Financing Climate Tech in India: Insights from a Dialogue with Entrepreneurs and Investors

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Introduction

India's ambitious climate commitments for 2030 and its Net-Zero target for 2070 signal a need for rapid decarbonisation and low-carbon economic growth. The transition to low-carbon technologies will require established industrial players as well as startups seeking to establish their niche in multiple climate tech sectors to adapt to the new green economy. However, the pace at which the climate tech ecosystem evolves will hinge on the ability of these new sectors to attract financing. India requires approximately US$2.5 trillion by 2030 to meet its nationally determined contributions (NDCs) and US$10.1 trillion to achieve net-zero emissions by 2070.[1] Meanwhile, India's current tracked green finance only represents around 25 percent of the total amount required across sectors just to meet the NDCs.[2,3]

Assessing Investments in the Climate Tech Venture Ecosystem

India has a vibrant climate tech ecosystem, with many startups looking to take advantage of the demand for green products and services. A number of prominent industrial players have also pledged substantial amounts towards climate tech investments.

In 2021, US$7 billion was raised by Indian climate tech startups through private market and venture funding.[4] Although a large part of this funding was allocated to two sub-sectors—energy management and electric vehicles—there are now newer sub-sectors that are gaining prominence in the early-stage venture space. These include alternative fuel technologies such as green hydrogen and biofuels, low-carbon biotech innovations within agriculture, material science, energy efficiency, recycling, carbon management, water tech, and property tech. In 2022, the amount of venture funding flowing to the agritech sector grew by 20 percent; the capital allocated to waste management and circularity solutions increased by 5X; and the total climate tech investment in 2022 was around US$22.5 billion.[5] Nevertheless, compared to other venture sectors, the climate tech startup ecosystem is still relatively nascent in India.

There is still a gap between the demand for climate tech investments and the availability of finance, resulting in limited investment opportunities and higher costs of capital. It is becoming increasingly important to connect investors with founders and industrial actors to identify and address regulatory and policy gaps that hinder the flow of green capital within India. Moreover, India's domestic financial systems must be reconfigured to promote a sustainable and environment-friendly economy.

The following paragraphs build on the themes that emerged during the Green Investment Dialogue in Mumbai, co-hosted by Observer Research Foundation, Theia Ventures, and MacArthur Foundation on 3 February 2023. The invigorating discussion between ~15 early-stage climate tech startups, ~10 investors, and ~5 intermediaries gave food for thought on the challenges faced in the development of this early ecosystem and suggestions to catalyse the right type of funding to ventures, while training the spotlight to undiscovered sub-sectors within climate tech in India.

1. Collaboration is key between multiple stakeholders to successfully foster the development of this nascent ecosystem.

With strong regulatory tailwinds now encouraging the growth of key climate sectors—for example, the National Hydrogen Mission, PLI schemes for various green technologies, the Battery Swapping Policy, and the overall green growth agenda in the Union Budget of FY23—the imperative is to systematically accelerate on-ground innovations in tandem with industry mandates and private capital providers' growing risk appetite.

In the last decade, climate tech was broadly defined under the umbrella of clean energy, with key stakeholders identified as the electric grid, discoms or utilities, panel manufacturers, utility-scale solar farms, financiers, and rooftop installers. As an industry, the solar industry has evolved through multiple iterations, with the high upfront capex costs now being offset by subsidies on an operational basis, bringing down the total cost of ownership associated with solar solutions. This has allowed for much faster adoption, particularly in the residential segment.

In a similar vein, independent power producers[a] have gained prominence as viable options to the existing, coal-fired electricity grid, while large corporations[b] have forayed into greener fuels for power generation. In addition, several privatisation and delicensing measures to encourage

a Examples are ReNew Power and Azure Power.
b Such as Reliance and Adani.

external liquidity into the power sector—such as the formation of the Real-Time Energy Market and the Green Term Ahead Market—have also spurred excitement for cleaner, more efficient power distribution and access to clean energy for the last mile. Finally, both venture capital and private equity funders are seeing growth opportunities in solar energy infrastructure projects, while solar startups are rapidly innovating on technologies such as generative artificial intelligence and machine learning for the predictive maintenance of solar panel assets.

The above example illustrates how one sub-sector within climate tech has come a long way in developing collaborative mechanisms for interdependent partnerships and allowing an ecosystem to develop with fewer silos. However, the journey has been long and not without impediments. A similar evolution in electric mobility is also emerging, where a few stakeholders are beginning to forge together to accelerate the development of the sub-sector at a faster pace than in solar. For example, the central government has mandated commercial fleets to transition to electric by 2030 and subsidies on lithium-ion cells and FAME II[c] regulation have had a significant impact on reducing total cost of ownership compared to traditional ICE (fuel-powered) vehicles. Legacy manufacturers have now also seen large market opportunities in transitioning to electric (particular for two- and three-wheeler vehicles), and infrastructure providers such as Sun Mobility and Tata Power have set ambitious goals for developing charging stations across the country. Finally, startups are innovating and attracting venture funding across all parts of the EV spectrum, such as battery chemistry, ride sharing, battery swapping, financing and software analytics.

c The Faster Adoption and Manufacturing of Electric Vehicles (FAME-II) scheme is administered by the Ministry of Heavy Industries under the National Electric Mobility Mission with the aim to encourage electric and hybrid vehicle purchase by providing financial support.

