



ASIAN DEVELOPMENT BANK

Trends, Standards, and Strategic Frameworks for Energy-Efficient IT Hardware in India

Contents

Executive Summary	3
1. Introduction	5
2. Regulatory & Standards Framework	8
3. Public-Sector Procurement Framework	12
4. Ground-Level Implementation and Barriers	16
5. Private Sector and Policy-Driven Manufacturing Trends	18
6. Recommendations: Strengthening India’s Sustainable IT Procurement Ecosystem.....	20
7. Implementation Roadmap: 2025–2030	23

Executive Summary

India's IT hardware market—including desktops, laptops, servers, and printers—is valued at approximately **USD 21.17 billion in 2025** and is expected to reach **USD 29.84 billion by 2030**, growing at a compound annual growth rate of **7.1 percent** (Mordor Intelligence, 2024). This growth is supported by expanding digital public infrastructure and increasing enterprise IT investments.

Public procurement of IT hardware is governed by the **Government e-Marketplace (GeM)**, mandated under **Rule 149 of the General Financial Rules, 2017**. While GeM has standardized procurement processes and improved transparency, enforcement of certification requirements remains inconsistent. Field analysis of recent tenders indicates that clauses mandating BIS safety certification and BEE energy-efficiency labeling are frequently absent from initial tender documents and, in some cases, only introduced through corrigenda or Additional Terms and Conditions (GeM Tenders, 2024).

India mandates product safety certification for IT hardware under the Compulsory Registration Scheme (CRS) administered by the Bureau of Indian Standards (BIS), in accordance with the BIS Act, 2016. Products such as laptops, desktops, monitors, and servers must conform to IS 13252 (Part 1): 2010 and display a valid BIS Standard Mark prior to sale or import (BIS, 2023). However, certification delays—especially for laptops and battery components—have hindered timely market access, with testing cycles reported to extend up to five to six months (KNN India, 2024).

Energy-efficiency labeling for IT hardware in India is currently voluntary under the Bureau of Energy Efficiency's (BEE) Standards & Labeling Programme. Laptops fall under Schedule 14, and office equipment—such as printers, scanners, and copiers—are listed under Schedule 16, with efficiency testing aligned to IEC 62301 standards (BEE, 2023). As of mid-2025, no Minimum Energy Performance Standards (MEPS) have been notified under the Energy Conservation Act for IT hardware. This voluntary status has led to limited market adoption of energy-efficient products and low participation in star labeling.

India's IT hardware market is primarily supplied by multinational OEMs—such as HP, Dell, Lenovo, and Acer—which account for the majority of laptops, desktops, and servers sold in both public and private sectors (IDC, 2024; Statista, 2024). Many of these products are registered under international eco-labels such as **ENERGY STAR** and **EPEAT**, reflecting the manufacturers' global compliance strategies. However, these certifications are **not mandated under Indian public procurement rules**, and most government tenders on the GeM platform do not systematically require or evaluate such certifications.

Globally, public procurement frameworks in several major markets incorporate environmental performance requirements. In the United States, the Federal Acquisition Regulation (Part 23) and Executive Order 13693 require all federal IT purchases to be ENERGY STAR-qualified and EPEAT-registered (U.S. EPA, 2023). Similarly, the European Union enforces binding energy-efficiency standards under EU Regulation 617/2013 for computers and servers, and mandates energy labeling for displays under Regulation 2019/2021 (European Commission, 2023). Indian procurement frameworks have not yet adopted equivalent requirements, and uptake of such certifications among domestic manufacturers remains limited due to resource and procedural constraints.

Environmental performance metrics and lifecycle costing methodologies are not systematically embedded in Indian IT hardware tenders. While permitted under the GeM framework, such provisions are seldom enforced. An analysis of publicly available tenders for laptops, desktops, and printers issued through GeM in 2023–2024 shows most procurements rely on L1 criteria and do not verify BIS or BEE compliance at the bid stage, despite existing mandates (GeM Tenders, 2024; CAG India, 2023).

Domestic IT manufacturers—particularly micro, small, and medium enterprises (MSMEs)—report persistent barriers to certification compliance. The BIS testing process for products such as laptops and servers can take 5–6 months, a timeline that often exceeds the product development cycle and discourages participation under schemes like the Production Linked Incentive (PLI) (KNN India, 2024).

Strengthening India’s green public procurement framework for IT hardware will require: (i) standardizing the inclusion of BIS and BEE certification as mandatory clauses in all GeM tenders; (ii) incorporating lifecycle cost and energy-efficiency metrics into bid evaluation processes; (iii) creating targeted support for certification access by MSMEs; (iv) integrating full lifecycle sustainability parameters—including embodied carbon, material composition, recyclability, and packaging waste—into procurement specifications; and (v) establishing phased implementation roadmaps with differentiated strategies for central, state, and private-sector procurement.

1. Introduction

1.1 Landscape and Scope of IT Hardware in India

The Indian information technology (IT) hardware landscape includes a broad set of digital devices that forms the backbone of public service delivery, enterprise operations, education systems, and national infrastructure. The ecosystem spans:

- **Personal computing equipment:** laptops, desktops, workstations
- **Printing and imaging devices:** printers, copiers, scanners, multifunction peripherals
- **Enterprise infrastructure:** tower and rack servers for data centres
- **Digital displays:** monitors, smart screens, large-format interactive displays
- **Mobile computing devices:** tablets, smartphones, hybrid systems

This report focuses on four hardware categories—**laptops, desktops, servers, and printers**—which are not only among the most procured devices by Indian government entities but also subject to evolving certification, energy-efficiency, and environmental performance mandates under both national and international frameworks.

1.2 Market Size and Demand Trajectory

This market has grown significantly in recent years, catalyzed by the Digital India programme, the expansion of e-governance services, hybrid learning and working models, and central investment in public digital infrastructure.

The total market for computers and peripherals was valued at approximately **₹626 billion in 2022** and is projected to reach **₹977 billion by 2026**, reflecting a **compound annual growth rate (CAGR) of 7.1%** (Statista, 2023). The **PC and workstation segment alone** accounted for **USD 12.43 billion in 2022**, and is expected to grow to **USD 17.11 billion by 2028**, registering a **CAGR of 5.62%** (Mordor Intelligence, 2024).

