Environmental Consciousness & Sustainable Development Goals

Integrating UN SDGs & ESG Framework with India's Agricultural, Manufacturing & Infrastructure Growth

A Faculty Development Module for Embedding Sustainability Across Disciplines

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Session Roadmap – What We Will Cover Together

01
UN SDGs
Foundational Framework

02
ESG
Global Goals → Corporate Reality

03
Agriculture
Feeding a Nation Sustainably

04
Manufacturing
Decoupling Growth from Emissions

05
Infrastructure
Building Green for Viksit Bharat

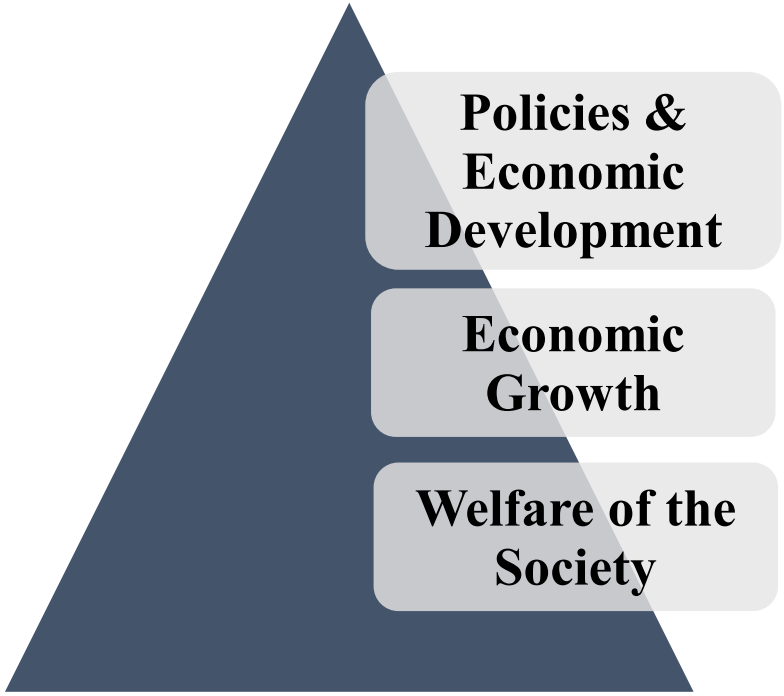
06
Regulation
India's SDG–ESG Architecture 2025–26

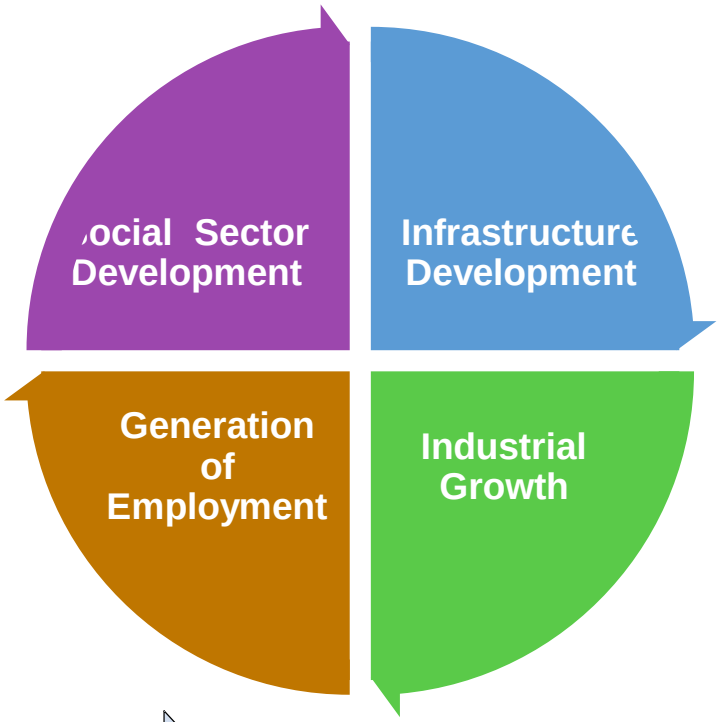
07
Data Centres Case Study

08
Pedagogy

Interdisciplinary Integration: Economics · Environmental Science · Business Management · Policy Studies · Engineering

