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FICCI 100
100 YEARS OF BUILDING TOMORROW

CIRCULAR ECONOMY
WEBINAR SERIES

Concept of Circular Economy and Sustainable Waste Management

The Zero Waste to Landfill & Circular Economy Playbook

Solutions you can implement starting Monday morning.

Today we read the hidden balance sheet together.

Presented by
Tarak Nandan Sahay

2 Introduction

This is not a compliance session. This is a competitiveness session.

Most sustainability webinars talk about problems. Today we talk about solutions you can implement on **Monday morning.**

Waste is not a cost of doing business — waste is money left on the table. Today we show you how **to pick it up.**

Every industry in this room is sitting on a hidden balance sheet — the value of materials they are throwing away. Today we read that **balance sheet together.**

This is a competitiveness session. Because the companies winning markets in 2035 are the ones building **the smartest material loops today.**



How Much Money is Buried in This Landfill?

Every tonne represents raw materials purchased, transported, processed, handled — and then discarded.

Landfill is not the end of a waste stream. It is the end of value creation.

100+ Bn Tonnes

Materials consumed annually

Only 6.9%

Global circularity rate

93%

Materials lost from economy

The Scale of the Crisis

Global resource consumption by the numbers

100+ Bn Tonnes

Materials consumed globally per year

Only 6.9%

Global economy circularity rate

93%

Materials NOT recovered back into the economy

500+ Bn Tonnes

Materials consumed globally in just 6 years

1.45 Lakh MT

India's daily municipal waste generation

72 Bn Litres

India's daily wastewater generation



Our resources are finite.
Our responsibility is infinite.

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“Every tonne sent to landfill is purchased value destroyed.”



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What is inside ONE TONNE of industrial waste?

Before reaching landfill, industry has **ALREADY** paid for:



- Raw Material Procurement
- Transportation
- Storage
- Processing Energy
- Water Consumption
- Labour
- Packaging
- Internal Handling
- Waste Transportation + Disposal Cost



Landfill receives the material AFTER all value-adding costs have been incurred.

Climate Linkage

Material extraction & processing are major drivers of global emissions

"The future industrial leader will not be defined only by production capacity."

"It will be defined by how intelligently it manages resources in closed loops."

"Zero Waste to Landfill becomes more than a waste initiative — it becomes a strategic industrial transformation model."



