India's Climate Finance Architecture

Trade Pressures, Industrial Strategy, and Institutional Transformation

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Executive Summary

As of early 2026, India stands at a structurally decisive moment in its climate transition. Over the past decade, the country has moved from declaratory ambition to policy-backed implementation, achieving rapid expansion in solar and wind capacity and establishing itself among the world's largest renewable energy markets. Yet the next phase of the transition presents a fundamentally different challenge. The constraint is no longer technological feasibility or policy articulation; it is the sustained mobilisation of capital at the scale, cost, and speed required to transform a coal-dependent emerging economy into a diversified low-carbon industrial system.

The core macro-financial challenge is stark. To achieve its *"Panchamrit"* commitments and its Net Zero 2070 target, India's cumulative investment requirement is estimated between USD 10.1 trillion and USD 22.7 trillion over the next five decades, according to modelling by NITI Aayog and international institutions. These figures reflect not merely renewable generation targets, but grid modernisation, storage integration, industrial decarbonisation, clean transport, and climate adaptation. In practical terms, this implies financing green infrastructure on a scale comparable to building a major metropolitan economy every few years.

The near-term gap is equally significant. Meeting India's 2030 Nationally Determined Contributions requires annual green investment of approximately USD 300 billion. By contrast, total green finance flows in FY 2025–26 are estimated at roughly USD 45–50 billion annually. The resulting funding gap—approaching 85 percent—cannot be bridged through domestic public expenditure alone. The challenge is systemic rather than incremental: it demands financial architecture capable of crowding in large-scale private and institutional capital.

Recognising this structural constraint, the Union Budget 2026–27 signals a strategic reorientation in fiscal and financial policy. The government's approach has shifted from direct expenditure to risk mitigation and capital catalysis. Rather than treating climate finance as a line-item subsidy, policy is increasingly focused on de-risking private investment, lowering financing costs, and enabling transition pathways in capital-intensive sectors.

This reorientation is visible across three major fronts. First, there is a deliberate pivot toward industrial decarbonisation. While renewable energy continues to expand, policy attention has shifted toward hard-to-abate sectors such as steel, cement, and heavy chemicals. The introduction of viability gap funding for Carbon Capture, Utilisation and Storage reflects recognition that deep decarbonisation in these sectors cannot occur without targeted financial support to reduce the "green premium."

Second, blended finance mechanisms are being institutionalised. Sovereign-backed first-loss guarantees and risk-sharing facilities are designed to attract long-term institutional investors—such as pension and insurance funds—into emerging areas including green hydrogen and offshore wind. Public capital is thus being redeployed

as catalytic capital, absorbing early-stage risk to crowd in larger volumes of private finance.

Third, the rise of transition finance marks a conceptual shift in India's sustainable finance discourse. Rather than limiting capital flows to "pure green" assets, policy frameworks now acknowledge the necessity of financing the gradual decarbonisation of existing carbon-intensive industries. Through taxonomy-aligned transition pathways, brown assets are being integrated into credible, time-bound decarbonisation trajectories rather than excluded from capital markets.

Parallel to fiscal innovation, regulatory institutions have embedded climate risk into mainstream financial governance. The Reserve Bank of India has incorporated climate stress considerations into supervisory frameworks, while SEBI's BRSR Core regime has elevated ESG disclosure standards to a level approaching financial audit equivalence. Simultaneously, the Indian Carbon Market is transitioning toward a compliance-based mechanism, laying the groundwork for an economy-wide carbon price signal that internalises environmental externalities.

India's climate finance landscape is also increasingly shaped by international trade dynamics. The full implementation of the European Union's Carbon Border Adjustment Mechanism in 2026 introduces a direct linkage between emission intensity and export competitiveness. Indian exporters in steel, aluminium, and cement now face explicit carbon-linked cost penalties in global markets. This external pressure has accelerated domestic demand for transition finance, technology upgrades, and internal carbon pricing strategies within large industrial conglomerates.

Despite these institutional advances, a persistent structural headwind remains: the cost of capital. Indian green projects continue to face a currency and sovereign risk premium, often 2–3 percentage points higher than comparable projects in advanced economies. Without significant credit enhancement, multilateral support, or domestic financial innovation, this cost differential risks slowing the pace of transition.

In summary, 2026 represents a pivotal shift from climate ambition to climate financial engineering. The emphasis has moved beyond megawatt additions toward systemic financial restructuring. The funding gap remains substantial, yet the emergence of a formal taxonomy, sovereign green debt instruments, blended finance structures, and a maturing carbon market provides a coherent institutional foundation. India's transition will ultimately depend not only on policy intent, but on whether its financial system can evolve rapidly enough to mobilise trillions in capital while maintaining macroeconomic stability.

The coming years will determine whether India becomes constrained by capital scarcity or emerges as a global laboratory for climate finance innovation in emerging markets.

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1 Financing Requirements and the "Green Gap"

India's climate transition requires an unprecedented mobilisation of long-term capital across power systems, heavy industry, transport networks, and enabling infrastructure. Unlike earlier phases of development, where incremental expansion was sufficient, the current transition demands structural replacement and technological substitution at scale. Coal-based generation must give way to renewables integrated with storage; carbon-intensive steel and cement production must adopt alternative fuels and capture technologies; transport systems must electrify while expanding in capacity; and grid infrastructure must be modernised to accommodate decentralised and intermittent energy flows.

Long-term modelling exercises underscore the magnitude of this transformation. Estimates suggest that cumulative investment requirements through 2070 could reach as high as USD 22.7 trillion. The scale is not evenly distributed across sectors. Power and utilities account for the largest share, reflecting the centrality of electricity in decarbonising other sectors such as transport and industry.

Table 1: Estimated Cumulative Investment Requirements (to 2070)

Sector	Estimated Requirement (USD)	Primary Drivers
Power & Utilities	~USD 14.23 trillion	Solar and wind expansion, grid modernisation, storage integration
Industry	~USD 4.5 trillion	CCUS deployment, green hydrogen, process efficiency upgrades
Transport	~USD 3.1 trillion	EV ecosystem, charging infrastructure, rail electrification
Total Estimated Pipeline	USD 22.7 trillion	Cumulative requirement (NITI Aayog, 2026 modelling)

The dominance of the power sector reflects the electrification imperative. Decarbonisation of transport, industrial heat, and residential consumption depends heavily on clean electricity expansion. However, the industrial requirement—particularly for steel, cement, refining, and chemicals—represents the most technologically complex and capital-intensive segment of the transition. These sectors are not merely expanding capacity; they are redesigning production pathways.

The scale of financing required fundamentally alters the nature of the policy challenge. Climate finance in India can no longer be framed as a supplementary development stream. It must be understood as a macroeconomic restructuring exercise, involving sustained annual capital flows comparable to a significant share of national GDP.

This is where the concept of the "Green Gap" acquires structural significance. The gap is not simply the arithmetic difference between required and available capital. It reflects deeper constraints: high cost of capital, currency risk premiums, limited risk appetite for early-stage technologies, regulatory uncertainty in hard-to-abate sectors, and the underdevelopment of long-tenor domestic capital markets.

As of early 2026, the delta between available annual green finance flows and the scale required to meet India's 2030 and 2070 commitments remains the single largest bottleneck in the transition pathway. Without credible mechanisms to narrow this gap—through blended finance, credit enhancement, transition instruments, and international concessional capital—the pace of industrial decarbonisation will remain uneven and potentially misaligned with global trade dynamics.

The Green Gap, therefore, is not a peripheral concern. It is the central macro-financial constraint shaping India's climate trajectory. The following subsections examine this gap in greater detail: first by analysing current flows, then by outlining near-term requirements, and finally by assessing the structural barriers that define its persistence.

1.1 Current Flow: The Domestic Heavy-Lift (~$45–50 billion/Year)

India's current green finance flows, estimated at approximately USD 45–50 billion annually in FY 2025–26, represent a marked increase from 2020 levels. Over the past five years, annual flows have nearly doubled, reflecting policy clarity, renewable sector maturity, and the gradual integration of sustainability considerations into mainstream banking. However, despite this quantitative expansion, the composition of capital remains highly concentrated in low-risk, revenue-stable segments.

The overwhelming majority of green finance continues to be domestically sourced. According to the Landscape of Green Finance 2026 report, nearly 83 percent of mitigation finance and 98 percent of adaptation finance is raised within India. International capital plays a supplementary rather than foundational role. This domestic predominance underscores both the resilience of India's internal financial system and the limited scale of cross-border concessional flows.

Commercial banks remain the primary channel for green capital mobilisation. Public and private sector banks have expanded green portfolios at an estimated 22 percent year-on-year growth rate. Institutions such as the State Bank of India and HDFC Bank have institutionalised green lending frameworks, introducing dedicated "Green Loan" products and internal climate risk screening mechanisms. Yet these flows are heavily skewed toward utility-scale solar and wind projects backed by long-term power purchase agreements (PPAs). The predictability of tariff structures and counterparty assurance makes these projects attractive from a credit-risk perspective. By contrast, industrial retrofits, green hydrogen pilots, and distributed renewable models continue to face higher risk perceptions and limited lending appetite.

Non-Banking Financial Companies (NBFCs) have emerged as increasingly important climate-aligned intermediaries. Entities such as IREDA, PFC, and REC have repositioned themselves as climate-focused financial institutions, expanding beyond conventional power lending. In FY25 alone, these institutions sanctioned over ₹2.5 lakh crore in clean energy-related projects, including pumped hydro storage, grid modernisation, and early-stage battery storage initiatives. Their role is particularly significant in providing longer-tenor financing and absorbing sectoral risk in projects that commercial banks may consider marginal.

Public sector expenditure constitutes the third pillar of current flows. Climate-linked spending is estimated at approximately 5.6 percent of GDP, up from 3.7 percent in 2016. Rather than allocating funds exclusively under a "climate" label, India has pursued a development-led adaptation strategy. Infrastructure programmes such as Jal Jeevan Mission and Amrit Sarovar integrate resilience objectives within broader development spending. Water security, rural connectivity, urban drainage, and heat-resilient infrastructure are framed as developmental investments with climate co-benefits. While this integrated approach reduces fragmentation, it also complicates precise climate tagging and measurement.

The structural limitation of current flows lies not in aggregate growth but in allocation patterns. Capital is concentrated in mature renewable energy assets with established revenue visibility. High-uncertainty sectors—industrial decarbonisation, emerging technologies, adaptation infrastructure with diffuse revenue streams—remain comparatively underfinanced.

Table 2: Composition of Current Green Finance Flows (FY 2025–26)

Source of Finance	Estimated Role	Characteristics of Capital Allocation
Domestic Commercial Banks	Primary mitigation financiers	Concentrated in utility-scale renewables with PPAs
NBFCs (IREDA, PFC, REC)	Sector-specialised lenders	Longer tenors; storage, grid, emerging clean technologies
Public Sector Spending	Dominant adaptation funding source	Development-led resilience; infrastructure-integrated climate expenditure
International Capital	<15% of total flows	Limited concessional and blended finance participation

In macroeconomic terms, India's current green finance landscape reflects a domestic heavy-lift. The financial system has demonstrated capacity to scale renewable energy financing, yet it remains risk-averse toward capital-intensive industrial transition and revenue-uncertain adaptation projects. The scale of mobilisation is notable; the breadth of sectoral coverage remains constrained.

