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IndianOil

INDIANOIL CORPORATION LIMITED, MARKETING DIVISION, IOCL LONI LPG BOTTLING PLANT, UP

CII NATIONAL AWARD FOR ENVIRONMENTAL BEST PRACTICES 2026

CREATION OF A BIODIVERSITY-RICH CARBON SINK THROUGH DIGITAL GREEN ASSET MANAGEMENT

RESOURCE & MATERIAL CONSERVATION / BIODIVERSITY MANAGEMENT / CLIMATE CHANGE & MITIGATION EFFORTS

Technology Partner: Mynzo Carbon

mynzo

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PROJECT SUMMARY

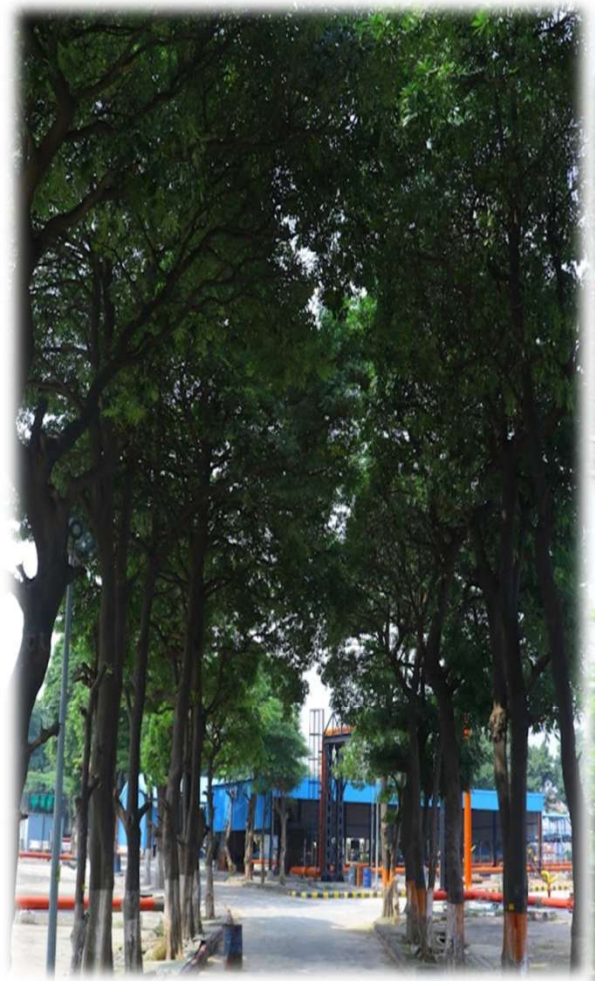
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Sr No.	Parameter / Dimension	Details & Operational Metrics
1	**Project Title**	Creation of a Biodiversity-Rich Carbon Sink through Digital Green Asset Management.
2	**Trigger of the Project**	Institutionalized unmonitored green cover into an auditable carbon sink supporting IndianOil's Net Zero pathway.
3	**Uniqueness of the Project**	**Digitization of Natural Assets via AI & Ground Calibration:** First-of-its-Kind Transitioning industrial green cover from passive compliance to a dynamic, geo-tagged enterprise carbon ledger.
4	**Timeline vs Planned Dates**	Commenced Nov 01, 2025; Full field & digital audit completed March 30, 2026
5	**Milestones Achieved**	5,527 trees mapped, 2,682 tCO2e sequestered, 18.2 acres identified for afforestation.

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PLANT GREEN COVER AT A GLANCE

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TANGIBLE BENEFITS

LIVING CARBON STOCK

2,682 tCO_2e

2,681,728 $kgCO_2e$ sequestered

CANOPY GROWTH

+30.3%

0.7% (2003) to 31.0% (2026)

BOTANICAL DIVERSITY & SPECIES BIOMASS DISTRIBUTION

Taxonomic Richness: Catalogued **31 distinct native species** across a verified inventory of **5,527 living trees**.

