

Innovating for Impact: The sustainability imperative for pharma & lifesciences

Table of contents



| | | | |
|----|--|----|--|
| 04 | Foreword by CII | 05 | Foreword by Deloitte India |
| 06 | Executive summary | 08 | Introduction to ESG, disclosure frameworks and rating agencies |
| 14 | The Indian pharmaceutical industry is on a high growth trajectory | 17 | Material ESG topics for the pharmaceutical sector: Key risks and opportunities |
| 20 | Emerging ESG trends in the sector | 24 | Decarbonising the pharmaceutical sector |
| 31 | Key case studies (Indian companies with Science Based Targets initiative (SBTi) validated targets) | 44 | Sustainable supply chain: Landscape, key challenges, and interventions |
| 49 | Human capital | | |



Foreword by CII

India's pharmaceutical and life sciences sector has long been a cornerstone of global healthcare; delivering affordable, high-quality medicines that heal people across continents. As the industry continues to expand its global footprint and deepen its impact, it faces a defining imperative: to chart a growth trajectory that is commercially competitive as well as environmentally regenerative, socially inclusive and governed with integrity.

Today, the question is no longer about choosing between competitiveness and responsibility. The convergence of environmental stewardship, social equity and governance excellence embodied in the ESG framework has become fundamental to the industry's future. ESG is now the lens through which investors assess risk, regulators craft policy, customers make purchasing decisions and society evaluates contribution.

Forward-looking Indian pharmaceutical enterprises are already adopting green chemistry, energy and water efficiency, circular economy practices, ethical sourcing and inclusive governance. These efforts go beyond regulatory compliance. They represent pathways to innovation, operational resilience and long-term value creation. Yet, the sector continues to grapple with distinctive challenges, such as high energy intensity, temperature-controlled logistics, fragmented supplier ecosystems and the need to balance affordability with sustainability investments.

Through collaborative platforms, capacity-building initiatives, knowledge-sharing and policy advocacy, we aim to empower life sciences enterprises, be it large and small, innovators or generics, established or emerging. This will help us to align growth with responsibility and competitiveness with conscience.

As India advances toward its net-zero commitments and global ESG disclosure standards become more rigorous, the pharmaceutical industry must evolve from reactive compliance to proactive leadership. This knowledge paper presents a comprehensive and actionable roadmap to drive sustainable transformation across the Indian pharmaceutical and life sciences ecosystem, contributing to the national vision of *Viksit Bharat 2047*.



Dr Rajesh Jain
Chairman,
CII National Committee on
Biotechnology and
Chairman & Managing Director,
Panacea Biotec Ltd.

Foreword by Deloitte India

India's pharmaceutical industry stands as one of the nation's most globally respected sectors. It is synonymous with quality, innovation and accessibility. Nicknamed "pharmacy of the global south," the Indian pharma industry continues to advance public health while strengthening India's economic resilience. Yet, as it scales to meet the growing healthcare needs of the world, the imperative to do so sustainably has never been stronger.

Across the global value chain, stakeholders, from regulators and investors to patients and procurement agencies, are demanding greater transparency, accountability and climate action. For the pharmaceutical sector, this moment offers more than a compliance challenge. It presents a profound opportunity to lead.

Decarbonising manufacturing, building responsible supply chains and embedding circularity and inclusivity into business models are no longer optional, but are central to competitiveness, credibility and capital access. Through science-based targets, green finance mechanisms, and digital sustainability systems, companies are already proving that environmental stewardship and business success can reinforce each other.

This joint report by Deloitte India and the Confederation of Indian Industry (CII) explores how India's pharmaceutical ecosystem is navigating this transition. It captures evolving Environment, Social and Governance (ESG) frameworks, sectoral risks and opportunities as well as the roadmap to a low-carbon, high-impact future. This is a future that aligns with India's national net-zero ambition and the sector's core purpose i.e. advancing human health while safeguarding planetary well-being.

At Deloitte India, we believe that sustainability is no longer an adjunct to strategy, it is strategy. I hope this publication inspires meaningful dialogue and collaborative action across industry leaders, regulators and investors to create an ecosystem where responsible growth becomes the defining measure of success.



Shailesh Tyagi
Partner and Service Line Leader –
Climate Change & Sustainability
Deloitte South Asia

Executive summary

India's pharmaceutical and life-sciences sector is at an inflection point: scaling global access to quality medicines while embedding sustainability across the value chain. This report, developed jointly with the Confederation of Indian Industry (CII), lays out how Environmental, Social and Governance (ESG) practices are shaping competitiveness, capital access and trust.

We outline the evolving disclosure landscape (Global Reporting Initiative (GRI), International Sustainability Standards Board (ISSB)/ International Financial Reporting Standards–Sustainability Disclosure Standard 1- Sustainability Disclosure Standard 2 (IFRS S1–S2), European Union (EU) Corporate Sustainability Reporting Directive (CSRD), Securities and Exchange Board of India's (SEBI) Business Responsibility and Sustainability Reporting (BRSR) and highlight material ESG topics for pharma including climate strategy, product stewardship, human capital, supply chain sustainability, clinical trials and human rights and water/waste management.

Decarbonisation is a business imperative. Cleanrooms and Heating, Ventilation, and Air Conditioning (HVAC) dominate energy loads; scope 3 emissions across purchased goods, packaging, transport and product use remain the largest share. A practical roadmap combines green chemistry in Research & Development (R&D), HVAC optimisation and heat recovery, renewable energy adoption (on-site and PPA), solvent recovery and circular packaging, logistics optimisation and structured supplier engagement backed by governance and data systems. We also discuss internal carbon pricing to align investment decisions with climate goals.

Case studies from Indian leaders with Science Based Targets initiative (SBTi) validation illustrate credible pathways across scopes 1–3, linking process efficiency, renewables, supplier programs and transparent monitoring.

As India advances towards long-term climate milestones, pharmaceutical enterprises that prioritise operational efficiency, renewable integration and value-chain collaboration, underpinned by strong governance, will unlock new markets, attract sustainable finance and strengthen their social license. This will reaffirm the sector's core purpose: advancing human health while safeguarding planetary well-being.

Introduction to ESG, disclosure frameworks and rating agencies

Sustainable development and business sustainability have become the key drivers of the academic, regulatory and industrial evolution. Sustainability has been defined in different ways. One of the landmark definitions of sustainable development was provided by the Brundtland Commission [also known as the World Commission on Sustainable Development (WBCSD)]. In its Report 'Our Common Future', it defines Sustainable Development as meeting the needs of the present generation without compromising that of future generations.¹

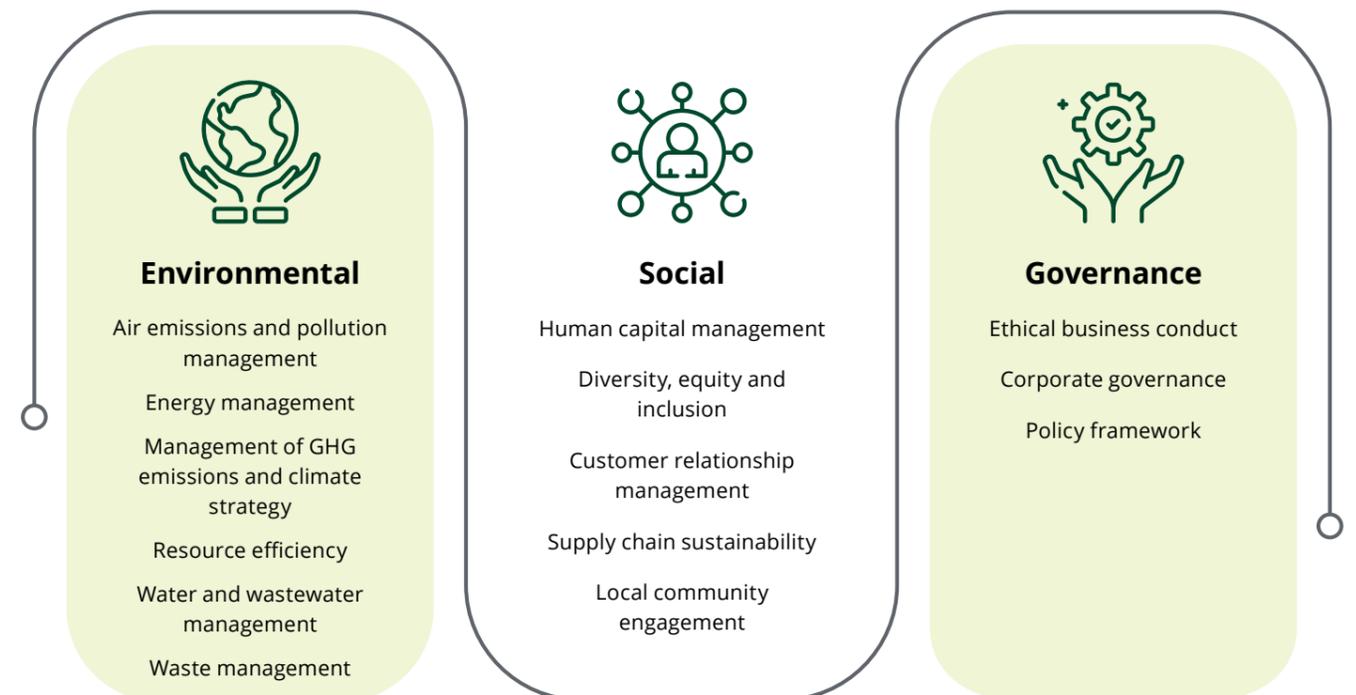
The concept of sustainability has evolved substantially over the past three decades. The International Sustainability Standards Board (ISSB) has provided a comprehensive definition of sustainability as a company's ability to sustainably maintain

resources and relationships, manage dependencies and impacts within its business ecosystem and access resources and relationships over time to achieve its goals.² On the other hand, Environmental, Social, and Governance (ESG) refers to a set of standards for measuring, monitoring and reporting a company's performance in relation to its impact on the economy, environment and society.

ESG is well beyond just an acronym

Over the years, ESG Standards have brought transparency, comparability and standardisation in non-financial disclosures. Such disclosures have enabled various stakeholders, especially investors, to assess and screen companies based on their ESG performance. Broadly, ESG covers various aspects of business as outlined below:

Figure 1: What ESG comprises



¹<https://sustainabledevelopment.un.org/content/documents/5987our-common-future.pdf>

²<https://www.ifrs.org/news-and-events/news/2022/12/issb-describes-the-concept-of-sustainability/>

ESG disclosure frameworks



Global Reporting Initiative (GRI) standards

- Standards are developed by the Global Sustainability Standards Board (GSSB) under the auspices of GRI
- Comprehensive set of indicators across various modules, including Governance, Economic, Environmental and Social aspects
- Sector-specific programmes are being developed for 40 sectors
- Voluntary disclosure



Integrated report framework <IR> published by the International Integrated Reporting Council (IIRC)

- Managed by the International Financial Reporting Standards (IFRS) Foundation, a global not-for-profit public interest organisation
- Based on Integrated Thinking Principles and adheres to the capital accounting approach covering Financial, Natural, Intellectual, Social and Relationship, Manufacturing and Human Capitals
- <IR> Framework helps inform the providers of Financial Capital of the long-term value creation and erosion
- Voluntary Adoption and Disclosure



Sustainability Accounting Standards Board (SASB) standards

- Developed by Sustainability Accounting Standards Board (SASB) in 2011
- Managed by the International Sustainability Standards Board (ISSB) of the IFRS Foundation
- Disclosures are related to industry-specific sustainability information, sustainability risks and opportunities and their impacts on organisations' financial health
- Current coverage spans across 77 industries



International financial reporting standards (TCFD, IFRS S1 and IFRS S2)

- IFRS S1 requires organisations to disclose sustainability-related risks and opportunities
- Task force on climate-related financial disclosures (TCFD) and IFRS S2 require organisations to disclose climate-related risks and opportunities
- Disclosure requirements include risk governance, strategy, risk and opportunity assessment process, and performance metrics
- IFRS S1 and IFRS S2 are mandatory disclosure requirements for jurisdictions that have adopted IFRS as an annual reporting standard



EU Corporate Sustainability Reporting Directive (CSRD) by European Sustainability Reporting Standards (ESRS)

- Mandates companies operating in EU jurisdiction in a phased manner to disclose ESG-related information
- Mandates companies to conduct a double materiality assessment to identify risks and opportunities associated with various aspects covered under ESG



Business Responsibility and Sustainability Reporting (BRSR)

- Mandated by Securities Exchange Board of India (SEBI)
- Requires the top 1000 listed companies by Market Capitalisation in India to disclose their ESG performance information in the Annual Report as an annexure to the Director's Report
- BRSR also has a provision for disclosing ESG data on value chain partners
- BRSR framework is structured in three sections, namely general disclosures, management and process disclosures, principle-wise performance disclosure and nine principles
- Mandates assurance/assessment requirements covering companies in a phased manner



ESG rating agencies

| | Rating scale | Solicited / unsolicited | Evaluation driver | Sectoral assessment approach | Industry relevance |
|-----------------------|---|-------------------------|--|--|--|
| CDP | A (Leader) –F (Refusal to answer) | Solicited | Transparency and performance | Tailored approach, 12 sectors | Industry-specific questionnaire |
| EcoVadis | 0 to 100 (Awards medals on performance percentile – Bronze, Silver, Gold, Platinum) | Solicited | Transparency and data-driven | Tailored approach | Industry-specific questionnaire |
| ISS ESG | A+ (Excellent) to D- (Poor) | Unsolicited | Risk management | Tailored approach, 40 sectors | Industry-specific |
| MSCI | AAA (Leader) to CCC (Laggard) | Unsolicited | Risk-based, active management of ESG risks | Cross-sector methodology with normalisation, 158 sectors | Industry-specific weighting |
| Refinitive | 0-100 (Leader) and D- to A+ (Leader) | Unsolicited | Transparency and data-driven | 1 tailored approach, 10 sectors | Industry-specific weighting |
| S&P Global | 0 (Very Low) to 100 (Very High; Leader) | Solicited | Impact, corporate sustainability ESG performance | Tailored approach, 61 sectors | Industry-specific criteria and weighting |
| Sustainalytics | Negligible risk (0 – 10) to Severe risk (40+) | Unsolicited | Risk-based assessment, exposure to unmanaged risks | Tailored approach, 40 sectors | Industry-specific criteria |

Sustainable development goals in pharmaceutical industry

Since the adoption of the UN sustainable development goals (SDG), the idea of sustainability has evolved from a global vision into a shared responsibility across industries. For the pharmaceutical sector, this journey has taken on a deeper meaning, one that extends beyond curing illness to nurturing the health of people and the planet alike. As the industry continues to uphold its commitment to human well-being, it also

recognises the need to align its operations with the principles of environmental stewardship, social responsibility and good governance. With the growing emphasis on ESG in today's world, embedding sustainability into every link of the pharmaceutical value chain is no longer optional. It is essential to protect both present and future generations. With the increasing importance of SDGs globally, the pharmaceutical sector can contribute significantly to advancing them through multiple channels, categorising broadly into ESG dimensions of the industry.

