

SustainEdge

Stories, Stats & Steps towards a greener tomorrow



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Message from the Editor-In Chief

The inaugural edition of *SustainEdge* is a powerful and timely contribution to the growing global discussion on sustainability and climate resilience. With a clear thematic focus on the United Nations Sustainable Development Goals (SDGs), this magazine serves as a documentation of India's sustainability journey and a showcase of innovative, scalable solutions with real-world impact.

This issue impressively presents national data, policy insights, and ground-level innovations. It begins with a comprehensive view of 17 SDGs, with skillful representation of India's progress goal-by-goal. Effectively explaining the national statistics and real-life success stories—from sanitation drives in rural villages to organic farming in Sikkim—the SDG section sets the foundation for the deeper explorations that follow.

What makes *SustainEdge* truly stand out is its focus on innovation-driven sustainability projects. This includes visionary innovative projects such as the solar-powered robotic fish for microplastics removal, artificial trees for carbon dioxide capture, solar powered passive desalination system and portable vertical-axis wind turbines for off-grid application. Each of these projects reflects the magazine's core commitment towards sustainable transitions through clean technology, bio-inspired design, and community-inclusive practices. The edition also presents an insight on practical solutions like decentralized composting, two bins waste collection, microbial fuel cells for wastewater treatment, and fuel cells for off-grid power. These articles are not only technically sound but also infused with clarity and accessibility, making them engaging for a wider audience—from policymakers and educators to students and entrepreneurs.

A unique strength of *SustainEdge* is its attention to local participation and grassroots innovation for the campus and in the campus. The magazine reinforces the truth that sustainability is not just a policy goal but a community-led movement.

Equally commendable is the editorial team's effort to contextualize these innovations with global SDG framework. This led to the publication that informs, inspires, and invites action. It does not merely report progress; it sets an agenda for the future.

As we turn the final page of this inaugural edition, we are left not just with information, but with hope—and a roadmap. *SustainEdge* is more than a magazine; it is a living platform for the sustainability thinkers and doers of tomorrow.



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<https://government.economictimes.indiatimes.com/news/governance/sustainable-development-goals-and-the-worldwide-climate-action-to-save-lives-and-ecosystems/105647318>

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IEM Kolkata's Journey towards Sustainability



https://en.wikipedia.org/wiki/Institute_of_Engineering_and_Management

Discover how our journey towards sustainability is gradually shaping the path towards a greener campus

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Sneak peek into our upcoming sustainability projects



<https://www.linkedin.com/pulse/innovative-solutions-greener-future-indian-esg-network-bvwdc>



SUSTAINABLE DEVELOPMENT GOALS

1 NO POVERTY



2 ZERO HUNGER



3 GOOD HEALTH AND WELL-BEING



4 QUALITY EDUCATION



5 GENDER EQUALITY



6 CLEAN WATER AND SANITATION



7 AFFORDABLE AND CLEAN ENERGY



8 DECENT WORK AND ECONOMIC GROWTH



The Sustainable Development Goals (SDGs), established by the United Nations in 2015, provide a global framework to achieve a sustainable future by 2030. Comprising 17 goals, they address challenges such as poverty, hunger, health, education, gender equality, clean water, energy, and climate action. The SDGs emphasize the interconnectedness of social, economic, and environmental development, urging collective action by governments, industries, and individuals. They promote equity, resilience, sustainable resource use, and ecosystem protection. In the pages ahead, each goal is explored through statistics, stories, steps taken by the Indian government, and reported outcomes.

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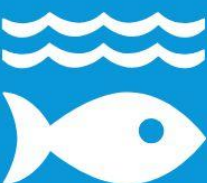
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Sustainable Development Goal 1 (SDG 1) aims to eradicate poverty in all its forms everywhere by 2030. It addresses not just income poverty but also deprivation in health, education, housing, sanitation, electricity, and social security. India is home to about 31% of the world’s poor, making poverty a critical challenge. Many Indians face multidimensional poverty, i.e., not only lack of income but also inadequate access to essential services and basic needs. India has aligned national policies and implemented numerous schemes to combat poverty. Key central initiatives include:



- ✚ Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA) for rural employment,
- ✚ Pradhan Mantri Jan Dhan Yojana for financial inclusion,
- ✚ National Social Assistance Programme for social security,
- ✚ Pradhan Mantri Awas Yojana for affordable housing,
- ✚ National Rural and Urban Livelihood Missions for job creation,
- ✚ Atal Pension Yojana and Pradhan Mantri Jeevan Jyoti Bima Yojana for insurance and pension,
- ✚ Pradhan Mantri Ujjwala Yojana for clean cooking fuel.

At the state and grassroots levels, innovative efforts include solar-powered water pumps for farmers in Rajasthan, women’s self-help groups (SHGs) in Kerala and West Bengal leading microenterprises, and solar mini-grids in the Sundarbans. NGOs like MARG advance digital literacy and inclusive education for tribal and underprivileged children in regions like Darjeeling and Kalimpong.

These initiatives have translated into the following successes.

- ✚ 415 million people moved out of multidimensional poverty between 2005-06 and 2019-21 (UNDP 2023).
- ✚ Extreme poverty rate dropped from 48% in 1993 to 12.9% in 2021.
- ✚ 99.9% village electrification achieved.
- ✚ 62% reduction in diarrheal deaths.
- ✚ 96%+ Gross Enrolment Ratio in elementary education.
- ✚ Numerous local success stories display women’s empowerment, climate resilience, and improved quality of life in vulnerable communities.

India’s multidimensional approach has delivered significant progress, though sustained and inclusive efforts remain vital.

Sustainable Development Goal 2 (SDG 2) seeks to end hunger, achieve food security, improve nutrition, and promote sustainable agriculture by 2030. India continues to face significant hunger and nutrition challenges. Around 13% of its population (almost 194 million people) are estimated to be chronically undernourished. In the 2024 Global Hunger Index, India ranks 105th out of 127 countries, categorized as having "serious" hunger levels. These persistent challenges are driven by poverty, unequal access to nutrition, and the vulnerability of small and marginal farmers.



The following mix of national and state initiatives is tackling hunger and malnutrition:

- ✚ National Programs: Major schemes include the Pradhan Mantri Garib Kalyan Anna Yojana (providing free food grains to over 800 million people), National Food Security Act, Poshan Abhiyan (nutrition mission), Mid-Day Meal/PM POSHAN scheme, Integrated Child Development Services, and the National Mission on Sustainable Agriculture. The 2025 agriculture budget launched new efforts like the Prime Minister Dhan-Dhaanya Krishi Yojana and focused campaigns for pulses and cotton self-sufficiency.
- ✚ State and Community Innovations: Local actions include personalized nutrition drives in Madhya Pradesh, millet promotion in Telangana, organic farming promotion in Sikkim and Uttarakhand, irrigation and climate-smart farming projects in West Bengal, and community farming cooperatives across the country.
- ✚ Technology and Sustainability Focus: Policies now support climate-resilient crops, digital tracking for public food distribution, improved irrigation, soil management, and the expansion of organic farming.

The following highlights the key successes achieved through the action plans.

- ✚ India's Global Hunger Index (GHI) score has improved from over 38 in 2000 to 27.3 in 2024.
- ✚ Free food grain distribution schemes have ensured basic food security for over 800 million people.
- ✚ India boasts one of the world's largest and most digitized food subsidy programs, with increasing integration of technology—like the Scheme for Modernisation and Reform through Technology in Public Distribution System (SMART-PDS) and digital record keeping.
- ✚ States like Sikkim are now fully organic, and innovative sustainable agriculture practices are being widely adopted.

India's efforts in nutrition, food system modernization, and climate-resilient farming led to impactful progress towards achieving SDG2.

Sustainable Development Goal 3 (SDG 3) aims to ensure healthy lives and promote well-being for all ages. It focuses on reducing maternal and child mortality, controlling communicable and non-communicable diseases, and improving mental health. India faces significant public health challenges due to its large population and socio-economic diversity. High maternal and child mortality rates, a heavy burden of infectious and chronic diseases, and unequal access to quality healthcare make SDG 3 critical for improving the well-being and economic development of the nation.