BHARAT – THE LEADING & EMERGING ECONOMY





2025 GDP $ 3.8 Tn

By

2030 Likely GDP $5.00 Tn

“ Environment | Agriculture –Manufacturing - Infrastructure ”

WORLD NET ZERO TARGETS WITH INDIA EMERGING $4 Tn ECONOMY

Need of the Hour

Environmental Sustainability & Better Future by ESG

COP 30 - Belém Package a set of 29 decisions adopted by 195 parties, Climate Finance & Adaptation, 1.5°C Target, Forest Protection


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
9 INDUSTRY, INNOVATION AND INFRASTRUCTURE
10 REDUCED INEQUALITIES
11 SUSTAINABLE CITIES AND COMMUNITIES
12 RESPONSIBLE CONSUMPTION AND PRODUCTION
13 CLIMATE ACTION
14 LIFE BELOW WATER
15 LIFE ON LAND
16 PEACE, JUSTICE AND STRONG INSTITUTIONS
17 PARTNERSHIPS FOR THE GOALS

The 'Why Now' – Global Urgency & India's Pivotal Role

~35%

of SDG targets are on track globally (2025-26)

67.0

India's SDG Index Score vs. 74.4 for China

22.13%

Renewable energy share in installed capacity

₹8 Tn

Annual revenue covered by BRSR analysis

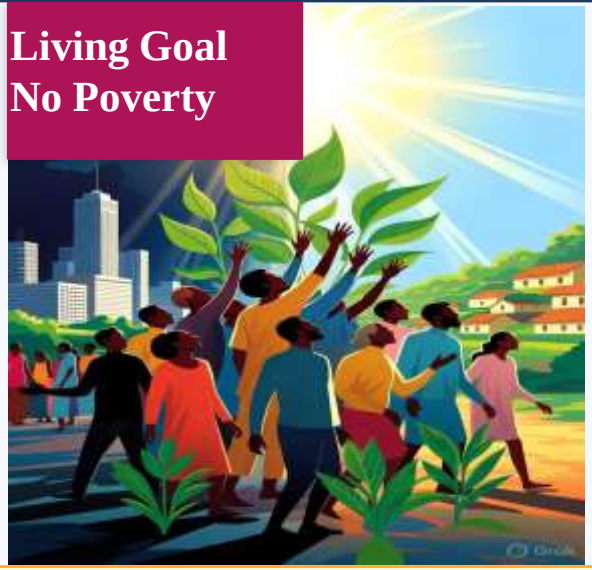
Key Takeaway for Faculty

India's rapid economic expansion (~6–7% GDP growth) cannot continue on fossil-fuel-intensive pathways. The SDG–ESG convergence represents a paradigm shift in how India will achieve Viksit Bharat @ 2047: resource-efficient, climate-resilient, and inclusive.

Note: Compare with the classical 'grow first, clean later' model. Is decoupling growth from emissions possible for a nation of 1.4 billion?

UN SDGs – Structure & Foundational Pillars

Living Goal
No Poverty



The 17 Goals are supported by 169 specific targets and over 200 indicators — rooted in three core pillars:

PEOPLE	PLANET	PROSPERITY
SDG 1 · SDG 2 · SDG 3 · SDG 4 · SDG 5	SDG 6 · SDG 12 · SDG 13 · SDG 14 · SDG 15	SDG 7 · SDG 8 · SDG 9 · SDG 10 · SDG 11
64.3% population under social protection (up from 22% in 2016)	*3,036 waste recycling plants (up from 829 in 2019–20)*	*22.13% renewable energy share in electricity generation*

SDGs UnderHigh-level Political Forum on Sustainable Development (HLPF) Review 2026: SDG 6 (Water) · SDG 7 (Energy) · SDG 9 (Industry) · SDG 11 (Cities) · SDG 17 (Partnerships)

The SDGs are interconnected — climate action (SDG 13) affects food security (SDG 2), water access (SDG 6), and poverty (SDG 1) simultaneously. Use systems mapping exercises in class to reveal these linkages to students across disciplines.