The key SDGs that impact the pharmaceutical sector are:³



Thus, SDGs are primarily thematic in nature and play the key role in aligning industry-specific ESG priorities with broader objectives.

³Applications Of Sustainable Development Goals in Pharmaceutical Industry: Challenges And Opportunities, Shruti Rawal, Nirma University

The Indian pharmaceutical industry is on a high growth trajectory

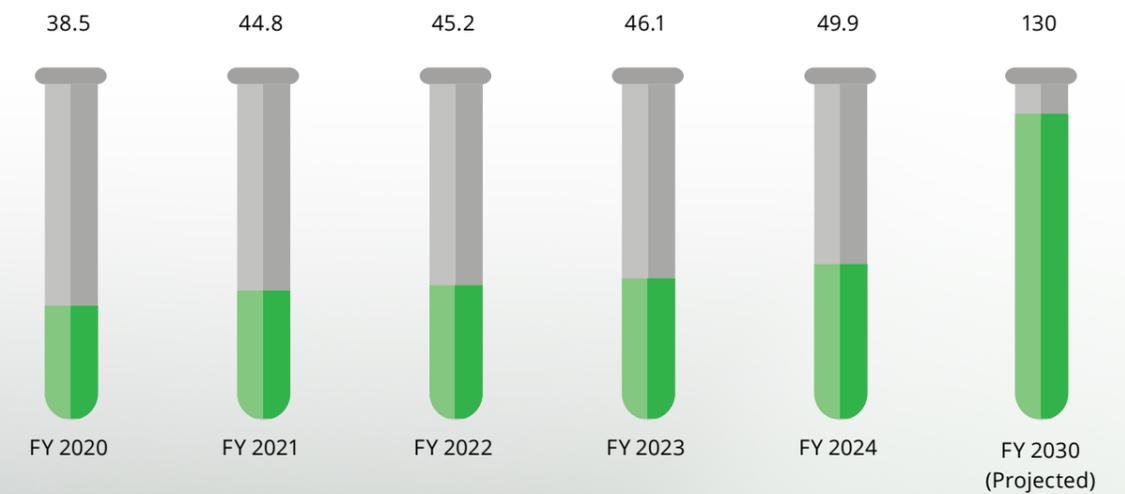


India is one of the fastest-growing economies. The Government of India has adopted a mission to become a US\$30 trillion economy by the year 2047. The current policy and regulatory landscape are well-positioned to boost rapid growth through enabling frameworks, initiatives towards ease of doing business and incentivisation schemes.

The pharmaceutical sector is one of the bright spots in the Indian economy. It contributes over 1.7 percent towards

Gross Domestic Product (GDP). India is the globally leading manufacturer of generic drugs, and it accounts for over 20 percent of the global supply. The current market size of the Indian pharmaceutical industry is over US\$50 billion, and it is expected to grow to US\$130 billion by the year 2030. With its current scale and Scope, India is ranked third globally in terms of production volume and 14th in terms of the value.⁴ The growth trajectory of the Indian Pharmaceutical industry is depicted in the following graph:

Figure 2: Growth trajectory of the Indian pharmaceutical industry



With a global movement toward achieving net-zero greenhouse gas (GHG) emissions by 2050, combined with evolving sustainability regulations, rising eco-conscious consumerism, and the growth of responsible investment strategies, the need to follow sustainability principles is becoming more important

than ever. This has become crucial for the industry to maintain its growth momentum and achieve the projected market size. Companies must identify key impacts and dependencies and develop effective strategies to manage them.

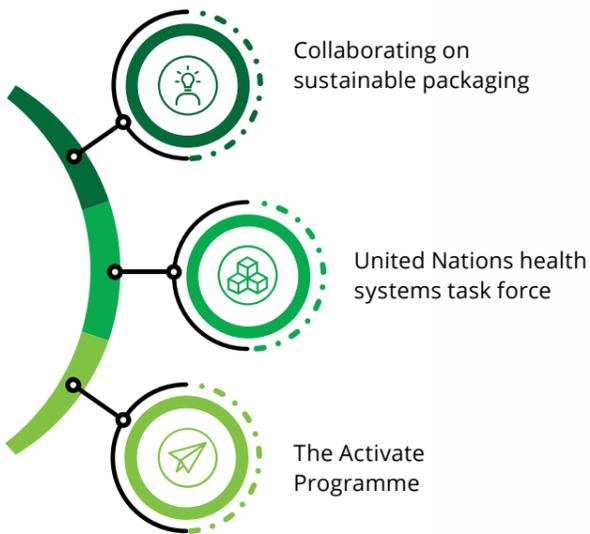
⁴Annual Report for FY 2024-25, Department of Pharmaceuticals, Government of India



Advent of sustainability in the pharmaceutical sector

The pharmaceutical sector presents immense opportunities to advance sustainability, including efforts to reduce carbon emissions, enhance waste management, optimise water use and embed sustainability principles within research and development. As the sector evolves, aligning with global sustainability benchmarks becomes crucial to meeting international regulatory expectations and satisfying buyer requirements. Embracing a sense of shared responsibility, Indian pharmaceutical companies have the potential to drive meaningful change by continuously monitoring their environmental performance, allocating necessary resources and actively engaging in net-zero initiatives. Collaborating with global energy partners who bring specialised expertise and share similar sustainability ambitions can further accelerate this transition, enabling the sector to build a more resilient, responsible and future-ready growth model.⁵

In recent years, global pharmaceutical companies have been coming together to collectively commit to advancing sustainability and performance improvements, including:



These commitments enable pharmaceutical companies to collaborate across their Active Pharmaceutical Ingredient (API) supply chains and distribution networks to minimise environmental impact, with a particular focus on reducing Scope 3 GHG emissions.

The pharmaceutical sector is also actively seeking ways to make its manufacturing processes more sustainable, wherein related organisations are increasingly investing in cleaner production technologies and adopting green chemistry principles to minimise the environmental footprint of medicine manufacturing. This shift to renewable energy (RE) sources across production facilities is playing a key role in reducing the sector's overall carbon emissions.⁶

⁵Sustainability in the Pharmaceutical Industry Opportunities for Indian pharmaceutical companies leveraging global impetus around environmental footprint; Frost & Sullivan
⁶<https://www.abpi.org.uk/media/blogs/2023/december/paving-the-way-to-sustainability-transforming-pharmaceutical-industry-practices/>

Material ESG topics for the pharmaceutical sector: Key risks and opportunities



Material topics are the sustainability issues that are considered critical by the organisations. Criticality is assessed on parameters of 'impact on business' and 'impact on economy, environment and society'. Impact on business is also depicted

as financial materiality, while impact on the economy, environment, and society is considered as non-financial materiality. Triangulation of the two provides a Double Materiality Map.

Figure 3: Key material topics for the pharmaceutical sector

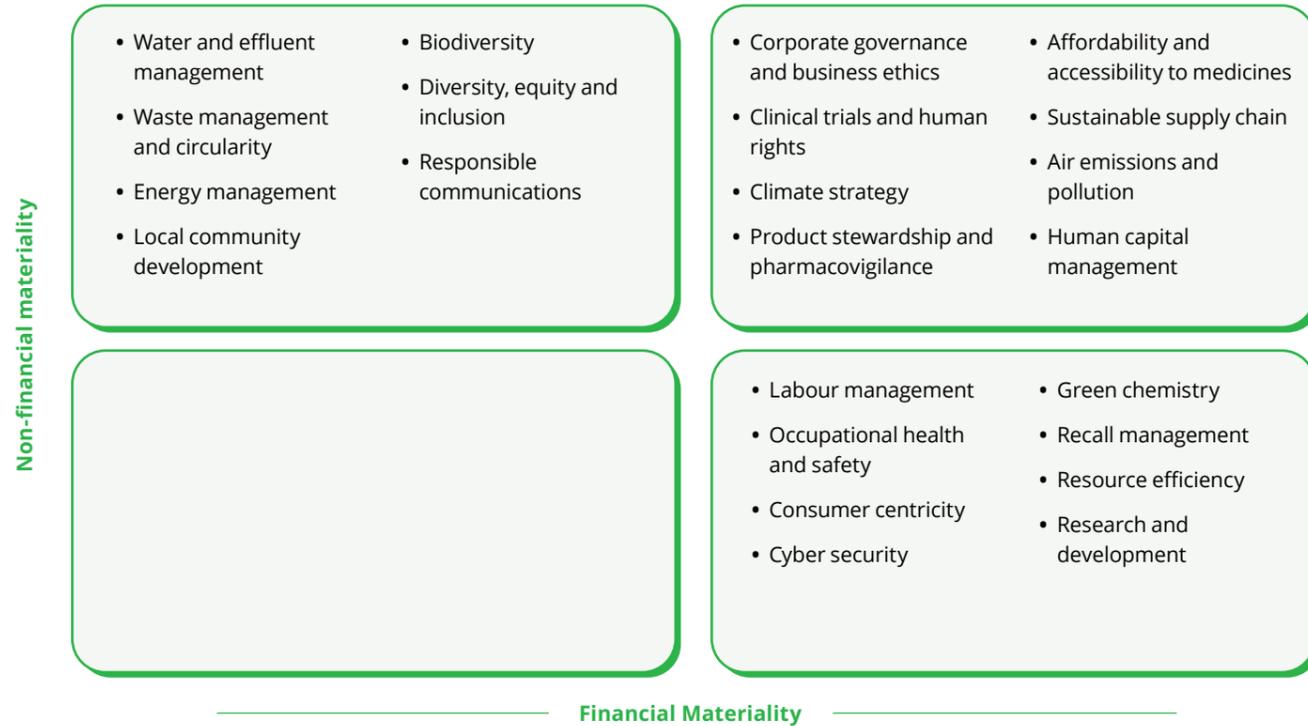


Figure 4: ESG material topics with business impact



Affordability and accessibility to medicines

- Enhanced accessibility and optimisation to improve cost competitiveness will directly impact business growth



Supply chain sustainability

- Engaging with suppliers on sustainability aspects can cut down supply chain costs and help identify and manage risks effectively



Human capital management

- Talent attraction and retention reduce the cost of recruitment and training
- Employee engagement initiatives help improve productivity



Labour management

- Effective labour management practices help organisations minimise management-labour conflicts and ensure compliance with labour laws



Green chemistry

- Principles of green chemistry help companies to achieve atomic efficiency and innovate



Research and Development

- R&D aligned with the emerging requirements enables organisations to have a robust pipeline, securing future cash flows



Effluent management

- Strict regulations governing the quantity and quality of water discharge
- Stakeholder activism and controversies may affect reputation and brand value adversely



Waste management

- Stringent regulations on hazardous waste management



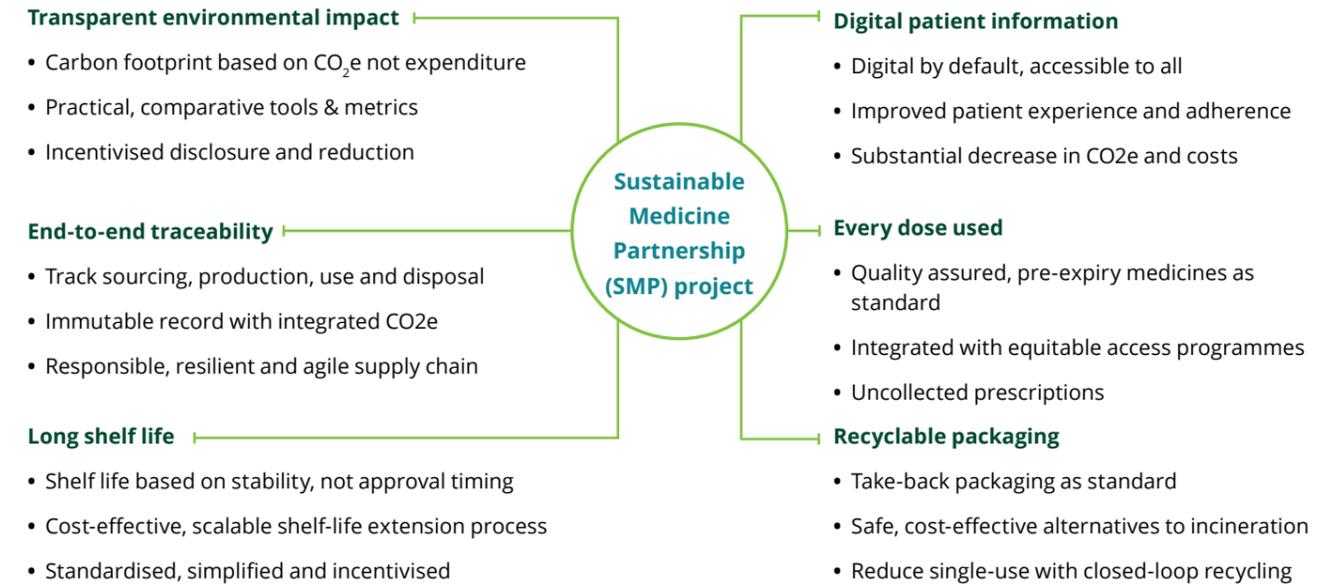
Emerging ESG trends in the sector



Sustainable Medicine Partnership (SMP)

Sustainable Medicines Partnership is a public-private, multi-stakeholder, not-for-profit collaboration of 48 organisations that aims to bring medicine waste to a minimum.

