors, partners, or customers, it becomes critical to ensure that your IP is well-defined and protected. Investors will often require you to demonstrate that your technology is defensible before they commit significant funding. Investors often consider IP as one of the main assets of a climate tech startup because it can significantly increase the company's value and protect its innovation.

During this stage, you should formalize your IP portfolio by filing patents, trademarks, or copyrights as needed, and ensuring that IP ownership is clearly defined in contracts and collaborative agreements.

3. When Expanding and Scaling

As your company grows and expands into new markets (especially international markets), IP becomes increasingly important to ensure that your innovation is protected globally. The scalability of your business is often tied to the exclusive rights you hold over your technology.

At this point, it's important to expand your IP protections beyond national borders through international patent filings or establishing local protections in key markets. This can also help prevent competitors from copying or infringing on your technology

4. When Preparing for Exit or Acquisition

If you're planning to exit your startup through acquisition, your IP assets will be crucial in determining the value of your company. Acquiring companies will look closely at your patent portfolio, trade secrets, and any proprietary technologies.

Ensure that your IP is properly documented, that ownership is clear, and that there are no potential infringement issues.

5. When Collaborating or Licensing Technology

If you plan to license your technology or collaborate with larger corporations, having a clear IP strategy is vital to protect your rights while sharing technology or collaborating on joint development projects. Well-defined IP agreements can create additional revenue opportunities through licensing or strategic partnerships.

Draft clear licensing agreements that outline ownership, usage rights, and any restrictions on the technology. Consider how to monetize IP through licensing deals to increase revenue streams.

6. Ongoing Considerations

As your business grows and new technologies emerge, it's important to keep updating and reviewing your IP strategy to reflect new developments and market conditions.

Regularly audit your IP portfolio, file new patents as needed, and adjust your strategy to address changing competitive or regulatory environments.

5.4 How to Secure Your 1st Customer & MVP

At this pre-seed stage, you're transforming your idea into reality by finding your **first paying customer** and building an **MVP (Minimum Viable Product)**. This phase is critical for validating your vision through real-world feedback, establishing credibility, and refining your solution to align with market demands.

An **MVP** represents your initial step toward realization, guided by the insights you have gathered. It should be a focused, high-impact solution that effectively addresses your customer's most critical pain point.

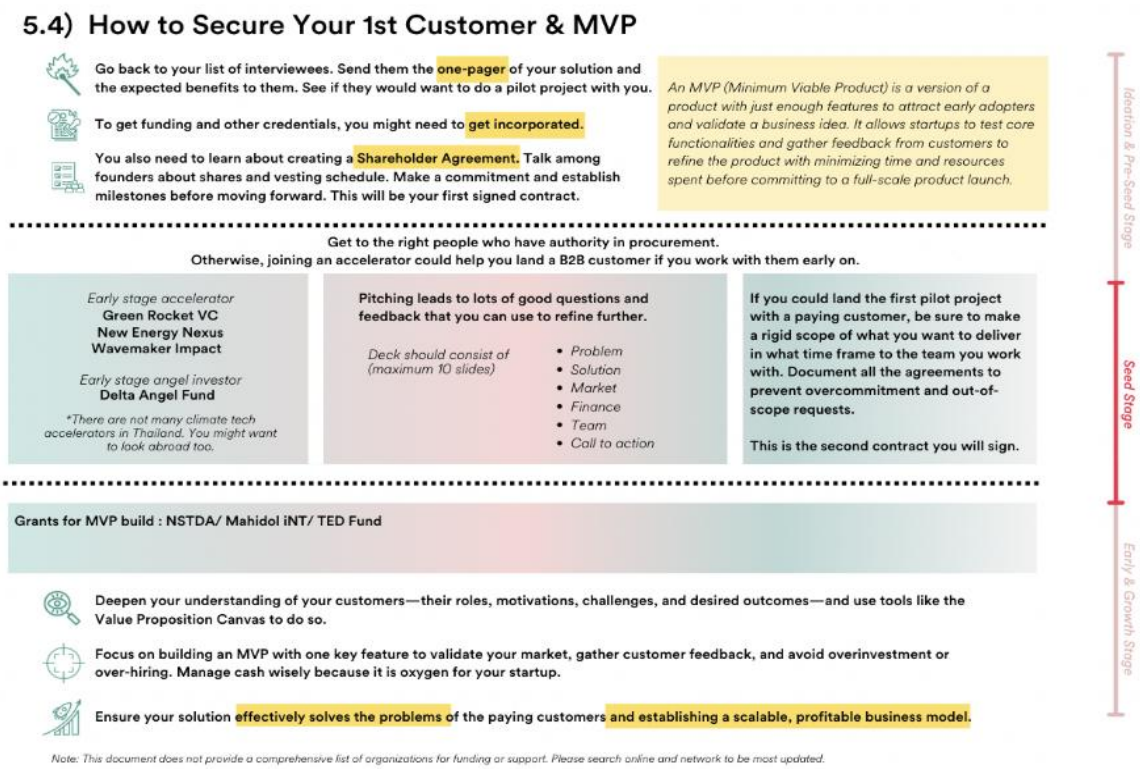
Your MVP doesn't need to be perfect; rather, it should effectively address a key problem. Focus on the following:

- **Addressing the core needs of your target customers**. Utilize tools such as the **Value Proposition Canvas** to fine-tune your offering.
- **Staying lean:** Avoid over-hiring or overspending as cash flow is essential for your startup's survival.

It is important to remember that an MVP is more than just a product—it is a learning tool. Continuously gather feedback, iterate, and ensure that your solution has the potential to scale into a sustainable and profitable business model.

Securing the first client and preparing for grants is the point where the team could get incorporated for better credentials. At this stage, the main focus would shift to financing and business development-securing tractions, putting your product to test with your first few paying customers, and getting more feedback to keep developing your MVP. Please find more details of this part in *Figure 5.4 How to secure your 1st customer & MVP*.

Figure 5.4 How To Secure Your 1st Customer & MVP



5.4.1 Reconnect with Your Interviewees

Start by sending the **one-pager** of your solution to the people you interviewed earlier. Highlight the expected benefits and propose a **pilot project**. These early adopters are your gateway to validation and your potential first customers.

Building Partnerships and Co-Innovation

Collaborations with corporates, municipalities, and public sector entities can significantly accelerate your growth by providing resources, credibility, and access to new markets.

- **Corporates**: Companies often look for solutions that reduce costs, improve operational efficiency, or meet regulatory sustainability goals. For example, a waste-to-energy startup could pitch to a manufacturing company to help them manage industrial waste.
- **Municipalities**: Focus on urban development goals such as renewable energy or smart city solutions. If your startup offers smart water management systems, emphasize how they can reduce water wastage and improve public service delivery.
- **Public Sector Entities**: Governments are focused on creating jobs, addressing environmental challenges, and promoting economic growth. If your startup is developing reforestation drones, highlight how they align with government-led carbon reduction initiatives.

Leverage Co-Innovation Models

Co-innovation means going beyond selling a product. It involves collaborating with partners to develop or test solutions together.

- **Pilot Projects**: Begin with small-scale implementations to demonstrate your solution's impact. For example, a startup working on vertical farming tech could run a pilot in a corporate cafeteria to show cost savings and fresher produce.
- **Joint R&D**: Work closely with corporate partners to customize and improve your product.
- **Living Labs**: Municipalities often allow startups to test technologies in real-world environments. For instance, a city could allow your air quality monitoring sensors to be installed across urban areas to collect actionable data.

5.4.2 Build Your Startup's Foundation

Before engaging in partnerships and scaling operations, it is essential to establish a strong legal and structural foundation for your startup. A well-defined foundation enhances credibility, mitigates potential disputes, and positions your venture for future growth and investment:

- **Get incorporated** to unlock funding opportunities and add credibility to your business.

- Draft a **Shareholder Agreement** to align expectations among co-founders. Define roles, shares, and a vesting schedule, and commit to key milestones. This will be your **first signed contract** as a team.

5.4.3 Pitch to the Right People

Your goal is to connect with decision-makers who have procurement authority. This could mean joining an accelerator program or networking directly with potential customers. You will need a concise **10-slide pitch deck** covering the problem, your proposed solution and its benefits, cost, timeline of the project, expected outcome, and team members. The goal is to tell your story effectively and convince them to try this journey with you with minimum cost, great benefit it is success, and with a trustworthy innovative team they could not find in their normal operation.

Feedback is gold: Each pitch will generate valuable questions and insights to refine your idea.

5.4.4 Nail Your First Pilot Project

Landing a pilot project with a paying customer is a major milestone. Make it count by:

- Setting a clear **scope of work**: Specify deliverables, timelines, and expectations to avoid misunderstandings.
- Signing a second contract to formalize the agreement and prevent scope creep.

5.4.5 Iterate

Iterate based on user feedback and fine-tune your product through your pilot project. Keep the development circle lean and agile.

5.5 How to Build Traction & Develop Your Product Roadmap

Securing your next investment round or bigger customers requires more than just a pitch deck—you need proven projects, early adopters, and a clear sense of direction. This phase of your startup journey is all about solidifying your foundation, proving your value, and getting ready for the next big leap. Your goal is to build momentum and confidence—both in your product, in your team, and in your business model.

Figure 5.5: How to build traction & Develop Product Roadmap

Below is your second level of foundation before growing to a bigger market.

- **Business Model** This is your startup's heartbeat. At this stage focus on pivoting and validating your business model to ensure product-market fit. If your current model isn't working, recognize it quickly and pivot strategically. Effective pivots are made possible by keeping an eye on your **cash reserves**. Stay lean but focused.
- **Technology Development** The product roadmap is your strategic GPS—helping you navigate development, communicate to investors and team members, and ensure you deliver on what truly matters. Hire product managers who excel at bridging technology and customer needs. They will help convey your product's value to customers and adapt its applications for different business cases.
- **Legal** Start filing patents if you have not done so and build on one another over time or license in some parts that could strengthen your product offering. Please consult with the IP office; they should have legal and IP advice services to help all the researchers who are not as keen in this arena. Please refer to section 5.3 regarding the IP focus at each stage.

5.5.1 Surviving the Death Valley

This critical stage could last a decade and is often the make-or-break period for startups, sometimes we call it a 'Death Valley'. The "**Death Valley**" of a startup refers to a critical and challenging phase in a startup's lifecycle where survival is most precarious. It is the period between the initial development of the idea (ideation) and achieving enough traction or funding to become a sustainable business. Many startups fail in this phase due to insufficient resources, lack of market validation, or failure to secure funding.

At this stage, having corporate financial background or a CFO would help you with your financial planning. For each investment round, you also need to **understand the valuation of your company and share distribution for investors**. Please consult with a financial consultant with startup background to hold your ownership while planning for each fund-raising round.

Key Characteristics of the Death Valley Phase:

1. **Resource Scarcity:** Startups often operate with minimal funding, relying on bootstrapping, personal savings, or contributions from friends and family.
2. **Uncertain Market Fit:** Startups are still testing their Minimum Viable Product (MVP) to determine if it resonates with customers.
3. **High Burn Rate:** Operating expenses often exceed revenue (if any), leading to a depletion of financial resources.
4. **Need for Validation:** Without a clear proof of demand or scalability, convincing investors or partners to support the startup can be difficult.
5. **Emotional and Operational Pressure:** Founders face immense stress from managing limited resources, juggling roles, and dealing with the possibility of failure.

How Startups Navigate Death Valley:

1. **Lean Operations:** Focus on prioritizing essential expenses and maximizing efficiency in development and operations.
2. **Customer Validation:** Constantly seek feedback from early adopters to refine the product and ensure it solves a real problem.
3. **Securing Pilot Customers:** Initial customers or partnerships can provide credibility, cash flow, and valuable insights.
4. **Strategic Fundraising:** Convince early-stage investors or angels with a clear vision, compelling MVP results, and a roadmap for growth.
5. **Support Systems:** Engage in accelerators, incubators, or mentorship programs that provide guidance, resources, and networks.

Surviving Death Valley is often considered a litmus test for the resilience and adaptability of a startup team. Once through, the startup is typically better positioned to attract investors and scale operations.

5.6 How to Scale Up

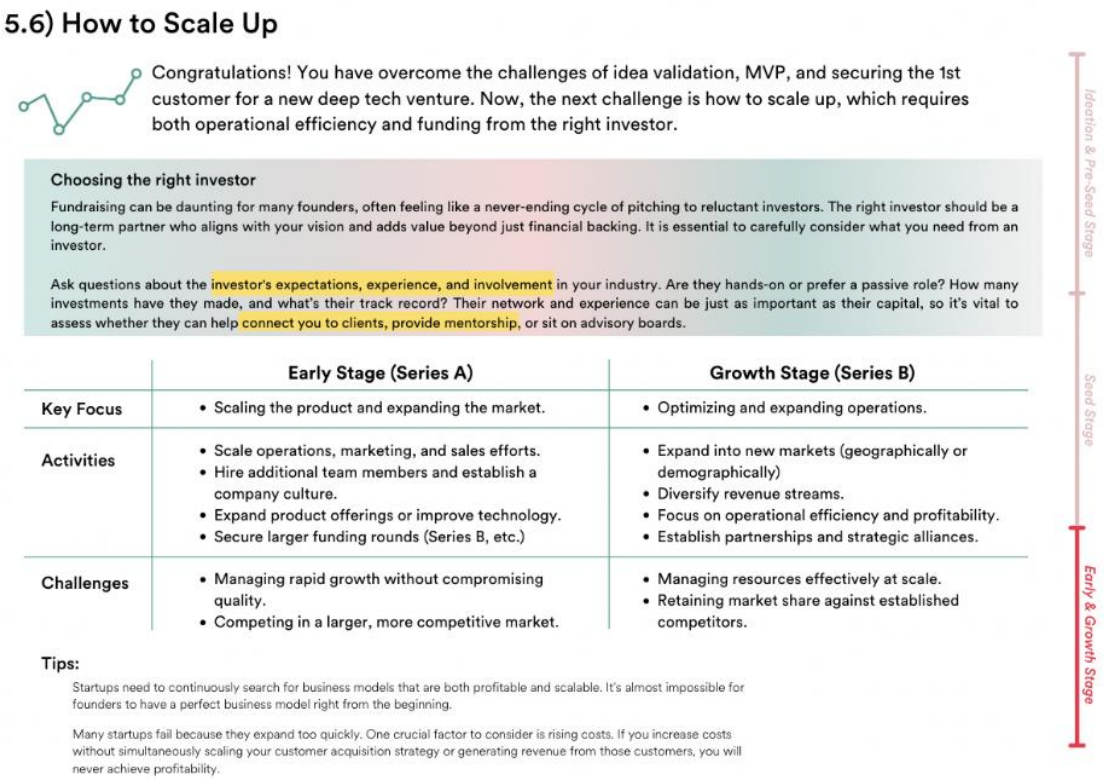
You have successfully navigated the challenges of early-stage development. By this stage, you are likely emerging from the high-risk phase, with a solid MVP and a sufficiently large market for the value you provide. This marks the beginning of your startup's transition from a niche group of early adopters to scaling operations and expanding into broader markets. For further details, refer to Figure 5.6: How to Scale Up.