This structural concentration sets the stage for the next subsection, which examines the magnitude and distribution of required capital flows relative to current levels.

1.2 Requirement: The $300 Billion Annual Mandate

If India is to remain aligned with a 1.5°C-compatible trajectory while meeting its 2030 Nationally Determined Contributions, annual green investment must increase nearly six-fold from current levels. The estimated requirement of approximately USD 300 billion per year is not simply a scaling up of existing renewable deployment. It reflects a structural shift in the composition of capital demand.

In the early 2010s, climate investment in India was primarily associated with solar and wind capacity addition. By contrast, the current decade is characterised by capital-intensive industrial transformation, grid modernisation, storage integration, and systemic electrification. The centre of gravity of climate finance is gradually moving from generation capacity to industrial decarbonisation and infrastructure reconfiguration.

The distribution of annual requirements illustrates this shift.

Table 3: Estimated Annual Green Investment Requirement (to 2030)

Sector	Estimated Annual Requirement (USD)	Primary Use of Funds
Heavy Industry	~USD 110 billion	Transition of steel, cement, refining and chemicals through green hydrogen, CCUS, and process electrification
Renewable Energy	~USD 85 billion	Expansion toward 500 GW capacity, grid strengthening, transmission corridors, battery and pumped storage
Clean Transport	~USD 60 billion	EV manufacturing and adoption, charging infrastructure, electrified freight and passenger rail
Adaptation	~USD 45 billion	Climate-resilient agriculture, flood defence, urban heat mitigation, water security systems
Total Annual Requirement	~USD 300 billion	Cross-sectoral decarbonisation and resilience

The most significant structural development is the prominence of heavy industry within the financing mandate. At approximately USD 110 billion annually, industrial decarbonisation constitutes the single largest component of the required investment. Unlike renewable generation projects, which benefit from relatively predictable revenue streams under power purchase agreements, industrial transition involves retrofitting existing assets, deploying emerging technologies such as green hydrogen and carbon capture, and absorbing substantial capital expenditure without

immediate revenue enhancement. These characteristics heighten financing complexity and increase reliance on blended instruments and policy-backed risk mitigation.

Renewable energy, while still a major capital sink, now includes more than generation capacity. Achieving the 500 GW non-fossil target requires significant transmission expansion, flexible grid management systems, battery storage deployment, and pumped hydro capacity. The integration challenge is therefore as capital-intensive as the generation challenge itself.

The clean transport requirement reflects systemic electrification of mobility. Beyond vehicle manufacturing, substantial investment is required in charging networks, battery supply chains, and freight rail electrification. Urban transport electrification and bus fleet conversion add further capital demand.

Adaptation, often overshadowed by mitigation, represents approximately USD 45 billion annually in required flows. These investments are directed toward climate-resilient agricultural practices, coastal and riverine flood protection, heat mitigation in urban centres, and water resource management. Unlike mitigation projects, adaptation investments frequently lack direct revenue streams, complicating private sector participation.

The aggregate USD 300 billion annual requirement therefore represents not a single investment pipeline but a complex, multi-sectoral reallocation of capital across technologies, geographies, and institutional actors. It reflects both replacement of high-carbon assets and creation of new low-carbon infrastructure.

When juxtaposed with current annual flows of USD 45–50 billion, the scale of the financing gap becomes structurally evident. The gap is not simply a short-term mismatch; it is a systemic capital mobilisation challenge that will require coordinated fiscal, regulatory, financial, and diplomatic interventions.

The next subsection examines the structural barriers that explain why this gap persists despite policy momentum and growing investor interest.

1.3 Status: The International Financing Bottleneck

The most consequential weakness in India's climate finance architecture is not domestic mobilisation capacity, but the stagnation of international capital flows. Despite renewed global commitments at successive climate summits, cross-border finance continues to contribute less than 15 percent of India's total green investment. In absolute terms, international participation remains modest relative to both India's annual requirement of approximately USD 300 billion and even its current domestic mobilisation of USD 45–50 billion.

This imbalance reflects structural barriers embedded within the global financial system rather than a lack of project pipeline. International capital is not absent because opportunities do not exist; it is constrained by currency risk, institutional rigidity, and definitional uncertainty around green eligibility.

The Currency Risk Premium

The most immediate barrier to international participation is currency volatility. Foreign investors financing rupee-denominated assets must account for exchange rate fluctuations, particularly over long tenors typical of infrastructure projects. To hedge against rupee depreciation risk, investors often demand an additional 300–500 basis points.

This premium materially alters project economics. A utility-scale solar project in Rajasthan, despite superior solar irradiation and competitive construction costs, may face a higher effective cost of capital than a comparable project in Spain purely due to currency exposure. The result is paradoxical: projects located in geographies with strong resource potential can become financially less attractive because of macroeconomic risk rather than technological or operational inefficiency.

Currency risk also constrains long-term bond markets. While India has made progress in sovereign green bond issuance, foreign institutional investors remain cautious about large-scale rupee exposure without credible, low-cost hedging instruments. The absence of a deep currency swap market further compounds the constraint.

Multilateral Development Bank (MDB) Rigidities

Institutions such as the World Bank and the Asian Development Bank continue to play a visible but limited role. While their climate portfolios have expanded nominally, their operating model remains largely loan-based and project-specific.

Critics argue that this approach underutilises MDB balance sheets. Rather than primarily extending direct loans, India has advocated for MDBs to deploy their AAA-rated balance sheets for credit enhancement mechanisms—guaranteeing Indian green bonds, providing first-loss tranches in blended finance structures, and de-risking institutional investor participation. Such instruments could potentially crowd in multiples of private capital relative to conventional lending.

During 2025–26, India intensified calls for MDB reform, pushing for greater use of guarantee facilities and portfolio-level risk sharing. However, institutional caution, capital adequacy constraints, and internal governance processes continue to limit rapid transformation. The gap between political commitment and operational restructuring remains evident.

The Taxonomy Delay and ESG Caution

A third constraint emerged from definitional ambiguity. Prior to the full operationalisation of the India Climate Finance Taxonomy in late 2025, international ESG-focused funds expressed hesitation regarding asset classification standards. Concerns around greenwashing, transition fuel categorisation, and disclosure consistency dampened participation.

The 2026 rollout of clearer labels—distinguishing between “Green” and “Transition” activities—has improved signalling. Standardised criteria reduce uncertainty

regarding eligibility and reporting, aligning India's framework more closely with evolving global disclosure norms. While this is expected to ease investor hesitation, implementation consistency and regulatory enforcement will determine whether confidence is sustained.

Structural Implications

The international financing bottleneck is therefore not merely quantitative but structural. Currency volatility raises project-level cost of capital. MDB operating models limit balance-sheet leverage. Taxonomy ambiguity delays ESG inflows. Together, these factors constrain cross-border capital precisely at a moment when India's annual requirement has expanded six-fold.

Table 4: Key International Financing Constraints (2026)

Constraint	Mechanism of Impact	Effect on Cost or Flow
Currency Risk Premium	300–500 bps hedging requirement	Raises effective project cost of capital
MDB Operating Model	Loan-heavy, limited guarantee use	Constrains crowding-in of private capital
Taxonomy Uncertainty	ESG classification ambiguity (pre-2025)	Delayed international fund participation
Limited Hedging Markets	Shallow long-term swap instruments	Restricts foreign bond market expansion

The net effect is a system in which domestic capital performs the heavy lift while international finance remains supplementary. Without structural reform—particularly around currency risk mitigation and balance-sheet innovation—India's capacity to close the USD 300 billion annual gap will remain constrained by macro-financial architecture rather than project ambition.

1.4 The Hard-to-Abate Shift (Budget 2026–27 Focus)

If Sections 2.1 to 2.3 establish the scale of the financing gap, this subsection locates where that gap is most structurally dangerous. The shortfall is not evenly distributed across sectors. It is most acute in industries where the "green" alternative is materially more expensive than the conventional production pathway. This cost differential—often described as the green premium—creates a structural competitiveness problem for heavy industry.

In sectors such as steel, cement, refining, and chemicals, decarbonisation requires either green hydrogen substitution, deep electrification, or carbon capture systems layered onto existing assets. These technologies are capital-intensive and, in most cases, commercially immature at scale. Unlike solar and wind power, where cost curves have fallen dramatically, the marginal cost of low-carbon industrial production remains significantly above that of fossil-fuel-based processes.

This divergence creates a dual pressure. On one hand, export markets are tightening carbon compliance standards. On the other, domestic firms face high upfront transition costs without guaranteed demand-side premiums. The risk is not merely slower decarbonisation but industrial hollow-out—where domestic producers lose competitiveness in global markets that increasingly penalise carbon intensity.

The European Union's Carbon Border Adjustment Mechanism (CBAM) represents a concrete manifestation of this risk. As carbon border measures phase in, high-emission exports such as steel and cement could face additional levies unless embedded emissions are demonstrably reduced. For Indian industry, the implication is clear: decarbonisation is no longer solely an environmental objective but a trade and industrial policy imperative.

Recognising this structural vulnerability, the Union Budget 2026–27 introduced a USD 2.2 billion (approximately ₹20,000 crore) Carbon Capture, Utilisation and Storage (CCUS) Viability Gap Funding (VGF) scheme. The objective is not to subsidise emissions indefinitely but to bridge the cost differential between conventional and low-carbon production during the early adoption phase.

Viability Gap Funding is designed to absorb part of the green premium by lowering effective project costs. In the context of CCUS, this may include support for capture infrastructure, transport networks, or shared storage facilities. By reducing upfront capital burdens, the scheme seeks to crowd in private investment that would otherwise remain commercially unviable under prevailing market conditions.

Table 5: The Green Premium Challenge in Hard-to-Abate Sectors

Dimension	Conventional Production	Low-Carbon Alternative	Financing Implication
Capital Cost	Lower, established assets	Significantly higher due to new technologies	Requires concessional support or guarantees
Operating Cost	Fossil-fuel dependent	Hydrogen, electrification, or CCUS inputs	Higher per-unit production cost
Market Demand	Stable, price-competitive	Limited willingness to pay green premium	Policy-driven demand creation needed
Trade Exposure	Increasing CBAM risk	Lower border carbon exposure	Strategic competitiveness advantage

2 Key Policy and Regulatory Framework

By 2026, India's climate finance architecture has entered a more mature regulatory phase. The emphasis has shifted from broad guideline-setting and voluntary disclosure frameworks toward enforceable standards that prioritise bankability, transparency, and systemic credibility. The earlier phase of signalling intent—through announcements, policy roadmaps, and high-level commitments—has given way to institutional mechanisms designed to convert climate ambition into investable, risk-assessable financial assets.

This transition reflects a recognition that capital mobilisation at the scale required under Section 2 cannot rely solely on fiscal allocations or sectoral incentives. It depends equally on regulatory predictability. Investors, particularly long-term institutional actors such as pension funds and insurance companies, require clarity on classification standards, disclosure obligations, risk treatment, and policy continuity. Without regulatory certainty, even commercially viable green projects face elevated risk premiums.

