

ForumIAS

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## Mains Marathon

2<sup>nd</sup> Week Oct, 2026

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HISTORY  
ECONOMICS  
POLITY  
SCIENCE AND TECHNOLOGY  
GEOGRAPHY AND ENVIRONMENT

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## Does India's revised Bilateral Investment Treaty framework effectively balance investor confidence with sovereign regulatory space? Analyze in context of post-2016 shifts.

### Introduction

A decade after unilaterally terminating over 60 Bilateral Investment Treaties (BITs) following costly adverse awards under Investor-State Dispute Settlement (ISDS), India is recalibrating its investment protection framework. Driven by rising Overseas Direct Investment (ODI) by Indian multinationals and a desire to attract long-term Foreign Direct Investment (FDI), the government is reforming the conservative 2015 Model BIT to seal flexible, balanced agreements.

### Post-2016 Shift From Ultra-Protectionism to Balanced Pragmatism

1. **Pragmatic Relaxation of the Local Remedies Clause:** Reduces the rigid 5-year mandatory exhaustion of domestic remedies requirement before approaching international tribunals. Example: India-UAE BIT 3-year relaxation.
2. **Refined Definition of 'Investment':** Replaces asset-based broad definitions with an enterprise-based approach requiring real economic activity and local capital commitment. Example: Enterprise-based BIT standard.
3. **Protecting Two-Way Investment Flows:** Shifts focus from merely protecting incoming foreign capital to safeguarding growing Indian corporate investments overseas. Example: Indian outward FDI protection.
4. **Targeted Negative-List Flexibility:** Retains sovereign protection over core public interest sectors while offering flexible arbitration terms for non-sensitive commercial sectors. Example: Negative-list BIT approach.

### Implications

1. **Constitutional & Legal:** Safeguards state authority to enact public-interest regulations without fear of retrospective taxation lawsuits or international damage claims. Example: Sovereign tax carve-outs.
2. **Economic & Financial:** Re-establishes capital predictability, helping reverse FDI net-inflow deceleration while protecting outbound Indian capital. Example: BoP capital stability.
3. **Geopolitical & Trade Synergies:** Accelerates ongoing FTA and CEPA negotiations with major trade partners like the UK, EU, and Gulf nations. Example: India-UK/EU trade pacts.

### Critical Bottlenecks & Concerns

1. **Exclusion of MFN & FET Standards:** Omitting Most-Favoured-Nation (MFN) and Fair and Equitable Treatment (FET) clauses creates hesitation among Western institutional investors.
2. **Judicial Delays:** Even shorter local-remedy periods become ineffective if domestic courts cannot resolve investment disputes promptly. Foreign investors cannot simply receive preferential treatment over Indian litigants. Example: Court pendency.
3. **Arbitration Exposure:** Reopening ISDS pathways risks legal costs and large awards, while narrow treatment standards or absent MFN protection may weaken investor confidence. Example: Legal uncertainty.
4. **Implementation Gap:** The Budget 2025-26 announced a review of the Model BIT; the new template remains pending. The 2026-27 investment agenda must therefore be matched by operational legal reform, not merely treaty announcements. Example: Reform delivery.
5. **Missing Standards & Enforcement:** Omitting MFN and tax coverage may deter Western institutional investors. Award recognition and annulment proceedings remain slow in Indian courts. Example: Enforcement delays.

### Way Forward

1. **Establish Dedicated Investment Courts:** Fast-track domestic investor-state disputes through specialized commercial benches to make local remedies effective. Example: Specialised commercial benches.
2. **Adopt Tiered Dispute Resolution:** Mandate compulsory mediation and conciliation phases before triggering formal arbitration proceedings. Example: Prior conciliation.
3. **Institutionalize Joint Interpretative Notes:** Issue binding joint Interpretative Declarations with treaty partners to prevent tribunals from expanding treaty clauses arbitrarily. Example: Joint declarations.
4. **Sectoral Safeguards & Alternative Models:** Retain negative-list carve-outs for health, environment and strategic sectors. Expand investment facilitation agreements that avoid ad hoc arbitration. Example: Negative-list approach & ICFT model.
5. **Impact Review & Capacity Building:** Publish treaty-wise dispute and investment-impact dashboards. Establish a dedicated ISDS defence cell. Example: Treaty impact review & Defence cell.

### Conclusion

Revisiting the BIT framework marks India's transition toward mature economic governance. By balancing investor security with sovereign regulatory rights, India aligns its investment regime with Viksit Bharat 2047 ambitions.

## Why does stubble burning persist despite regulatory interventions? Analyze the underlying legal, economic, and technological drivers, and suggest a sustainable resolution.

### Introduction

Seasonal stubble burning across the Indo-Gangetic Plains particularly in Punjab and Haryana remains a major driver of severe air pollution, public health emergencies, and soil degradation in northern India. Despite judicial bans, technological subsidies, and statutory mandates under the CAQM, the practice persists due to structural dependencies within the agrarian economy.

### Structural Drivers of Stubble Burning

1. **Legal & Regulatory Distortions:** The Punjab Preservation of Subsoil Water Act, 2009 mandates delayed paddy sowing to conserve groundwater, narrowing the harvest window between paddy and wheat sowing to barely 10–15 days Example: Subsoil Act mandate.
2. **Economic Incentives & MSP Distortion:** Assured Minimum Support Price (MSP) procurement for water-intensive paddy disincentivizes farmers from shifting to less resource-intensive crops like pulses or oilseeds Example: Rice-wheat MSP bias.
3. **Technological & Operational Friction:** In-situ management tools like Happy Seeders require high-horsepower tractors, making equipment rentals cost-prohibitive for small and marginal farmers Example: Happy Seeder costs.
4. **Inadequate Ex-Situ Value Chains:** Supply chains for biomass power plants, bio-ethanol facilities, and compressed biogas (CBG) units suffer from high collection, baling, and transport expenses Example: Paddy straw logistics.

### Multi Impact Architecture

1. **Environmental & Atmospheric:** Releases massive volumes of particulate matter (PM2.5, PM10), carbon monoxide, and volatile organic compounds, forming toxic winter smog Example: Winter smog spikes.