Segment-specific trends include:

- The **server market** is projected to exceed **₹15,000 crore by 2025**, driven by rising cloud adoption, demand for localized data processing, and e-governance backend expansion (Market Research Future, 2023).
- The **multifunction printer (MFP) segment** is expected to grow at a **CAGR of 6.2%**, reaching **USD 3.6 billion by 2028**, led by demand from government offices, education, and banking services (TechSci Research, 2023).
- The **digital display and monitor market** is anticipated to reach **USD 10.7 billion by 2025**, supported by the proliferation of digital classrooms and public digital signage (Mordor Intelligence, 2023).

Public procurement constitutes a significant share of this market. The Government of India is projected to spend **₹1.05 lakh crore (~USD 14 billion)** on IT and telecommunications equipment by 2025, including major outlays for servers, printers, and educational computing devices (Ministry of Finance, 2023).

1.3 Market Structure and Vendor Participation

India's IT hardware market remains consolidated around a handful of global vendors. According to **IDC's Q3 2024 PC tracker**, **HP Inc., Lenovo, and Dell Technologies** together accounted for over **60% of total PC shipments**. While **HP maintained leadership with a 29.0% market share**,

Acer Group recorded a year-over-year growth of 26.2%, indicating targeted penetration into government and MSME procurement channels (IDC, 2024).

Table 1. India PC Market – Top 5 Vendors by Shipments (Q3 2024)

Vendor	Shipments ('000 units)	Market Share (%)	YoY Growth (%)	Source
HP Inc.	1,300	29.0	-1.5	IDC, 2024
Lenovo	778	17.3	1.9	IDC, 2024
Dell Technologies	658	14.6	0.6	IDC, 2024
Acer Group	657	14.6	26.2	IDC, 2024
Asus	435	9.7	-22.3	IDC, 2024
Others	664	14.8	-0.7	IDC, 2024
Total	4,492	100	0.1	

(Source: IDC, 2024)

These vendors play a critical role in shaping the degree of compliance with Indian and international energy and quality standards. HP, Dell, and Lenovo maintain large portfolios of ENERGY STAR and EPEAT-registered devices, enabling them to participate in central procurement opportunities that reference these benchmarks.

1.4 Adoption of Standards and Certification Frameworks

Despite the availability of standards under the **Bureau of Indian Standards (BIS)** and **Bureau of Energy Efficiency (BEE)**, as well as international programs such as **ENERGY STAR** and **EPEAT**, the uptake within the Indian IT hardware market remains uneven.

- **BIS certification under the Compulsory Registration Scheme (CRS)** is mandatory for IT equipment categories such as laptops, desktops, and printers under IS 13252 (Part 1) (BIS, 2023). However, enforcement at the tendering stage remains inconsistent, particularly in decentralized and state-level procurement processes. A 2024 GeM analysis of 150 IT hardware tenders found that only 17% explicitly required BIS CRS registration, despite its statutory status (GeM, 2024). Similarly, a 2023 audit by the Comptroller and Auditor General (CAG) reported that 35.4% of IT devices procured by four state governments lacked valid BIS certification, even when compliant variants were listed on GeM (CAG, 2023).
- **BEE star ratings**, while available under voluntary Schedule 14 (for laptops and desktops) and Schedule 16 (for servers), are rarely enforced through procurement clauses (BEE, 2024). The same GeM tender analysis showed that only 12% of tenders referenced any BEE rating requirement (GeM, 2024). A capacity assessment by the Digital India Foundation further revealed that most procurement officials lack training on integrating energy-performance thresholds such as annual kWh limits into tender specifications (Digital India Foundation, 2022).
- **ENERGY STAR and EPEAT certifications**, though commonly adopted by global OEMs supplying to India, are almost entirely absent from public-sector RFP language. Only 4.7% of GeM tenders reviewed in 2024 made reference to either certification (GeM, 2024). However, a joint MeitY–NASSCOM review of central procurement programs found that over 65% of laptops procured were ENERGY STAR compliant—not due to mandate, but because such compliance was embedded by default in the offered models (MeitY &

NASSCOM, 2023). This suggests a missed opportunity to codify existing international compliance into formal tender documentation.

2. Regulatory & Standards Framework

This section outlines the key regulatory levers shaping IT hardware compliance in India, including the Bureau of Indian Standards (BIS) Compulsory Registration Scheme, Bureau of Energy Efficiency (BEE) Star Labelling Programme, and international certification systems such as ENERGY STAR® and EPEAT.

2.1 National Mandatory Certification: BIS CRS and QCOs

Under the **BIS Act, 2016**, the Bureau of Indian Standards enforces the **Compulsory Registration Scheme (CRS)** for specific electronics and IT goods. As of March 2025, **61 products** are notified under the CRS, of which **56 fall under electronics and IT**, including laptops, desktops, printers, plotters, and power adapters (BIS, 2024a).

Products under CRS must conform to relevant Indian Standards (IS) and bear the **BIS Standard Mark**. The principal safety standard for IT hardware is **IS 13252 (Part 1):2010**, derived from IEC 60950-1, which prescribes electrical and fire safety requirements for computing and business machines. Compliance is mandatory before sale, import, or distribution in India, and testing must be conducted in BIS-recognized laboratories (BIS, 2018).

In parallel, the government has issued 187 Quality Control Orders (QCOs) covering 769 product categories, several of which intersect with IT and computing equipment. BIS's standardization efforts are overseen by the Electronics and IT Division Council (LITDC), which also aligns Indian standards with ISO 9001 (quality management systems) and ISO 14001 (environmental management systems) to support interoperability and export-readiness (BIS, 2023).

2.2 National Energy Efficiency Labelling Framework for IT Hardware

The Bureau of Energy Efficiency (BEE) governs India's Standards & Labelling (S&L) Programme, which assigns 1–5 star energy-efficiency ratings based on product-specific performance thresholds. These thresholds are defined by metrics such as annual energy consumption (kWh/year) or mode-specific power draw (e.g., standby, active). IT hardware and related electronic products are primarily listed under Schedule 14 (Computers) and Schedule 16 (Office Automation Equipment). Although these categories are covered, star labeling for IT hardware remains voluntary, and no Minimum Energy Performance Standards (MEPS) have been notified for these products under the Energy Conservation Act, as of mid-2025 (BEE, 2024; AlephIndia, 2024; Vincular, 2024).

2.3 Test Procedures vs. Performance Standards

While test procedures are harmonized with global standards—including IEC 62301 (for standby/off mode), ISO/IEC 62087 (on-mode for displays), and ISO 9409 (computing devices)—the energy performance thresholds are set nationally by BEE. Manufacturers must submit products for third-party lab testing and receive star ratings based on BEE's published thresholds.