The core objective of the 2026 regulatory environment is therefore the creation of a predictable investment horizon. This entails three interlinked elements: definitional clarity regarding what qualifies as "green" or "transition"; credible disclosure frameworks that reduce information asymmetry; and prudential alignment within the financial system to appropriately price climate-related risks.

First, taxonomy consolidation has reduced ambiguity in asset classification. Clear differentiation between green and transition activities addresses earlier investor hesitation linked to greenwashing concerns. By establishing uniform criteria across sectors, regulators aim to ensure that capital labelled as sustainable corresponds to measurable emissions or resilience outcomes. This definitional clarity is critical in enabling the growth of green bonds, sustainability-linked loans, and transition finance instruments.

Second, disclosure regimes have become progressively more stringent. Climate-related financial risk is increasingly treated as a material financial risk rather than a peripheral sustainability metric. Banks and large corporates are expected to integrate climate exposure into risk management frameworks, asset-liability assessments, and forward-looking scenario analysis. Such disclosure requirements reduce informational asymmetry and enable investors to evaluate long-term transition risk more accurately.

Third, prudential frameworks are gradually incorporating climate considerations. Discussions around risk weights for green assets, stress testing for climate scenarios, and exposure norms for carbon-intensive sectors reflect a broader shift in regulatory philosophy. Rather than treating climate finance as a specialised niche, regulators are embedding it within mainstream financial supervision.

This regulatory tightening also serves a strategic purpose in addressing the international financing bottleneck described in Section 2.3. Transparent classification

standards, credible reporting, and prudential integration enhance confidence among foreign institutional investors. In effect, regulatory reform functions as a risk-reduction instrument, lowering the implicit premium attached to policy uncertainty.

However, regulatory strengthening introduces its own challenges. Stricter disclosure requirements increase compliance costs, particularly for smaller firms. Banks must build internal capacity for climate risk modelling, which demands technical expertise and data infrastructure that remain unevenly distributed across institutions. There is also the risk of regulatory fragmentation if sectoral regulators adopt divergent standards without adequate coordination.

The 2026 framework therefore represents a balancing act. It seeks to provide sufficient rigour to attract large-scale capital while maintaining operational feasibility within domestic institutions. The shift from guideline-setting to enforceable standards marks a critical evolution in India's climate finance governance: climate objectives are no longer framed solely as developmental aspirations but as financially material realities embedded within regulatory architecture.

This foundational shift sets the stage for the subsections that follow, which will examine specific instruments and institutional mechanisms underpinning this regulatory transformation.

2.1 Climate Finance Taxonomy (2025–26): The "Shades of Green"

Finalised in late 2025 and operationalised through 2026, India's Climate Finance Taxonomy functions as the definitive classification framework for sustainable finance. In effect, it serves as a national dictionary for green and transition investment, translating climate objectives into legally and financially recognisable asset categories. Its introduction marked a decisive shift from principle-based sustainability narratives to technically defined screening criteria.

The taxonomy's primary objective is to prevent greenwashing while preserving financing pathways for sectors that cannot immediately achieve zero emissions. It does so through the establishment of Technical Screening Criteria (TSC), which define measurable performance thresholds across sectors. These criteria are designed to ensure that projects labelled as green or transition-aligned are grounded in quantifiable emissions or resilience outcomes rather than marketing claims.

A defining feature of India's taxonomy is its tiered structure—often described as the "shades of green" model. This framework recognises the developmental and industrial complexity of the Indian economy, avoiding a binary classification that would exclude entire sectors from sustainable finance.

Tier 1: Climate Supportive (Dark Green)

The first tier is reserved for activities that result in clear and measurable emission avoidance or removal. These projects are aligned with long-term net-zero objectives and generally represent mature or near-mature low-carbon technologies. Typical examples include utility-scale renewable energy generation, green hydrogen

production facilities, and industrial water management systems such as Zero Liquid Discharge (ZLD) installations.

Projects qualifying under this tier must demonstrate absolute emissions reductions relative to conventional baselines, not merely intensity improvements. This classification provides strong signalling value for domestic and international investors seeking assets with high environmental integrity. It also forms the backbone of India's green bond market.

Tier 2: Climate Supportive (Light Green)

The second tier acknowledges incremental but material improvements where zero-carbon substitutes are not yet commercially viable. Rather than demanding immediate elimination of emissions, this category recognises significant efficiency gains or resilience enhancements.

Illustrative activities include major energy-efficiency upgrades in existing transmission and distribution networks, retrofitting industrial equipment to reduce energy intensity, and climate-resilient infrastructure such as flood-resistant housing in vulnerable coastal regions. These investments may not deliver absolute zero emissions but contribute meaningfully to mitigation or adaptation pathways.

This tier is particularly relevant for a rapidly industrialising economy where complete technology substitution may be infeasible in the short term. By providing recognition for credible incremental progress, the taxonomy avoids creating financing cliffs for sectors undergoing gradual transition.

Transition Supportive (Amber/Transition)

The most strategically significant innovation is the inclusion of a Transition Supportive category. This tier provides a structured financing pathway for hard-to-abate industries such as steel, cement, and aluminium—sectors that collectively form a substantial share of India's industrial base and export profile.

Rather than excluding carbon-intensive industries from sustainable finance eligibility, the taxonomy defines "Transition Thresholds." These thresholds specify time-bound, performance-based emission reduction pathways. Firms that align with these trajectories may access labelled "Transition Bonds" or other structured financing instruments.

This approach recognises a core economic reality: industrial decarbonisation is capital-intensive and technologically evolving. A rigid exclusionary taxonomy could inadvertently restrict capital flows to precisely those sectors that require the most investment to decarbonise. By contrast, a threshold-based framework preserves market discipline while maintaining industrial competitiveness.

Table 6: Structure of India's Climate Finance Taxonomy

Tier	Classification Label	Nature of Impact	Illustrative Activities	Financing Instrument
Tier 1	Climate Supportive (Dark Green)	Absolute emission avoidance or removal	Utility-scale renewables, green hydrogen, ZLD systems	Green Bonds, Green Loans
Tier 2	Climate Supportive (Light Green)	Significant efficiency or resilience gains	Grid efficiency upgrades, climate-resilient housing	Sustainability-Linked Loans
Tier 3	Transition Supportive (Amber)	Time-bound industrial decarbonisation	Steel, cement, aluminium under defined emission thresholds	Transition Bonds

Regulatory and Financial Implications

The taxonomy enhances transparency by standardising definitions across regulators, financial institutions, and issuers. It reduces classification ambiguity, improves investor confidence, and strengthens alignment between fiscal incentives and private capital allocation.

Crucially, it also interacts with international capital flows. Alignment with evolving global disclosure norms reduces friction for foreign ESG funds and institutional investors. By clearly distinguishing between green and transition activities, India provides greater clarity to investors evaluating carbon risk exposure in light of mechanisms such as the European Union's Carbon Border Adjustment Mechanism.

However, effective implementation depends on rigorous monitoring and verification. Technical Screening Criteria must remain science-based and periodically updated to reflect technological advancements. If thresholds are set too leniently, credibility risks emerge; if set too stringently, financing access may be constrained.

Overall, the taxonomy represents a foundational regulatory instrument within India's climate finance framework. It does not mobilise capital directly, but it shapes the credibility, direction, and integrity of capital flows. By institutionalising the "shades of green" approach, India has attempted to reconcile environmental ambition with industrial realism—an equilibrium central to the next phase of climate finance mobilisation.

2.2 Infrastructure Risk Guarantee Fund (IRGF)

The Infrastructure Risk Guarantee Fund (IRGF), introduced in the Union Budget 2026–27, represents a structural intervention aimed at resolving one of the most persistent barriers in climate infrastructure finance: construction-phase risk. While operational renewable assets with long-term power purchase agreements have become relatively bankable, early-stage infrastructure development continues to carry substantial

uncertainty. Regulatory approvals, land acquisition delays, supply-chain disruptions, and cost overruns have historically deterred institutional capital from entering at the construction stage.

The IRGF seeks to address this gap by directly intervening in the risk architecture of large-scale climate projects. Rather than offering direct subsidies or concessional loans, it deploys partial credit guarantees to lenders, including commercial banks and non-banking financial companies. These guarantees cover a defined portion of potential default risk during the most vulnerable phase of project development.

Mechanism: Partial Credit and First-Loss Absorption

The core design principle of the IRGF is risk layering. By absorbing a portion of first-loss exposure, the fund reduces the probability-adjusted loss for senior lenders. This reallocation of risk improves the effective credit profile of the underlying project. In practical terms, projects that would otherwise be rated below investment grade may, with a guarantee backstop, achieve a higher credit rating.

This improvement is critical for unlocking long-term institutional capital. Pension funds, insurance companies, and sovereign wealth funds typically operate under regulatory constraints that limit exposure to sub-investment-grade assets. By enhancing credit quality through guarantees, the IRGF enables such institutions to participate in infrastructure financing without breaching prudential norms.

The fund thus operates less as a source of capital and more as a catalytic instrument. Its impact depends on its ability to crowd in multiples of private investment relative to its own fiscal allocation.

Objective: Enhancing Bankability and Lowering Cost of Capital

The broader objective of the IRGF is to convert technically viable but financially risky projects into bankable assets. Construction-phase uncertainty often leads to higher interest rates and shorter tenors, which in turn undermine project viability. By mitigating early-stage default risk, the IRGF lowers the perceived risk premium and stabilises financing terms.

This mechanism aligns with the broader regulatory shift described in Section 3, where climate policy increasingly focuses on improving financial architecture rather than relying solely on direct expenditure. The IRGF exemplifies a balance-sheet-based approach: using public risk-bearing capacity to mobilise private capital at scale.

Scale and Strategic Targeting

The IRGF is embedded within a broader infrastructure capital expenditure target of approximately ₹12.2 lakh crore for FY27. Within this macro framework, the fund specifically prioritises Public-Private Partnership (PPP) models in capital-intensive green sectors. Two focus areas stand out:

- **Green hydrogen corridors**, where integrated infrastructure—production, storage, and transport—requires coordinated investment across multiple nodes.
- **Offshore wind farms**, which involve high upfront capital costs, complex marine construction risks, and longer gestation periods relative to onshore renewables.

These sectors are particularly sensitive to construction-phase risk and therefore prime candidates for guarantee-based support.

Table 7: IRGF Risk Mitigation Architecture

Dimension	Without IRGF	With IRGF Support	Expected Outcome
Construction Risk	Fully borne by lenders/investors	Partially absorbed through guarantee	Reduced perceived default probability
Credit Rating	Often below investment grade	Upgraded due to risk backstop	Access to institutional capital
Cost of Capital	Higher risk premium	Lower financing cost	Improved project viability
Institutional Participation	Limited pension/insurance entry	Increased long-term investor participation	Expanded capital pool

Structural Implications

The IRGF signals a maturing climate finance strategy. Earlier phases relied heavily on direct fiscal spending or sector-specific incentives. The guarantee-based model reflects a recognition that risk mitigation, not merely capital availability, is the principal constraint in infrastructure scaling.

