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SIES
Indian Institute of Environment Management
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ECOINSIGHTS

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About Us

Founded in 1999, the SIES Indian Institute of Environment Management (SIES IIEM) is a premier academic and research institution committed to advancing sustainable practices through innovative research, comprehensive education, and impactful training programs. Recognized by the Department of Scientific and Industrial Research (DSIR), Government of India, the institute is ISO 9001:2015 certified to provide Environment Education, Research & Development and Laboratory Testing Services.

Some of our major activities include Academics, Research & Development, Industrial Consultancy, Environmental & Green Audits, Laboratory Testing and Outreach Activities. The institute also offers a range of academic programs, including Ph.D. program in Environmental Sciences, affiliated to University of Mumbai; M.Sc. in Sustainable Development and Environment Management, affiliated to Garware Institute of Career Education & Development (GICED); and, an online Post Graduate Diploma in Sustainable Environment Management (PGDSEM) for working professionals.

Since its inception, SIES IIEM has established strong collaborations with government and non-government agencies, industries, academia and environmental consultancies. The institute is equipped with state-of-the-art laboratories and is at the forefront of pioneering solutions for sustainable environmental management. Institute's core Research Areas on Environment and Energy include, Management of Natural Resources, Water Resources, Air Quality, Solid Waste, and Radioactive Waste; , Energy Transitions, Conservation, and Management; and Global Issues of Climate Change & Global Warming; Ozone Depletion; Trade and Environmental Linkages; Forest and Biodiversity, etc.

The institute specializes in conducting comprehensive Green Audits and offering specialized environmental consultancy services. Our green audit services assist organizations in assessing their environmental impact, identifying areas for improvement, and developing strategies to reduce their ecological footprint. We help organizations achieve sustainability goals while ensuring compliance with the environmental regulations. At SIES IIEM, we continue to lead the way in sustainability education and environmental research, driving positive change and fostering a sustainable future for all.

MISSION

To harness the power of Science, Technology and Innovation in pollution control, management of natural resources and excellence in academics to promote environmental, social and institutional sustainability.

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Editorial

India is one of the world's fastest-growing economies and our energy demands are soaring but so are the environmental costs. With this growth comes a dual imperative, to fuel development and to do so sustainably. The choices we make today will shape not only our own developmental trajectory but also future global climate goals. With rising pollution, climate change, and depleting fossil fuels, the shift towards sustainable energy is not just important, it is essential. India has taken notable steps in this direction, particularly in solar power. From setting a target of 500 GW of non-fossil fuel capacity by 2030 to expanding solar parks across the country, the momentum is building. Initiatives like the International Solar Alliance and policy instruments that support decentralized solar deployment and rural electrification are helping make clean energy more accessible. The path forward is achieving a just, equitable, and sustainable transition from fossil fuels to renewable energy.

The transition process has its challenges, such as aging grid infrastructure, financial strain on power distribution companies, and the socio-economic complexities of phasing out coal. Over seventy per cent of India's electricity still comes from coal, and millions depend on it for their livelihood. A just transition, therefore, must prioritize re-skilling, economic diversification, and social protection for affected communities. Moreover, investment remains a critical concern, and although foreign and domestic interest in clean energy is growing, regulatory uncertainty and land acquisition hurdles continue to deter large-scale implementation.

India's energy transition also needs to be inclusive, particularly as energy poverty continues to be a persistent issue. Sustainable development goes beyond lowering carbon emissions; it means ensuring that every household, regardless of geography or income, has access to clean, reliable power. In this regard, green energy can become a tool of empowerment rather than just being an environmental necessity.

To accelerate the transition, the government must create an enabling environment for both public and private sector investments, ensuring that renewable energy projects are financially viable and efficient. Despite the obstacles, the opportunity is substantial, and India has the chance to lead the world in clean energy innovation, creating jobs, reducing emissions, and ensuring energy for all.

With smart policies, strong leadership, and public support, we can build a greener, cleaner, and more equitable future. By fostering innovation, supporting displaced communities, and investing in modern infrastructure, India can emerge as a leader in the global renewable energy transition.

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Director (I/C), SIES IIEM

India's Green Leap: Advancing Towards a Sustainable Energy Future

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The world currently faces the ever-increasing impacts of climate change, with repercussions felt across environmental, socio-economic, and public health dimensions. Rising global temperatures have intensified natural disasters and caused ecosystem degradation as well as loss of biodiversity. This has, in turn, affected agriculture and other livelihoods, threatening food and water security and further widening the socio-economic disparity. Additionally, changing climate patterns contribute to health crises through increased disease transmission and heat-related illnesses. At the core of these problems lies the rapid rise in greenhouse gas emissions, primarily from the burning of fossil fuels for energy, transportation, industry, and other anthropogenic activities.

India's Emission Profile and Need for Transition

Globally, total carbon dioxide (CO_2) emissions were projected to be about 41.6 billion tonnes in 2024 (Global Carbon Budget). India's emissions in 2024 stood at 2,437 million tonnes of CO_2e (as per its 4th Biennial Update Report to the UNFCCC). India still depends heavily on coal as the major energy source. In FY 2021–22, coal accounted for about 72.92% of total electricity generation, followed by hydro, nuclear and other renewable energy sources (8.24%), natural gas (8.16%), crude oil (7.87%), and lignite (2.81%) (Energy Cell, Ministry of Coal). Identifying the urgent need to cut these growing emissions, countries worldwide are moving towards low-emission pathways. A decisive shift from current conventional fuel usage patterns to cleaner solutions and low-carbon alternatives has become crucial to ensure a sustainable future.

Sustainable energy transition marks the global shift from fossil fuel-based energy systems to a sustainable energy system powered by renewable energy sources like solar, wind, and hydro. India stands at a pivotal moment in its energy journey, navigating the complex but critical shift towards a sustainable and low-carbon future. As one of the fastest-growing economies and the third-largest energy consumer (India Energy Outlook, 2021) globally, India's transition to clean energy is not just a national imperative but a global priority. With ambitious renewable energy targets, progressive policy frameworks, and a strong focus on energy equity and innovation, the country is steadily moving away from fossil fuel dependency towards a more resilient, inclusive, and environmentally sustainable energy system. However, achieving this transformation demands coordinated action across various sectors, inclusive planning, and substantial investment in green technologies and infrastructure.