2. **Ecological & Agrarian:** Thermal burning destroys essential soil micro-flora, organic carbon, nitrogen, phosphorus, and potassium reserves, increasing chemical fertilizer dependency Example: Soil carbon loss.
3. **Socio-Economic & Health:** Imposes severe respiratory health costs across urban and rural populations while depressing farm labor productivity during peak harvest seasons Example: Respiratory health burden.
4. **Legal and federal:** CAQM's statutory directions and penalties have not removed the underlying incentives. Enforcement-heavy approaches can punish vulnerable farmers while overlooking institutional responsibility for machinery, procurement and market access. Example: Shared accountability.
5. **Measurement:** Satellite-based active-fire counts capture observations during specific overpasses; they may miss fires at other times. Combining polar and geostationary satellite data with burn-scar assessment would improve evaluation. Example: Night-time fires.

### Way Forward

1. **Incentivize Crop Diversification:** Provide direct price support and assured public procurement for millets, pulses, and oilseeds to break the paddy-wheat mono-cropping cycle. Example: Haryana's ₹7,000-per-acre incentive.
2. **Expand Biomass Value Chains:** Mandate 5% paddy straw co-firing in thermal power plants and expand Compressed Biogas (CBG) units under the SATAT scheme Example: SATAT CBG expansion.
3. **Enhance In-Situ Subsidies:** Shift equipment subsidies directly to Custom Hiring Centres (CHCs) and small farmer cooperatives to lower operational machine rental rates. Example: Straw floor price.
4. **Deploy Real-Time Satellite Measurement:** Utilize high-resolution ISRO satellite monitoring and geo-fenced enforcement to track active fire points and evaluate local policy outcomes accurately. Example: Geostationary monitoring.
5. **Calibrated Agronomy and Machinery Access:** Promote shorter-duration varieties and review sowing dates alongside rainfall patterns. Subsidise Custom Hiring Centres and cooperatives instead of individual purchases. Example: CHC and PR-126 variety.

### Conclusion

As emphasized in NITI Aayog's Sustainable Agriculture Framework and Economic Survey recommendations, eliminating stubble burning requires moving away from punitive measures toward market-led incentives. Coupling crop diversification with robust ex-situ biomass commercialization will protect soil health, clean northern air corridors, and secure farmer livelihoods.

## How does India's performance at the 48th WorldSkills Competition reflect human capital investment? Analyze the role of institutional skilling in global competitiveness.

### Introduction

India's rise to the 10th position globally at the 48th WorldSkills Competition in Shanghai (2026) winning 6 Silver Medals and 20 Medals for Excellence, marks a structural leap from basic vocational training to high-end human capital development. Driven by targeted capacity-building programs like Skill-Ex (investing in top-tier vocational talent), India is transitioning from a high-volume low-skill supplier to a global benchmark for precision workforce talent.

### What the Medals Reflect

1. **NSQF Framework:** NSQF and the Skill India Mission institutionalised competency-based training after decades of ITI neglect.

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2. **PM-SETU:** PM-SETU's ₹60,000 crore upgrades 1,000 ITIs as 200 hubs and 800 spokes, adding Skill-Ex to Capex and Opex.
3. **IndiaSkills Funnel:** Over 3.65 lakh registrants narrowed to 650 finalists and a 70-member team across 63 skills.
4. **Rank Progression:** Rankings improved from 39th in 2011 to 19th in 2017, 13th in 2019 and 10th, with bronze medals becoming silver.
5. **Industry 4.0:** Debuts in 11 skills and excellence medals in Industry 4.0, additive manufacturing and robotics show frontier orientation.
6. **Dignity of Labour:** Champions like Kaif Khan and Mohammed Salam, from modest backgrounds, challenge degree bias; Gita verse 18.46 dignifies work.

#### Analysis of Institutional Skilling Reforms

1. **Institutional Governance & Industry Alignment:** The National Skill Development Corporation (NSDC) and Industry Sector Skill Councils (SSCs) actively co-design industry-relevant curricula with private sector standards Example: Skill India Digital.
2. **Expanding Frontier Vocational Domains:** Diversifying training beyond traditional trades into high-tech sectors like additive manufacturing, drone mechanics, and green logistics expands career avenues Example: Unmanned Aerial Systems.
3. **Aspirational Shift in Vocational Education:** Integrating vocational training into mainstream schooling under NEP 2020 removes the social stigma surrounding blue-collar craftsmanship Example: Vocational school integration.
4. **Global Mobility & Benchmark Standardisation:** Aligning domestic Qualification Packs (QPs) with WorldSkills International standards facilitates international workforce migration Example: India-Japan TITP framework.

#### Impact & Systemic Bottlenecks

1. **Economic & Employability Bottlenecks:** Despite elite competition successes, broader youth workforce employability remains low (only ~51–56% industry-ready as per the Economic Survey), indicating an elite-vs-mass skill gap.
2. **Socio-Gender Parity Challenges:** Women participation in vocational training remains skewed toward traditional service roles, underrepresenting them in technical core trades. Example: Female STEM skilling.
3. **Infrastructure Disparities:** State-level Industrial Training Institutes (ITIs) suffer from outdated machinery, inadequate funding, and a deficit of certified master trainers. Example: ITI modernisation gaps.
4. **Elite-Mass Gap & Quality:** Medallists are exceptions; formal training reaches few youth. CAG found 94.5% of PMKVY participant bank records invalid or missing, undermining outcome claims. Example: Formal training deficit & PMKVY audit.

#### Way Forward

1. **Establish Regional Centers of Excellence (CoE):** Scale competition-grade training ecosystems across tier-2 and tier-3 ITIs using public-private partnerships (PPP).
2. **Expand Apprenticeship Mandates:** Enforce mandatory, credit-linked industrial apprenticeships across MSMEs through the National Apprenticeship Promotion Scheme (NAPS).
3. **Institutionalize Skill-Ex Mentorship:** Deploy former WorldSkills medalists as master trainers to mentor incoming batches and refine technical execution standards.
4. **Strengthen International Skill Pacts:** Expand bilateral Mobility and Migration Partnerships (MMPs) with aging economies to secure overseas employment pathways.

5. **Replicate Odisha:** Transform ITIs through alumni campaigns and industry partnerships. Example: Odisha ITI model.
6. **Prior Learning & Tracer Studies:** Certify informal workers' existing skills. Publish independent placement data for every programme. Example: RPL certification and tracer studies.

### Conclusion

As emphasized in NITI Aayog's skilling roadmaps, turning India's demographic dividend into a economic engine requires bridging the gap between top-level talent initiatives like Skill-Ex and foundational ITI training. Sustained investment in vocational excellence will establish India as the world's premier talent capital for Viksit Bharat 2047.