Figure 5: Salient features of SMP

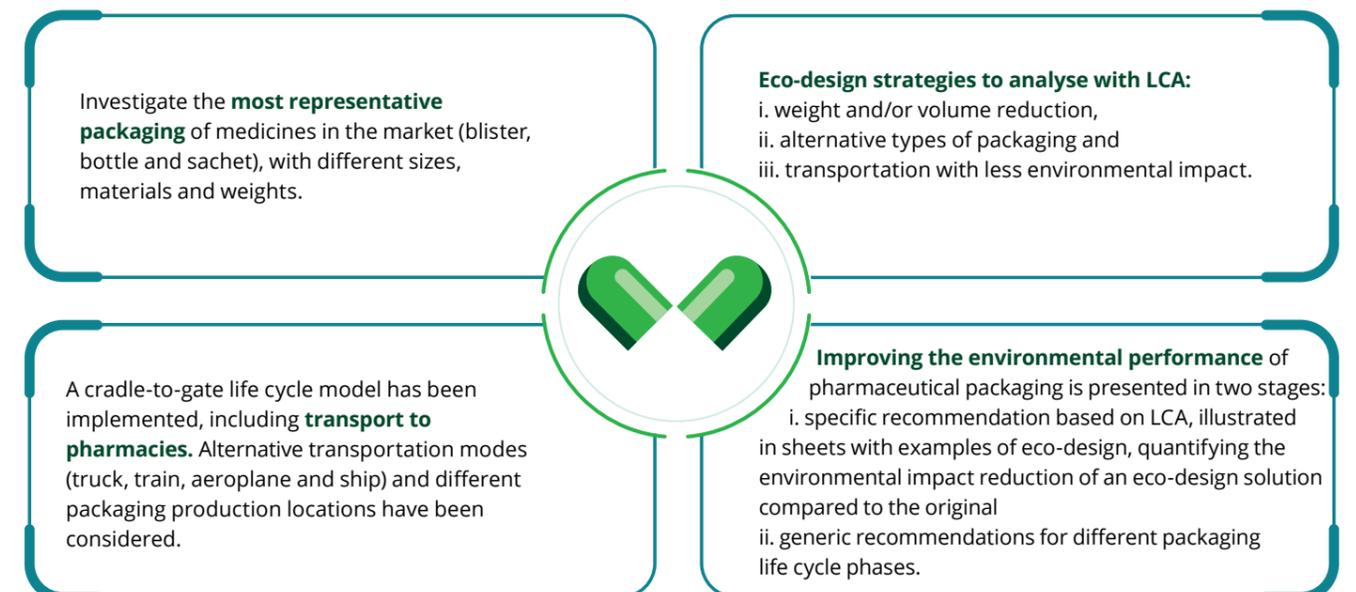


Ecodesign

Product development is time-consuming, pricey and requires certain procedures. At the same time, pharma companies rely mostly on innovation to provide the best medicines to patients. The industry can reduce the environmental impact of its products by utilising Ecodesign practices.

Figure 6: Key elements of Ecodesign

The eco-design approach based on Life Cycle Assessment (LCA)* for pharmaceutical packaging



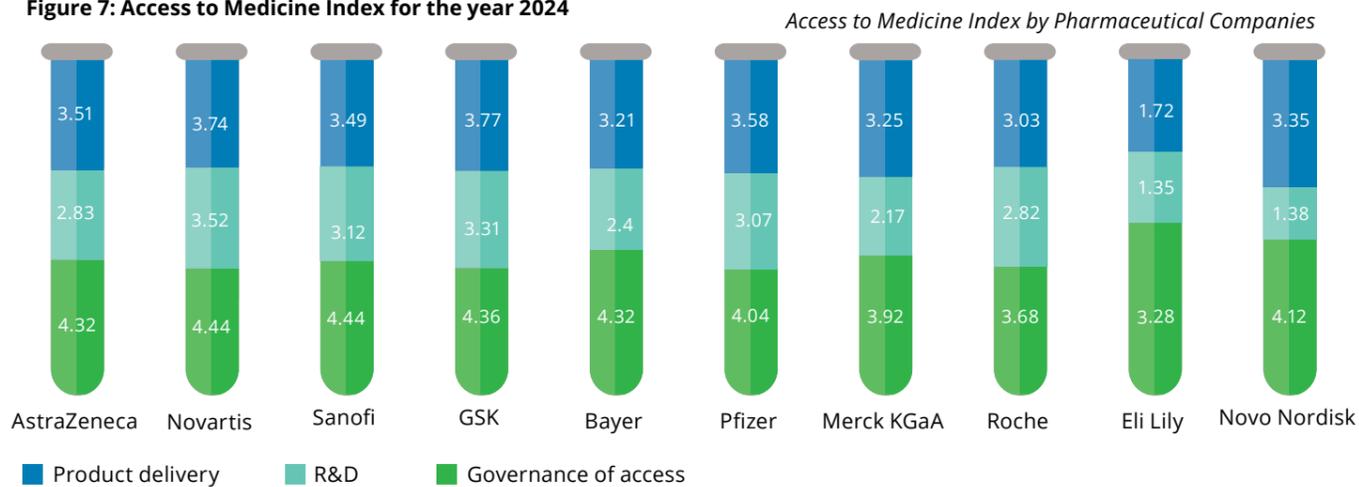
Access to Medical Index (ATMI)⁷

ATMI caters to a biennial ranking of major pharmaceutical companies by the Access to Medicine Foundation, an independent not-for-profit organisation. The index aims to measure, assess and rank the efforts of the companies to enhance and improve the access to medicines, vaccines and diagnostics in low- and middle-income countries. The index is published every two years evaluating pharmaceutical

companies on various parameters such as governance of access, research and development (R&D) and product delivery.

As per ATMI 2024 Report, assessed companies showed the best performance on Governance while the R&D has emerged as the biggest gap. This Report further highlights the need for inclusive business models by strengthening the implementation gaps and transparent reporting.

Figure 7: Access to Medicine Index for the year 2024



Clinical trials

Clinical research involves investigating health and disease in human participants, majorly comprising of two types: observational studies (monitoring real-world participants to understand disease pattern, without assigning specific treatments) and clinical trials (evaluating medical, surgical or

behavioral interventions in humans to assess their safety and effectiveness).

Clinical trials determine whether a new therapy, preventive approach or device, performs better or causes fewer side effects compared to existing treatments.

The key phases of clinical trials include:⁸

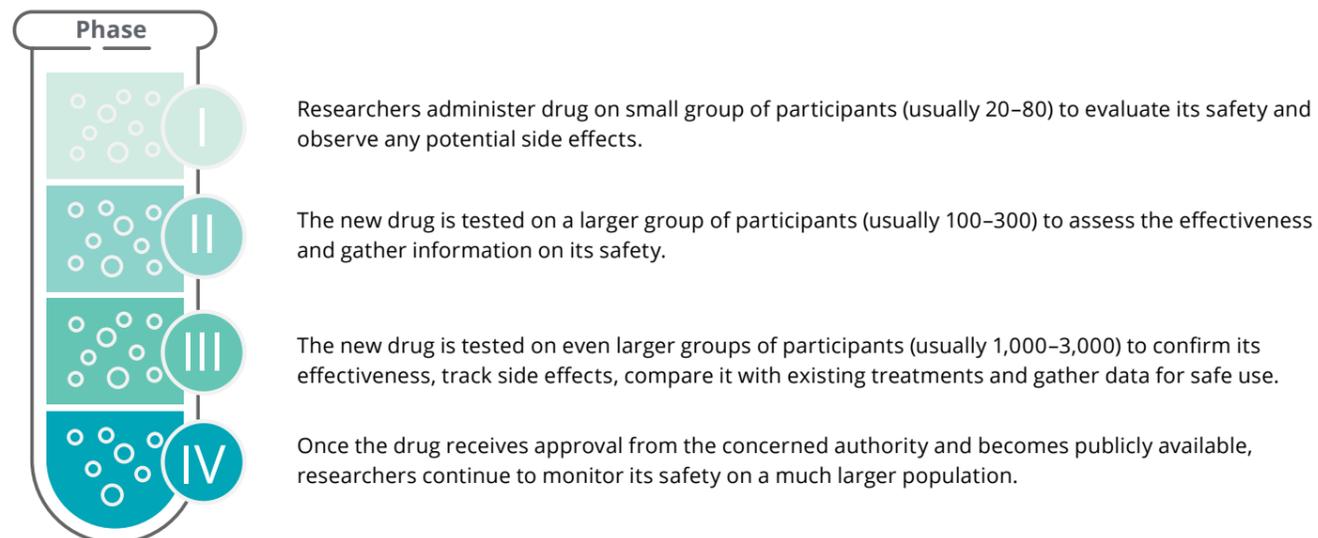


Figure 8: Trials by phase of development

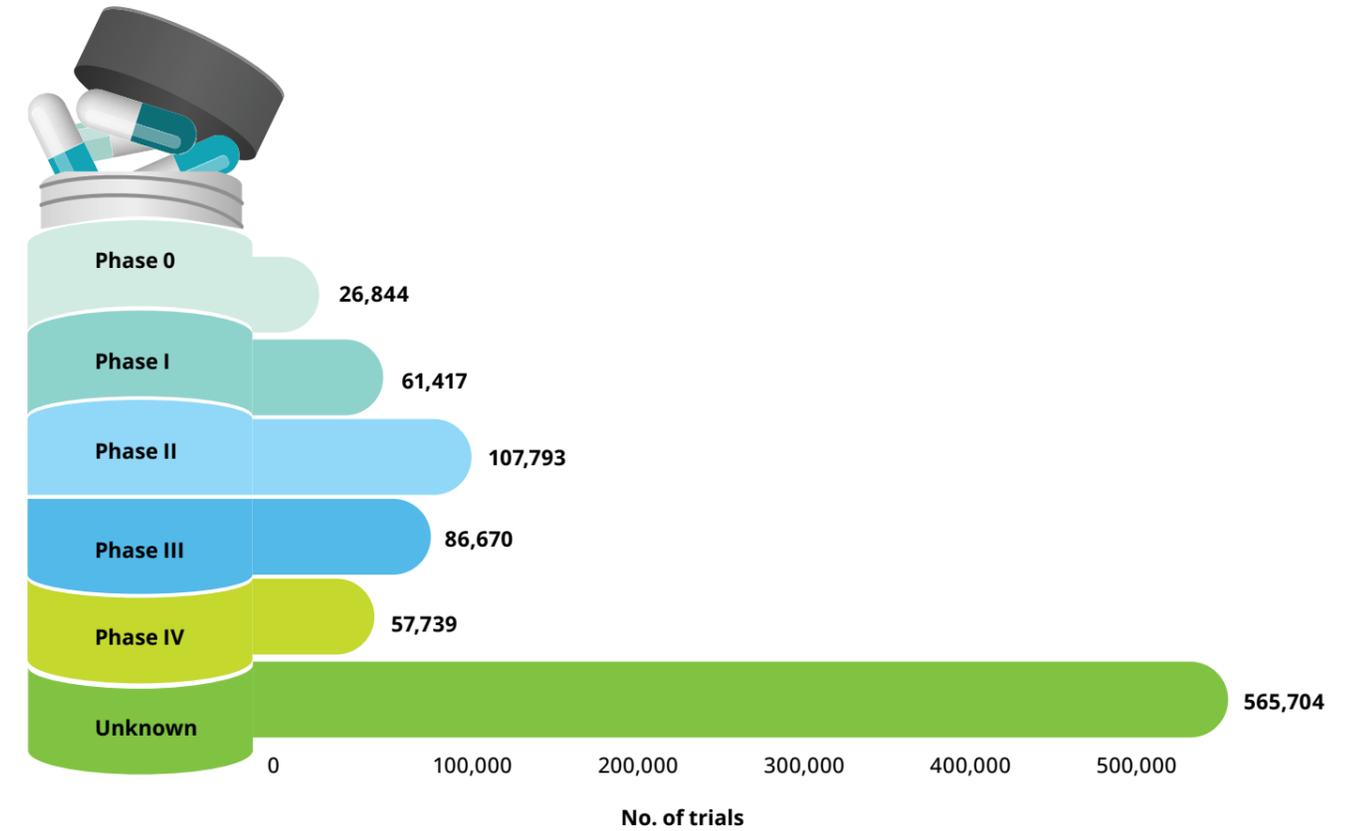
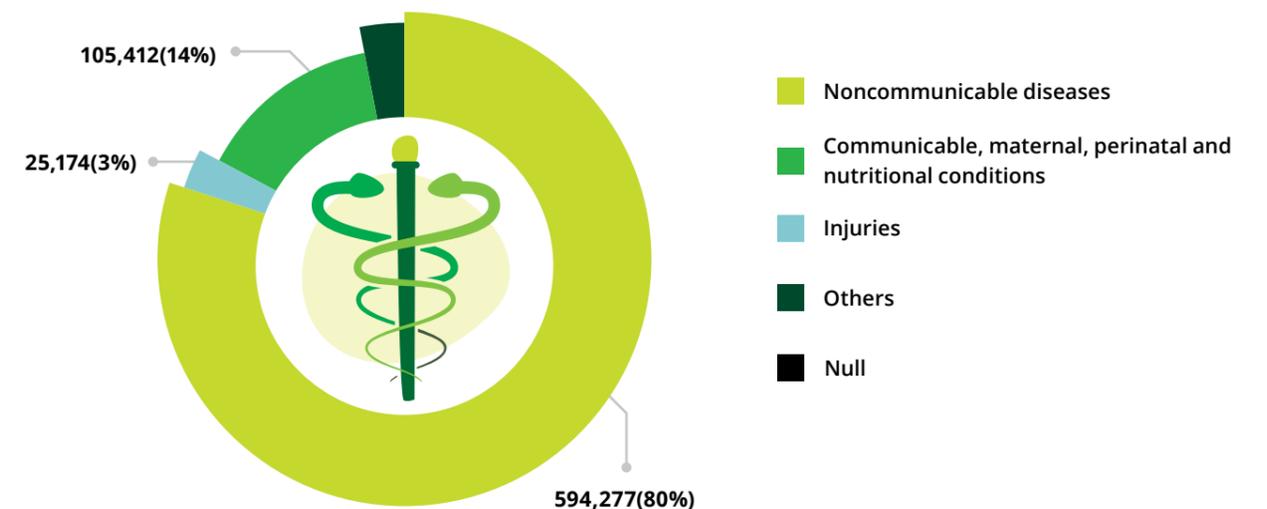