As a Chief Executive Officer (CEO), you would need to start hiring more people for new expansion. The focus of operation would shift toward building the right team, enabling talents to work well, and get more strategic partnerships. Delegating effectively ensures the organization can scale efficiently without over-reliance on the founder.

The Chief Technology Officer (CTO)'s role becomes equally pivotal during scaling. They must focus on developing a scalable technology infrastructure to handle increased user demand, improving product features, and ensuring technical reliability. The CTO should also foster a strong engineering team, mentoring talent and streamlining processes to accelerate product development while maintaining quality.

Market expansion is another core priority. The CEO, supported by the CTO's technical expertise, should target larger or international markets. Collaborations with corporations or distributors and navigating local regulations are key to entering new markets effectively.

Figure 5.6: How to scale up



5.6) How to Scale Up

Congratulations! You have overcome the challenges of idea validation, MVP, and securing the 1st customer for a new deep tech venture. Now, the next challenge is how to scale up, which requires both operational efficiency and funding from the right investor.

Choosing the right investor

Fundraising can be daunting for many founders, often feeling like a never-ending cycle of pitching to reluctant investors. The right investor should be a long-term partner who aligns with your vision and adds value beyond just financial backing. It is essential to carefully consider what you need from an investor.

Ask questions about the investor's expectations, experience, and involvement in your industry. Are they hands-on or prefer a passive role? How many investments have they made, and what's their track record? Their network and experience can be just as important as their capital, so it's vital to assess whether they can help connect you to clients, provide mentorship, or sit on advisory boards.

	Early Stage (Series A)	Growth Stage (Series B)
Key Focus	• Scaling the product and expanding the market.	• Optimizing and expanding operations.
Activities	• Scale operations, marketing, and sales efforts. • Hire additional team members and establish a company culture. • Expand product offerings or improve technology. • Secure larger funding rounds (Series B, etc.)	• Expand into new markets (geographically or demographically) • Diversify revenue streams. • Focus on operational efficiency and profitability. • Establish partnerships and strategic alliances.
Challenges	• Managing rapid growth without compromising quality. • Competing in a larger, more competitive market.	• Managing resources effectively at scale. • Retaining market share against established competitors.

Tips:

Startups need to continuously search for business models that are both profitable and scalable. It's almost impossible for founders to have a perfect business model right from the beginning.

Many startups fail because they expand too quickly. One crucial factor to consider is rising costs. If you increase costs without simultaneously scaling your customer acquisition strategy or generating revenue from those customers, you will never achieve profitability.

Ideation & Pre-Seed Stage

Seed Stage

Early & Growth Stage

5.6.1 The Two Stages of Scaling

Early Stage (Series A):

Series A funding is the first significant round of venture capital investment a startup receives after demonstrating product-market fit and gaining traction with its product or service. It often serves as the company's first formal step toward scaling operations.

Key Characteristics	○ The startup has validated its product in the market and acquired early users or customers. ○ The focus shifts to optimizing the business model, expanding the team, and scaling the product or service to a larger market. ○ Investors are typically looking for startups with a clear revenue model and substantial growth potential
Funding Amount	Typically ranges between USD 2 million to USD 15 million (though amounts can vary based on the industry and geography).
Key Investors	Venture capital firms, angel investors, and sometimes corporate investors.
Primary Goals	○ Build and scale operations. ○ Strengthen marketing and sales strategies. ○ Establish a solid foundation for future growth.

Growth Stage (Series B):

Series B funding represents the next stage of growth funding. At this point, the startup is focused on scaling rapidly to expand its market reach, develop additional products or services, and improve operational efficiency.

Key Characteristics	○ The startup has already achieved significant market traction and established a stable revenue stream. ○ The company is now looking to optimize operations, scale the team, and enter new geographic or demographic markets. ○ Investors assess the startup's ability to grow sustainably and its market leadership potential.
Funding Amount	Typically ranges between USD 10 million to USD 50 million (but it can go much higher for certain industries, like tech or biotech)
Key Investors	Larger venture capital firms, private equity firms, or corporate investors.
Primary Goals	○ Expand into new markets. ○ Diversify revenue streams and strengthen profitability. ○ Build partnerships and infrastructure for sustained growth.

5.6.2 Crossing the Chasm

Geoffrey Moore's *Crossing the Chasm* is a vital resource for startups seeking to transition from early adopter customers to the mainstream market, a challenge often encountered by deep tech and climate tech startups. The "chasm" represents the gap between early adopters (enthusiastic visionaries) and the early majority (pragmatic customers). Climate tech startups often fall into this gap due to:

- Long technology cycles (3+ years to market readiness).
- High costs and technical complexity.
- Resistance from mainstream industries to adopt unproven solutions.

To cross the chasm, founders must transition from selling visionary benefits to meeting pragmatic needs with clear, measurable value.

1. **Identify a Beachhead Market**: In climate tech, the beachhead market is a focused segment with pressing needs your technology can solve. For example, solar technology startups might target industrial manufacturers seeking clean energy alternatives, or carbon capture solutions could prioritize cement companies facing emission regulations. Focus on winning over this segment before expanding.

   Common pitfall!

   - **Targeting Too Broadly:** Trying to serve multiple markets early can dilute focus. Start with a specific segment and expand gradually.
   - **Growing Too Fast:** Rapid expansion without refining processes can lead to operational inefficiencies and loss of focus.
   - **Overextending Resources:** Scaling is capital-intensive. Ensure a balance between expansion and financial health.

2. **Build the Whole Product:** Develop a solution that goes beyond your core innovation to address all aspects of customer needs, such as:
   - Installation and Maintenance: Offer training or partnerships for seamless integration.
   - Regulatory Support: Assist customers in navigating compliance requirements.
   - Customization: Tailor solutions for industry-specific challenges.

Common pitfall!

- **Over-Promising:** Pragmatic buyers are skeptical of bold claims. Use evidence from pilot projects to set realistic expectations.
- **Ignoring Feedback:** Customer feedback remains crucial even after scaling begins. Continuous improvement is key.

3. **Create a Compelling Value Proposition:** Pragmatic customers care about results, not just innovation. Your messaging should focus on:
    - **Cost Savings:** Demonstrating ROI through energy savings or regulatory compliance.
    - **Reliability:** Highlight pilot success stories and quantified impacts (e.g., reduced CO_2 emissions).
    - **Ease of Adoption:** Show how your solution integrates with existing systems or processes.
4. **Build Brand Credibility**
    - Demonstrate Impact:
        - Publish measurable outcomes from your pilot, such as carbon reductions or cost savings.
        - Use testimonials and case studies to attract more customers and investors.
    - Participate in Global Forums:
        - Showcase your innovation at global climate summits or tech expos
        - Network with international players to explore export opportunities.
5. **Leverage Influencers in the Pragmatist Market:** Collaborate with well-known organizations, influencers, or industry groups to validate your technology. For instance, partner with government bodies like Thailand's BOI for credibility, or secure testimonials from respected early adopters.

Once the early majority is engaged, scaling beyond the chasm requires expanding the market through geographical scaling by evaluating regions aligned with the technology, such as Southeast Asia's focus on renewable energy or water management, and partnering with local players to navigate market dynamics and regulations while replicating success globally; diversifying customer segmentation by tailoring offerings to adjacent industries within the segment; and solidifying infrastructure by investing in manufacturing, talent, and customer support to ensure scalability.

5.6.3 Choosing the Right Investor and Partnerships

Finding the perfect investor is like matchmaking. A good investor provides more than money—they offer wisdom, industry insights, networks, and support throughout your startup journey. For instance, a startup developing solar-powered cooling systems partnered with an angel investor who not only provided funds but also introduced them to a chain of grocery stores struggling with high energy costs—creating their first B2B pilot project.

Choosing the wrong investor could hinder your growth. When vetting potential investors, consider:

- **Track Record**: Have they successfully supported startups in similar industries? For example, an investor experienced in climate tech is more likely to understand your challenges and opportunities.
- **Hands-On vs. Hands-Off**: Do they want to actively mentor you, or prefer to let you lead independently? If you need guidance, look for a hands-on investor.
- **Network Value**: Can they introduce you to key partners, customers, or other investors? For example, an investor with ties to municipal projects could help you secure government contracts.

Governments also offer significant financial support to promote climate tech innovations. Look into:

- **Tax Incentives**: Governments often reward businesses working on sustainability with tax credits.
- **Public-Private Partnerships (PPPs)**: Collaborate on projects where public funds help scale private innovations. For example, a startup developing electric vehicle infrastructure could partner with municipalities aiming for carbon-neutral transportation.

5.6.4 Understand the Regulatory Landscape

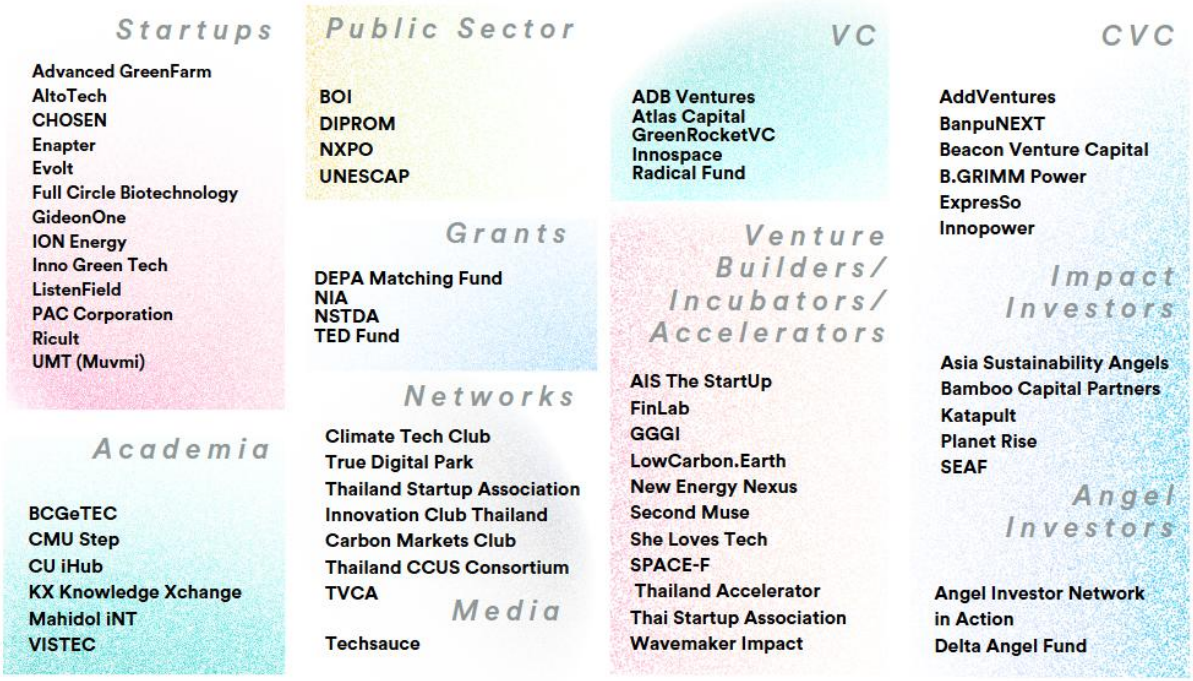
Regulations are a double-edged sword: they can either help your startup or create barriers. For example, a startup exporting renewable energy products had to redesign their packaging to comply with Europe's strict recycling laws before entering the market. Thus, stay informed about:

- **Sustainability Requirements**: Ensure your product meets energy efficiency or waste management laws.
- **Environmental Impact Assessments**: Be prepared to show compliance with local or international standards.

5.7 The Thai Climate Tech Ecosystem 2024

Below is a snapshot of the Thai climate tech ecosystem based on information collected towards the end of 2024. It includes relevant grants and key players in various areas; startups, public sector entities, investors, venture builders, accelerators, incubators, academia, networks, and media.

Climate Tech Startup Landscape in Thailand



6. Case Studies

This section explores the journeys of a few leading climate tech startups in Thailand, as well climate tech-focused investment in Southeast Asia, and government policies in other countries (France and Japan). The case studies offer valuable insights into the challenges, strategies, and successes, providing practical lessons for aspiring entrepreneurs and key players in the Thai climate tech ecosystem.

6.1 Climate Tech Startup: AltoTech Global

AltoTech, founded by a former IoT engineer with experience in Silicon Valley, is tackling a critical challenge in energy efficiency for buildings. The founder identified a pressing need for cost-saving energy solutions but observed a significant barrier in the "how." Transforming buildings to be more energy-efficient required advanced software, which became the foundation of AltoTech's mission.

A pivotal moment in the company's growth came when it joined the New Energy Nexus accelerator, which helped Altotech secure its first corporate client, B.Grimm Power. This initial project proved AltoTech's capabilities and established its credibility in the demanding B2B climate tech market. The founder noted that gaining traction in this sector without credentials or institutional backing would have been nearly impossible, highlighting the critical role accelerators play in supporting startups.

AltoTech's team reflects its technical expertise, with 70% comprising engineers focused on innovative energy management solutions. To address the industry's skill gap, the company launched its own Altotech Academy, designed to train workers in the specialized knowledge required to implement and manage its cutting-edge systems. This initiative not only supports workforce development but also reinforces Altotech's role as a leader in the energy transformation space.

By combining technical innovation, strategic partnerships, and a commitment to training the next generation of experts, AltoTech demonstrates how startups can overcome barriers in the climate tech industry and drive meaningful change in sustainable building operations.

From AltoTech's journey, three important lessons learned are as follows:

As a Founder:

1. **Identifying Real-World Problems:** The founder's ability to pinpoint the inefficiency in building energy management systems highlights the importance of aligning innovation with clear market demands.
2. **Leveraging Expertise:** The founder's background as an IoT engineer and his exposure to Silicon Valley culture underscored the value of technical knowledge and global perspectives in building solutions that address local and regional needs.

3. **Building Credibility Early:** For B2B startups, securing credentials through initial projects is crucial. The founder leveraged support from accelerators to demonstrate capability and gain trust in the market.

In the Venture Journey:

1. **Importance of Ecosystem Support:** Participating in the New Energy Nexus accelerator was transformative, offering Altotech connections, mentorship, and its first corporate client. Accelerators can fast-track a startup's validation and growth in specialized sectors like climate tech.
2. **Specialized Team Composition:** AltoTech's technical focus, with 70% of its workforce being engineers, illustrates the value of a skilled, mission-aligned team in scaling a tech-focused venture.
3. **Establishing a Unique Value Proposition:** Launching AltoTech Academy demonstrates how startups can differentiate themselves by not only offering innovative products but also addressing industry skill gaps.

In the Ecosystem:

1. **The Role of Accelerators:** AltoTech's journey shows how climate tech accelerators can bridge the gap between startups and the corporate sector by providing resources, connections, and credibility.
2. **Corporate Collaboration:** Early support from entities like B.Grimm Power highlights the importance of partnerships in scaling innovations in B2B climate tech.
3. **Skill Development for Market Transformation:** Initiatives like AltoTech Academy reflect the ecosystem's need for continuous workforce upskilling to meet the demands of emerging technologies in climate tech.