Agriculture – Feeding a Nation Sustainably (SDG 2, 12, 13 & 15)

India's Agricultural Reality

Over 60% of agriculture is rain-fed — highly vulnerable to climate change · **~75%** of rural households depend on farming · Projected **~20% productivity decline** by 2050 for rain-fed crops

Case 1: Stubble-to-Energy (Vedanta/Talwandi Sabo)

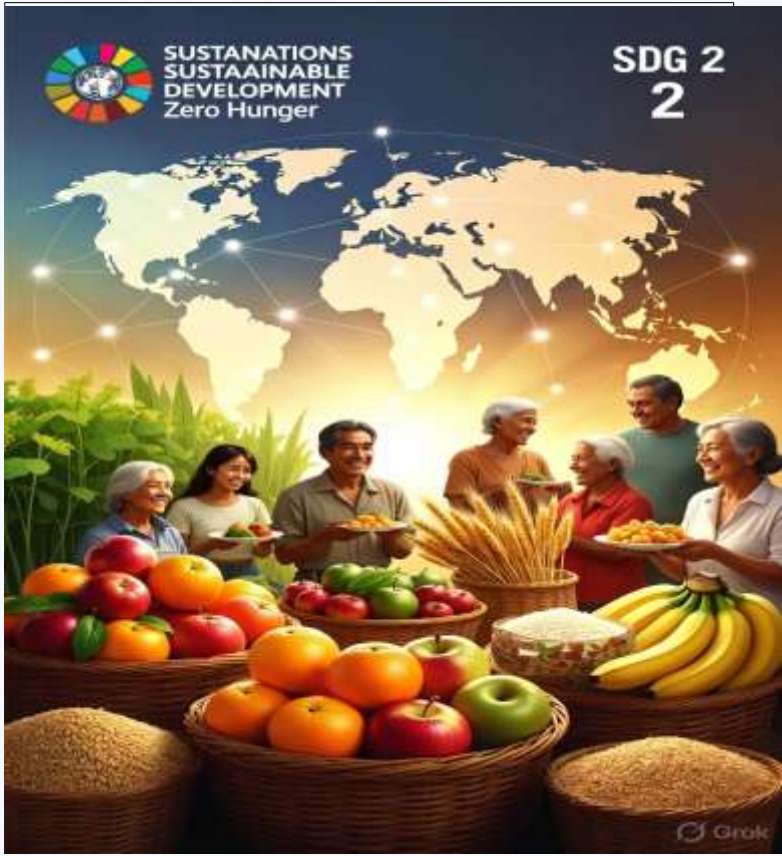
Paddy straw co-fired as biomass (up to 5%) → Tens of thousands of tonnes diverted from open burning. Links to SDG 12, 13 & 15.

Case 2: Yara India ESG Stewardship

650,000+ farmers engaged · 27% emissions reduction via rail transport · 967 million litres water recycled · Target: 70,000 tCO_2e reduction by 2026.

Case 3: Agristack – Digital Agriculture DPI

IDEA platform links soil health, weather forecasts & market intelligence for personalised farmer advisories. Improves productivity and climate resilience.



Manufacturing – Decoupling Growth from Emissions (SDG 9 & 12)

The Challenge

With Production Linked Incentive (PLI) schemes driving manufacturing expansion, the challenge is to grow output while reducing per-unit environmental intensity. ESG frameworks are becoming the mechanism for this decoupling.

ITC's Net Zero Commitments

Net Zero Operations by 2050 · 52% energy from renewables · AI-enabled Climate Risk Assessment across 140 sites · Expanding Scope 3 reporting to include supply chain partners & raw material embedded emissions

Sustainable Food Processing (MoFPI)

