

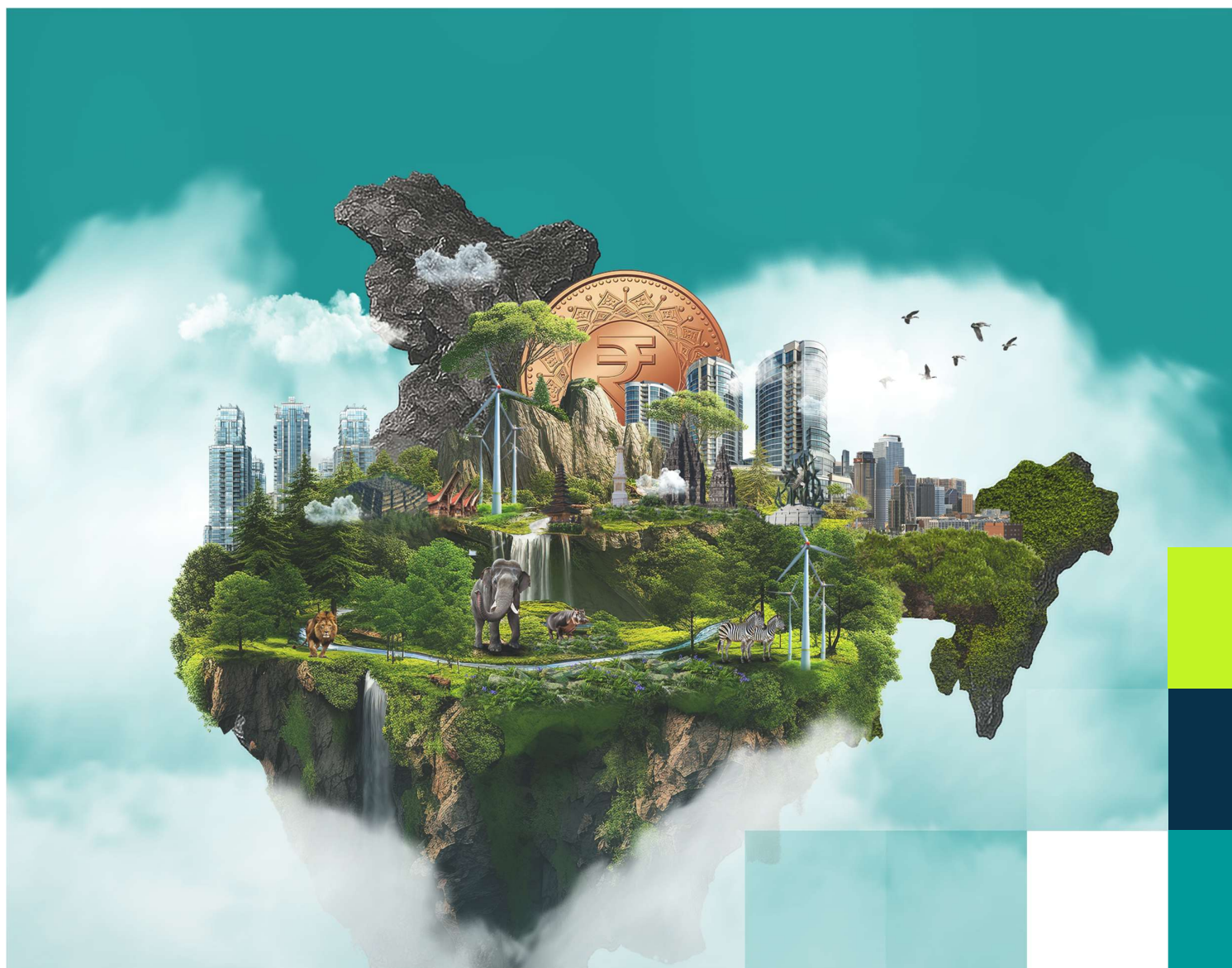
The Hard Economics of India's Transition

How Capital, Capacity, and Institutions Will Shape the Low-Carbon Future



Intueri
Consulting

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The principle of common but differentiated responsibilities is the bedrock of our enterprise for a sustainable world”

Narendra Modi

Honourable Prime Minister of India, during his address at the United Nations Sustainable Development Summit in New York on September 25, 2015.

Message from the Knowledge Partner

It is a privilege for Intueri Consulting LLP to serve as the Knowledge Partner for the 20th National Convention of the UN Global Compact Network India. At this moment in history, the global sustainability agenda is shifting decisively from commitment to execution, and India stands at the centre of this transition. The theme of this year's Convention, "**Financing a Sustainable Future: Aligning Capital with Climate, Equity, and Growth**", reflects both the urgency and the opportunity before us.

Our knowledge paper, "*The Hard Economics of India's Transition*", provides a technically rigorous view of India's climate and sustainability financing challenges. The central insight is unambiguous. India does not lack ambition, nor does it necessarily lack investor interest. Instead, it confronts a **climate finance absorption gap**. Capital will not flow at scale until we build the underlying technical, institutional and risk-management systems that convert climate ambition into credible, bankable projects.

Solving this requires strengthening what we describe as the **transition-enabling architecture**. This includes a robust climate finance taxonomy, reliable MRV systems, interoperable data platforms, state-level regulatory predictability, and strengthened project preparation pipelines. These enablers are not peripheral. They are the backbone of sustainable finance and are essential to advancing a wide suite of UN SDGs, from SDG 7 and SDG 9 to SDG 11, SDG 12 and SDG 13.

But India's transition cannot be viewed through the lens of climate alone. It must also advance India's broader growth aspirations, including becoming a five-trillion-dollar economy, strengthening industrial competitiveness, expanding global manufacturing share, and lifting millions into more secure livelihoods. A climate-aligned growth model offers India a structural advantage. It reduces long-term economic risk, lowers resource intensity, and positions India to lead in emerging sectors such as green hydrogen, energy storage, sustainable mobility, circularity, and climate technology.

The pathway ahead must therefore serve dual objectives:

1. **Accelerating India's rise as a global economic powerhouse** and
2. **Delivering on the UN Sustainable Development Goals with integrity and scale.**

This requires integrating MSMEs into sustainable supply chains through digital tools, aligning banks and financial institutions with climate-risk analytics, deploying blended finance to absorb early-stage technological risk, and ensuring that vulnerable communities and climate-exposed regions are not left behind. These elements lie at the intersection of SDG ambition and India's national development goals.

What inspires us at Intueri is the magnitude of India's opportunity. India can demonstrate to the world that climate leadership and economic growth are not competing agendas but mutually reinforcing pathways. A transition that is technically credible, economically sound and socially inclusive can position India as a global exemplar for emerging economies.

As Knowledge Partner, our commitment is to provide deep analytical insight and a systems-driven perspective to support this transition. We hope this Convention catalyses new collaborations, unlocks innovative financial mechanisms and accelerates India's progress toward both the SDGs and its long-term growth aspirations.

Ambarish Dasgupta
Senior Partner
Intueri Consulting LLP

1. Executive Summary

India stands at a strategic juncture. A decade of growth lies ahead in which the nation must align its capital flows with the twin imperatives of climate action and inclusive growth. The next few years will determine whether India succeeds in embedding sustainability at the heart of its economic trajectory or risks locking in high-carbon, resource-intensive growth that raises transition costs and economic vulnerability.

To date, India's policy frameworks, such as its enhanced NDCs under the Paris Agreement, the net-zero by 2070 goal, and the 500 GW non-fossil energy target reflect ambition. But ambition alone is not sufficient. The missing piece is **mobilising, structuring and deploying capital at scale** across sectors, geographies and stakeholders. Without this, the gap between aspiration and action will widen.