6.2 Climate Tech Startup: PAC Corporation

PAC Corporation (Thailand) Co., Ltd. (PAC) has a rich history rooted in family entrepreneurship and a clear vision for sustainability. The company was founded by Khun Atchara and Khun Apichat Poomee, who inherited the air conditioning business from their father, a pioneer in the air conditioning industry for over 30 years. Recognizing future trends toward energy savings, clean energy, and renewable energy, the founders saw an opportunity to evolve their business by focusing on sustainable solutions that could address both customer needs and environmental concerns.

Key Milestones in PAC's Journey:

1. **Origins in Air Conditioning:** PAC's roots are in the air conditioning industry, where the Poomee family built a strong foundation over decades. As the global market began shifting toward energy efficiency and sustainability, they recognized a gap in the market for energy-saving solutions.

2. **Launch of the PAC Frenergy Water Heater:** PAC's first breakthrough innovation was the PAC Frenergy, a water heater from the air conditioner. This product utilized waste energy from air conditioning systems to heat water, helping customers reduce electricity costs while also minimizing environmental impact. This early success in combining energy efficiency with environmental responsibility laid the foundation for PAC's future growth.
3. **Product Innovation and Development:** Following the success of the PAC Frenergy, PAC continued to expand its product line with new innovations aimed at solving specific customer needs across various industries. Some of PAC's notable innovations include:
    - **PAC Pooltemper**: A swimming pool heat pump designed to efficiently heat pool water using less energy.
    - **PAC Compact Cooled Water-Cooled Air Conditioners**: Air conditioners that use water cooling systems for improved energy efficiency.
    - **PAC Heatralized Heat Pump Water Heaters**: Advanced heat pump water heaters that optimize energy usage and minimize waste.
    - **PAC SolarAire**: **Solar-powered air conditioners**, leveraging renewable energy to reduce reliance on traditional power sources.
4. **Leadership in Energy Saving Solutions:** Through continuous research and development, PAC has grown into a leader in energy-saving technologies and climate tech. The company's innovations not only cater to energy efficiency but also contribute to reducing carbon footprints, making PAC a key player in the global push toward sustainable, clean energy solutions.
5. **Global Recognition:** PAC's commitment to innovation and sustainability has earned international recognition, positioning the company as a pioneer in energy-saving solutions. This global acclaim further strengthens PAC's mission to expand its impact and provide environmentally friendly products worldwide.

From PAC's journey, three important lessons learned are as follows:

As a Founder:

1. **Build on Family Legacy:** The founder uses family values as a foundation for business ethics and long-term vision. This enabled intergenerational knowledge transfer to ensure continuity and innovation.
2. **Anticipate Future Trends:** The founder stayed ahead of the curve by continuously monitoring market trends and emerging technologies to identify opportunities for innovation. She aligned business goals with environmental sustainability to create long-term value.
3. **Prioritize Customer Needs:** The founder understands customer pain points by conducting thorough market research to identify specific customer needs and challenges. She was then able to develop innovative solutions that address these needs and provide significant benefits.

In the Venture Journey:

1. **Incremental Innovation:** Start small then scale big. Begin with a core product or service and gradually expand into new markets and product lines. Iterate and improve. Continuously refine and enhance products based on customer feedback and market trends.
2. **Build a Strong Brand:** Develop a strong brand identity that resonates with customers and differentiates the company from competitors. Focus on quality, reliability, and customer satisfaction to build trust and loyalty.
3. **Foster a Culture of Innovation:** Create a work environment that fosters creativity and innovation. Recognize and reward employees who come up with innovative ideas.

In the Ecosystem:

1. **Support Sustainable Businesses:** Provide incentives via tax breaks, subsidies, and other ways to encourage businesses to adopt sustainable practices. Fund research and development in clean energy and sustainable technologies.
2. **Promote Education and Awareness:** Raise awareness about the importance of energy efficiency and climate change. Develop the skills and knowledge needed to support the transition to a sustainable future.
3. **Collaborate for Impact:** Foster collaboration and partnerships between businesses, government, and academia to accelerate innovation and address global challenges.

6.3 Climate Tech Startup: Full Circle Biotechnology

As a novel feed startup, Full Circle Biotechnology takes food and agricultural waste products and treats them with insects and microbes, which results in sustainable ingredients for animal feed that is highly nutritious and ultra-low carbon. It addresses both the climate challenges of food waste, deforestation and ocean depletion and pollution, as well as human rights in the agri-food supply chain globally.

Felix Collins, founder of Full Circle Biotechnology, oversees 20 million black soldier fly larvae at a facility near Bangkok. The larvae, fed on fruit and vegetable waste, are used to produce high-protein animal feed for shrimp and pig farms. Full Circle uses patent-pending R2A technology to recapture, remediate and amplify nutrients to process and package these nutrients and reintroduce them into the food system. During the interview, Felix explained “I wanted to start an impact company and needed a really clear story about lower price. We can price lower and have lower carbon footprint.”

Full Circle's feed, containing up to 70% protein, is a more sustainable alternative to soy-based feeds. Founded in 2019, the company employs 14 people and supplies 49 farms across

Thailand. To reduce costs, Full Circle is using AI to optimize production by analyzing data on insect farming.

Full Circle Biotechnology is an impact company, backed by impact investors, including Katapult Ocean, Olaisen Blue, Planet Rise, and Asia Sustainability Angels. It is committed to reinvesting profits into scaling impact of alternative protein that is highly sustainable environmentally and socially. It was in the second incubator cohort of SPACE-F.

From Full Circle Biotechnology's journey, three important lessons learned are as follows:

As a Founder:

1. **Clear Mission and Impact:** Define a compelling mission to articulate the problem you're solving and the positive impact you aim to achieve. Full Circle's mission to address food waste, climate change, and human rights in the agri-food supply chain is both ambitious and inspiring. Integrate sustainability into every aspect of your business, from sourcing to production to distribution. This can lead to cost savings, reduce environmental impact, and attract socially conscious investors.

2. **Innovative Technology:** Leverage technology to optimize operations, reduce costs, and improve efficiency. Full Circle's use of AI to analyze insect farming data is a prime example of this. Secure patents and other intellectual property rights to safeguard your innovative ideas and gain a competitive edge.

3. **Build Strong Partnerships:** Forge strong relationships with suppliers, customers, and investors. Full Circle's partnerships with farms and impact investors have been instrumental in its growth. Participate in incubators, accelerators, and industry events to network with other entrepreneurs, mentors, and potential investors.

In the Venture Journey:

1. **Impact Investing:** Seek out investors who share your vision for a sustainable future. Impact investors are often willing to take a longer-term view and prioritize social and environmental impact over short-term financial returns. Develop robust impact measurement and reporting frameworks to track and communicate your social and environmental performance.

2. **Scalability and Growth:** Develop a scalable business model that can accommodate rapid growth while maintaining quality and sustainability standards. Optimize processes and implement cost-effective strategies to achieve economies of scale.

In the Ecosystem:

1. **Support Innovation:** Foster innovation hubs to provide a supportive ecosystem that encourages entrepreneurship and innovation in sustainable technologies. Offer access to capital and expert guidance to help startups grow and scale.

2. **Promote Sustainable Practices:** Educate consumers, businesses, and policymakers about the importance of sustainable practices. Implement policies and incentives that reward environmentally friendly and socially responsible businesses.

6.4 Impact Investor: Planet Rise

Planet Rise was co-founded by Steve and Liz Melhuish due to growing concerns about climate change. Steve had spent the previous 28 years building tech start-ups and businesses. This included co-founder and CEO of Asian unicorn PropertyGuru, used by 37 million people monthly in 5 countries. Planet Rise advises, and has invested millions of dollars, into a growing portfolio of climate and social impact “greentech” companies. Planet Rise backs entrepreneurs primarily in Asia that have the potential to mitigate more than 1GT of greenhouse gas emissions, or improve the lives of more than 10 million people, within a decade. Planet Rise supports sustainability tech focused programs including Habitat For Humanity’s Sheltertech for new affordable housing tech, Capitaland’s Sustainable Buildings accelerator and judge/investor for Temasek Foundation’s The Liveability Challenge. Planet Rise also supports charitable projects focused on fostering the next generation of sustainability entrepreneurs and addressing social inequality such as NVPC, Lighthouse and Asia Startup Network (MentorForHope and MakanForHope).

Below are actionable recommendations for funding Thailand's climate tech startups, inspired by Planet Rise:

1. Leverage Experienced Entrepreneurs: Engage experienced entrepreneurs with a proven track record in building successful tech startups to mentor and invest in climate tech ventures.

2. Focus on High-Impact Goals: Prioritize funding for startups that have the potential to significantly mitigate greenhouse gas emissions or improve the lives of millions of people within a decade.

3. Support Sustainability Programs: Invest in sustainability tech-focused programs and accelerators, such as those for affordable housing tech and sustainable buildings.

4. Encourage Corporate Involvement: Partner with major corporations to launch funds and initiatives that support climate tech startups, similar to the involvement of Capitaland and Temasek Foundation.

5. Foster the Next Generation: Support charitable projects and initiatives that aim to foster the next generation of sustainability entrepreneurs and address social inequality.

6.5 Venture Capital: Atlas Capital

Atlas Capital is Southeast Asia's first venture capital fund that is 100% dedicated to investing in built environment climate startups – rapidly *scalable* businesses that blend *financial returns* with real and *measurable CO_2 reduction* in cities. It works across the following 3 pillars:

1. **Homes Heat Resilience & Data Centers Cooling**
    - Supporting built environment resilience to heat by investing in technologies reducing the impact of air conditioning systems to cool our homes and shopping malls.
    - Focus: HVAC (Heating, Ventilation, and Air Conditioning), Buildings Energy Retrofitting.
2. **Logistics AI Adaptation & Mitigation**
    - Rerouting a cargo ship crossing Singapore from a typhoon can cost several hundred million dollars. Logistics also represents 24% of total annual CO_2 emissions.
    - Focus: Alternative Fuels, SAFs, Robotics & AI applied to logistics.
3. **Insurance Adaptation to Extreme Weather**
    - In 2023 insurance companies lost USD 50B in the first half of 2023. Leveraging satellite data, machine learning and more, we can help the insurance industry and its clients to climate-proof their homes, families, agricultural yields, and commercial assets.
    - Focus: Satellites for Weather Prediction, AI for Insurance.

From Atlas Capital's journey, three important lessons learned are as follows:

For Founders:

- **Targeting Niche High-Impact Areas:** Founders can identify critical challenges within specific industries, such as HVAC systems, logistics, and insurance, where solutions can yield significant environmental and financial benefits.
- **Building Scalable and Resilient Business Models:** Atlas Capital's focus on blending financial returns with measurable CO_2 reduction demonstrates the importance of aligning business viability with environmental sustainability.

For the Ecosystem:

- **Create Sector-Specific Investment Funds:** Atlas Capital exemplifies the role of specialized climate-focused funds in accelerating innovation and impact in the built environment sector. By concentrating on built environment climate startups, Atlas Capital highlights the need for specialized funds that can provide expertise, funding, and networks to niche sectors.

6.6 Climate Tech Venture Builder: Wavemaker Impact

Wavemaker is a VC firm that also has a venture builder called Wavemaker Impact, which focuses on climate tech startups. In one of the stakeholder consultations for developing this Guide, a key informant was a Thai founder with no climate tech background. Through a series of interviews to find the right type of founder to work with, Wavemaker Impact intentionally selects seasoned founders, who may not have experience in climate solutions, to build ventures focusing on climate impact. The selected founders get a team, support, money, and the freedom to choose what type of climate tech venture they would like to pursue.

"This kind of people is hard to find, a proven entrepreneur in their home market with curiosity and openness to explore something new, as well as humbleness and the willingness to learn." - Founding Partner & GP, Wavemaker Impact

Strategic Analysis and Policy Recommendations from the Wavemaker Impact Case Study:

- **Founder-Driven Climate Innovation:** Wavemaker Impact strategically identifies seasoned entrepreneurs with strong market knowledge, even if they lack prior climate tech experience. Thailand can replicate this model by creating mechanisms to attract experienced entrepreneurs, empowering them to tackle climate challenges with innovative ventures, creating a national platform to connect experienced entrepreneurs with climate tech mentors, researchers, and investors, ensuring cross-disciplinary collaboration, and facilitating interviews and matchmaking processes similar to Wavemaker Impact's approach to identify high-potential founders

- **Comprehensive Support System:** Providing selected founders with a dedicated team, funding, and operational freedom could accelerate the creation of high-potential climate startups by mitigating barriers like resource scarcity and lack of climate-specific expertise.

- **Human-Centered Selection Criteria:** Wavemaker Impact emphasizes recruiting entrepreneurs who exhibit curiosity, openness, humility, and a willingness to learn—traits critical for success in uncharted domains like climate tech. This human-centered approach highlights the need to prioritize not just technical skills but also personal attributes conducive to innovation.

6.7 Government Policy: Japan GX

Japan's Green Transformation (GX) is an ambitious initiative aimed at transitioning the country's economy and society from a reliance on fossil fuels to clean energy-driven structures. The Japanese government is also actively supporting climate tech startups through various initiatives and policies. Below are some key aspects of their support:

1. **Five-Year Plan:** The government has unveiled a five-year plan to accelerate R&D across the economy, supported by a ¥1 trillion budget (THB 227.85 billion). This plan includes easier visa regimes for entrepreneurs.
2. **Startup Ecosystem:** Japan's startup ecosystem is booming, with significant investments in startups, particularly in manufacturing, life sciences, and climate tech.
3. **Policy Support:** Prime Minister Kishida has been vocal about supporting startups, which is translating into increased interest and investment in climate tech.
4. **Corporate Involvement:** Major corporations like Mitsubishi Corp are launching funds to support climate tech startups, unlocking greater interest and investment in this sector.

The number of university startups has increased about 2.5 times between 2014-2023, contributing to the increase of deep tech startups. Further growth of competitiveness is expected in Japan with numerous climate tech-related patents in offshore wind, solar, geothermal, hydrogen, fuel ammonia, carbon recycling, and resource recycling. See snapshots of key enablers for climate tech startups in Japan in Annex III.

Below are actionable recommendations for strengthening Thailand's climate tech startup ecosystem, inspired by Japan's GX initiative:

- **Develop a Comprehensive Five-Year Plan:** Create a strategic plan to accelerate research and development (R&D) across the economy, supported by a substantial budget. Include provisions for easier visa regimes to attract international entrepreneurs.
- **Boost the Startup Ecosystem:** Encourage significant investments in climate tech startups by fostering a thriving startup ecosystem. Focus on sectors such as manufacturing, life sciences, and climate tech.
- **Enhance Policy Support:** Ensure strong governmental support for climate tech startups. Vocal and active support from key government figures can translate into increased interest and investment in the sector.
- **Engage Major Corporations:** Encourage large corporations to launch funds and initiatives to support climate tech startups. Corporate involvement can unlock greater interest and investment in this sector.