India's approach towards addressing these issues are as follows:



Flagship Programs:

- ✚ Ayushman Bharat (PMJAY), the world's largest health insurance scheme, covers secondary and tertiary care for over 500 million people.
- ✚ Enhanced institutional deliveries and maternal-child nutrition efforts.
- ✚ National campaigns to combat HIV, TB, malaria, and large immunization drives.
- ✚ Expansion of healthcare infrastructure through Health and Wellness Centres and digital health initiatives.

Supporting Programs:

- ✚ Swachh Bharat for sanitation, Jal Jeevan Mission for safe drinking water, and Ujjwala Yojana for clean cooking fuel, improving health indirectly.

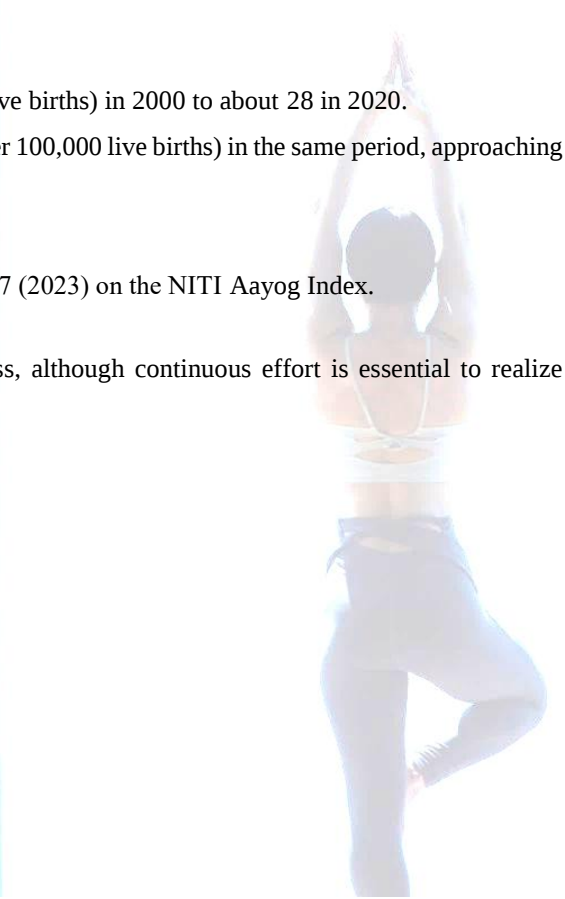
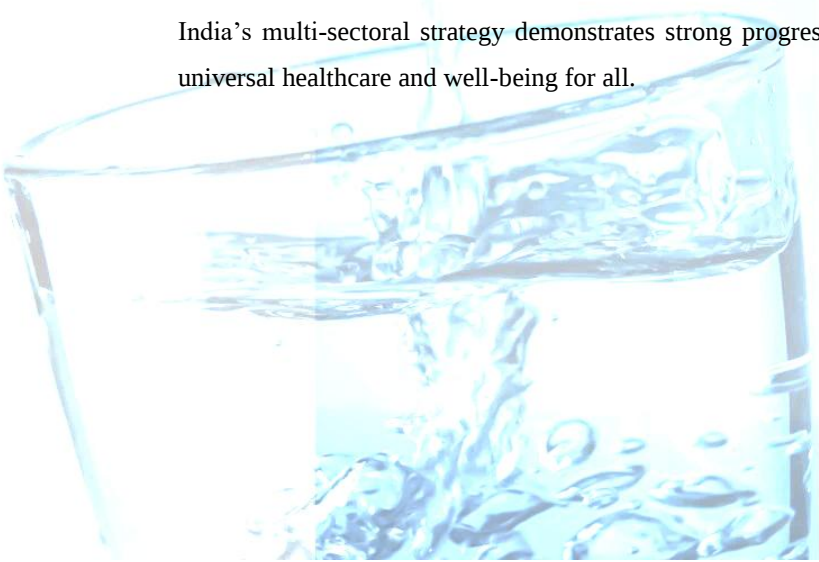
State and Community Efforts:

- ✚ States like Kerala, Tamil Nadu, and West Bengal have implemented focused health policies, achieving early SDG 3 targets through integrated public health services and immunization drives.

Outlined below are some of the notable achievements.

- ✚ Infant mortality rate declined from 66 (per 1,000 live births) in 2000 to about 28 in 2020.
- ✚ Maternal mortality ratio dropped from 327 to 97 (per 100,000 live births) in the same period, approaching the SDG target of 70.
- ✚ Life expectancy increased to roughly 70 years.
- ✚ India's SDG 3 score improved from 52 (2018) to 77 (2023) on the NITI Aayog Index.

India's multi-sectoral strategy demonstrates strong progress, although continuous effort is essential to realize universal healthcare and well-being for all.



Sustainable Development Goal 4 (SDG 4) seeks to ensure inclusive and equitable quality education and promote lifelong learning opportunities for all. It covers universal primary and secondary education, early childhood development, technical and vocational training, literacy and numeracy, gender equality, and safe learning environments.

India’s large, diverse population faces persistent educational challenges. The overall literacy rate stands at 80.9% (urban: 87.2%, rural: 77%), with a marked gender gap—male literacy at 84–87% and female literacy at 74–77%. Improving access, quality, and equity in education is crucial for economic growth, social justice, and development.



India demonstrates its commitment to SDG 4 through various policies and programs.

- ✚ Sarva Shiksha Abhiyan (SSA) for universal elementary education.
- ✚ Right to Education Act (RTE) mandating free, compulsory schooling for ages 6–14.
- ✚ Rashtriya Madhyamik Shiksha Abhiyan (RMSA) focusing on secondary education access and quality.
- ✚ Mid-Day Meal Scheme improving enrolment, retention, and nutrition among marginalized children.
- ✚ National Skill Development Mission and Skill India Mission expanding vocational training.
- ✚ Launch of Community Colleges, Polytechnics, ITIs, and gender/social inclusion initiatives.
- ✚ Adoption of digital learning platforms (e.g., DIKSHA, SWAYAM) ensuring education continuity during COVID-19.

Below are the outcomes and successes of the government initiatives.

- ✚ Female literacy rose from 65.46% in 2010 to 73.5% in 2020, narrowing gender disparities.
- ✚ States like Kerala, Tamil Nadu, and Uttarakhand excel in access, quality, and inclusion.
- ✚ Millions of youth gained vocational and technical skills, enhancing employability.
- ✚ Mid-Day Meal Scheme boosted school enrolment and retention for marginalized communities.

India’s sustained, multi-faceted approach continues to drive notable progress in advancing quality education for all.

Sustainable Development Goal 5 (SDG 5) seeks to achieve gender equality and empower all women and girls by 2030, addressing disparities across social, economic, political, and cultural spheres. India faces entrenched gender inequalities, ranking 131st out of 148 countries in the 2025 Global Gender Gap Index with a gender parity score of 64.4%. India's roadmap to SDG 5 involves holistic, multi-level interventions powered by government, judiciary, civil society, and private enterprise.

Key initiatives of the Indian government to achieve goals of SDG5 are:



- ✚ Beti Bachao, Beti Padhao: To raise community awareness, improve sex ratios, and promote girls' education.
- ✚ Reservation Policies: To help women gained leadership in local governance, with up to 50% seats reserved for women in many Panchayats and urban local bodies across at least 17 states.
- ✚ Support Schemes: POSHAN Abhiyaan (nutrition), Pradhan Mantri Ujjwala Yojana (clean cooking fuel), Stand Up India (entrepreneurship), amendments to legal protections, and digital/financial inclusion drives.
- ✚ One Stop Centres (Sakhi Centers): Provide legal, health, and psychosocial support for survivors of violence, enabling rehabilitation and empowerment.
- ✚ Training Initiatives: Digital literacy programs in Maharashtra and Tamil Nadu have empowered thousands of rural women for jobs and financial inclusion.

Following are the milestones reflecting the impacts of India's ongoing efforts:

- ✚ More than 1.4 million women elected to grassroots governance, many leading transformative community initiatives.
- ✚ The Beti Bachao, Beti Padhao campaign has improved child sex ratios and girls' schooling, particularly in focus districts.
- ✚ Workers like ASHA and Anganwadi have delayed child marriages and promoted girls' education in states like Rajasthan and West Bengal.
- ✚ Digital and financial inclusion efforts have enabled rural women to access jobs, entrepreneurship, and social services.