Table 2. BEE Star Rating Thresholds for Selected IT Devices

Device Type	Metric	1-Star Max	5-Star Max	Test Standard
Laptop	Annual Energy Use (kWh/year)	≤ 70	≤ 40	ISO 9409 / IEC 62301
Desktop	Annual Energy Use (kWh/year)	≤ 150	≤ 85	ISO 9409 / IEC 62301
Printer (MFD)	Ready Mode Power (W)	≤ 10	≤ 2.5	IEC 62301

Display Monitor (24")	On-Mode Power (W)	≤ 60	≤ 35	ISO/IEC 62087
Enterprise Server	Annual Energy Use (kWh/year)	≤ 500	≤ 350	BEE Internal Protocol

(Source: BEE Schedule 14 & 16, 2024)

2.4 Procurement Uptake and Implementation Gaps

Despite the technical robustness of India’s Standards & Labelling Programme, its integration into public procurement remains limited. A review of IT hardware tenders floated through GeM during 2023–2024 indicates that only 12% of IT hardware tenders explicitly required BEE star ratings, despite the widespread availability of certified products from major OEMs such as HP, Dell, and Lenovo (GeM Analytics, 2024). Bid evaluation criteria continue to rely heavily on lowest-price (L1) selection, with energy-efficiency specifications either omitted or treated as non-scored, declarative fields. In many cases, BIS and BEE compliance is marked through “Yes/No” checkboxes without submission of technical documentation (CAG India, 2023).

2.5 International Environmental Labelling Frameworks

ENERGY STAR, managed by the U.S. Environmental Protection Agency (EPA), certifies devices in the top 25% of energy efficiency. Over 3,000 ENERGY STAR–registered configurations were available globally as of 2025 (U.S. EPA, 2025). EPEAT (Electronic Product Environmental Assessment Tool), maintained by the Global Electronics Council (GEC), provides a lifecycle-based environmental rating system with Bronze, Silver, and Gold tiers. A Gold rating requires compliance with 23 mandatory and at least 75% of 28 optional sustainability criteria (GEC, 2025). Indian OEM participation in EPEAT remains low, mainly due to costs, procedural complexity, and lack of domestic facilitation infrastructure.

2.6 Comparison of BEE and International Efficiency Thresholds

Table 3. Comparative Energy-Efficiency Thresholds: BEE 5-Star vs. ENERGY STAR

Device Type	BEE (India) 5-Star	ENERGY STAR (U.S.)	Unit	Sources
Laptop	≤ 40	~35	kWh/year	BEE Sch. 16; ENERGY STAR v8.0
Desktop	≤ 85	~80	kWh/year	BEE Sch. 16; ENERGY STAR v8.0
Monitor (24")	≤ 35	~30	Watts	BEE Sch. 16; ENERGY STAR v8.0
Printer (MFD)	≤ 2.5 (Ready)	≤ 2.0	Watts	BEE Sch. 16; ENERGY STAR
Server	≤ 350	~330	kWh/year	BEE Draft; ENERGY STAR v3.0

While BEE’s rating framework is broadly aligned with global norms, its procurement uptake is undermined by the absence of enforcement, lack of technical scoring in tenders, and non-mandatory application of global standards like ENERGY STAR and EPEAT.

2.7 Full Lifecycle Sustainability Parameters

While energy efficiency during the operational phase is a necessary condition for sustainable IT procurement, it is not sufficient. A comprehensive approach must account for environmental

impacts across the entire product lifecycle—from raw material extraction and manufacturing through use and end-of-life management. This section addresses sustainability parameters that complement energy-efficiency metrics and are essential for aligning Indian procurement practice with internationally recognised lifecycle assessment (LCA) frameworks, including ISO 14040/14044 and the Product Environmental Footprint (PEF) methodology of the European Commission.

2.7.1 Embodied Carbon and Manufacturing-Phase Emissions

The manufacturing phase of IT hardware is carbon-intensive, encompassing semiconductor fabrication, printed circuit board assembly, rare-earth mineral extraction, and intercontinental logistics. Peer-reviewed lifecycle assessments indicate that embodied carbon—defined as the sum of greenhouse gas emissions from cradle to point-of-sale—accounts for approximately 70–80% of a laptop’s total lifecycle carbon footprint and 40–50% for rack-mounted servers, particularly in scenarios where use-phase electricity is sourced from low-carbon grids (Circular Computing, 2022; Dell Technologies LCA Report, 2023). For Indian procurement, where grid emission factors remain elevated (CEA, 2024: ~0.71 tCO₂/MWh), the relative share of embodied carbon is lower but still substantial. Mandating Product Carbon Footprint (PCF) declarations aligned with ISO 14067:2018 in procurement specifications would enable quantitative comparison of cradle-to-gate emissions across competing bids, thereby incentivising manufacturers to reduce upstream carbon intensity.

2.7.2 Material Composition and Hazardous Substance Restrictions

IT hardware contains materials of significant environmental and health concern, including lead (Pb), mercury (Hg), cadmium (Cd), hexavalent chromium (Cr⁶⁺), polybrominated biphenyls (PBBs), and polybrominated diphenyl ethers (PBDEs). The European Union’s Restriction of Hazardous Substances (RoHS) Directive 2011/65/EU establishes maximum concentration limits for these substances, and the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH) Regulation EC 1907/2006 imposes additional controls on substances of very high concern (SVHCs). While India’s E-Waste Management Rules 2022 address end-of-life management, they do not impose upstream substance restrictions equivalent to RoHS at the point of manufacture or import. Incorporating RoHS-equivalent material declarations—aligned with IEC 62321 test methods—into BIS standards and procurement specifications would close this regulatory gap and reduce downstream hazardous waste generation.

2.7.3 Recyclability, Circular Design, and Post-Consumer Recycled Content

Product design decisions taken at the engineering stage determine recyclability outcomes at end-of-life. Key design attributes that influence recyclability include: ease of disassembly (measured by the number of fastener types, tool requirements, and disassembly time); material homogeneity and labelling (per ISO 11469 for plastics identification); avoidance of adhesive bonding that prevents material separation; and use of post-consumer recycled (PCR) plastics. The EPEAT framework’s criteria for Design for End-of-Life (criterion 4.5.1–4.5.4 under IEEE 1680.1) and the EU’s proposed Ecodesign for Sustainable Products Regulation (ESPR) provide established benchmarks. Indian procurement specifications should progressively introduce minimum recyclability thresholds (e.g., 65% by weight, rising to 80% by 2030) and preferences for products incorporating PCR content, aligned with manufacturer Environmental Product Declarations (EPDs) per ISO 14025.

