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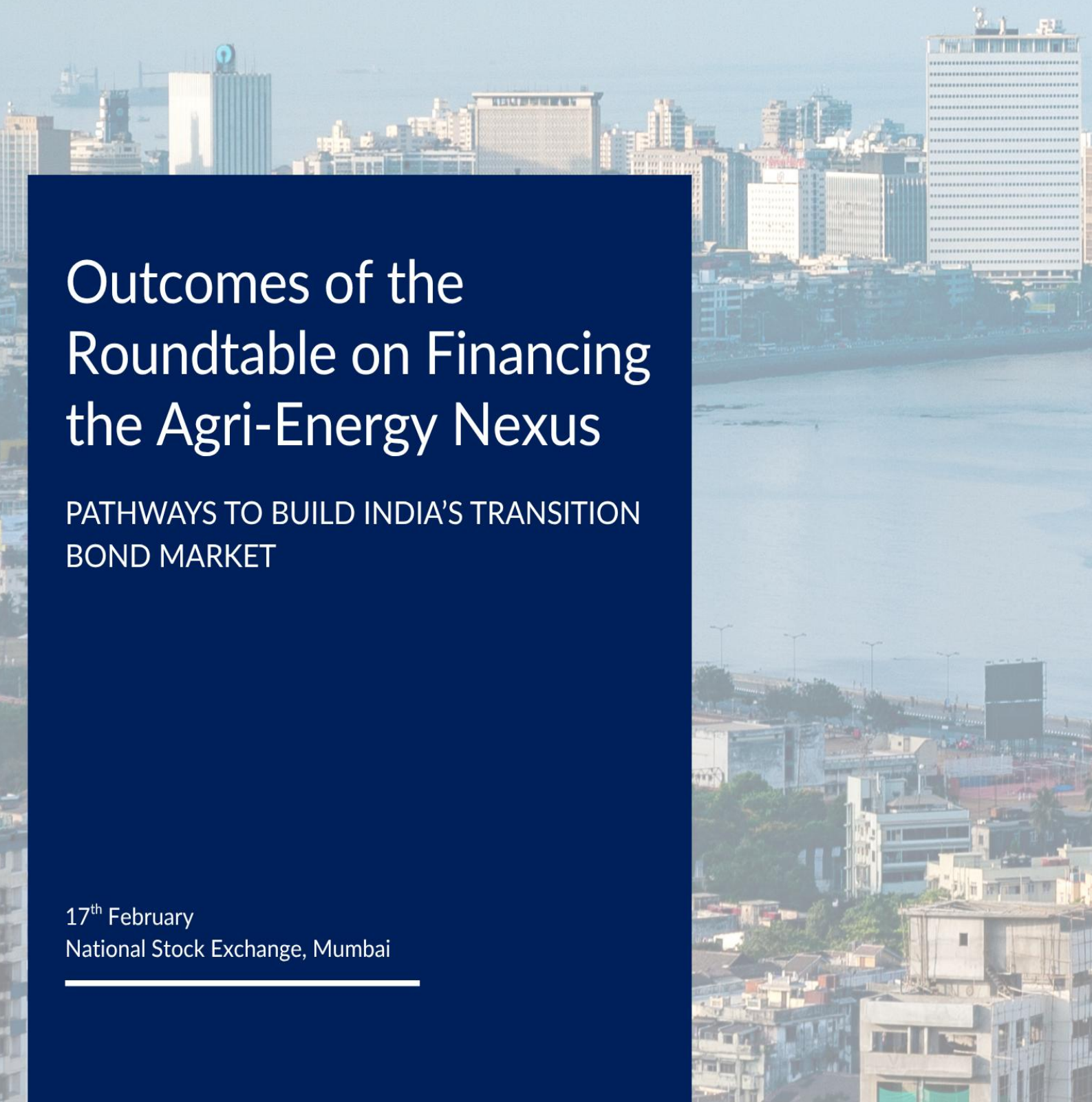

Outcomes of the Roundtable on Financing the Agri-Energy Nexus

PATHWAYS TO BUILD INDIA'S TRANSITION BOND MARKET

17th February
National Stock Exchange, Mumbai

Authors

Prepared by auctusESG

Namita Vikas, Founder & Managing Director, auctusESG
Smitha Hari, President, auctusESG
Cymroan Vikas, Senior Manager, auctusESG

Contributors

Anjali Sreeram, Manager, auctusESG
Lekhani Raja, Senior Associate, auctusESG

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Designer & illustrator

Cymroan Vikas, Senior Manager, auctusESG

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Executive summary

India's agri-energy nexus, the structural intersection of agricultural production, rural energy access, and climate transition, sits at the centre of the country's development and net-zero agenda. Agriculture contributes approximately 18% of gross value added and employs nearly 43% of the workforce, while the sector's dependence on subsidised grid power embeds both fiscal and emissions risk into the rural economy. Mobilising capital toward this nexus is therefore not only a climate priority but rather a macroeconomic imperative.

India's total climate investment requirement stands at US $22.7 trillion by 2070, with US $2.5 trillion needed by 2030. The vision for financing India's agri-energy transition toward 2047 is centred on a fundamental shift: moving away from a traditional reliance on public and concessional aid toward deep, commercial capital market integration. By transforming the agri-energy sector from a vulnerability hotspot into a driver of resilient growth, the vision seeks to align ground-level agricultural productivity with the sophisticated liquidity of global finance.

Yet the financial intermediaries best placed to channel capital into this sector, i.e., mid-sized non-banking financial companies (NBFCs) with deep rural reach and specialised agri-energy lending models remain excluded from the labelled transition bond markets that could enable them to deploy at scale. The key challenge is a lack of capital market readiness among the institutions that serve the real economy.