Global Resource Loss

100 Bn+ Tonnes

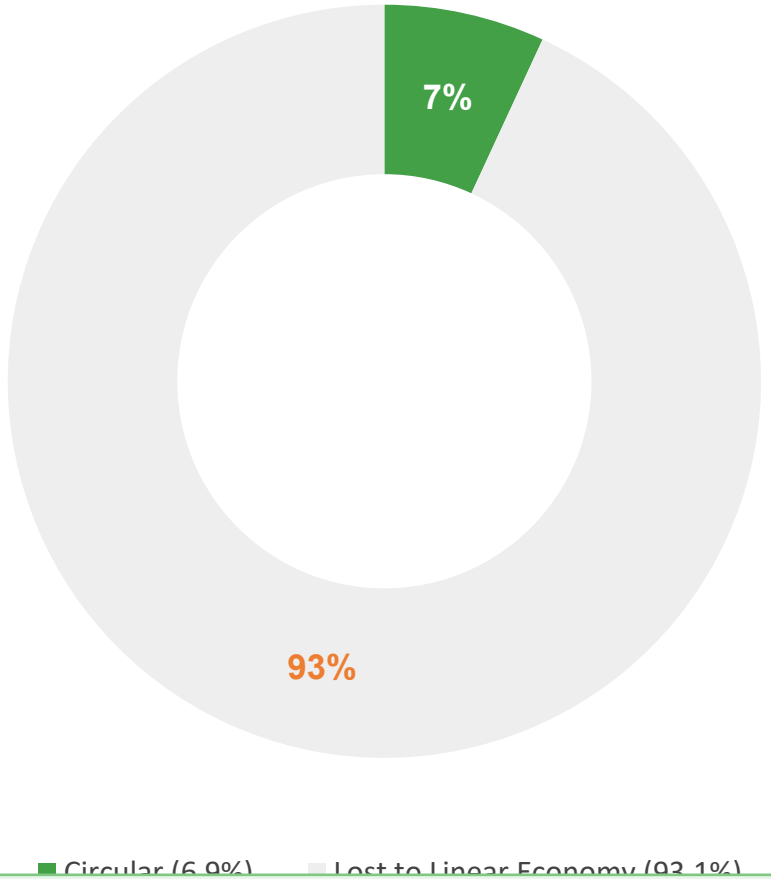
Materials consumed globally every year

Only 6.9%

Comes back into the economy via recycled/secondary sources

↓ from 9.1%

Circularity has DECLINED since 2018



"Imagine if a manufacturing plant ran at only 7% recovery efficiency. No CEO would accept it. Yet globally — that is exactly what's happening."

INDIA'S WATER CRISIS IS REAL.
BUT SO IS THE OPPORTUNITY.

INSTITUTE FOR WATER AND CLIMATE INITIATIVES

1,588 m³
water per person per year in India (2025)
By 2050, this drops to ~1,140 m³.

Below 1,700 m³
is classified as extreme water stress (NITI Aayog).
India has crossed that line.

Groundwater falling 1–3 metres
every year in the north-west. Monsoons are getting more erratic. And we keep pumping.

Nearly **600 million** people in India are already experiencing high to extreme water stress (2025).

INDIA GENERATES
77 BILLION LITRES
OF WASTEWATER EVERY DAY.

25%
Less than 25% of India's wastewater is treated.

3%
Less than 3% is reused.

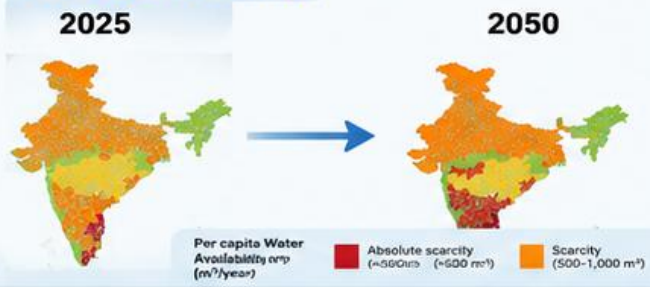
"The remaining **75%** is yet to be treated.

GLOBAL BENCHMARKS

GERMANY
96%
of wastewater is treated
Advanced industrial water reuse systems

JAPAN
97%
of wastewater is treated
Advanced wastewater treatment systems

THE 2050 WARNING



Most of India is already in the danger zone. Nearly 600 million people experiencing high to extreme water stress in India!