India is not short of climate ambition; it is short of *investable pathways*. The country has articulated strong commitments under its enhanced NDCs and net-zero goals, but progress will ultimately depend on its ability to convert policy targets into bankable, risk-priced assets that attract private capital at scale. The next decade will therefore be defined not by how much capital India needs, but by how efficiently it can **translate sustainability ambitions into viable projects, predictable cash flows, and credible risk signals**.

Today, this conversion process remains fragile: project pipelines are thin, risk frameworks inconsistent, data non-standardised, and transition incentives misaligned across corporates, MSMEs, and financial institutions. This whitepaper argues that the real challenge is not capital scarcity, but **capital absorption**.

We make four core arguments:

1. The financing gap is real, measurable and urgent: India needs **hundreds of billions of dollars** of incremental investment annually in high-impact sectors.
2. Private capital must become the dominant force, but only if enabled by smart structures, de-risking mechanisms and robust data/technology infrastructure.
3. Technology, data and digital infrastructure are no longer optional 'nice to haves' as they are the **central enablers** that link sustainability ambition to financial economics.
4. The transition must be inclusive, i.e., MSMEs, hard-to-abate sectors, regional clusters and underserved geographies must all be part of the "capital alignment" story if India is to deliver climate, equity and growth simultaneously.

We close with a short "India 2030 Scenarios Box" to guide strategic planning, followed by actionable pathways for corporates, MSMEs, financial institutions and policymakers.



We never know the worth of water till the well is dry.

Thomas Fuller

The big idea: India's transition will be determined by its ability to industrialise climate ambition

India's climate transition will not only hinge on the volume of capital available, but on the country's **capacity to industrialise its sustainability ambitions**. Global capital pools are deep, but investable opportunities in India remain thin because the enabling architecture such as project preparation, risk-sharing mechanisms, regulatory clarity, and data integrity are not yet mature enough to convert ambition into bankable assets.

In other words, India does not only have a climate finance gap; it also has a climate finance absorption gap.

Three structural constraints define this absorption gap:

1. **Bankability Deficit:** Projects in hard-to-abate sectors, adaptation, and circularity are high-impact but not structured for institutional capital.
2. **Institutional Capacity Deficit:** State-level execution capability, permitting systems, and regulatory predictability remain inconsistent.
3. **Trust Infrastructure Deficit:** Investors hesitate when data is non-verifiable, risks are opaque, and cash flows depend on policy discretion.

India's transition success will therefore not be measured just by the quantum of capital raised but also by the **percentage of that capital which successfully turns into functioning, de-risked, long-term transition assets**.

The expanded transition landscape now includes two high-impact sectors that require urgent capital: the built environment, which risks locking India into decades of high-emission infrastructure, and agriculture, which supports nearly half the population yet remains under-financed. At the same time, the persistent gap between climate finance commitments and delivery at the global level reinforces the need for India to rely primarily on domestic capital while using international funds to reduce risk and enable technology access.

2. India's climate & sustainability financing landscape

The Scale of the Financing Gap

Determining the size of the financing gap is foundational as it sets the scale of the mobilisation challenge. A recent bottom-up study covering four hard-to-abate sectors (power, steel, cement, road transport) estimates incremental climate finance needs of **US\$467 billion from 2022-2030**, or roughly US\$54 billion annually (~1.3 % of India's GDP) to align with decarbonisation in these sectors alone¹.

Another estimate places India's total climate investment requirement at **US\$2.5 trillion** (at 2014-15 prices) to meet its NDCs through 2030².

These numbers highlight two things:

- 1) the **order of magnitude** of the challenge and

¹ <https://economictimes.indiatimes.com/industry/renewables/india-needs-467-billion-climate-finance-by-2030-to-decarbonise-4-key-sectors-study/articleshow/123434151.cms>

² <https://static.pib.gov.in/WriteReadData/specificdocs/documents/2025/may/doc202557551101.pdf>

- 2) the fact that it is **dominated by a handful of sectors**.

These estimates expose a deeper structural issue: India's climate finance deficit is increasingly a **misallocation problem, not merely a shortage problem**. Capital exists, but it is not flowing to the right sectors at the right maturity or at the right risk pricing. The binding constraint is the absence of bankable, de-risked, and standardised projects, especially in sectors where returns are uncertain or dependent on state-level policy execution. India therefore faces a dual challenge: expanding the supply of climate-aligned capital *and* strengthening its capacity to absorb it.

Key market signals

While the gap is large, several positive developments are visible:

- The labelled sustainable debt market (green, sustainability-linked, transition-aligned instruments) is growing. For example, India's sustainable debt issuances crossed USD 55.9 billion, opening space for infrastructure-scale and portfolio financing³.
- Regulatory frameworks are maturing: the creation of a national climate finance taxonomy, enhanced corporate reporting requirements (e.g., BRSR in India), and increasing visibility of climate risk in financial disclosures.
- Cost declines in key technologies (solar PV, batteries) and economies of scale are improving project economics and therefore investment viability⁴.
- Corporates are transitioning from target-setting to execution-planning on climate and sustainability, for example, scope 3 emissions mapping, supplier sustainability financing, and internal transition committees.

Despite these positive signals, **mobilisation remains uneven**.

- 1) The pipeline of bankable projects is fragmented.
- 2) Risk perceptions remain elevated in hard-to-abate sectors.
- 3) MSMEs often lack access to capital or data infrastructure.
- 4) Adaptation/resilience investment remains severely under-funded.

Why the Gap Persists

The persistent financing gap is not the result of a single bottleneck but a **stacked set of frictions** across project preparation, risk perception, policy certainty, and data quality. While climate ambition has accelerated, the institutional machinery required to turn that ambition into investable outcomes has lagged. Put simply: India's climate finance ecosystem suffers from an "execution deficit," where capital is available but cannot be deployed at scale because the underlying projects lack clarity, predictability, or verifiable performance data.

Why does the gap continue to persist notwithstanding policy and market momentum? Several inter-linked factors are responsible for this:

- **Project preparation & de-risking:** Many sustainability/ transition projects require high upfront cost, long pay-back periods, and sometimes technology or regulatory risk. Without blended capital, they do not meet conventional risk-return thresholds.


³ <https://www.climatebonds.net/news-events/press-room/press-releases/indias-sustainable-debt-market-tops-usd-55-9-billion-new-mufg-cbi-report-maps-rapid-growth-pathways-2030>

⁴ <https://arxiv.org/abs/2107.04928>

- **Data and reporting deficiency:** Investors and lenders require credible data on ESG performance, transition pathway risk, climate resilience. Inefficient or incomplete disclosure raises cost of capital or deters investment.
- **MSME and supply-chain scale:** While large corporates often have access to capital and ESG capabilities, large swathes of the economy (particularly MSMEs) are under-served. These create major blind-spots in national transition pathways.
- **Regulatory and taxonomy ambiguity:** While India is advancing climate-finance taxonomy and disclosure standards, uncertainties remain around definitions of “transition” vs “green”, eligibility criteria, treatment of stranded-asset risk, and cross-jurisdictional alignment.
- **Adaptation/Resilience under-funding:** Most capital flows still prioritise mitigation (clean energy, decarbonisation) rather than adaptation (climate-proofing infrastructure, water resilience, agriculture). Adaptation financing is often lower return, higher risk and less well served by capital markets.

In sum, the financing landscape is evolving, i.e., the foundations for scale are present but systemic “mobilisation friction” remains.