Figure 9: Trials by health category



⁷<https://accessmedicinefoundation.org/sectors-and-research/index-ranking#index--download-2024-access-to-medicine-index>
⁸[NHLBI Clinical Trials and Studies](#)

Source: WHO International Clinical Trials Registry Platform

Decarbonising the pharmaceutical sector

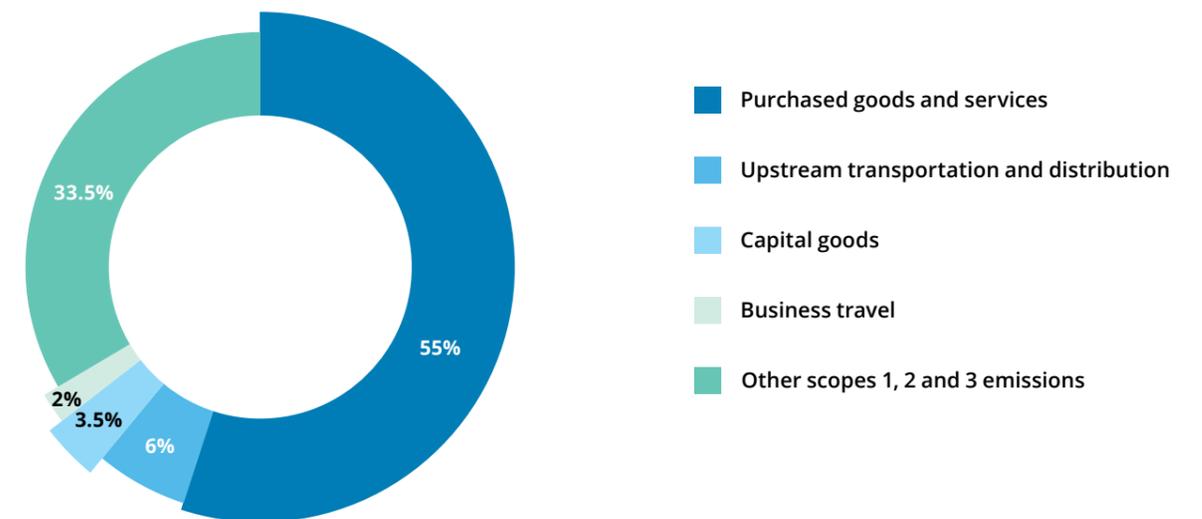
A high-energy and high-impact sector

The pharmaceutical and life sciences sector stands among the most energy-intensive industries, driven by the need for uninterrupted operations, tightly controlled environments and stringent quality and compliance requirements. Between 1995 and 2019, global emissions associated with pharmaceutical consumption increased by approximately 77 percent, reflecting the sector's growing scale and energy intensity.⁹ Cleanrooms and Heating, Ventilation, and Air Conditioning (HVAC) systems alone can account for over half of a facility's total energy usage, consuming up to 15 times more energy than commercial buildings.¹⁰ Such dependence on precision-controlled conditions makes the sector's decarbonisation efforts both technically complex and strategically vital.

Globally, healthcare accounts for nearly 5 percent of GHG emissions, with the pharmaceutical value chain contributing a substantial share.¹¹ Studies indicate that around 70 percent of these emissions arise beyond direct operations, from the production, packaging, transport and disposal of goods and services that health care purchases.¹² Yet, many smaller suppliers lack the technical capacity or financing to decarbonise, and inconsistent data standards hinder the assurance of Scope 3 reporting. Inconsistent data standards also hinder comparability and assurance, and long payback periods constrain capital deployment. Investor and lender expectations reinforce this transition. Access to sustainability-linked loans and green bonds increasingly depends on verified emission-reduction outcomes.

Figure 10: Major sources of emissions in the pharmaceutical industry

Sources of emission in the pharmaceutical industry



⁹<https://www.universiteitleiden.nl/en/news/2025/03/emissions-from-pharmaceutical-consumption-almost-doubled-in-24-years>

¹⁰<https://ispe.org/pharmaceutical-engineering/september-october-2021/pharmaceutical-cleanroom-design-iso-14644-16>

¹¹<https://www.reuters.com/sustainability/climate-energy/big-pharma-pulls-together-shrink-healthcares-outsize-carbon-footprint-2024-02-14/>

¹²https://global.noharm.org/sites/default/files/documents-files/5961/HealthCaresClimateFootprint_092319.pdf

Key drivers influencing the need for decarbonisation in the industry

Regulation and disclosure mandates

Global frameworks such as per the International Financial Reporting Standards Sustainability Disclosure Standard 2 (IFRS S2), the European Union's Corporate Sustainability Reporting Directive (EU CSRD), and India's Business Responsibility and Sustainability Report – Core Indicators (BRSR Core) are making climate disclosure a compliance requirement. They demand transparent reporting of Scope 1, 2 and 3 emissions, climate targets and transition plans.

Market access and trade readiness

Export buyers, including global distributors and public-health systems, increasingly assess suppliers on renewable-energy adoption, carbon intensity and disclosure quality. This makes climate performance a prerequisite for long-term contracts.

Investor and financial pressure

Access to sustainability-linked loans (SLLs) and green bonds hinges on verified emission reductions, often rewarded through interest-rate discounts tied to performance metrics.

Operational efficiency and resilience

Energy and water represent substantial cost components. Electrification, efficiency upgrades and renewable integration deliver dual benefits of emission reduction and cost predictability.

Reputation and social license

In a sector dedicated to human well-being, environmental stewardship reinforces brand trust. Climate accountability is becoming an integral part of corporate purpose.

Decarbonisation is therefore not merely a matter of regulatory compliance; it is a business and reputational imperative.

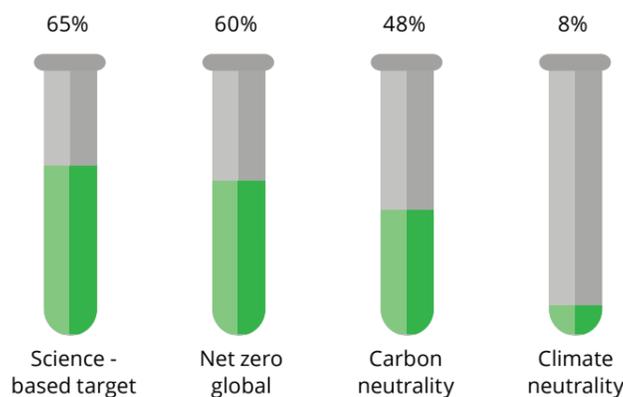
Global industry commitments and trends

The decarbonisation momentum in the pharmaceutical sector is not limited to India. Globally, leading companies are formalising climate commitments through recognised frameworks and third-party verification.

According to a 2022 survey by the European Federation of Pharmaceutical Industries and Associations (EFPIA),¹³ conducted among its members represented in the Environment, Health, Safety and Sustainability group (EHSEG), there has been clear progress in aligning corporate action with science-based climate goals.

Figure 11: Climate commitment by EFPIA Members

Global trend in climate-related target



A significant number of global pharmaceutical majors is advancing structured climate strategies through verified, science-based targets and transparent reporting frameworks.

While nearly all EFPIA member companies have now set long-term decarbonisation targets covering Scope 1 and 2 emissions, many are also defining near-term milestones. Compared with 2020, when only 55 percent of companies had long-term targets, the share rose significantly by 2022, underscoring accelerated action and leadership commitment.

The reason most companies are prioritising Scope 1 (direct) and Scope 2 (energy-related) emission reductions is that they fall within direct operational control. Actions include RE procurement, process electrification and high-efficiency HVAC or clean utility systems. However, EFPIA's expert group has emphasized that limiting climate ambition to Scopes 1 and 2 is no longer sufficient, as a majority of pharmaceutical emissions reside in Scope 3, spanning raw material sourcing, packaging, logistics and product use.

A comprehensive, value-chain-wide decarbonisation effort is therefore essential for alignment with science-based pathways and emerging EU due diligence regulations.

Key challenges of pharmaceutical companies related to practical implementation of decarbonisation roadmap

The pathway to decarbonisation in the pharmaceutical industry is technically complex and operationally demanding. High-grade heat requirement processes, temperature-sensitive logistics and stringent Good Manufacturing and Distribution Practice (GMP/GDP) validation protocols often constrain the

rapid adoption of low-carbon technologies.

At the same time, rising energy and water costs heighten the urgency for efficiency improvements, which can deliver both emission reductions and resilience dividends.

In the Indian context, several structural and operational barriers continue to impede accelerated transition:

| Key challenge | Description |
|---|---|
|  Regulatory validation and compliance | Modifying critical utilities such as HVAC, sterilisation or boiler systems requires revalidation under GMP and GDP norms. These processes extend project timelines and increase compliance costs, often discouraging innovation. |
|  Thermal decarbonisation constraints | Many manufacturing steps depend on high-grade heat (>150 °C) for sterilisation and lyophilisation. Limited availability of reliable renewable electricity and high-temperature electrification technologies restricts immediate substitution of fossil fuels. |
|  Fragmented and capacity-constrained supply chain | A large proportion of India's pharmaceutical supply base comprises MSMEs that lack access to emission data, technical expertise and affordable financing for decarbonisation investments. |
|  Cold-chain energy intensity | Extensive cold-chain requirements for biologics, vaccines and temperature-sensitive products significantly increase energy demand. Renewable-powered refrigeration and low-carbon transport options remain limited in scale. |
|  Data quality and standardisation gaps | Absence of harmonised emission factors, inconsistent reporting boundaries and varied accounting methodologies make Scope 3 data unreliable and difficult to assure. |
|  Capital and technical capability limitations | Emerging technologies, such as membrane-based water-for-injection systems, solvent-recovery units and hybrid heat systems, require high upfront investment and specialised engineering expertise, leading to long payback periods. |

¹³<https://efpia.eu/media/gtbnscj/survey.pdf>

The decarbonisation roadmap of the pharmaceutical industry

Overcoming decarbonisation challenges in the pharmaceutical sector will require coordinated action across the value chain, combining process innovation, RE integration, supplier engagement and robust governance mechanisms that ensure transparency and accountability.

Research and development to ensure resource-efficient product development

Integrating sustainability principles at the research and design stage helps prevent high impact processes later in the value chain. By embedding green chemistry principles such as atom economy, solvent substitution and continuous manufacturing, companies can significantly reduce resource intensity and process emissions. They can achieve savings of approximately 20–30 percent in material and energy consumption. Increasingly, pharmaceutical laboratories are applying life cycle assessment (LCA) tools during molecule and process development to quantify environmental impacts early on. This proactive approach enables more sustainable product design, process optimisation and informed decision-making throughout the development pipeline.

Key R&D trends driving sustainable innovation

- AI-driven discovery and process design:** Artificial intelligence and machine learning are accelerating target identification, lead optimisation and predictive toxicology. Companies are using these tools to shorten development timelines and reduce experimental waste, while also creating new ESG considerations around data governance and model transparency.¹⁶
- Green chemistry and quantitative process metrics:** Leading pharmaceutical firms are adopting measurable indicators such as Process Mass Intensity (PMI) and solvent-class scoring to evaluate environmental performance during synthesis. These metrics enable data-driven route selection and continuous improvement, translating sustainability gains into lower costs and Scope 3 reductions.¹⁷
- Decentralised and hybrid clinical trials:** Hybrid trial models combining telemedicine, home-based data collection and wearable technologies are gaining traction. They improve patient accessibility, particularly in underserved areas, while reducing emissions associated with travel and logistics.¹⁸
- Biologics, biosimilars and complex generics:** R&D investment is shifting toward biologics and advanced formulations with higher therapeutic value. These portfolios demand new expertise in cold-chain logistics, green bioprocessing and end-to-end traceability, which are all key ESG focus areas for the coming decade.¹⁹
- Ecosystem partnerships and external innovation:** Collaboration with Contract Research Organisations (CROs), AI firms and academic institutions is enabling faster innovation and risk-sharing. However, these external interfaces expand the ESG boundary, requiring stronger oversight on data security, labour standards and emissions performance across partners.

R&D in the Indian pharmaceutical context

India's pharmaceutical industry is undergoing a strategic shift from cost-efficient generic manufacturing to higher value innovation in biosimilars, complex generics and specialty medicines. Companies are increasing R&D investments, which currently account for 6–7 percent of revenues among leading firms,¹⁴ to move up the value chain and capture greater global market share. The focus is expanding from volume-driven growth to innovation-driven differentiation, supported by government initiatives such as the Production Linked Incentive (PLI) scheme for APIs and biopharmaceuticals.