However, the effectiveness of the IRGF will depend on governance and calibration. Guarantee exposure must be carefully structured to avoid moral hazard, where private developers undertake excessive risk under public backstopping. Transparent eligibility criteria, risk-sharing ratios, and independent project appraisal mechanisms will be critical to maintaining fiscal prudence.

In combination with the Climate Finance Taxonomy discussed in Section 3.1, the IRGF enhances both definitional clarity and financial bankability. The taxonomy determines what qualifies as green or transition-aligned; the IRGF improves the risk-return profile of qualifying projects. Together, they form complementary pillars of India's evolving climate finance framework.

2.3 SEBI BRSR Core: Standardizing the ESG Narrative

A central pillar of India's evolving climate finance architecture is the transformation of sustainability reporting from a largely narrative-driven disclosure exercise into a statutory, audit-grade compliance framework. By 2026, the Business Responsibility

and Sustainability Reporting (BRSR) Core framework mandated by the Securities and Exchange Board of India applies to the top 1,000 listed entities by market capitalisation. This expansion signals a decisive regulatory shift: environmental, social, and governance performance is no longer peripheral to financial reporting but embedded within it.

The BRSR Core framework standardises disclosure through a defined set of key performance indicators and introduces heightened assurance requirements. In doing so, it addresses one of the most persistent constraints in sustainable finance—information asymmetry.

From Limited to Reasonable Assurance

Under earlier disclosure regimes, sustainability reporting was typically subject to limited assurance, implying lower audit depth and higher reliance on management representations. The 2026 framework elevates this to "reasonable assurance" for nine core ESG attributes. This standard is equivalent in rigour to financial audit practices.

Among the mandatory attributes are greenhouse gas (GHG) emissions footprint, water intensity, energy consumption metrics, occupational safety indicators, and data privacy controls. The requirement for audit-grade verification increases credibility and reduces the scope for inflated or selectively presented claims. For investors, this enhances comparability and strengthens confidence in reported climate and sustainability performance.

The transition to reasonable assurance also compels firms to invest in internal data systems, emissions tracking methodologies, and governance processes. Sustainability metrics must now be integrated into enterprise resource planning systems rather than treated as externally compiled disclosures.

Value Chain Disclosures: Extending Accountability

Perhaps the most consequential expansion is the extension of reporting obligations to value chain partners. The top 250 listed entities are now required to disclose ESG performance metrics not only for their own operations but also for upstream suppliers and downstream partners.

This provision effectively embeds climate and sustainability compliance within corporate supply chains. Large firms, in order to meet reporting requirements, must seek data from their suppliers. As a result, micro, small, and medium enterprises (MSMEs) supplying to major corporations are indirectly drawn into the sustainability compliance ecosystem.

This cascading effect has two implications. First, it accelerates the diffusion of green practices beyond large listed entities into the broader industrial base. Second, it introduces new compliance costs and data burdens for smaller firms that may lack technical capacity. Over time, access to major corporate supply chains may become contingent on demonstrable ESG alignment.

Investor Impact: Reducing Information Asymmetry

For global institutional investors and ESG-focused funds, the BRSR Core framework substantially reduces informational opacity. Standardised, auditable disclosures enable cross-border comparability with firms operating under European or North American sustainability regimes.

This is particularly significant in the context of the international financing bottleneck discussed in Section 2.3. Higher perceived disclosure risk previously contributed to elevated risk premiums for Indian assets. By mandating consistent metrics and third-party verification, regulators aim to narrow this perception gap.

From a capital markets perspective, improved disclosure quality enhances pricing efficiency. Investors are better equipped to differentiate between firms with credible transition strategies and those with lagging performance. Over time, this can influence cost of capital differentials across sectors and incentivise more rapid decarbonisation.

Table 8: Key Features of BRSR Core (2026)

Dimension	Pre-2026 Model	BRSR Core (2026)	Financial Implication
Assurance Level	Limited assurance	Reasonable assurance (audit-equivalent)	Higher data credibility
Scope	Entity-level reporting	Entity + value chain (Top 250)	Supply chain compliance integration
Standardisation	Mixed metrics, evolving formats	Uniform core indicators	Improved cross-firm comparability
Investor Confidence	Moderate	Significantly strengthened	Reduced information risk premium

Structural Significance

The BRSR Core framework reinforces the broader regulatory transition outlined in Section 3. Climate finance is increasingly supported not only by fiscal incentives and risk guarantees but also by data transparency and audit discipline. If the Climate Finance Taxonomy defines what qualifies as green, and the Infrastructure Risk Guarantee Fund improves bankability, BRSR Core ensures that corporate performance claims are verifiable and comparable.

Together, these instruments reflect a regulatory ecosystem moving toward enforceability and financial materiality. Climate governance is no longer framed as voluntary corporate responsibility; it is embedded within capital market regulation, shaping how risk is assessed, priced, and allocated.

3 Financing Instruments and Mechanisms

If Section 2 quantified the scale of the financing gap and Section 3 examined the regulatory architecture designed to improve credibility and bankability, Section 4 turns to the instruments through which capital is actually mobilised. Climate ambition becomes financially meaningful only when translated into structured products, risk-sharing arrangements, and marketable securities. The effectiveness of India's climate transition will therefore depend not only on policy direction but also on the sophistication and scalability of its financing mechanisms.

The landscape of financing instruments in 2026 reflects a layered ecosystem. It spans sovereign issuances, corporate-labelled bonds, blended finance vehicles, credit enhancement tools, sustainability-linked lending structures, and emerging transition finance instruments. Each mechanism addresses a specific constraint within the broader capital mobilisation challenge—whether that constraint relates to cost of capital, tenor mismatch, construction risk, or information asymmetry.

At the sovereign level, green bond issuances have served both a signalling and market-development function. By issuing labelled sovereign green bonds, the government establishes benchmark yield curves for domestic green securities. This reduces pricing uncertainty for corporate issuers and creates a reference framework for investor appetite. Sovereign issuances also demonstrate commitment to transparent use-of-proceeds reporting, reinforcing the credibility of the broader green bond market.

Corporate green bonds and sustainability-linked bonds have expanded steadily. Unlike traditional bonds where proceeds may be fungible, green bonds are tied to specific eligible projects under the Climate Finance Taxonomy framework. Sustainability-linked bonds, by contrast, embed performance-based triggers—coupon step-ups or step-downs linked to predefined emissions or energy intensity targets. This structure aligns financing costs with corporate transition performance, incentivising measurable outcomes rather than mere capital allocation.

Transition bonds have emerged as a particularly significant instrument for hard-to-abate sectors. Under the taxonomy's Transition Supportive category, industrial firms may issue bonds linked to time-bound emission reduction thresholds. This approach avoids the exclusion of carbon-intensive industries from capital markets while preserving environmental accountability. The instrument recognises that industrial transformation is a phased process requiring sustained investment rather than immediate zero-emission compliance.

Blended finance structures represent another critical mechanism. These combine concessional capital—often from public institutions or multilateral agencies—with private investment. By taking subordinate or first-loss positions, concessional capital improves the risk-return profile for senior investors. This approach is particularly relevant in sectors such as green hydrogen, battery storage, and climate adaptation infrastructure, where technology and revenue risks remain elevated.

Credit enhancement tools, including partial guarantees such as those provided under the Infrastructure Risk Guarantee Fund, further strengthen bankability. By improving credit ratings and reducing perceived default probability, these instruments expand the pool of eligible investors, especially among long-term institutional actors.

Sustainability-linked lending by banks has also evolved. Instead of earmarking funds solely for green projects, these loans tie interest rates to borrower performance on climate metrics. Borrowers meeting defined sustainability targets benefit from lower borrowing costs. This structure broadens participation beyond explicitly green sectors and integrates transition incentives into mainstream corporate finance.

The diversity of instruments reflects a key strategic insight: no single financing mechanism can bridge a USD 300 billion annual requirement. The challenge is systemic and therefore demands instrument diversification. Renewable energy expansion, industrial decarbonisation, grid modernisation, clean transport electrification, and climate adaptation each require distinct risk-sharing and revenue models.

Table 9: Key Climate Financing Instruments

Instrument	Primary Use	Risk Mitigation Mechanism	Target Sector
Sovereign Green Bonds	Benchmarking and signalling	Government credit backing	Public infrastructure, renewables
Corporate Green Bonds	Project-specific financing	Use-of-proceeds transparency	Renewable energy, grid upgrades
Sustainability-Linked Bonds/Loans	Performance-based transition	Coupon linked to ESG targets	Diversified corporates
Transition Bonds	Industrial decarbonisation	Threshold-based eligibility	Steel, cement, aluminium
Blended Finance Vehicles	Early-stage/high-risk projects	Concessional first-loss capital	Hydrogen, storage, adaptation
Partial Credit Guarantees	Construction-phase infrastructure	Risk absorption by public fund	PPP models, offshore wind

Despite this expanding toolkit, certain structural constraints persist. Long-tenor financing remains limited in domestic bond markets. Hedging instruments for currency risk are shallow, constraining foreign participation. Adaptation finance continues to lack commercially viable revenue models, making it heavily dependent on public expenditure or concessional capital.

The effectiveness of financing instruments therefore depends on coherence with regulatory frameworks and fiscal strategy. The Climate Finance Taxonomy defines eligible activities. Disclosure standards such as BRSR Core enhance transparency. Risk

mitigation tools like the Infrastructure Risk Guarantee Fund improve credit quality. Financing instruments operate within this architecture to translate policy clarity into capital flows.

Section 4 thus marks the operational layer of India's climate finance strategy. Instruments and mechanisms are not peripheral technicalities; they are the channels through which the financing gap can either narrow or persist. The subsequent subsections can examine specific instruments in greater detail, assessing their scale, effectiveness, and limitations within the broader transition pathway.

3.1 Sovereign Green Bonds (SGrB): Institutionalizing Green Debt

The introduction of Sovereign Green Bonds represents a structural shift in India's public finance strategy. Rather than financing climate-linked infrastructure through general-purpose borrowing, the government has created a labelled debt instrument explicitly tied to environmental outcomes. This shift enhances transparency, strengthens signalling to markets, and builds a high-visibility pipeline for impact-aligned capital.

Sovereign Green Bonds move climate expenditure from the periphery of budgetary classification to the core of debt management strategy. By ring-fencing proceeds under an updated Sovereign Green Bond Framework (2025), the government has institutionalised use-of-proceeds discipline, aligning borrowing with measurable carbon avoidance and resilience metrics. The result is not merely an alternative funding source but a structural integration of climate objectives into sovereign debt architecture.

Issuance Trajectory and Fiscal Scaling

The SGrB programme has expanded steadily as the eligible project pipeline matured.

- **FY26 Issuance (Actual): ₹15,000 crore.**
  This tranche emphasised longer tenors, extending up to 30 years, to better match the lifecycle of infrastructure assets such as rail electrification and metro systems. The shift toward longer maturities signals growing market confidence in green-labelled sovereign paper.
- **FY27 Pipeline (Proposed): ₹31,000 crore.**
  The Union Budget 2026–27 nearly doubled the issuance target. This reflects a saturation strategy—positioning green bonds not as a niche instrument but as an embedded component of the broader government borrowing programme.
- **Cumulative Milestone:**
  As of February 2026, cumulative issuance has surpassed ₹72,000 crore. This benchmark is significant for domestic capital markets, as it establishes a sovereign yield curve reference for corporate green bond issuers.