Despite notable advancements, significant gaps remain in political representation, workforce participation, and social attitudinal change. Achieving full gender equality in India requires sustained commitment to strengthen laws, expand schemes, and foster collective social change nationwide by 2030.

Sustainable Development Goal 6 (SDG 6) seeks to ensure availability and sustainable management of water and sanitation for all by 2030. Key targets include universal access to safe and affordable drinking water, adequate sanitation and hygiene, end open defecation, improve water quality, sustainable use and protection of water-related ecosystems.

With 1.4 billion people, India faces severe water stress, possessing only 4% of global freshwater for 16% of the world's population. Thirty-five million lack safe water and 678 million-lack access to a safe toilet.



The government towards took the following initiatives to achieve the goals of SDG6.

- ✚ Swachh Bharat Mission (SBM): Over 100 million toilets built; open defecation nearly eliminated, particularly in rural areas. Focus on behaviour change and sustainability of sanitation.
- ✚ Jal Jeevan Mission (JJM): Provided tap water to over 14.5 crore rural households (about 75% coverage). Installed 100% tap coverage in Goa, Haryana, Telangana, Gujarat, Puducherry, and certain Union Territories.
- ✚ Namami Gange Programme: More than 300 projects completed for river Ganga rejuvenation—focusing on sewage treatment, pollution reduction, biodiversity and afforestation with an investment of over Rs. 40,000 Crore.
- ✚ 10-Year Rural Sanitation Strategy (2019–2029): Focused on sustaining Open Defecation Free (ODF) gains and improving solid/liquid waste management.
- ✚ Smart Technologies & Urban Focus: Large investments in digital water monitoring, urban water management, and public-private partnerships in 2025-26 budget.

India's strategic initiatives have led to the following noteworthy outcomes.

- ✚ Rural sanitation coverage improved from 38.7% in 2014 to near 100% in 2024-25. Over 564,000 villages declared open defecation free. SBM contributed to reduced diarrhoeal disease and improved school enrolment for girls.
- ✚ Tap water reach expanded to over 75% of rural households, directly improving health, gender equality, and time spent by women collecting water.
- ✚ States/UTs like Ladakh, Sikkim, and Goa achieved 100% targets for toilets and rural drinking water.
- ✚ India's SDG 6 index rose from 63 in 2018 to 89 in 2023–24, reflecting significant improvement in access and sanitation behaviour.

Despite this progress, rapid population growth, urbanization, groundwater depletion, and climate change still strain resources. Sustaining and deepening these gains through inclusive and resilient infrastructure.

Sustainable Development Goal 7 (SDG 7) aims to ensure access to affordable, reliable, sustainable, and modern energy for all by 2030. It targets universal electricity and clean cooking access, major increases in renewable energy, improved energy efficiency, and international cooperation for clean energy.

India’s large population and development needs put extraordinary pressure on energy systems. Reliable electricity access is essential for economic growth, health, and education. India, the third-largest greenhouse gas emitter globally, must rapidly transition to clean and renewable sources to achieve climate goals and reduce pollution.



India has implemented the following robust policies to achieve SDG 7:

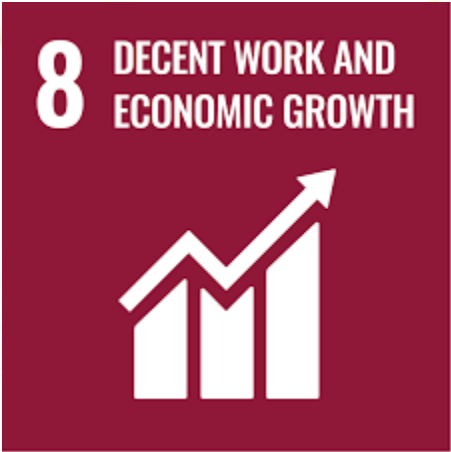
- ✚ Universal electrification via the Deen Dayal Upadhyay Gram Jyoti Yojana and Saubhagya Scheme, which electrified over 18,000 villages and reached 28 million households in 18 months.
- ✚ The Pradhan Mantri Ujjwala Yojana (PMUY) expanded clean LPG cooking to over 100 million poor households.
- ✚ Record addition of renewable energy—29.52 GW in 2024–25, making up nearly 47% of installed power capacity, led by solar and wind.
- ✚ The Green Hydrogen Mission (2023) targets 5 million metric tons annual production by 2030, alongside 125 GW of new renewables.
- ✚ Energy efficiency improvements via codes like the Energy Conservation Building Code and funding for clean technology projects.

India’s noteworthy efforts have translated into the following successes:

- ✚ Electricity reached 100% of households by 2024, transforming quality of life and economic opportunities.
- ✚ India ranks fourth globally in solar and wind capacity, with 105 GW installed solar and rapid growth in rooftop installations.
- ✚ Kerosene use fell 77% (2014–21), cutting CO₂ emissions by 17.2 million tonnes annually.
- ✚ The hydrogen sector advanced with major projects and international investment. India secured \$627 million for clean projects in 2022.
- ✚ PMUY improved health and economic agency for 10 crore+ women beneficiaries.

India has made phenomenal progress towards achieving the goals of SDG7, with expanding access to affordable and clean energy.

Sustainable Development Goal 8 (SDG 8) aims to promote inclusive, and sustainable economic growth, full and productive employment, and decent work for all by 2030. It calls for innovation-driven growth, decent job creation, entrepreneurship support, equal pay and safe working environments, elimination of child and forced labour, and expanded access to financial services. With 72% of its population below 32, India's demographic profile offers a powerful opportunity to drive growth through productive employment. However, harnessing this potential requires creating sufficient quality jobs, protecting labour rights, closing gender and youth employment gaps, curbing informal work and child labour, and improving financial inclusion.



India pursues a multi-pronged approach to SDG 8, balancing economic expansion with social inclusion and labour standards:

- ✚ Make in India: Drives manufacturing, investment, and job creation.
- ✚ Skill India Mission: Boosts youth employability with vocational and digital skills.
- ✚ MGNREGA: Provides guaranteed rural employment and income security.
- ✚ Pradhan Mantri Mudra Yojana (PMMY): Offers over 15 crore loans to spur entrepreneurship and Micro, Small and Medium Enterprises (MSME) growth.
- ✚ Digital India: Expands digital infrastructure and access.
- ✚ Labour Reforms & Social Protection: Extends maternity benefits, modernizes labour codes (Factories Act), and ensures social insurance.
- ✚ Financial Inclusion: Jan Dhan Yojana and other schemes promote banking access and financial security for millions.

Following are the key outcomes of India's journey towards achieving the goals of SGD 8.

- ✚ GDP per capita grew 6.5% in 2024–25; nominal GDP grew by 9.8% recently.
- ✚ Employment surged to 64.33 crore in 2023-2024 as compared to 47.5 crore in 2017-18.
- ✚ Unemployment dropped from 6% to 3.2%, and labour force participation rose to 54.2%.
- ✚ Youth unemployment reduced to 10%.
- ✚ Expanding MSMEs, formalization of jobs, and targeted support for the informal sector are increasingly protecting workers' rights.
- ✚ Efforts to end child labour, enforce minimum wages, and promote workplace safety underscore India's inclusive growth model.

While impressive progress has been made, sustained innovation, investment in upskilling, and continued attention to informality and job quality are essential to meeting SDG 8 by 2030.

Sustainable Development Goal 9 (SDG 9) aims to build resilient infrastructure, promote inclusive and sustainable industrialization, and foster innovation. Key targets include climate-resilient infrastructure, broad access to financial services and markets for small industries, the upgrade and sustainability of existing industries, greater adoption of clean technologies, stronger research and technological capacity. India's ambition to become a \$5 trillion economy depends on overcoming significant infrastructure deficits—such as inadequate roads, railways, ports, water, power, and urban sanitation. Industrial growth and innovation are essential to bridge these gaps, increase productivity and competitiveness, and generate broad-based economic opportunities.