On February 18, 2026, the high-level roundtable titled "Financing the agri–energy nexus: Pathways to build India's transition bond market" was convened as a flagship event under the aegis of Mumbai Climate Week. Hosted by National Stock Exchange International Exchange (NSE IX) in partnership with auctusESG, Rabo Foundation, Shakti Sustainable Energy Foundation, and the Finance Industry Development Council (FIDC), the session addressed the critical need to integrate agriculture with renewable energy transitions to accelerate India's path to net-zero. The roundtable served as a strategic forum to move the discourse from "impact-aligned" pilot transactions to scaled, repeatable bond issuances, specifically targeting the "missing middle", i.e., mid-sized NBFCs that possess the last-mile reach but currently face structural barriers in the GSS+ bond market.

Three themes dominated the discussion. First, financing constraints: asset-liability mismatches between long-tenor agri-energy loans and short-term wholesale borrowings, the high fixed costs of green and transition bond certification, and currency hedging costs that can add 6-7% to the effective cost of international capital. Second, classification and disclosure barriers: the absence of a final, operational climate finance taxonomy for agri-linked transition assets in India, and the limited reach of existing disclosure frameworks such as SEBI's Business Responsibility and Sustainability Reporting (BRSR) requirements, which currently exclude most mid-sized and unlisted NBFCs. Third, an emerging opportunity; the IFSC ecosystem in GIFT City, through which NBFCs can access offshore institutional capital at significantly lower minimum issuance thresholds and within a domestically anchored regulatory framework, with NSE IX providing the exchange infrastructure for listing and secondary market activity.

To achieve this, the strategic focus needs to remain on bridging the missing middle of climate finance. By professionalising these intermediaries i.e., moving them from being impact lenders in practice to becoming credible, repeat issuers, India can ensure that capital flows to the decentralised, small-ticket assets that underpin rural livelihoods.

A structured market-development approach is therefore required to prepare these institutions for participation in labelled debt markets. This involves strengthening institutional investment readiness through the embedding of ESG governance practices, robust monitoring, reporting and verification (MRV) systems, and alignment with emerging climate taxonomies. In parallel, targeted support is needed on transaction structuring and market access, including mechanisms for asset aggregation, the use of blended finance structures, and solutions to manage foreign exchange risk in international capital mobilisation. Together, these interventions can help unlock a scalable pipeline of transition-labelled issuances from institutions that have historically remained outside capital markets.

Ultimately, the architecture for 2047 rests on creating a seamless gateway between domestic impact and international capital pools. Leveraging strategic platforms like GIFT City and NSE IX allows the market to bypass domestic fragmentation and access global ESG-mandated investors through a unified regulatory framework. By institutionalising aggregation and pooling mechanisms, the vision aims to demonstrate that highly fragmented, decentralised transition assets can be made globally bankable, thereby establishing a repeatable and scalable model for transition finance across the emerging world.

High-level, closed-door roundtable

Financing the agri-energy nexus: Pathways to build India's transition bond market

Under the aegis of Mumbai's first ever Climate Week in February 2026, auctusESG, the National Stock Exchange International Exchange (NSE IX), the Rabo Foundation, the Shakti Sustainable Energy Foundation and the Finance Industry Development Council (FIDC) convened an important dialogue to unpack key issues in this space. The high-level, closed-door roundtable titled "**Financing the agri-energy nexus: Pathways to build India's transition bond market**", served as a strategic culmination of the discourse surrounding India's urgent need to mobilise US $22.7 trillion for its net-zero transition, specifically targeting the historically under-financed agri-energy nexus. This roundtable moved the conversation from theoretical barriers to an actionable market-building mechanism, aiming to transition the sector from small, isolated pilot transactions to scaled, repeatable transition bond issuances that can mobilise capital.

The roundtable's focus areas were dual-pronged: first, dissecting the structural risks in scaling agri-energy finance from a financier's lens; and second, harnessing the commercial opportunities of NBFC-led transition finance through international capital markets. This necessitated a high-level convergence of the entire financial value chain, featuring institutional participation from apex bodies such as NABARD, providing sovereign anchor support, and regulators like IFSCA, who detailed the unified, tax-efficient oversight that bypasses domestic complexity.

Global development finance institutions such as BII and IFC shared insights on innovative de-risking through first loss guarantees, while a diverse cohort of leading NBFCs (e.g., Vivriti Capital, Navadhan, UC Inclusive among others) and impact investors (e.g., Omnivore) provided the ground-level perspective on operational constraints. Together with exchange leadership, these stakeholders collectively endorsed a structured capacity-building and capital-raising journey designed to prepare mid-sized NBFCs to access global sustainable debt marketsas the essential architecture to prepare issuers for the global stage.

Chapter I: Strategic context

India's agri-energy nexus (the intersection of agricultural production, rural energy access and climate transition) represents one of the most consequential and underfinanced areas of the country's development agenda. Capital mobilisation toward this nexus is lagging, and the financial intermediaries best positioned to close the gap remain locked out of the capital markets instruments that could enable them to do so at scale. It is this convergence of barriers to finance, institutional constraints, compounding climate risk and an underdeveloped transition bond market that the roundtable convened at Mumbai Climate Week was designed to interrogate. This chapter explores why the agri-energy nexus demands urgent capital mobilisation, why mid-sized NBFCs are the critical delivery channel, how climate change is compounding the risk environment and why India's transition finance market remains structurally insufficient to meet the challenge at scale.

Significance of India's agri-energy nexus

Agriculture is foundational to India's macroeconomic stability, rural livelihoods, and food security architecture. The agriculture and allied sectors contribute approximately 18% of India's gross value added and employ nearly 43% of the country's workforce. As such, agricultural productivity and resilience carry disproportionate implications for income distribution, rural consumption and the performance of financial institutions that extend credit to the sector. Consequently, improving agricultural productivity and strengthening the sector's resilience to climate and resource stresses is both a developmental priority and a macroeconomic and financial stability imperative.