- **Leverage Academic Institutions:** Increase the number of university startups by fostering collaborations between academic institutions and the private sector. Promote the development of deep tech startups through university research and innovation.

- **Focus on Patents and Innovation:** Encourage the filing of climate tech-related patents in areas such as offshore wind, solar, geothermal, hydrogen, fuel ammonia, carbon recycling, and resource recycling. This can enhance the competitiveness of Thai startups on a global scale.

6.8 Government Policy: La French Tech

The French Tech Mission (La French Tech) is a government-backed initiative aimed at fostering France's startup ecosystem, operating as is an administrative unit of the Directorate General for Enterprise within the Ministry of the Economy, Finance and Industrial and Digital Sovereignty since 2013. In 2022, French technology companies raised €13.5 billion, putting them in first place in the European Union (according to the 2022 EY report). Recognizing the urgency of climate change, the initiative has taken significant steps to support climate tech startups as follows.

La French Tech provides various resources and initiatives to support climate tech startups:

- **Funding:** The initiative offers grants, loans, and tax incentives to encourage innovation and growth in the climate tech sector.
- **Incubators and Accelerators:** La French Tech operates numerous incubators and accelerators that provide mentorship, networking opportunities, and access to resources for climate tech startups.
- **Talent Development:** The initiative supports programs that train and develop talent in climate-related fields, ensuring a skilled workforce for the sector.
- **Internationalization:** La French Tech helps climate tech startups expand internationally, connecting them with global markets and investors.

French Tech Capitals and Communities are gateways for French start-ups to the French Tech ecosystem. Present throughout France in 31 local communities and in 52 countries, they bring together innovation players in their territory and mobilize them on common initiatives, in accordance with the challenges of the French Tech Mission and according to the local priorities of their ecosystem. The French Tech Communities abroad are groups of volunteer entrepreneurs who represent the French Tech Mission internationally.

The Sobriety Commitment is a key component of La French Tech's climate action strategy. It is a pledge for French tech companies to reduce their environmental impact by:

- **Measuring and reducing their carbon footprint:** Companies are encouraged to assess their environmental impact and set targets for reducing emissions.
- **Promoting sustainable practices:** The commitment emphasizes the adoption of eco-friendly practices, such as using renewable energy, reducing waste, and promoting telework.
- **Collaborating with other stakeholders:** The Sobriety Commitment encourages companies to work with suppliers, customers, and other stakeholders to promote sustainability throughout the value chain.

Below are a few notable French climate tech startups:

- **ZE Energy:** A renewable energy producer founded in 2019, focusing on energy and nuclear manufacturing.
- **HysetCo:** A developer of hydrogen-powered transportation solutions.
- **Calyxia:** A manufacturer of biodegradable microcapsules and microparticles for use in consumer goods.
- **Driveco:** An EV charging manufacturer.
- **Sublime Energie:** A developer of proprietary biogas liquefaction technology.

Key Takeaways of Strategic Insights from La French Tech's Climate Tech Support Model:

1. **Funding Ecosystem:**
    - La French Tech provides comprehensive financial support, including grants, loans, and tax incentives, to encourage innovation and startup growth.
    - Establishing a dedicated funding framework in Thailand for climate tech startups would stimulate sector growth and attract investors.
2. **Incubators and Accelerators:**
    - Numerous incubators and accelerators offer mentorship, resources, and networking opportunities to startups.
    - Thailand should develop region-specific climate tech incubators and accelerators to support early-stage startups with tailored resources.
3. **Talent Development:**
    - Focused programs develop a skilled workforce for climate-related fields, ensuring startups have access to top-tier talent.
    - Thailand should introduce education and training programs focused on climate tech skills, aligning with its labor market needs.
4. **Global Connectivity:**
    - La French Tech connects startups with international markets and investors, enhancing their global reach.

- Thailand's climate tech ecosystem must prioritize international collaborations and market access initiatives.

5. **Regional and International Networks:**
    - The French Tech Capitals and Communities create local and global networks, bridging regional innovation hubs with international opportunities.
    - Thailand can replicate this model by fostering regional hubs and engaging Thai climate tech startups with international ecosystems.
6. **Sobriety Commitment:**
    - A pledge emphasizing sustainability and eco-friendly practices strengthens startups' environmental responsibility and value proposition.
    - A national commitment, modeled after La French Tech's Sobriety Commitment, would drive Thai startups toward measurable environmental goals.
7. **Notable Success Stories:**
    - Startups like ZE Energy and HysetCo showcase the diverse potential of climate tech, from renewable energy to hydrogen-powered solutions.
    - Highlighting successful Thai climate tech ventures could inspire further innovation and attract investment.

6.9 Government Policy: Innovate UK

Innovate UK is the United Kingdom's national innovation agency, part of UK Research and Innovation (UKRI). Their mission is to drive economic growth by supporting business-led innovation across various sectors and technologies. They provide funding, support, and resources to help companies develop and commercialize new products, processes, and services. Innovate UK aims to create an inclusive and agile innovation ecosystem that is easy to navigate.

Innovate UK stands out in several ways when compared to similar innovation agencies worldwide. Based on Innovate UK's strengths, the following are strategic recommendations for Thailand's development of a strong climate tech startup ecosystem.

1. Inclusivity: Innovate UK offers funding opportunities for a wide range of sectors, including those that don't typically align with traditional innovation categories. This is similar to the "User-driven Research-based Innovation" program in Norway and the SME program from Business Finland.

2. Online Platforms: Innovate UK has an interactive online platform for grant applications and project management, keeping up with agencies like BPI France and the European Commission.

3. Innovative Funding Streams: Innovate UK has unique funding streams like "Analysis for Innovators," which addresses specific business problems.

Thailand can enhance its climate innovation efforts by adopting Innovate UK's strategies, such as creating targeted funding streams for decarbonization innovations, fostering inclusivity in grant eligibility, developing user-friendly online platforms for transparency, promoting funding opportunities proactively, and collaborating with international partners to co-fund initiatives. These approaches can help Thailand build a stronger and more accessible ecosystem for climate innovation.

6.10 Blended Finance: CorPower Ocean

CorPower Ocean is a startup dedicated to revolutionizing renewable energy through innovative wave power technology. Founded in 2009 by Patrik Möller, CorPower envisioned harnessing the untapped energy of ocean waves to produce clean electricity. Yet, developing such groundbreaking technology came with significant challenges, particularly the need for substantial capital and the difficulty of convincing private investors to back an unproven concept.

The company's journey began to take shape in 2012, when CorPower was accepted into the EIT InnoEnergy accelerator program, which provided crucial support and guidance with a structured five-stage development process. A major breakthrough came in 2014 with the invention of WaveSpring technology at NTNU by Dr. Jörgen Hals Todalshaug, building on decades of research in phase control technology pioneered by Professors Falnes and Budal since the 1970s. This technology was later integrated into CorPower's wave energy converters upon incorporation in 2015, marking a pivotal milestone for the company.

In 2018, nearly a decade after its founding, CorPower had garnered significant support from the Swedish Energy Agency, which invested €8.2 million to fund the full-scale demonstration of its technology. This backing was instrumental in de-risking the venture, instilling confidence among private investors. That same year, CorPower achieved a major technical feat by successfully deploying and testing its 1:2 scale C3 wave energy converter in Orkney, Scotland, proving both its performance and survivability.

The company also secured its first equity investors, Midroc New Technologies and Almi Greentech. This partnership, underpinned by a blended finance model, was a turning point. The Swedish Energy Agency's grants and concessional loans played a pivotal role in bridging the gap between public and private funding, creating a collaborative financial structure that mitigated risks and attracted venture capital and impact investors.

Key Takeaways and Strategic Lessons from CorPower Ocean are as follows:

- **The Importance of Public-Private Collaboration:** Public grants and concessional loans provided by the Swedish Energy Agency were instrumental in de-risking the venture, encouraging private investment. Blended finance mechanisms could de-risk climate tech innovations and bridge funding gaps.
- **Strategic Technology Development**: CorPower's technological advancements, such as WaveSpring technology, were grounded in decades of research, ensuring credibility

and innovation. A focus on research-backed innovation is crucial for startups in the renewable energy sector. Partnerships with academic institutions and industry leaders can accelerate development.

- **Scaling Through Demonstrations and Validation:** CorPower's full-scale demonstrations in Orkney proved the technology's viability, addressing investor concerns. Demonstrating the scalability and reliability of climate tech solutions is vital for securing investor confidence and market entry.

6.11 Early-stage Funding for Capital-Intensive Climate Tech Startups

The following are brief descriptions of notable international climate tech startups that successfully raised early-stage funding for capital-intensive technology development.

Energy Tech:

Proxima Fusion is a German startup founded in 2023 that focuses on developing fusion power plants using quasi-isodynamic stellarators to produce clean and abundant energy. It has raised **USD 21.7 million in seed funding.**

Carbon Capture:

Climeworks is a Swiss deep tech climate startup founded in 2009 by Jan Wurzbacher and Christoph Gebald. Climeworks specializes in direct air capture (DAC) technology, which removes carbon dioxide (CO_2) directly from the atmosphere. Their modular CO_2 collectors capture atmospheric CO_2, which can then be either stored underground or utilized in various applications. For Series A funding, Climeworks raised **USD 1.88 million** in 2011. In 2021, Climeworks launched "Orca" in Iceland, one of the world's largest DAC and storage plants. By 2024, the company had secured significant funding, including a **USD 650 million** equity round, elevating its valuation to over USD 1 billion. Climeworks has been recognized among Fast Company's "World's Most Innovative Companies of 2024" and included in Time's 2024 list of influential companies.

Spiritus is a San Francisco-based direct air capture (DAC) startup with an **USD 11 million** Series A funding round. The company aims to develop technology inspired by the human lung to address climate challenges. In May 2024, Spiritus entered into a memorandum of understanding (MoU) with Aramco and received an investment from Aramco Ventures to further enhance its technology and explore potential piloting and scale deployment. By October 2024, Spiritus had raised a total of USD 25.07 million over two funding rounds, with the latest being a Series A round of USD 14.07 million.

Agrifood Tech:

HeavyFinance, a Lithuanian climate technology startup, secured **USD 1 million** in funding in December 2021. The company operates a marketplace facilitating investments in debt capital for small and medium-sized agricultural enterprises, promoting regenerative agriculture practices such as no-till farming and mixed crop rotation.

Pivot Bio is an innovative ag tech company based in Berkeley, California. It develops microbial nitrogen solutions that enhance crop production and reduce reliance on synthetic fertilizers. Pivot Bio raised **USD 750,000 in seed funding** in 2014. The flagship product, Pivot Bio PROVEN® 40, delivers nitrogen directly to the plant's roots, improving efficiency and reducing environmental impact. Pivot Bio's N-Ovator program connects companies with farmers to reduce upstream emissions and promote sustainable practices.

Industrial Process Tech:

Electra, founded in Boulder, Colorado, is a startup that aims to decarbonize the iron and steel industry, which accounts for about 7% of global carbon emissions. Electra utilizes a novel electrochemical process powered by renewable energy to produce iron at lower temperatures, significantly reducing emissions. It raised **USD 85 million from Series A funding**. In March 2024, Electra launched a pilot plant and received over USD 2.8 million from the U.S. Energy Department to support its efforts.

Sublime Systems, founded by Professor Yet-Ming Chiang and former postdoc Leah Ellis, is a Massachusetts Institute of Technology (MIT) spinout that has developed a sustainable way to produce cement using electrochemistry. Their process eliminates the need for the high temperatures and limestone typically used in conventional cement production, significantly reducing carbon dioxide emissions. Sublime Systems raised USD 5.86 million in seed funding and USD 75 million in early-stage VC. Siam Cement Group (SCG) was among the investors, joining climate-tech focused venture fund Lowercarbon Capital, which led the USD 40 million in series A funding.

Key Takeaways: Early-Stage Funding for Capital-Intensive Climate Tech Startups

1. **The Importance of Seed and Early-Stage Funding**: Early-stage funding is critical for capital-intensive climate tech startups to develop and validate their technologies. Examples include:
    - **Proxima Fusion:** Raised USD 21.7 million in seed funding to advance fusion power plant technology.
    - **Pivot Bio:** Secured USD 750,000 in seed funding to develop microbial nitrogen solutions, demonstrating the importance of foundational support for innovation.
2. **Role of Government and Institutional Backing**: Public funding and institutional grants often play a pivotal role in de-risking early-stage climate tech ventures. Example:

- **Electra** received over USD 2.8 million from the U.S. Energy Department for its pilot plant.

3. **Impact of Innovative Technology and Research**: Startups leveraging cutting-edge research and innovation attract early-stage investors seeking impactful solutions. Examples include:
   - **Spiritus:** Inspired by the human lung, this DAC startup secured USD 11 million in Series A funding.
   - **Sublime Systems:** Developed sustainable cement production methods based on electrochemistry, raising USD 75 million in early-stage VC funding.
4. **Blended Finance Models for Risk Mitigation**: Combining public grants, private equity, and venture capital helps mitigate risks associated with unproven technologies. Example:
   - **Climeworks** used a combination of equity rounds and recognition to build confidence among impact investors.
5. **Recognition and Branding as Catalysts for Growth**: Industry accolades and media coverage enhance visibility and attract investor confidence. Example:
   - **Climeworks** was **f**eatured among "World's Most Innovative Companies" and "Time's Influential Companies" in 2024, strengthening its market position.

These takeaways illustrate the critical components of success for climate tech startups, emphasizing the need for innovative technologies, early-stage funding, strategic partnerships, and scalability.

Annex

I. List of Stakeholder Consultations and Notable Quotations

Objective:
The Thailand Climate Tech Startup Guide aims to provide clear pathways for climate tech startups to access funding, technical support, and market opportunities. Key informant interviews and exchanges with other relevant stakeholders were conducted between October to November 2024 to provide input for developing the Guide.

Interview Questions:
We would like to get an overview of the current climate tech startup landscape in Thailand (e.g., players, market potential, policy and regulatory frameworks, challenges and opportunities, subsectors, etc.)

1. What are the major **challenges and opportunities** for a climate tech startup in Thailand?
2. How does a climate tech startup access **funding** in Thailand or abroad?
3. How to access **regulatory** guidance as a climate tech startup in Thailand?
4. What are the existing **support** mechanisms for climate tech startups (available technical, financial, and business development support)?
5. How to foster a more robust innovation **ecosystem** in the Thai climate tech sector?