India has launched major efforts to modernize infrastructure and support innovation:

- ✚ Infrastructure Modernization: Flagship projects like Bharatmala (roadways), Sagarmala (ports), Dedicated Freight Corridors (rail), airport expansions, and the Smart Cities Mission are transforming transport and urban infrastructure.
- ✚ Digital & Rural Connectivity: The National Broadband Mission and Digital India are expanding digital access; the Pradhan Mantri Gram Sadak Yojana connected 79.7% of targeted habitations by all-weather roads—a steep increase since 2017.
- ✚ Industrial & Technological Upgrading: Make in India has boosted manufacturing, improved business ease, and fostered adoption of resource-efficient, cleaner technologies.
- ✚ Innovation Ecosystems: Elevated R&D investment, Startup India, and the Atal Innovation Mission have driven growth in patents, scientific output, and entrepreneurial activity. States like Gujarat, Maharashtra, and Tamil Nadu lead in performance through robust industrial bases and innovation hubs.

India achieved the following successes through initiatives taken:

- ✚ 79.7% of rural habitations connected by all-weather roads (up from 47.4% in 2017–18); 95.1% of villages now have 3G/4G coverage; 93.3% of households own at least one mobile phone.
- ✚ Share of medium and high-tech industries increased from 37.1% (2008) to 43.4% (2022).
- ✚ Nearly 3,000 in-house R&D centres; a fourfold rise in design patents (2015–19).
- ✚ India's SDG 9 score rose from 41 (2018) to 61 (2023–24); jumped from 121st to 99th globally on the SDG Index by 2025—its highest-ever rank.

Challenges like energy intensity in major sectors and regional disparities persist, but India's robust, multi-layered strategy for infrastructure, industry, and innovation continues to drive notable, broad-based progress.

Sustainable Development Goal 10 (SDG 10) aims to reduce inequality within and among countries. It focuses on boosting income growth for the bottom 40%, enhancing the social, economic, and political inclusion of vulnerable groups, implementing fair wage and social protection policies, improving developing country representation globally, and ensuring safe migration and affordable remittances.

India faces deep-rooted inequality: the top 1% own 40.1% of wealth while the bottom 50% hold just 3–6%. Persistent gaps exist across caste, gender, rural–urban lines, and digital access. Women earn only 63% as much as men. Rural digital and financial inclusion lags behind urban. National-level political representation for women and marginalized groups remains low, despite local improvements.

India’s response combines national and state programs:

- ✚ Social Protection & Financial Inclusion: Jan Dhan Yojana and National Social Assistance Program have reached over 800 million people with banking, pensions, and benefits.
- ✚ Inclusive Policy Measures: Reservation policies secure legislative seats for women and fiscal, wage, and welfare initiatives support vulnerable populations.
- ✚ Skill & Welfare Programs: States like Madhya Pradesh and Maharashtra provide targeted training and welfare for marginalized communities.
- ✚ Infrastructure & Digital Access: National Broadband Mission and Digital India expand rural connectivity; major schemes extend housing, health, and education.
- ✚ State Innovations: States such as Kerala, Uttarakhand, and Tamil Nadu excel in inclusive governance.
- ✚ Global Advocacy: India works to improve developing nation representation in global forums and ensure low-cost remittance flows.

India’s measurable progress can be seen from the following achievements:

- ✚ 171 million people exited extreme poverty (2011–2023); extreme poverty fell from 16.2% to 2.3%.
- ✚ The Gini Index reduced from 28.8 to 25.5, making India the fourth equal country globally.
- ✚ Women now hold 45.6% of local government posts.
- ✚ Vocational, welfare, and digital initiatives boosted inclusion and opportunities.

Despite progress, sharp wealth gaps and regional disparities persist, highlighting the ongoing need for targeted reforms and sustained efforts.



Sustainable Development Goal 11 (SDG 11) aims to make cities and human settlements inclusive, safe, resilient, and sustainable. It focuses on affordable housing, sustainable transport, participatory urban planning, disaster risk reduction, environmental footprint reduction, protection of cultural as well as natural heritage, and increasing green spaces.

India's rapid urbanization and growth puts immense pressure on housing, urban infrastructure, transport, water, sanitation, and green spaces. About 35% of urban dwellers live in slums, facing poor access to clean water and safe housing. Fourteen of the world's 20 most polluted cities are in India, contributing to 1.7 million annual deaths from air pollution. Cities endure transport congestion, high accident rates (155,000 deaths yearly), and massive economic losses. Additionally, disaster risks like floods and heatwaves—especially in coastal areas—are increasing, underscoring urgent sustainable urban development needs.



India has launched multiple flagship programs to address urban challenges:

- ✚ Pradhan Mantri Awas Yojana – Urban (PMAY-U): Securing affordable housing and improving urban amenities, reducing slum populations.
- ✚ Atal Mission for Rejuvenation and Urban Transformation (AMRUT): Enhancing urban infrastructure and services.
- ✚ Smart Cities Mission: Promoting digital governance and citizen participation for inclusive planning.
- ✚ Swachh Bharat Mission – Urban (SBM-U): Advancing solid waste and sanitation management.
- ✚ Sustainable Urban Mobility: Expansion of metro rail networks, promotion of electric vehicles, and creation of non-motorized transit infrastructure.
- ✚ Urban Natural Resource Management: Wetland restoration and greening efforts in cities to improve water security and increase green spaces.
- ✚ Disaster Resilience: Coastal cities strengthening infrastructure and early warning systems.

India's targeted strategies have led to the following successes:

- ✚ Millions benefited from PMAY-U housing, reducing urban slum populations.
- ✚ Cities like Indore, Surat, and Navi Mumbai lead in waste management and air quality improvements.
- ✚ Smart Cities such as Pune and Bhubaneswar have improved inclusive governance and planning through citizen engagement and digital tools. Hyderabad, Ahmedabad, and Chennai have enhanced water security and green space through ecosystem restoration.
- ✚ Coastal cities have bolstered disaster-resilient infrastructure & India's urban sustainability index rose from 39 (2018) to 83 (2023–24).

Despite progress, only one-third of SDG 11 targets are on track, reflecting ongoing challenges in pollution control, equitable service access, and sustainable urbanization.

Sustainable Development Goal 12 (SDG 12) aims to ensure sustainable consumption and production patterns by promoting waste reduction, improved resource efficiency, and responsible management of chemicals and waste. Key targets include halving per capita food waste, substantially reducing waste generation through prevention, reuse, and recycling, encouraging sustainable business practices, and raising awareness about sustainable lifestyles by 2030. India generates approximately 62 million tonnes of municipal solid waste annually, but only 70% is collected and just 20% properly treated, with the remainder ending up in landfills. Plastic waste stands at around 26,000 tonnes daily, but only 30% is recycled, and merely 4% of hazardous plastic waste is managed effectively. Average per capita plastic consumption is 11 kg and rising. Food waste is high at 50 kg per person annually, contributing to greenhouse gas emissions and economic losses. India’s material footprint is 8,400 kg per capita, already exceeding the sustainable threshold of 8,000 kg, signalling urgent need for better resource management. Excessive use of nitrogenous fertilizers in farming further demonstrates unsustainable production practices.



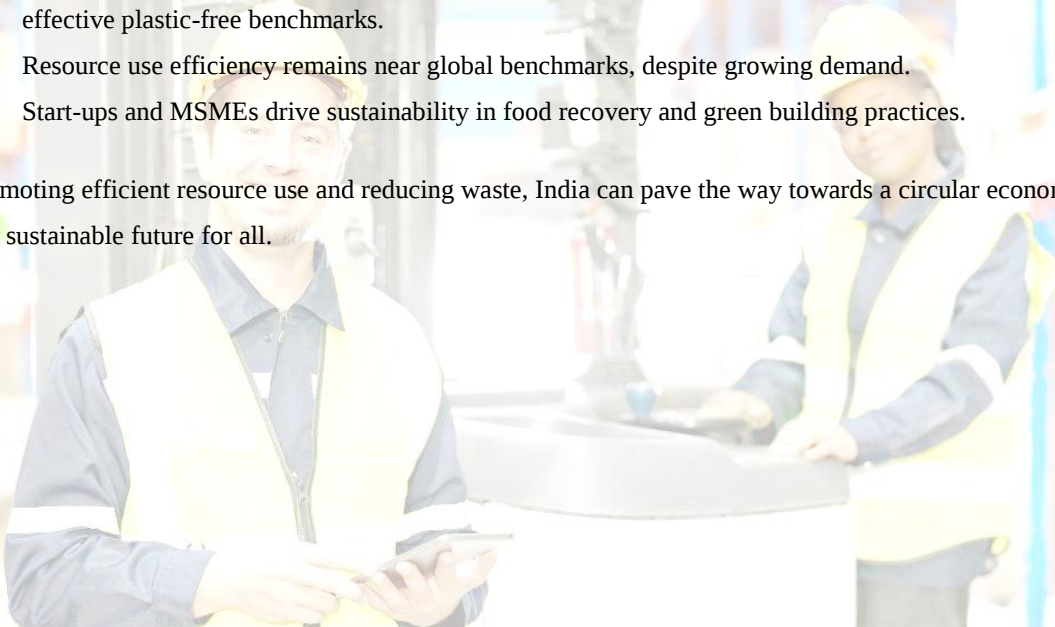
India has integrated SDG 12 through various policies and programs:

- ✚ National Environment Policy and Solid Waste Management Rules (2016) strengthen waste governance.
- ✚ Single-Use Plastic Ban targets reduction of plastic pollution.
- ✚ National Policy on Biofuels promotes sustainable energy alternatives.
- ✚ Sustainable Tourism and Public Procurement Policies emphasize green tourism.
- ✚ Corporate engagement has increased through mandatory Corporate Social Responsibility (CSR) initiatives.
- ✚ Local innovations and MSMEs support circular economy efforts, such as food recovery, agricultural waste reuse, and Zero Energy Design certifications.