India's agricultural transition is now increasingly intertwined with the clean energy transition. Agriculture accounts for a significant share of electricity consumption, estimated between 18-22% of total electricity use, largely through groundwater irrigation powered by subsidised grid electricity. This subsidy burden places sustained pressure on state finances and DISCOM balance sheets, and encourages excessive groundwater extraction, exacerbating water scarcity and heightening long-term agricultural and credit risk. At the same time, the proliferation of decentralised renewable energy presents a large-scale opportunity for efficiency gains, emissions reduction, and renewable substitution. India's renewable energy capacity has crossed 254 GW, with solar energy accounting for a share, and decentralised applications relevant to agriculture representing a significant, underpenetrated segment of this pipeline.

Realising this opportunity requires substantive capital investment. The assets involved (solar irrigation pumps, agri-processing units, cold storage etc.,) are geographically dispersed, small-ticket and cash-flow dependent. Mobilising capital for these assets at scale requires placing financial intermediaries capable of operating at the last mile, placing NBFCs at the centre of India's transition financing architecture.

NBFCs as critical intermediaries in the agri-energy space

NBFCs have become systemically important intermediaries within India's financial architecture, accounting for roughly 20% of total credit in the financial system, with assets under

management exceeding US $382 billion. They play a disproportionate role in sectors underserved by traditional banks, including MSMEs, vehicle finance, infrastructure, and rural credit. This expanding footprint has positioned NBFCs as essential intermediaries in segments where traditional bank lending models remain constrained by collateral requirements, formal documentation and balance sheet exposure limits. NBFCs, particularly, have emerged as key financiers of decentralised and small-ticket assets that fall below the operational thresholds of large commercial banks.

As a result, NBFCs act as critical last-mile capital providers, with strong sector specialisation. Mid-sized NBFCs specifically, operate with specialised sectoral focus, lean underwriting structures, and higher tolerance for cash-flow-based lending. These characteristics make NBFCs particularly suited to financing decentralised infrastructure and productive assets that generate stable but relatively small cash flows over time, segments often below the risk-adjusted threshold of commercial bank lending. This positions them as credible last-mile providers for India's climate transition.

However, the capital structure of these institutions constrains their ability to deploy at the scale the transition requires. NBFCs predominantly rely on wholesale borrowings from banks and larger institutions. Access to deep, long-term capital markets (particularly labelled debt instrument) remains limited, creating a structural bottleneck between investor appetite and investable deal flow.

Climate change impacts on agriculture, the trilemma of risk, and implications for NBFCs

India remains significantly exposed to extreme weather events, being among the top affected nations in international climate risk ranking. Rising temperatures, erratic monsoons, and groundwater depletion are already impacting crop productivity. Approximately 50-55% of India's net sown area remains rainfed, making agricultural output highly sensitive to rainfall variability, resulting in climate impacts on agriculture translating rapidly into economic and financial risk. On the other hand, groundwater accounts for nearly 62% of irrigation, with several regions experiencing over-extraction. This establishes a structural water-energy-finance trilemma: irrigation depends on energy access; energy access depends on fiscal sustainability; and both require financing models aligned with seasonal cash flows. These interdependencies mean that climate shocks in agriculture propagate across water systems, energy consumption and rural credit dynamics.

The risk transmission operates through three mutually reinforcing channels:

- **Physical risk at the borrower-level**: Reduction in crop yield caused by rising temperature, erratic monsoons and prolonged dry spells reduces farmer incomes and heighten default risk on agriculture loans. Over-extraction of groundwater due to increases in irrigation needs will increase demand for pumping energy and deepen operating costs for farmers, especially where pumping depths rise and diesel or electricity prices fluctuate, thus worsening cash-flow seasonality and repayment capacity. Projected increases in extreme weather events suggest this risk will intensity and become less predictable over time

- **Credit risk at the portfolio-level:** For NBFCs, borrower income volatility increases repayment uncertainty and raises the likelihood of restructuring requests following climate shocks. Seasonal disruptions may lead to deterioration of portfolio quality and heightening credit volatility across rural lending portfolios
- **Broader liquidity and balance sheet risk:** Non-performing assets, strained NBFC liquidity (particularly where asset-liability mismatches exist), and greater volatility in rural lending can impair an NBFC's own cost of funding and access wholesale capital markets

The convergence of these three channels means that climate change is a core credit and operational risk embedded in financial institutions, especially, NBFCs' business model, and one that also defines their most significant market opportunity.

Current landscape of the transition bond/finance market

By 2070, it is estimated that India will need over US $10 trillion in climate investments, of which more than US $2 trillion are needed by 2030. Climate finance in India remains heavily skewed toward mitigation, with adaptation being severely underfunded, relying on domestic public budgets. Agriculture sits at the intersection of these financing needs, requiring investment in both adaptation and mitigation activities. That being said, a clear and updated picture of climate finance flows to the agri-energy sector remains absent. The Climate Policy Initiative's 2025 Sustainable Finance Flows to India's Agriculture Sector tracks US $299 billion to sustainable agriculture in the country in FY2021-2022.

Globally, sustainable debt markets have grown at a brisk pace. Cumulative green, social, sustainability, and sustainability-linked (GSS+) bond issuances have already surpassed US $6 trillion. In India, by the end of 2024, cumulative GSS+ issuance was approximately US $55-60 billion, with green bonds making up around 83% of issuances. However, the issuance remains concentrated among large corporate and financial institutions, and transition-labelled bonds in particular, remain nascent (limited in number, quantum and sectoral breadth).