2.7.4 Packaging Sustainability

IT hardware packaging generates significant waste streams including expanded polystyrene (EPS), polyethylene films, and non-recyclable composite materials. Indian procurement criteria should address packaging sustainability by requiring compliance with the Plastic Waste Management Rules, 2016 (as amended 2022), mandating use of recyclable or compostable

materials for primary and secondary packaging, requiring elimination of single-use plastic packaging components above a specified threshold (e.g., 90% recyclable by weight by 2027), and encouraging adoption of returnable packaging systems for bulk institutional procurement. Leading OEMs have demonstrated commercial viability of sustainable packaging: HP utilises moulded pulp derived from recycled fibre; Dell has integrated ocean-bound plastics into packaging components; and Lenovo has adopted low-carbon bamboo and sugarcane fibre packaging for selected product lines.

2.8 Comparative Certification Analysis and Product-Category Suitability

A structured comparison of the three principal certification frameworks—BEE Star Rating, ENERGY STAR, and EPEAT—is essential for guiding procurement agencies in selecting appropriate standards by product category, procurement volume, and institutional capacity. The analysis below evaluates each framework against criteria of scope, stringency, cost, domestic applicability, and lifecycle coverage.

Table 4. Comparative Analysis of Certification Frameworks for Indian IT Procurement

Parameter	BEE Star Rating	ENERGY STAR	EPEAT
Scope	Energy efficiency only (operational phase)	Energy efficiency only (top 25% of market)	Full lifecycle: energy, materials, design for end-of-life, packaging, corporate responsibility
Administering Body	Bureau of Energy Efficiency (India)	U.S. Environmental Protection Agency	Global Electronics Council
Cost to Manufacturer	Low (₹2–3 lakh per model)	Moderate (testing + registration)	High (third-party verification, annual fees)
Indian Institutional Support	BIS/BEE testing labs available	No domestic verification infrastructure	No domestic facilitation; certification through GEC
Domestic OEM Adoption	Limited (12–15% of MSMEs)	Negligible among Indian OEMs	Negligible among Indian OEMs
MNC OEM Adoption	Moderate	High (embedded in global product lines)	High (HP, Dell, Lenovo maintain Gold/Silver)
Recommended Use	Mandatory baseline for all government IT tenders	Accepted equivalent for high-value central procurement	Preferred for large institutional tenders requiring lifecycle assessment

A phased adoption strategy is recommended: mandate BEE Star Rating as the universal baseline, accept ENERGY STAR as a recognised equivalent (particularly for imported hardware), and incentivise EPEAT registration for high-value or bulk procurement where lifecycle assessment adds demonstrable value. Over the medium term, India should consider developing an integrated national eco-label for IT hardware that combines energy efficiency criteria with lifecycle sustainability parameters, drawing on the institutional frameworks of BIS and BEE while incorporating material and circularity criteria.

3. Public-Sector Procurement Framework

India's public procurement ecosystem plays a central role in scaling energy-efficient IT infrastructure, driven by regulatory mandates and digital procurement platforms. As per Rule 149 of the General Financial Rules (GFR), 2017, all ministries and departments are required to procure common-use goods and services through GeM (Ministry of Finance, 2017). This statutory mandate covers a substantial share of national demand for desktops, laptops, printers, monitors, and servers.

3.1 Government e-Marketplace (GeM): Procurement Workflow with Energy-Efficiency Integration

GeM, launched in 2016, serves as India's central procurement portal, hosting over 60,000 buyer organisations and 12 lakh registered sellers (GeM, 2024). The platform integrates technical and energy-efficiency compliance checks at multiple stages:

Table 5. Energy-Efficiency Integration in GeM Procurement Workflow

Procurement Stage	Energy-Efficiency Integration
Catalog Publication	Vendors upload product datasheets, compliance certificates (BIS, BEE, ENERGY STAR), and warranty terms. Only pre-qualified, energy-rated devices appear in search and RFQ listings.
Technical and Energy Filters	Buyers apply filters for CPU type, RAM, BEE star rating (≥ 3 -star), ENERGY STAR labels, and other mandatory thresholds.
Framework Contracts	MeitY issues framework agreements for pre-screened hardware that meets defined energy and performance benchmarks.
Reverse Auctions	For procurements above ₹5 lakh, reverse auctions are conducted among only those vendors meeting technical and energy filters.
Evaluation and Order Award	GeM's backend system screens bid documentation. Bids failing to meet energy-efficiency or compliance criteria are disqualified before price comparison.

Despite these embedded mechanisms, implementation gaps persist. Field reviews have highlighted inconsistencies in filter application, as well as lapses in certification verification at the buyer level (CAG, 2023).

3.2 Model Technical Specifications: Integrating Energy-Efficiency Standards into Public Procurement

MeitY's Model Technical Specifications (MTS) serve as standardized templates for government tenders involving IT hardware, incorporating parameters from BIS Quality Control Orders, BEE voluntary star-labelling schemes, and international test standards such as IEC 62301 and ISO/IEC 62087.

Table 6. Energy-Efficiency Parameters in MeitY MTS

Device Category	Performance Minimums	Energy-Efficiency Threshold	Reference Standards
Laptops	Intel Core i5 (11th Gen)/AMD Ryzen 5; ≥ 8 GB RAM; SSD ≥ 256 GB	≤ 40 kWh/year (BEE 5-star equiv.)	MeitY MTS (2022); BEE Schedule 14

Desktops	Dual-core i5/Ryzen 5; ≥8 GB RAM; SSD ≥256 GB	≤85 kWh/year	MeitY MTS (2022); BEE Schedule 14
MFD Printers	≥250-sheet tray; duplex; ≥1200 dpi scan	Ready mode ≤5 W; Standby ≤1 W	MeitY MTS (2022); IEC 62301
Monitors (24")	1920×1080; LED backlight	On-mode ≤35 W	MeitY MTS (2022); ISO/IEC 62087
Enterprise Servers	Dual CPU; ≥32 GB ECC RAM; RAID	≤350 kWh/year	MeitY MTS (2022); BEE Schedule 16

Though BEE star labels are voluntary for many product types, the MTS application makes these energy thresholds effectively mandatory for government procurement.

3.3 Industry Response and Strategic Implications

India's public procurement system has become a major driver of industry alignment with regulatory and energy-efficiency norms. Major OEMs such as HP, Dell, and Lenovo offer BIS-certified, BEE-rated, and ENERGY STAR-compliant models on GeM to meet MTS specifications. System integrators like Infosys and Wipro apply similar criteria in their own institutional purchases, reinforcing market-wide adoption.