At the same time, Indian firms are progressively integrating sustainability into their R&D through process efficiency, the use of RE in labs, solvent recovery and the adoption of green chemistry principles. This dual focus: scientific innovation and sustainable design, is positioning the Indian pharmaceutical industry as both a global player that is both competitive and responsible.¹⁵

Case study: Respiratory leadership and patient-centric product innovation



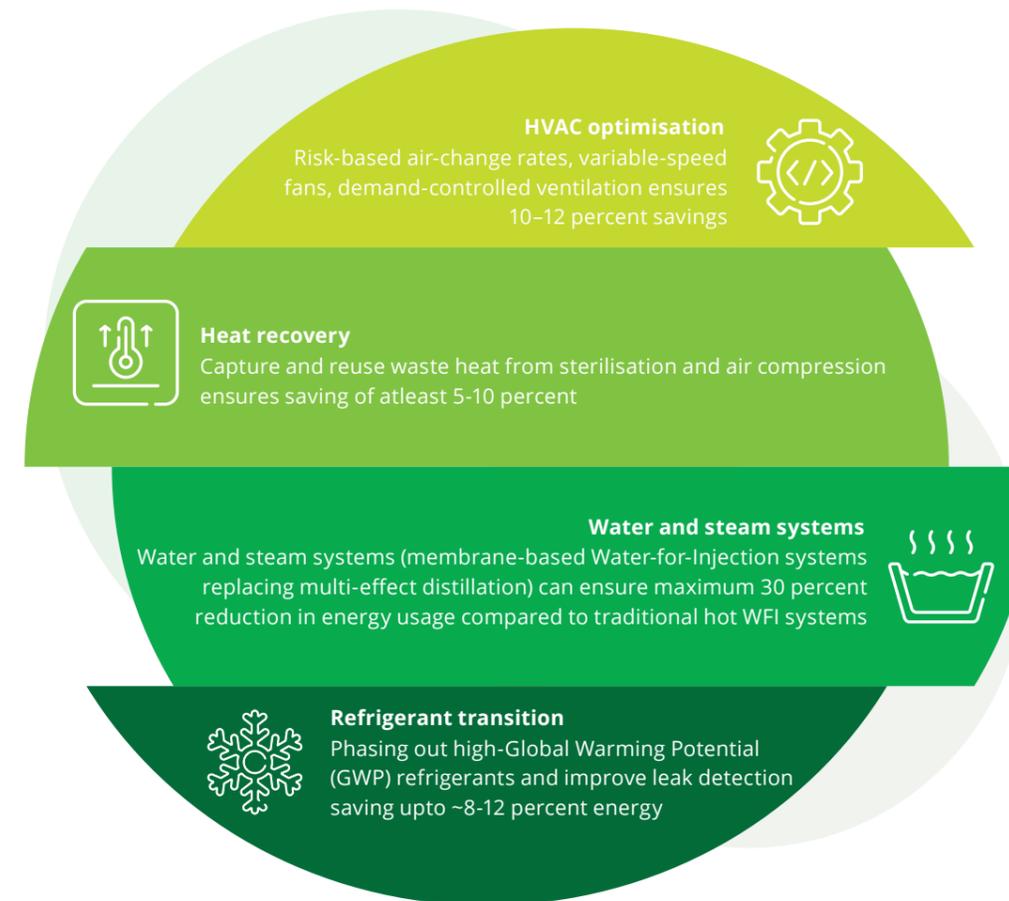
Another Indian company with deep expertise in respiratory medicine has expanded its R&D efforts beyond conventional formulations to include innovations in diagnostics and delivery devices. By developing portable, digitally-enabled respiratory devices, it has improved accessibility to care and early diagnosis, particularly in settings with limited resources. Its research teams also apply green chemistry principles and data-driven process optimisation to reduce solvent waste and emissions, aligning product innovation with a broader commitment to sustainable healthcare and equitable access.

Ensuring HVAC Efficiency

In manufacturing, clean room utility systems are a major area of energy consumption. HVAC systems account for roughly 50–70 percent of total clean room energy consumption, presenting significant decarbonisation opportunities.²⁰ HVAC efficiency can be enhanced through demand-controlled filtration and heat recovery, while clean-utility optimisation,

such as membrane-based water-for-injection systems, can substantially lower energy and operating costs. The electrification of thermal loads is also becoming increasingly feasible as renewable power costs decline, with high-temperature heat pumps capable of operating at temperatures of 90–160°C, providing a promising pathway for low-carbon process heat.²¹

Figure 12: Energy saving from process efficiency²²



¹⁴<https://www.icra.in/CommonService/OpenMediaS3?Key=98c77d00-825a-4d0f-b12c-62b72d59e09f>

¹⁵<https://www.eqmagpro.com/indian-pharma-adopts-green-initiatives-with-eco-friendly-manufacturing-processes-to-save-environment-eq/?utm>

¹⁶<https://www.delveinsight.com/blog/generative-ai-drug-discovery-market-impact>

¹⁷<https://pubs.acs.org/doi/10.1021/acs.joc.3c01494>

¹⁸<https://www.fda.gov/media/167696/download>

¹⁹<https://www.bain.com/insights/healing-the-world-a-roadmap-for-making-india-a-global-pharma-exports-hub/>

²⁰<https://www.sciencedirect.com/science/article/pii/S0378778819308102>

²¹<https://docs.lib.purdue.edu/cgi/viewcontent.cgi?article=2875&context=iracc>

²²<https://www.dceew.gov.au/sites/default/files/documents/leaks-maintenance-and-emissions-in-refrigeration-and-air-conditioning-equipment-2021.pdf>

<https://www.haskoning.com/en/newsroom/blogs/2024/cold-wfi-boost-efficiency-and-cut-costs-in-pharma>, <https://www.mdpi.com/1996-1073/15/1/313>,

<https://www.sciencedirect.com/science/article/abs/pii/S037877882501237X>

Minimising packaging waste and logistics emissions

Packaging and logistics also significantly impact the carbon footprint. Right-sized and mono-material packaging can lower associated emissions by approximately 47 percent, depending on design and barrier requirements.²³ In the logistics chain, optimising freight modes, integrating renewable-powered cold storage and piloting electric or bio-fuelled transport fleets help reduce distribution-related emissions.

Collaboration with suppliers to ensure Scope 3 emission reduction

Engaging the right kind of suppliers is extremely critical. Supplier programmes promoting measurement, disclosure, and cleaner production can significantly reduce the sector's footprint. True decarbonisation, therefore, extends beyond factory gates. A lifecycle perspective that spans R&D, manufacturing, logistics and end-of-life ensures impact across the entire value chain.

Proper governance and data systems to monitor progress

Strong governance anchors decarbonisation in corporate decision-making. Site-level energy councils supported by digital dashboards ensure transparent data flow. Integrating performance metrics, such as energy intensity, renewable share, solvent recovery rate and supplier coverage, into ESG dashboards enhances disclosure readiness for IFRS S2 and BRSR Core.

Ensuring monitoring through internal carbon pricing

Embedding a financial value on emissions can turn climate ambition into an actionable strategy. Internal carbon pricing (ICP) enables companies to incorporate the cost of carbon into their investment and procurement decisions, fostering accountability across operations and supply chains. Globally, over 1,700 companies already apply an internal carbon price.²⁴ For India's pharmaceutical sector, applying a shadow price

during project appraisal or linking management incentives to verified emission reductions can embed decarbonisation into business decisions.

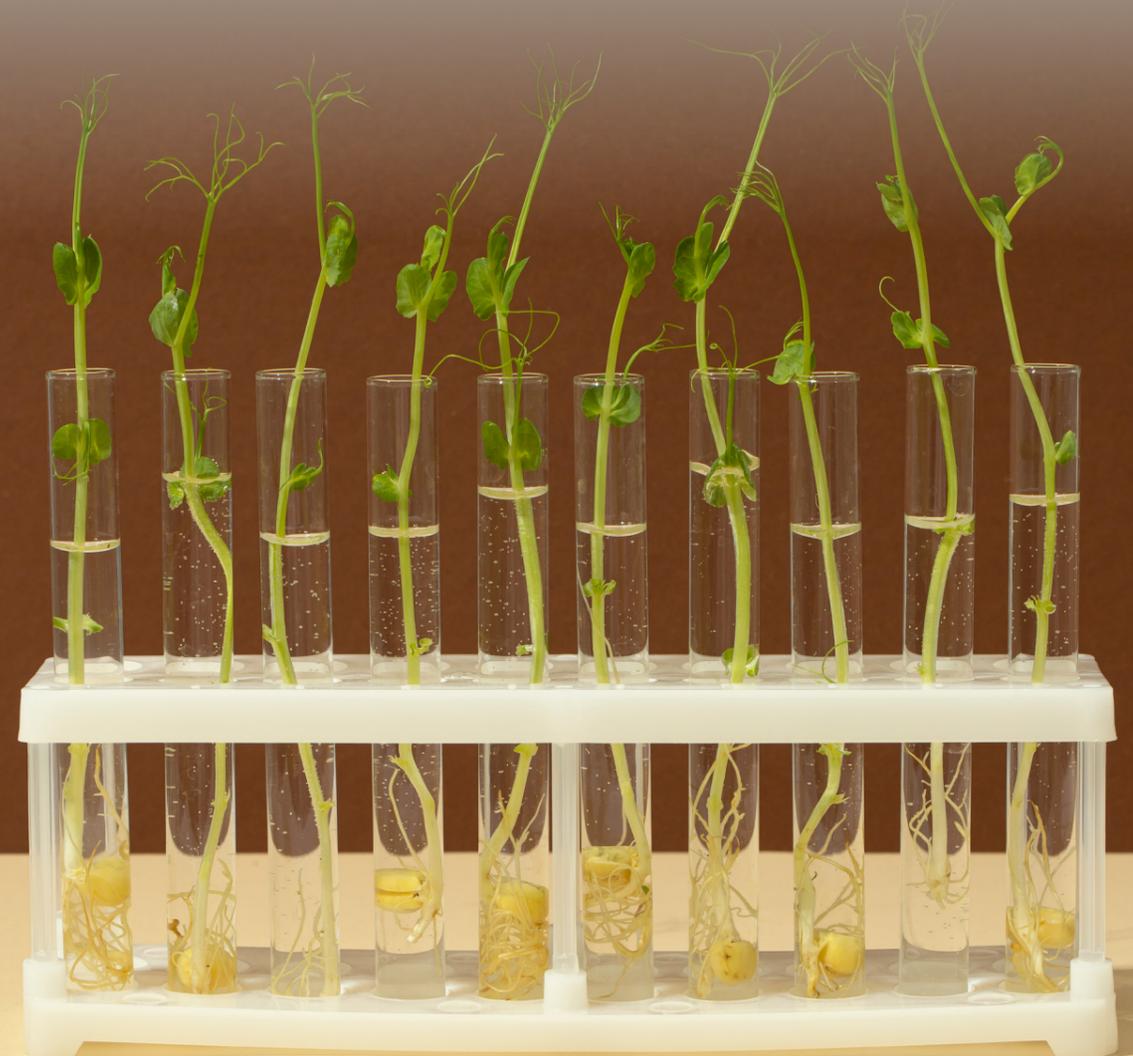
Decarbonising the pharmaceutical sector demands a delicate balance between regulatory rigour, scientific precision and operational resilience. The transformation over the next decade will be driven by three interdependent levers: operational efficiency, RE integration and value chain collaboration, all underpinned by robust governance and reliable data systems.

Adopting a lifecycle approach ensures that emission reductions are embedded from molecule design to end of life, while internal carbon pricing translates climate ambition into measurable financial accountability.

As India charts its course toward the 2070 net-zero milestone, pharmaceutical enterprises that act decisively by electrifying utilities, optimising resource use and decarbonising supply chains will reduce their carbon footprint, unlock new markets, attract sustainable capital and lead the transition toward climate-positive healthcare. In doing so, the industry can reaffirm its core purpose: advancing human health while safeguarding the planet that sustains it.



Key case studies (Indian companies with Science Based Targets initiative (SBTi) validated targets)

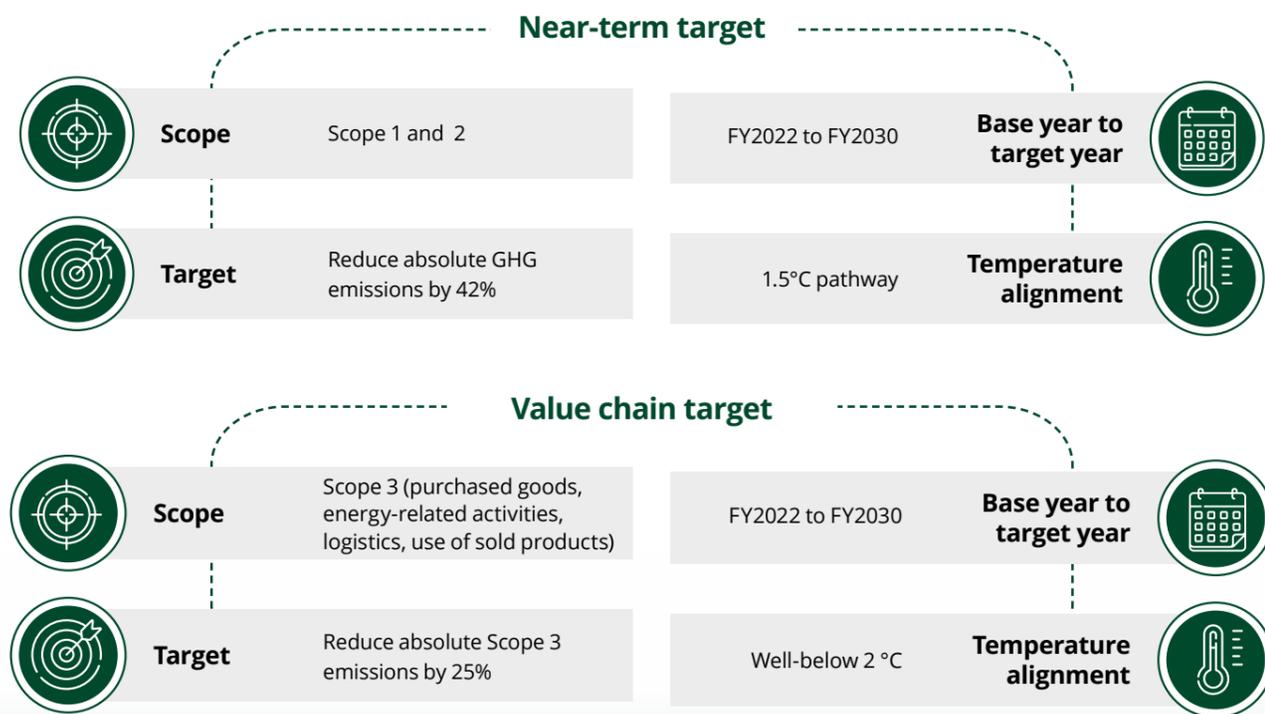


²³<https://www.plasticsindustry.org/articles/innovative-recyclable-blister-pack-reduces-carbon-footprint/>
²⁴<https://www.wbcsd.org/news/integrating-climate-with-financials-internal-carbon-pricing/>