Key Informant Interviews: 35 (14 startups,14 investors/supporting organizations, 7 public agencies)
Other Stakeholder Consultations: 9

Startups				
No.	**Organization**	**Description**	**Informant**	**Date**
1	ListenField	AgriTech startup created by academic researchers that specializes in the gathering, processing, and analysis of multilayer data. We provide insightful information to agro professionals, allowing them to make better decisions to optimize their production capabilities	Dr. Rassarin Chinnachodteeranun, Founder	15 Oct
2	Ricult	a venture-backed social enterprise that leverages machine learning and satellite imagery to help farmers in Thailand and Pakistan increase farm productivity and access affordable loan	Aukrit Unahalekhak, Co-Founder/CEO (Thailand),	1 Nov
3	PAC Corporation	a heating and energy efficiency company	Atchara Poomee	24 Oct
4	AltoTech Global	a building management systems company	Warodom Khamphanchai, CEO and Co-Founder	21 Oct

5	Urban Mobility Tech Co., Ltd. (MuvMi)	an on-demand electric ridesharing service	Krisada Kritayakirana, CEO and Co-Founder	17 Oct
6	Enapter	an energy technology company that specializes in producing modular electrolyzers for green hydrogen generation	Sebastian-Justus Schmidt, Co-Founder and Advisor	16 Oct
7	Evolt	a leading provider of electric vehicle (EV) charging solutions in Thailand	Poonpat Loharjun, CEO and Founder	4 Nov
8	Inno Green Tech Company Limited	a Songkhla-based solid waste and wastewater company	Prof. Dr. Chontisa Sukkasem, CTO and Founder	1 Nov
9	ION Energy	A distributed renewable energy provider with advanced data analytics	Peerakarn Manakit, CEO and Co-Founder	6 Nov
10	Advanced GreenFarm (FLO Wolffia)	a research-driven startup based in Thailand, focusing on the sustainable cultivation of Wolffia, the world's smallest and fastest-growing flowering plant. Wolffia, also known as watermeal, is a nutrient-dense superfood packed with high-quality protein, essential vitamins, and minerals	Asst. Prof. Dr. Wisuwat Wisuwat Songnuan, Chief Strategy Officer (CSO)	17 Nov
11	Wavemaker Impact	a climate tech venture builder based in Southeast Asia. It focuses on co-founding sustainable businesses with the goal of reducing global carbon emissions by 10% by 203512. They aim to achieve this by partnering with proven entrepreneurs to create high-growth, scalable companies that address major sources of emissions, such as agriculture, energy, and industrial processes	Chatchanart Jiratornsirikul, Founder in Residence	17 Oct
12	CHOSEN Digital	EV and Energy Modernization Platform Software	Worapoj Ruenrerngwong Founder and CEO	31 Oct
13	GideonOne	A leading provider of artificial intelligence (AI)-powered customer experience solutions, including Zplify Emission Management Platform, Carbon Credit Trading Platform and Gideon Energy Trading Platform	Krittanan Auamkul, Chief Operating Officer	11 Nov
14	Full Circle Biotechnology	Biotech novel feed startup that takes food and agricultural waste products and treats them with insects and microbes, which results in a highly nutritious animal feed ingredient.	Felix Collins, Founder & MD	8 Nov
Investors/Supporters				
1	Beacon Venture Capital	a wholly-owned corporate venture capital fund of Kasikornbank, which has the highest mobile penetration and largest SME base. Beacon VC focuses on	Woraphot Kingkawkantong, Head of Investment and K.Krongkamol deLeon,	22 Oct

		strategic investments in early to growth-stage technology startups covering not only fintech, but also consumer internet and enterprise technology. In 2022, Beacon VC expanded its fund size to USD 255 million.	Senior Investment Manager	
2	KBank	a leading Thai commercial bank committed to sustainable finance, offering green loans and supporting environmental projects	Sompop Santiwatanakul, First Vice President - Corporate Strategy & Innovation, KBank, and Thai Climate Business Network (ThaiCBN)	30 Oct
3	The Atlas Capital the first climate adaptation VC fund	the first climate adaptation VC fund & community builder in Southeast Asia focused on the built environment that will help adapt our industrial value chain & cities to climate risk	Djoann Fal, Founder,	4 Nov
4	New Energy Nexus	a global non-profit organization dedicated to accelerating the transition to clean energy. They provide funding, accelerators, training, and networks to support clean energy entrepreneurs worldwide.	Jirapat Horesaengchai, Thailand Country Manager	7 Oct
5	GreenRocketVC	a venture capital firm focused on supporting and accelerating the growth of green technology startups. They offer a range of programs and services designed to help startups, SMEs, and corporations develop sustainable solutions and scale their businesses globally.	Bobby Mahasith, CEO and Founder	7 Oct
6	Second Muse	an impact and innovation company that collaborates with communities to address complex global challenges, focusing on climate, equity, and technology. They believe in building resilient economies where all people and communities can thrive, contribute, and recover quickly from hardships	Pakpoom Tanthaprabha, Program Consultant - Circularity	6 Nov
7	Seedefy	Investment platform for pre-vetted startups in emerging markets	Meeran Malik, Founder & Chief Executive Officer	21 Oct
8	Innopower	a joint venture between the Electricity Generating Authority of Thailand (EGAT), RATCH Group Public Company Limited, and The Electricity Generating Public Company Limited (EGCO). Innopower stands as a prominent pioneer of decarbonization, energy innovation, and emerging green technologies	Om Kaosa-ard, Head of Venture Capital	4 Nov
9	ADB Ventures	the venture capital arm of the Asian Development Bank (ADB), established to support and scale up technology	Pang Thitirat Sittakaradej, Principal	28 Oct

		startups with a focus on climate and gender impact in emerging Asia.		
10	Radical Fund	an early-stage venture capital fund enabling an inclusive climate transition for a resilient Southeast Asia.	Paul Ark (Polapat Arkkrapridi), Venture Partner, Climate & ESG	30 Oct
11	Addventures	Corporate venturing arm of SCG	Chatiwat Lerdvongveerachai, Senior Investment Manager	27 Nov
12	BanpuNEXT	a leading Smart Energy Solutions provider in Asia Pacific	Kittipop Trisinsomboon, Corporate Venture Capital Associate	6 Nov
13	B.GRIMM Power	Thailand-based energy company that focuses on the development, financing, construction and operation of green-field power plants	Pakorn Thepparat, Head of System Planning and Energy Solution Business, Investment, Innovation and Sustainability	19 Nov
14	Techsauce	The Technology Ecosystem Builder, with the mission to drive Thailand to become the Tech Gateway of Southeast Asia	Oranuch Lerdsuwankij, Co-Founder and CEO	1 Nov
Public Sector				
1	Digital Economy Promotion Agency (DEPA) - Digital Startup Institute	DEPA, under the Ministry of Digital Economy and Society in Thailand, established the Digital Startup Institute to foster the growth of digital startups and drive the country's digital economy by developing the ecosystem, providing measures, facilities, infrastructure, networking, policy advocacy, and knowledge to support the growth of digital startups.	Warin Ratchananusorn, Vice President, Digital Startup Institute	31 Oct
2	National Innovation Agency (NIA)	a public organization under the Ministry of Higher Education, Science, Research, and Innovation. Established in 2003, NIA's mission is to support and develop Thailand's innovation system to promote economic restructuring and enhance competitiveness	Dr. Krithpaka Boonfueng, Executive Director	5 Nov
3	NSTDA	National Science and Technology Development Agency (NSTDA) is actively promoting climate-smart agriculture, developing biodegradable packaging from agricultural waste, advancing green hydrogen technology, and enhancing climate resilience in Thailand's food systems. These initiatives aim to increase productivity, reduce environmental impact, and support sustainable development through innovative and eco-friendly solutions.	Jitti Mungkalasiri CEO & Senior Researcher, Technology and Information Institute for Sustainable Development (TIIS) under National Metal and Materials Technology Center (MTEC) National Science and Technology Development Agency (NSTDA)	19 Nov
4	EGAT	The Electricity Generating Authority of Thailand (EGAT) is advancing climate technology to support Thailand's carbon	Warit Rattanachuen, Assistant Governor,	27 Nov

		neutrality goals through its "Triple S" strategy, which includes increasing renewable energy, enhancing grid modernization, and studying alternative fuels. EGAT also promotes green cooling technology with GIZ, develops hydro-floating solar hybrid projects with a target capacity of 5,325 MW by 2037, and explores carbon capture and storage (CCS) technologies to reduce emissions from power plants.	Project Management Office	
5	UNESCAP	The United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP) is actively involved in leveraging climate technology to enhance resilience and support sustainable development in the region. Key initiatives include: AI for Climate Adaptation: UNESCAP uses AI to improve risk modeling and climate adaptation strategies, particularly in data-scarce areas. The Asia Pacific Risk and Resilience Portal is one such tool that helps pinpoint vulnerable locations and develop impact scenarios. Digital Technologies: They promote the use of digital technologies and data management to support climate action, increase productivity, and enhance ICT connectivity. Carbon Neutrality Goals: UNESCAP collaborates with countries in the Asia-Pacific region to share policy practices and explore cooperation for achieving their carbon commitments. Urban Climate Action: They focus on integrating climate-sensitive urban planning and sustainable practices in cities to accelerate national commitments to climate goals.	Mr. Veerawin Su, Associate Economics Affairs Officer, Financing for Development Section, UN Economic and Social Commission for Asia and the Pacific (ESCAP)	25 Nov
6	KX Knowledge Xchange	KX Knowledge Xchange is a platform that fosters innovation and entrepreneurship in climate tech by connecting universities, startups, and SMEs. It facilitates research collaboration, technology transfer, startup support, ecosystem development, education, and policy advocacy, driving the development and commercialization of innovative climate solutions.	Dr. Keita Ono, Senior VP for Innovation and Business Ecosystem Development	21 Oct
7	Mahidol University Institute for Technology and Innovation Management (iNT)	While iNT may not have a dedicated climate tech program, its expertise in technology management and innovation can make a valuable contribution to the field. By providing guidance on technology assessment, innovation management, policy analysis, and	Nantikarn Seedavong, Entrepreneurial Ecosystem Officer	5 Nov

		education, ITIM can help drive the development and adoption of climate tech solutions.		
Stakeholder Consultations (via email, conversations, seminars, etc.)				
1	Carbonwize	Decarbonization platform, carbon data and intelligence company	Natalie Lerthatasilp, CEO	13 Nov
2	City University, Hong Kong/DDI Lab	Data-Driven Innovation Lab (DDI Lab), fuses design science, system science and artificial intelligence with domain expertise to develop DDI ontologies, methods and tools.	Jianxi Luo, Professor; Angel Investor; Founder/Director of Data-Driven Innovation Lab; Associate Editor, Journal of Artificial Intelligence for Engineering Design Analysis and Manufacturing	7 Oct
3	Innovation Leverage/Pilot Lite	Venture management partner for corporates in the CPG, food & beverage, and consumer healthcare industries to identify, de-risk, validate and launch early-stage technologies and new ventures across developed and emerging channels and markets	Joel Nelson, Founder and CEO, Innovation Leverage, LLC, Executive Partner, Pilot Lite	17 Oct
4	Xponential/ Pivot Digital/ Alpha Founders Capital	Xponential is a subsidiary of Siam Piwat Group, in partnership with Pivot Digital, a boutique advisory firm specializing in retail and fintech. The firm provides digital strategy, customer experience, and emerging technology consulting services.	Axel Winter, CEO, Xponential; Director, Pivot Digital; Partner, Alpha Founders Capital,	15 Oct
5	Wavemaker Impact	A climate tech VC studio	Steve Melhuish, Co-Founder	7 Oct
6	DDX	Smart City engineering and project management consultancy	Gareth Davies, Partner & CTO,	25 Oct
7	Eigen Energy Thailand Co. Ltd.	A systems integrator specializing in renewable energy solutions, offering a range of services including solar photovoltaic (PV) systems, battery energy storage systems (BESS), and electric vehicle (EV) charging infrastructure	Geraldina Koh, Country Manager	18 Oct
8	Social Enterprise Thailand	A key organization dedicated to promoting and supporting social enterprises in Thailand	Nattakorn Asunee Na Ayudhaya, General Manager	25 Oct
9	Seedefy	Investment platform for pre-vetted startups in emerging markets	Rashedun Nabi, Ecosystem Developer	21 Oct

Notable Quotations:

1. What are the major challenges and opportunities for a climate tech startup in Thailand?

"The theory of change in Thailand is not clear and everyone works in silos."

"Founders really need to understand the climate problem they really want to solve and see where the opportunity is. You need to obtain certifications, standards, build a track record and credibility. You need deep knowledge in the tech that comes from research labs and you need to put time in to be an expert on it. If Thailand doesn't build this capacity, we will have to buy technology from foreigners forever."

"There are a lot of things to do on the scientific research side to make better products and services for people and the environment. When we don't do this, then profits just go to the companies and the waste from unsustainable products and services just become a problem for society."

"The prevailing Thai mindset does not intrinsically embrace the concept of 'thinking big' in terms of ambitious growth strategies"

"Biotech is perceived as low tech. Thailand has low bio-literacy due to separating education into science and arts tracks. If you don't choose the science track, you won't know much about science at all. This leads to executive change makers who have low bio-literacy so there is bias in climate solutions to be chemical based. Biotech is often perceived as just gene editing, etc. AI may be a hype but it is an 'elephant war' (for the big players to battle in), so it's not worthwhile for Thailand to compete in. For Thailand, we have a great biotech potential. We just need investment and bio-literacy. We need capital for biotech opportunities."

"What people really want are 1) education 2) the feeling of being a part of a bigger group that is changing the world."

2. How does a climate tech startup access funding in Thailand or abroad?

"In the past six years, the Thai public sector has spent THB 2 billion on fostering startups but we don't have many prominent startups, only maybe 2 unicorns: Flash and Wongnai. Half of the budget was spent on event organization."

"Thai investors just want quick wins. We need investors to develop a long-term view and investment in climate tech startups."

"Impact investment is not on the Thai investors' agenda yet. They focus on quick returns, not impact. Banks need to give loans to businesses that reduce carbon."

"Successful startups usually work together to be more powerful together. If capital is so limited, then everyone feels like they're trying to survive and don't share information. In the US, there is so much capital and people look to collaborate. It's ok to talk, there is success for everyone because sustainability is huge. We just need to organize."

“Thai corporates will support Thai startups only after they succeed abroad. It’s a reality that I wished wasn’t the truth.”

“Sometimes NIA and DEPA don’t know which startups in their database are climate tech.”

"Thais need to transform from being historically and culturally-minded as traders to innovators. Thus, we need real investment for climate innovation"

3. How to foster a more robust innovation ecosystem in the Thai climate tech sector?

““As opposed to a regulatory push, the Thai carbon market needs to be driven by Public-Private-Partnership (PPP) in order to have better uptake.”

“I think there are still no foreigners sitting on the Committee of the Thai Startup Association. In terms of fostering climate tech, we really need international experts for R&D, incubation, mentoring, tech transfer, etc. to build the Thai capacity for the long term. Thai people are very talented and Thai ideas can go global, we just need to build a stronger climate tech ecosystem to unleash Thai potential.”

“Why is there so much innovation happening in the US and China? It really starts with education in STEM. It’s not an accident. People want to go to the Silicon Valley and be around people who want to build things. So the Thai government could invest THB 3-5 billion to build a technology focus. The key is that you send a signal to the world that you are committed to build this tech startup ecosystem. Show that we’re going bring smart people together to build things. It is beyond organizing events where you just listen to lectures.”