High-Yield Native Hardwoods Distribution:

- **Jamun: 486 trees** sequestering **253.4 tCO_2**
- **Arjun: 202 trees** sequestering **203.3 tCO_2**
- **Pipal: 37 keystone trees** sequestering **118.3 tCO_2**

COMPREHENSIVE INDUSTRIAL LAND ZONING & ALLOCATION

Categorized 100% of the plant's 101-acre premises into defined operational zones:

34% (34.3 Acres): Built operational infrastructure.

31% (31.3 Acres): Dense, mature green canopy.

18% (18.2 Acres): Non-hazardous open parcels.

17% (17.2 Acres): Earthen retention berms and grass buffers.

INTANGIBLE BENEFITS

Energy & Thermal

1.8°C microclimate reduction across plant offices and plant operating area.

Water & Soil Recharge

Groundwater percolation across 31.3 acres mature green cover and berms.

Toxicity & Dust Filter

Perimeter bio-shield absorbing Near Road PM10/PM2.5 and Industrial dust.

People & Society

Dense green barrier dampens terminal noise and buffers neighboring residential areas from industrial emissions.

Healthy microclimate for 600 internal stakeholders

Morale & Motivation

Transforms a hazardous LPG bottling plant into a recognized ecological haven supporting pollinators, birds, and flora.

Active shift adoption of plant groves

Mindset Shift & ESG

Shifts mindset from passive compliance to proactive Natural Capital accounting with strict zero-felling charters.

Compliance driven to asset creation

GREEN ASSET ASSESSMENT

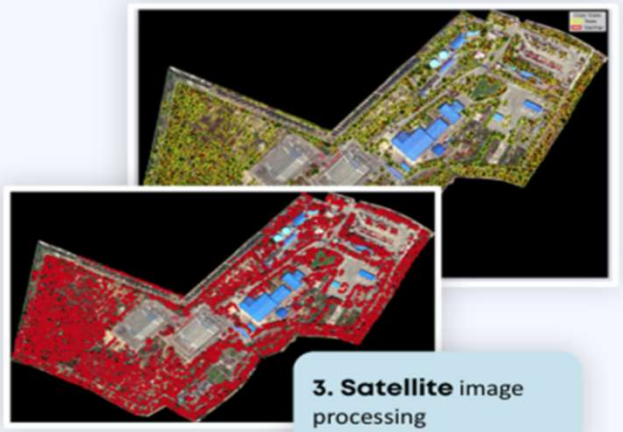
Overview of *process steps*



1. KML boundary and image acquisition



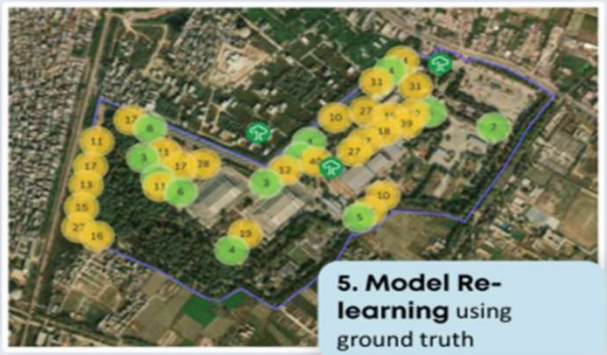
2. Baseline using historic images and assessments



3. Satellite image processing



4. Ground truth sampling



5. Model Re-learning using ground truth

6. **Carbon** Assessments and audit Trail

Common Name	No. of Trees	CO2e (Metric Tonnes)
Safeda	18	29.59
	18	37.77
	37	118.27
	138	87.99
	202	203.28
Jamun	486	253.39
Botale brush	83	35.87

GROUND TRUTH COLLECTION



607

GEO-LOCATED SAMPLES

Physically audited across Loni plant zones



31

DISTINCT SPECIES

Diverse multi-canopy botanical richness



86

SAMPLES PER DAY

Daily survey audit velocity with GPS logging

Allometric Tree Parameters

Field teams captured Diameter at Breast Height (DBH) at 1.37m, crown width across two orthogonal axes, total height, and vitality status.

Botanical Verification

Foliage, bark texture, and branching morphology were photographed to confirm taxonomic classification, cross-referencing regional forestry indices.

Satellite Spectral Re-Anchoring

The 607 tagged positions served as the training corpus to calibrate spectral signatures across the remaining 4,920 trees across the 101-acre premises.