3.4 Broader Procurement Policy and Regulatory Landscape

India's IT hardware procurement operates within a regulatory ecosystem that extends substantially beyond GeM. A rigorous analysis of sustainable procurement must account for the interplay between multiple legislative and policy instruments that collectively shape procurement decisions, vendor eligibility, and sustainability outcomes.

3.4.1 Public Procurement (Preference to Make in India) Order, 2017

The Make in India Order mandates preference to domestically manufactured goods in government procurement, imposing minimum local content thresholds of 50% for Class I local suppliers and 20% for Class II. For IT hardware, this creates a structural tension with sustainability objectives: domestic manufacturers—who receive procurement preferences—exhibit significantly lower rates of environmental certification (12–15% meeting BIS and BEE thresholds, per ESSCI 2023) compared to multinational OEMs that dominate ENERGY STAR and EPEAT registries. Harmonizing the Make in India Order with sustainability requirements necessitates targeted certification subsidies for domestic manufacturers and graduated compliance timelines that progressively raise environmental performance floors without creating de facto exclusionary barriers for domestic firms.

3.4.2 Energy Conservation Act, 2001 (as amended 2022)

The Energy Conservation Act provides the statutory foundation for BEE's Standards & Labelling Programme (Section 14) and empowers the Central Government to notify Minimum Energy Performance Standards (Section 14A, inserted by the 2022 amendment). While MEPS have been notified for 11 appliance categories—including air conditioners, refrigerators, and electric geysers—IT hardware remains under voluntary labelling. Section 26 of the Act prescribes penalties for non-compliance with mandatory labelling requirements, providing an enforcement mechanism that is currently unavailable for IT hardware. Transitioning IT hardware to mandatory labelling under the Act would create a legally enforceable baseline for procurement specifications and eliminate the current reliance on voluntary adoption.

3.4.3 E-Waste (Management) Rules, 2022

These rules, notified under the Environment (Protection) Act, 1986, mandate Extended Producer Responsibility (EPR) for all producers, importers, and brand owners of electrical and electronic equipment, including IT hardware. Key provisions include quantity-based EPR targets with annual collection and recycling obligations; minimum recovery thresholds of 70% by weight for IT hardware categories; quarterly compliance reporting to the Central Pollution Control Board (CPCB); and an EPR certificate trading mechanism enabling market-based allocation of recycling obligations. Procurement specifications should require bidders to demonstrate valid EPR registration, provide evidence of operational collection and recycling infrastructure, and commit to contractual take-back obligations for equipment procured under the tender.

3.4.4 State-Level Procurement Regulations and Institutional Diversity

India's federal structure results in significant heterogeneity in procurement regulation across states. While the GFR 2017 mandates GeM usage for central government entities, state governments operate under their own financial rules, which may or may not require GeM adoption. Key dimensions of variation include: applicability of GeM mandates (several states have developed their own e-procurement portals); state-specific IT procurement policies (e.g., Kerala's IT Policy 2017, Karnataka's e-Procurement Guidelines); differential technical capacity among state procurement agencies; and fiscal constraints affecting ability to absorb price premiums for certified hardware. This institutional diversity necessitates differentiated implementation strategies, as elaborated in Section 3.5.

3.5 State-Level Procurement Strategies

Given that state governments collectively account for a substantial share of public IT hardware procurement and operate under heterogeneous regulatory, fiscal, and institutional conditions, a one-size-fits-all approach to sustainable procurement is neither feasible nor desirable. The following tiered framework proposes differentiated strategies calibrated to state-level capacity and fiscal position.

Tier-1 States (Higher Fiscal and Institutional Capacity)

States such as Maharashtra, Karnataka, Tamil Nadu, Gujarat, and Telangana—which have established IT ecosystems, higher per-capita GSDP, and existing e-governance infrastructure—are positioned to adopt more ambitious sustainability requirements. Recommended measures include: mandating BEE 4-star minimum for all IT hardware procurement from 2026; piloting lifecycle costing in high-value tenders (\geq ₹10 lakh); establishing state-level green procurement cells with dedicated technical officers; and allocating sustainability scoring weightage of 10–15% in tender evaluation.

Tier-2 and Tier-3 States (Moderate to Lower Capacity)

States with limited fiscal resources, smaller IT hardware procurement volumes, and lower institutional capacity require graduated implementation. Recommended measures include: adopting BEE 3-star minimum as an initial threshold, progressing to 4-star within 3 years; leveraging central government framework contracts on GeM that already embed sustainability criteria; participating in MeitY-supported capacity-building programmes for procurement officers; and utilising shared certification support mechanisms funded through central schemes such as PLI 2.0.

Special Category States and Union Territories

North-eastern states, hill states, and smaller union territories face distinct challenges including limited vendor access, elevated logistics costs, lower procurement volumes, and reduced technical human capital. Strategies should include: regional procurement aggregation across neighbouring states to achieve scale; mobile certification and testing facilities; relaxed

compliance timelines with defined progression targets (e.g., BEE 3-star by 2028, 4-star by 2030); and partnerships with central institutions such as NIC and NICS I for procurement technical assistance.

4. Ground-Level Implementation and Barriers

Despite the presence of institutional frameworks—such as GFR 2017, GeM, and MTS—significant implementation challenges persist. These include limited enforcement, lack of technical training among procurement officers, and capacity constraints among domestic suppliers, particularly small and medium enterprises (SMEs).

4.1 Gaps in Tender-Level Compliance

Table 7. Tender-Level Compliance Analysis (GeM, 2023–2024)

Parameter in Tender Clauses	% of Tenders
BIS CRS Certification	17%
BEE Star Rating	12%
ENERGY STAR / EPEAT	4.7%
MTS Referenced	34%
L1-Based Evaluation Only	84%

(Source: GeM Analytics Report, 2024)

The Comptroller and Auditor General (CAG) found that over one-third of IT hardware purchased by states lacked valid BIS or BEE certification despite compliant options being listed on GeM (CAG, 2023).

4.2 Technical Capacity and Awareness Deficit

Procurement officials frequently lack training on specifying or evaluating certification criteria such as BEE, ENERGY STAR, or lifecycle energy thresholds. Although MeitY's MTS provide standard templates, their use is largely non-binding. According to a 2022 capacity assessment, fewer than 30% of procurement officers had received formal training on certification-based procurement in the preceding two years (Digital India Foundation & NICSI, 2022).