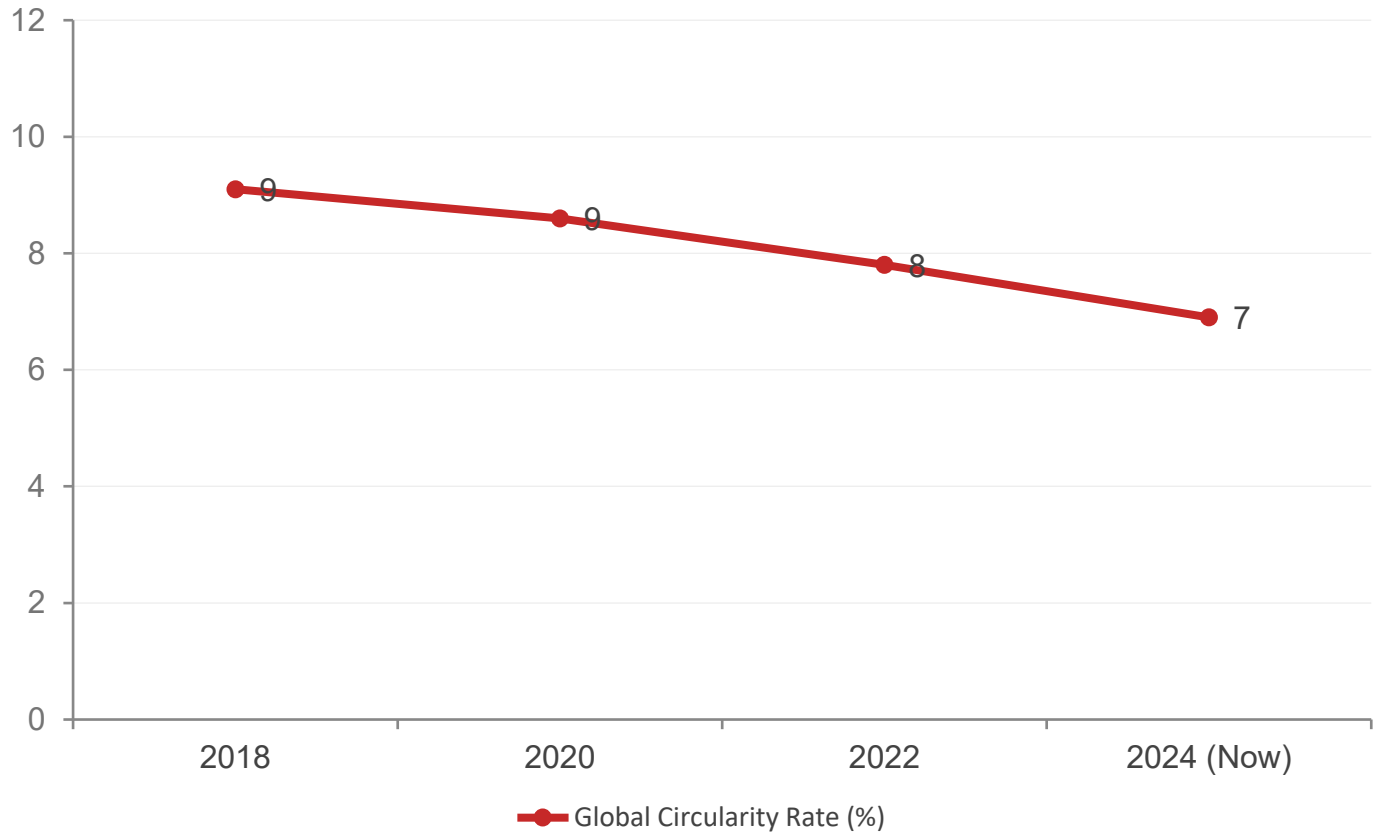
THE CIRCULAR ECONOMY OPPORTUNITY

Treat. Reuse. Restore.
Closing the loop on water can secure our future, strengthen industries, and build a water-resilient India.

From Wastewater to Wealth.
From Crisis to Circularity.

Sources: NITI Aayog Composite Water Management Index Report, 2018 | NITI Aayog (Water Availability Projections) | CPCB (2023) | Government of India Reports | IWCI Analysis

The World is Consuming Resources Faster Than It Can Recover



100 Bn+

Tonnes consumed globally every year

6.9%

Only this much cycles back into the economy

↓ 9.1%→6.9%

Circularity has DECLINED since 2018

Join the Circular Transformation — Zero Waste to Landfill Starts Here.

Circular Economy Creates Value

NET ANNUAL GAIN

$108.5 Billion

per year — by moving towards circular economy systems vs. continuing today's waste practices (UNEP)