Table 10: Sovereign Green Bond Issuance Trajectory

Fiscal Year	Issuance (₹ crore)	Strategic Emphasis
FY26 (Actual)	15,000	Longer tenors (up to 30 years)
FY27 (Proposed)	31,000	Integration into core borrowing strategy
Cumulative (Feb 2026)	72,000+	Benchmark for domestic green bond market

Box 1: Indian Railways: The Decarbonisation Engine (~₹15,000 crore)

Figure 1: Electric freight locomotive (WAG-9 class) operated by Indian Railways, representing the electrification of freight corridors and the decarbonisation of India's transport infrastructure

Figure 2: Rooftop solar installations at a railway station, illustrating the integration of distributed renewable energy within public transport infrastructure under India's decarbonisation strategy

The largest beneficiary in the FY27 pipeline is Indian Railways, reflecting its role as a systemic emissions reducer in freight and passenger mobility.

Funding allocations include:

- **Energy-Efficient Locomotives:** Procurement of WAG-12B (12,000 HP) electric locomotives equipped with regenerative braking systems that feed electricity back into the grid.

- **Hydrogen for Heritage:** Deployment of 35 hydrogen-powered trains on non-electrified scenic and heritage routes, building on pilot trials completed in late 2025.
- **Zero-Carbon Stations:** Installation of rooftop solar capacity and "Shunya" (Net Zero) certification for over 2,000 railway stations.

Rail decarbonisation has multiplier effects—reducing diesel dependence, improving freight efficiency, and lowering urban air pollution simultaneously.

Box 2: PM Surya Ghar: Muft Bijli Yojana (~₹22,000 crore Budgetary Support)

Figure 3: Residential rooftop solar deployment supported by subsidy schemes and green credit mechanisms, reflecting the role of distributed energy in reducing grid dependence and household carbon footprints

The PM Surya Ghar: Muft Bijli Yojana represents one of the most socially redistributive applications of SGrB proceeds.

Although the scheme's total outlay stands at ₹75,000 crore, sovereign green bond financing increasingly supports the Central Financial Assistance component.

Key features include:

- Installation of rooftop solar systems across 10 million households.
- Target capacity of approximately 30 GW.
- Up to 60 percent capital cost support for low-income households.
- Provision of up to 300 units of free electricity per month.

By effectively transferring the green premium from households to the sovereign bond market, SGrBs convert public debt into distributed energy access infrastructure.

Box 3: Urban Mass Transit: Metro Expansion (~₹4,069 crore)

Figure 4: Electric metro network expansion reflecting public investment in sustainable urban mobility and reduced fossil-fuel dependence

Urban mass transit investments focus on Tier-2 cities such as Pune, Patna, and Kochi.

Allocations support:

- Phase expansions to reduce vehicular congestion and particulate pollution.
- Intermodal integration through electric feeder buses.
- Charging hubs for e-rickshaws and last-mile connectivity.

These investments combine mitigation (reduced emissions) with public health co-benefits through lower PM2.5 levels.

The "Greenium" and Financial Engineering

A central strategic objective is capturing the "Greenium"—the yield advantage where green bonds trade at slightly lower interest rates than conventional sovereign bonds.

Current trends indicate:

- A modest and intermittent Greenium in the range of 0–6 basis points.
- Strong domestic demand from institutions such as the Life Insurance Corporation of India and commercial banks.
- Limited but growing cost-saving benefits for the sovereign.

To deepen international participation, SGrBs have been placed under the Fully Accessible Route (FAR), enabling unrestricted foreign investment. Additionally, the Reserve Bank of India and the International Financial Services Centres Authority have enabled trading of SGrBs at GIFT City's International Financial Services Centre (IFSC). This permits USD-denominated trading, reducing immediate currency hedging costs and addressing one of the key barriers identified in Section 2.3.

Governance and Climate Credibility

Oversight of project selection is vested in the Green Finance Working Committee, chaired by the Chief Economic Adviser. The governance architecture emphasises transparency and impact quantification.

Annual reporting now includes:

- Audited CO_2-equivalent emissions avoided per crore invested.
- Sector-wise allocation breakdowns.
- Compliance with Technical Screening Criteria under the Climate Finance Taxonomy.

This reporting discipline enhances credibility among global ESG funds and facilitates classification within "dark green" portfolios.

Structural Significance

Sovereign Green Bonds represent more than an alternative borrowing channel. They institutionalise climate-linked public expenditure within debt markets, deepen domestic green capital markets, and signal long-term policy commitment. While the fiscal scale remains modest relative to the USD 300 billion annual requirement outlined in Section 2, the instrument's catalytic and benchmarking value is substantial.

The next subsection can examine corporate green and transition bond markets, assessing whether sovereign signalling has translated into broader private sector issuance depth.

3.2 Carbon Markets and Green Credits

The year 2026 represents a structural turning point in India's environmental governance framework. For over a decade, climate action in the industrial sector operated largely through voluntary efficiency mechanisms and perform-achieve-trade style energy saving instruments. The transition underway now moves decisively toward carbon pricing and compliance-based emissions management. The architecture is deliberately two-pronged: the Indian Carbon Market (ICM), designed to drive industrial decarbonisation through tradable compliance instruments, and the Green Credit Programme (GCP), aimed at incentivising ecological restoration and non-industrial environmental outcomes.

Together, these mechanisms expand climate finance beyond project-level funding into market-based price signalling.

Indian Carbon Market (ICM): Institutionalising Carbon Pricing

The Indian Carbon Market introduces a compliance-oriented trading framework for carbon intensity reduction across designated industrial sectors. Rather than relying solely on technology-specific subsidies or viability gap funding, the ICM creates a price on carbon externalities within regulated sectors. This shifts decarbonisation from being purely policy-driven to market-driven.

The ICM operates through sectoral benchmarks and tradable carbon credit certificates. Entities exceeding prescribed emission intensity norms must purchase credits from entities that outperform targets. This structure creates a financial incentive for firms to invest in cleaner technologies—such as electrification, green hydrogen substitution, waste heat recovery, or carbon capture—if the marginal cost of abatement is lower than the prevailing carbon price.

The significance of the ICM lies not only in compliance enforcement but in capital allocation. Once carbon liabilities become measurable and tradable, they become bankable variables. Financial institutions can price transition risk more accurately. Industrial firms can incorporate forward carbon price assumptions into capital budgeting decisions. Over time, carbon price discovery may influence investment flows in steel, cement, aluminium, fertilisers, and refining—precisely the hard-to-abate sectors discussed in Section 2.4.

A predictable and credible carbon market also interacts with international trade exposure. As external mechanisms such as the European Union's Carbon Border Adjustment Mechanism begin to penalise embedded emissions in exports, a functioning domestic carbon pricing framework strengthens India's negotiating position. Demonstrable carbon accounting reduces the risk of arbitrary external carbon levies.

However, the effectiveness of the ICM depends on design calibration. Overly lenient benchmarks may dilute price signals; excessively stringent targets may generate compliance shocks. Market liquidity, transparent registry systems, and credible monitoring, reporting, and verification (MRV) infrastructure are essential to avoid volatility and speculative distortion.

Green Credit Programme (GCP): Valuing Ecological Services

Parallel to the industrial carbon market, the Green Credit Programme extends the logic of tradable incentives to ecological restoration. Unlike the ICM, which focuses on emissions reduction in regulated sectors, the GCP monetises positive environmental externalities—afforestation, water conservation, mangrove restoration, biodiversity protection, and sustainable land management.

Under the programme, entities undertaking certified environmental restoration activities earn tradable green credits. These credits can be purchased by corporations seeking to meet sustainability commitments, offset residual impacts, or enhance ESG performance metrics under disclosure regimes such as BRSR Core.

The GCP broadens the climate finance ecosystem beyond industrial mitigation. It creates a financial pathway for ecosystem services that traditionally relied on budgetary support or philanthropic funding. By assigning tradable value to ecological enhancement, the programme attempts to integrate natural capital into market systems.

This approach also has implications for rural economies. Community-led afforestation or watershed restoration projects can potentially generate credit flows,

linking climate finance to local livelihoods. However, safeguards are critical to ensure environmental integrity, avoid double counting, and protect community land rights.

Table 11: Comparative Structure – ICM vs GCP

Dimension	Indian Carbon Market (ICM)	Green Credit Programme (GCP)
Primary Objective	Industrial decarbonisation	Ecological restoration
Instrument Type	Compliance-based carbon credits	Voluntary environmental credits
Target Actors	Energy-intensive industries	Corporates, local bodies, communities
Revenue Logic	Avoided carbon liability	Monetised environmental enhancement
Risk Consideration	Carbon price volatility	Verification and ecological permanence

Market Signalling and Financial Integration

The coexistence of ICM and GCP signals a maturing environmental governance model. One internalises negative externalities through carbon pricing; the other rewards positive environmental contributions. Both instruments transform environmental performance into financial variables.

For investors, these markets provide additional layers of data and price discovery. Carbon prices influence industrial valuation models. Green credits affect corporate sustainability scores and access to ESG-aligned capital pools. In combination with the Climate Finance Taxonomy and enhanced disclosure standards, carbon markets embed climate considerations directly into financial decision-making.

Nonetheless, scale and credibility remain decisive factors. Market liquidity, transparent registries, and independent verification determine whether these instruments reduce financing gaps or merely create parallel trading mechanisms with limited impact.

In structural terms, Section 4 now reflects a diversified toolkit: sovereign bonds mobilise public capital; guarantees improve bankability; carbon markets create price signals; and green credits monetise ecological value. The question that follows is whether these instruments, collectively, are sufficient to narrow the six-fold investment gap identified earlier—or whether deeper financial reform remains necessary.

4 Emerging Trends and Sectoral Focus

The 2026 fiscal and regulatory cycle marks a decisive shift from broad-based renewable expansion toward targeted interventions in structurally complex sectors. Climate finance is no longer concentrated primarily in generation capacity or grid integration. Instead, it is increasingly directed toward technologically intensive domains that sit at the intersection of industrial competitiveness, energy security, and long-term decarbonisation.

This transition reflects a deeper recalibration of priorities. As renewable energy deployment stabilises within an established financing ecosystem, the policy focus has moved to sectors where emissions intensity remains high and abatement pathways are technologically demanding. The emerging agenda centres on three strategically significant areas: carbon capture and storage technologies for hard-to-abate industries, nuclear energy expansion under a reformed legislative framework, and the securing of critical mineral supply chains necessary for clean technology manufacturing.

These sectors share several characteristics. They are capital-intensive, involve long development timelines, and require strong regulatory alignment to attract sustained investment. They also carry geopolitical and industrial implications that extend beyond climate mitigation alone. Carbon capture is tied to export competitiveness and border carbon adjustments. Nuclear energy intersects with energy sovereignty and base-load stability. Critical minerals underpin the domestic manufacturing of batteries, renewable components, and advanced clean technologies.