Seven Hard Truths About India's Climate Transition

 <p>Truth 1</p> <p>Capital isn't the only problem. Bankable pipelines are. India has more green capital interest than viable projects to absorb it.</p>	 <p>Truth 2</p> <p>MSMEs cannot transition until their cashflow cycles do. Green loans do not matter when receivables come in 120 days later.</p>	 <p>Truth 3</p> <p>Most adaptation projects are un-investable under current financial logic. Because they prevent losses rather than generate revenue, they require new financial instruments, not traditional lending.</p>	 <p>Truth 4</p> <p>Transition finance will not scale without loss-absorbing capital. No lender will finance early-stage hydrogen, CCUS, or circularity without first-loss buffers.</p>
 <p>Truth 5</p> <p>State-level policy uncertainty is the largest unpriced transition risk. Investors care less about national targets and more about land, approvals, and tariff stability in specific states.</p>	 <p>Truth 6</p> <p>India's cost of capital is too high for several green technologies. Even viable technologies turn unviable at 11–14% borrowing rates.</p>	 <p>Truth 7</p> <p>Just transition is an economic stability risk. Regions dependent on coal, low-skill labour, or informal MSMEs face concentrated vulnerability that can derail transition momentum.</p>	

These truths force a more realistic, mature and investable view of India's path to 2030.

The climate finance credibility gap: From Copenhagen to Belém

India's transition strategy must be grounded in the lived reality of international climate finance. Over fifteen years, the gap between global commitments and actual delivery has steadily widened, creating a structural credibility deficit that fundamentally shapes how countries like India must plan their transition.

The Copenhagen baseline: A promise delivered late and poorly

At COP15 in Copenhagen (2009), developed countries committed to mobilising USD 100 billion annually by 2020 for developing countries.

The target was only met in 2022, two years late, and even that achievement masks persistent quality issues:

- Around 70 % of climate finance is delivered as loans, not grants
- Only ~26 % is true grant finance
- The grant-equivalent value is far lower than headline figures suggest
- Adaptation remains severely underfunded, receiving less than one-third of total climate finance

For a country like India, which faces recurring climate losses of USD 6–8 billion annually, this imbalance between mitigation and adaptation support represents a real economic vulnerability.

COP29 Baku (2024): A new goal that falls short

USD 300 billion per year by 2035 from developed countries. This is less than one-quarter of the USD 1.3 trillion annually that developing countries collectively identified as necessary.

India strongly criticised the process and the substance:

- The USD 300 billion commitment is not exclusively public money
- Developing countries may “voluntarily” contribute which is an inversion of equity principles
- The quantum is “abysmally poor” relative to documented needs (USD 6.8 trillion through 2035)

India's intervention, supported by several developing countries, reflected rising frustration with procedural shortcuts and widening trust deficits within the climate finance architecture.

COP30 Belém (2025): A shift toward implementation, but gaps remain⁵

COP30 in Belém focused on implementation, with five outcomes directly relevant to India:

1. Adaptation finance tripling by 2035, that is an important signal but still lacking binding structures
2. A Just Transition Mechanism established, welcomed by India as a significant milestone
3. Launch of the Tropical Forests Forever Facility (TFFF) with USD 5.5 billion in initial pledges
4. Trade formally integrated into the climate agenda which is critical given mechanisms like CBAM
5. No roadmap for fossil fuel phase-out, despite broad support

India's stance in Belém was diplomatically assertive: supportive of Brazil's presidency, firm on equity, and clear that climate finance obligations must reflect historical responsibility and differentiated capability.

⁵ <https://thesecretariat.in/article/ahead-of-cop30-countries-submit-revised-action-plans-but-climate-targets-remain-largely-elusive>

The Copenhagen-to-Belém arc: Structural lessons for india

Across fifteen years of negotiations, five patterns stand out:

1. Commitments remain consistently under-delivered, both in timing and quantum
2. Finance quality is weak, with loans treated as climate finance despite increasing debt risks
3. Developing countries finance most of their own transition, including India
4. Adaptation continues to be structurally underfunded
5. Process credibility is eroding, as seen in India's objection at COP29

COP30 and global finance context⁶

- COP30's Belém Political Package sets an indicative mobilisation target of at least USD 1.3 trillion per year by 2035, with a commitment to double adaptation finance by 2025 and politically signal a tripling by 2035, while operationalising the loss-and-damage fund agreed at COP28.
- Despite the higher headline ambition, developed countries' NCQG pledge still falls well below the USD 1 trillion per year demanded by many developing countries at COP29, reinforcing India's need to plan for 80–90% of transition finance from domestic sources.
- COP30 also launched implementation-focused platforms such as the Global Implementation Accelerator and a just-transition mechanism, underlining a shift from target-setting to delivery and giving India an entry point to align national investment pipelines with UNFCCC support instruments.

These patterns now define the baseline from which India must plan its transition.

India's NDC, mitigation and adaptation numbers⁷

- India's updated NDC commits to a 45% reduction in emissions intensity of GDP by 2030 from 2005 levels, 50% of installed capacity from non-fossil sources by 2030 (already effectively surpassed in capacity share), and net-zero by 2070, implying multi-trillion-dollar investment needs across power, industry, transport and land use.
- Recent estimates suggest cumulative investment requirements of around USD 10.1 trillion to place India on a net-zero-by-2070 pathway, with at least USD 2.5 trillion to meet 2030 NDC goals and roughly USD 467 billion between 2022–2030 just for decarbonising power, steel, cement and road transport.
- India's adaptation needs are estimated at roughly INR 53.4 lakh crore (about USD 648.5 billion) through 2030, covering water, agriculture, infrastructure and health, yet adaptation continues to receive less than one-third of global climate finance flows, reinforcing the case for an adaptation-heavy domestic finance strategy.

⁶ <https://cop30.br/en/news-about-cop30/cop30-landmark-outcomes-emerge-from-negotiations-despite-unprecedented-geopolitical-tensions>

⁷ <https://www.iisd.org/articles/insight/cop-30-outcome-what-it-means-and-whats-next>

Implications for India's transition strategy

1. Self-reliance is unavoidable

With NCQG flows capped at USD 300 billion annually, India can realistically expect USD 10–20 billion each year, far below the USD 50+ billion required annually for priority sectors alone. India must therefore plan for 80–90 % domestic capital mobilisation, using international finance primarily for de-risking.

2. Negotiation Focus must Shift from Quantum to De-risking Tools

India should prioritise:

- First-loss guarantees
- Currency hedging facilities
- Highly concessional finance for early-stage technologies
- Technology access and IP flexibility

These multiply the impact of limited public finance far more than negotiating higher headline amounts that history suggests will not materialise.

3. India must document its own contributions

India invests USD 45–50 billion annually in domestic climate action, far exceeding international inflows. Systematic documentation strengthens India's position against narratives that undermine equity and CBDR principles.

The Belém reality: A new planning baseline

Belém marks a transition from a world where developing countries expected significant public finance flows to one where large emerging economies must largely self-finance their transitions, supported by targeted international instruments for risk reduction and technology access.

For India, this means the coming decade will be shaped by:

- Efficient structuring of domestic capital flows
- Strengthening institutional capacity and project preparation
- Expanding bankable pipelines across priority sectors
- Reducing technology costs through domestic capability and strategic partnerships

The Belém Action Mechanism on Just Transition adopted at COP30 creates a UNFCCC work programme to support country-driven strategies for workers and communities in carbon-intensive regions, which India can leverage for coal districts in Jharkhand, Odisha, Chhattisgarh and parts of West Bengal⁸.

India can link state-level just-transition plans (for coal-dependent districts and MSME-heavy clusters) to global practice from South Africa's and Indonesia's Just Energy Transition Partnerships, multi-billion-dollar blended-finance packages combining concessional loans, guarantees and technical assistance, even as overall JETP finance remains below recipient countries' estimated needs.

⁸ <https://unfccc.int/cop30/belem-political-package>

Going forward, India's transition planning must operate on this pragmatic foundation: domestic capital will drive the bulk of investment, while international finance will function as catalytic support that reduces risk, improves affordability, and accelerates technology deployment.