“We need a sustainability/innovation forum that is not sponsored by a corporation as a corporate showcase. It needs to be focused on innovation and exchange. For example, within the Singapore fintech forum, there is an insights forum, closed room sessions, and business matching. This is missing in all the sustainability and climate-related conferences in Thailand. We need people to have a place to share their experiences, and space for innovators. In Thailand, the government agencies focus on supporting mainly the R&D stage, but not beyond. There is not enough support for the growth stage of startups.”

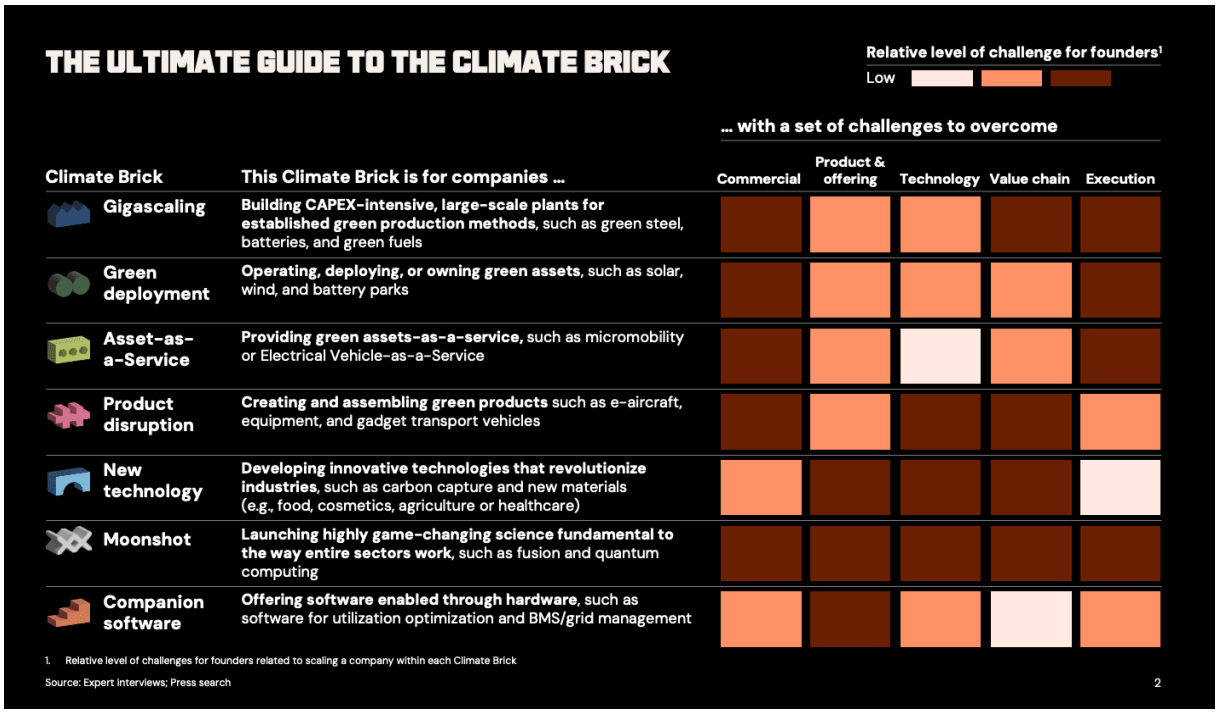
“A one-on-one conversation between a startup and an investor is the most valuable e.g. 35 minutes at Indonesia’s Nexticorn/Nexthub in Bali. Thailand should also have sufficient time for startups to talk to investors like this.”

“Rather than a private sector-led event, there would be no conflict of interest if the Thai public sector organizes an innovation/sustainability event with business matching and one-on-one conversations between startups and investors.”

II. Climate Bricks

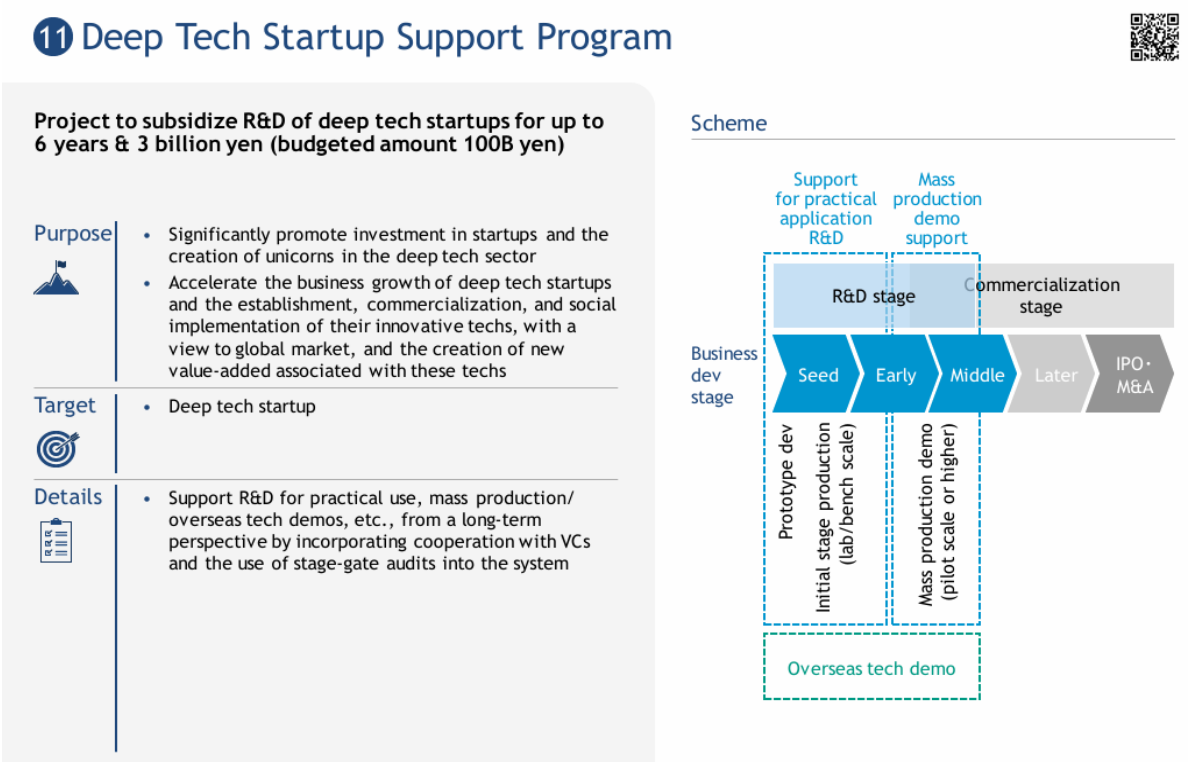
McKinsey & Company came up with “the missing manual for scaling up climate tech” with the rationale that although the technologies which could solve the climate crisis are already available today, to make them mature and cost-efficient, we need to fast-track their journey to scale and align the stakeholders needed along the journey. Although the study is about European climate tech companies, the following chart may be a good reference for climate tech startups and key stakeholders in the Thai startup ecosystem in terms of the concept of alignment, funding stages, tech development, and sustainable growth.

The study documented the scaling and fundraising journeys of mapping more than 3,000 companies in total, conducted more than 100 interviews with stakeholders along the journey, ranging from founders and investors, to off-takers and policymakers. The climate bricks are designed to accelerate 7 distinct climate tech journeys. The following chart maps out the level of challenge for a climate tech founder in each of the journeys.



Source: https://climatebrick.com/our-approach

III. Japan's Support Measures for Startup Ecosystem and Climate Tech Startups



Source: METI, Japan Startup Ecosystem June 2024

IV. Climate Tech-Related Events in Thailand

Networking at industry events, conferences, and trade shows is a great way for startups to build connections. Some prominent events in Thailand include:

- **EARTH JUMP:** An annual forum by KASIKORNBANK with a focus on addressing climate change by equipping Thai businesses with the knowledge and tools necessary to navigate the challenges. By fostering discussions on national and international regulations, financial support mechanisms, and sharing success stories, the event facilitates a collective movement toward sustainability.

- **Techsauce Global Summit:** A significant tech event in Southeast Asia, taking place in the heart of Bangkok. It serves as a pivotal gathering point for the tech community, bringing together individuals from various sectors to network and forge business opportunities. Under the mission to establish Thailand as the Digital Gateway of Southeast Asia.
- **ASEAN Sustainable Energy Week (ASEW)**: A leading exhibition and conference focused on sustainable energy solutions and technologies in Asia. The event typically features a wide range of exhibitors from the energy sector, including renewable energy companies, energy storage and efficiency solutions providers, and related industries.

- **Future Energy Asia (FEA)**: Hosted by the Ministry of Energy, it is Asia's most comprehensive energy exhibition and conference that blends pragmatic energy solutions with cutting-edge technologies to power the global energy landscape.
- **Thailand Climate Action Conference: TCAC**: Organized by the Ministry of Natural Resources and Environment, TCAC is an annual event on accelerating the climate transition
- **SETA and Solar + Storage Asia:** The largest solar exhibition in Thailand and ASEAN. If your startup focuses on solar energy or renewable technologies, this conference is an excellent place to network with industry professionals, government representatives, and potential partners.

- **Startup X Innovation Thailand Expo (SITE):** Part of the MHESI Fair, SITE is organized by NIA to showcase the latest innovations and startups in Thailand. The expo aims to foster growth and sustainability through innovation, and includes workshops and forums, business matching, Prime Minister Award, and marketplace for startups to showcase their products and services.

V. Thai Climate Tech Startups

1. **Agri-Food Tech**
   - 1.1 Advanced GreenFarm (FLO Wolffia) - A research-driven startup focused on sustainable cultivation of Wolffia, the world's smallest and fastest-growing flowering plant. Wolffia, also known as watermeal, is a nutrient-dense superfood packed with high-quality protein, essential vitamins, and minerals
   - 1.2 Distar Fresh - Medical grade and beyond organic superfood farm with subscription delivery service
   - 1.3 Full Circle Biotech - Biotech novel feed startup that takes food and agricultural waste products and treats them with insects and microbes, which results in a highly nutritious animal feed ingredient.
   - 1.4 HydroNeo - Providing IoT-based Smart Farm Management Systems for shrimp farms, leading to higher productivity, energy efficiency, and lower costs from water monitoring and automation systems
   - 1.5 ListenField - AgriTech startup created by academic researchers that specializes in the gathering, processing, and analysis of multilayer data. We provide insightful information to agro professionals, allowing them to make better decisions to optimize their production capabilities
   - 1.6 Ricult - A venture-backed social enterprise that leverages machine learning and satellite imagery to help farmers in Thailand and Pakistan increase farm productivity and access affordable loan
   - 1.7 Thai Carbon - Commercial producer of advanced bio-based materials derived from biochar for industrial applications, including carbon storage
   - 1.8 UniFAHS - a biotech startup that focuses on sustainable agriculture and food safety through the use of bacteriophage technology. Their innovative approach helps combat antimicrobial resistance and promotes climate-friendly agricultural practices, which can contribute to reducing greenhouse gas emissions

1.9 Wongphai - Converts agricultural waste into biochar to improve soil health and resilience, and also capture and store carbon

2. Energy Management

2.1 Alto Tech - Smart solutions for efficient building operations for air, water, and energy

2.2 PAC Corporation - Innovative technologies for energy-saving water heaters and air conditioners

2.3 TIE Smart Solutions - Automated Fault Diagnostics and optimization system control for energy savings based analytical AI Energy Platform and IoT solutions in all building types and factories

2.4 Nano Coating Tech - Deeptech startup providing innovative nano-coating solutions for various industries, enhancing the performance and durability of materials, which can lead to reduced energy consumption and lower environmental impact

3. Carbon Accounting, Environmental Data, and Climate Analytics

3.1 Carbonwize - Decarbonization platform, carbon data, and intelligence company

3.2 GideonOne - AI-powered customer experience solutions, including Zplify Emission Management Platform, Carbon Credit Trading Platform and Gideon Energy Trading Platform

3.3 Varuna (Thailand) Co., Ltd. - Combines satellite data and drone imagery with AI through the "Varuna Analytics" platform that addresses:

- Smart Forest: Green area management
- Smart Farm: Integrated intelligent farming management
- Service Matching: A service matching of agricultural drone pilots with farmers to increase production capacity with agricultural drones

3.4 Vekin - A decarbonization and carbon tokenization platform utilizing blockchain technology, artificial intelligence (AI), internet of things(IoT), and big data

4. Clean and Renewable Energy

4.1 Enapter - An energy technology company that specializes in producing modular electrolyzers for green hydrogen generation

4.2 ION Energy - A distributed renewable energy provider with advanced data analytics capability

5. Mobility and Transport

5.1 APX Solutions - a logistics technology startup that aims to reduce CO_2 emissions by eliminating wasteful journeys and optimising truck space utilisation.

5.2 CHOSEN Digital - EV and Energy Modernization Platform Software

5.3 ETRAN - Sustainable mobility solutions centered on public electric motorcycles

5.4 Evolt - Provider of EV charging solutions

5.5 Ginka EV - Provider of EV charging solutions

5.6 TOP Engineering Corporation - Tech provider of unmanned aerial vehicle (UAV) systems for aerial photography, geographical data, security and protection

5.7 Urban Mobility Tech (MuvMi) - An on-demand electric ridesharing service

6. Waste Management and Circular Economy

6.1 CIRAC - Turns aluminum laminated thermoplastic focusing on snack packaging into valuable products and materials

6.2 GEPP Sa-Ard - A platform that connects waste producers with waste collectors, using technology to optimize waste collection and recycling, contributing to reducing greenhouse gas emissions.

6.3 Get2Green - A circular economy platform for waste management

6.4 LightBlue Environmental Consulting - Agile tech solution for commercial kitchens to track and reduce food waste

6.5 Moreloop - One-stop service solution providing surplus fabric from garment factories to designers or SME clothing businesses at competitive prices

6.6 Nornnorn- Mattress subscription service, using research in polyurethane foam upcycling technology

6.7 PEEL Lab - Upcycling leftover food waste to create low-impact plant-based leather

6.8 Recyglo Thailand - Specializes in transforming food waste into high-quality compost and organic fertilizer that can be used to improve soil health and increase crop yield

6.9 UPCYDE - A biotech startup that upcycles agricultural and fruit wastes into usable products

7. Water Management and Conservation

7.1 Inno Green Tech - A Songkhla-based solid waste and wastewater company

8. Shopping and Lifestyle

8.1 Onela Market - Online marketplace dedicated to making affordable, high-quality food more accessible while helping to reduce food waste, working directly with farmers and food producers to obtain organic products to deliver them at up to 40% less than the food store.