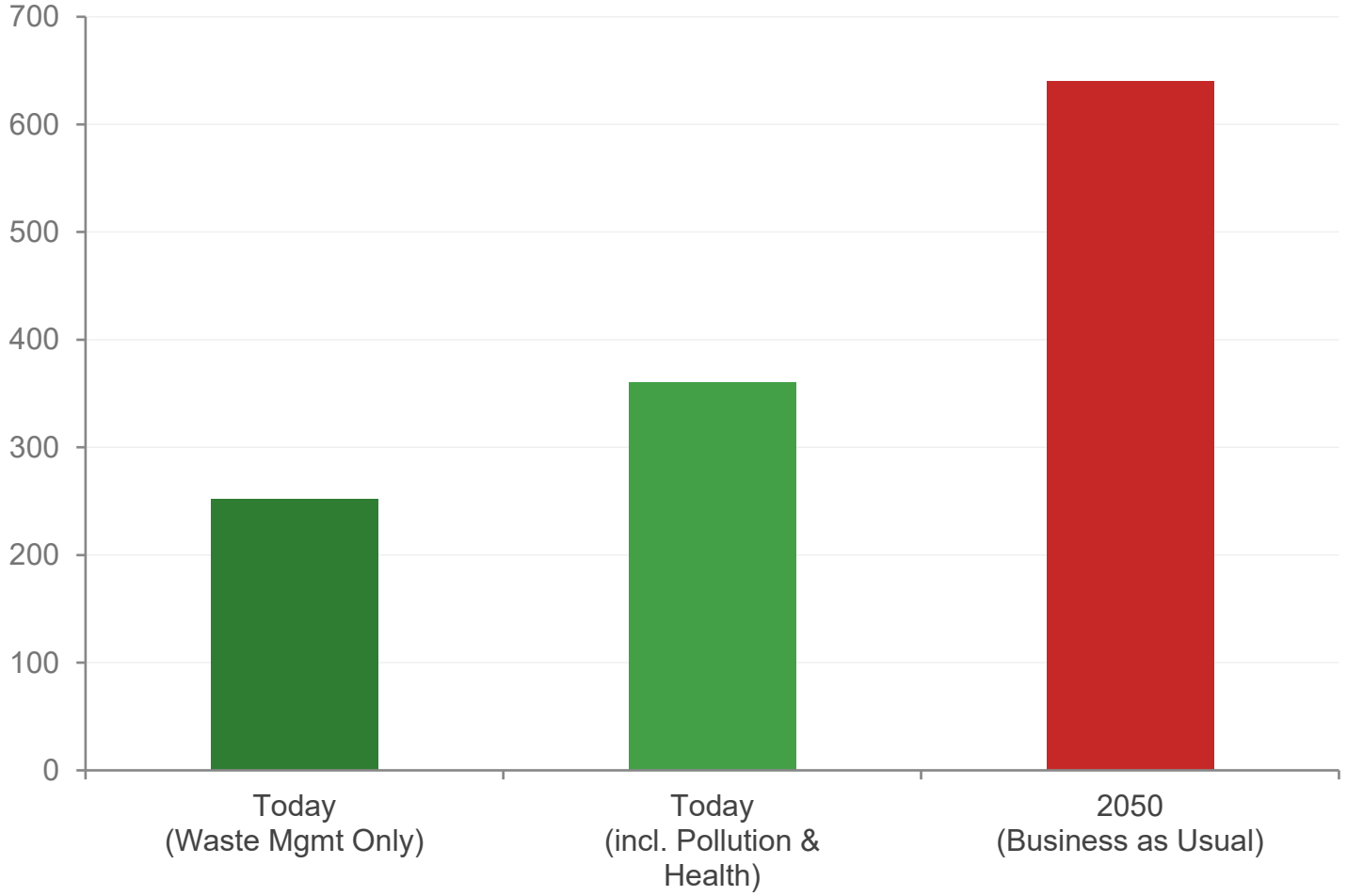
What drives this gain?

- Recovery of materials that would otherwise be lost
- Reduced raw material procurement costs for industry
- Lower waste disposal and environmental compliance costs
- New secondary material markets and circular business models

"The question is no longer whether we can afford circularity. The question is whether we can afford NOT to."

Economic Cost of the Linear Model

Source: UNEP Global Waste Management Outlook



$252 Bn

Annual waste management costs today

$361 Bn

True cost incl. pollution, health & climate impacts

$640 Bn

Projected cost by 2050 under business-as-usual

"Landfill is not just consuming land — it is creating a growing economic liability."