India's Commitments and Policy Interventions

At COP26, India set itself the ambitious target of achieving net-zero carbon emissions by 2070. The updated Nationally Determined Contributions (NDCs), submitted by the country in August 2022 under the Paris Agreement, reflect its enhanced climate ambition and commitment to a low-carbon development path. The updated NDCs include targets to reduce the emissions intensity of its GDP by 45% by 2030 from 2005 levels and to achieve about 50% of cumulative electric power installed capacity from non-fossil fuel sources by 2030. These targets build upon India's earlier commitments and align with the country's *Panchamrit* goals announced at COP26. The updated NDCs also emphasize climate-resilient development, lifestyle changes through the LiFE (Lifestyle for Environment) movement, and promote a just, inclusive transition that balances environmental sustainability with economic growth and developmental priorities.

To support these commitments, India has launched several flagship schemes and policies to accelerate clean energy adoption and energy efficiency, with a strong focus on inclusivity and rural empowerment. The National Action Plan on Climate Change (NAPCC), launched in 2008, laid the foundation through eight national missions, including the National Solar Mission and the National Mission for Enhanced Energy Efficiency. The Green Energy Corridor Scheme (2015) aims at synchronizing the electricity produced from renewable resources, such as wind and solar, with the conventional power stations in the grid. More recent efforts include the PM-KUSUM scheme (2019), which supports farmers by subsidizing solar pumps and aims to solarize 49 lakh agricultural pumps, reducing both costs and emissions. The PM Surya Ghar Muft Bijli Yojana (PMSGMBY), launched in February 2024, has become the world's largest domestic rooftop solar initiative, with the aim of providing solar power to over 11.88 lakh low-income households by April 2025. Complementing these efforts, the UJALA scheme has improved energy efficiency by distributing over 36.87 crore LED bulbs across India, making sustainable lighting affordable and reducing overall electricity demand. Through the 'Scheme for Promotion of Manufacturing of Electric Passenger Cars in India, the Government of India has greenlit a strategic policy aimed at positioning India as a prime manufacturing hub for electric vehicles. Furthermore, the National Green Hydrogen Mission (2023) envisions India as a leader in green hydrogen, targeting 5 million metric tonnes of production capacity by 2030.

Achievements and Emerging Trends

The result of these initiatives is quite evident as India has made significant strides in renewable energy, especially during FY 2024–25, achieving its highest-ever annual capacity addition. As of November 2024, the country's installed electricity generation capacity from non-fossil fuel sources reached 46.8%, putting it on track to meet the 50% target under the NDCs. This progress reflects the country's strong commitment to a cleaner, greener future.

Solar energy has seen exceptional progress, rising from just 2.82 GW in 2014 to 107.9 GW, with tariffs dropping by 65% to ₹2.15/kWh, among the lowest globally. Wind energy has also expanded, reaching 51.05 GW, with a national target of 140 GW by 2030. Meanwhile, nuclear power capacity has grown from 4.78 GW in 2014 to 8.78 GW, with a long-term goal of 100 GW by 2047, reflecting India's multi-pronged approach to a cleaner, low-carbon energy future. Also, as of July 2024, there was a 16% rise in EV registrations in the country, with 8.4 lakh EVs registered.

The role of states is also crucial in achieving India's national aspirations. Several Indian states have taken the lead in advancing renewable energy, playing a crucial role in the country's clean energy transition, with states like Karnataka, Gujarat, and Rajasthan taking the lead in the overall energy transition. Rajasthan, Gujarat, and Tamil Nadu emerged as the top-performing states in 2024, contributing 71% of India's total utility-scale solar installations. Around 25 Indian states have introduced Electric Vehicle Policies, thus steering the decarbonisation of the transport sector.

The private sector is also emerging as a key driver of innovation and investment in the clean energy ecosystem. From solar panel manufacturers and EV companies to green hydrogen start-ups and battery storage innovators, Indian enterprises are building cost-effective, scalable solutions for the future. Micro, Small, and Medium Enterprises (MSMEs), which form the backbone of India's industrial economy, are also playing a growing role by adopting energy-efficient technologies, rooftop solar solutions, and sustainable manufacturing practices. Supporting MSMEs through targeted incentives, technical support, and green financing is vital to ensure their smooth transition and active contribution to India's clean energy goals. Corporate decarbonisation pledges, ESG (Environmental, Social, Governance) commitments, and climate finance are further accelerating the transition by aligning business goals with sustainability imperatives.

Challenges in Achieving a Sustainable Transition

While India's progress is commendable, the country continues to face challenges, one of which is affordable and accessible financing. The global trend looks encouraging, wherein it was observed that energy investments worldwide surpassed USD 3 trillion in 2024, with over USD 2 trillion allocated to clean energy technologies and infrastructure (International Energy Agency, 2024). However, high upfront capital costs and limited access to long-term, low-interest green finance remain significant bottlenecks. Land acquisition and grid infrastructure also present further obstacles, while on the regulatory front, delayed clearances, slow implementation of reforms like net metering discourage private investment. Moreover, the transition poses a social challenge as workers in fossil fuel industries need retraining and reskilling to adapt to new roles in the green economy. Without a planned and just transition, communities dependent on coal or traditional energy sectors may face economic displacement. In addition, technological gaps and a lack of public awareness and public demand can slow the process of sustainable transition.

Addressing the Hurdles and the Way Forward

To overcome these challenges, an integrated and inclusive approach is essential. Introduction of innovative financing mechanisms such as green bonds, blended finance models, and interest subvention schemes can improve access to affordable capital, especially for MSMEs and decentralized energy projects. For land acquisition and grid infrastructure, adopting integrated spatial planning, simplifying land leasing policies, and investing in transmission corridors like the Green Energy Corridor initiative can help reduce delays and improve project viability. On the regulatory side, fast-tracking approval processes, ensuring policy consistency across states, and introducing digital platforms for clearances can encourage ease of doing business in the clean energy sector. To address social challenges, government and industry-led programs for retraining and reskilling workers, particularly in coal-dependent regions, must be scaled up, ensuring a just transition that includes social protection and employment alternatives. Lastly, bridging technological gaps and increasing public awareness through outreach campaigns, capacity building programs for government and other stakeholders, energy literacy programs in schools and communities, and incentivizing local innovations can foster greater demand for clean energy solutions.

Sustainable energy transition for a developing country like India is not just a necessity but a significant opportunity, and no longer a distant ideal. The country has made impressive strides in its renewable energy journey so far and holds immense potential to scale up further, setting an example for other developing nations. With bold and far-reaching government policies, robust investments, innovation from the private sector, and the active involvement of communities and states, India is laying a strong foundation for a cleaner, healthier, and more equitable future.