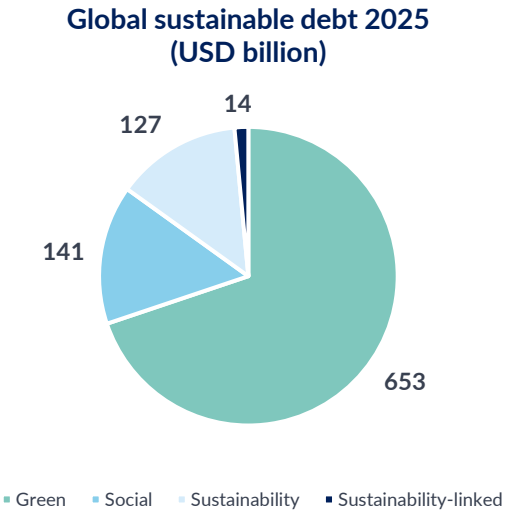


Figure 1: Global sustainable debt 2025 (USD billion)

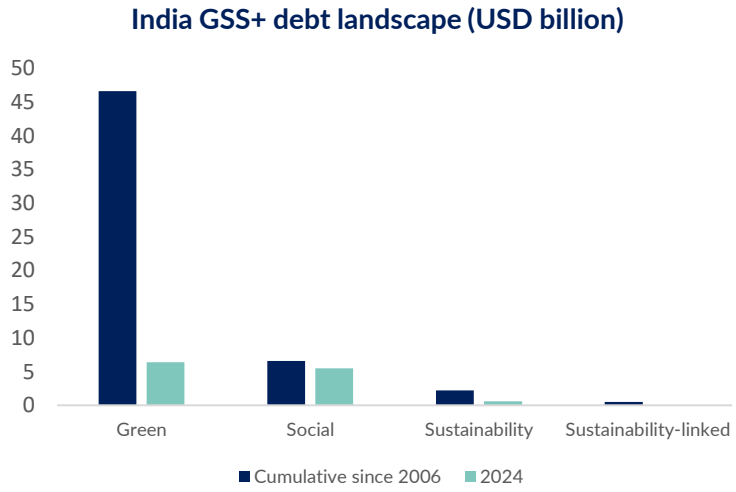


Figure 2: India GSS+ debt (USD billion)

The regulatory architecture supporting transition finance is strengthening, however. In 2023, the International Financial Services Centres Authority (IFSCA) published a special Framework of Transition Bonds (2023) to support credible issuance of transition labelling, especially in the hard-to-abate sectors and infrastructural sectors. Globally, this is complemented by ICMA's Climate Transition Bond Guidelines launched in late 2025. These frameworks are increasingly relevant to the agri-energy context, where emissions reductions and efficiency gains occur progressively rather than through immediate asset replacement implied by a pure green label.

Despite this regulatory momentum, mid-sized agri-focused NBFCs have not yet meaningfully accessed transition bond markets. The barriers (institutional, structural and market-side) are well defined, and bridging them is a market-building challenge, requiring broadening of the participation of financial intermediaries that currently remain outside labelled debt markets.

Chapter II: Insights from the roundtable

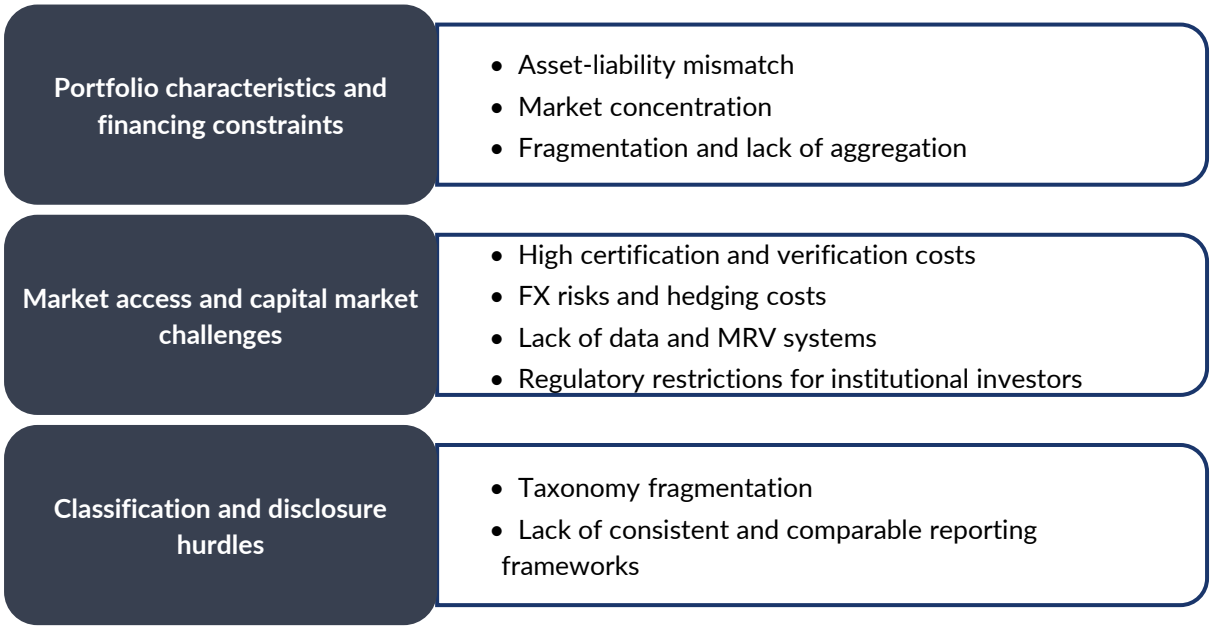


Figure 3: Key issues emerging from the roundtable discussion

The conclusion of the roundtable was clear: the primary bottleneck for the agri-energy sector is not a lack of demand, but a lack of capital market readiness of NBFCs, which possess the operational reach to finance these assets. Three themes dominated the discussion; (a) the financing constraint limiting NBFC access to labelled debt markets, (b) the classification and disclosure barriers facing agri-linked transition assets, and (c) the emerging opportunity presented by the IFSC ecosystem to route offshore capital to this segment. Each of these barriers is examined in turn below.

Portfolio characteristics and financing constraints

One structural constraint relates to asset-liability mismatches within agri-energy lending. Loans in this sector usually have 6-7-year tenors, whereas most NBFCs depend upon wholesale borrowings of 2-3 years, resulting in structural asset-liability risks. The seasonality of farm cash flows complicates the repayment structures based on EMI and enhances liquidity and rollover risks. This creates a persistent asset-liability mismatch for lenders, complicating the ability of NBFCs to finance longer-tenor agri-energy assets using shorter-term funding sources.