What is Zero Waste to Landfill (ZWTL)?

ZWTL does not mean zero waste generated. It means zero waste buried.

THE ZWTL HIERARCHY

REDUCE	REUSE	RECYCLE	CO-PROCESS	LANDFILL
Don't create it in the first place	Direct reuse at highest value	Material recovery loops	Cement kiln / energy recovery	❌ Not allowed under ZWTL

ZWTL CERTIFICATION TIERS

🥈 **SILVER**
90%+ Diversion

🥇 **GOLD**
95%+ Diversion

🏆 **PLATINUM**
100% Diversion

Global FTAs: ZWTL as a Trade Tool

"This is the key reality industries still underestimate — future trade access will increasingly depend on circular economy performance."

Future Trade Access Will Depend On:

Carbon Intensity

Low-carbon products gain preferential access under EU CBAM & green trade agreements

Waste Footprint

Waste per unit of production will become a supply-chain qualification criterion

Recyclability

Product recyclability metrics required under EU Ecodesign & sustainable product regulations

Resource Efficiency

Resource productivity ratios increasingly embedded in supplier qualification frameworks

Supply Chain Traceability

Material provenance and ESG documentation required for global procurement

ESG Disclosures

BRSR, GRI, CSRD compliance becoming baseline for global market participation

Circular Economy: The Foundation of ZWTL

⚠ LINEAR ECONOMY

TAKE (Raw Material) → **MAKE (Manufacture)** → **DISPOSE (Landfill)**

- End-of-pipe thinking — waste is a problem to dispose of
- ETP treats water then discharges it — value lost
- Wastewater is a department, not a design principle
- Measures: how much waste treated
- Old model: manage the problem after it's created

♻ CIRCULAR ECONOMY

TAKE → **MAKE** → **TAKE BACK** → **MAKE AGAIN**

- Upstream design — engineer waste out before it starts
- ZLD reclaims water and returns it to production
- Circular economy is a design principle, not a department
- Measures: how much material value recovered
- Steel plant slag = premium raw material for cement industry

What's Driving Industries to ZWTL & Water Neutrality?

Regulation

EPR mandates, Plastic Waste Rules, Hazardous Waste Rules, CPCB norms tightening every year.



Markets

IKEA, Unilever, Apple, BMW — all told Indian suppliers ZWTL certification is a future procurement requirement.



Green Finance

ESG-linked loans from SBI, HDFC & IFC at 40–80 bps lower rates. On ₹500 Cr: saves ₹2–4 Cr/year in interest.



Water Licence

Water neutrality is fast becoming a licence-to-operate condition in water-stressed states.



Export Requirement

New FTAs signed by the European Union and other developed economies are introducing mandatory compliance requirements for businesses engaged in global trade.



Four Principles of Circular Economy

Eliminate · Circulate · Regenerate · Systems Think

01 Design for Circularity

The cheapest way to manage waste is to not create it. This decision happens in the design room, not in the waste yard.

→ *Your design engineers are your most important sustainability resource.*

02 Preserve Material Value

Hierarchy: Reuse › Repair › Remanufacture › Recycle › Recover Energy.

→ *Most Indian industries jump straight to recycling — missing the higher-value options above it.*

03 Renewable Energy for Circular Processes

Running a recycling plant on coal-fired power is not circular.

→ *The energy loop must close with renewables for ZWTL to deliver its full carbon benefit.*

04 Systems Thinking

You cannot optimise a circular economy one factory at a time. Your waste is someone else's raw material.

→ *Think in clusters, not chimneys.*

The Role of Data in ZWTL

"You cannot divert what you have not measured." — ZWTL starts with waste characterisation.

Real-Time IoT Monitoring

At waste generation points, treatment systems & dispatch gates — converting diversion rate from an annual estimate to a live operational metric.

Material Flow Accounting

Mass balance for your plant — every kg that enters must be accounted for at exit. The gaps reveal where value is leaking.