3. Capital Allocation Pathways for High-Impact Interventions

Not all capital pathways are created equal. While multiple sectors require investment, the urgency, risk, and scalability differ significantly, and treating them uniformly obscures critical trade-offs.

For example, decarbonising steel and cement requires long-tenor, high-risk capital with policy guarantees, whereas MSME supply chain sustainability requires low-ticket, working-capital-linked innovations.

Nature and circularity demand aggregation models, while climate tech needs venture-style early-stage finance. A credible capital mobilisation strategy therefore requires **pathway-specific approaches**, not a one-size-fits-all narrative.

India's transition priorities (2025–2030): A ranked view

Priority Area (2025–2030)	Why it Matters	Critical Constraint	What Unlocks it
1. Industrial Decarbonisation (Steel, Cement, Chemicals)	Largest abatement potential	High capex + tech risk	Transition finance, guarantees, long-term PPAs
2. MSME Supply Chain Greening	High employment + Scope 3 impact	Cashflow stress + no data	Anchor-backed finance + digital reporting
3. Renewable Grid Integration & Storage	Determines pace of RE expansion	DISCOM fragility	Regulatory reform + grid modernisation
4. Built Environment & Urban Infrastructure	Urbanization + 40% global emissions from buildings	Retrofit economics + split incentives	Green building codes + ESCO models
5. Adaptation & Resilience Infrastructure	Rising climate losses	No revenue model	Outcome-based financing + public guarantees
6. Climate Tech Scale-Up	India's competitiveness in new markets	Early-stage risk	Innovation funds + procurement incentives
7. Nature & Circularity Projects	Waste, biodiversity, local jobs	Small fragmented tickets	Aggregation vehicles + carbon pricing

The built environment blind spot

India's urbanisation, with 416 million additional urban residents expected by 2050, makes the built environment a major but often overlooked transition frontier. Buildings already consume one-third of India's electricity, and globally nearly 40 % of emissions come from construction and operations. The sector's investment needs are significant.

- **Green new construction:** Ensuring that annual additions of commercial space and housing meet green standards requires USD 15–20 billion and prevents long-term carbon lock-in.
- **Retrofits:** India's commercial real estate can achieve 30 to 40 % energy savings. Deep retrofits represent a USD 25–30 billion investment opportunity.
- **Cooling transition:** Cooling demand will increase sharply. Early investment of USD 10–15 billion in district cooling and efficient technologies is essential.

Financing is limited due to split incentives between builders and occupants, weak ESCO business models, and low municipal creditworthiness.

Solutions such as on-bill financing, fiscal incentives for green buildings, and standardised ESCO lending supported by credit enhancement can unlock this market. With the green building sector projected to reach USD 570 billion by 2030, integrating the built environment into India's transition strategy is both urgent and economically sound.

We define seven priority capital pathways that align with India's dual focus: reducing emissions and building resilience, while supporting inclusive growth. Each pathway offers distinct investment logic, actors, and enabling mechanisms.

Pathway 1: Decarbonisation of core industrial sectors

India's industrial base, particularly steel, cement, chemicals and heavy manufacturing account for a large share of emissions. As mentioned before, it is estimated that steel and cement alone will require the largest fraction of the incremental US\$467 billion investment through 2030.

Key investment themes include:

- Renewable energy PPAs and captive renewables on-site in industry
- Electrification of process heating
- Green hydrogen and e-fuels for heavy industry
- Carbon capture and utilisation/storage (CCUS) for cement and steel

These investments require very long pay-back periods, large initial capex and exposure to technology risk. Financial structuring must therefore be geared towards risk-sharing: e.g., blended capital, government-led viability-gap support, transition bonds, supplier financing linked to offtake commitments.

Comparative assessment of capital pathways

Pathway	Abatement Potential	Capex Intensity	Risk Level	Time to Scale	Policy Dependence
Industrial Decarbonisation	Very High	Very High	High	Slow	Very High (tariffs, hydrogen, CCUS rules)
Renewables + Storage	High	Medium	Medium	Medium	High (DISCOM reforms)
MSME Supply Chain Greening	Medium	Low	Medium	Fast	Medium (procurement, compliance)
Adaptation & Resilience	Indirect (loss reduction)	Medium	High	Slow	Very High (public infra, standards)
Circularity & Waste	Medium	Medium	Medium	Medium	Medium
Climate Tech / Data Infra	Long-term, strategic	Varies	Very High (early-stage)	Slow → Medium	Medium

Pathway 2: Climate resilience & adaptation financing

As one of the most climate-vulnerable major economies, India's adaptation challenge is acute. Investment needs span:

- 1) Water and irrigation systems, flood defence,
- 2) Resilient infrastructure,
- 3) Heat-stress adaptation in agriculture and urban areas.

The adaptation requirement has been estimated at around USD 648.5 billion till 2030 at 2023-24 prices⁹.

Resilience investments often yield indirect returns (avoided losses rather than new revenue), making them less attractive to commercial capital unless structured with government support, insurance-linked mechanisms, or outcome-based contracting. For example, climate-indexed crop insurance or water-resilience bonds could create money-backed revenue streams.

⁹ <https://static.pib.gov.in/WriteReadData/specificdocs/documents/2025/may/doc202557551101.pdf>

The Missing Middle in Adaptation Finance: Insurance and Risk Transfer

Climate adaptation in India requires not only resilient infrastructure but also financial mechanisms that convert climate shocks into predictable cashflows. Insurance and risk-transfer instruments form this “missing middle” that links prevention and recovery, strengthening the economic logic of adaptation investment.

Key elements of the risk-transfer architecture:

- Parametric and climate-indexed insurance
Trigger-based payouts tied to temperature, rainfall or wind-speed thresholds provide rapid liquidity for farmers, MSMEs and informal workers. Scaling these products requires investment in satellite data, weather-station networks and model validation systems.
- Catastrophe bonds and insurance-linked securities (ILS)
These instruments shift extreme climate risks to capital markets, unlocking resilience capital for cyclones and floods while reducing fiscal stress on states.
- Regional risk pools
State or South Asia-wide risk pooling can diversify exposure and lower premium costs, reflecting successful global examples where collective structures reduce climate-risk pricing by 30–40 %.
- Micro-insurance for vulnerable households
Low-premium, DPI-enabled coverage protects smallholder farmers, livestock owners and informal workers, stabilising incomes during climate shocks and improving long-term resilience.

Why this matters:

Integrating risk-transfer instruments alongside adaptation infrastructure strengthens India's ability to mobilise private capital, enhances climate-loss buffering capacity and shifts resilience planning from post-disaster relief toward anticipatory risk management.

Pathway 3: Sustainable MSME supply chains

MSMEs are critical for employment and value-addition across India, but they face structural challenges in sustainability: limited access to capital, low ESG reporting capability, weak linkages to large-corporate supply chains. Transforming MSME supply chains unlocks enormous scale potential. Capital pathways include the following:

- Sustainability-linked lending for MSMEs, tied to KPIs such as energy-intensity reduction or waste-reduction
- Anchor-led supplier finance programmes where large corporates extend favourable financing to their MSME suppliers if sustainability criteria are met
- Embedded data-platforms (fintech) that reduce onboarding cost and track ESG metrics for MSMEs
The return logic: improved productivity, reduced resource risk, enhanced access to private and export markets.

Pathway 4: Nature, circularity & waste management

India's circular-economy potential is large. Investments in advanced recycling infrastructure, bioeconomy, landfill-to-energy, and nature-based solutions (NBS) represent under-exploited capital opportunities. These projects also support social and biodiversity co-benefits, thereby aligning with broader sustainability mandates. From a finance perspective, bundling of smaller projects, outcome-based contracts, and aggregation are effective enabling mechanisms since individual units may lack scale or clear revenue streams initially.