Through these strategies, India has achieved the following successes:

- ✚ India’s SDG 12 score improved from 57 (2018) to 71 (2023–24), reflecting stronger adoption of sustainable production and consumption.
- ✚ Cities like Indore and Pune lead zero-waste initiatives, while Sikkim and Himachal Pradesh have set effective plastic-free benchmarks.
- ✚ Resource use efficiency remains near global benchmarks, despite growing demand.
- ✚ Start-ups and MSMEs drive sustainability in food recovery and green building practices.

By promoting efficient resource use and reducing waste, India can pave the way towards a circular economy and a more sustainable future for all.



Sustainable Development Goal 13 (SDG 13) calls for urgent action to combat climate change and its impacts by strengthening resilience to climate disasters, integrating climate action into policies, building capacity, increasing education, mobilizing finance, and supporting vulnerable communities.

India is highly vulnerable to climate change, having faced 573 climate-related disasters since 1970 with over 138,000 deaths. Rapid glacier retreat threatens river supplies, and urban temperatures are rising 3–4°C above rural levels. The nation emitted 2.8 billion tonnes of CO₂ in 2023 (7.8% of global total) and faces immense risks to livelihoods, health, and development.



India has taken the following steps to address and mitigate these challenges:

- ✚ India reduced emissions intensity of GDP by 36% (2005–2020) and targets 33–35% by 2030.
- ✚ The National Action Plan on Climate Change (NAPCC) directs eight missions: solar energy, energy efficiency, sustainable habitat, water, Himalayan ecosystem protection, afforestation (Green India Mission), climate-smart agriculture, and knowledge sharing.
- ✚ All states and UTs have State Action Plans addressing regional climate risks.
- ✚ Renewable capacity rose sharply; non-fossil sources make up 46% of installed power.
- ✚ Adaptation is addressed through the National Adaptation Fund supporting projects in 27 states/UTs.
- ✚ Community-driven climate risk management is integrated into rural employment (e.g., ICRG-MGNREGA), and Smart Cities Mission promotes resilient urban growth.

India's initiatives have translated into following successes:

- ✚ SDG 13 composite score climbed from 54 (2020–21) to 67 (2023–24), shifting India from “Performer” to “Front Runner” status.
- ✚ Renewables nearly 40% of electricity capacity; national solar capacity exceeds 105 GW.
- ✚ Forest carbon stocks up 2.29 billion tonnes since 2005.
- ✚ About 95% of Indian industries comply with environmental standards.
- ✚ States like Kerala, Uttarakhand, Uttar Pradesh, and Sikkim emerge as climate action leaders.
- ✚ Resilient infrastructure, urban green initiatives, flood/heat action plans, and rural afforestation have improved adaptation and lowered risk.

India's blend of ambitious policy, national and local innovation, and growing climate finance reflects clear progress will be key in sustaining this momentum and ensuring a climate-resilient future for all.

Sustainable Development Goal 14 (SDG 14) aims to conserve and sustainably use the oceans, seas, and marine resources. Its targets include reducing marine pollution, restoring ecosystems, ending overfishing, conserving marine areas, and empowering coastal communities.

India's 7,517 km coastline sustains over 250 million people. However, marine ecosystems are severely threatened as 61% of Indian fish stocks are overexploited, coral reefs face bleaching, and 0.6 million tonnes of plastic pollute the seas annually, making India one of the top ten marine plastic polluters. Sea-level rise, erosion, and cyclones increasingly risk coastal livelihoods and biodiversity.



To combat these challenges, India has implemented the following strategic measures:

- ✚ **Regulatory and Policy Actions:** Coastal Regulation Zone Notification, Water (Prevention & Control of Pollution) Act, and Marine Fisheries Bill strengthen marine protection. India also collaborates globally on marine pollution efforts.
- ✚ **Marine Plastic Control and Clean Beaches:** Bans on single-use plastics, “plastic-free” zones, and the National Marine Plastic Mission address marine debris.
- ✚ **Ecosystem Restoration:** Massive efforts in mangrove and coral restoration, especially in the Sundarbans.
- ✚ **Fisheries and Blue Economy:** Sustainable fisheries management under Pradhan Mantri Matsya Sampada Yojana, vessel monitoring, and cooperative development foster responsible resource use.
- ✚ **Protected Areas and Certification:** Expansion of marine protected zones; 12 Indian beaches have achieved international Blue Flag certification for sustainability.
- ✚ **Community Engagement:** Fisherfolk empowerment, awareness campaigns, and research on biodiversity conservation and sustainable aquaculture are underway.

India's proactive stance on these issues has translated into the following successes:

- ✚ **Landmark mangrove restoration projects** in the Sundarbans have protected biodiversity and bolstered disaster resilience.
- ✚ **Significant reduction in single-use plastics** and improvement of marine waste management in cities like Mumbai and Chennai.
- ✚ **Empowered fisherfolk** through cooperatives and sustainable aquaculture, enhancing incomes and resilience. Progress in sustainable fisheries and technological upgrades supports global seafood market access.

India's SDG 14 performance reflects steady pollution control, community engagement, and scientific monitoring, though persistent challenges remain with pollution, overfishing, and climate impacts, underscoring the need for ongoing action.

Sustainable Development Goal 15 (SDG 15) seeks to protect, restore, and promote the sustainable use of terrestrial ecosystems. It emphasizes sustainable forest management, combating desertification, halting land degradation and biodiversity loss, and strengthening ecosystem resilience.

Almost 30% of India’s land, about 96.4 million hectares, is degraded, risking agriculture, water resources, and biodiversity. Forest cover stands at 21.71%, but critical regions like the Northeast and Western Ghats are losing green cover. Around 250 million Indians depend on forests for their livelihoods. Soil erosion affects 147 million hectares, reducing crop yields and harming rivers. India ranks among the top 10 countries facing desertification. Human-wild life conflict leads to 1,500 deaths annually, and over 1,000 species face extinction risks, highlighting the necessity for urgent conservation and land management.



India’s approach integrates policy, afforestation, conservation, and community involvement:

- ✚ Forest & Land Management: Enforcement of the Forest (Conservation) Act, 1980, and the National Action Plan to Combat Desertification (NAP-CCD).
- ✚ Afforestation: National Afforestation Programme, Compensatory Afforestation Fund Management and Planning Authority (CAMPA), mass tree-planting drives (e.g., National Green Highways Mission, PM Krishi Sinchayee Yojana).
- ✚ Wildlife Conservation: Project Tiger and Project Elephant have successfully revived flagship species populations.
- ✚ Community and State Action: Initiatives like Uttar Pradesh’s Mission 5 Crore Tree Plantation and Telangana’s Harit Haran Yojana provide green jobs, improve soils, and boost rural livelihoods.
- ✚ Integrated Development: Biodiversity and ecological resilience are integrated into rural development schemes through partnerships among government, corporates, and local communities.

These efforts spanning afforestation, conservation and community engagement has led to the following achievements.