The financial architecture supporting these domains differs from that used in mature renewable markets. Investment decisions are influenced by liability frameworks, technological risk, strategic reserves policy, and international supply chain dependencies. Public finance instruments, legislative reform, and industrial incentives play a larger role in shaping investor confidence.

Section 5 therefore examines the next frontier of India's climate finance evolution: sectors where decarbonisation is inseparable from industrial strategy. The subsections that follow explore carbon capture deployment, nuclear energy reform, and critical mineral security as core pillars of this emerging phase.

4.1 Carbon Capture, Utilization, and Storage (CCUS)

The Union Budget 2026–27 marked a decisive transition for Carbon Capture, Utilisation, and Storage (CCUS), repositioning it from a research-driven pilot concept to an industrial-scale intervention. A dedicated allocation of ₹20,000 crore (approximately USD 2.2 billion) over five years targets five high-emitting, hard-to-abate sectors: steel, cement, thermal power, refineries, and chemicals. The financial architecture is structured primarily as Viability Gap Funding, designed to narrow the green premium and make carbon capture commercially viable for large industrial actors.

This allocation is not merely environmental expenditure; it reflects industrial policy in response to trade exposure, process emissions, and energy security considerations. CCUS is being framed as both a defensive mechanism to preserve export competitiveness and an enabling bridge in India's broader decarbonisation pathway.

The Strategic Rationale: Why 2026 Is a Turning Point

Export Safeguard and Trade Competitiveness

With the European Union's Carbon Border Adjustment Mechanism entering full operational force in 2026, Indian exporters of steel and cement face increasing exposure to embedded carbon pricing. Without demonstrable emissions reduction, exports risk being subject to border levies that erode price competitiveness. In this context, CCUS is positioned as one of the few technologies capable of delivering rapid, measurable emissions reductions in heavy industry within this decade.

Addressing Process Emissions

In industries such as cement, a substantial proportion of emissions—often estimated at around 60 percent—arises from chemical reactions inherent to production, particularly calcination. These process emissions cannot be eliminated through renewable energy substitution alone. Carbon capture becomes the only technically scalable solution to intercept these unavoidable emissions streams.

Energy Security and Transitional Stability

CCUS also intersects with energy security. India continues to rely on domestic coal for grid stability. By enabling emissions capture at thermal power plants, CCUS allows continued utilisation of domestic resources while mitigating international climate compliance pressures. This positioning casts CCUS as a transitional instrument pending cost breakthroughs in long-duration energy storage technologies.

Circular Carbon Economy

Policy emphasis is increasingly placed on the "Utilisation" component of CCUS. Captured carbon dioxide is being piloted for industrial reuse, including concrete curing applications that improve material strength and lifecycle emissions performance. Additional pilots involve conversion of captured carbon into methanol or urea, effectively integrating waste carbon into industrial feedstocks. This approach reframes captured emissions from liability to input resource, aligning with circular economy objectives.

Structural and Operational Headwinds

Despite fiscal backing, CCUS remains technically and economically complex.

The Energy Penalty

Carbon capture processes are energy-intensive. Operating capture systems can consume an estimated 15 to 25 percent of a plant's total power output. This "energy penalty" reduces net efficiency and may necessitate additional power generation, partially offsetting emissions gains unless renewable electricity is integrated.

Capital and Cost Escalation

Even with Viability Gap Funding support, CCUS significantly increases production costs. Estimates suggest electricity costs could rise by 60 to 80 percent under full capture integration, while steel production costs may increase by approximately 20 percent. The risk of cost pass-through to consumers remains a concern, particularly in price-sensitive domestic markets.

Infrastructure and Geological Constraints

India currently lacks a dedicated carbon dioxide transport network. Effective CCUS deployment requires pipelines linking industrial clusters—such as those in Odisha, Gujarat, and Maharashtra—to suitable geological storage sites. Subsurface storage introduces additional considerations, including monitoring requirements, groundwater protection, and the management of induced micro-seismic activity.

Moral Hazard Debate

Critics argue that large-scale CCUS investment may extend the operational lifespan of fossil fuel infrastructure, potentially delaying deeper structural shifts toward green hydrogen and fully renewable-based systems. This critique underscores the importance of time-bound transition planning and integration with broader decarbonisation targets.

Sectoral Implementation Strategy (2026–2031)

The government's deployment strategy emphasises targeted pilots and cluster-based scaling.

Table 12: Sectoral Implementation Strategy (2026–2031)

Sector	Deployment Strategy	Key 2026 Project Highlight
Steel	Blast furnace top-gas recovery and capture	Pilot hubs in Eastern India led by major integrated producers
Cement	Oxy-fuel combustion capture systems	Net-zero facility trials at large integrated plants
Power	Post-combustion capture at thermal plants	Capture and methanol conversion pilots at large NTPC facilities
Refineries	Capture from hydrogen production units	CCUS cluster initiatives in Gujarat refining hubs
Chemicals	Carbon utilisation in urea and soda ash production	Fertiliser clusters in Gujarat and Uttar Pradesh

The strategic logic centres on the "hub and cluster" model. By aggregating multiple facilities within a geographic corridor and linking them to shared transport and storage infrastructure, economies of scale can be achieved. This model aims to

reduce capture costs from current levels of roughly USD 100 per tonne toward a target range of USD 30–50 per tonne by 2030.

Industrial and Financial Implications

The ₹20,000 crore outlay represents catalytic rather than comprehensive financing relative to the USD 110 billion annual requirement for industrial transition identified in Section 2.2. Its success will depend on cost reduction trajectories, cluster coordination, and alignment with carbon market pricing signals under the Indian Carbon Market.

CCUS in 2026 therefore represents a calculated bet: that targeted public risk-sharing and industrial clustering can compress technology costs rapidly enough to preserve export competitiveness while maintaining macroeconomic stability. Whether this bridge strategy accelerates transition or prolongs fossil dependence will depend on how tightly CCUS deployment is integrated with broader decarbonisation milestones.

4.2 Nuclear Energy: The SHANTI Act and the 100 GW Roadmap

The enactment of the Sustainable Harnessing and Advancement of Nuclear Energy for Transforming India (SHANTI) Act in 2025 constitutes the most consequential restructuring of India's atomic energy governance since the Atomic Energy Act, 1962. By repealing legacy statutory frameworks, including the Civil Liability for Nuclear Damage Act, 2010, the SHANTI Act transitions the sector from a state-dominated model to a regulated, multi-stakeholder ecosystem with calibrated private participation.

At the core of this legislative overhaul lies an ambitious expansion target: increasing installed nuclear capacity from approximately 8.8 GW in 2026 to 100 GW by 2047. This roadmap positions nuclear energy as the long-term low-carbon baseload anchor of the Indian electricity grid, complementing intermittent renewables and supporting industrial electrification.

Structural Enablers: Fiscal and Regulatory Realignment

The Union Budget 2026–27 operationalised the SHANTI Act through targeted fiscal interventions and regulatory harmonisation.

Customs Duty Exemptions

Customs duties have been reduced to Nil on critical nuclear imports under designated HS codes, including non-irradiated fuel elements and reactor components such as control rods. By extending this exemption through 2035, the government provides a decade-long investment horizon for international technology suppliers. This predictability lowers input costs and reduces regulatory uncertainty for reactor procurement.

Liability Harmonisation

One of the most consequential reforms involves liability restructuring. Under the SHANTI Act, liability is confined exclusively to the plant operator, aligning India with

the Convention on Supplementary Compensation for Nuclear Damage framework. The removal of supplier liability provisions addresses a longstanding deterrent for global reactor manufacturers such as Westinghouse Electric Company and GE Vernova. By clarifying liability exposure, the Act lowers entry barriers for foreign technology partnerships.

Private Ownership and Participation

For the first time, private entities may build, own, and operate nuclear facilities under a structured licensing regime. The state retains control over strategic elements of the fuel cycle—specifically enrichment and spent fuel management—preserving sovereign oversight of sensitive components while liberalising project-level development.

Strategic Rationale: Why Nuclear Now?

Baseload Reliability

Unlike solar and wind generation, nuclear plants operate at capacity factors exceeding 90 percent. This reliability is critical for sectors requiring uninterrupted electricity, including heavy industry and India's rapidly expanding data centre ecosystem. Nuclear energy therefore serves as a stability counterweight within a grid increasingly dominated by variable renewables.

Land Efficiency

Land acquisition remains a major bottleneck in infrastructure deployment. Nuclear facilities require substantially less land per unit of electricity generated compared to large-scale solar parks. In a densely populated country where land disputes delay projects, spatial efficiency is a significant comparative advantage.

Small Modular Reactors (SMRs)

The SHANTI framework explicitly enables the Bharat Small Reactor initiative, comprising units in the 220–300 MW range. These reactors are designed for modular deployment within industrial clusters or on repurposed coal plant sites. Their smaller footprint reduces transmission expansion requirements and allows incremental capacity additions rather than single mega-project commitments.

Thorium-Based Long-Term Vision

India possesses an estimated 25 percent of global thorium reserves. The 100 GW roadmap revitalises the long-standing three-stage nuclear programme aimed at harnessing thorium through Advanced Heavy Water Reactors. If successfully commercialised, thorium utilisation would significantly reduce long-term uranium import dependence and strengthen energy sovereignty.

Structural Constraints and Risk Factors

Despite legislative momentum, the nuclear expansion pathway faces formidable constraints.

Scale Acceleration Challenge

Achieving 100 GW by 2047 requires an average annual addition of approximately 4.3 GW. Historically, India has added less than 0.5 GW per year. Bridging this gap demands unprecedented acceleration in project execution, supply chain mobilisation, and capital deployment.

High Capital Intensity

Nuclear energy remains among the most capital-intensive clean technologies. Even with duty exemptions and liability clarity, upfront capital expenditure for large reactors is substantial, and payback periods extend across decades. Financing models must therefore accommodate long tenors and stable tariff frameworks.

Public Perception and Social Acceptance

Safety concerns remain politically sensitive. Post-Fukushima apprehensions continue to shape public discourse. Large-scale nuclear projects have historically faced local resistance, particularly in coastal regions. Liability reforms may be interpreted by critics as dilution of accountability, requiring sustained public engagement and transparent regulatory oversight.

Uranium Import Dependence

In the near term, India remains reliant on imported high-grade uranium. Geopolitical disruptions or supply chain instability could constrain expansion timelines unless domestic thorium-based technologies mature rapidly.

Table 13: Strategic Roadmap (2026–2047)

Phase	**Target Capacity**	**Strategic Focus**
Stage 1 (By 2032)	22.4 GW	Completion of ten 700 MW indigenous Pressurised Heavy Water Reactors
Stage 2 (By 2040)	~50 GW	Deployment of Small Modular Reactors and Fast Breeder Reactors
Stage 3 (By 2047)	100 GW	Commercialisation of Thorium-based Advanced Heavy Water Reactors

4.3 Critical Minerals: The Rare-Earth Corridors (Budget 2026–27)

In early 2026, India's transition from a resource exporter to a technology manufacturing hub has been institutionally reinforced through the announcement of Dedicated Rare-Earth Corridors in the Union Budget 2026–27. These corridors, located in Odisha, Tamil Nadu, Kerala, and Andhra Pradesh, are designed to operationalise the National Critical Minerals Mission by building integrated value chains that connect extraction directly to advanced manufacturing.