Pathway 5: Agriculture, food systems & water security financing

Agriculture is a major gap in India's climate finance system despite contributing 14 % of GDP, supporting 45 % of the workforce, and accounting for roughly 14 % of emissions. Yet it receives less than 2 % of climate-linked capital.

Investment need (2025 to 2030)

Climate-smart farming, efficient irrigation, methane reduction and cold-chain infrastructure require an estimated USD 30 to 40 billion.

Why finance does not reach the sector

Fragmented landholdings, weather-related cashflow volatility, low collateral and subsidy distortions limit bankability for smallholder agriculture.

Priority investment areas

- Micro-irrigation and precision farming, with significant water savings potential
- Improved crop insurance and parametric risk-transfer products
- Methane reduction in rice and livestock through proven practices
- Cold chain and processing infrastructure to reduce food loss
- Water security investments in aquifer recharge and watershed systems

Financing models

Anchor to FPO to lender partnerships, blended climate-agriculture funds and results-based financing can improve access and reduce risk.

Why it matters

Agriculture shapes rural livelihoods, food prices and climate resilience. Leaving it under-financed weakens both equity and economic stability. Strengthening agricultural finance supports a transition that protects farmers while improving national resilience.

Pathway 6: Climate tech, data & digital infrastructure

Crucially, this pathway underpins the others. Capital allocation here includes:

- AI/ML models for climate risk and transition scenario analysis
- Blockchain and traceability platforms (for carbon-credits, circular-economy flows)
- ESG reporting and data-platforms that feed into lenders' risk models
- IoT, sensor-networks and software for real-time resource (energy/water/waste) monitoring

Cost-effectiveness of transition investments improves sharply when the data/tech backbone is present: capital-markets investors begin to treat sustainability as a risk-adjusted factor rather than a moral premium.

For example, one study shows that replacing coal with solar & storage becomes cost-effective where battery-cost declines and low-cost capital coincide.

Hence, investing in the “infrastructure of the transition” is a high leverage move.

Pathway 7: Carbon Markets and Crediting Mechanisms

A critical financing pathway missing from conventional analysis is the role of carbon markets and international crediting mechanisms under Article 6 of the Paris Agreement, operationalized at COP28 and COP29.

The opportunity scale: If India successfully establishes itself as a credible carbon credit supplier, conservative estimates suggest \$5-8 billion annually could flow through voluntary carbon markets (VCM) alone, with larger sums possible through Article 6.4 crediting mechanisms. Sectors like afforestation, renewable energy displacing coal, methane capture, and industrial efficiency improvements all generate saleable credits.

Three-part architecture required:

1. Domestic carbon pricing foundation: India must establish credible domestic carbon pricing (either explicit tax or implicit through regulations) to create baseline price signals. Without this, Indian projects compete as low-cost credit suppliers in a race-to-the-bottom that undermines transition financing domestically.
2. Article 6.2 bilateral cooperation: India can enter into bilateral agreements with countries seeking to meet NDCs through internationally transferred mitigation outcomes (ITMOs). Early movers like Singapore and Switzerland are already establishing such frameworks. For India, this creates an additional revenue stream for verified emission reductions, but requires robust MRV infrastructure.
3. Voluntary market integrity: As the VCM faces credibility challenges globally (concerns about additionality, permanence, leakage), India's ability to supply high-integrity credits depends on verification infrastructure, third-party validation, and satellite-based monitoring, all requiring upfront investment.

The CBAM connection: The EU's Carbon Border Adjustment Mechanism (CBAM), effective from 2026, will impose carbon tariffs on Indian steel, cement, aluminum, and fertilizer exports unless domestic carbon pricing is demonstrated. This transforms carbon pricing from a voluntary sustainability initiative into a trade competitiveness imperative. Indian exports worth \$8-10 billion annually are exposed.

Here, carbon markets serve dual purposes: generating climate finance revenue *and* avoiding trade penalties. However, India's taxonomy must clarify whether carbon credit revenues can be counted toward climate finance targets or represent trade-defensive measures.

Current status: India is developing its domestic carbon market framework, but international interoperability, registry infrastructure, and MRV protocols remain nascent. Investment in this architecture, estimated at \$200-300 million for comprehensive digital infrastructure that could unlock 20-30x returns through credit revenues and CBAM penalty avoidance.

Financial instrument innovation: Carbon-credit-backed bonds, where future credit revenues are securitized, represent an emerging instrument. Similarly, “carbon-plus” credits that bundle biodiversity or

social co-benefits command 30-50% price premiums in VCMs, creating incentive alignment for just transition.

Without explicit attention to carbon market infrastructure, India misses both a financing source and a trade defense mechanism.

India in action: Real transition examples

A. NTPC's green hydrogen pilots (2023–2025)

NTPC has initiated green hydrogen blending pilots at Kawas, Surat, blending up to 8% by volume into the PNG network for domestic consumption. It has deployed hydrogen-based mobility pilots in Leh. These initiatives demonstrate NTPC's early steps in developing a hydrogen ecosystem and testing operational feasibility under real-world conditions¹⁰.

Public documentation emphasises the importance of further technological learning and enabling infrastructure, particularly renewable energy integration to support future scale-up¹¹.

B. Tata Steel's CCUS exploration

Tata Steel has collaborated with Carbon Clean to operate a 5 tonnes-per-day carbon capture demonstration unit at its Jamshedpur facility, aimed at validating process feasibility and generating operational learnings.

In its own public disclosures, the company notes that broader deployment of CCUS technologies is **"technology and investment dependent on financial and policy support,"** underscoring the need for supportive frameworks to enable wider-scale adoption.

The example illustrates how leading industrial players are exploring decarbonisation pathways while recognising the role of enabling policy and economic drivers¹².

C. Kerala's state-level resilience bonds

Following repeated extreme weather events, Kerala partnered with multilateral institutions to strengthen its climate and disaster-resilience systems, supported through initiatives such as the **World Bank's Resilient Kerala Program**. These efforts highlight how state-level resilience financing can emerge from local priorities and hazard exposure.

At the same time, they reflect the broader national need to develop standardised outcome-based frameworks for climate-resilience finance, so successful examples can be replicated across states¹³.

D. Gujarat & Rajasthan: Renewable energy policy adjustments

Gujarat and Rajasthan have periodically updated banking rules, open-access charges, and transmission frameworks to balance grid stability and sectoral growth. For example, changes in banking charges for open-access consumers in Gujarat and adjustments to open-access norms in both states have been documented in regulatory and industry reports¹⁴.

¹⁰ <https://www.pib.gov.in/Pressreleaseshare.aspx?PRID=1989809>

¹¹ https://www.pngrb.gov.in/pdf/press-note/GGL_15032024.pdf

¹² <https://www.tatasteel.com/media/23973/fy25-integratedreport.pdf>

¹³ <https://www.worldbank.org/en/news/press-release/2023/06/16/world-bank-approves-additional-financing-to-build-climate-resilience-in-the-indian-state-of-kerala>

¹⁴ <https://economictimes.indiatimes.com/industry/renewables/end-of-inter-state-transmission-fee-waiver-for-solar-wind-projects-to-hit-26-gw-renewable-projects-crisil/articleshow/123141434.cms>

Such adjustments, while part of natural policy evolution, also highlight why investors consistently emphasise the importance of **stable and predictable state-level regulatory environments** in accelerating renewable energy deployment¹⁵.

E. JSW Energy's transition finance efforts

JSW Energy is actively expanding its clean energy portfolio including **battery storage, green hydrogen, green ammonia, and renewable energy capacity**¹⁶. The company has also commissioned a **3,800 TPA green hydrogen facility in Karnataka**, supported by a long-term offtake agreement with JSW Steel¹³.