- ✚ Forest cover and plantations have modestly increased, restoring ecosystems, improving fertility, and securing income for millions.
- ✚ Protected areas and anti-poaching measures have led to major increases in tiger and elephant numbers, earning global conservation leadership.
- ✚ Landscape restoration and sustainable land use have curbed desertification and aided community resilience, especially in Rajasthan.
- ✚ Biodiversity is increasingly prioritized in policy, rural development, and corporate social responsibility.

Despite gains, issues still exist, underscoring the need for sustained, coordinated efforts for long-term ecological health and sustainable growth.

Sustainable Development Goal 16 (SDG 16) aims to promote peaceful and inclusive societies, provide universal access to justice, and build effective, accountable, and inclusive institutions at all levels. Its targets include reducing violence, combating organized crime and corruption, ensuring legal identity for all, strengthening the rule of law, and increasing public participation. India contends with substantial justice and governance challenges: over 5 crore pending court cases, high rates of crimes against women (4.45 lakh in 2022) and SC/STs (70,000+ annually), low trust in institutions, and police density below UN norms. Widespread bribery, delays in justice, political violence, and weak enforcement threaten democracy and the rule of law, making SDG 16 essential for social stability and development.



India's multi-layered reforms and policies include:

- ✚ Legal Identity: The Aadhaar biometric system has provided unique legal identity to over a billion citizens, improving access to services and justice.
- ✚ Judicial Reforms: E-courts, fast-track and POCSO courts, online case filing, digitization of records, and expanded legal aid have improved access and reduced delays, especially for the vulnerable.
- ✚ Anti-Corruption & Transparency: Digital India, e-governance, the RTI Act, digitized procurement (GeM), and transparent land registration curb corruption and promote accountability.
- ✚ Citizen Safety & Responsive Policing: Community policing, women's safety apps enhance security and trust.
- ✚ Participatory Governance: Decentralized Panchayati Raj, reservations for women and marginalized groups, and digital citizen feedback tools increase participation and representation.
- ✚ Legal Awareness: Legal literacy campaigns empower marginalized populations about their rights.

These reforms have strengthened justice, transparency, and citizen participation marking the following progresses:

- ✚ Over 1 billion Indians now have a legal identity via Aadhaar.
- ✚ E-courts, legal aid, and digitized justice have expanded access, especially for rural and marginalized groups.
- ✚ Community policing have boosted public trust and accelerated crime response.
- ✚ Major anti-corruption wins through digitization and greater transparency.
- ✚ Haryana's Centres of Excellence skilled over 5,000 youth, replicated in multiple states.

Despite these gains, large backlogs, violence against vulnerable groups, and under-reporting highlight the need for sustained innovation, local reforms, and stronger accountability to fully realize peace, justice, and strong institutions.

Sustainable Development Goal 17 (SDG 17) centres on strengthening and revitalizing global partnerships to achieve all Sustainable Development Goals. Its targets focus on mobilizing financial resources, technology transfer, capacity-building, improved data, and international policy coherence, alongside boosting exports, supporting multi-stakeholder partnerships, and ensuring global cooperation for sustainable progress.

Limited access to advanced technology, especially for clean energy and health underscores India’s need for technical collaboration and capacity building.



India has woven SDG 17 into its national development agenda via:

- ✚ **Government Coordination:** NITI Aayog leads SDG mapping, stakeholder engagement, and tracks progress using the SDG India Index. The Ministry of Statistics drives improvements in national data systems.
- ✚ **International Partnerships:** India is a global leader in South-South cooperation, providing aid, expertise, and launching initiatives like the International Solar Alliance. Its G20 Presidency mainstreamed sustainable development, finance, and climate action internationally.
- ✚ **Resource Mobilization:** The Union Budget aligns with SDGs; ministries cooperate on funding, leveraging domestic taxes, FDI, and remittances.
- ✚ **Technology & Capacity-Building:** Digital infrastructure expansion, open data platforms, and global knowledge partnerships enhance skills, technology access, and institutional capacity.
- ✚ **State and Local Engagement:** States construct their own SDG strategies, often in collaboration with UN agencies, NGOs, and the private sector.

These collaborative efforts have translated into the following achievements:

- ✚ **Public-private partnerships,** such as Haryana’s high-tech training centres funded via CSR, have trained over 5,000 students, expanding to other states.
- ✚ **India leads the International Solar Alliance** with 120+ member countries, training rural women from developing nations as “Solar Mamas”—empowering them as solar engineers.
- ✚ **Indian universities excel** in global collaborative research for clean energy, education, and water.
- ✚ **The SDG India Index and digital innovations** have improved progress tracking and data-driven policy.

Despite notable progress, challenges remain in closing the financing gap, expanding technology transfer, and improving data collection. SDG 17 underscores the critical importance of coordinated, inclusive partnerships for India’s sustainable development and for achieving the 2030 Agenda.

IEM Kolkata's journey towards Sustainability

- ✚ **Solar Power Integration:** Rooftop solar panels installed on academic blocks to reduce dependency on conventional energy sources and lower carbon emissions.
- ✚ **Energy-Efficient Buildings:** Use of LED lighting, natural ventilation, timer switch installations and energy-efficient appliances to minimize energy consumption across the campus.
- ✚ **Rainwater Harvesting Systems:** Rainwater harvesting units installed to conserve water and recharge groundwater levels, supporting water sustainability.
- ✚ **Green Landscaping and Campus Greening:** Extensive green cover with native plants, vertical gardens, and shaded walkways to enhance biodiversity and thermal comfort.
- ✚ **Waste Management Facilities:** Separate bins for biodegradable and non-biodegradable waste, with composting units to process organic waste on-site.
- ✚ **Low-Carbon Transportation:** Electric vehicle awareness to reduce fossil fuel use on campus.
- ✚ **Awareness:** Displaying banners to inspire greater awareness towards sustainability.

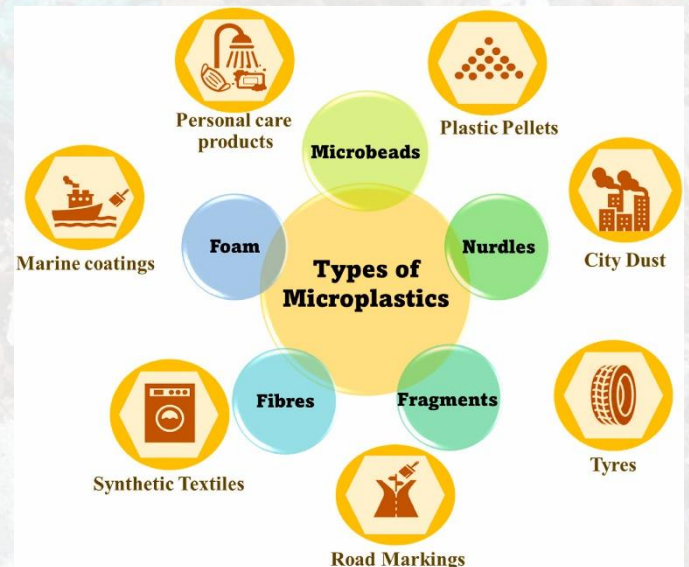
A person with dark hair and glasses is peeking from behind a white, horizontally-slatted door. Their face is partially visible on the left side of the frame, and their hand is resting on the door. The background is a soft, out-of-focus outdoor scene.