8.2 Yindii - Food surplus app enabling retailers to sell their excess food to consumers at discounted rates

VI. Relevant Resources, Sources of Funding, Support Programs, and Startup Competitions

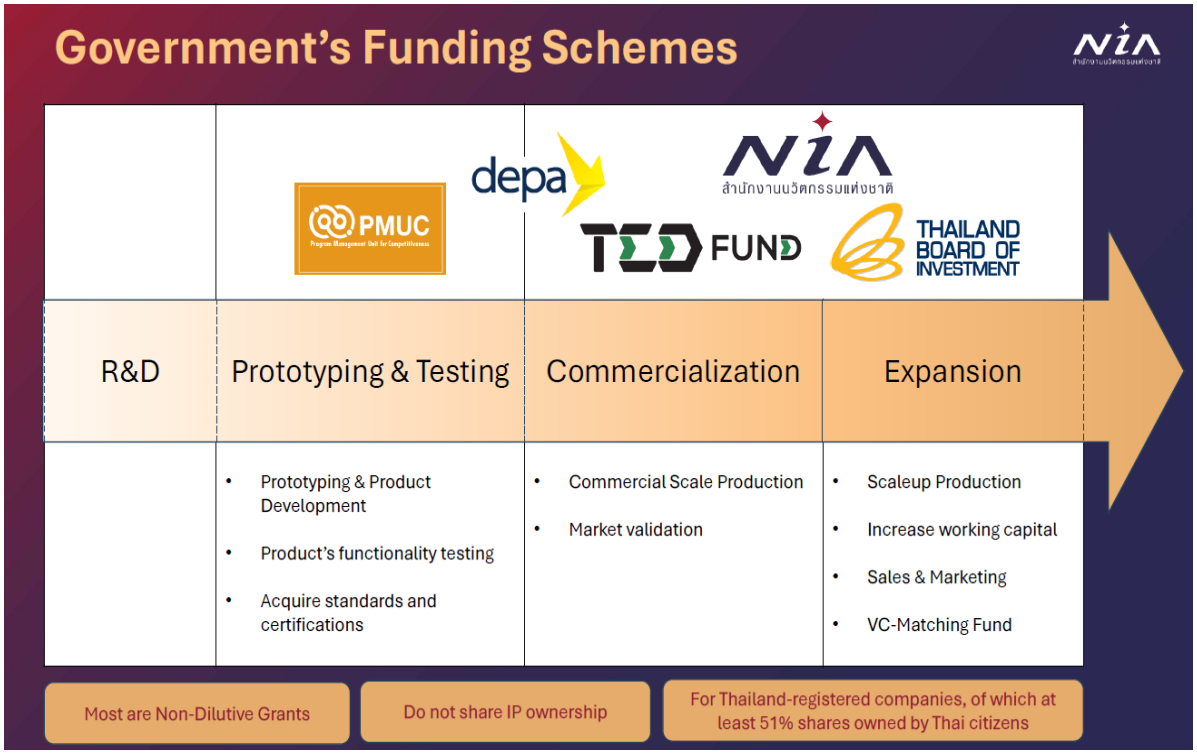
Online Resources	
Thai Startup Association (TSA)	Thai Startup – Thai Startup Association
Thai Startup Database	Home - Thai Startup Directory
Thailand Venture Capital Association (TVCA)	https://tvca.or.th/

True Digital Park (TDPK)	https://www.truedigitalpark.com
Innovation Club Thailand	https://innovationclubthailand.com
Climate Tech Club	https://techsauce.co/pr-news/climate-tech-club https://www.facebook.com/BeaconVenture
Carbon Markets Club Thailand	https://www.carbonmarketsclub.com
Thailand Climate Business Network (ThaiCBN)	https://www.facebook.com/ClimateFinanceNetworkThailand
Thailand CCUS Alliance	https://tcca.nstda.or.th/
Thailand CCUS Consortium	https://tinyurl.com/yc39psfm
Corporate Decarbonization Exchange (CDx)	Corporate Decarbonization Exchange 2024
Startup Funding in Thailand	
TED Fund	TED Fund
TED Youth Startup	https://tedfund.mhesi.go.th/index.php/join-proj/ted-fund-youth-startup
TED Market Scaling Up	https://tedfund.mhesi.go.th/index.php/join-proj/ted-market-scaling
TED Startups for Startups	https://tedfund.mhesi.go.th/index.php/join-proj/startups-for-startups
NIA Financial Support	https://www.nia.or.th/service/financial-support
NIA Mandatory Innovation	https://mandatory.nia.or.th
DEPA Digital Startup Fund	https://www.depa.or.th/th/digitalservice/digital-startup-fund
DIPROM x Delta Angel Fund	กิจกรรม: DIPROM x DELTA ANGEL FUND 2024
FTI Innovation One	FTI | INNOVATION ONE ตัวอย่างการกรอกใบสมัครโครงการกองทุนอินโนเวชั่นวัน.pdf
BOI Investment Promotion Guide	https://www.boi.go.th/un/guides
Shark Tank Thailand	Home - Shark Tank Thailand
Support Programs for Climate Tech Startups	
NIA Climate Tech Acceleration Program 2024	(1) [News Update] NIA... - NIA - National Innovation Agency Thailand | Facebook
DIPROM	https://diprom.go.th/#ServiceSction

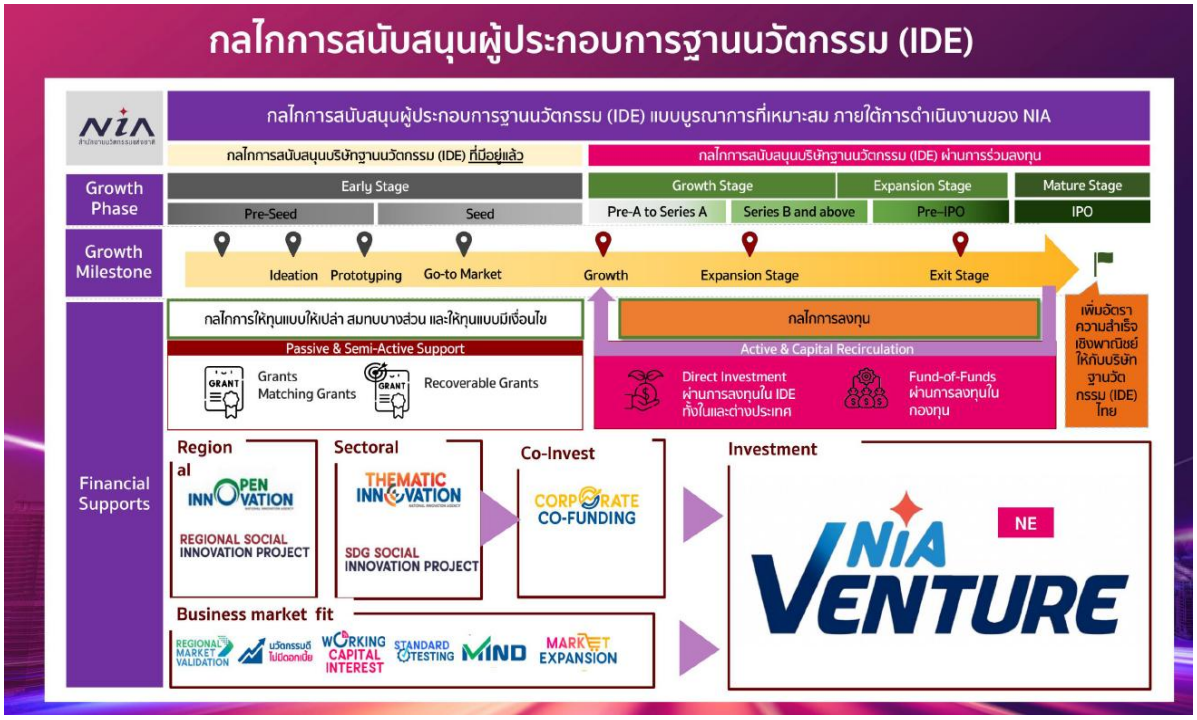
Startup Connect 2024	DIPROM NextGen Biz Facebook
New Energy Nexus	https://www.newenergynexus.com/for-entrepreneurs/
SEA Climate Pitches	Climate Tech Pitch - SEA
Wavemaker Impact	https://wavemakerimpact.com/
HK Science Park	Startup Support Programmes, Incubators and Accelerators - HKSTP
MATCH (Malaysia Technology Commercialisation platform) curated by MRANTI (Malaysian Research Accelerator for Technology and Innovation)	https://mranti.my/investors/commercialise
Startup SG	Startup SG Entrepass | Institute of Innovation & Entrepreneurship Startup SG - The Singapore Startup Ecosystem
UN Women Climate Tech Accelerator (She Loves Tech)	UN Women Climate Tech Accelerator
Techbite KX Innovation Center	Techbite for Startup – KX Knowledge Exchange
Startup Competitions and Events	
NIA Awards	หน้าหลัก
Bangkok Business Challenge	Home - Bangkok Business Challenge @ Sasin
Startup Wheel Vietnam	Introduction | Startup Wheel
Meet Taipei Startup Festival	https://meettaipei.tw/
JETRO Zest Thailand Fast Track Pitch Event	Zest Thailand/Thailand-Japan Fast Track Pitch Event 2025 | Topics - Thailand - JETRO

Snapshots from NIA Nurturing Innovation:

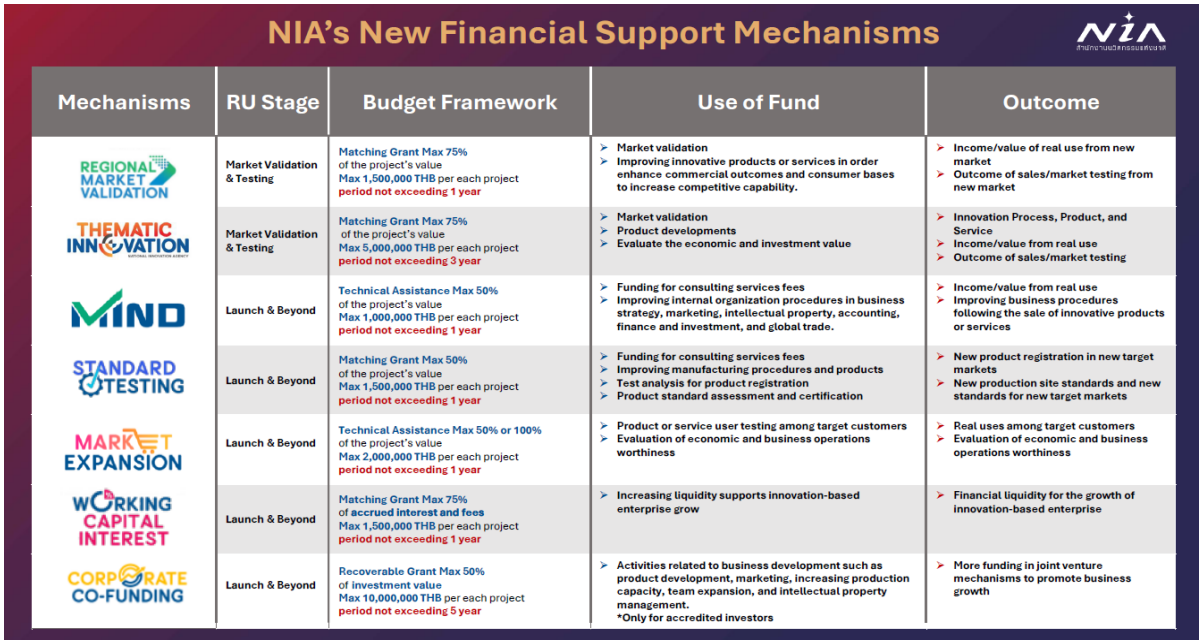
The Government's Role in Foodtech Startups - applicable to biotech startups