These initiatives demonstrate how large corporates are diversifying into next-generation technologies. Public filings also note that project economics in emerging segments are influenced by cost of capital and evolving policy frameworks, highlighting the importance of supportive financing environments for scale-up.

Eastern India Spotlight

Eastern India combines high climate vulnerability (coastal and deltaic systems, cyclones, riverine flooding, heat stress) with relatively low access to large-scale climate finance, making it a prime test bed for state-anchored climate-investment platforms aligned with India's forthcoming National Adaptation Plan and unified climate-finance mechanism announced around COP30.

West Bengal's State Action Plan on Climate Change identifies priority investments across water resources, coastal protection, agriculture and urban resilience; budgeted actions in earlier plan periods ran into several thousand crore rupees, providing a basis for structured adaptation and resilience pipelines that can be financed through green bonds, resilience bonds and blended-finance facilities¹⁷. Kolkata's Low-Carbon and Climate-Resilient Roadmap and the Kolkata Climate Action Plan (K-CAP) focus on reducing emissions from buildings, transport and waste while strengthening flood and heat resilience, offering concrete project concepts (public transport electrification, green buildings, drainage upgrades) that could be bundled into a dedicated Eastern India climate-finance window.¹⁸

¹⁵ <https://www.eqmagpro.com/indias-rajasthan-and-gujarat-need-policy-reforms-to-fuel-re-transition-eq/>

¹⁶ <https://www.jsw.in/wp-content/uploads/2025/08/JSW-Energy-Annual-Report-Integrated-2023-24-v2.pdf>

¹⁷ <https://moef.gov.in/uploads/2017/08/West-Bengal.pdf>

¹⁸ https://ncdc.mohfw.gov.in/wp-content/uploads/2025/01/32_SAPCCHH_West-Bengal_21-10-24.pdf

4. Technology, data & innovation: The next frontier

In the architecture of sustainable capital flows, the “tech-&-data layer” is rapidly shifting from optional to essential. Without it, flows remain inefficient, risk premia remain high, and scalability remains constrained.

Data as the catalyst for capital flow

Credible, comparable, and timely data is the foundation for shifting investor behaviour from perception-based to performance-based. For example, in corporate lending, when banks can observe real-time energy or water use, they can attach lower risk margins, higher tenors, and more favourable covenants. On the flip side, lack of data forces higher risk charging, lower capital deployment, and exclusion of smaller entities.

India's evolving disclosure regime illustrates the point. The draft India Climate Finance Taxonomy was explicitly developed to channel “greater resource flow to climate-friendly technologies and activities”, including by creating clarity around what counts as a “climate-aligned activity”. By providing classification and thresholds, the taxonomy reduces ambiguity, which in turn supports financial institutions to calibrate risk and reward¹⁹.

However, while credible data can theoretically lower risk premia, the real-world effect is far less linear. Investors today still rely more on audited statements, collateral profiles, and operating history than on real-time IoT or ESG data streams. The bottleneck is not data availability alone, but whether that data is **decision-grade, verifiable, and integrated into underwriting models**. Without regulatory recognition of alternative data or standardised verification frameworks, the impact of digital tools remains limited. In other words: technology expands visibility, but only institutional adoption converts that visibility into cheaper capital.

Technology integration is no longer optional

Across both corporates and MSMEs, technology adoption (IoT sensors, monitoring dashboards, AI/ML forecasting) is increasingly the trigger for investment. For example:

- Real-time resource monitoring unlocks continuous performance verification, which is a prerequisite for sustainability-linked finance.
- Predictive climate risk modelling enables lenders to assess future cashflow impacts and adjust credit decisions accordingly.
- Traceability platforms (e.g., for supply-chain emissions, circular economy flows) provide transparency, thereby reducing perceived risk of ESG-greenwash or stranded assets.



Credible, comparable, and timely data is the foundation for shifting investor behaviour from perception-based to performance-based.

¹⁹ <https://www.india-briefing.com/news/overview-of-indias-climate-finance-taxonomy-in-2025-37768.html/>

The investment logic is clear: the returns on transition capital improve significantly when the front-end tech/data stack is in place. The tech stack becomes part of the “enabler” cost of rollout rather than an afterthought.

Innovation curve and financial implications

As the tech-stack matures, cost curves decline (solar, batteries, IoT sensors), risk perceptions fall, and financing structures become more standardised. For example, one study shows that solar + storage combinations become cost-effective in India under scenarios where battery costs decline and low-cost capital is available.

Thus, deploying capital toward the “infrastructure of the transition” (data platforms, sensors, reporting tools) is a high-leverage play, often yielding higher marginal impact per rupee than incremental green asset deployment without that backbone²⁰.

India's digital public infrastructure: A hidden enabler of climate finance

India's Digital Public Infrastructure (DPI) provides a structural advantage in sustainable finance. The combination of Aadhaar, UPI, DigiLocker and the Account Aggregator framework lowers transaction costs, expands financial inclusion and enables real-time verification, features that directly strengthen climate finance pipelines.

Why DPI matters for climate capital mobilisation

- **Low-cost MSME onboarding:** Digital KYC, GST-linked verification and automated cashflow analysis reduce underwriting costs dramatically, making small-ticket green loans viable for MSMEs.
- **Real-time incentive delivery:** DBT-enabled subsidies for solar pumps, rooftops or EVs reduce leakage and increase programme efficiency, improving the economics of scale-up.
- **Distributed MRV at scale:** IoT-linked devices and blockchain-based registries tied to DPI rails allow low-cost verification of emissions reductions from small and distributed systems such as rooftop solar or electric mobility.
- **Alternative data for climate risk underwriting:** The Account Aggregator data stream provides lenders with signals on energy intensity, operational resilience and transition-readiness, enabling sustainability-linked pricing even for small enterprises.

DPI's international adoption across 50+ countries signals India's potential to become not only a user but an exporter of climate finance infrastructure. However, climate-specific DPI layers, emissions APIs, green credit scoring, interoperability standards for Scope 3 tracking still remain underdeveloped and represent a high-impact investment frontier.

The MRV challenge: Why verification determines whether capital flows

Even with strong digital infrastructure, climate finance cannot scale without credible Measurement, Reporting and Verification (MRV). Capital providers require verifiable evidence that claimed mitigation or adaptation outcomes are real, additional and durable. India's current MRV ecosystem is fragmented, costly for smaller actors and insufficiently integrated with financial regulation.

Core gaps that constrain MRV integrity

- **Fragmented data systems:** Emission and activity data sits across ministries with limited interoperability, creating no unified national dataset.

²⁰ <https://group.jsw.in/energy/clone-acquisition-175-gw-renewable-portfolio-mytrah-energy>

- Self-reported disclosures: Corporate emissions data is mostly self-declared, with inconsistent verification standards.
- High verification costs: For MSMEs, audit fees can represent 5–15 % of project value, discouraging participation.
- Underused technologies: Satellite monitoring, IoT sensors and blockchain registries exist but lack regulatory recognition for lending and disclosure.

Where MRV gaps hinder capital mobilisation

- Carbon credit markets remain thin due to baseline disputes and illiquid ESCerts.
- Corporates cannot verify MSME Scope 3 emissions, stalling supply-chain decarbonisation finance.
- Adaptation projects lack standard outcome metrics, limiting access to results-based financing.

Technology-driven MRV solutions

- **Satellite-based MRV:** Suitable for forestry, agriculture, distributed solar and methane detection.
- **IoT and smart meters:** Enable continuous verification for efficiency-linked loans and performance contracting.
- **Blockchain registries:** Improve carbon credit integrity and prevent double counting.

What a credible MRV architecture requires

- A unified national emissions registry with interoperable datasets.
- Tiered verification standards, full audits for large projects and digital-first verification for MSMEs.
- Regulatory recognition of digital MRV tools within green bonds, sustainability-linked lending and taxonomies.
- Public investment in satellite data processing, emissions factors and open-source MRV software.