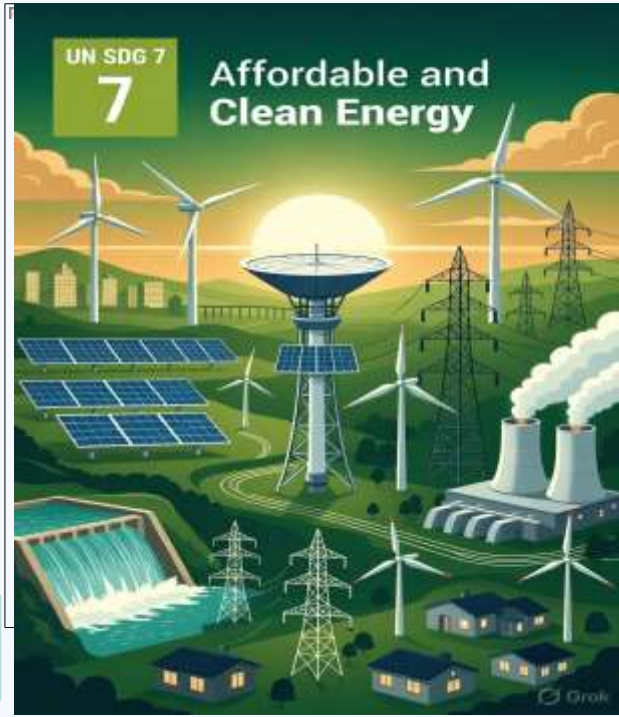
PM Kisan SAMPADA Yojana: up to ₹35 lakh per project for RE integration · World Food India 2025: dedicated 'Net Zero Food Processing' pillar · Biodegradable packaging from PLA, starch & nano fibres (NIFTEM-Thanjavur)

BRSR Barometer: Textile sector — 407 kL water per ₹1 crore revenue · Median RE adoption below 10% across sectors · Pharma outliers show >90% is achievable

Infrastructure Services – Building Green (SDG 7, 9 & 11)

Union Budget 2026–27: A Climate-Focused Infrastructure Roadmap

Public Capex ₹11.2 → ₹12.2 lakh cr	Enables low-carbon transport & logistics
Freight Corridors Dankuni to Surat DFC	Shift freight from road to rail → reduced transport emissions
National Waterways 20 new NWs over 5 years	Low-carbon inland water transport
High-Speed Rail 7 HSR corridors incl. Mumbai-Pune, Hyd-Bengaluru	Low-emission passenger systems
Renewable Energy 22.13% installed capacity	India — 4th largest global wind energy producer



Digital Public Infrastructure for Climate Action: NeGPA for crop insurance via geospatial data · National Smart Grid Mission for RE distribution · Aadhaar-enabled farmer access to subsidies, credit & insurance seamlessly

India's ESG Regulatory Architecture (2025–2026 Updates)

2012 — *Voluntary BRR*

2021 — *BRSR Notified*

2023 — *BRSR Core Mandatory*

2025 — *ESG Debt Securities*

2026-27 — *Value Chain Mandatory*

Regulator	Framework	Applicability	Timeline
SEBI	BRSR Core	Top 1,000 listed entities	Mandatory FY 2023–24
SEBI	Value Chain ESG Disclosures	Top 250 listed entities	Mandatory FY 2026–27
RBI	Climate-related Financial Risk Disclosure (draft)	RBI-regulated entities	To be finalised
SEBI	ESG Debt Securities Framework	Listed entities issuing ESG bonds	June 2025

BRSR Barometer 2025 Findings: Only 23% of companies report Scope 3 emissions · Median renewable energy share remains below 10% · Less than 20% have third-party ESG data assurance · Female workforce under 5% in heavy sectors

From UN Goals to Corporate Scorecard

Environment (E)

- To address the impact on the Physical Environment
- To Estimate the GHG for minimization
- To improve Air Quality
- To improve the Water Quality
- To improve the Soil Quality
- Waste Management
- Bio-Diversity Eco-System

Solution is Circular Economy of Re-Cycling

Social (S)

- Env. and Social Due Diligence (ESDD)
- Social Impact on all the Stake Holders
- Best Labour Practices
- Health and Safety
- Local Community Engagement

Solution is CSR & ISR

Governance(G)

- ✓ Policies & Governance Structure
- ✓ Standards : ISO, SDG and other for Estimations & Monitoring.
- ✓ Capital Commitment
- ✓ Best Practices & Ethics
- ✓ Compliance
- ✓ Reporting & Disclosures : Domestic SEBI/RBI and International
- ✓ Data Protection