PROJECT:BEFORE / AFTER SCENARIO

	BEFORE SCENARIO	AFTER SCENARIO (IMPLEMENTED)
Green Cover & Biomass Baseline & Accounting	Unverified tree counts relying solely on paper nursery purchase bills.	31.0% mature canopy (+30.3% delta); 5,527 geo-tagged trees holding 2,682 tCO_2e verified carbon.
MRV & Precision Measurement Technique	Manual Estimation	AI crown segmentation retrained via 607 ground GPS DBH audits, lifting accuracy above 95%.
Land Optimization Zoning & Expansion	101-acre premises unclassified; barren patches unquantified without clear plantation demarcation.	18.2 acres land identified for approx. 2880 trees plantation
ESG & Carbon Ledger Statutory Assurance	Passive environmental compliance; unmonitored green belts with zero auditable carbon asset value.	Full dynamic compliance, geo-tagged enterprise carbon ledger.

REPLICATION POTENTIAL ACROSS IOCL

PILOT BENCHMARK
Loni BP: 101 Acres

TOTAL SCALED FOOTPRINT
26,973 Acres Across IOCL

LAND ALLOCATION & PLANTATION READINESS

GREEN CANOPY
31%
8,362 Acres Across IOCL
31.3 Acres at Loni

OPEN / UNUTILIZED
18%
4,855 Acres Potential
18.2 Acres at Loni

OTHERS (UTILITIES)
17%
4,585 Acres
17.2 Acres at Loni

OPERATION AREA
34%
9,171 Acres Operating
34.3 Acres at Loni

TOTAL CARBON STOCK
34,04,000 tCO_2e

Loni Pilot Baseline: 2,682 tCO_2e

ANNUAL CARBON SINK
1,48,000 tCO_2e/yr

Loni Pilot Baseline: 116 tCO_2e/yr

AFFORESTATION TARGET
Forestry Model

7.68 Lakh Trees

Target Incremental Sink: 0.0178 $MMTCO_2e$

WHAT NEXT

Systematic rollout across 464 Marketing Units & 11 Refineries to unlock 4,855+ acres of plantation potential.

REPLICATION SCALE-UP & DISSEMINATION

Scale-Up & Succession

- **National Scalability:**

  Ready for cross-sector public and private adoption.

- **Succession & Continuity:**

  Tech-driven, self-sustaining HSE framework combining standardized SOPs with user-friendly, annual telemetry training.

100% In-house HSE execution capability

Knowledge Dissemination

- **ESG & Statutory Sharing:**

  Published in IndianOil Annual Sustainability Reports and directly integrated BRSR Core Principle 6 disclosures.

- **Industry Best-Practice Exchange:**

  May present at CII GreenCo summits, and inter-PSU workshops as a replicable digital forestry model.

National benchmark for PSU Natural Capital accounting

KEY CHALLENGES & STRATEGIC COUNTERMEASURES

Satellite Distortion

Overlapping crowns caused 48% satellite undercount (2,835 detected vs 5,527 actual trees).

607 ground GPS DBH coordinates re-train the AI model, segmenting crowns with >95% accuracy.

Missing Archives

Complete absence of 2003 plantation records, sapling survival logs, and boundary surveys.

Reconstructed an independent 23-year temporal growth trail using archived 2003 satellite data.

Species Variance

31 diverse species made flat generic plantation carbon factors wildly inaccurate.

Applied species-specific allometry (Ficus, Arjun, Jamun etc).

NATIONAL BENCHMARK & BEST PRACTICES

5M Parameter	Global Frontier i.e. BHP, Golden Agri-Resources (GAR)	National Leaders i.e. Tata Steel, Titan Company, Adani, ITC, JSW etc)	Our Integrated Model	Traditional Industrials
Men (Workforce)	Central specialized ESG teams	Dedicated forestry contractor	**Plant HSE technicians upskilled (86/day)**	Contract gardeners; zero training
Material (Species)	Commercial agro-forestry saplings	Mixed native hardwood	**31 native species (Jamun, Arjun, Peepal)**	Monoculture eucalyptus & shrubs
Methods (MRV)	Annual airborne LiDAR drone flights	Sample quadrat ground counting (CDM: Clean Development Methodology)	**Satellite AI + 607 Ground Telemetry**	Nursery bill paper counts
Technology	Proprietary digital forestry twins	Desktop GIS mapping (ArcGIS)	**AI Driven App**	Basic spreadsheets without GPS
Measurement (Audit)	Verra / Gold Standard registered	Third-party biennial audit	**2,682 tCO_2e verified living stock**	Hypothetical seedling survival formulas