Investing **USD 800 million–1.2 billion** in a national MRV backbone could reduce risk premiums, strengthen India's export competitiveness under mechanisms such as CBAM, and unlock **USD 5–8 billion annually** in credible carbon credit revenues. MRV therefore becomes the bridge between climate ambition and financial bankability.

Together, DPI and MRV form the digital and verification foundations that enable climate finance to scale. DPI reduces onboarding and transaction costs; MRV provides credibility and investability. Without these twin pillars, India's technology-led transition remains constrained. With them, the country can unlock capital at scale, integrate MSMEs into transition pathways and strengthen competitiveness in global markets.

5. Role of corporates, MSMEs & financial institutions

1. Corporates

Large corporates sit at the strategic centre of India's transition. They:

- Set climate and sustainability targets (e.g., net-zero ambitions, Scope 3 mapping)
- Influence large supply chains and thus drive indirect emissions downstream
- Have access to capital markets and can issue sustainability-linked bonds or transition bonds

But to convert ambition into execution, corporates must embed transition planning into capital expenditure cycles, procurement policy, and supplier financing strategies.

2. MSMEs

The MSME universe is both a large untapped opportunity and a structural faultline for India's transition. Key facts:

- India's MSME sector contributes ~30% of GDP and ~45% of total exports²¹.
- But awareness of green-finance options among MSMEs is weak: one recent report shows 3 in 4 Indian MSMEs were unaware of green-financing options²².
- MSMEs face acute constraints: lack of reporting/data capabilities, higher perceived risk, limited access to equity and debt²³.

From a capital deployment perspective, mobilising the MSME segment means simplifying access, deploying data-light onboarding platforms, using anchor-corporate procurement advantages and supply-chain finance levers to overcome structural weaknesses.

3. Financial Institutions

Financial institutions (FIs) are the multiplier of transition ambition. Their role is threefold:

1. **Risk-integration:** FIs must embed climate risk (physical + transition) into credit models and portfolio strategies.
2. **Product innovation:** Development of blended-finance instruments, transition bonds, sustainability-linked loans tailored for Indian sectors.
3. **Scaling access:** Particularly for smaller corporates and MSMEs — digital platforms, anchor-led lending, guarantee schemes all matter.

Despite their central roles, corporates, MSMEs, and financial institutions often operate with **misaligned incentives**. Corporates demand traceability from MSMEs but are reluctant to pay for the digital infrastructure required to produce it. Financial institutions require high-quality sustainability data but are

²¹ <https://www.msme.gov.in/sites/default/files/MSME-ANNUAL-REPORT-2024-25-ENGLISH.pdf>

²² <https://bfsi.economicstimes.indiatimes.com/articles/msmes-in-india-lack-awareness-of-green-financing-options/124112813?>

²³ <https://www.crfindia.org/publications/issue-brief/redefining-green-for-msmes-understanding-the-gaps-in-definition-recognition-and-policy-alignment?>

unwilling to adjust credit pricing when MSMEs improve performance. MSMEs, in turn, face tight working capital cycles that make long-term sustainability investments unappealing.

These frictions explain why supply-chain decarbonisation in India remains slow despite strong top-level commitments as the economics are distributed unevenly across participants. Together, corporates, MSMEs and FIs form the key actor ecosystem in which the transition is financed. Without concurrent progress across all three, capital flows will remain unbalanced and bottlenecked.

6. Policy, regulatory and market enablers

India's regulatory ecosystem has made meaningful progress, but the trajectory remains uneven. The emerging climate taxonomy, enhanced BRSR disclosures, and climate-risk guidance for banks are important steps, yet they stop short of providing **binding enforceability, unified data standards, and predictable sectoral pathways**. Policy uncertainty, especially around renewable integration, carbon markets, green hydrogen incentives, and CCUS regulation, continues to inflate risk premia and dissuade long-term capital.

For sustainable finance to scale, India needs regulation that provides **clarity, not just ambition**.

1. Evolving taxonomy and disclosure framework

The Government of India has issued a draft of the Climate Finance Taxonomy through the Department of Economic Affairs (DEA), with the stated aim of "enabling the country to achieve the vision of being Net Zero by 2070" and channel resources to climate-friendly technologies.

One analytical brief estimates the taxonomy could facilitate ~US\$ 250 billion per year in dedicated climate finance flows²⁴.

2. Regulator-driven climate risk integration

Regulators such as Reserve Bank of India (RBI) have issued climate risk guidance; corporate disclosure requirements (such as BRSR in India) are tightening; these create a more rigorous footing for financial institutions and capital markets to price transition and resilience risks.

3. Market innovation & instruments

Key market enablers include sustainability-linked bonds, transition finance instruments, digital marketplaces for carbon credits, blended-finance platforms and MSME-specific green-financing channels. While these instruments are nascent, they are critical for scaling capital beyond traditional project finance.

The Government of India has issued a draft of the Climate Finance Taxonomy through the Department of Economic Affairs (DEA), with the stated aim of "enabling the country to achieve the vision of being Net Zero by 2070" and channel resources to climate-friendly technologies.

4. Co-ordinated policy ecosystem

The policy ecosystem is increasingly multi-ministerial and multi-stakeholder: ministries, financial regulators, state governments and the private sector must coordinate on taxonomy, incentive design, data standards,

²⁴ <https://www.lse.ac.uk/granthaminstitute/publication/seven-lessons-for-indias-climate-finance-taxonomy/>

tax policy and risk-mitigation frameworks. Without alignment, fragmentation increases cost of capital and slows deployment.

7. Pathways to a Just, Inclusive and Low-Carbon Future

A just transition is often framed as an ethical imperative, but in India it is a **macroeconomic necessity**. With over 90% of the workforce employed informally and several regions deeply dependent on carbon-intensive industries, unmanaged transition could exacerbate inequality, disrupt local economies, and undermine political support for climate policy. A meaningful just transition strategy must therefore address not only the flow of climate finance but also the **flow of jobs, skills, and social protection**, particularly in coal-dependent districts and MSME-heavy clusters where vulnerability is highest. A comprehensive transition strategy must also recognise differentiated vulnerabilities across gender, caste, tribal communities, and informal workers. Women-led enterprises face limited access to credit and land-linked collateral, tribal districts in coal belts carry heavier livelihood risks, and informal workers lack social protection coverage. These structural inequities shape who can participate in and benefit from climate-aligned capital deployment.

Even the most ambitious climate-finance plan will falter if it neglects **equity** and **inclusion**. Strengthening inclusion requires targeted measures that address the constraints faced by women entrepreneurs, ST/SC communities in coal regions, and informal worker networks, ensuring that climate-linked capital reaches high-vulnerability geographies and segments. For India, ensuring that underserved segments (geographies, MSMEs, vulnerable communities) participate is both an imperative and an opportunity.

Key strategic pathways include:

- **Blended & catalytic capital structures:** Using concessional finance, guarantees, first-loss tranches, etc., to de-risk early-stage transition investments, especially in hard-to-abate sectors.
- **MSME-centric financing ecosystems:** Embedding financing and data access mechanisms within the supply chains of large corporates, enabling smaller firms to upgrade and decarbonise.
- **Sector-specific transition frameworks:** For steel, cement, chemicals, agriculture etc — create tailored pathways, policies, financing models and performance metrics.
- **Investing in digital infrastructure:** The “enabler layer” of sensors, dashboards, ESG-reporting platforms and climate-risk analytics must be financed as part of transition capital.
- **Corporate-MSME-FI collaboration models:** Large corporates should lead supply-chain decarbonisation or climate-resilience financing, financial institutions should support the upstream and downstream, and ecosystem enablers (chambers, consulting firms, UN-networks) bring design and capability.
- **Predictable regulation and taxonomy clarity:** Stability and clarity in policy reduce risk premia and attract private capital; conversely, regulatory uncertainty elevates cost of capital and slows deployment.
- **Social equity mechanisms for underserved groups:** Embedding gender-responsive finance, community safeguards for tribal regions, and portability of social protection for informal workers to ensure broad-based participation in transition capital flows.