Rethinking Environmental Regulation: Incentives, Markets, and the Future of Industrial Growth in India

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As India accelerates toward its developmental ambitions, it faces the dual challenge of achieving economic growth while meeting its environmental goals. The performance of key industrial sectors such as power, cement, textiles, iron & steel, pharmaceuticals, and chemicals is critical to India's economic progress. However, the continued rise in industrialisation also brings with it an increasing risk of pollution.

According to the IMF's World Economic Outlook (April 2025), India is projected to grow by 6.2% in 2025 and 6.3% in 2026, maintaining its position as the fastest-growing major economy globally. Historically, India's carbon emissions have increased with economic growth. While the rate of increase in carbon emissions has slowed down, this also emphasises the urgency of having to rethink environmental governance to aid in environmental sustainability without hampering economic growth.

According to OECD's Policy Instruments for the Environment (PINE) database, there are over 4,500 environmental policy instruments implemented across 146 countries as of March 2024. These regulations take the nature of command-and-control practices, including penalties and fees, and cap-and-trade systems.

Traditional command-and-control environmental regulations, while more broadly used globally, suffer from enforcement bottlenecks and limited effectiveness in motivating firms to innovate or exceed compliance. A promising alternative lies in shifting towards a regulatory system that maintains rigorous environmental standards while simultaneously encouraging active industrial participation by incentivising pollution abatement.

Status quo, command-and-control regulations place a heavy reliance on inspections, fines, and static standards to manage pollution. These methods are not only expensive to enforce and comply with, but also fail to incentivise continuous improvement. Moreover, their rigidity can stifle both innovation and investment in cleaner technologies as it comes at high costs of compliance for the industries.

India’s regulatory landscape now needs a bold rethink. The revised regulatory approach should strengthen environmental performance while also supporting industrial productivity. In theory, these reforms should pivot from reactive punishment to proactive improvement and use positive incentives such as transparency, competitive benchmarking, and financial rewards for abatement, to encourage industrial participation in environmental governance. This approach can maximise environmental benefit per unit of economic output, aligning the goals of industrial competitiveness with those of environmental sustainability.

These strategies are not merely utopian or theoretical. India has piloted a combination of such initiatives at the sub-national level and witnessed substantial improvements in both industrial performance and pollution levels. The success of Maharashtra’s Star Rating Programme and Gujarat’s Emission Trading Scheme (ETS) provides compelling evidence of the effectiveness of such policy instruments.

The Power of Public Disclosure: Maharashtra’s Star Rating Programme

On 5 June 2017, the Maharashtra Pollution Control Board (MPCB) launched its Star Rating Scheme, targeting major industrial plants across high-polluting sectors. The initiative rated firms on a scale of one to five stars, based on their polluting behaviour. This system ensures both data transparency and a reduced likelihood of manual data manipulation.

In a first-of-its-kind initiative in India, the MPCB publicly displayed these ratings on its website, aiming to improve pollution management within industries through public disclosure. This approach allowed civil society, media, and the broader public to actively engage with pollution data, building both awareness among citizens and accountability among industrial plants. The pilot revealed that this simple disclosure also increased the probability of a firm receiving a legally actionable and formal communication from the regulator upon violating environmental norms. This would motivate the firms to strategically invest in pollution control devices to improve their ratings, while providing the public and market actors with sufficient information on emission behavior to favour higher-rated firms.

Importantly, this model is cost-effective and scalable as it relies on existing regulatory infrastructure and data streams, requiring minimal additional staffing. Investments in information dissemination and capacity building delivered environmental gains far outweighing the operational costs. By embedding reputational incentives into a public-facing system, the scheme motivated firms toward voluntary and sustained environmental performance improvements.

Market-based Instruments for Flexibility in Pollution Abatement: Gujarat's Emission Trading Scheme

Beyond transparency, market-based instruments provide a powerful complementary tool to reduce industrial emissions. The Gujarat Pollution Control Board (GPCB) piloted the Emission Trading Scheme for particulate matter, which yielded compelling results. The ETS scheme enabled firms to buy and sell pollution permits within a capped limit, which offered investment flexibility.

The cap-and-trade system allowed firms with lower marginal abatement costs to sell unused permits, creating a financial incentive to stay below their emissions limits. With a benefit-to-cost ratio of 215:1, the piloted emission market revealed that the ETS could deliver a 20–30% reduction in particulate matter emissions while reducing compliance costs for firms by approximately 11%.

As of 2025, there are 38 emissions trading systems (ETSs, i.e., cap-and-trade markets) in operation globally, with an additional 20 systems under development or consideration. Though most of these are concentrated in developed economies, the PM ETS market in Surat is a testament to the fact that this can prove to be efficient in developing economies, where there is a greater need for accelerating economic growth.

As India prepares to implement its national-level Carbon Credit Trading Scheme (CCTS), the success of Gujarat’s ETS raises an important question: should similar sub-national emission markets also be established for other critical environmental pollutants such as particulate matter and sulphur dioxide? Given that local pollutants have local health and environmental consequences, a decentralized cap-and-trade mechanism backed by access to real-time emission data could play a critical role in India’s next phase of air quality management.

Combining Transparency and Market-Based Instruments for the Multiplier Effect

While both the Star Rating Scheme and the ETS have demonstrated effectiveness individually, their combined application offers a multiplier effect. Together, they can catalyse a self-reinforcing cycle of improvement. Both initiatives hinge on the shared foundation of access to emission data, which is now strengthened by the rollout of Continuous Emissions Monitoring Systems (CEMS) to 17 critically polluting sectors. When emissions are measured accurately and continuously, they can be made transparent to the public and used to allocate or trade emissions permits. Markets allocate emissions reduction to the firms best equipped to achieve them cost-effectively. Transparency boosts reputational stakes and catalyses competitive pressure within industries. Caps on emissions can be steadily tightened over time, pushing overall performance higher. The feedback loop from public ratings reinforces firm-level accountability, even as markets offer flexibility.

This dual strategy aligns economic and environmental incentives and enables regulators to shift their role from enforcers to enablers, facilitating continuous improvement rather than merely policing standards.

Research on environmental regulation strongly supports these alternative approaches to conventional command-and-control models. The law must evolve to become nimble and adaptive, allowing for innovative regulatory regimes that reward compliance and incentivise firm participation in pollution abatement.