## How can the US investigation into the EU's Carbon Border Adjustment Mechanism benefit India? Analyze the strategic and trade implications for metal exports.

### Introduction

The USTR initiated a formal probe into the EU's CBAM over concerns that its embedded carbon tariffs restrict market access and penalize foreign exporters. For India, where the carbon border tax threatens \$8+ billion worth of metal shipments (predominantly iron, steel, and aluminum), Washington's pushback offers strategic leverage to negotiate flexibilities under MFN trade clauses.

### How the US Probe Benefits India

1. **EU Green Deal & Forward-MFN clause:** CBAM stems from the EU Green Deal (2019), clashing with India's long-standing opposition to unilateral climate measures. The forward-MFN clause lets India claim any CBAM concession the EU grants others; it is defensive, not an exemption.
2. **EU-US statement & Default-Value Mark-Up:** The EU-US 2025 joint statement already promised additional CBAM flexibilities for small businesses. USTR attacks punitive default-value mark-ups and mandatory EU-accredited verification, burdens Indian MSMEs also face.
3. **Steel Quota & Green Steel Transition:** India shipped about 2.4 million tonnes of steel to the EU in 2025; the FTA quota of 1.64 million tonnes cannot offset carbon costs. Delayed or softened enforcement buys time for scrap-based electric arc furnaces and green hydrogen-based DRI.
4. **CBDR Leverage & Carbon Leakage:** Aligning with Washington against unilateral carbon pricing strengthens Global South arguments on common but differentiated responsibilities. The carbon-leakage rationale is legitimate, yet India's per-capita emissions remain low.
5. **Lowering Non-Tariff Barriers:** US pressure on the EU to ease rigid default emission calculation values reduces administrative penalties on developing-country manufacturers.

### Strategic & Trade Implications

1. **Legal & Multilateral (WTO):** Joint US-India critique reinforces WTO arguments against CBAM acting as a disguised restriction on international trade under GATT Article XX Example: GATT compliance challenge.
2. **Economic & Industrial:** Prevents immediate margin compression for domestic primary producers while providing a transition buffer to green production routes Example: Blast furnace transition.
3. **Geopolitical Alignment:** Aligns the Global South with major non-EU economies against unilateral carbon-pricing mechanisms that disregard the Principle of Common But Differentiated Responsibilities (CBDR) Example: Global South CBDR.

### Critical Bottlenecks & Strategic Risks

1. **Temporary Relief vs. Long-Term Transition:** US-led flexibilities offer procedural delays rather than permanent structural exemptions from European climate standards.
2. **EU Regulatory Expansion:** Ongoing EU proposals to expand CBAM to cover over 300–400 downstream finished metal products continue to pose long-term export risks Example: Downstream CBAM expansion.
3. **Scrap shortage:** Scrap forms only 20% of India's feedstock, constrained by roughly 25 million tonnes annual availability. Example: ICRIER scrap findings.
4. **Verification & MRV Frictions:** Absence of a fully operational domestic carbon market creates dependence on foreign verifiers for Measurement, Reporting, and Verification (MRV) protocols.

### Way Forward

1. **Leverage India-EU FTA Negotiations:** Institutionalize explicit MFN equivalence and carbon-credit recognition clauses in the ongoing India-EU Free Trade Agreement.
2. **Accelerate Carbon Credit Trading Scheme (CCTS):** Operationalize the domestic carbon market to ensure carbon prices paid within India are credited against EU CBAM liabilities.
3. **Scale Green Steel Production:** Fast-track investments in Green Hydrogen-based Direct Reduced Iron (DRI) and Electric Arc Furnaces (EAF) to permanently decarbonize metal exports.
4. **Market diversification & Legal recourse:** Expand exports to the UK and West Asia. Seek WTO consultations if CBAM expansion breaches non-discrimination. Example: UK-India FTA, WTO consultations.

### Conclusion

As highlighted in the Economic Survey 2025-26 regarding climate-resilient trade, US scrutiny of CBAM provides India vital diplomatic leverage. By pairing international trade negotiations with accelerated domestic industrial decarbonization, India can turn unilateral climate tariffs into an opportunity for industrial modernization.

## Does the Unlawful Activities Prevention Act undermine constitutional due process and civil liberties? Analyze the need for structural statutory reforms.

### Introduction

UAPA, 1967 originally enacted to address threats to national sovereignty has evolved through successive amendments into India's primary anti-terror statute. However, cases of prolonged pre-trial detention followed by full acquittals highlight how ambiguous statutory definitions and restrictive bail conditions can transform process into punishment, challenging Article 21 guarantees.

### Structural Features Undermining Due Process & Civil Liberties

1. **Overbroad & Vague Statutory Definitions:** Broad phrasing in Section 2(o) (disaffection against India) and Section 15 (terrorist act) enables subjective interpretation, risking the criminalization of dissent and journalism. Example: Arup Bhuyan reversal (2023).
2. **Stringent Statutory Embargo on Bail:** Section 43D(5) requires courts to deny bail if accusations are prima facie true based solely on prosecution diaries, inverting the bail is the rule principle. Example: Section 43D(5) bar.
3. **Extended Detention & Investigation Periods:** Section 43D(2) permits police custody up to 30 days and doubles charge-sheet filing windows to 180 days, extending pre-trial incarceration. Example: 180-day charge-sheet window.
4. **Low Conviction Rates vs High Pendency:** Data from the National Crime Records Bureau (NCRB) indicates low conviction rates under UAPA alongside prolonged undertrial pendency, turning pre-trial detention into de facto punishment. Example: Low conviction rate.

## Impact Architecture

1. **Constitutional & Legal:** Conflict between Section 43D(5) and Article 21 (Right to Life & Personal Liberty). The Supreme Court ruled in *Union of India v. K.A. Najeer* (2021) that statutory bail bars cannot override constitutional guarantees against indefinite incarceration.
2. **Judicial Inconsistencies:** Judicial interpretation varies between strict evidentiary scrutiny (*Vernon Gonsalves v. State of Maharashtra*, 2023) and deferential acceptance of prosecution narratives. Example: Watali precedent, 2019.
3. **Socio-Political & Democratic:** Prolonged detention of journalists, scholars, and activists creates a chilling effect on legitimate democratic dissent. Example: Academic freedom erosion.