Rather than treating mining as an upstream, standalone activity, the corridor model seeks to internalise the full rare-earth lifecycle—from beach sand mineral extraction to magnet fabrication—within geographically concentrated industrial clusters.

Strategic Infrastructure: The Corridor Model

The defining feature of the corridor approach is vertical integration and spatial clustering.

Coastal Resource Base

India's primary source of rare-earth elements is monazite, found in beach sand minerals along the eastern and southern coastline. Odisha, Tamil Nadu, Kerala, and Andhra Pradesh together account for an estimated 11 million tonnes of monazite reserves, positioning India among the globally significant holders of rare-earth-bearing minerals.

Integrated Industrial Ecosystems

Each corridor is envisioned as a co-located ecosystem comprising:

- **Mining and Separation Units**
  Extraction of heavy minerals such as ilmenite, rutile, and zircon alongside monazite, which is classified as a prescribed substance due to its thorium content.
- **Refining and Chemical Processing Facilities**
  Processing monazite into high-purity rare-earth oxides, including neodymium, praseodymium, and dysprosium—key inputs for high-performance permanent magnets.
- **Manufacturing Hubs**
  Production of sintered rare-earth permanent magnets supported by a ₹7,280 crore incentive scheme aimed at building domestic Rare Earth Permanent Magnet (REPM) capacity.

By concentrating these activities within dedicated corridors, the model aims to reduce logistics costs, improve regulatory oversight, and accelerate downstream industrialisation.

Strategic Rationale: Economic and Security Dimensions

Electric Mobility and Renewable Energy Security

Permanent magnets form the core component of electric vehicle motors and wind turbine generators. India currently relies heavily on imports—predominantly from China—for magnet-grade rare-earth materials. Export restrictions imposed in late 2025 have amplified supply vulnerabilities. Localising rare-earth magnet production therefore reduces exposure to external shocks while strengthening the domestic clean energy supply chain.

State-Level Industrial Upgrading

Preliminary projections indicate that corridor development could mobilise significant private capital investment in each participating state. Beyond mining, the emphasis on refining and precision manufacturing is expected to generate high-skill employment in chemical processing, materials science, and advanced fabrication.

Defence and Strategic Autonomy

Rare-earth elements such as samarium and gadolinium are critical for missile guidance systems, radar technologies, and specialised alloys. Domestic supply chains mitigate geopolitical risk and reduce dependence on concentrated global suppliers, reinforcing national security objectives.

Linkages with Semiconductor and Electronics Manufacturing

The corridors are designed to complement India's electronics and semiconductor expansion strategy, particularly in Tamil Nadu and Andhra Pradesh. Rare-earth inputs are essential for advanced electronics, precision components, and emerging clean-tech applications.

Structural Risks and Implementation Challenges

Despite strategic logic, the corridor model faces substantive environmental, technological, and regulatory constraints.

Ecological Sensitivity of Coastal Zones

Beach sand mineral extraction occurs in fragile coastal dune ecosystems. Deep sand removal can alter geomorphology, increase erosion risk, and affect groundwater salinity. Biodiversity loss in alluvial sand systems and impacts on artisanal fishing communities represent significant socio-environmental trade-offs.

Radioactive By-Products

Monazite contains thorium and trace uranium. Safe handling, storage, and regulatory oversight of radioactive by-products require stringent compliance mechanisms. Any lapse could have long-term public health consequences for coastal populations, raising both environmental justice and governance concerns.

Technological Chokepoints

While India possesses experience in mineral extraction, it remains technologically constrained in achieving ultra-high purity (99.9 percent and above) separation required for high-performance magnets. Bridging the gap between laboratory-scale capability and industrial-scale fabrication remains a critical bottleneck.

Legal and Regulatory Complexity

Historically, handling of monazite has been restricted under the Atomic Energy Act, 1962, limiting participation largely to public sector entities such as Indian Rare Earths Limited. Recent reforms, including the Sustainable Harnessing and Advancement of Nuclear Energy for Transforming India (SHANTI) Act, signal a move toward calibrated private participation. However, the transition from a tightly controlled regime to a hybrid regulatory framework remains legally and institutionally complex.

Table 14: State-Specific Strategic Roles (2026)

State	Primary Strategic Asset	Targeted Downstream Industry
Odisha	High monazite concentration	Heavy engineering and aerospace alloys
Tamil Nadu	Advanced manufacturing ecosystem	EV motors and magnet fabrication
Kerala	Chemical processing expertise	High-purity rare-earth oxide refining
Andhra Pradesh	Extensive coastline for BSM extraction	Electronics and semiconductor inputs

Strategic Assessment

The 2026 realignment of global rare-earth supply chains has elevated critical minerals from an industrial policy issue to a national security priority. The Rare-Earth Corridor strategy reflects an attempt to compress the mineral-to-manufacturing value chain within domestic territory.

However, long-term success will depend on managing a delicate balance between industrial acceleration and coastal ecosystem preservation. The policy challenge is not merely geological or technological; it is distributive. Ensuring that corridor development does not marginalise fishing communities or degrade coastal commons will determine whether the strategy advances inclusive industrialisation or reproduces extractive tensions in a new sector.

Within the broader climate finance architecture, critical minerals function as the material foundation of decarbonisation. Without secure supply chains for rare-earth elements, ambitions in electric mobility, wind energy, and electronics manufacturing remain structurally constrained.

5 International Trade and Systemic Climate Risks

India's climate transition is no longer shaped solely by domestic policy choices. In 2026, global trade rules and climate risk exposure are exerting direct pressure on industrial competitiveness and fiscal stability. Two structural realities define this moment: first, the operationalisation of carbon border taxes in major export markets; second, the persistent underfunding of climate adaptation despite escalating physical risks.

This section examines how external trade regimes are reshaping mitigation finance (6.1), and how internal fiscal constraints are constraining adaptation finance (6.2).

5.1 The CBAM Impact: Carbon as a Trade Barrier

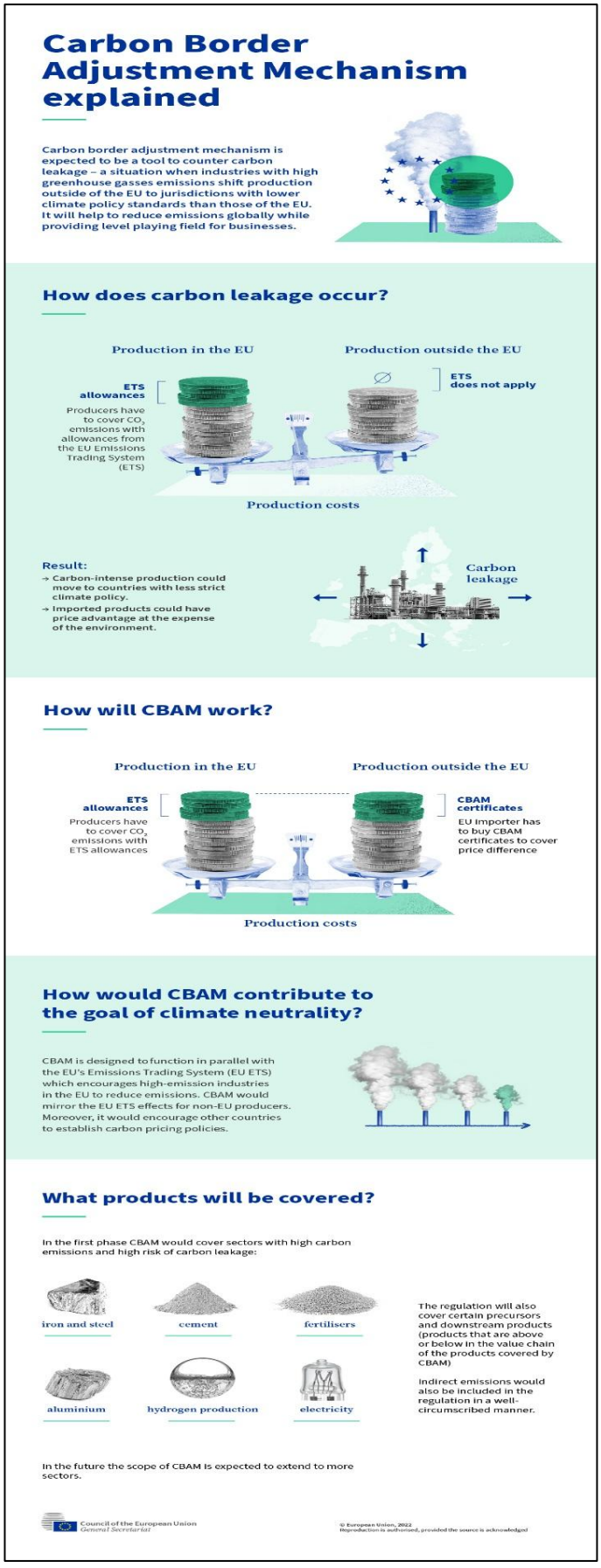

Figure 5: Schematic explanation of CBAM demonstrating the equalisation of carbon costs between EU producers (under the EU ETS) and foreign exporters through CBAM certificates

Source: Council of the European Union. (2023). Carbon Border Adjustment Mechanism explained*. © European Union*.

As of 1 January 2026, the Carbon Border Adjustment Mechanism of the European Union has moved from a transitional reporting phase to full financial implementation. For the first time, export competitiveness is explicitly tied to carbon intensity. Carbon accounting is no longer voluntary disclosure; it is embedded in customs duty calculations.

Economic Risk: The Carbon Price Transmission

The CBAM functions as a mirror extension of the EU Emissions Trading System. If the embedded emissions of imported goods exceed European benchmarks, importers must purchase CBAM certificates priced at prevailing EU carbon rates.

The Tax Exposure

Indian exports in carbon-intensive sectors such as steel, aluminium, and cement are now exposed to an effective carbon surcharge estimated between 20 percent and 35 percent. In the steel sector, this translates into additional duties exceeding USD 100 per tonne under current EU carbon prices.

Margin Compression

Evidence suggests that EU buyers are transferring a substantial portion of the carbon compliance cost back to Indian exporters. Margin erosion in the range of 16 to 22 percent risks rendering coal-based steel production commercially unviable in European markets.

The Carbon Intensity Gap

India's average steel emission intensity remains around 2.5 tonnes of CO_2 equivalent per tonne of crude steel, compared to lower EU averages. At EU carbon prices hovering near €80–€90 per tonne, this emissions differential is directly monetised under CBAM, converting environmental inefficiency into a financial liability.

The Default Value Penalty

From 2026 onward, plant-level verified data is mandatory. Firms unable to submit audited emissions disclosures face "default values," which are deliberately conservative and often significantly higher than actual emissions. For smaller exporters lacking monitoring systems, this creates a structural risk of exclusion from the EU market.

Financial Response: The Rise of Transition Finance

The CBAM shock has triggered a decisive pivot in industrial finance.

Technology Migration: BF-BOF to EAF

Traditional coal-based Blast Furnace–Basic Oxygen Furnace (BF-BOF) routes emit roughly 2.4 tonnes of CO_2 per tonne of steel. Electric Arc Furnaces (EAF), when powered by renewable electricity and recycled scrap, can dramatically reduce emissions intensity. Gas-based Direct Reduced Iron (DRI) is emerging as an intermediate pathway pending green hydrogen deployment.