*Sneak peek
into our
future
projects*

Solar-Powered Robotic Fish for Micro plastics Removal from Water Bodies

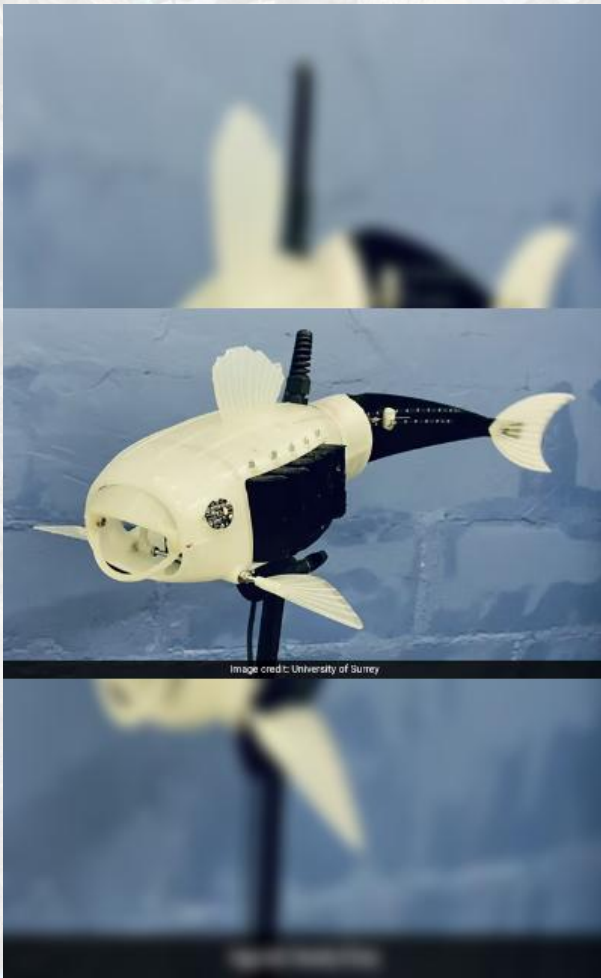
“Autonomous, Renewable, Effective – The Future of Aquatic Clean-Up”

Microplastics have been found in over 114 aquatic species, and in every ocean on Earth. Studies reveal that 90% of seabirds and marine life have ingested plastic. Alarming, microplastics were detected in 77% of human blood samples, indicating widespread exposure. In local water bodies, including rivers and lakes, concentrations can reach hundreds and thousands of particles per cubic meter, especially near urban and industrial areas. These pollutants enter the food chain, threatening ecosystems and human health. Solar-powered robotic fish will provide a sustainable solution to reduce this contamination, particularly in shallow and accessible freshwater ecosystems.



Source: <https://doi.org/10.1016/j.polymertesting.2023.108223>

Gilbert the Robo-fish



The Gilbert robotic fish made by students of University of Surrey, UK is equipped with filter like material to actively collect micro plastics from lakes, rivers, and oceans during its swimming motion. Its fish-like, quiet propulsion allows it to operate without disturbing aquatic life, making it ideal for sensitive ecosystems where traditional clean-up methods are too invasive. Designed with biodegradable or recyclable components and powered by solar or battery systems, Gilbert minimizes its environmental footprint while cleaning polluted waters. Advanced robot sensors on board monitor water quality and plastic concentration, transmitting real-time data to researchers for better tracking of pollution hotspots. Gilbert's design allows for easy scaling in swarms or integration with other robotic systems, enhancing its efficiency in large-scale micro plastic clean-up efforts.

Source: <https://doi.org/10.1016/j.polymertesting.2023.108223>

Carbon Dioxide Capture from Direct Air: Cleaning the Atmosphere

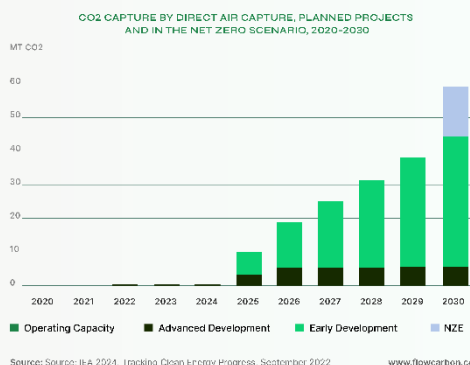
"Clearing the Air, Capturing the Future."

Artificial trees, designed to mimic the carbon-absorbing properties of natural trees, can capture carbon dioxide from ambient air at highly efficient rates. One artificial tree can remove up to 1 ton of CO₂ per day, equivalent to what 20 average trees absorb annually. The Global Carbon Project estimates that DAC technologies, including artificial trees, could remove up to 10 billion tons of CO₂ per year by 2050. However, costs remain high, averaging \$100–\$600 per ton of CO₂ captured. Pilot projects in the U.S., Europe, and the Middle East demonstrate increasing viability as technology and policy support grow.

Flowcarbon

Direct Air Removal Projects On the Planning Table

Currently, 18 direct air capture (DAC) plants operate worldwide, removing almost 0.01 Mt CO₂/year. The International Energy Agency says, however, to meet its Net Zero Emissions by 2050 Scenario, direct air capture will need to scale to capture almost 60 Mt CO₂/year by 2030. Here is a snapshot of projects currently in the works.



Source: IEA 2024, Tracking Clean Energy Progress, September (2024)

Artificial Tree That Capture CO₂ 1,000x Faster!



Columbia University Has Developed an
"Artificial Tree" That Passively Removes
Carbon Dioxide From the Atmosphere
 1,000 Times Faster Than Real Trees

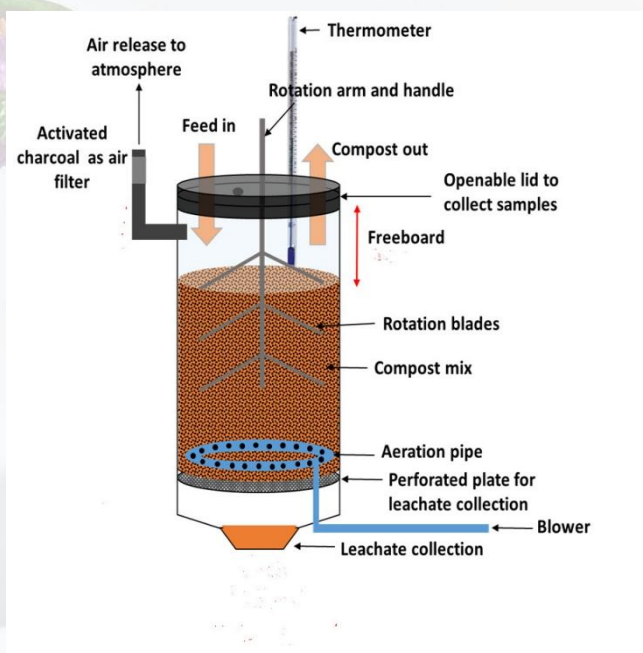
Scientists at Columbia University, led by Dr. Klaus Lackner, have developed "artificial trees" capable of passively removing carbon dioxide from the air up to 1,000 times faster than natural trees. These innovative structures use advanced sorbent materials to capture CO₂ without external energy, relying instead on humidity and smart chemistry to absorb and release carbon. Unlike traditional systems, they require no electricity, no farmland, and no water - making them ideal for large-scale deployment. This breakthrough is powering the growth of Direct Air Capture (DAC) and is being scaled by climate-tech start-ups worldwide. This breakthrough is powering the growth of Direct Air Capture (DAC) and is being scaled by climate-tech start-ups worldwide. One artificial tree can match the carbon removal of thousands of real trees, offering a transformative tool in the fight against climate change.

Source: <https://news.climate.columbia.edu/2010/03/15/university-joins-synthetic-tree-venture/>

Composter

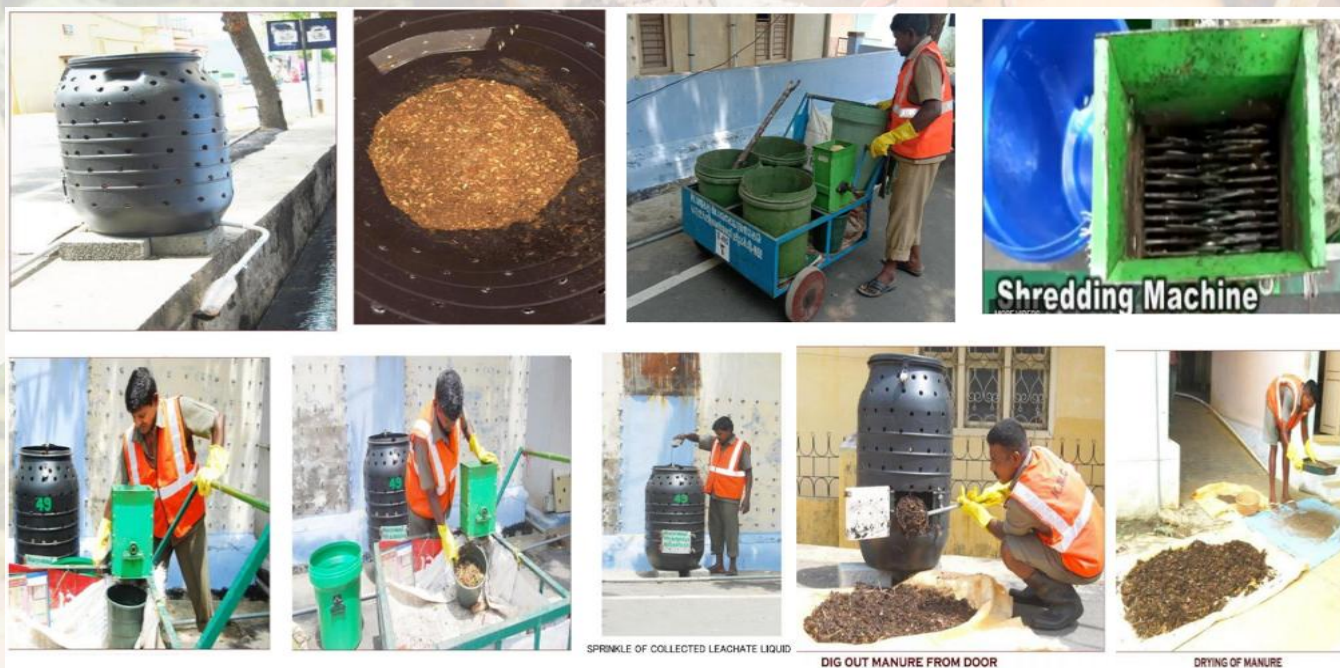
"Turning Waste into Wealth - Green Composting Revolution"