Lifecycle Assessment (LCA)

Quantifies the environmental benefit of circular choices. Tells you whether co-processing fly ash actually saves carbon, or just moves it around.

Blockchain Waste Manifests

Unbreakable chain of custody for hazardous waste — audit-ready documentation for regulators, insurers & global buyers simultaneously.

BRSR & CDP Reporting

Your disclosures are only as credible as the data behind them. Companies investing in waste data infrastructure gain a 3–5 year reporting advantage.

Waste Characterisation

Know type, quantity, composition & generation point of every stream. This is the non-negotiable starting point for any ZWTL programme.

Business Value of Circular Economy + ZWTL

PRIMARY CASE

Material Cost Reduction

Every tonne recovered & reused = a tonne of virgin raw material not bought. In a commodity business, this is margin.

SECONDARY CASE

Avoided Costs

Landfill fees, hazardous waste treatment, regulatory penalties, litigation risk from environmental damage — all eliminated.

TERTIARY CASE

Revenue from Secondary Materials

Certified fly ash, recycled plastic pellets, recovered copper, compost — these have market prices. Your waste yard is a product portfolio.

💹 ESG-linked green finance: 40–80 basis points lower interest rates with circular economy metrics. On a ₹500 Cr facility → ₹2–4 Cr saved annually. Green finance is not abstract — it is cheaper capital right now.