Investor appetite for labelled instruments was widely acknowledged as robust. Cumulative GSS+ bond issuances in India reached approximately US $55.9 billion by the end of 2024, reflecting significant market growth. However, issuance remains concentrated among large corporates and established infrastructure players, with roughly three-quarters of green debt volumes directed toward utility-scale energy, buildings, and transport. High-impact transition sectors such as agriculture and decentralised rural energy continue to receive comparatively limited representation in labelled markets. Participants noted that even where investor appetite exists, structural characteristics of agri-energy assets make them difficult to translate into investable bond transactions.

This reflects the key characteristics of agri-energy assets. Solar pumps, biogas digesters, and decentralised cold chains among others, are small-ticket, geographically dispersed assets, which makes due diligence, monitoring, and transaction costs disproportionately high relative to investment size. Institutional investors typically require larger, standardised, and liquid issuances, whereas these assets generate irregular, seasonal cash flows linked to agricultural cycles, increasing credit risk and making aggregation and securitisation difficult without specialised intermediaries such as NBFCs. The World Bank identifies pipeline fragmentation as a central type of impediment to the mobilisation of institutional capital to distributed infrastructure. Here, the lack of aggregation platforms means that transition-aligned agricultural assets are not aggregated to the minimum issuance size necessary to interest institutional investors.

Market access and capital market constraints

The high upfront costs associated with certification and external review were stressed upon in the discussion. Further, high transaction costs of green or transition bond issuance involve providing extra compliance expenses, as well as external review, impacting reporting and disclosure. The cost of third-party verification may go anywhere between US $10,000 and US $100,000 per issuance, which affects small issuers disproportionately. Such fixed costs make economic viability less practical for small-ticket or sub-scale portfolios unless they are aggregated.

For issuers seeking international capital, currency mismatch becomes a significant issue when foreign capital is obtained, either via development finance institutions or offshore investors. The cost of hedging in India may increase the cost of borrowing by 6-7% a year, which would greatly reduce the viability of the project with small-ticket assets. Such high FX costs can render transactions non-viable for distributed assets with moderate IRRs. Together, high certification costs and FX hedging expenses can add several percentage points to the effective cost of issuances, rendering the economics unfeasible for portfolios without targeted cost reduction mechanisms.

Credibility also emerged as a recurring theme throughout the dialogue. Institutional investors increasingly require transparent governance, structured ESG frameworks, and reliable data before allocating capital. Participants emphasised the significance of robust MRV systems to support investor confidence and risk assessment. However, in the agri-energy case, the absence of more granular data on the intensity of irrigation, the range of yield variability, and resilience indicators discourages proper risk pricing and portfolio aggregation.

Approximately 95% of financial institutions globally report a lack of granular, verifiable data to robustly assess climate risk, leading to "invisible" assets on balance sheets that are not easily translated into bankable capital market instruments. While the RBI has recognised the necessity of better climate-related disclosures and climate scenarios analysis frameworks, MRV systems are still expensive and technology-intensive to roll out at scale.

Further, barriers exist not only from the asset side, but also within the demand side of India's capital markets. Even where such portfolios can be aggregated and structured into bond

issuances, participation from institutional investors remains constrained by regulatory investment rules that prioritise highly rated securities.

Institutional investors in India operate under regulatory investment frameworks that prioritise securities of high credit quality, which has a direct impact on their ability to participate in the broader GSS+ bond market. Under the Insurance Regulatory and Development Authority of India's (IRDAI) investment framework, insurers are required to invest in graded securities rated at least "very strong", generally interpreted as AA or equivalent credit rating or higher for bonds and debt instruments to be treated as approved investments. Similarly, pension funds regulated by the Pension Fund Regulatory and Development Authority (PFRDA) also operate under prudential investment guidelines that emphasise investment in high-quality debt (minimum rating threshold of at least A or higher).

While these safeguards are designed to protect policyholder funds by limiting credit risk, they also narrow the pool of eligible sustainable debt instruments, particularly those issued by mid-sized financial institutions or first-time issuers. There are numerous NBFCs of medium size in the agriculture and distributed energy segments that are, not rated or have ratings below these levels and consequently, such regulations restrict patient capital allocation to a large portion of the domestic GSS+ bond universe.

Classification and disclosure hurdles

The discussion highlighted challenges in the classification of agri-linked transition assets, because, unlike utility-scale renewable projects that sit neatly inside well-defined taxonomy criteria, agricultural activities are diverse, location-specific and involve multiple environmental objectives (emissions, biodiversity, water and soil health). This makes standardised classification and reporting technically challenging. Global taxonomies have attempted to define "transition" with varying levels of sectoral detail. The EU taxonomy sets out technical screening criteria and transition pathways to align activities with a net-zero trajectory, while the ASEAN taxonomy similarly provides a multi-tiered, science-based framework for identifying transition activities across member states.

By contrast, India does not yet have a final, operational climate-finance taxonomy that provides a clear, nationally calibrated classification for agri-linked transition assets. The Indian government has published a draft Climate Finance Taxonomy and consultation materials in 2025, but the taxonomy remains under development and stakeholder review, and detailed, operational criteria for agriculture and food-system activities are still being refined. This gap results in many agri-linked transition projects lacking an interoperable, nationally recognised label and consistent reporting template. Consequently, this reduces comparability for cross-border investors used to screening with other international taxonomies.

Beyond asset classification, consistent issuer-level disclosure frameworks are equally important for enabling investor confidence and comparability across sustainable debt markets. SEBI's BRSR framework represents a significant step toward standardised ESG disclosures in India, its mandatory applicability is currently limited to only the top listed entities. The BRSR became mandatory from FY 2022–23, however, it is not universally required for all listed companies. Given that it applies only to the top 1,000 listed entities by market capitalisation,

many mid-sized and unlisted NBFCs, including those seeking to tap into (GSS+) bond markets are left out, resulting in a lack of consistent and comparable reporting frameworks.