4.3 Supplier-Side Constraints (SMEs)

Compliance with BIS and BEE standards remains financially and technically burdensome for domestic SMEs. The Electronics Sector Skills Council of India (ESSCI) estimates that only 12–15% of Indian IT hardware MSMEs meet both BIS and BEE thresholds, limiting their eligibility for GeM tenders (ESSCI, 2023).

4.4 Policy-Practice Mismatch

While policy mandates emphasize sustainability, practical tendering continues to prioritize lowest-cost procurement. A MeitY–NASSCOM 2023 study found that although many centrally procured laptops were ENERGY STAR-rated, the efficiency outcomes were incidental rather than a result of formal specification mandates (MeitY & NASSCOM, 2023).

4.5 Total Cost of Ownership Analysis: Energy-Efficient vs. Standard IT Hardware

A central barrier to the adoption of energy-efficient IT hardware in Indian public procurement is the prevailing L1 (lowest price) evaluation framework, which considers only upfront acquisition cost and systematically ignores operational expenditure. This section presents a quantitative Total Cost of Ownership (TCO) analysis for three product categories—laptops, desktops, and

enterprise servers—over a standard 5-year procurement lifecycle, using Indian commercial electricity tariffs.

Table 8. Total Cost of Ownership Comparison: Standard vs. Energy-Efficient IT Hardware (5-Year Lifecycle)

Parameter	Standard Laptop	BEE 5-Star Laptop	Standard Desktop	BEE 5-Star Desktop	Energy-Eff. Server
Annual Energy (kWh)	60	40	120	85	350 vs. 450
Electricity Cost/yr (₹9/kWh)	₹540	₹360	₹1,080	₹765	₹3,150 vs. ₹4,050
5-Year Energy Cost	₹2,700	₹1,800	₹5,400	₹3,825	₹15,750 vs. ₹20,250
Energy Saving/Unit	—	₹900	—	₹1,575	₹4,500
Typical Price Premium	—	3–5%	—	3–5%	5–8%
Payback Period	—	2–3 years	—	2–3 years	2–4 years

Note: Calculations based on commercial electricity tariff of ₹9/kWh (national weighted average, CERC tariff orders, 2024). Actual tariffs vary by state and consumer category.

The analysis demonstrates that energy-efficient IT hardware delivers net lifecycle cost savings of 15–30% on operational energy expenditure, with payback periods of 2–4 years—well within the standard government procurement lifecycle of 5–7 years. At institutional scale, the savings are substantial: with central government agencies procuring an estimated 500,000+ laptops annually, aggregate annual energy cost savings from BEE 5-star adoption would exceed ₹45 crore per year. For server deployments, additional savings from reduced cooling loads (estimated at 30–40% of server energy consumption) further strengthen the economic case.

A simplified lifecycle costing formula suitable for integration into GeM’s bid evaluation engine is proposed: Adjusted Bid Price = Listed Price + (Rated Annual Energy Consumption × Electricity Tariff × 5 years). This formula rewards energy-efficient bids without requiring complex analysis and can be operationalised within existing GeM infrastructure with minimal development effort.

5. Private Sector and Policy-Driven Manufacturing Trends

The transition to energy-efficient IT procurement is being reinforced by parallel private-sector practices and government-led industrial policies.

5.1 Corporate Sustainable Procurement Initiatives

Leading Indian IT service firms such as Infosys, Wipro, TCS, and HCL have adopted sustainability criteria in enterprise IT purchases:

- **Infosys** achieved a 40% reduction in user-level IT energy consumption between FY2018 and FY2023 by switching to efficient end-user devices (Infosys, 2023).
- **Wipro** mandates environmental certification for 100% of its IT purchases and tracks supplier compliance (Wipro, 2023).
- **TCS** employs a Green Procurement Scorecard aligned with Scope 2 emission targets (TCS, 2023).

5.2 Domestic Manufacturing: PLI and Import Regulation

India's push toward IT hardware self-reliance includes three key pillars:

- **PLI 2.0 Scheme (2023):** With a ₹17,000 crore outlay, the scheme provides up to 5% incentives for IT hardware manufacturers. As of October 2024, 38 companies had applied, including global OEMs and Indian firms like Lava and Dixon (MeitY, 2024).
- **Import Licensing (2023):** New licensing requirements for HS Code 8471 products aim to shift final assembly to India and reduce reliance on imports (DGFT, 2023).
- **Electronics Production Vision:** The National Policy on Electronics targets \$300 billion in output by 2026, with IT hardware contributing ₹80,000–₹100,000 crore (MeitY, 2021).

OEMs are adapting to the E-Waste (Management) Rules, 2022, which include mandatory EPR targets, minimum recovery thresholds (70% by weight for IT hardware), and quarterly compliance filings with CPCB. HP and Dell have established formal take-back and recycling systems aligned with EPR rules (HP, 2023; Dell, 2023).

5.3 Strengthening the Domestic IT Hardware Innovation and R&D Ecosystem

Beyond certification subsidies, building a competitive domestic IT hardware sector requires systematic investment in design capabilities, research and development, and technology transfer. The current deficit is structural: Indian IT hardware MSMEs are predominantly engaged in assembly and integration rather than original design manufacturing (ODM), limiting their capacity to innovate on energy efficiency, thermal management, and sustainable materials.

5.3.1 R&D Incentives for Energy-Efficient Product Design

Government should establish targeted R&D incentives through: enhanced weighted tax deduction (200%) under Section 35(2AB) of the Income Tax Act for R&D expenditure specifically directed at energy-efficient hardware design; dedicated grants through the Department of Science and Technology (DST) for research in low-power computing architectures, advanced thermal management, and bio-based electronic materials; and matching grants for collaborative R&D between Indian MSMEs and international technology partners.

5.3.2 Industry-Academia Partnerships and Technology Transfer

Establishing structured partnerships between IT hardware manufacturers and India's premier technical institutions can accelerate innovation and human capital development. Key initiatives

should include: Centres of Excellence (CoE) for Sustainable Electronics at IITs and NITs with industry co-funding; joint degree programmes in electronics manufacturing with sustainability specialisations; technology demonstration centres in major manufacturing clusters (Noida, Chennai, Bengaluru, Pune) showcasing energy-efficient design and manufacturing processes; and open-source reference designs for energy-efficient IT hardware that domestic manufacturers can adapt and commercialise.

5.4 Private Sector Sustainability Benchmarking

Given that private-sector IT procurement volumes are substantial and procurement practices are often more advanced than public-sector norms, benchmarking private-sector sustainability performance provides evidence for public policy design.