8. India 2030 Outlook: A Conclusion Grounded in Realistic Pathways

India's trajectory to 2030 will not be defined by ambition alone but by its ability to **convert ambition into investable, scalable, and institutionally supported transition pathways**. The next few years are decisive: they will determine whether India builds the institutional capacity, financial architecture, and regulatory trust needed to industrialise its sustainability agenda.

Across the whitepaper, a consistent pattern emerges, i.e., India's transition outcomes hinge on a small set of structural "trigger variables":

1. **Flow of catalytic and concessional capital** that absorbs early-stage risk and unlocks private finance at scale.
2. **Operationalisation of a national climate taxonomy** that is binding, standardised, and investment-grade.
3. **State-level policy coherence**, particularly across land, tariffs, open access, and grid integration.
4. **Digitalisation of MSMEs**, enabling reliable data, performance visibility, and credit access.
5. **Strengthening of institutional execution capacity**, especially for project preparation, permitting and monitoring.

These triggers are not independent; they reinforce one another. Their interaction creates three plausible and self-reinforcing outcomes for India's 2030 transition:

Scenario 1: Accelerated alignment: India as a low-carbon growth engine

In this trajectory, India operationalises its taxonomy, accelerates MSME digitalisation, and deploys blended finance at meaningful scale. Corporates, states, and financial institutions align around sector-specific transition frameworks. The resulting trust infrastructure lowers cost of capital and expands the bankable pipeline.

Outcome:

India meets or exceeds major 2030 targets; industrial decarbonisation advances meaningfully; MSMEs integrate into low-carbon supply chains; and India positions itself as a global manufacturing hub for climate solutions.

Scenario 2: Fragmented momentum: Progress with uneven depth

Here, national ambition continues, but execution varies across states and sectors. Some industries (e.g., renewables, advanced manufacturing) accelerate, while hard-to-abate sectors and MSME clusters lag due to inconsistent policies, limited project preparation, and data gaps. Capital flows rise, but remain insufficiently targeted or risk-aligned.

Outcome:

India achieves moderate emissions intensity reduction, expands RE capacity, and builds early climate-tech infrastructure, but resilience gaps widen and regional disparities deepen.

Scenario 3: Capital drag: A slow and costly transition

In this scenario, taxonomy implementation slows, blended finance remains limited, and state-level policies continue to fluctuate. Project pipelines remain thin, cost of capital stays high, and technology adoption plateaus.

Investors price in uncertainty, reducing the scale and speed of deployment.

Outcome:

India's transition becomes costlier, slower, and more uneven. Industrial competitiveness is affected, resilience vulnerabilities remain, and the economy bears higher adaptation costs.

India's transition trajectory gains clearer definition when viewed alongside the experiences of peer emerging economies. Countries with comparable income levels, coal dependence and governance structures offer practical lessons in scale, sequencing, and the political economy of climate finance.

Table: Comparative snapshot: India vs. select emerging markets

Metric	India	China	Indonesia	Brazil	South Africa
Coal dependence (% of power)	~55%	~60%	~65%	~4%	~80%
Cost of capital (sovereign 10-yr)	~7%	~2.8%	~6.5%	~12%	~9.5%
Climate finance mobilized (2023, \$bn)	~55	~150	~8	~12	~8.5 (incl. JETP)
Green taxonomy status	Draft	Operational (2021)	Operational (2022)	Developing	Operational (2022)
Just transition mechanism	None	Limited (regional programs)	None	Limited (Amazon Fund)	JETP (\$8.5bn)
DPI for climate finance	Emerging	Limited	Limited	Limited	Minimal

Inference:

China – Scale with Systemic Risk

China mobilised roughly USD 150 billion in climate-linked finance in 2023 through state-led lending and mandated renewable requirements. This delivered rapid expansion but also created overcapacity in key sectors and elevated credit risk in projects with weak underlying economics.

Implication for India: Rapid scale without disciplined project quality and risk-pricing weakens long-term market resilience. India's market-driven approach can be more durable if capital costs are reduced through structured de-risking.

Indonesia – linking transition with industrial co-benefits

Indonesia's USD 20 billion JETP links coal phase-down with EV-battery manufacturing, creating an economic rationale for transition.

Implication for India: Identifying sectoral co-benefits such as green hydrogen for ammonia/urea, circularity for urban employment, and solar manufacturing for exports can align climate goals with industrial strategy.

Brazil – nature as an investable asset class

Brazil demonstrated that high-integrity MRV systems can unlock global capital for nature, though political volatility has deterred sustained inflows.

Implication for India: India's stronger institutional continuity can be leveraged to position nature-based solutions as stable, investment-grade opportunities.

South Africa – just transition as a funding magnet

South Africa's USD 8.5 billion JETP succeeded because social protection, worker support, and community redevelopment were integrated into the financing proposal.

Implication for India: A structured just transition proposal for coal regions could attract large-scale concessional finance, potentially in the USD 30–50 billion range, given India's scale of coal-dependent populations.

India's expanding role in south-south climate leadership

India is increasingly positioned as both a recipient and provider of climate solutions. This dual identity strengthens India's geopolitical standing and creates new markets for Indian firms.

Knowledge provider

- India's digital public infrastructure (DPI) is being adopted by 50+ countries, creating a pathway to export climate-finance digital systems.
- Through the International Solar Alliance, India supports 120+ countries with technology partnerships and project development.
- India's operational expertise in heatwaves, monsoons, and cyclones offers direct relevance for Africa, Southeast Asia and small island states.

Emerging capital provider

India's Development Partnership Administration has extended USD 30+ billion in lines of credit to developing economies. A focused "Green Lines of Credit" mechanism would allow India to support renewable energy, adaptation infrastructure, and climate technologies across the Global South.

Strategic value: modest outward climate finance can significantly strengthen India's negotiation leverage, credibility, and influence in multilateral climate forums.

Leveraging the BRICS climate finance architecture

The New Development Bank aims for 30 % of lending to be climate-linked. India can use it to finance hard-to-abate sectors and adaptation projects that face higher risk premiums in Western-led institutions.

What peer comparisons reveal

- India's policy architecture is not the constraint; implementation capacity is.
- India's democratic stability and DPI infrastructure represent significant, underutilised competitive advantages.
- India's just transition challenge is unique in scale, making India a central demonstration case for global climate equity.
- South-South cooperation is a strategic growth lever, not a charitable obligation, enabling India to build influence while expanding markets for Indian climate solutions.

India's 2030 positioning will therefore depend not only on how much capital it mobilises at home, but on how effectively it strengthens the institutional, financial and regulatory foundations that make its transition credible in global markets. In this sense, India's global role reinforces, rather than replaces, the core domestic enablers that ultimately determine its transition trajectory.

What this means for India's transition narrative

India's transition is no longer about setting goals. It is about **institution-building, market design, and executing at scale**.

The difference between the three scenarios is not ideology or ambition, but:

- the **quality** of enabling frameworks,
- the **sequencing** of reforms,
- the **credibility** of data and disclosures, and
- the **collaboration** between corporates, MSMEs, financial institutions, and the state.

If the next few years prioritise these foundational enablers, India can shift decisively toward accelerated alignment, creating a transition that is not only low-carbon but also growth-oriented, competitive, and inclusive.

India has the ambition, the market size, and the technological dynamism. The question for 2030 is whether it can now build the **institutional capacity and investment architecture** to match.