This absence of formalised disclosure norms creates information asymmetry and fragmentation, making it difficult for investors to systematically assess the sustainability credentials and risk profiles of smaller issuers. Without consistent ESG data, institutional and global investors may be reluctant to allocate capital to bonds from mid-sized NBFCs, inhibiting the growth of a deeper and more inclusive sustainable debt market in India.

The IFSCA advantage: Why GIFT City and NSE IX matter for mid-sized NBFCs

A key learning from the roundtable was around the opportunities available through the IFSCA, GIFT city and NSE IX, as these entities present a significant opportunity for NBFCs seeking access to offshore capital markets. As a single integrated regulator for banking, capital markets, insurance, and fund management, IFSCA substantially reduces the jurisdictional complexity typically associated with cross-border issuance, without requiring issuers to route transactions through London or Singapore.

Four features are directly relevant to NBFCs:

- The IFSC framework enables participation by smaller issuers, with bond listings permitted at significantly lower minimum issuance thresholds, reportedly as low as US $3 million. For mid-sized NBFCs operating in distributed agri-energy segments, this lower threshold expands the feasible universe of capital market access, particularly for pooled or transition-linked issuances
- The IFSC regime also provides targeted tax incentives, including concessional withholding tax rates on certain foreign currency borrowings and exemptions for specified IFSC transactions, improving post-tax yield attractiveness for offshore investors. For NBFC issuers, this enhances competitiveness relative to alternative offshore listing jurisdictions, potentially lowering the effective cost of capital
- The IFSC regulatory framework also allows borrowing of foreign currency, new debt instruments such as sustainable and transition bonds and softened external commercial borrowing standards up to specified limits. These features a allow access to diversified sources of funds, longer-term capital structures and may offer diversification of currency, important in overcoming asset-liability mismatches and capital concentration risks in domestic markets
- NSE IX lists foreign currency bonds, green and sustainability-linked instruments and structured products with connectivity to international depositories and clearing systems that lower operational friction for global investors

Consequently, the IFSC ecosystem serves as an important enabler for mid-sized NBFCs to access diversified, long-tenor capital and a broader global investor base.

Figure 4: IFSCA advantages

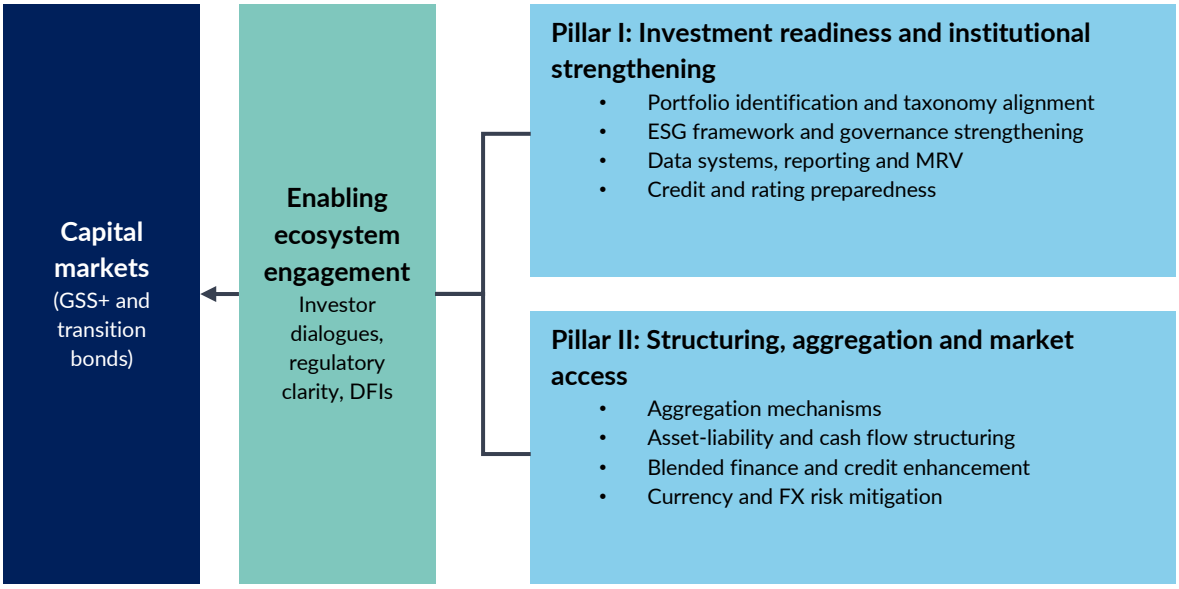
Taken together, these insights point to a clear market implication. The objective is not merely to increase the number of labelled bonds, but to expand the issuer base by enabling mid-sized NBFCs to transition from impact lenders in practice to credible participants in sustainable and transition debt markets. Achieving this shift requires a structured, programmatic approach that strengthens institutional architecture, enhances credibility, and aggregates issuance pathways at scale. Without such coordination, capital will remain concentrated among established players, and critical transition sectors will continue to face structural financing gaps.

Chapter III: Building a bond-ready agri-energy NBFC pipeline

While investor appetite and regulatory infrastructure are increasingly aligned to support transition-labelled bond issuance, the core constraint facing mid-sized agri-focussed NBFCs lies in institutional preparedness, aggregation capability and structured market access. Addressing this requires a coordinated, sequenced market-development approach that strengthens internal readiness, enables scalable structure and builds a systematic interface with capital markets.

Such an approach focuses on preparing a pipeline of bond-ready institutions through targeted investment readiness and institutional strengthening, alongside the development of aggregation and structuring mechanisms capable of pooling fragmented agri-energy assets and facilitating credible market access. This includes aligning portfolios with emerging climate taxonomies, strengthening ESG governance and MRV systems, and enhancing credit and disclosure readiness, while simultaneously enabling asset aggregation, appropriate asset–liability structuring, blended finance and credit enhancement mechanisms, and solutions for currency and FX risk management. By progressively aligning governance, disclosure and risk management systems with capital market expectations, these institutions can transition from operating as impact-oriented lenders to becoming credible and repeat issuers within the transition-labelled debt market. The following section outlines the essential components of such an approach.