Solution is Policies & Standards

EFFECTIVE TECHNOLOGY USAGE NEEDED

2026 Global ESG Trends: ISSB emerging as global baseline · Central banks integrating climate risk into monetary policy · Anti-ESG backlash in US creating regulatory fragmentation — important for cross-border business courses

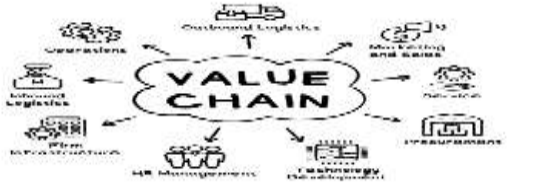
The SDG–ESG–Sector Matrix

Sector	Primary SDGs	ESG 'E' Priority	ESG 'S' Priority	ESG 'G' Priority	India Initiative
Agriculture	SDG 2, 12, 13, 15	Water efficiency, soil carbon, methane	Smallholder livelihoods, women farmers	Land governance, subsidy transparency	NMSA, PM-KISAN, Agristack
Manufacturing	SDG 9, 12, 13	Energy efficiency, RE transition, circularity	Worker safety, local employment	Supply chain governance, BRSR compliance	PLI scheme, Green Credit Program
Infrastructure	SDG 7, 9, 11	Modal shift, green building, RE integration	Resettlement, community health, local hiring	PPP transparency, anti-corruption	Budget 2026-27, PM GatiShakti

Classroom Use: Assign student groups to populate this matrix for any Indian company or government scheme — excellent for project-based learning across disciplines.

ESG Benefits For Corporates

- Corporate and Brand Image Enhancement in the Industrial and Financial Markets
- Use of Standards and Best Practices enhances the Corporate Governance & Sustainability
- ***ESG impact trickles down to the upstream value chain involving thousands of smaller players, ancillary companies and third parties***
- Employer - Employee engagement and well-being among the social parameters
- ***Financial Institutions, Green Funds and Special Funds are looking for the ESG compliant corporates. Minimizes the Cost of Funds***
- ***Positive Outlook and Improvement in the Credit Rating & ESG Rating of the Corporate***



INDIA & ANDHRA PRADESH

AI & DATA CENTRES

TRANSFORMATION LANDSCAPE

Facts · Figures · Real Estate · Infrastructure · Employment · Environmental Impact

SDG`s
6,7,11,13,16,17
Sustainability
&
Environment

Dr. Emandi Sankara Rao | www.sankararao.com

Sources: Public news articles · Ratings Agencies · Cushman & Wakefield · McKinsey · NITI Aayog · S&P Global · CEEW · MeitY · UNESCO

Leaders on the Digital & AI Revolution

Shri Narendra Modi
Hon'ble Prime Minister of India

"Digital India is an enterprise for India's transformation on a scale unmatched in human history"

Sundar Pichai
CEO, Google

"We've learned that that when we solve for a place like India, we solve for everyone around the world. #Digital Unlocked"

Satya Nadella
CEO, Microsoft

"Everything that's happening in marketing is digitised. Everything that's happening in finance is digitised. So Pretty much every function in every industry, has a huge element that's driven by information technology. It's no longer discreet."

Nandan Nilekani
Co-founder of Infosys &
First Chairman of UIDAI

"The new trifecta of a bank account, digital identity and smartphone for everyone will drive economic change."

Global Data Centre Landscape (2025–2030)

82.3 GW
Global DC demand (2025)

219 GW
Forecast by 2030 (22% CAGR)

US$ 800B
Asia-Pacific DC investment by 2030

40%
APAC share of global DC capacity

⚡ *India Structural Gap: Accounts for 20% of worldwide data production but hosts only 3–5% of global data centre capacity — the key driver for the next decade of investment*

US$ 4.5 Bn
India DC market value (2023)

US$ 11.6 Bn
Projected by 2032 (~11% CAGR)

1.3–1.5 GW
Installed capacity top 7 cities (2025)

₹6,429–7,286
Hyperscaler rate/kW/month (US$ 75–85)