## Wider Democratic and Institutional Costs

1. **Human and social:** Professor G.N. Saibaba's acquittal in 2024 after a decade in custody illustrates how delayed justice can devastate health, family life and livelihood. Prolonged detention may chill journalism, scholarship and peaceful dissent. Example: Saibaba case.
2. **Institutional accountability:** Low annual conviction percentages, alongside lengthy proceedings, demand scrutiny of investigation quality, evidence collection and prosecution decisions not assumptions that every accused person is innocent or every case unjustified. Example: Evidence standards.
3. **Federal and technological:** Counterterrorism requires coordination between central agencies and states, while digital evidence needs independent forensic validation. Weak safeguards can magnify investigative errors and erode public confidence. Example: Forensic integrity.

## Structural Reforms

1. **Narrow and Precise Definitions:** Amend Section 2(o) and Section 15 to strictly align the definition of unlawful and terrorist acts with international standards. Example: UN Special Rapporteur recommendations.
2. **Reform Bail Jurisprudence:** Modify Section 43D(5) to require independent judicial evaluation of evidence at the bail stage, restoring constitutional balance.
3. **Establish Fast-Track Trial Courts:** Create dedicated Special Courts with strict time-bound trial mandates to eliminate indefinite undertrial detention.
4. **Mandate Statutory Compensation & Accountability:** Introduce legislative provisions under the Bharatiya Nagarik Suraksha Sanhita (BNSS) to compensate individuals acquitted after prolonged wrongfully held custody, alongside accountability for malicious prosecution.
5. **Compensation & Safeguards:** Legislate remedies for wrongful prosecution, as the Law Commission's 277th Report recommended. Mandate recorded reasons for arrest and prompt judicial verification. Example: Arrest safeguards.

## Conclusion

National security imperatives must coexist with constitutional protections. As the Supreme Court observed in *K.A. Najeer*, statutory restrictions cannot bypass fundamental rights. Aligning UAPA with constitutional due process is essential to preserve the rule of law and safeguard civil liberties.

**Does the state's regulation of public protest balance national security with fundamental freedoms? Examine in the context of Article 19(1)(b) guarantees.**

## Introduction

The right to assemble peacefully and without arms under Article 19(1)(b) is a cornerstone of Indian democracy. However, this fundamental freedom is not absolute and is subject to "reasonable restrictions" under Article 19(3) in the interests of the sovereignty, integrity, and public order of India. Balancing state regulation with civil dissent remains an ongoing constitutional debate.

### Constitutional Foundations & State Regulatory Mechanisms

1. **Guaranteed Freedom of Expression & Assembly:** Article 19(1)(a) and 19(1)(b) collectively protect the citizen's right to voice grievances and organize non-violent demonstrations. (e.g., Non-violent public assembly).
2. **Reasonable Restrictions Framework:** Article 19(3) empowers the state to enact regulatory measures to prevent public disorder and maintain traffic flows. (e.g., Section 163 BNSS).
3. **Judicial Precedents on Public Space:** The Supreme Court in *Himmat Lal v. Police Commissioner* (1973) established that the state can regulate, but not prohibit, public assembly, maintaining that streets are traditional sites for public discourse. (e.g., *Himmat Lal* precedent).
4. **Limits on Prolonged Occupation:** In *Himato Zimo & Ors. / Shaheen Bagh* case (2020), the apex court ruled that the right to protest cannot extend to the indefinite occupation of public ways, balancing public convenience with democratic dissent. (e.g., *Shaheen Bagh* verdict).

### Does the State Achieve the Balance?

1. **National Security and Public Order:** Credible threats of violence, communal tension or attacks on sensitive installations justify preventive action. Yet indiscriminate detention and blanket prohibitions risk punishing peaceful participants without assessing individual conduct. Example: Threat-specific policing.
2. **Contemporary accountability: Contemporary:** Reports describe mass detentions and travel curbs before the 10 October protest, though the Supreme Court has said blanket bans on travel or assembly are impermissible. Example: Delhi protests.
3. **Social and Economic:** Protest provides marginalised groups, students and workers a channel to influence policy when institutional representation feels inadequate. Conversely, prolonged blockades disrupt livelihoods, emergency access and commuters' freedom of movement. Regulation must protect both demonstrators and the wider public. Example: Livelihood protection.
4. **Technological and Institutional Safeguards:** Internet shutdowns, surveillance and digital monitoring can obstruct mobilisation and chill lawful speech. Police anonymity, excessive force and delayed inquiries further erode public trust. Article 21 and procedural safeguards therefore require transparent orders, identifiable officers and independent accountability. Example: Digital civil liberties.
5. **Administrative Capacity:** The Union Budget 2026–27 allocated ₹12,846.1 crore to Delhi Police, a reported 4.78% increase over 2025–26, including support for modernisation. Such resources should strengthen communication, traffic management and de-escalation not merely expand coercive capacity. Example: Modern policing.

### Way Forward

1. **Enforce the Proportionality Test:** Apply the framework articulated in *K.S. Puttaswamy* (2017) to ensure state restrictions are necessary, legitimate, and strictly proportionate to the public order threat.

2. **Designate Dedicated Protest Grounds:** Urban planning authorities should designate accessible, high-visibility sites for public demonstrations to prevent traffic disruption while upholding assembly rights.
3. **Adopt Non-Lethal Crowd Control:** Standardize police operational guidelines to prioritize de-escalation strategies and non-lethal crowd management technologies.
4. **Institutionalize Pre-Protest Liaison Units:** Establish regular dialogue between civil society organizers and police administration before planned demonstrations to prevent public order disruptions.

## Conclusion

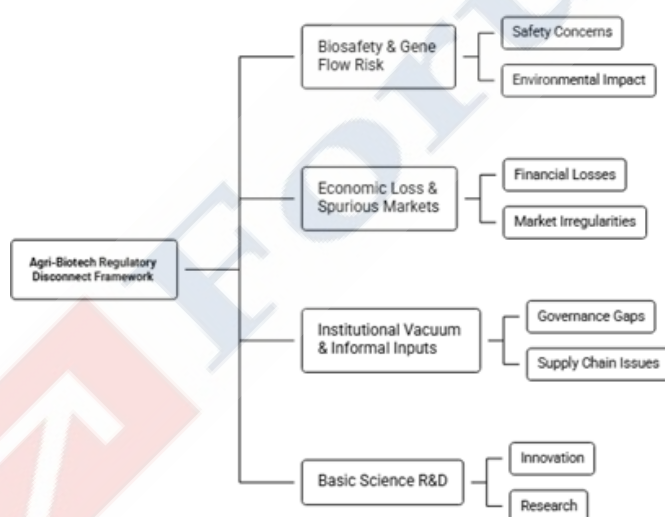
As the Supreme Court observed in Ramlila Maidan Incident (2012), the right to peaceful assembly is vital to a democratic society. Ensuring that executive regulations adhere strictly to constitutional boundaries preserves public order while upholding civil liberties.