Figure 5: Pillars supporting the NBFC pipeline



Pillar I: Investment readiness and institutional strengthening

Closing the preparation gap that currently limits mid-sized NBFC participation in labelled bond markets is critical. Institutional investors require credible ESG governance, transparent use-of-

proceeds frameworks, independent review mechanisms and robust data systems before allocating capital.

I. Portfolio identification and taxonomy alignment: NBFCs need to undertake portfolio identification and asset tagging as a foundational step toward bond issuance. This involves mapping existing and prospective exposures to clearly defined use-of-proceeds categories, aligned with recognised frameworks such as the ICMA Green Bond Principles and Sustainability-Linked Bond Principles. Asset tagging needs to be embedded within loan origination and portfolio management systems to enable transparent allocation tracking and auditable use-of-proceeds reporting in key sectors including solar irrigation, decentralised renewable energy systems, efficient agri-processing infrastructure, storage solutions and climate-resilient farming inputs among others.

Where activities do not meet strict "pure green" definitions, NBFCs may develop clear transition pathways supported by measurable performance improvements. Internationally, transition-labelled issuances in hard-to-abate sectors have demonstrated the importance of linking financing to time-bound decarbonisation or efficiency milestones. In India, green bond issuers such as Yes Bank and State Bank of India have adopted transparent use-of-proceeds categories aligned with ICMA guidance, strengthening investor clarity. Agri-focused NBFCs need to adopt a similar structured approach, clearly articulating how financed activities contribute to emissions reduction, resource efficiency, or climate resilience over defined time horizons.

II. ESG framework and governance strengthening: Formal governance structures signal to investors that sustainability commitments are embedded institutionally rather than applied transaction-by-transaction. As a result, issuers need to formalise ESG governance at both board and management levels. This requires board-approved sustainable finance policies, clear accountability structures, and integration of climate and sustainability considerations into risk management frameworks. SEBI's BRSR regime has already set expectations for structured ESG disclosure among listed entities. While mid-sized NBFCs may not be listed, adopting comparable governance discipline enhances market credibility.

Internationally, issuers that have successfully accessed global sustainable debt markets typically establish dedicated sustainability committees or assign board-level oversight to climate-related risks. Internationally, even emerging market issuers accessing sustainable debt markets institutionalise ESG governance. For example, Nigeria's Access Bank has established a Board Sustainability Committee overseeing climate and ESG risks, while microfinance institutions such as Mibanco in Peru have embedded senior-level oversight and impact monitoring frameworks in connection with their green and social bond issuances. These examples highlight that board-level or senior governance of sustainability is increasingly a prerequisite for credible participation in global sustainable debt markets.

III. Data systems, reporting and MRV: A robust data architecture needs to underpin any labelled issuance. NBFCs would need to adopt standardised reporting templates that track allocation of proceeds, portfolio performance, and impact indicators. Climate impact metrics

need to be defined in advance and linked to measurable outputs such as renewable energy capacity financed, emissions avoided, water-use efficiency improvements, or productivity gains. ICMA green bond principles recommend that issuers maintain formal internal processes for tracking proceeds and provide annual allocation and impact reporting, including quantitative performance indicators where feasible, supported by external review. These globally recognised frameworks demonstrate how structured data architecture and predefined impact metrics can underpin credible labelled issuances and could be adopted or adapted by NBFCs seeking to access sustainable capital markets

IV. Credit and rating preparedness: A coordinated approach to credit readiness reduces execution risk and supports pricing aligned with institutional benchmarks. As a result, credit robustness remains central to investor participation. NBFCs need to enhance underwriting discipline, portfolio analytics, and documentation standards to meet rating agency expectations. This includes stress-testing agri-linked portfolios for climate variability, commodity price volatility, and seasonal cash flow fluctuations.

Early engagement with credit rating agencies and second-party opinion providers improves structuring outcomes and pricing efficiency. In India's green debt market, issuers that have combined conventional credit ratings with independent ESG verification have achieved broader investor participation. Preparation needs to therefore integrate both credit evaluation and external review processes well in advance of issuance.

While Pillar I focuses on institutional credibility and internal preparedness, readiness alone does not guarantee issuance. Inefficiencies related to scale, cost and balance sheet dynamics need to be addressed to convert eligible portfolios into investable bond transactions.

Pillar II: Structuring, aggregation and market access

Addressing structural factors requires coordinated structuring approaches, portfolio aggregation mechanisms, and deliberate market interface strategies that enable efficient, repeatable issuance rather than isolated transactions. This pillar, therefore, outlines the practical structuring and access pathways needed to convert eligible portfolios into investable bond transactions.

I. Aggregation mechanisms: A programmatic, pooled approach can reduce issuance costs and create sufficient scale to attract institutional participation. Issuers, therefore, need to explore structured aggregation mechanisms that pool similar agri-energy portfolios into investable bond formats to address fragmented loan books and relatively smaller balance sheets. This may involve internal portfolio pooling, multi-issuer platforms, or the use of SPVs to consolidate assets with comparable risk and cash flow characteristics.

Institutions such as Northern Arc Capital have facilitated pooled loan transactions where receivables from multiple originators are aggregated and issued as structured instruments to institutional investors. It structured India's first pooled multi-originator securitisation (MOSEC) transaction, which aggregated loan receivables from multiple originators to enable funding access. This directly supports the idea of pooling receivables from different lenders and issuing them to investors. While many of these transactions are not labelled green, the aggregation

model is directly applicable to agri-energy portfolios seeking bond market access. The BII's US $75 million Green Basket Bond programme pools financing that is then deployed through MSMEs, lenders across Africa, South Asia, and Southeast Asia. The objective is to provide financing for small-ticket green projects that are typically too fragmented or small to attract direct institutional investment. Mufin Green Finance's US $7 million green bond targeted towards EVs was a product of this programme, demonstrating a viable and replicable use case in the Indian market.