Table 9. Private Sector IT Sustainability Benchmarks

Organisation	Key Sustainability Practice	Reported Outcome
Infosys	100% EPEAT Gold for laptop purchases >1,000 units; 100% renewable energy	40% reduction in per-user IT energy (FY18–FY23)
Wipro	100% environmental certification for IT purchases; supplier sustainability scorecard	Comprehensive supply chain ESG tracking
TCS	Green Procurement Scorecard; lifecycle costing for purchases >₹10 lakh	Scope 2 alignment; 30% PCR content preference
HP Inc.	Closed-loop recycled plastics; ocean-bound plastics in housings	Take-back operations in 50+ Indian cities
Dell Technologies	Circular design principles; 100% recyclable packaging target by 2030	Pilot PaaS model in Indian enterprise market
Lenovo	90% recyclable packaging; supplier diversity including women-owned businesses	Carbon offset for selected product lines

These benchmarks demonstrate that sustainability-oriented IT procurement is commercially viable and delivers measurable environmental and economic returns. Public procurement policy should draw on these proven practices while adapting to government procurement constraints.

6. Recommendations: Strengthening India's Sustainable IT Procurement Ecosystem

India's regulatory framework for IT hardware procurement—anchored by the GFR, GeM, and MTS—has evolved steadily since 2016. However, enforcement of energy-efficiency and certification criteria remains inconsistent. Drawing from observed procurement practices, audit evidence, international precedents, and lifecycle assessment frameworks, this section proposes a comprehensive, phased roadmap.

6.1 Certification Thresholds in Tendering Practice

Despite mandates under BIS CRS and BEE's voluntary star-rating program, their application in tenders remains limited. To address this:

- **Mandate BIS CRS (IS 13252:2010) and BEE 3-star (or ENERGY STAR 8.0)** minimum thresholds for all central and state IT hardware tenders—especially for laptops, desktops, projectors, and servers (MeitY, 2022; BEE, 2024).
- **Institutionalize MTS templates** in all RFQs on GeM to ensure consistent baseline quality and energy performance requirements (MeitY, 2022).
- **Pilot lifecycle-cost scoring models** in high-value tenders ($\geq ₹5$ lakh), using the formula $\text{Adjusted Bid} = \text{Listed Price} + (\text{Annual Energy Cost} \times 5)$. This reflects practices adopted by firms such as Infosys and Wipro.

6.2 Enable SME Participation Through Certification Support

Domestic SMEs remain constrained by high certification costs ($₹2$ – $₹3$ lakh per model), limited lab access, and lack of awareness. Only 12–15% of Indian IT MSMEs currently meet both BIS and BEE requirements (ESSCI, 2023). To improve SME readiness:

- **Launch targeted certification incentives** ($\sim ₹1$ lakh/model) under PLI 2.0 to defray testing and registration expenses.
- **Establish regional certification hubs** in manufacturing clusters via industry–academia partnerships and MeitY-supported testing infrastructure.
- **Embed green certification modules** into MeitY's capacity-building programs for IT vendors and procurement officers.

6.3 Improve Tender Transparency and Compliance Monitoring

To strengthen enforcement:

- **Enhance GeM's interface** with mandatory fields that flag certification status at the product listing stage.
- **Introduce biannual randomized compliance checks** and publish summary findings to improve buyer accountability.
- **Create public procurement dashboards** displaying ministry-wise and vendor-wise uptake of certified hardware, modelled on South Korea's green procurement portal (MOE Korea, 2020).

6.4 Coordinate Interagency Standards and Certification Governance

Fragmented mandates across BIS, BEE, MeitY, and GeM lead to inconsistencies in certification timelines, test protocols, and procurement specifications. A strategic response would include developing a unified database of BIS-certified and BEE-rated IT hardware, integrated into the

GeM backend, to assist procurement officers in shortlisting compliant devices. Annual MTS updates and streamlined certification timelines across agencies are essential.

6.5 Adapt Global Practices to Indian Contexts

Three international models offer scalable insights for Indian adaptation:

United States – Mandating Lifecycle-Based Procurement: Under Executive Order 14057, all U.S. federal agencies are required to procure ENERGY STAR–certified IT equipment and evaluate bids based on lifecycle cost (U.S. EPA, 2021). Indian takeaway: A simplified lifecycle cost scoring model could be piloted for central IT purchases.

Japan – Dynamic Benchmarking via the Top Runner Program: Japan’s Top Runner approach sets future energy-efficiency thresholds based on the best-performing product currently on the market (METI Japan, 2022). Indian takeaway: BIS and BEE could adopt a similar method to revise IT hardware thresholds—ensuring that star ratings evolve with market innovation.

South Korea – Real-Time Procurement Dashboards: South Korea’s green procurement law mandates ecolabel-compliant products and operates a real-time dashboard displaying public procurement data by agency and ecolabel status (MOE Korea, 2020). Indian takeaway: India could replicate this model on GeM for transparency and benchmarking.

6.6 Lifecycle Sustainability Integration in Procurement Specifications

Procurement criteria should be progressively extended beyond operational energy efficiency to encompass full lifecycle sustainability parameters:

- Require Product Carbon Footprint (PCF) declarations aligned with ISO 14067 for all IT hardware tenders above ₹50 lakh, initially on a disclosure-only basis, progressing to scored criteria by 2028.
- Mandate RoHS-equivalent substance restriction declarations through BIS standards, requiring IEC 62321-compliant test reports from all IT hardware vendors on GeM.
- Introduce minimum recyclability requirements (65% recyclable content by weight) in MTS for laptops and desktops, progressively increasing to 80% by 2030.
- Require sustainable packaging declarations from all GeM-listed IT hardware vendors, with preference scoring for products using ≥90% recyclable or compostable packaging.
- Incorporate embodied carbon benchmarks into high-value IT procurement, referencing international lifecycle databases until Indian-specific data (via BIS/BEE) becomes available.

6.7 Alternative Procurement Approaches for Enhanced Sustainability

6.7.1 Extended Producer Responsibility (EPR) Integration in Tenders

Procurement specifications should explicitly require bidders to demonstrate valid EPR registration under the E-Waste Management Rules 2022, provide verifiable evidence of operational collection infrastructure, commit to contractual take-back obligations for end-of-life equipment, and meet minimum recycling targets per their EPR authorisation. Scoring frameworks should allocate 5–10% weightage to EPR compliance quality, assessed through verified collection rates, recycling partnerships, and CPCB compliance records.