## Does prioritizing translational biotechnology over basic research cause regulatory paralysis in agricultural innovation? Analyze in the context of unapproved GM crops.

### Introduction

India's scientific deficit is driven not by a lack of human capital, but by misaligned research priorities. Underinvestment in foundational basic science, disconnect between scientific discovery and practical technological adoption. This structural gap is visible in the agricultural sector, where widespread farmer adoption of illegal, unapproved HT Bt cotton (covering over 25% of cultivated cotton areas) highlights a disconnect between field-level economic demand and formal regulatory approval frameworks.

### Agri-Biotech Regulatory Disconnect Framework



### Drivers of the GM Innovation Disconnect

1. **Institutional Focus on Applied vs Basic Science:** Public agricultural research institutes prioritize incremental crop management solutions over fundamental genetic and molecular breakthroughs Example: ICAR translational focus.
2. **Regulatory Delays & Decision Inertia:** The Genetic Engineering Appraisal Committee (GEAC) faces protracted multi-departmental clearances, creating a regulatory vacuum that delays formal crop approvals Example: GEAC approval backlog.

3. **Farmer Economics & Cost Pressures:** High manual weeding costs and severe pink bollworm pest pressures drive farmers to procure unapproved HT/Bt-II seeds from informal markets Example: Unapproved HT-cotton adoption.
4. **Weak Intellectual Property Enforcement:** Rigid price controls and compulsory licensing disputes under the Protection of Plant Varieties and Farmers' Rights (PPV&FR) Act discourage global and domestic private R&D investments Example: Seed trait-fee disputes.

#### Consequences Across Various Areas

1. **Ecological & Environmental Security:** Widespread cultivation of unmonitored HT trait variants without biosafety checks risks gene flow to wild relatives and accelerates herbicide resistance in weeds Example: Super-weed emergence risk.
2. **Economic & Agrarian Vulnerability:** Reliance on uncertified seed markets exposes farmers to spurious quality inputs, leading to crop losses without formal insurance or legal redress Example: Spurious seed exposure.
3. **Sovereign R&D Stagnation:** A risk-averse regulatory environment forces domestic laboratories to avoid frontier gene-editing research Example: CRISPR-Cas9), entrenching dependency on legacy imported technology traits Example: CRISPR research lag.
4. **Judicial and institutional uncertainty:** In Gene Campaign v. Union of India (2024), the Supreme Court delivered a split verdict on GM mustard and directed the government to formulate a national GM-crop policy through stakeholder consultation. This highlights the need for transparent, scientifically defensible decisions. Example: GM mustard.

#### Way Forward

1. **Rebalance Science Funding Priorities:** Reallocate public R&D funds under the Anusandhan National Research Foundation (ANRF) toward core molecular biology and plant genetics to build indigenous trait pipelines.
2. **Establish an Independent Science-Driven Regulator:** Enact statutory legislation to replace the fragmented multi-ministerial GEAC with an autonomous Biotechnology Regulatory Authority of India (BRAI).
3. **Streamline Modern Breeding Protocols:** Differentiate traditional transgenic modifications from targeted gene-edited crops (SDN-1 and SDN-2 categories) to accelerate biosafety clearances.
4. **Institutionalize Farmer-Centric Field Trials:** Expand transparent, state-supported post-release monitoring mechanisms to align scientific evaluation directly with agrarian socio-economic needs.
5. **Differentiate technologies:** Apply proportionate, science-based pathways to transgenic and genome-edited crops without diluting safety standards.
6. **Strengthen enforcement and stewardship:** Improve seed traceability, laboratory testing, penalties against illegal trade, farmer awareness and post-release ecological monitoring.

#### Conclusion

As emphasized in the Economic Survey 2025-26 regarding the need to upgrade national research quality, closing the gap between laboratory science and agricultural application is vital. Reforming regulatory frameworks and strengthening foundational scientific research will protect biosecurity, support farmer livelihoods, and advance Viksit Bharat 2047 goals.

**Does prioritizing immediate applied innovation over foundational basic research hinder transformative scientific breakthroughs? Analyze in the context of India's research ecosystem.**

#### Introduction

Nobel Prizes regularly highlights India's challenge in foundational scientific breakthroughs despite its immense talent pool. India invests ~0.64%–0.7% of its GDP in R&D (compared to 2.4% in China, 3.5% in the US, and 4.8% in Israel). This deficit stems not from a lack of human capability, but from institutional priorities that prioritize short-term, incremental applied technology over high-risk, long-term basic research.

### Drivers of the Basic Science Gap

1. **Funding Asymmetry & Bureaucratic Delays:** Public R&D spending favors applied institutional projects, while university-led basic research faces prolonged equipment procurement cycles and grant disbursement delays. Example: University research underfunding.
2. **Risk-Averse Grant Allocation:** Funding agencies prioritize predictable, incremental outcomes over open-ended fundamental inquiries, discouraging young researchers from pursuing high-risk scientific questions. Example: Conservative grant approval.
3. **Siloed Academic Infrastructure:** Public research laboratories (e.g. CSIR, DRDO) remain structurally isolated from higher education institutions (HEIs), limiting student access to advanced scientific instruments. Example: Lab-university insularity.
4. **Privatization Deficit in Core R&D:** Private corporate spending accounts for less than 40% of national R&D expenditure, focusing primarily on commercial product development rather than fundamental research. Example: Low corporate basic R&D.
5. **Intellectual Property & Institutional:** Price controls on trait fees and PPV&FR Act disputes deter private investment. Public research prioritises incremental crop management over foundational molecular breakthroughs, thinning indigenous trait pipelines. Example: Trait-fee disputes, ICAR translational focus.

### National Science Priority Architecture Response

1. **Strategic & Technological Autonomy:** Over-reliance on imported foundational technologies (Example: semiconductor IP, quantum algorithms, active pharmaceutical ingredients) creates vulnerability during global supply chain disruptions. Example: Core technology dependence.
2. **Quantity over Quality Evaluation Metrics:** Performance systems emphasize paper publication counts over citation impact, intellectual property creation, or groundbreaking discoveries. Example: Journal paper inflation.
3. **Human Capital & Brain Drain:** Inadequate lab infrastructure and administrative friction lead top scientific talent to migrate to Western research ecosystems. Example: High-end talent flight.