A key institutional enabler discussed during the roundtable was the potential role of NABARD as an apex aggregation platform. Given its sectoral mandate, balance sheet strength, and existing relationships with rural financial institutions, NABARD is well positioned to intermediate pooled agri-energy portfolios, provide partial credit guarantees, and standardise aggregation structures. Anchoring such a mechanism through the GIFT IFSC ecosystem could further enable offshore capital access, improve credit profiles of pooled issuances, and create a scalable, programmatic pipeline for transition-labelled bonds.

II. Asset-liability and cash flow structuring: Bond structuring needs to reflect the underlying cash flow profile of agri-linked loan portfolios. Agricultural lending is often influenced by crop cycles, seasonal revenues, and climate variability. Issuers, therefore, need to align bond repayment schedules with expected portfolio inflows, avoiding rigid structures that create liquidity strain during low-cash periods. Amortising bonds or staggered repayment schedules may provide better alignment than bullet maturities in certain cases.

Brazil's agribusiness receivables certificates, backed by agricultural receivables, are often structured with repayment profiles linked to seasonal cash flows. These structures pool agricultural receivables and issue tradable securities to investors, allowing capital market investors to finance agricultural supply chains. Similarly, in India's microfinance securitisation market, pass-through certificates are commonly structured as amortising instruments aligned to underlying borrower repayments. These instruments represent an investor's share in a pool of underlying loan receivables, and the cash flows from borrower repayments (principal and interest) are passed through to investors, often following amortising repayment structures aligned with the underlying loans. These examples demonstrate that agricultural and small-ticket portfolios can be successfully matched to bond servicing obligations when structuring discipline is applied.

III. Blended finance and credit enhancement: Initial issuances by mid-sized NBFCs may benefit from targeted credit enhancement to improve pricing and broaden investor participation. Partial guarantees, first-loss capital structures, or subordinated tranches can reduce downside risk for senior investors and facilitate market entry.

Emerging market green bond transactions have frequently incorporated catalytic capital. For example, development finance institutions have supported inaugural sustainable bond issuances through anchor participation or guarantee structures. In India, blended finance approaches have been used in renewable energy platforms to crowd in commercial investors alongside multilateral institutions. A clear example of blended finance in India's renewable energy sector is the Ayana Renewable Power platform. Ayana was established by British

International Investment (formerly CDC Group) and later attracted additional capital from the National Investment and Infrastructure Fund (NIIF) and EverSource Capital. Through this structure, development finance capital from BII helped de-risk the platform and crowd in institutional investors to expand renewable energy capacity in India. Applying similar structures within the agri-energy context can help bridge perceived credit gaps while maintaining market-based pricing discipline.

IV. Currency and FX risk mitigation: Issuers need to evaluate hedging strategies, swap costs, and the impact of currency volatility on debt servicing capacity. India's experience with external commercial borrowings (ECBs) and masala bonds demonstrates the importance of managing FX exposure carefully. Some issuers have opted for rupee-denominated offshore bonds to mitigate currency mismatch risk, while others have absorbed hedging costs to access deeper pools of capital. A clear comparison between domestic and offshore issuance pathways needs to inform structuring decisions, with proactive FX risk management embedded into bond design. For instance, Indian Renewable Energy Development Agency (IREDA) issued green Masala bonds on the London Stock Exchange, raising rupee-denominated capital offshore and avoiding currency risk exposure.

The two pillars are interdependent; (a) institutional strengthening without the right transaction structuring produces ready but unissued portfolios; and (b) structuring without underlying institutional credibility generates investor interest that cannot ultimately be converted into capital. While the pathway to issuance is clear, execution requires a coordinated and programmatic approach that integrates readiness, transaction structuring and ecosystem engagement. Together, these elements create the conditions necessary to convert institutional preparedness into sustained capital mobilisation and to build a scalable pipeline of transition-labelled issuances from agri-focused NBFCs.

Chapter IV: Conclusion and way forward

India's agri-energy nexus sits at the intersection of climate resilience, rural productivity and long-term macroeconomic stability. The ability to mobilise capital toward key sectors is likely to increasingly shape the pace of country's net-zero pathway, as climate risks intensify. Financing this transition is, therefore, a critical requirement to sustain rural incomes, strengthen food systems and manage systemic climate risks.

Strengthening the capacity of mid-sized NBFCs to participate in sustainable debt markets can play an important catalytic role in advancing this transition. Institutional strengthening, portfolio preparation and structured engagement with capital markets can help bridge the gap between decentralised climate lending and scalable transition bond issuance. Over time, such efforts have the potential to expand the issuer base, build institutional confidence, and create replicable pathways for sustainable debt issuance.

However, realising this opportunity requires strengthening the broader enabling environment for transition finance. From a policy and regulatory perspective, clearer taxonomies for agri-linked transition activities, improved climate data and MRV systems, and more consistent disclosure standards will be critical for enabling investors to assess and price risk across distributed assets. At the same time, greater regulatory coordination across financial sector institutions, exchanges, and development finance actors can help reduce transaction friction and establish credible issuance pathways for emerging issuers.

Equally important is the development of mechanisms that help translate decentralised lending portfolios into investable capital market instruments. This includes strengthening portfolio aggregation platforms, expanding credit enhancement mechanisms for first-time issuers, and fostering deeper engagement between institutional investors and financial intermediaries that originate climate-aligned assets. Such developments can help ensure that agri-energy investments become visible and investable within sustainable debt markets.

Ultimately, unlocking capital at the scale required for India's agri-energy transition will depend on building a financial architecture that connects climate assets with global pools of capital. Expanding the participation of mid-sized NBFCs in sustainable debt markets represents one promising pathway toward this goal; one that can help translate local climate solutions into scalable investment opportunities, while strengthening the resilience of India's economy.