Innovation Driven Enterprise (IDE) Mechanism

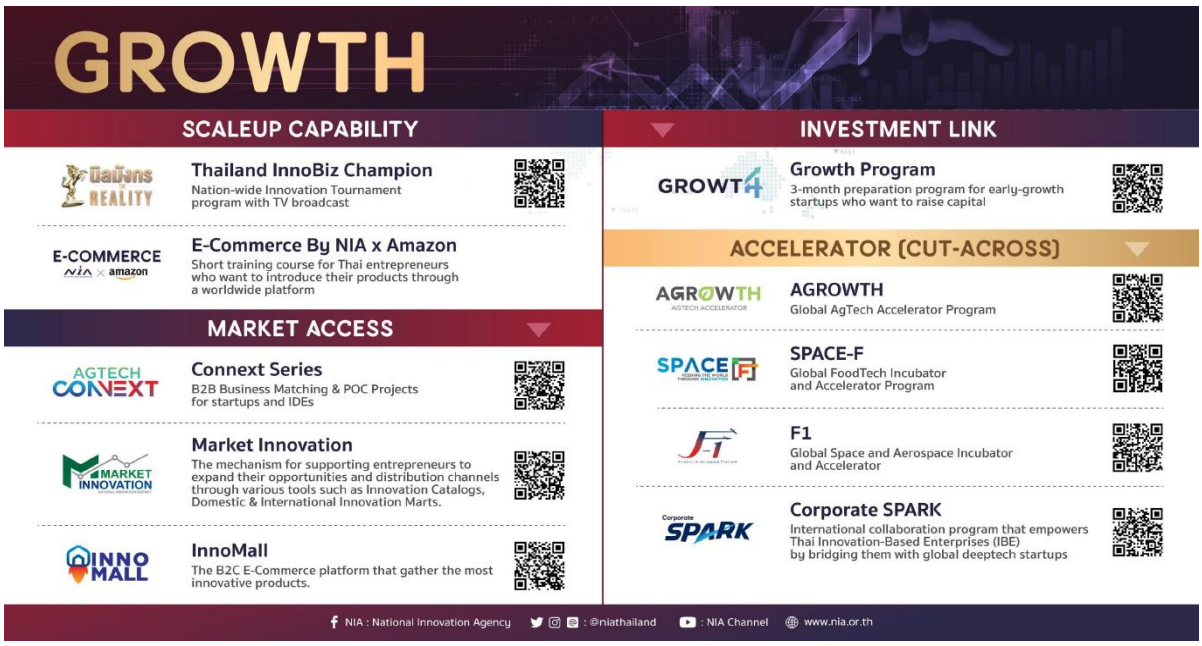


NIA's New Financial Support Mechanisms



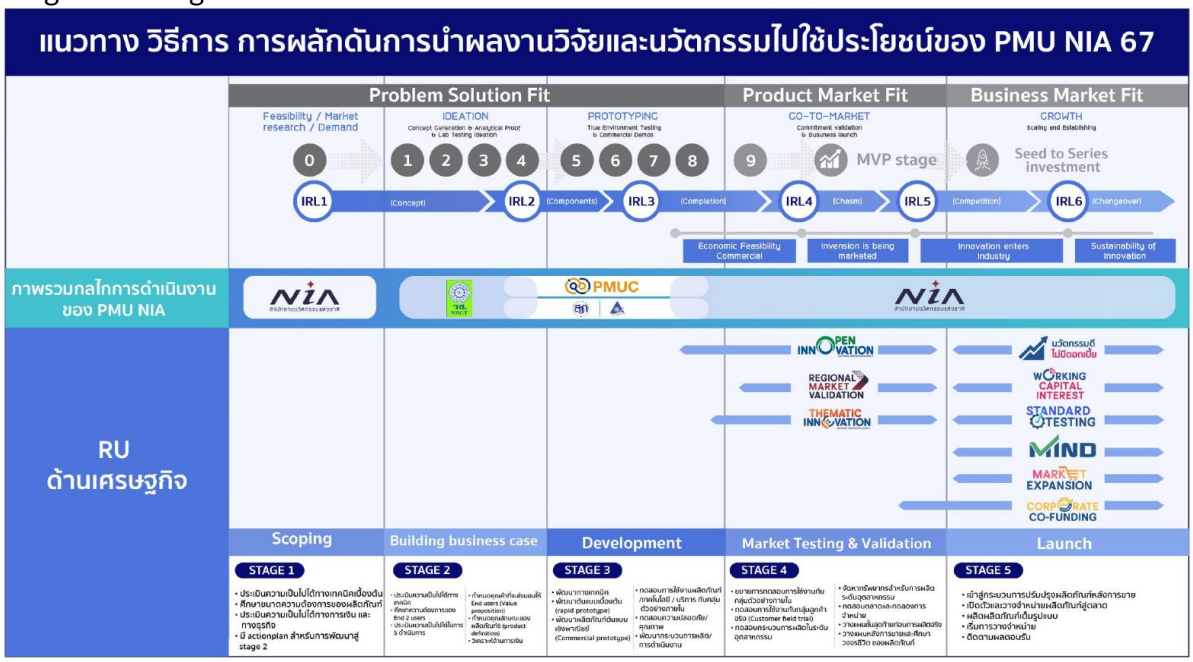
Mechanisms	RU Stage	Budget Framework	Use of Fund	Outcome
REGIONAL MARKET VALIDATION	Market Validation & Testing	Matching Grant Max 75% of the project's value Max 1,500,000 THB per each project period not exceeding 1 year	➢ Market validation ➢ Improving innovative products or services in order enhance commercial outcomes and consumer bases to increase competitive capability.	➢ Income/value of real use from new market ➢ Outcome of sales/market testing from new market
THEMATIC INNOVATION	Market Validation & Testing	Matching Grant Max 75% of the project's value Max 5,000,000 THB per each project period not exceeding 3 year	➢ Market validation ➢ Product developments ➢ Evaluate the economic and investment value	➢ Innovation Process, Product, and Service ➢ Income/value from real use ➢ Outcome of sales/market testing
MIND	Launch & Beyond	Technical Assistance Max 50% of the project's value Max 1,000,000 THB per each project period not exceeding 1 year	➢ Funding for consulting services fees ➢ Improving internal organization procedures in business strategy, marketing, intellectual property, accounting, finance and investment, and global trade.	➢ Income/value from real use ➢ Improving business procedures following the sale of innovative products or services
STANDARD TESTING	Launch & Beyond	Matching Grant Max 50% of the project's value Max 1,500,000 THB per each project period not exceeding 1 year	➢ Funding for consulting services fees ➢ Improving manufacturing procedures and products ➢ Test analysis for product registration ➢ Product standard assessment and certification	➢ New product registration in new target markets ➢ New production site standards and new standards for new target markets
MARKET EXPANSION	Launch & Beyond	Technical Assistance Max 50% or 100% of the project's value Max 2,000,000 THB per each project period not exceeding 1 year	➢ Product or service user testing among target customers ➢ Evaluation of economic and business operations worthiness	➢ Real uses among target customers ➢ Evaluation of economic and business operations worthiness
WORKING CAPITAL INTEREST	Launch & Beyond	Matching Grant Max 75% of accrued interest and fees Max 1,500,000 THB per each project period not exceeding 1 year	➢ Increasing liquidity supports innovation-based enterprise grow	➢ Financial liquidity for the growth of innovation-based enterprise
CORPORATE CO-FUNDING	Launch & Beyond	Recoverable Grant Max 50% of investment value Max 10,000,000 THB per each project period not exceeding 5 year	➢ Activities related to business development such as product development, marketing, increasing production capacity, team expansion, and intellectual property management. *Only for accredited investors	➢ More funding in joint venture mechanisms to promote business growth

NIA's 4G (Groom, Grant, Growth, Global)

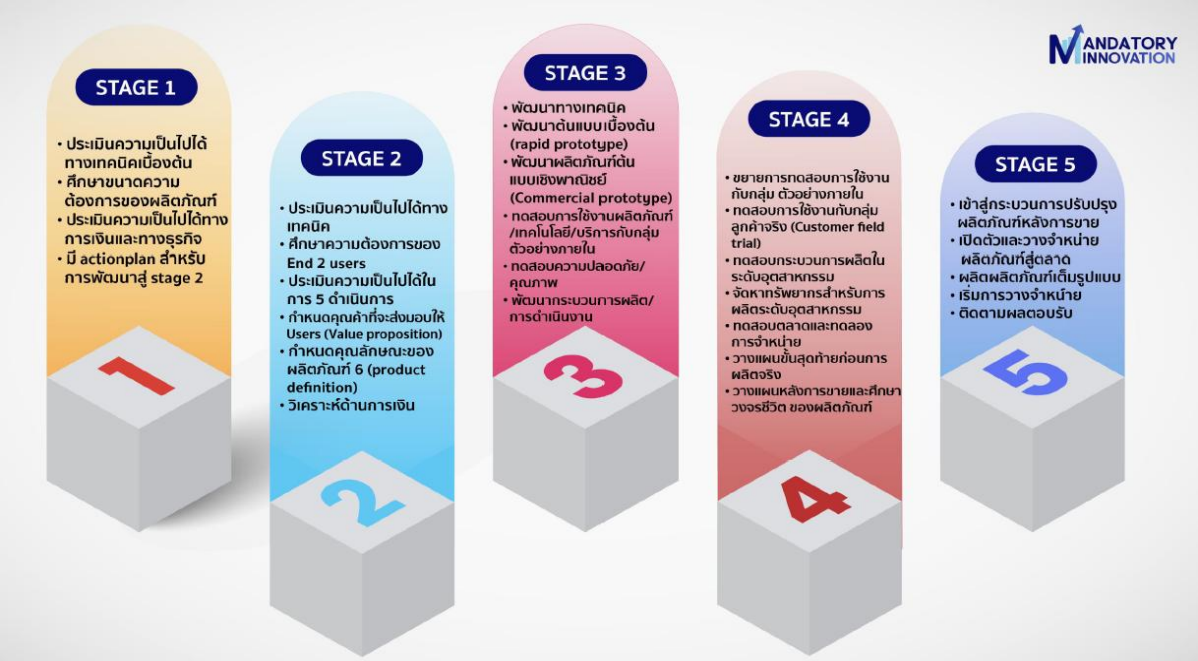


Snapshots from Mandatory Innovation 2024:

The Program Management Unit for Competitiveness (PMUC) Research Utilization Approach Program Management Unit NIA 2024



Research Utilization (RU) and Stages 1-5



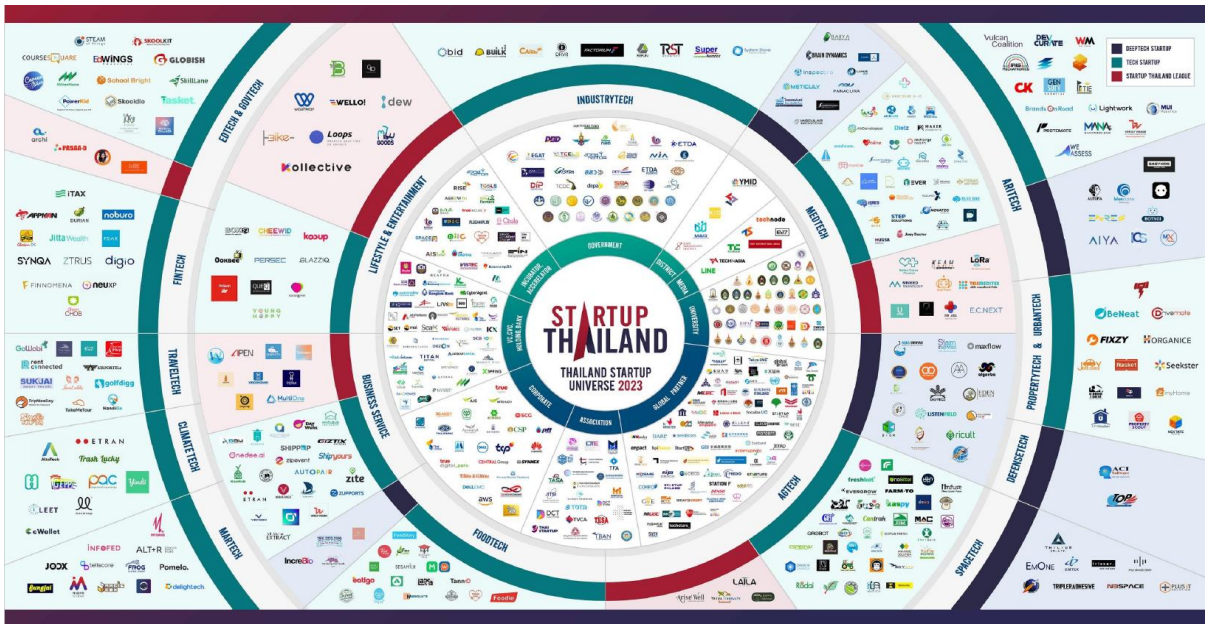
Mandatory Innovation Mechanisms

กลไกการสนับสนุน (Mechanisms)

MANDATORY INNOVATION

กลไก (Mechanisms)	ระยะโครงการที่สนับสนุน (Stage)	กรอบวงเงินที่สนับสนุน (Budget Framework)	หมวดค่าใช้จ่ายที่สนับสนุน (Use of Fund)	ธุรกิจนวัตกรรมเป้าหมาย (Focused Sectors)
THEMATIC INNOVATION กลไกการสนับสนุนทุนโครงการนวัตกรรมแบบมุ่งเป้า (Thematic Innovation)	STAGE 4 ทดสอบความเป็นไปได้ทางการตลาด (Market Validation & Testing)	• Matching Grant Max.75% ของมูลค่าโครงการ • Max. 5,000,000 บาท ต่อ คก. ในระยะเวลาไม่เกิน 3 ปี	การทดสอบตลาด การปรับปรุงผลิตภัณฑ์ การประเมินความคุ้มค่าทางเศรษฐศาสตร์ และการลงทุน	Food & Fruits, Agri Commodity, Circular Economy, Clean Energy, ARI Tech, EV
MIND กลไกการสนับสนุนที่ปรึกษาเพื่อพัฒนานวัตกรรม (MIND)	STAGE 5 การนำผลิตภัณฑ์หรือบริการเข้าสู่ตลาด (Launch & Beyond)	• Technical Assistance Max.50% ของมูลค่าโครงการ • Max. 1,000,000 บาท ต่อ คก. ในระยะเวลาไม่เกิน 1 ปี	การจ้างที่ปรึกษา การปรับปรุงกระบวนการดำเนินงานภายในองค์กรด้านกลยุทธ์ธุรกิจ การตลาด ทรัพย์สินทางปัญญา การบัญชี การเงินและการลงทุน การค้ระหว่างประเทศ	Food & Fruits, Agri Commodity, EV
STANDARD TESTING กลไกการสนับสนุนการพัฒนามาตรฐานสำหรับธุรกิจนวัตกรรม (Standard Testing)	STAGE 5 การนำผลิตภัณฑ์หรือบริการเข้าสู่ตลาด (Launch & Beyond)	• Matching Grant Max. 50% ของมูลค่าโครงการ • Max. 1,500,000 บาท ต่อ คก. ในระยะเวลาไม่เกิน 1 ปี	การจ้างที่ปรึกษา การปรับปรุงพัฒนากระบวนการผลิตและผลิตภัณฑ์ การวิเคราะห์ทดสอบเพื่อขอขึ้นทะเบียน การตรวจประเมินและขอรับรองมาตรฐาน	Food & Fruits, EV
MARKET EXPANSION กลไกการขยายธุรกิจนวัตกรรม (Market Expansion)	STAGE 5 การนำผลิตภัณฑ์หรือบริการเข้าสู่ตลาด (Launch & Beyond)	• Technical Assistance Max. 50% หรือ 100% ของมูลค่าโครงการ • Max. 2,000,000 บาท ต่อ คก. ในระยะเวลาไม่เกิน 1 ปี	การดำเนินงานทดสอบใช้งานในกลุ่มลูกค้าเป้าหมาย พร้อมกับการประเมินความคุ้มค่าทางเศรษฐศาสตร์และการดำเนินธุรกิจ	ARI Tech
WORKING CAPITAL INTEREST กลไกสนับสนุนดอกเบี้ยบางส่วนเพื่อเสริมสภาพคล่อง (Matching Interest for Working Capital)	STAGE 5 การนำผลิตภัณฑ์หรือบริการเข้าสู่ตลาด (Launch & Beyond)	• Matching Grant Max. 75% ของดอกเบี้ยและค่าธรรมเนียมที่เกิดขึ้น • Max. 1,500,000 บาท ต่อ คก. ในระยะเวลาไม่เกิน 1 ปี	การเพิ่มสภาพคล่องเพื่อการเติบโตของธุรกิจฐานนวัตกรรม	Food & Fruits, Circular Economy, Clean Energy, EV
CORPORATE CO-FUNDING กลไกการสนับสนุนผู้ประกอบธุรกิจเทคโนโลยีและนวัตกรรมให้มีโอกาสเติบโตและขยายตลาดโดยการร่วมมือจากแหล่งทุนภาครัฐและเอกชน (Corporate Co-funding)	STAGE 5 การนำผลิตภัณฑ์หรือบริการเข้าสู่ตลาด (Launch & Beyond)	• Recoverable Grant Max. 100% ของมูลค่าการลงทุน* • Max. 10,000,000 บาท ต่อ คก. ในระยะเวลาไม่เกิน 5 ปี	กิจกรรมเกี่ยวเนื่องกับการพัฒนาธุรกิจให้เติบโต เช่น การพัฒนาผลิตภัณฑ์ การตลาด การเพิ่มกำลังการผลิต การขยายกิจ การจัดการทรัพย์สินทางปัญญา *เฉพาะหน้าลงทุนที่ผ่านการรับรอง	Food & Fruits, ARI Tech
นวัตกรรมดี ไม่มีดอกเบี้ย กลไกนวัตกรรมดี.. ไม่มีดอกเบี้ย (Zero Loan Interest)	STAGE 5 การนำผลิตภัณฑ์หรือบริการเข้าสู่ตลาด (Launch & Beyond)	• Recoverable Grant Max. 100% ของ มูลค่าดอกเบี้ย • Max. 5,000,000 บาท ต่อ คก. ในระยะเวลาไม่เกิน 3 ปี	การขยายผลิตภัณฑ์หรือบริการสู่เชิงพาณิชย์	Food & Fruits, Circular Economy, Clean Energy, EV

VII. Thailand Startup Universe 2023 (from NIA)



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