The Road Ahead: Pollution Abatement as An Asset

To unlock the full potential of these reforms, India must scale up the rollout of CEMS across major polluting industries and regularize the calibration and third-party audits of the CEMS infrastructure to ensure reliability and quality of emission data. India must also invest heavily in building capacity within regulatory bodies to analyze and respond to real-time data to take timely actions against violators. Investments in institutional infrastructure must also be bolstered, alongside strengthening monitoring and evaluation of critical regulatory programs.

India stands at a strategic inflection point in its environmental governance. Rather than viewing growth and sustainability as opposing forces, India can fuse the two through a democratic and participatory, incentive-driven regulatory framework that treats pollution abatement not as a burden, but as an asset to the firm.

Powering the Future: Sustainable Energy Transition in India

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India is at an energy crossroads. As the world's third-largest energy consumer, its growing appetite for power is fueled by rapid urbanization, industrial expansion, and a rising population. But this growth comes at a cost - a heavy dependence on fossil fuels that contributes to dangerous air pollution, rising carbon emissions, and increasing climate vulnerability. Cities suffocate under toxic air, while rural communities face unpredictable weather patterns caused by global warming. In this context, the shift to sustainable energy isn't just an environmental choice- it's an economic, social, and strategic imperative. With vast solar potential, expanding wind corridors, and ambitious national goals, India is uniquely positioned to lead a clean energy revolution. This article explores why this transition is urgent, how it is unfolding, and what challenges and opportunities lie ahead in powering India's future sustainably.

India's energy mix remains heavily reliant on fossil fuels, particularly coal, which accounts for nearly 70% of the country's electricity generation. While coal has historically powered industrial growth, it is also one of the biggest contributors to greenhouse gas emissions and local air pollution. Oil and natural gas-largely imported, make up a significant portion of India's energy consumption, increasing dependency on global markets.

At the same time, the energy demand continues to rise. According to the International Energy Agency (IEA), India's energy demand is expected to double by 2040, making it the fastest-growing energy the global market. With such rapid growth, continuing with a fossil-fuel-led path would worsen environmental degradation, strain natural resources, and jeopardize long-term energy security.

However, there is a silver lining: India has made notable progress in integrating renewable energy. As of 2025, renewable sources (excluding large hydropower) contribute over 30% of installed power capacity, with solar and wind leading the way. Yet, in terms of actual energy generation, coal still dominates, which shows the long road ahead for a meaningful transition.

India's push toward a sustainable energy future is not just a matter of environmental responsibility; it is driven by a complex set of national and global factors that make the transition both urgent and strategic and accomplish the Sustainable Development Goals. A few major factors are listed below:

1. **Climate Commitments and Global Pressure**

India has committed to achieving net-zero carbon emissions by 2070 and has pledged that 50% of its electricity generation capacity will come from non-fossil fuel sources by 2030.

These commitments, made under the Paris Agreement and reinforced at various COP summits, are shaping national energy policy. As one of the most climate-vulnerable countries, India also faces mounting pressure to lead by example in clean energy adoption.

2. Air Pollution and Public Health

Major Indian cities frequently rank among the most polluted in the world, with coal-fired power plants and vehicular emissions as major contributors. The World Health Organization (WHO) links air pollution in India to respiratory illnesses, heart disease, and premature deaths. Transitioning to cleaner energy sources like solar, wind, and hydro can significantly reduce air pollution and improve public health outcomes.

3. Energy Security and Import Dependence

India imports over 80% of its crude oil needs, making it highly susceptible to global price volatility and geopolitical tensions. Investing in domestic renewable energy reduces this dependence and strengthens energy security, especially in a volatile global energy market.

4. Economic Growth and Green Jobs

The renewable energy sector presents a massive opportunity for employment and innovation. According to reports, India's clean energy transition could generate over 1 million green jobs by 2030. From solar panel manufacturing to wind turbine maintenance and battery storage, the sector offers new avenues for sustainable development.

5. Energy Access and Equity

Despite significant progress in rural electrification, millions still lack reliable access to power. Decentralized renewable systems like solar mini-grids and off-grid solutions are helping bridge the energy gap in remote areas, empowering communities and improving the quality of life.

Over the past decade, India has emerged as a global leader in renewable energy deployment. U.N. climate chief Simon Stiell has called India a "solar superpower" and urged it to develop an ambitious climate plan covering its entire economy, saying that an even stronger embrace of the global clean energy boom will supercharge its economic rise. With ambitious targets, supportive policies, and falling technology costs, India is steadily reshaping its energy landscape toward a cleaner and more sustainable future. India’s initiatives in various renewable energy platforms are discussed here:

Solar Energy: India has one of the highest solar potentials in the world, with an average of 300 sunny days annually. The National Solar Mission, launched in 2010, was a game-changer. As of 2025, India has crossed 70 GW of installed solar capacity, with large-scale solar parks in states like Rajasthan, Gujarat, and Madhya Pradesh. Rooftop solar is also gaining momentum in urban and semi-urban areas, although it still faces challenges related to financing, awareness, and grid integration.

Wind Energy: India's wind energy sector, particularly in states like Tamil Nadu, Karnataka, and Gujarat, has been a strong pillar of the renewable mix. With over 45 GW of installed wind capacity, India ranks among the top wind energy producers globally. New developments in offshore wind are also being explored to expand capacity further.

Hydropower and Bioenergy: Large hydroelectric projects continue to play a crucial role in India's clean energy efforts, especially for grid balancing. Meanwhile, bioenergy- including biogas and biomass power- supports rural livelihoods and offers a circular solution for agricultural waste.

Emerging Technologies-Green Hydrogen and Storage: India is investing in emerging clean technologies such as green hydrogen, aimed at decarbonizing hard-to-abate sectors like steel and transport. Battery storage systems are also being prioritized to address the intermittency of renewables and improve grid reliability.

International Collaboration and Investment

India is attracting global investment in renewables through initiatives like the International Solar Alliance (ISA) and participation in global clean energy funds. These partnerships not only boost financial and technological resources but also reinforce India's leadership in the global climate movement. While India's renewable energy journey has been impressive, the road to a fully sustainable energy system is not without obstacles. Several technical, financial, policy, and social challenges need to be addressed to ensure a smooth and equitable transition; some are provided below:

Grid Infrastructure and Integration: One of the biggest challenges is integrating variable renewable energy like solar and wind into India's existing power grid. The grid was originally designed for centralized coal power plants, not for decentralized or intermittent sources. Issues like transmission bottlenecks, grid balancing, and energy storage need urgent upgrades and modernization.