### Way Forward

1. **Increase National R&D Spending:** Raise gross expenditure on R&D (GERD) to at least **1.5%–2% of GDP**, allocating a dedicated portion specifically to curiosity-driven basic science.
2. **Empower the ANRF Framework:** Utilize the Anusandhan National Research Foundation (ANRF) to direct non-bureaucratic, high-risk grants directly to state and central university laboratories.
3. **Incentivize Private Basic Science Research:** Offer tax credits and co-funding matching grants to corporations establishing fundamental research labs in deep-tech domains.
4. **Institutionalize Cross-Border Collaborations:** Partner with international mega-science initiatives (e.g., CERN, Thirty Meter Telescope, LIGO) to integrate Indian researchers into frontier global science experiments.

### Conclusion

As emphasized in the Economic Survey 2025–26 regarding national innovation capacity, world-class breakthroughs are the product of robust basic science ecosystems. Shift focus from chasing international awards to building autonomous, well-funded scientific institutions to ensure India's research trajectory supports the vision of Viksit Bharat 2047.

## Does systemic concentration of institutional leadership lead to governance atrophy? Analyze in light of Ram Manohar Lohia's doctrine of substantive equality.

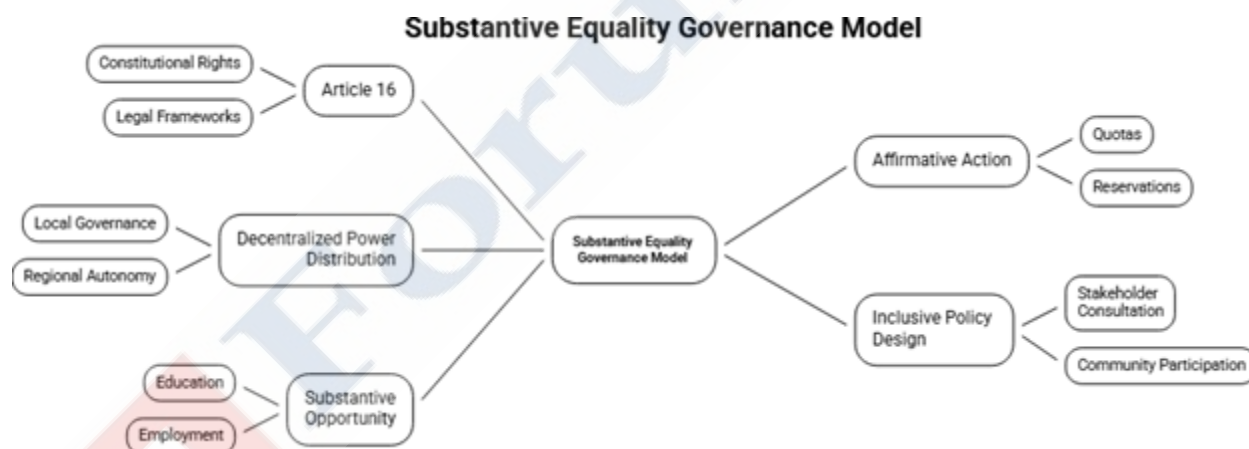
### Introduction

In his seminal essay 'The Meaning of Equality', socialist thinker Dr. Ram Manohar Lohia warned that when over 80% of a nation's vital leadership is drawn from a narrow 20% elite, structural stagnation and governance atrophy inevitably follow. Lohia advocated for moving beyond formal procedural equality toward substantive equality (Samta), emphasizing that representative leadership across public institutions is essential for democratic legitimacy and social vitality.

### Causes and Manifestations of Institutional Atrophy

1. **Elite Capture & Policy Disconnect:** Decision-making bodies dominated by homogenous socio-economic backgrounds risk developing policy blind spots toward rural and marginalized realities Example: Top-down policy bias.
2. **Perpetuation of Historical Inequities:** Lack of diversity in higher civil services, judiciary, and academia restricts vertical social mobility for backward classes, Scheduled Castes (SCs), Scheduled Tribes (STs), and women Example: Leadership representation gaps.
3. **Institutional Rigidity:** Governance structures lacking pluralistic perspectives struggle to adapt to grassroots challenges, fostering administrative inertia Example: Grassroots administrative disconnect.
4. **Erosion of Democratic Trust:** Monopolization of key governance posts breeds alienation among underrepresented communities, weakening social cohesion and constitutional trust Example: Public trust deficits.

### Constitutional and Evidence-Based Assessment



1. **Constitutional & Legal:** Article 16(4) empowers the state to make provisions for the reservation of appointments in favor of any backward class not adequately represented, operationalizing Lohia's vision of preferential opportunity. In *M. Nagaraj and Jarnail Singh*, the Supreme Court addressed evidentiary requirements for promotional reservation.
2. **Data deficit:** DoPT's 2024–25 Annual Report gives representation figures for SCs, STs and OBCs across central-government groups, based on information from 80 ministries and departments, but these are not apex-post figures. A 2026 parliamentary reply reportedly stated that SC/ST representation data at Joint Secretary level and above is not maintained.
3. **Developmental relevance:** The Economic Survey 2025–26 stresses capacity-building, digital tools and stronger Panchayati Raj institutions. This supports a leadership pipeline, but neither the Survey nor Budget 2026–27 should be presented as proof of apex-level underrepresentation.

4. **Socio-Political:** True democracy requires transitioning from purely formal equality (equality before law) to affirmative, result-oriented measures (preferential opportunity for the marginalized).
5. **Administrative Efficiency:** Broadening the social base of public leadership enriches institutional problem-solving capacity through diverse, ground-level insights.

### Way Forward

1. **Promote Diversity in Higher Governance:** Extend diversity frameworks beyond entry-level recruitment to ensure fair representation in senior decision-making roles and statutory bodies. Example: Senior leadership diversity.
2. **Strengthen Democratic Decentralization:** Empower Panchayati Raj Institutions (PRIs) and Urban Local Bodies (ULBs) under the 73rd and 74th Constitutional Amendments to build leadership pipelines from the grassroots level.
3. **Expand Capacity-Building Programs:** Invest in targeted skill development, higher education, and mentorship for marginalized groups to prepare them for top administrative and judicial posts. Example: Targeted leadership mentorship.
4. **Institutionalize Social Audits:** Evaluate public policies and institutional compositions against inclusion metrics to ensure equitable distribution of power and opportunity. Example: Inclusive governance audits.
5. **Review Mechanism & Mentorship:** Constitute a standing commission monitoring representation at apex levels. Create leadership programmes for marginalised officers. Example: Standing commission & Leadership mentoring.