Transition Loans and Capital Retrofitting

Major banks and non-banking financial companies have introduced dedicated transition finance products to fund large-scale industrial retrofits. These instruments are structured around long tenors and sustainability-linked performance metrics.

- **Scope 2 Mitigation:** Firms are securing renewable Power Purchase Agreements to reduce indirect emissions under CBAM accounting rules.
- **Internal Carbon Pricing:** Large conglomerates have adopted shadow carbon pricing in capital budgeting, typically assuming future carbon costs of ₹5,000–₹6,000 per tonne. This embeds climate risk into investment decisions before regulatory compulsion.

Government and Diplomatic Strategy

India is exploring the introduction of a domestic carbon pricing framework. Under CBAM rules, carbon costs already paid domestically may be deducted from EU liabilities. Capturing carbon revenue at home prevents fiscal leakage and allows reinvestment into domestic decarbonisation.

The Bureau of Energy Efficiency has also initiated support programmes to assist smaller exporters in developing Monitoring, Reporting, and Verification (MRV) systems. Without such institutional support, micro, small, and medium enterprises risk being disproportionately excluded from EU trade corridors.

Analytical Insight: In 2026, low-carbon production has become synonymous with market access. Transition finance is no longer reputational; it is survival capital.

5.2 Adaptation Underfunding: The Structural Imbalance

Figure 6: Flooded city streets following extreme rainfall, highlighting infrastructure vulnerability and the urgent need for investment in urban drainage, resilience, and climate adaptation

Figure 7: Shoreline erosion damaging homes and community infrastructure, illustrating the social and livelihood risks associated with climate-induced coastal change

While mitigation attracts capital and policy momentum, adaptation remains structurally underfunded. The imbalance has widened into what may be described as a "double ninety" problem:

- Approximately 90 percent of climate finance flows toward mitigation.
- Nearly 90 percent of adaptation finance is sourced from domestic public budgets.

The Funding Requirement Gap

International assessments suggest that India's adaptation needs could reach hundreds of billions of dollars annually by the mid-2030s. Current public expenditure has increased as a share of GDP over the past decade, yet fiscal space remains constrained.

International flows for adaptation remain limited and are often structured as non-concessional loans, adding to sovereign debt rather than easing it. This financing architecture risks converting climate vulnerability into fiscal vulnerability.

Why Private Capital Avoids Adaptation

The private sector's reluctance stems from structural characteristics of adaptation investments:

1. **Public Goods Nature**
   Infrastructure such as sea walls or urban drainage systems generates collective benefits without direct revenue streams.
2. **Extended Time Horizons**
   Many adaptation measures produce avoided-loss benefits over long periods rather than immediate cash flow.
3. **Measurement Challenges**
   Unlike mitigation, where emissions reductions are quantifiable, resilience lacks standardised metrics. Without measurable return indicators, risk pricing becomes difficult.

Budgetary Signalling in 2026–27

The Union Budget 2026–27 integrates adaptation within broader development expenditures rather than earmarking dedicated, highly visible adaptation funds. The policy position emphasises that improved infrastructure, health systems, and digital connectivity inherently enhance resilience.

While development does strengthen adaptive capacity, the absence of clearly ring-fenced adaptation financing complicates accountability and long-term planning.

Emerging Financial Innovations

To address the gap, several instruments are being piloted:

- **Municipal Green Bonds** for urban resilience infrastructure.
- **Blended Finance Structures** leveraging philanthropic first-loss capital to crowd in private insurers for climate-indexed agricultural insurance.
- **Resilience Credits**, a nascent concept aimed at monetising verified investments in community-level adaptation outcomes.

Strategic Implication

The underfunding of adaptation represents a systemic macroeconomic risk. Rising heat stress, crop losses, and urban flooding directly affect labour productivity, food security, and public health. If mitigation protects future emissions trajectories, adaptation safeguards present economic output.

Without increased concessional international finance and innovative domestic instruments, the cost of climate inaction could erode the very growth required to fund the transition.

6 Conclusion and Future Outlook

The year 2026 marks a structural inflection point in India's climate policy trajectory. The emphasis has shifted from declaratory ambition to institutional and financial engineering. Targets such as 500 GW of non-fossil capacity by 2030 and net zero emissions by 2070 are no longer framed solely as environmental commitments; they are now embedded within financial architecture, trade exposure, and industrial policy.

The coming five-year window (2026–2031) will determine whether India consolidates its position as a climate-vulnerable economy managing transition risks, or emerges as a laboratory for scalable green finance innovation. The outcome will depend on the operational strength of three institutional pillars.

6.1 Institutional Deepening: A National Green Finance Institution

While the National Investment and Infrastructure Fund has functioned as a catalytic vehicle for infrastructure financing, there is growing consensus around the need for a dedicated National Green Finance Institution (NGFI).

A Specialised Climate Lender

Unlike conventional banks, the proposed NGFI would concentrate exclusively on climate-aligned sectors, particularly high-risk, early-stage technologies such as green hydrogen, offshore wind, long-duration storage, and carbon capture. These technologies require patient capital with longer tenors and concessional features that commercial lenders are typically reluctant to provide.

Blended Finance Anchor

The NGFI is expected to function as a central risk-absorbing entity. Through first-loss guarantees and subordinated capital structures, it could crowd in private investment at scale. A blended finance model—where limited public capital de-risks substantially larger private flows—would be essential to bridge India's annual climate investment gap.

The institutional question is not merely about capital availability, but about risk allocation. Without a specialised intermediary capable of absorbing technological and currency risks, private participation will remain sub-optimal.

6.2 International Cooperation: Reducing the Cost of Capital

A persistent constraint on India's climate transition is the cost of capital differential between developed and emerging economies. Even commercially viable renewable projects often face a 3–5 percent premium attributable to currency risk and sovereign rating perceptions.

From Lending to Credit Enhancement

Future cooperation with Multilateral Development Banks must evolve beyond conventional project loans. Credit enhancement instruments—such as partial risk

guarantees and foreign exchange hedging facilities—can materially reduce borrowing costs. By improving project credit ratings, these tools unlock access to global institutional investors, including pension and insurance funds that require investment-grade securities.

Bilateral Green Corridors

Recent partnerships such as the India-UK Green Growth Equity Fund and the India-Germany Green Hydrogen Taskforce illustrate a corridor-based model of cooperation. Rather than relying solely on multilateral frameworks, these bilateral arrangements provide targeted capital and technical collaboration for specific transition sectors.

Reducing the currency premium is not a peripheral concern. It directly determines the speed and scale at which clean technologies can compete with legacy fossil assets.

6.3 Operationalising the Indian Carbon Market

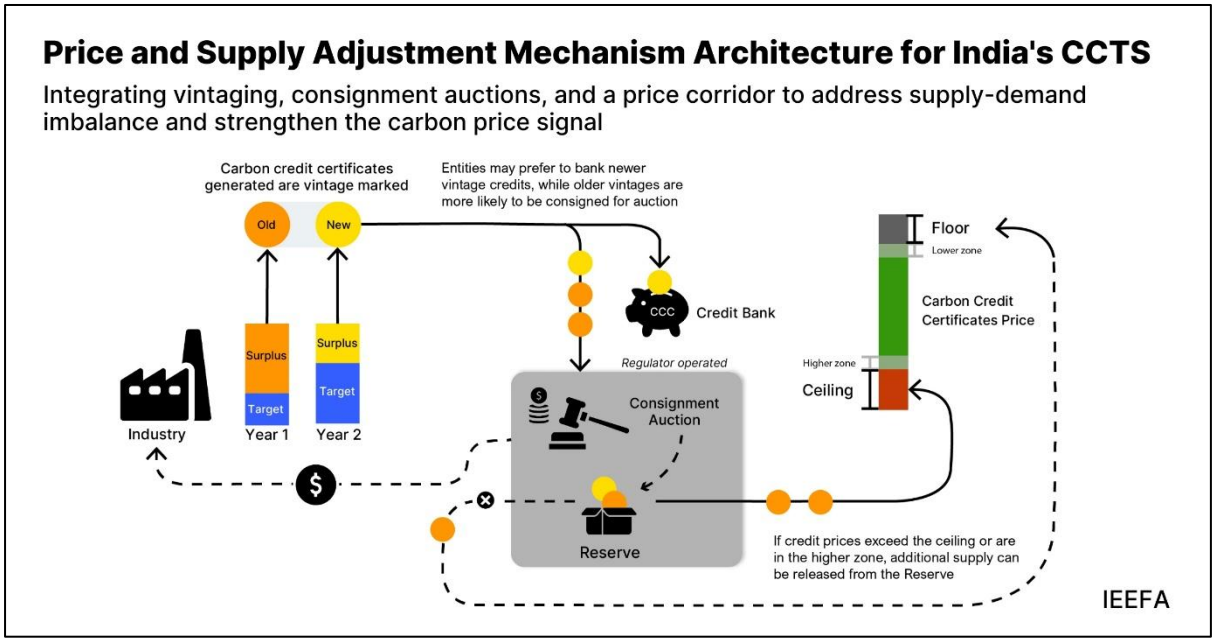

Figure 8: Mechanism to manage supply–demand imbalances in India's CCTS through regulated credit banking and a price corridor to strengthen the carbon price signal

Source: IEEFA

With compliance mechanisms beginning to take full shape in 2026, the Indian Carbon Market is positioned as the central price-signalling mechanism of the transition.

Domestic Price Discovery

A functioning carbon market must establish a price that balances environmental integrity with economic stability. If prices are too low, behavioural change will not occur. If excessively high, carbon costs may disrupt industrial output and

employment. Market analysts anticipate gradual convergence toward a price band that reflects both domestic industrial structure and international trade exposure.

Potential Global Linkages

Looking beyond 2027, policy discussions include the possibility of linking India's carbon market with established systems such as the EU Emissions Trading System. Such integration could enable Indian firms to monetise high-quality emissions reductions in global markets, potentially positioning India as a competitive supplier of verified carbon credits.

However, linkage requires regulatory robustness, credible monitoring, and harmonised standards. Market credibility will determine whether the ICM becomes a transformative policy instrument or remains a compliance mechanism with limited liquidity.

Strategic Outlook (2026–2031)

India's climate transition now rests on three interconnected dynamics:

1. **Institutional Innovation** — establishing specialised green finance intermediaries capable of managing technological and financial risk.
2. **International Financial Architecture Reform** — reducing structural capital cost disadvantages through credit enhancement and targeted partnerships.
3. **Market-Based Carbon Pricing** — embedding climate externalities into domestic price signals while maintaining industrial competitiveness.

The decisive variable will be execution capacity. Legislative reform and fiscal signalling have created the framework. The next five years will test whether institutional coordination, regulatory credibility, and financial innovation can converge at the scale required.

If successfully aligned, India could move beyond being a climate-affected economy to becoming a rule-shaping participant in global green finance. Failure, by contrast, would not only delay emission reductions but also entrench trade vulnerabilities and fiscal strain in an increasingly carbon-constrained global economy.

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