Financial Constraints: Renewable energy projects often face high upfront costs and financing hurdles, especially in rural or smaller-scale setups like rooftop solar. Although the costs of solar and wind technologies have dropped significantly, financial institutions still consider them high-risk, which limits investment, particularly from local entrepreneurs and residential users.

Land Acquisition and Local Opposition: Large-scale solar and wind farms require vast tracts of land, which can lead to conflicts over land rights, displacement, and ecological disruption. In some cases, renewable projects have faced opposition from local communities due to a lack of consultation or inadequate compensation.

Policy Uncertainty and Implementation Gaps: While India has launched several ambitious policies, there are often gaps in implementation at the state and local levels. Issues like delayed payments to renewable energy developers, unclear regulations, or frequent changes in tariffs and subsidies create uncertainty for investors and developers.

Intermittency and Storage: Solar and wind power are inherently intermittent- they depend on sunshine and wind availability. Without efficient energy storage systems, this can lead to supply-demand mismatches, especially during peak hours or in poor weather. Battery technology and storage infrastructure are still in early stages in India.

Skilled Workforce Shortage: The transition requires a new set of skills across sectors- from solar panel installation and wind turbine maintenance to smart grid management. India needs to invest more in training and upskilling programs to build a green workforce for the future.

India's shift to sustainable energy offers significant opportunities for green job creation, especially in rural and semi-urban areas, through sectors like solar, wind, electric mobility, and energy efficiency. The country is also emerging as a clean tech innovator, developing solutions such as green hydrogen, smart microgrids, and AI-driven energy systems. Decentralized renewables like solar mini-grids and biogas are improving energy access and livelihoods in remote communities. On the global front, India's leadership in platforms like the International Solar Alliance strengthens its climate diplomacy and attracts investment. Aligned with the UN Sustainable Development Goals, this transition is not just an environmental necessity but a pathway to inclusive and resilient economic growth.

Yet, the transition is not automatic. It requires coordinated action from governments, businesses, innovators, and citizens alike. Bold investments in infrastructure, supportive policies, community engagement, and continuous innovation will be essential. The challenges are real, but so are the opportunities.

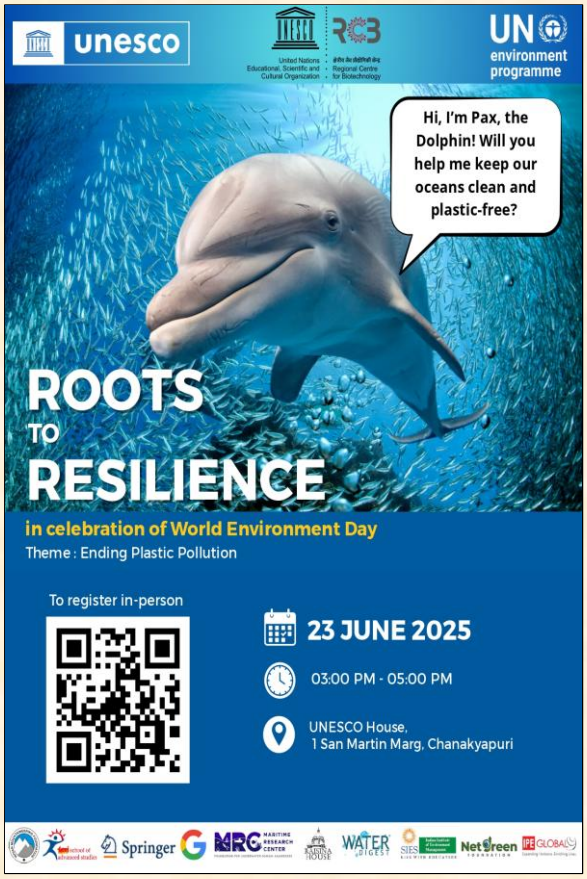
"If development comes at the cost of environmental degradation, we may someday find that we've transitioned into a dead planet, powered, but lifeless."

This warning is not a prophecy, but a call to act wisely. India stands at the dawn of an energy revolution. By embracing sustainable solutions today, the country can ensure a cleaner, healthier, and more equitable tomorrow- one where economic progress goes hand in hand with environmental stewardship.

Events

UNESCO - UNEP Seminar Series Partnership

SIES IIEM is one of the partners for the Seminar series titled "Roots to Resilience" being organized by UNEP & UNESCO for a period of 18 months. The first seminar was held on 21st April followed by the second seminar on 23 June, 2023 at UNESCO House in New Delhi



Earth Day: Webinar on "Protecting Tomorrow: The Power of Earth Day Today"

As part of the World Earth Day celebrations, the SIES Indian Institute of Environment Management (SIES IIEM), in collaboration with the SIES One India One People (SIES OIOP) Foundation, organized a webinar titled "Protecting Tomorrow: The Power of Earth Day Today" on 22nd April 2025. The webinar was aimed at promoting awareness and dialogue around global environmental challenges and the role of innovative solutions in addressing them. Mr. Vinay Kumar, Associate Director, ESG Advisory at KPMG India, was the keynote speaker. The webinar attracted active participation from students, professionals, and academicians.

World Environment Week

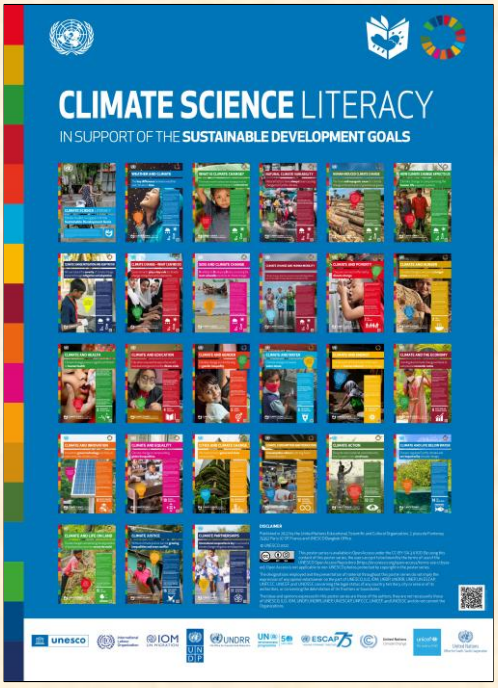
SIES IIEM celebrated the World Environment Week in the first week of June, 2025, with a series of impactful activities, including a Plantation Drive, Poster Making Competition, and Essay Writing Competition, all centered around the theme: **"Ending Plastic Pollution."** Students participated with great enthusiasm, bringing creativity and awareness to the forefront.