A composter can biologically convert kitchen and garden waste into nutrient-rich compost through aerobic microbial decomposition. It reduces landfill burden and methane emissions, promoting sustainable waste management and a circular organic nutrient cycle. A composter includes aerobic bins, tumblers, vermicomposting units, and anaerobic digesters, each suited to specific waste types and settings. It requires balanced carbon-nitrogen ratio, proper aeration, optimum moisture, and suitable temperature for efficient and odor-free composting. Final compost improves soil fertility, water retention, and plant growth in gardens, agriculture, and landscaping.



Decentralised Composting in Komarapalayam, Tamilnadu

Komarapalayam Municipality established decentralized composting units to manage organic waste, reducing landfill use and promoting sustainable ward-level waste practices. Active resident participation in source segregation, aided by awareness drives, ensured clean, compostable waste collection and improved compost quality. The initiative generated income for groups managing daily composting and created jobs for local sanitation workers through compost sales. Simple aerobic compost pits and bins were installed in key areas, requiring minimal energy and maintenance, making the system cost-effective. It reduced waste transport, lowered methane emissions, and enhanced soil health using nutrient-rich compost in nearby farms.

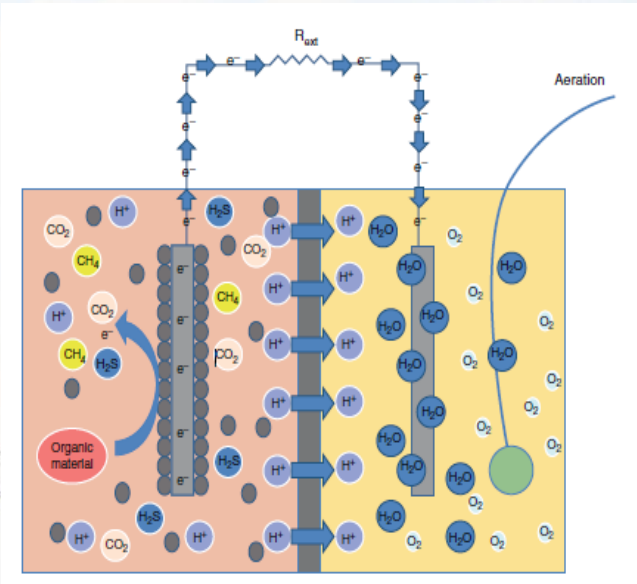


Source: https://www.nitforstates.gov.in/public-assets/Policy/policy_files/BNC491E000204.pdf

Microbial Fuel Cell

“Turning waste into electricity”

Microbial fuel cells (MFCs) generate electricity while treating wastewater by utilizing bacteria to oxidize organic matter, converting chemical energy into electrical power. MFCs use naturally occurring microbes, reducing reliance on fossil fuels, and offer a green alternative for energy production from biodegradable organic waste streams. They effectively degrade pollutants and reduce chemical oxygen demand (COD), making them ideal for decentralized wastewater treatment with minimal sludge generation and chemical usage. MFCs operate at ambient conditions without requiring external energy input, making them cost-effective and suitable for rural and remote locations with limited infrastructure.



Bioelectric Toilet at IIT Kharagpur

The Bioelectric Toilet developed at IIT Kharagpur utilizes MFC technology for onsite treatment of human waste while generating electricity. It achieves over 95% organics removal, disinfects wastewater-using hypochlorite, and enables reuse of treated water for flushing and agriculture. The system illuminates toilet premises using stored bioelectricity, reducing energy demand. Designed with low-cost clay ware membranes and locally synthesized catalysts, it is affordable, portable, and easy to maintain.



Recognized by national awards, this sustainable sanitation solution minimizes environmental pollution, conserves water, and provides a decentralized, energy-efficient alternative to conventional toilets. Its integration of waste treatment, energy recovery, and water recycling positions it as a model innovation for rural and urban sanitation under the Swachh Bharat Mission. Its adaptability and low operational cost make it ideal for deployment in remote and resource-limited communities across India and beyond.

Source: https://cdn.cseindia.org/docs/sfd2019/SFD_week_CSE_Ghangrekar-April-4-2019.pdf

Wind Turbine

“Turning Wind into Power, Anywhere”

A wind turbine is a device that converts kinetic energy from wind into electrical power using rotating blades connected to a generator. Globally, wind energy capacity reached over 1000 GW in 2024, contributing approximately 9% of global electricity. Wind turbines range from large-scale onshore and offshore units to compact, portable systems. Modern turbines can generate 2–15 MW of power, with capacity factors around 30–50%, depending on location and design. Small wind turbines, like micro or vertical-axis types, are ideal for off-grid or remote applications. Wind power is clean, renewable, and essential for reducing carbon emissions and ensuring energy sustainability worldwide.



Micro wind Turbine



Designed by Nils Ferber for his master's thesis at École Cantonale d'Art de Lausanne in Switzerland, this micro wind turbine serves as a reliable alternative to solar panels. Compact and lightweight, it charges devices using wind power even in low sunlight or night-time conditions, making it ideal for remote adventures. Featuring a vertical-axis rotor based on tension and compression, it efficiently captures wind from any direction and folds down to the size of a trekking pole for easy transport. Weighing under 1 kg (~2 lb), about 40% lighter than competitors, it unfolds within seconds via a telescopic shaft and can be operated by one person. The turbine generates a steady 5 W output at around 18 km/h (11 mph), storing energy in a 24 W-h battery or delivering it directly through an integrated USB port.

Source: <https://nilsferber.de/micro-wind-turbine>

Biogas plant for treatment of institutional organic waste

"Turning Campus Waste into Clean Energy – Powering Institutions Sustainably"

A biogas plant treating institutional organic waste can process 500–1000 kg of food and kitchen waste daily, producing approximately 30–60 m³ of biogas-equivalent to 20–40 kg of LPG. This energy can power cooking, lighting, or generators within the institution. Additionally, it generates 400–800 liters of digestate slurry per day, a valuable organic fertilizer. Institutions like colleges, hostels, and hospitals can save ₹10,000–₹20,000 monthly in LPG and waste disposal costs. A typical plant footprint is 50–100 m² and pays back investment within 2–3 years. Beyond economics, such systems contribute to cleaner campuses, reduced greenhouse gas emissions, and promote circular economy practices in waste management.



Biogas Plant at Tezpur University



Source: https://www.tezu.ernet.in/dener/Waste_to_Energy.pdf

This plant processes up to 13 m³/day of biogas for on-site cooking purposes, supplementing LPG and reducing fuel costs. Food waste is transformed into clean fuel, while solid digestate is converted into compost supporting institutional landscaping and soil health. Estimated savings of around 10 LPG cylinders per month and generation of 1.5 tonnes of vermicompost annually enhance both financial and ecological returns. It stands as a successful model for small-to-medium institutions generating 100–200 kg of waste daily. Led by Tezpur University's Department of Energy, the project fosters growing industry-academia collaboration, including partnership with IOCL under SATAT for compressed biogas deployment in Northeast India.

Thank
you



Editorial Team

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