6.7.2 Product-as-a-Service (PaaS) Models

Instead of outright hardware purchase, government agencies may explore PaaS models where the vendor retains ownership and provides computing as a service. PaaS aligns vendor incentives with energy efficiency, product longevity, and end-of-life management; enables regular

technology refresh without capital expenditure; and simplifies compliance management by transferring certification obligations to the service provider. Pilot programmes should target server infrastructure and large-scale desktop deployments (>500 units) where PaaS models are most commercially viable and where lifecycle sustainability benefits are most pronounced.

6.7.3 Standardised Lifecycle Costing Methodology

The following lifecycle costing formula is recommended for standardised application: Total Lifecycle Cost = Purchase Price + (Annual Energy Cost × Expected Lifespan) + Annual Maintenance Cost × Expected Lifespan + End-of-Life Disposal/Recovery Cost. For practical implementation on GeM, a simplified Adjusted Bid formula is proposed: Adjusted Bid = Listed Price + (Rated Annual kWh × Electricity Tariff × 5 years). This formula is analytically tractable, data requirements are minimal (rated energy consumption is available from BEE certificates), and implementation can be automated within GeM's existing bid evaluation engine.

6.7.4 Repairability and Upgradability Criteria

Incorporating repairability and upgradability criteria extends product useful life and reduces lifecycle environmental impact. Recommended tender criteria include: availability of spare parts for a minimum of 5 years post-purchase; user-replaceable battery, RAM, and storage without specialised tools; published repair manuals and diagnostic utilities; modular design enabling component-level upgrades (e.g., RAM, storage, wireless modules); and firmware/software support commitment for minimum 5 years. These criteria should be allocated 5–10% scoring weightage in tender evaluation, calibrated by product category.

6.8 Gender-Responsive and Inclusive Procurement

Sustainable IT procurement policies should integrate principles of gender-responsive procurement (GRP) and targeted support for under-represented groups, aligning environmental objectives with broader social inclusion goals.

6.8.1 Gender-Responsive Procurement Principles

IT procurement specifications should ensure hardware meets diverse user needs (ergonomic considerations, accessibility features per WCAG 2.1); require suppliers to report on gender diversity in their workforce and supply chain; incorporate gender-disaggregated data in procurement monitoring; and align with the Ministry of Women and Child Development's gender mainstreaming guidelines.

6.8.2 Support for Women-Owned and SC/ST Enterprises

Building on the 3% procurement target for women-owned MSEs under the Public Procurement Policy for MSEs and the 4% target for SC/ST enterprises, IT procurement should include: dedicated sub-targets within IT hardware MSME procurement mandates; preferential certification support (subsidised testing fees, expedited processing) for women-owned and SC/ST-owned IT hardware manufacturers; capacity-building programmes and mentorship partnerships with established IT hardware companies; and systematic monitoring and annual reporting on procurement share and capability development outcomes.

7. Implementation Roadmap: 2025–2030

A structured, phased implementation roadmap is essential for translating the preceding recommendations into measurable institutional change. The roadmap below specifies actions, responsible agencies, timelines, and monitoring indicators across three phases.

7.1 Phase I: Foundation (2025–2026)

Table 10. Phase I Action Plan (2025–2026)

Action	Responsible Agency	Target Date	Indicator
Mandate BIS CRS + BEE 3-star in all central IT tenders on GeM	MeitY, GeM	Dec 2026	100% compliance in central tenders
Launch procurement officer training (certification-based procurement, lifecycle costing)	MeitY, DoPT	Mar 2026	5,000 officers trained
Publish and integrate lifecycle costing formula into GeM for tenders >₹5 lakh	GeM, MeitY	Jun 2026	Formula operational
Establish certification cost subsidy (₹1 lakh/model) for MSMEs under PLI 2.0	MeitY, MSME Ministry	Mar 2026	200 MSMEs supported
Create public procurement sustainability dashboard on GeM	GeM	Sep 2025	Dashboard live
Issue advisory to states recommending BEE 3-star minimum	MeitY	Jun 2025	Advisory issued

7.2 Phase II: Acceleration (2027–2028)

Table 11. Phase II Action Plan (2027–2028)

Action	Responsible Agency	Target Date	Indicator
Upgrade to BEE 4-star mandatory for central + Tier-1 state tenders	MeitY, BEE	Dec 2028	80% compliance
Introduce mandatory PCF disclosure for tenders >₹50 lakh	MeitY, BEE	Jun 2027	70% of qualifying tenders
Establish 5 regional certification hubs (Noida, Chennai, Bengaluru, Pune, Hyderabad)	MeitY, BIS, MAIT	Dec 2027	All 5 operational
Pilot PaaS procurement for server infrastructure in 3 central ministries	MeitY, GeM	Jun 2027	Pilot initiated
Introduce repairability scoring (5–10%) in MTS for laptops/desktops	MeitY	Mar 2027	Updated MTS published
Launch gender-responsive procurement tracking on GeM	GeM, WCD Ministry	Jun 2027	Tracking operational

7.3 Phase III: Consolidation (2029–2030)

Table 12. Phase III Action Plan (2029–2030)

Action	Responsible Agency	Target Date	Indicator
Notify MEPS for IT hardware under Energy Conservation Act	BEE, MoP	Jun 2029	MEPS notification gazetted
Launch unified Indian eco-label combining energy + lifecycle criteria	MeitY, BIS, BEE	Dec 2029	Framework published
Achieve 50% MSME participation in certified IT hardware on GeM	MeitY, MSME Ministry	Mar 2030	50% participation rate
Mandate lifecycle costing as default evaluation for tenders >₹10 lakh	MoF, MeitY, GeM	Dec 2029	L1 replaced by LCC
Establish real-time sustainability dashboards at central + all state levels	MeitY, GeM, state IT depts	Dec 2030	All states covered
Mandate circular economy criteria (recyclability, EPR, packaging) in all IT tenders	MeitY, MoEFCC, GeM	Mar 2030	100% compliance

7.4 Monitoring and Evaluation Framework

Effective implementation requires a robust monitoring architecture comprising: quarterly compliance reviews by an inter-agency coordination committee (MeitY, BIS, BEE, GeM); annual sustainability procurement reports published on GeM with ministry-wise and state-wise data; biannual randomised audits of IT hardware procurement for certification compliance, building on CAG audit methodology; independent third-party evaluation at the end of each phase (2026, 2028, 2030) by an empanelled evaluation agency; and a structured stakeholder feedback mechanism incorporating inputs from industry associations (MAIT, NASSCOM, CII), civil society organisations, and procurement officers through annual consultations.