The events were held in collaboration with the Maharashtra Pollution Control Board (MPCB) and featured a guest lecture by Mr. Rajesh Doshi, Chairman, Indian Plastics Institute, Mumbai: "Sustainable Business Practices and the Role of Industry in Combating Plastic Pollution." Mr. Satish Padwal, Regional Officer, MPCB, Navi Mumbai, distributed the prizes to the winners of the Poster & Essay competitions. This was followed by a plantation drive at SIES IIEM.

UNESCO Climate Science Literacy Poster Launch

SIES IIEM hosted the UNESCO Climate Science Literacy Poster Launch & Prize Distribution Ceremony on 24th June 2025.

The event was graced by our distinguished chief guest, Mr. Sanjeev Raina, Executive Director, BPCL, accompanied by Mr. Sohail Akhtar, Net Zero Initiatives-Corporate HSSE, BPCL, and Mr. Arul Muthunathan V, Executive Director, Engg. & Technology, from BPCL. We were also honoured by the presence of Dr. Vikram Bhalerao, Sub-Regional Officer, MPCB Navi Mumbai, and Mr. P. Sethuraman, Member of the Managing Council, SIES and Mr. Mangesh Brahme, GM Thane Belapur Industries Association.



The poster launch was inaugurated by Mr. Sanjeev Raina, followed by insightful and thought-provoking addresses by both Mr. Sanjeev Raina and Dr. Vikrant Bhalerao on the urgent need for climate action and awareness. A special message was also shared by Dr. Benno Böer from UNESCO, emphasizing the global significance of climate science literacy.

The ceremony featured the prize distribution for the Poster Making and Essay Writing Competitions, celebrating the creative and conscious contributions of our young participants. The event concluded with students exploring the climate literacy posters on display.

Student & Faculty Achievements

Students Internships:

M.Sc. Environmental Science (Part II) students successfully completed their internship-based research projects, in June, 2026, contributing valuable insights into contemporary environmental challenges. At GreenSutra, Mr. Mohammad Naseeb conducted research on "Extended Producer Responsibility (EPR)," while Mr. Mohammed Faseeh worked on "The Carbon Border Adjustment Mechanism (CBAM)."

At the Mumbai Port Authority, Ms. Aditi Bhagat completed her project titled "Restoration and Development of an Ecological and Cultural Mangrove Park at Sewri." Ms. Deepali Mulage undertook a sectoral analysis on "ESG Performance in India: A BRSR Disclosures-Based Approach Using Principles and Indicators," and Ms. Janhavi Rasam conducted a study on "Carbon Emission Estimation of Mumbai Port Authority – 2024: Scope 1 and Scope 2."

Faculty Development Workshops / Conference Participation

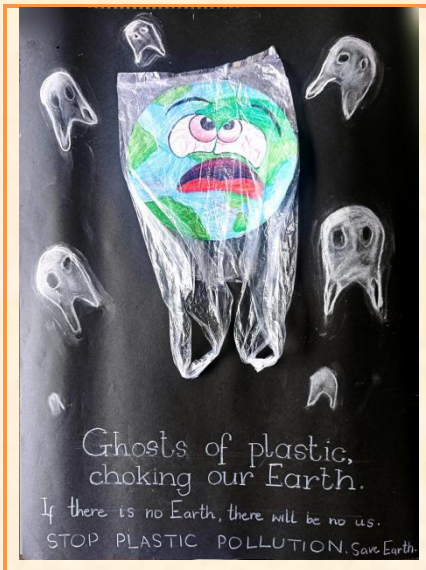
Dr. Sangeeta Sharma participated as a panelist in the “Green Energy and Sustainability Hub (GESH) IIT Bombay Campus Sustainability Conclave” held at IITB on 14th May 2025 which brought together academic leaders to foster a more cohesive approach to campus sustainability in the region.

Dr. Sangeeta Sharma delivered a talk on “Plastic Pollution: Industry Impact, Global & Indian Outlook and Regulatory Landscape“ on 03rd June, 2025, at an event titled “Ending Plastic Pollution” held at the Thane Belapur Industries Association (TBIA), Navi Mumbai, organized by Maharashtra Pollution Control Board and TBIA.

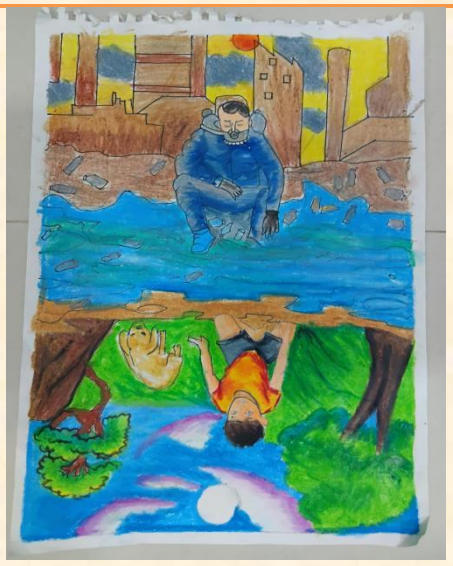
Curious Minds

SIES IIEM and SIES One India One People (SIES OIOP) Foundation, in collaboration with the Maharashtra Pollution Control Board (MPCB), proudly hosted a poster-making competition and an Essay Wiring Competition on the theme "Ending Plastic Pollution," aimed at spreading awareness about plastic pollution and sustainability. The winning posters and essays are presented below:

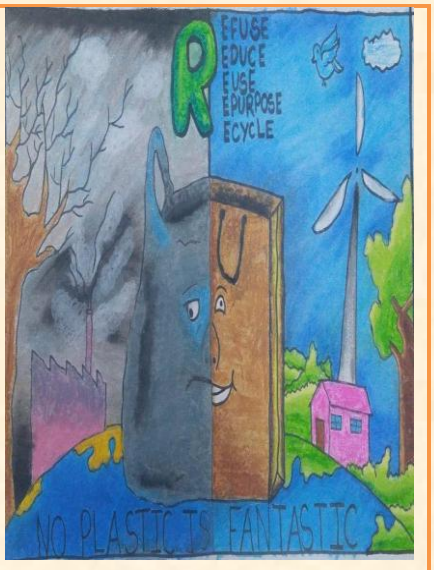
Primary School Category - Winners (Poster Making)



Ist Prize: Jatan Khetani
(P.G. Garodia School)