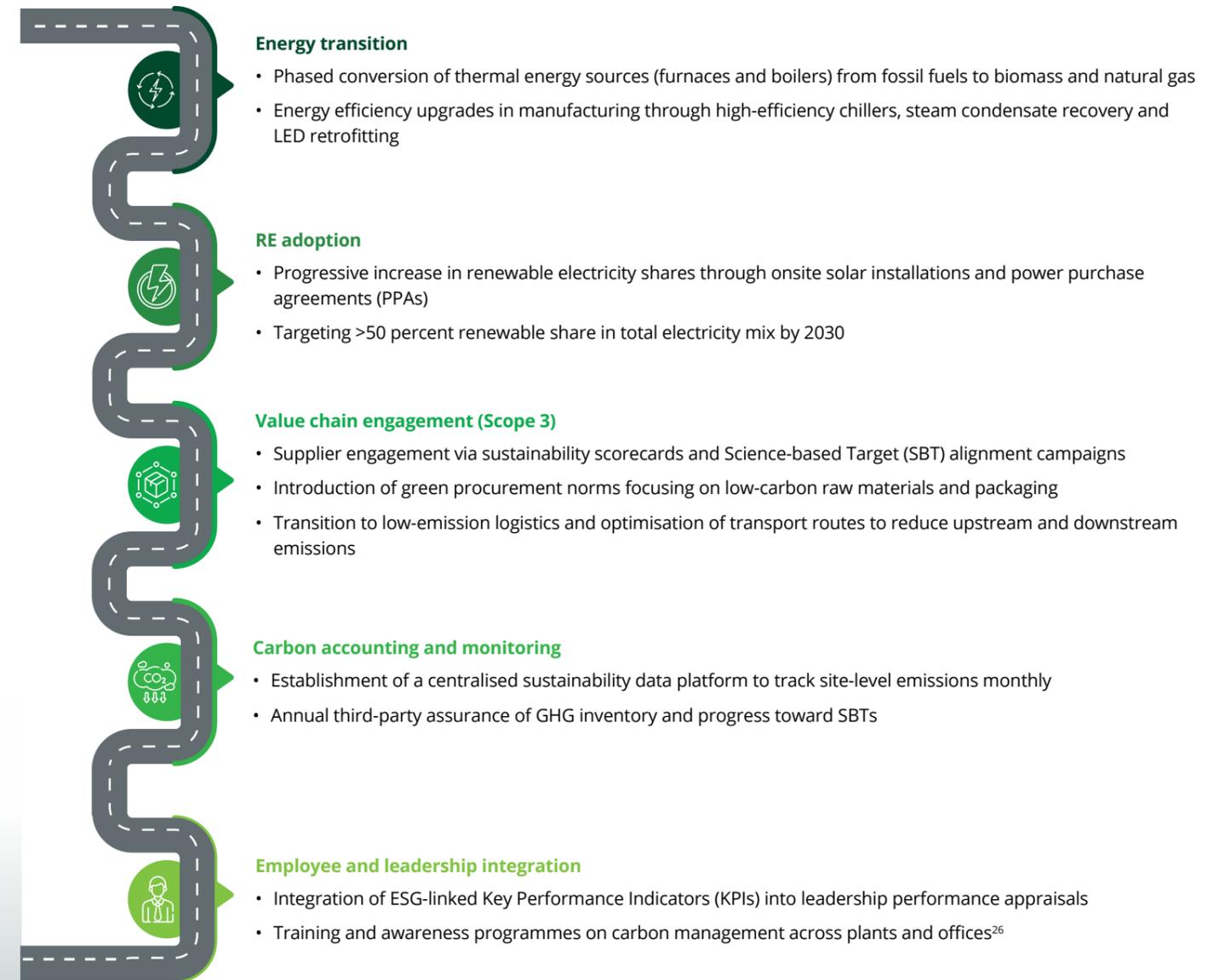
Global Large Diversified Pharma & CDMO Player

The Pharma & CDMO is a leading Indian pharmaceutical and contract development and manufacturing organisation (CDMO) offering end-to-end solutions across APIs, formulations and healthcare insights, spanning across India, Europe and North America.

Summary



Roadmap to achieving target:²⁵



Highlights

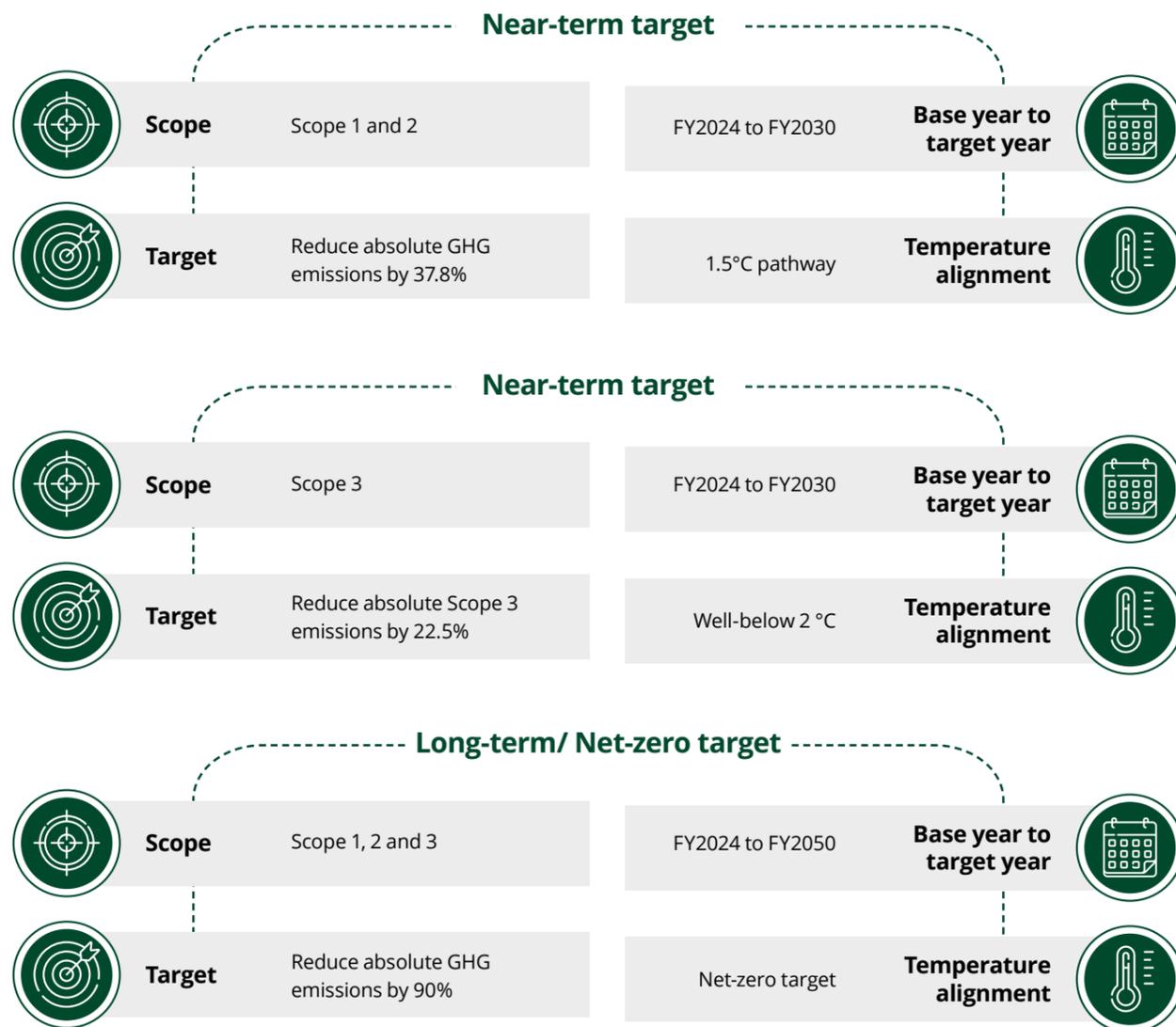
- SBTi validation signifies organisation's time-bound decarbonisation roadmap
- The roadmap combines transition to RE, enhanced energy efficiency and supplier engagement, enabling a balanced approach to reduction in Scopes 1, 2 and 3

²⁵GHG Commitment Validated and Approved by SBTi
²⁶Sustainability Report FY23-24

Global Specialty Chemicals & API Manufacturer

The Manufacturer is a leading Indian integrated pharmaceutical and speciality chemical manufacturer specialising in Active Pharmaceutical Ingredients (APIs) and intermediates. The company operates multiple manufacturing sites in India and exports to over 50 countries. With a strong focus on green chemistry and process innovation, the manufacturer has embedded sustainability as a core business driver.

Summary²⁷



Roadmap to achieving target:²⁸



Highlights

- RE share increased by 20 percent since 2024
- Supplier engagement framework initiated for the top 50 vendors
- Life Cycle Impact Assessment (LCIA) initiated
- With SBTi validation focus is on innovation in chemistry and RE integration

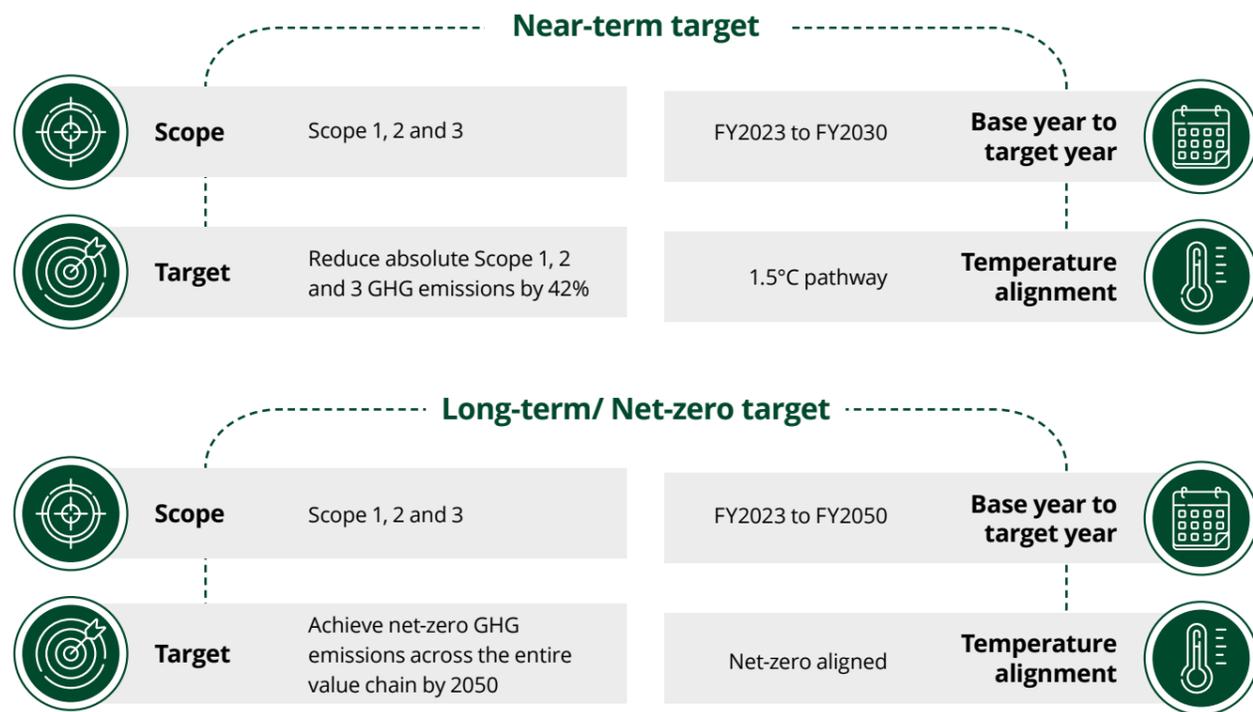
²⁷SBTi Validation

²⁸Sustainability report FY 24-25

High-volume API & Formulation Manufacturer

The API & Formulation Manufacturer is a Hyderabad-based integrated pharmaceutical manufacturer with a strong presence across APIs, Pharmaceutical Formulation Intermediates (PFIs), and Finished Dosages (FDs). Its global supply footprint is spread across 80+ countries

Summary²⁹



Roadmap to achieving target:³⁰



Highlights

- Achieved >15 percent reduction in Scopes 1 and 2 emissions intensity with FY23 as the baseline
- RE procurement increased from 10% to 25%
- Roadmap integrates energy efficiency measures, renewables, supplier collaboration and innovation