What now remains is the catalysing of other sub-sectors within climate tech, such as recycling and circular economy, energy efficiency and cooling, material science, water tech, and biotech, with the same collaborative action between stakeholders such as industry, startups, university labs, and the government. At present, many of the above climate tech sub-sectors are growing in a disaggregated manner and there is need for greater alignment to democratise startup access to capital, offer clarity for industries to have visibility to science-led start-ups to whom they can offer pilots, and create awareness to encourage technology adoption. For instance, long-term, broad-vision white papers could help in this alignment and bridge the silos that inevitably arise when on-ground innovation, academic lab incentives, policy intervention, and corporate mandates are yet to operate in sync towards a common goal.

2. Climate technologies are closely interlinked to R&D and hardware, requiring a deep tech venture investing lens.

For startups to build climate technologies that will fundamentally contribute to decarbonisation and replace existing products in the value chain with bio-based or climate-positive products, there needs to be active support in bringing R&D innovation and hardware lab-scale startups to the market rapidly. It is highly capital-intensive to demonstrate a Proof of Concept (PoC) in the hardware space, even using a disruptive technology. Therefore, a startup needs access to large-scale and long-term capital to prove these technologies to a point of maturity that it can be adopted at scale. As non-deep tech venture investors often refrain from underwriting early hardware technology risk, there needs to be access to large enough pools of philanthropic capital or large-ticket government grants to fund and actively nurture these technologies to a growth scale.

Moreover, early collaboration needs to occur between startups and relevant manufacturing industries, so that the latter stakeholder group is willing to integrate newer, cutting-edge technologies that are built within Indian labs as opposed to foreign technology interventions. While there are many labs enthusiastically incubating startups across universities in India, there are varying degrees of quality, and it is challenging for industries to judge which companies

would make the best technology partners. Therefore, support mechanisms employed by the government need to be streamlined and replicated across university labs; lab facilities need to be enhanced for prototyping to occur; academics need to be incentivised to turn research projects into ventures; and startups should avoid early death at the lab stage.

One example of an industry that would benefit from streamlined funding support at the lab scale is material science, specifically for batteries, alternative hydrogen fuel cells, urban mining, industrial biotechnology, and synthetic biology. With regard to batteries, for India to meet its goal of 500 GW of clean energy installed by 2030, at least 100 GW needs to be from battery-storage systems that are weather-resistant and survive as long as solar and wind technologies.

Another example of a sub-sector that could benefit from lab ramp-up is agriculture, specifically nature-based solutions to manage soil carbon at the farm level. Agriculture as a sector contributes to 14 percent of global emissions, and when factoring in forestry and livestock, this amounts to almost 24 percent of global emissions.[6] India is uniquely placed as the country with the second-largest cultivable land at 18 million hectares (second only to the United States).[7] If the right technological tools are utilised, increased soil organic carbon can lead to agricultural land becoming a carbon sink and significantly reducing carbon emissions through sequestration. The fundamentals of this technology are governed by science-based experiments which should ideally be conducted by labs to generate enough data sets for credible modelling (through soil sample collection). This can eventually translate to high-quality offsets for carbon buyers and capabilities for farmers to fully transition to regenerative agriculture practices.

To facilitate this wide-scale support, there is need for diverse types of financing, including but not limited to blended finance, advanced carbon mechanisms, and development bonds.

3. Venture funding for early-stage climate tech is available, but challenges remain in securing late-stage capital, directing it to the appropriate players, and expanding access to alternative asset classes.

To achieve its desired effect, the climate finance gap in India needs to be solved at three levels: i) venture equity funding for early-stage startups, which helps address operational expenditures but poses challenges to access beyond the first few rounds; ii) debt funding in the form of asset financing for these climate tech businesses, being largely hardware-driven and asset-heavy; and iii) blended finance through philanthropic capital and multilateral development banks (MDBs) to address the US$80 billion climate finance gap (US$100 billion is needed, of which only US$20 billion came in over the last year).