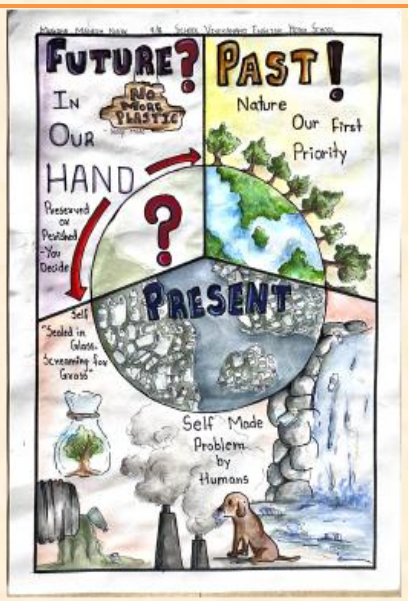


2nd Prize: Falak Kenia
(P.G. Garodia School

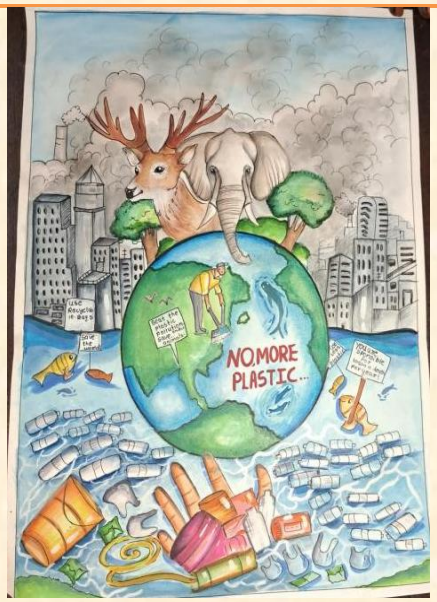


3rd Prize: Chinmayee Gaonkar
(Vivekanand High School)

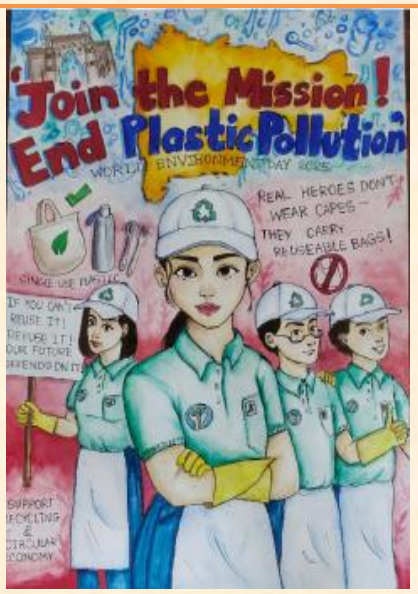
Secondary School Category –Winners (Poster Making)



Ist Prize: Mughda Naik
(Vivekanand High School)



2nd Prize: Durva Sutar
(Micheal High School)



3rd Prize: Ashlesha Yadav
(Cosmos English High school)

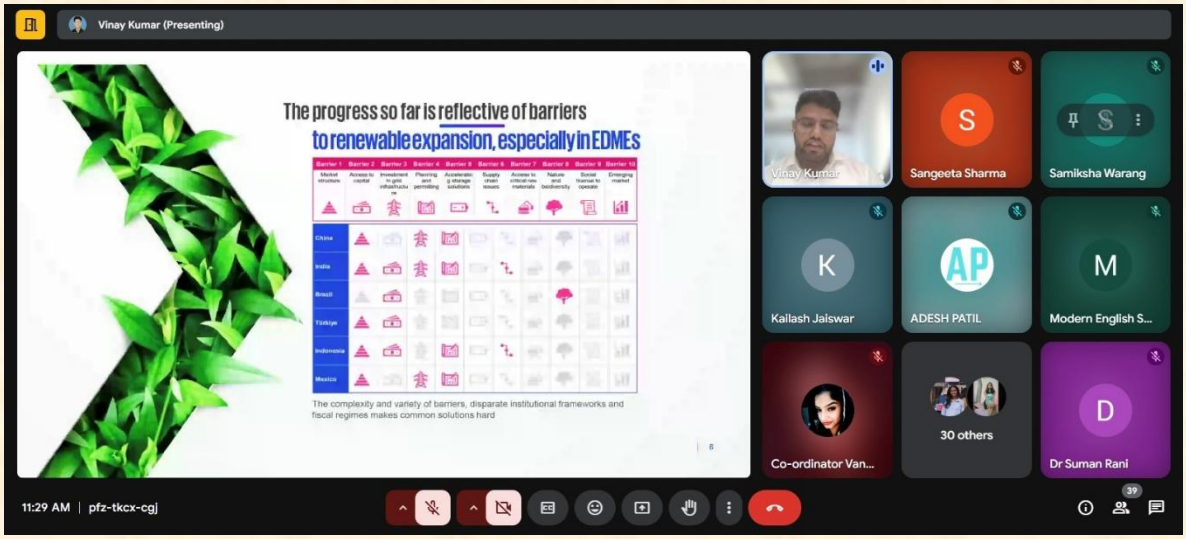
🏅 Primary School Category - Winners (Essay Writing)

- *Ist Prize: Ms. Lakshita CS (Bhartiya Vidya Bhavan)*
- *2nd Prize: Mr. Ansh Sopan Adhao (Gokuldham High School & Jr. College)*
- *3rd Prize: Stuti Jadhav (Modern English School)*

🏆 Secondary School Category - Winners (Essay Writing)

- *Ist Prize: Ms. Likhita Milind Adate (SIWS High School)*
- *2nd Prize: Ms. Anantkriti Pandey (Gokuldham High School & Jr. College)*
- *3rd Prize: Shruthi Govind (Modern English School)*

Glimpses


Vinay Kumar (Presenting)
The progress so far is reflective of barriers
to renewable expansion, especially in EDMEs
The complexity and variety of barriers, disparate institutional frameworks and fiscal regimes makes common solutions hard
Vinay Kumar
Sangeeta Sharma
Samiksha Warang
Kailash Jaiswar
ADESH PATIL
Modern English S...
Co-ordinator Van...
30 others
Dr Suman Rani
11:29 AM | pfz-tkcx-cgj


World Environment
2025


Plastic Pollution

India adds 1,707 MW of new renewable energy capacity in May; Rajasthan leads with 33% share