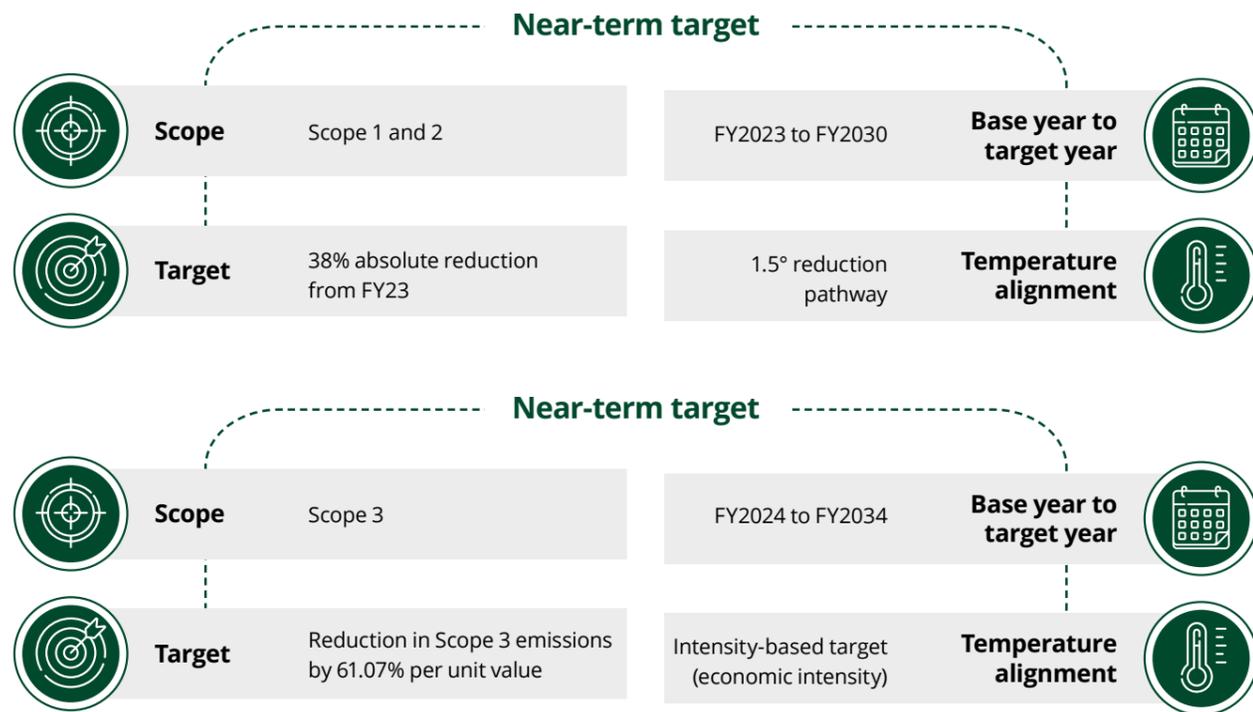
²⁹SBTi Validation

³⁰Sustainability Report FY24-25

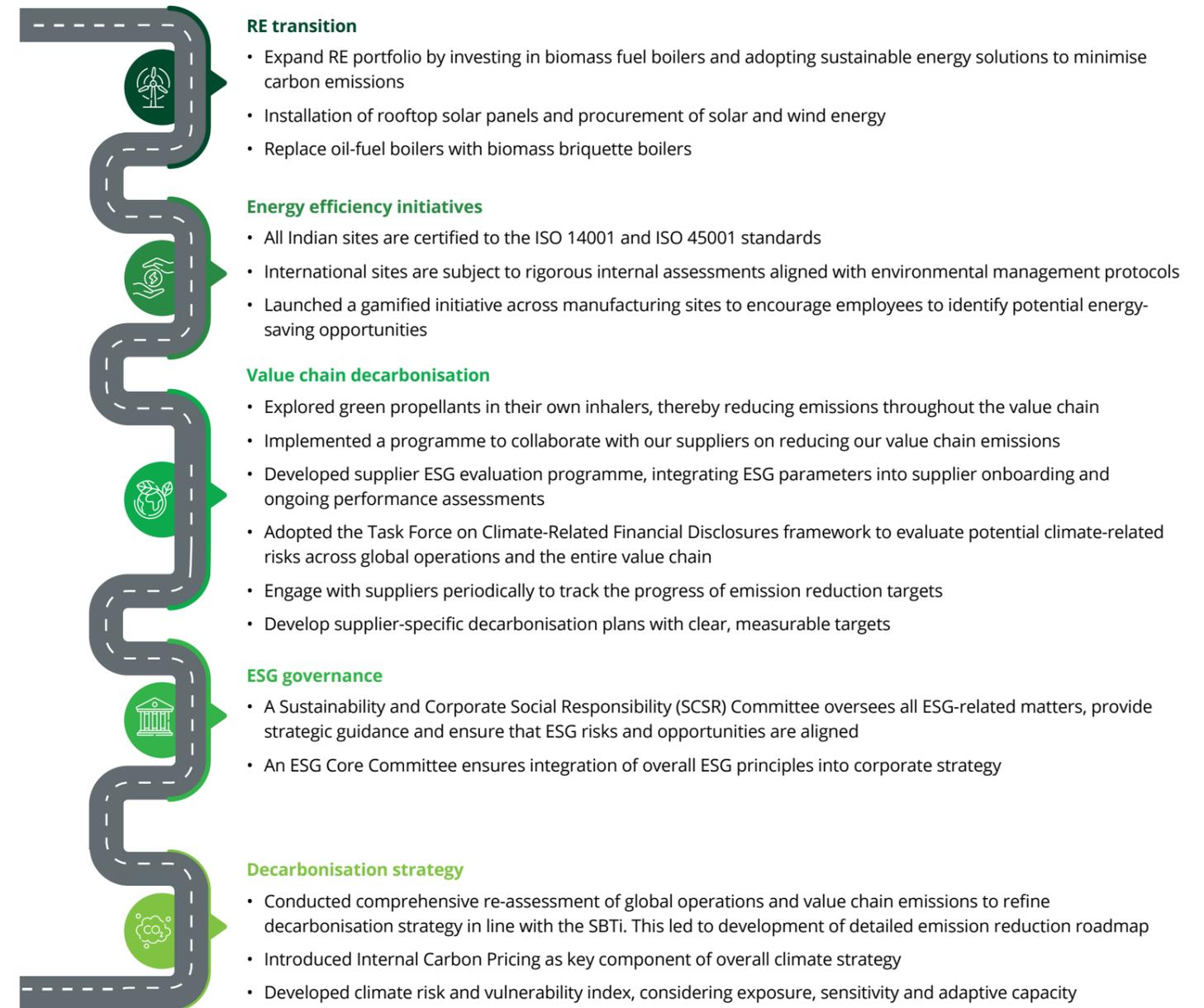
Global Generic Pharmaceuticals Company

The pharmaceutical company is driven to develop treatments that turn hope into healing. As a leading pharmaceutical company, it is dedicated to making healthcare more accessible, sustainable and transformative. It stands as a global leader in the pharmaceutical industry, with a strong footprint in over 100 countries including North America, EMEA, LATAM, APAC and India.

Summary³¹



Roadmap to achieving target:



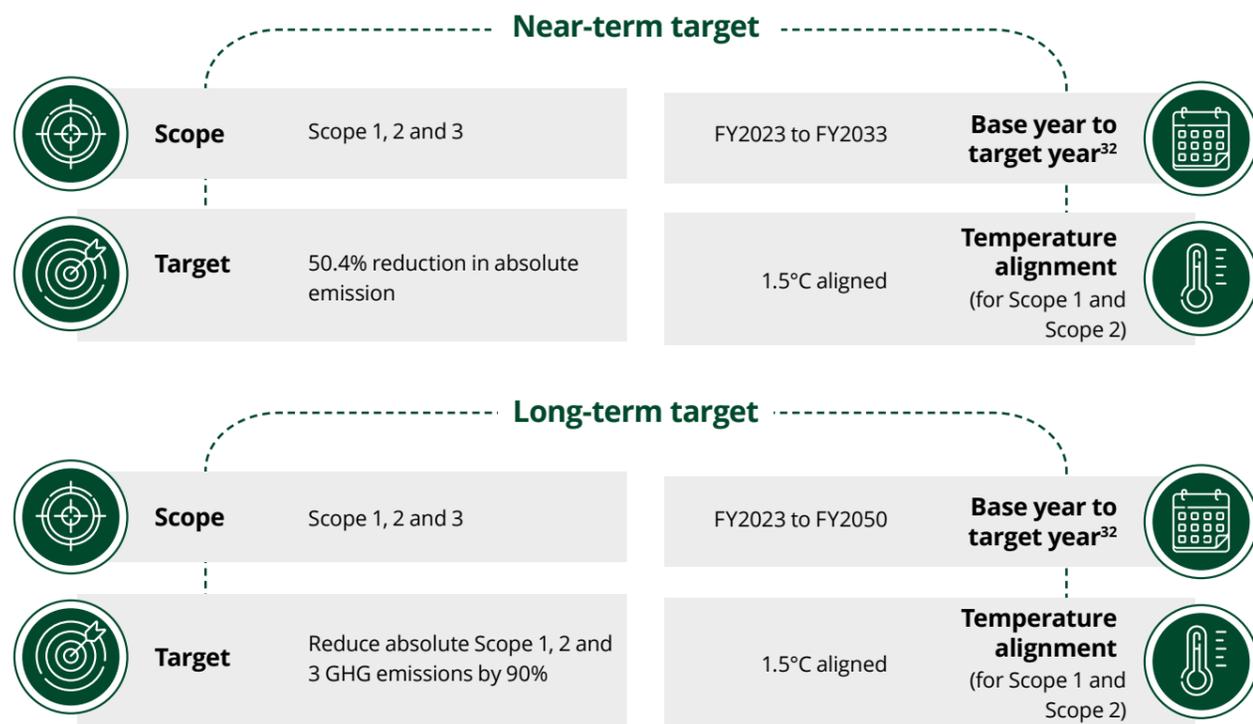
Highlights

- Invested INR17,672 million in R&D, representing an increase in investment from FY24
- Invested INR528 million in renewable and environmental initiatives, reducing overall Scopes 1 and 2 emissions by 26 percent over the FY23 baseline
- Completed LCA of 30 percent of products
- Introduced Environment, Health, and Safety Awards and Accolade System (EHSAAS) reward programme for the workforce, to ensure contribution towards meeting ESG targets

Global Integrated Discovery-to-Development CRO/CDMO

The CRO/CDMO remains committed to driving science-based innovation and sustainability-focused initiatives. As a trusted R&D and manufacturing partner to the global life sciences industry, the CRO/CDMO includes sustainability across every phase of the drug development lifecycle, from discovery to large-scale production.

Summary



Roadmap to achieving target:³³



Highlights

- 24.7 percent of total energy consumption is derived from RE
- Investing in a climate risk financial disclosure system

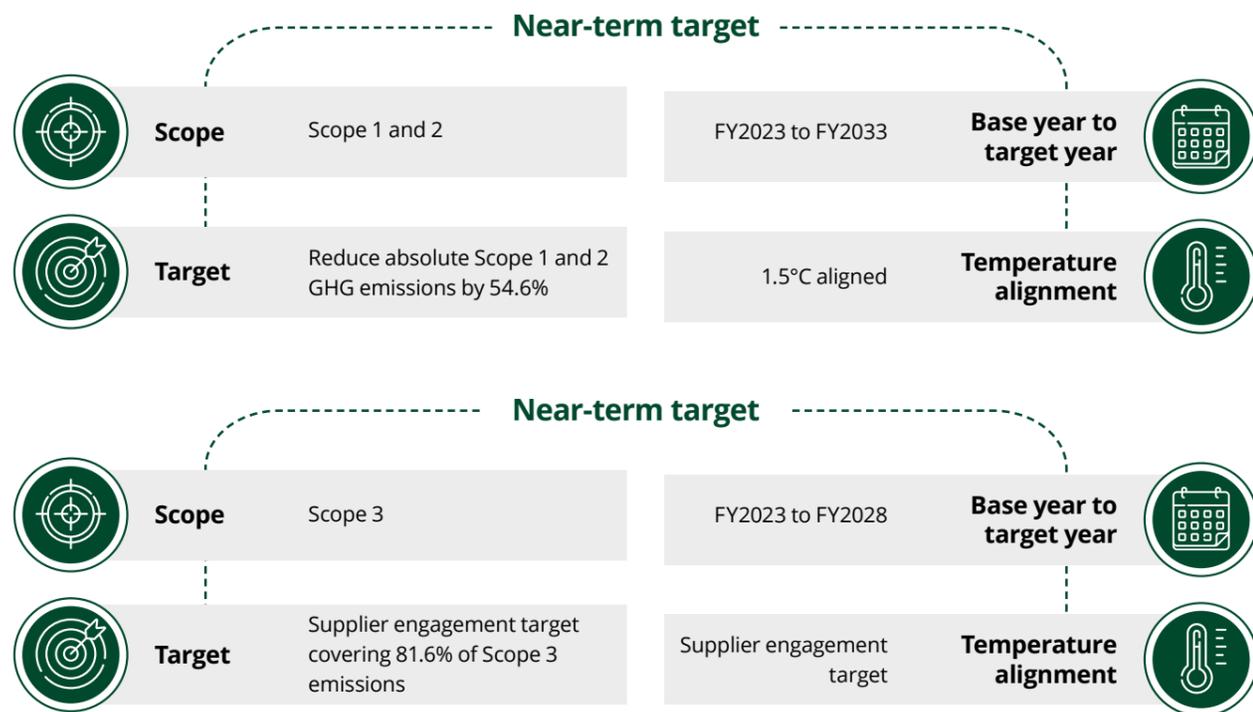
³²SBTi Commitment Letter

³³Sustainability Report FY2024-25

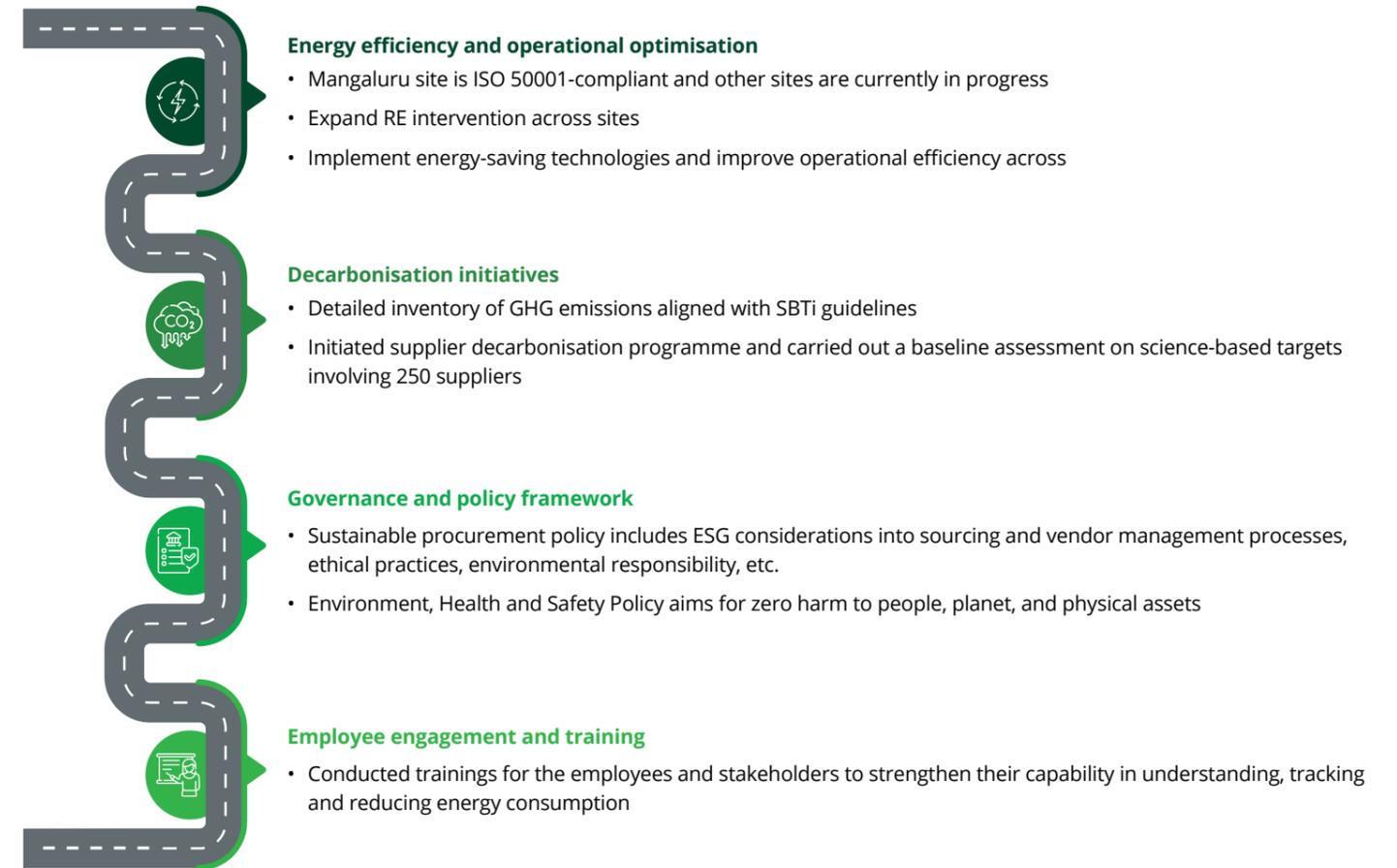
Global Contract Research, Development & Manufacturing Organisation

The CRD & Manufacturing Organisation offers end-to-end discovery, development and manufacturing solutions to organisations across pharmaceutical, biotechnology, animal health, consumer goods and agrochemical sectors.