Major Operators: CTRLS · Sify Technologies · NTT GDC India · Jio Datacentre · Yotta Infrastructure · AdaniConneX · Nxtra (Airtel)

Amazon Web Services	900+ facilities, 50+ countries	**US$68B pledged for India**
Microsoft Azure	400+ facilities, 70+ regions	**AI facility in Pune; $80B AI expansion**
Google Cloud	42 regions, 127 zones	**$15B AI Hub at Visakhapatnam, AP**

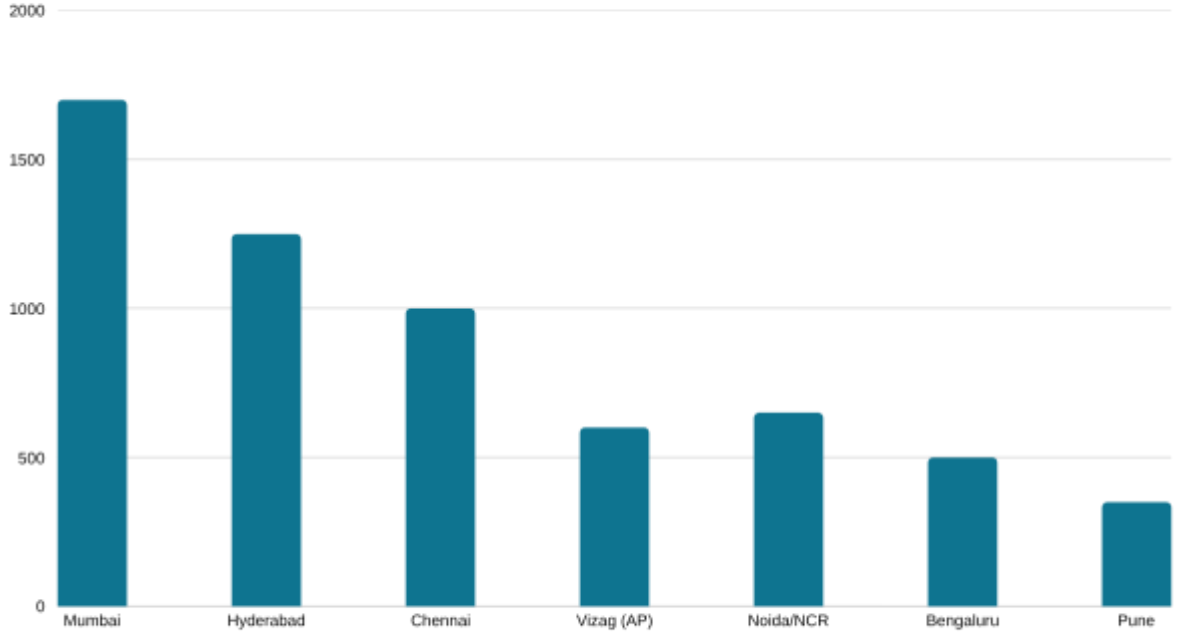
National DC Projections: 2025–2030

1.5 GW → 10 GW
Capacity growth
(5–7x expansion by 2030)

15M → 55M sq ft
DC real estate expansion

7.1 GW
Fresh capacity announced

US$ 20–25 Bn
Additional investment expected by 2030



⚡ Capacity Addition Rate

FY22–25: 150–250 MW/year
FY26–28: 300–350 MW/year
(2x acceleration)

💰 Investment Overview

Since 2020: ₹1,25,000 Cr (US$14.6B)
By 2030: US$20–25B additional
Total 5–7 yr: US$18.67–23.33B