### Conclusion

As Dr. B.R. Ambedkar cautioned in the Constituent Assembly, political democracy cannot survive without social democracy. Realizing Lohia's vision of substantive equality requires breaking institutional monopolies and ensuring that India's leadership truly reflects its social diversity to build a Viksit Bharat 2047.

## Does corporate social responsibility in India require shifting from fund mobilization to strategic impact? Analyze the governance challenges in optimizing CSR.

### Introduction

India's CSR framework has mobilised ₹2.6 lakh crore over a decade; in 2024–25, 29,500 companies spent ₹40,794 crore across 72,000 projects. The challenge is converting scale into measurable, equitable, lasting development outcomes.

### From Compliance to Strategic Impact

1. **Historical and legal foundation:** Section 135 of the Companies Act, 2013 requires qualifying companies to spend 2% of average net profits on Schedule VII activities. It transformed philanthropy into a development resource, but compliance with spending rules is not proof of lasting impact. Example: Section 135.
2. **Spatial inequality:** CSR often follows corporate headquarters and industrial clusters rather than deprivation. A NITI Aayog assessment found that six states containing 60% of aspirational districts received only 9% of CSR expenditure during 2014–19; aspirational districts received about 10% in 2018–19. These figures reveal the need for updated district-level mapping. Example: Regional imbalance.
3. **Sectoral and temporal bias:** Education and healthcare deliver benefits, but concentration can leave climate adaptation, livelihoods, water security and research underfunded. Annual spending pressure also favours short projects over multi-year systems change. Example: Sectoral concentration.

### Structural Challenges in Optimizing CSR Impact

1. **Geographic Imbalances & Regional Disparities:** CSR investments remain heavily skewed toward industrialized states Example: Maharashtra, Gujarat, Tamil Nadu), leaving under-resourced regions like the North-East and aspirational districts underfunded. Example: Regional allocation skew.
2. **Sectoral Concentration in Traditional Avenues:** Funds disproportionately flow to education and healthcare, under-allocating resources to deep-tech research, climate resilience, and rural livelihoods. Example: Sectoral funding bias.
3. **Short-Term Project Horizons:** Focus on immediate, annual compliance metrics discourages long-term, multi-year interventions necessary for systemic community impact. Example: Annual spending bias.
4. **Monitoring & Impact Evaluation Deficits:** Limited reliance on standardized Social Return on Investment (SROI) metrics leads to fragmented monitoring and outcome tracking. Example: SROI evaluation gap.

### Governance & Strategic Impact Architecture

1. **Constitutional & Federal:** Aligning local corporate spending with State-level development priorities fosters cooperative federalism and ensures equitable asset creation in backward regions. Example: Regional development parity.
2. **Economic & Financial:** Channeling CSR capital as catalytic first-loss capital through Social Stock Exchanges (SSE) unleashes innovative blended finance instruments. Example: Social impact bonds.
3. **Socio-Environmental:** Integrating CSR with flagship public interventions Example: PM-SHRI, Jal Jeevan Mission, Aspirational Districts Programme) maximizes ecosystem-level outcomes. Example: Public-private development synergies.

### Way Forward

1. **Establish a National CSR Spatial Portal:** Create a unified platform mapping regional development deficits to guide corporate funds toward lagging districts and underfunded SDGs.
2. **Incentivize Pooled & Blended Finance:** Permit corporate pooling of CSR funds with impact investors and philanthropic foundations to finance large-scale infrastructural and climate projects.
3. **Mandate Standardized Impact Audits:** Require independent, third-party social impact assessments for high-value projects under the MCA framework to ensure transparency and measurable outcomes.
4. **Promote R&D and Innovation Funding:** Encourage corporate contributions to public universities, incubation centers, and government research bodies under Schedule VII to bolster national innovation capacity.

### Conclusion

As highlighted in the Economic Survey 2025–26 regarding private-sector partnership in national development, CSR must evolve from transactional philanthropy to strategic co-investment. Aligning corporate social investments with Viksit Bharat 2047 goals will ensure that private capital drives long-term, inclusive, and equitable growth.

### How does the persistence of PFAS in water sources challenge public health and environmental governance in India? Examine the necessary policy interventions.

#### Introduction

Per- and polyfluoroalkyl substances PFAS often called forever chemicals are synthetic organofluorine compounds that resist environmental degradation due to their ultra-strong carbon-fluorine bonds. Although utilized globally for over six decades in industrial non-stick coatings, firefighting foams, and textiles, studies

from IIT-Madras reveal widespread PFAS presence in surface and groundwater across states like Gujarat, Maharashtra, and Tamil Nadu.

### Legal and Regulatory Status in India

1. **General Environmental Laws:** India relies on broad legacy statutes such as the Environment (Protection) Act, 1986 and the Water (Prevention and Control of Pollution) Act, 1974 to manage industrial emissions and general water quality, but these do not explicitly mention or regulate PFAS limits.
2. **Stockholm Convention:** India ratified the Stockholm Convention on Persistent Organic Pollutants in 2006, which includes certain PFAS chemicals on restricted lists, yet specific domestic restrictions have lagged behind international commitments.
3. **Bureau of Indian Standards (BIS):** In 2020, BIS adopted International Organization for Standardization (ISO) methods for sampling and testing PFOA and PFOS, though monitoring remains sparse and non-enforceable.
4. **FSSAI Food Packaging Draft (2025):** The FSSAI issued a draft amendment to the Food Safety and Standards (Packaging) Regulations, 2018 in October 2025 proposing a complete ban on PFAS and Bisphenol A (BPA) in food contact materials. As of late 2026, this draft amendment is awaiting final notification.