Summary³⁴



Roadmap to achieving target:



Highlights

- 31 percent Y-o-Y reduction in GHG (Scope 1 and 2) emissions
- 92 percent of total energy consumption sourced from renewables
- Invested in wind and solar power plants through power purchase agreements
- 26 percent suppliers by emissions are committed to SBTi

Adopting these practices would transform pharmaceutical MSMEs into more sustainable, efficient and resilient businesses. Transitioning to RE sources would lower carbon emissions and operational costs. Implementing energy efficiency measures and ISO standards would enhance resource optimisation and workplace safety. Strengthening governance and ESG frameworks would improve accountability, transparency and stakeholder

confidence. Engaging suppliers in decarbonisation efforts and aligning with SBTi and Task Force on Climate-related Financial Disclosures (TCFD) standards will develop climate resilience across the value chain. Overall, these measures would support pharmaceutical MSMEs to attract global partners and contribute meaningfully to a low-carbon economy.

³⁴ESG Report FY2024-25

Sustainable supply chain: Landscape, key challenges and interventions



Landscape

India's pharmaceutical supply chain is one of the largest and most interconnected in the world, supporting both domestic healthcare and a strong global export network. It brings together a diverse ecosystem of raw material suppliers, manufacturers, distributors and logistics providers that collectively ensure the continuous supply of affordable medicines to more than 200 countries. Despite its scale and strategic importance, the system faces several structural and sustainability challenges. A significant portion of key raw materials, particularly APIs, continues to be imported. Over 70 percent of the APIs come from China, leaving the industry exposed to supply disruptions and limiting control over environmental and quality standards.

Key challenges

As the sector continues to evolve, understanding the key sustainability challenges within this complex supply chain becomes essential to shaping effective interventions and ensuring long-term resilience. India's pharmaceutical supply chain faces a combination of environmental, economic and social challenges that collectively affect its sustainability and long-term resilience. On the environmental front, pharmaceutical manufacturing is highly resource-intensive, with significant energy and water requirements.

Regulatory compliance remains one of the most persistent and complex challenges within India's pharmaceutical supply chain. The sector functions under a multi-layered

regulatory framework that demands adherence to rigorous quality, safety and documentation standards. For companies operating across multiple jurisdictions, navigating differing and frequently changing regulations adds further complexity. Ensuring alignment with both domestic and international requirements, ranging from manufacturing practices to product approvals and export certifications, requires significant administrative capacity and continuous monitoring. This regulatory diversity not only increases operational costs but also exposes firms to potential delays and compliance risks, emphasizing the need for greater harmonisation and capacity-building across the regulatory ecosystem.

Infrastructure-related limitations continue to pose another major challenge to the efficiency and resilience of India's pharmaceutical supply chain. Although the sector has seen notable progress in logistics development over the past decade, the availability and quality of transport networks remain uneven. According to estimates by NITI Aayog, logistics expenses account for nearly 14 percent of GDP, compared with a global average of 8-10 percent, underscoring persistent inefficiencies that weaken India's competitiveness in international trade³⁵. These challenges are particularly critical for the pharmaceutical sector, where temperature-sensitive products require specialised handling and timely distribution. Addressing these infrastructure constraints will require targeted public-private investments, modernisation of freight and cold chain systems and improved multimodal connectivity to enhance both cost efficiency and supply chain resilience.



Strategic interventions



End-to-end digital visibility and data integration Implementing comprehensive digital visibility across the entire supply chain can significantly improve operational sustainability. Advanced digital platforms and real-time analytics enable the identification of environmental and logistical hotspots, support dynamic decision-making and enhance demand forecasting accuracy.



Investment in sustainable logistics and cold chain infrastructure Develop efficient logistics networks that prioritise low-emission transport modes and energy-efficient cold chain systems.



Circular economy initiatives and waste recovery systems Implementation of circular economy models focusing on waste segregation, recycling of packaging materials and the recovery of solvents and chemicals. Collaboration between manufacturers, distributors and recyclers can create a closed-loop system, minimising landfill waste and conserving resources.



Strengthening regulatory frameworks and green procurement policies Introduction of regulatory incentives for companies adhering to sustainable practices, such as tax benefits or preferential procurement. Establishment of green procurement standards encouraging eco-friendly materials, low-carbon processes, and transparent sustainability reporting.



Capacity building and workforce training Development of skill enhancement programmes to train supply chain professionals in sustainable operations, digital transformation and environmental compliance. Empowering the workforce ensures long-term adoption and innovation in sustainability practices.



Public-private partnerships for sustainable infrastructure development Fosters collaboration between government agencies, industry stakeholders, and research institutions to co-develop sustainable infrastructure projects, such as renewable-powered industrial parks, advanced waste management facilities and digital logistics hubs.

Driving sustainability in the sector



The Indian pharmaceutical industry is one of the key drivers of domestic economic growth. The sector is poised to grow by over 200 percent in the next 5–7 years. At the same time, the evolving regulatory landscape on ESG, the emergence of physical and transition risks and enhanced stakeholder involvement have made it imperative for the sector to adopt good ESG practices. Furthermore, European regulations concerning the Corporate Sustainability Reporting Directive (CSRD) and Corporate Sustainability Due Diligence Directive (CSDDD) would impact Indian companies having exposure to EU markets through cascading reporting obligations. The key

direct impacts will include enhanced scrutiny of the supply chain, costs associated with due diligence, cost of compliance, etc.

There is a need to take a collaborative, concerted and comprehensive approach towards integrating good ESG practices. The key to such an approach includes a value-chain-based approach, adopting integrated thinking within business strategy and operations, bringing transparency and accuracy in disclosures and making use of peer learning.

Human capital



Human capital is a strategic asset for pharmaceutical and life sciences companies. It is a growth enabler and an ESG concern, wherein people are key carriers of social value, operational safety, innovation, R&D productivity, regulatory compliance, etc.

The success of the pharmaceutical industry relies significantly on human capital to drive innovation, advance the development of new medicines and enhance access in underserved and

low-income regions.³⁶ Given the sector's heavy investment in research and development, accompanied by high risks of failure, companies are increasingly integrating patient perspectives early in the research process. This underscores the critical importance of optimising innovation processes and effectively managing human capital. Additionally, issues related to business ethics, competitive behaviour and product quality or safety can lead to substantial reputational and financial repercussions.

13,86,150 registered allopathic doctors and 7,51,768 registered practitioners in AYUSH, contributing to doctor-population ratio of 1:811

[Source: PIB Release](#)

157 new medical colleges are being set up by upgrading district/ referral hospital

[Source: PIB Release](#)

³⁶DJSI Yearbook

Connect with us

Deloitte

Joydeep Ghosh

Industry Leader – Life Sciences and Healthcare
Deloitte South Asia
joghosh@deloitte.com

Shailesh Tyagi

Partner and Service Line Leader –
Climate Change & Sustainability
Deloitte South Asia
shaileshTyagi@deloitte.com

CII

Amita Sarkar

Deputy Director General,
Confederation of Indian Industry
amita.sarkar@cii.in

Mamta Sharma

Director
Confederation of Indian Industry
mamta.sharma@cii.in

Contributors

Deloitte

[Dr. Remant Kumar Tiwari](#)

[Kanika Dhiman](#)

[Piyush Yadav](#)

[Rajashree Banerjee](#)

[Parul Pushkarna](#)

[Manish Basaligundi](#)

[Vibhuti Raina](#)

[Kirtana Valluri](#)

CII

[Alveera Nadeem](#)

[Arundhuti Sen](#)

[Raghav Rathi](#)

About Deloitte India

Deloitte is one of the world's largest and most diversified professional services organisations, providing assurance, tax, strategy, risk & transactions, and technology & transformations services through more than 460,300 professionals in more than 150+ countries. Our organisation includes a unique portfolio of competencies integrated in one industry-leading organisation. Deloitte Touche Tohmatsu India LLP (DTTI LLP) is a member firm in India that provides non-audit consulting services. Our experienced professionals deliver seamless, consistent services wherever our clients operate.

In India, Deloitte is recognised as one of the country's top professional services firms, spread across 16 cities namely – Ahmedabad, Bengaluru, Bhubaneswar, Chennai, Coimbatore, Goa, New Delhi, Hyderabad, Jamshedpur, Lucknow, Kochi, Kolkata, Mumbai, Noida, Pune and Indore. With over 42000 professional staff, our professionals are proficient at delivering the right combination of local insight and international expertise to our clientele drawn from across industry segments.

About CII



Confederation of Indian Industry

The Confederation of Indian Industry (CII) works to create and sustain an environment conducive to the development of India, partnering Industry, Government and civil society through advisory and consultative processes.

For 130 years, CII has been engaged in shaping India's development journey and works proactively on transforming Indian Industry's engagement in national development. With its extensive network across the country and the world, CII serves as a reference point for Indian industry and the international business community.

In the journey of India's economic resurgence, CII facilitates the multifaceted contributions of the Indian Industry, charting a path towards a prosperous and sustainable future. With this backdrop, CII has identified "Accelerating Competitiveness: Globalisation, Inclusivity, Sustainability, Trust" as its theme for 2025-26, prioritising five key pillars. During the year, CII will align its initiatives to drive strategic action aimed at enhancing India's competitiveness by promoting global engagement, inclusive growth, sustainable practices, and a foundation of trust.

Confederation of Indian Industry

The Mantosh Sondhi Centre

23, Institutional Area, Lodi Road, New Delhi – 110 003 (India)

T: 91 11 45771000

E: info@cii.in • W: www.cii.in

Follow us on



[cii.in/facebook](https://www.cii.in/facebook)



[cii.in/twitter](https://www.cii.in/twitter)



[cii.in/linkedin](https://www.cii.in/linkedin)



[cii.in/youtube](https://www.cii.in/youtube)

Reach us via CII Membership Helpline: 1800-103-1244



Confederation of Indian Industry

No part of this publication may be reproduced, stored in, or introduced into a retrieval system, or transmitted in any form or by any means (electronic, mechanical, photocopying, recording or otherwise), in part or full in any manner whatsoever, or translated into any language, without the prior written permission of the copyright owner. CII has made every effort to ensure the accuracy of the information and material presented in this document. Nonetheless, all information, estimates and opinions contained in this publication are subject to change without notice, and do not constitute professional advice in any manner. Neither CII nor any of its office bearers or analysts or employees accept or assume any responsibility or liability in respect of the information provided herein. However, any discrepancy, error, etc. found in this publication may please be brought to the notice of CII for appropriate correction.

Published by Confederation of Indian Industry (CII).

Deloitte.

Deloitte refers to one or more of Deloitte Touche Tohmatsu Limited (“DTTL”), its global network of member firms, and their related entities (collectively, the “Deloitte organization”). DTTL (also referred to as “Deloitte Global”) and each of its member firms and related entities are legally separate and independent entities, which cannot obligate or bind each other in respect of third parties. DTTL and each DTTL member firm and related entity is liable only for its own acts and omissions, and not those of each other. DTTL does not provide services to clients. Please see www.deloitte.com/about to learn more.

Deloitte Asia Pacific Limited is a company limited by guarantee and a member firm of DTTL. Members of Deloitte Asia Pacific Limited and their related entities, each of which is a separate and independent legal entity, provide services from more than 100 cities across the region, including Auckland, Bangkok, Beijing, Bengaluru, Hanoi, Hong Kong, Jakarta, Kuala Lumpur, Manila, Melbourne, Mumbai, New Delhi, Osaka, Seoul, Shanghai, Singapore, Sydney, Taipei and Tokyo.

This communication contains general information only, and none of DTTL, its global network of member firms or their related entities is, by means of this communication, rendering professional advice or services. Before making any decision or taking any action that may affect your finances or your business, you should consult a qualified professional adviser.

No representations, warranties or undertakings (express or implied) are given as to the accuracy or completeness of the information in this communication, and none of DTTL, its member firms, related entities, employees or agents shall be liable or responsible for any loss or damage whatsoever arising directly or indirectly in connection with any person relying on this communication.

© 2025 Deloitte Touche Tohmatsu India LLP. Member of Deloitte Touche Tohmatsu Limited