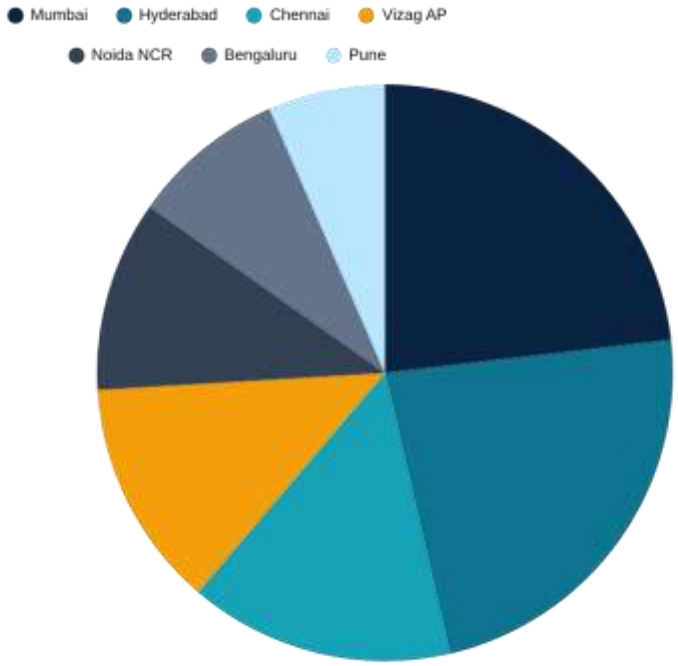
DC-Led Employment: Construction & Operations

4.2–7.98 Lakh
Total Construction Jobs (2025–2030)

1.6–3.2 Lakh
Permanent Operational Jobs by 2030

3–5x
Indirect/Ancillary Jobs per Direct Job

35 Mn+
STEM Graduates per year (India)



Operational Jobs (Direct) | Steady State Post-2028	
Mumbai	8,000–14,400
Hyderabad	5,750–10,800
Chennai	4,500–8,800
Vizag (AP) ★	**2,500–5,600**
Noida/NCR	2,750–6,000
Bengaluru	2,000–4,800
Pune	1,250–3,600

Urban Heat Island Effect & Water Stress by City

⚠ A single 100 MW AI facility rejects 120–150 MW of heat. Hyderabad adding 1,000–1,200 MW = equivalent of running 12–18 thermal power plants inside city limits continuously.

City	DC Capacity	Waste Heat (MW)	Temp Rise	Water Stress	Key Risk
Mumbai	~1,800 MW	2,160–2,700	+1.5–2.5°C	MODERATE	Monsoon flooding risk
Hyderabad	~1,350 MW	1,620–2,025	+2.0–3.0°C	HIGH ⚠	909 ML/day shortage by 2027
Chennai	~1,100 MW	1,320–1,650	+1.5–2.0°C	HIGH ⚠	Sea level rise; cyclone belt
Vizag (AP)	~700 MW	840–1,050	+1.0–1.5°C	MODERATE	Cyclone risk; grid needs upgrade
Noida/NCR	~750 MW	900–1,125	+1.5–2.5°C	CRITICAL ⛔	Yamuna severe stress; groundwater depleted
Bengaluru	~600 MW	720–900	+1.0–2.0°C	HIGH ⚠	Lakes shrinking; groundwater limit
Pune	~450 MW	540–675	+0.8–1.5°C	HIGH ⚠	Water shortage protests 2024

Green Belt Requirements & Greenhouse Gas Mitigation

42–48 Mn T
CO_2/yr by 2030 (10 GW) without renewable transition

17–19 Mn T
CO_2/yr with 61% renewable energy target

20–30 Cr
Trees needed nationally in DC hub cities by 2030

City	Temp Rise	Green Belt (Ha)	Trees Needed	Recommended Strategy
Mumbai	+1.5–2.5°C	3,000–5,000	3–5 Cr trees	Mangrove restoration; green roofs; urban forest corridors
Hyderabad	+2.0–3.0°C	4,000–6,000	4–6 Cr trees	Nala greening; Cyberabad tree buffers; lake rejuvenation
Chennai	+1.5–2.0°C	3,000–4,000	3–4 Cr trees	Coastal mangroves; IT corridor greening; wetland restoration
Vizag (AP) ★	+1.0–1.5°C	1,400–2,100	1.4–2.1 Cr	30% green cover in DC zones; coastal buffer greening
Noida/NCR	+1.5–2.5°C	3,000–5,000	3–5 Cr trees	Yamuna floodplain reforestation; Aravalli ridge protection
Bengaluru	+1.0–2.0°C	2,000–4,000	2–4 Cr trees	Lake watershed greening; Namma Green expansion
Pune	+0.8–1.5°C	1,200–2,250	1.2–2.3 Cr	Mula-Mutha river greening; 25%+ campus green cover