WAY AHEAD

Near Term Strategy: In-Plant Expansion (2026-28)

- **Barren Land Afforestation:** Plant 2880 native saplings across mapped 18.2 acres identified land (18% open land).
- **High-Yield Selection:** Mandate Ficus varieties (Pipal 40-90 kg/yr) and Jamun (25-45 kg/yr) for 2.5× faster carbon yield.
- **Scale to 464 Marketing Units and 11 IOCL refineries:** Expand standardized digital MRV across 4,855 Acre identifiable area across IOCL
- **Digital biodiversity eassessment:** Re-run sub-meter satellite telemetry to record incremental trunk girth and sapling survival rate via MYNZO mobile app or similar app.

Long Term Strategy: Network Replication (2028-31)

- **Central Enterprise Green Ledger:** Real-time dashboard tracking removals across 13217 Acres developed green cover land.
- **TNFD & GRI Nature Ledger:** Institutional No-Net-Loss (NNL) reporting directly fed into BRSR Core Scope 1 disclosures.
- **CCTS Credit Monetization:** Register physical sinks under Bureau of Energy Efficiency (BEE) Carbon Credit Trading Scheme.

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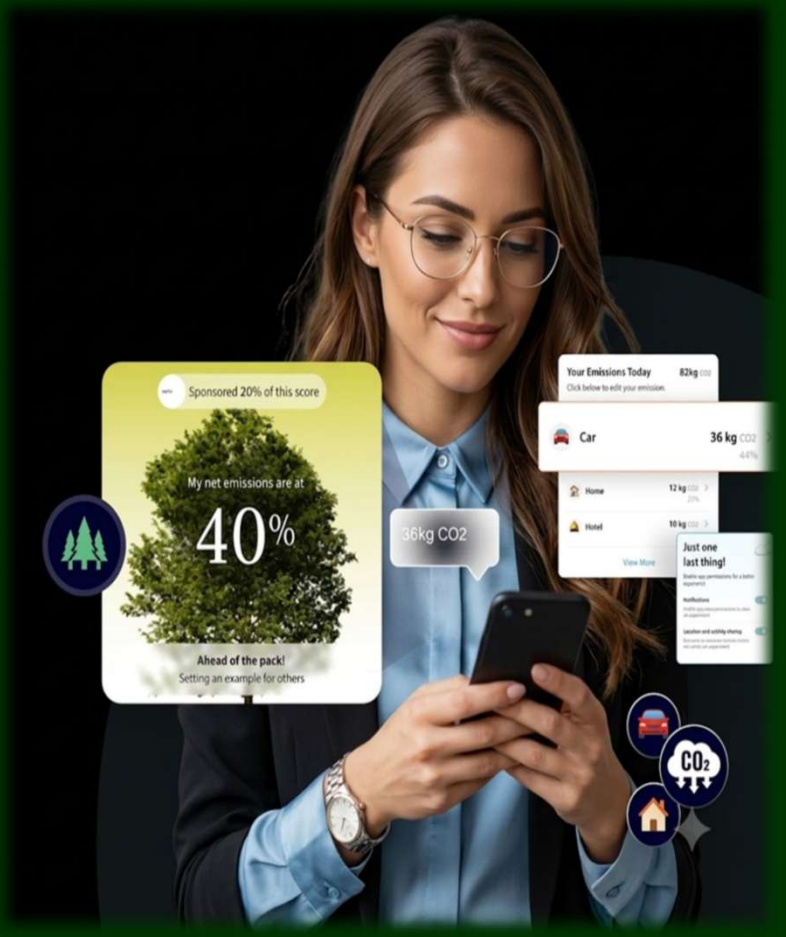
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Leading the Clean Energy Transition through Verifiable Green Assets

Thank You



Technology Partner: Mynzo Carbon
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