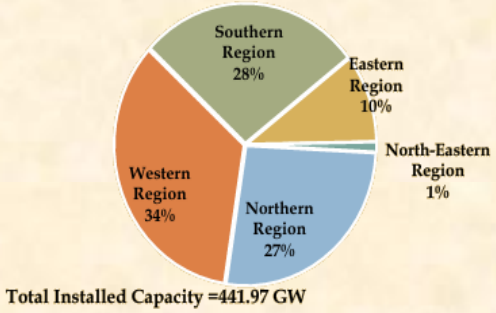
Utility-scale solar led the capacity additions with 955 MW, followed by rooftop solar at 559 MW and wind energy at 193 MW

India added 1,707 megawatts (MW) of new renewable energy capacity in May 2025, with solar power contributing 89 per cent of the total additions, according to JMK Research's latest monthly update. Out of the total additions, Rajasthan accounted for 33 per cent, followed by Gujarat at 18 per cent and Madhya Pradesh at 9 per cent. Utility-scale solar led the capacity additions with 955 MW, followed by 559 MW and wind energy at 193 MW. In the rooftop solar segment, Tata Power added 111 MW, Amplus Solar installed 80 MW, and Fourth Partner Energy commissioned 54 MW during the month. These three players contributed nearly 44 per cent of the total rooftop solar capacity installed in May. Key project commissions in May included ReNew Solar Energy Rajasthan's 420 MW wind-solar hybrid project in Jaisalmer and Avaada Energy's 75 MW solar project in Chhatarpur, Madhya Pradesh. Upcoming projects scheduled for commissioning include SJVN's 200 MW solar project in Bihar and NTPC Renewable Energy's 150 MW project in Gujarat.

Energy World: The Economic Times, 4 June 2025

Geographical Distribution of Installed Electricity Capacity (As of 31.03.2024)

The Western Region leads with 34%, followed by the Southern Region at 28% and the Northern Region with 27%. The Northern Region also holds the largest share of the country's hydropower capacity. Karnataka leads in hydroelectric power, with 3.63 GW among states, while Rajasthan leads in other renewable resources, with 26.35 GW. In terms of regional growth during 2023-24(P), the Western Region experienced the highest increase in installed capacity, registering a 7.66% growth overall, alongside a significant 23.40% rise in the installed capacity for renewable energy sources (RES), underscoring the region's increasing focus on clean energy. This trend underscores the ongoing shift toward renewable energy, which meets the increasing electricity demand nationwide.



Total Installed Capacity =441.97 GW

https://www.mospi.gov.in/publication/energy-statistics-india-2025-0

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RISE WITH EDUCATION

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Articles, photos etc. are invited for next issue (July – September, 2025)

Theme:

"Reimagining Plastic: Solutions for a Circular Economy"

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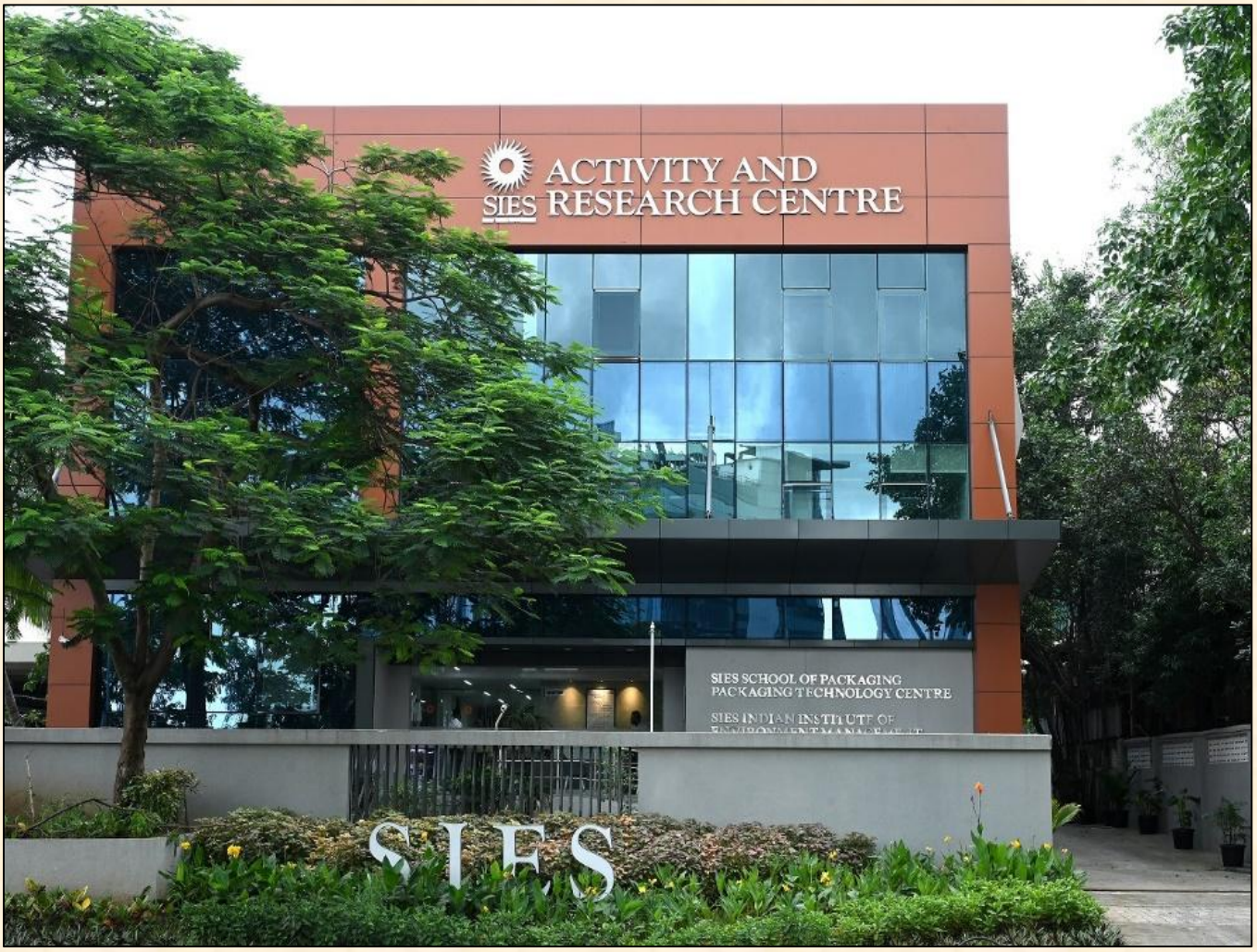

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