INDIAN PROOF POINTS

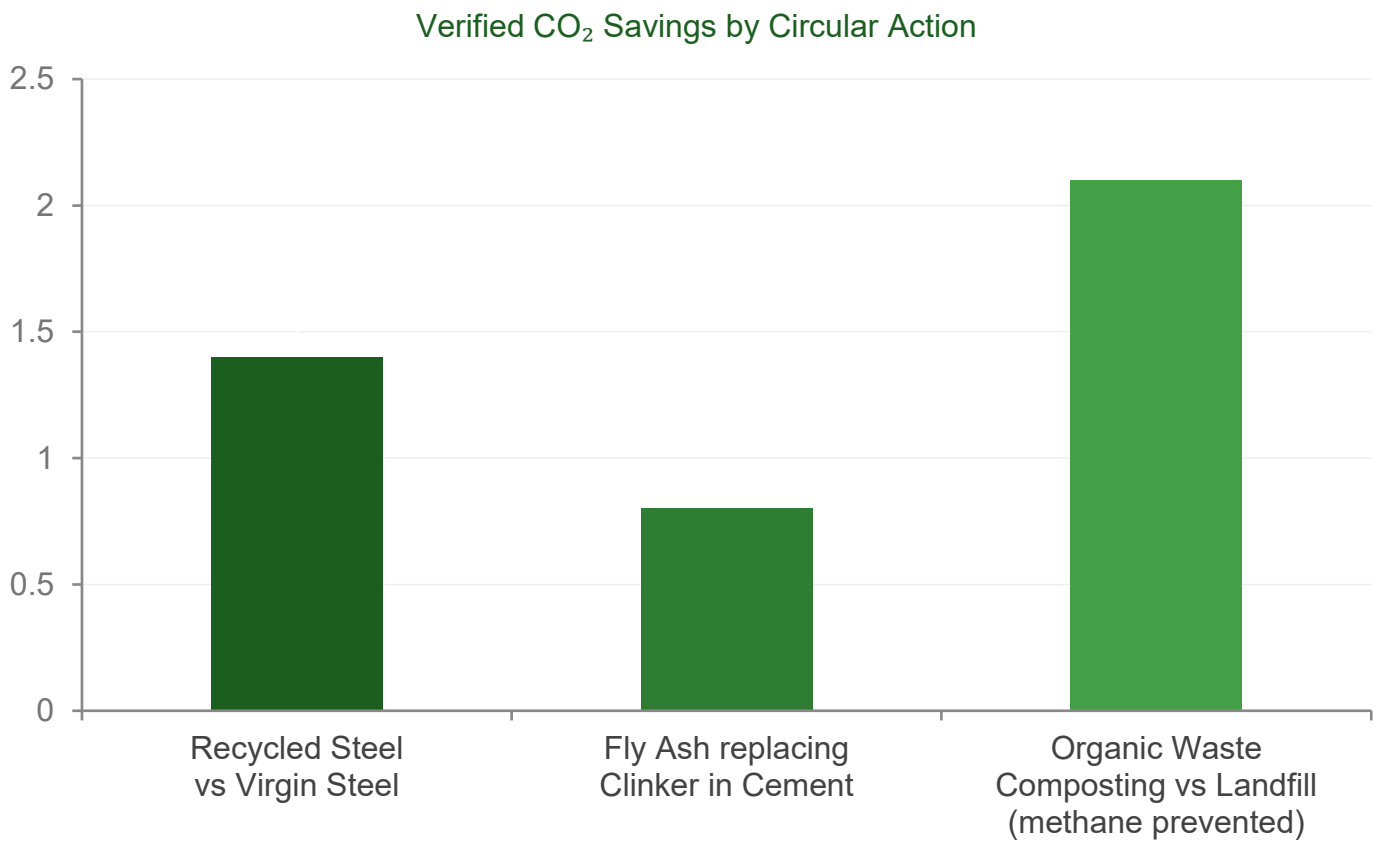
Tata Steel
100% steel slag repurposed

Hindustan Zinc
Sulphuric acid → fertiliser feedstock

ACC Cement
Fly ash as clinker substitute

How Circular Economy Reduces Carbon Intensity

Circular economy addresses ~45% of global GHG emissions — the portion that energy transition alone CANNOT solve.



- Industrial symbiosis shares waste heat & steam — reducing total energy without a single solar panel.
- Water recycling & ZLD reduce energy burden of freshwater treatment — an invisible carbon saving.
- Running circular processes on renewables is the final step to close the carbon loop.
- For SBTi companies, ZWTL is the primary mechanism for delivering Scope 3 emission reductions.

Key Indicators: How Industries Will Be Measured

Waste Diversion Rate

100% = Platinum

Below 90% = not in the conversation

Material Productivity

↑ ₹ per kg consumed

Revenue generated per kg of material input

Water Recycling Ratio

Mandatory metric

Becoming a site approval condition

Secondary Material Input

% from recycled sources

Measures demand-side circularity

Carbon Intensity

tCO_2 per tonne output

Directly connects ZWTL to climate targets

Cost Avoidance

₹ Cr / year

The CFO's number — makes the internal case

EPR Compliance Rate

100% only acceptable

Non-compliance = criminal liability

ZWTL Certification Tier

Silver → Gold → Platinum

Set a 3-year roadmap. Announce it publicly.

Future of Industries: Circular Manufacturing

1

Now

Measure & Disclose

Waste characterisation, BRSR reporting, ZWTL baseline

2

2027

Certify & Optimise

ZWTL Silver/Gold. IoT-enabled tracking. Secondary material markets

3

2030

Industrial Symbiosis

Cluster-level waste exchange. Shared heat, steam, and by-products

4

2035

Factory of the Future

No waste yard. Only a resource recovery bay. AI-routed material streams

IN India's Advantage: Industrial clusters (Surat, Ludhiana, Tiruppur, Pune, Bhilai) are geographically concentrated. The infrastructure for symbiosis is sitting there — waiting to be connected.

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3 Steps to Begin Today:

1. Measure — Know every waste stream
2. Disclose — BRSR data earns credibility
3. Recover — One waste stream at a time

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The Journey Begins with One Waste Stream.

- Circular economy and ZWTL are no longer optional sustainability initiatives.
- They are the metrics by which future industrial competitiveness will be measured.
- The companies building circular systems today will be the industrial leaders of 2035.

"ZWTL is not the destination — it is the discipline that gets you there."

Thank You.

website - www.zwc.co.in

contact@zwc.co.in

ZERO WASTE CIRCULAR

Circular Economy · Zero Waste to Landfill · Water Neutrality · Resource Recovery