Policy Recommendations for Responsible DC Development

Mandate Green Cover

Minimum 25–30% green cover on all new DC campuses above 50 MW capacity

Water Impact Assessment

Require WIA before granting DC approvals in water-stressed cities; max WUE 1.5 L/kWh

National DC Green Code

Introduce under the National Building Code as recommended by Deloitte; mandatory PUE ≤ 1.3

DC Economic Zones

Create 4 dedicated Data Centre Economic Zones (DCEZs) with built-in green infrastructure

100% Renewable by 2028

Link DC tariff incentives to RE commitments; 100% RE mandate for AI-grade DCs by 2028

Liquid Cooling Mandate

Require liquid or closed-loop cooling for all AI/GPU facilities (rack density > 30 kW/rack)

Urban Forest Programme

Target 20–30 crore trees in DC hub cities by 2030; integrate with National Urban Forest Programme

Oversight Committee

Create Visakhapatnam DC Oversight Committee — GVMC, APPCB, APEPDCL, Andhra University, fisheries

Integrated Teaching Framework – Five Pedagogical Innovations

1

Systems Thinking Exercise

Map one SDG (e.g., SDG 13) → 4 interconnected SDGs. Ask: How does a climate policy in agriculture affect manufacturing employment?

2

ESG Case Clinic (Harvard Method)

Use actual BRSR filings. Students roleplay: ESG analyst, board member, activist investor, regulator. Substantiate claims using performance data.

3

Policy Simulation

Teams represent MoEFCC, NITI Aayog, SEBI, MoF. Problem: Accelerate ESG compliance in MSMEs without excessive burden. Debate mandatory vs. voluntary.

4

Data Analytics Assignment

Use NITI Aayog SDG Index & BRSR Barometer 2025. Compare state-wise performance. Correlate ESG metrics with economic growth data.

5

Field Immersion

Partner with local industry for a sustainability audit. Students evaluate a food unit or agri-cooperative against ESG indicators. Prepare recommendations mapping to SDG targets.

Conclusion & Call to Action for Faculty

"Transformative change begins with transformed mindsets. Cultivating a culture of sustainability is not optional — it is foundational. Education is the primary vehicle for this transformation."
UNECE Regional Forum, 2026

This Week	This Month	This Semester
Download the SDG India Index & BRSR Barometer 2025. Identify one sector or indicator relevant to your course.	Redesign one assignment with an SDG/ESG dimension — even 5 marks allocated to 'sustainability implications' is a start.	Invite a guest speaker from SEBI, MoSPI or a BRSR-certified corporate sustainability officer via virtual session.

Your Role as Faculty: You are cultivating environmental consciousness among future policymakers, managers, engineers, and citizens.

- NITI Aayog SDG India Index Dashboard
- SEBI BRSR Portal (sebi.gov.in)
- BRSR Barometer 2025 (green.indianexpress.com)
- SDG Index (sdgindex.org)
- MoSPI SDG NIF Progress Report 2025

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Key Discussion Questions for Faculty Reflection

Q1 Intersection of SDGs: Contradictions or Synergies?

SDG 8 (growth) vs SDG 13 (climate action). Can India achieve both simultaneously? What does evidence from 2015–2025 show?

Q2 The SME vs Large Corporate Gap

BRSR applies to top 1,000 entities. What about MSMEs (99% of Indian enterprises)? How does ESG affect their cost of capital?

Q3 Data Quality & Assurance

Only 23% report Scope 3 emissions. Less than 20% have third-party ESG assurance. Is this a regulatory design failure?

Q4 The 'Just Transition' Question

As manufacturing decarbonises, who bears the adjustment costs? How do we ensure vulnerable groups are not left behind (SDG 10)?

Q5 Global vs Local ESG Standards

India built its own BRSR Core rather than adopt ISSB directly. Is this a strategic advantage or a barrier to foreign investment?

For Inclusive Sustainable Infra Development And Brand Vizag & AP

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