Within the venture equity bucket in particular, there is a paucity of capital in India for post Series A or B for climate tech startups. Traditional VCs are accustomed to asset-light investing, where scale-up takes place rapidly across software platforms or marketplace B2C models. In the climate tech space, the nature of business models is typically in the form of B2B, where scale-up may take longer, with industry customers having long sales cycles, and there is often a lack of skillsets on the part of these venture investors to understand these deep tech technologies. In order to really evangelise these technologies, there needs to be a 'roadshow of Indian technology', where innovations are showcased globally and further global capital can be funnelled into Indian startups.

Moreover, there are several tools in the broader economy that can be applied to climate finance beyond venture equity—for example, adoption of crop insurance within agriculture and securitisation pools in distributed renewable assets. The process to apply for government grants (including through 'Startup India') can also be facilitated to allow for easier access and discovery. Similarly, for startups to avail pools of corporate CSR funding and other industry support, the process, eligibility, and criteria for these startups can be made more seamless.

Microfinance is an example of an industry that has mainstreamed wide funding access to startups operating in the sector in the mid-2000s in India and established itself as an asset class. By following this example, there are several ways in which climate finance can also be mainstreamed as an asset class: i) bring this asset class into Indian public sector banks' priority sector lending (PSL) allocations; ii) attract large grants from international foundations to be driven into Indian startups; iii) and catalyse instruments such as SDG impact bonds and other blended finance tools which can be listed on exchanges to further democratise funding access for startups.

4. An important step for building the ecosystem is in defining the taxonomy and international standards for investing in climate tech in India.

It is crucial to develop the right standards for the fast-evolving climate tech venture space in India, as the technologies are diverse and will involve varied forms of capital infusion, both domestic and global. Therefore, having the right types of disclosures for transparency will accelerate the path to international climate finance, both at the individual startup level and at the national level. The government therefore can make efforts towards investing in a taxonomy that is climate-friendly, standardised, and specific to the requirements of particular industries. Common tools include IoT for data capture and generative AI, the latter of which develops datasets that do not exist yet and bring in pattern recognition to help inform best practice at the industry level.

A successful example of a type of climate framework is the Taskforce on Nature-related Financial Disclosures (TNFD)— a new global initiative aiming to give financial institutions and companies a complete picture of their environmental risks. The focus is on delivering a framework for nature-related dependencies, impacts, risks, and opportunities, including climate, of their operations and across their value chain, including a consideration of the upstream (supply) and downstream (distribution and sale) value chains.

Conclusion

These are exciting times for the early-stage climate tech ecosystem in India, where much of the success depends on effective collaboration between key stakeholders; a greater risk appetite and knowledge base for venture investors to make bets on R&D and lab-based hardware tech (with vetting experts from academia to aid in the process); and a normalisation of climate finance taxonomy and disclosures to build it in the long term as a credible asset class for the future. Eventually, once industry has seen large-scale adoption, the next big transition will necessarily come from consumers, who will need additional incentives to fully commercialise and drive the country into mass-scale adoption of climate technologies.

Annexure

List of participants in Roundtable 1:

Name	Designation	Organisation
Priya Shah	General Partner	Theia Ventures
Suranjali Tandon	Assistant Professor	The National Institute of Public Finance and Policy
Dhanpal Jhaveri	Vice Chairman	Everstone Capital
Samir Shah	Managing Partner	Peak Ventures
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Tejas Kusurkar	Co-Founder	Offgrid Energy Labs
Simmi Sareen	Co-Founder	Climake
Lakshmi Santhanam	Co-Founder	Renkube
Starlene Sharma	Co-founder and Managing Partner	Green Artha
Mirik Gogri	Sustainability Investor	Family Office of Aarti Industries Promoters (Spectrum Impact)
Urvi Tembey	Associate Fellow	ORF
Promit Mookherjee	Associate Fellow	ORF
Madhur Jain	Co-founder and CEO	Varaha Ag
Sanchayan Chakraborty	Partner	Aavishkaar
Madhav Pai	Interim CEO	WRI India
Royston Braganza	Director	Grameen Capital
Chandru Badrinarayanan	COO	Blue Sky Analytics
Trupti Lahiri	Founding Director and Executive Chairman	Om Janah AI solutions(OJAS)
Lavanya Pawar	Co-Founder	Carboledger
Ankita Vijayvergiya	Co-Founder	Billion Carbon
Karuna Jain	Co-founder and Partner	Enzia Ventures
Anirudh Suri	Managing Partner	India Internet Fund
Ganesh Shankar	Founder	FluxGen
Ankit Mittal	Co-Founder and CEO	Sheru
Anirudh Gupta	Co-Founder	Climes
Arpit Agarwal	Director	Blume Ventures

Endnotes

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2 Economic Times, "BFSI Research," 2022

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Attribution: Priya Shah, Promit Mookherjee, and Urvi Tembey, *Financing Climate Tech in India: Insights from a Dialogue with Entrepreneurs and Investors*, June 2023, Observer Research Foundation.

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