### Why PFAS Challenge Governance

1. **Inadequacy of Conventional Water Infrastructure:** Standard municipal water treatment plants (utilizing sand filtration, coagulation, and biological treatment) fail to capture or neutralize short-chain PFAS molecules. Example: Treatment technology gaps.
2. **Regulatory Deficit in Water Quality Standards:** The Bureau of Indian Standards (IS 10500:2012) lacks statutory limits or maximum contaminant levels (MCLs) for PFOA/PFOS compounds. Example: IS 10500 standard vacuum.
3. **Severe Carcinogenic & Health Risks:** The International Agency for Research on Cancer (IARC) classifies PFOA as carcinogenic to humans. Chronic low-dose ingestion causes endocrine disruption, organ toxicity, and developmental delays. Example: Bioaccumulation health burden.
4. **High Technological & Economic Barriers:** Advanced remediation technologies, such as Granular Activated Carbon (GAC), Ion Exchange Resins, and Reverse Osmosis (RO) remain financially prohibitive for mass municipal scaling. Example: High advanced filtration costs.
5. **Ecological & Bioaccumulation:** PFAS runoff enters aquatic foodwebs and agricultural soil, leading to biomagnification in food crops and livestock. Example: Soil-crop bioaccumulation).
6. **Legal & Precautionary Principle:** Absence of enforceable discharge limits violates the Precautionary Principle under the Environment (Protection) Act, 1986, compromising Article 21 rights to clean water.
7. **Socio-Economic Asymmetry:** Disproportionately impacts rural and low-income urban populations dependent on untreated groundwater near industrial zones and landfill leachates. Example: Groundwater vulnerability.

### Way Forward

1. **Update BIS Standards & Mandate Interim Limits:** Amend the IS 10500 drinking water standard to establish strict parts-per-trillion (ppt) thresholds for target PFAS variants.
2. **Deploy High-Resolution Mass Spectrometry:** Empower the Central Pollution Control Board (CPCB) and CSIR-IITR to conduct baseline contamination mapping across major river basins.
3. **Upgrade Municipal Filtration Infrastructure:** Phased integration of modular Granular Activated Carbon (GAC) and Nanofiltration units into Jal Jeevan Mission treatment plants.

4. **Implement Extended Producer Responsibility (EPR):** Enforce EPR frameworks requiring chemical and textile manufacturers to substitute persistent fluorinated compounds with eco-friendly alternatives.
5. **Research Funding & Public Disclosure:** Support indigenous low-cost remediation through ANRF. Publish water-quality dashboards and health surveillance.

## Conclusion

Addressing the forever chemical challenge requires transitioning from reactive water management to proactive environmental governance. Updating drinking water standards, upgrading infrastructure, and mapping baseline contamination will safeguard public health and ensure water security under Viksit Bharat 2047.

## Does balancing thermal comfort with HFC phasedown under the Kigali Amendment challenge India's energy security? Analyze necessary sustainable cooling strategies.

### Introduction

Marking a decade since its adoption, the Kigali Amendment to the Montreal Protocol aims to phase down HFCs by over 80% by 2047, offering the potential to prevent up to 0.5 degree C of global warming by 2100. With India's cooling demand projected to more than double by 2035 driven by rapid urbanization, rising ambient temperatures, and expanding cold chains, reconciling climate commitments with expanding thermal comfort presents a critical energy governance challenge.

### Governance & Energy Security Challenges

1. **Indirect Emissions & Electricity Grid Strain:** Expanding space cooling without energy efficiency improvements inflates peak electricity demand, straining the thermal-heavy power grid. Example: Summer peak load surges.
2. **High Global Warming Potential (GWP) Refrigerants:** Conventional HFC refrigerants (Example: R-410A, R-134a) exhibit high global warming potentials hundreds to thousands of times greater than CO2 exacerbating direct leakage risks. Example: HFC refrigerant leakage.
3. **Industrial Transition Costs for Domestic Manufacturers:** Shifting manufacturing lines to low-GWP natural refrigerants (Example: Hydrocarbons like R-290, Isobutane) requires significant capital re-tooling and safety upgrades. Example: Propane R-290 retooling.
4. **Servicing Sector Disconnect & Unregulated Disposal:** Over 80% of the HVAC servicing workforce operates in the informal sector, leading to uncontained venting during equipment maintenance and disposal. Example: Informal technician skill gaps.

### Strategic Mitigation Architecture

1. **Environmental & Climate Interventions:** Dual mitigation combining refrigerant replacement (direct emissions) with appliance efficiency upgrades (indirect emissions) accelerates decarbonization targets under India's NDCs.
2. **Economic & Public Health Benefits:** Accessible cold chain infrastructure protects food security and vaccine storage, mitigating extreme heat health risks for vulnerable populations. Example: PM-KSY agricultural cold-chains.
3. **Sovereign R&D Alignment:** Developing low-GWP, indigenous cooling technologies shields domestic markets from foreign IP monopolies and dumping of obsolete equipment.

### International Commitments and Domestic Policy

1. **Kigali Obligations:** Adopted in 2016, the Amendment could prevent approximately 0.3–0.5°C of warming by 2100. India ratified it in 2021; its HFC freeze begins in 2028, followed by reductions of 10% in 2032, 20% in 2037, 30% in 2042 and 85% in 2047.
2. **Existing Policy Foundation:** The 2019 India Cooling Action Plan targets reductions by 2037–38 of 20–25% in cooling demand, 25–30% in refrigerant demand and 25–40% in cooling energy requirements. BEE's appliance labels, Energy Conservation and Sustainable Building Code, and Eco-Niwas Samhita support this transition.
3. **Global Cooperation:** The Montreal Protocol's Multilateral Fund supports developing countries' transition costs. India must use such support for technology transfer, technician training and domestic innovation while avoiding dependence on imported equipment.

### Way Forward

1. **Operationalize India Cooling Action Plan (ICAP):** Synchronize ICAP goals with Kigali baseline freezes (effective 2028) to enforce aggressive star-labeling energy standards across room air conditioners.
2. **Promote Passive Cooling & Eco-Niwas Samhita:** Mandate thermal-comfort building design—including cool roofs, natural ventilation, and insulation—into municipal building codes to reduce active cooling demand.
3. **Formalize the Servicing Ecosystem:** Upskill HVAC service technicians under the Skill India Mission in safe handling, recovery, and recycling of flammable, low-GWP natural refrigerants.
4. **Leverage the Multilateral Fund (MLF):** Secure financial and technology transfers under the Montreal Protocol to support domestic MSMEs during manufacturing line conversions.

### Conclusion

As emphasized in the Economic Survey 2025–26 regarding climate-resilient growth, sustainable cooling is essential for social equity and energy security. Integrating efficient appliances, passive architectural design, and low-GWP refrigerants ensures that India expands cooling access without accelerating global warming, reinforcing its leadership.