Confederation of Indian Industry

Larsen & Toubro Limited
Construction Division

CII - National Award for Environmental Best Practices 2025

A Greener Tomorrow, Built Digitally

Presented by:

1) **V.Kasiraja**, VP & Head, Plant & Machinery
2) **S.Janakiraman**, Sr.DGM, Plant & Machinery
3) **Pradeep Paul**, DGM, COE Digital
4) **Rama Chandra Sekhar**, Manager, Plant & Machinery

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Trigger of the Project

The construction industry significantly contributes to greenhouse gas emissions due to its heavy use of fossil fuels and energy-intensive materials like cement and steel. Fossil fuel consumption is widespread and sometimes hidden under other industries, but it greatly increases carbon emissions when combined. Large amounts of water and energy are also consumed during the construction phase, adding to the environmental impact. The industry's large scale and growing material demand amplify its carbon footprint.

In L&T Construction:

Committed to carbon and water neutrality, we analyzed high-emission construction activities like fossil fuel use, concrete consumption, and excess water and energy use. Mega projects require heavy diesel machinery and significant resource use, increasing emissions. To improve accuracy and efficiency toward net zero, we digitized operations despite data collection challenges across stakeholders.

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Project Title : A Greener Tomorrow, Built Digitally

Equipment Performance

- ✓ IoT
- ✓ Sensors

Water & Energy

- ✓ Monitoring
- ✓ Pattern
- ✓ Governance

Fuel

- ✓ FDMS & FLS
- ✓ Fuel Additive
- ✓ Biodiesel
- ✓ EVs & CNG

Concrete

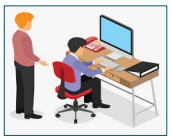
- ✓ Production to Placement

3

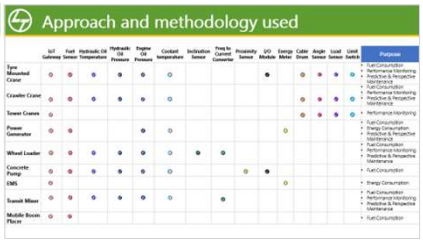
Equipment Performance - Operational Change

Equipment

Manual Log sheet



Data feeding



Data Analysing

Call for Action

Saved **38 Cr. by demobilized & redeploying** 321 equipment	Saved **1.5 Lakh Litres Diesel** worth **1.3 Cr.**
Saved **23 Cr. by de-hiring** 200+ Sub-optimal equipment	Reduced **386 t CO2e** (FY'24-25)

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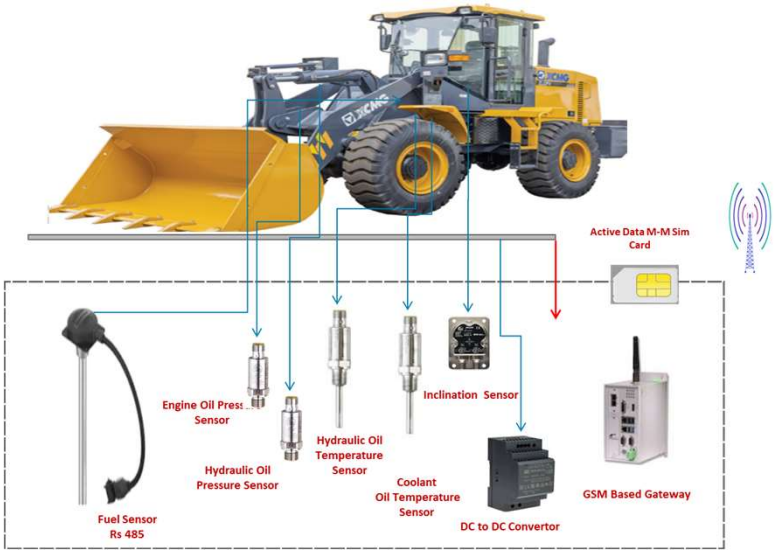
Approach and methodology used



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Approach and methodology used

	IoT Gateway	Fuel Sensor	Hydraulic Oil Temperature	Hydraulic Oil Pressure	Engine Oil Pressure	Coolant temperature	Inclination Sensor	Freq to Current Converter	Proximity Sensor	I/O Module	Energy Meter	Cable Drum	Angle Sensor	Load Sensor	Limit Switch	Purpose
Tyre Mounted Crane	✓	✓	✓	✓	✓	✓				✓		✓	✓	✓	✓	• Fuel Consumption • Performance Monitoring • Predictive & Perspective Maintenance
Crawler Crane	✓	✓	✓	✓	✓	✓						✓	✓	✓	✓	• Fuel Consumption • Performance Monitoring • Predictive & Perspective Maintenance
Tower Cranes	✓											✓	✓	✓	✓	• Performance Monitoring
Power Generator	✓	✓			✓	✓					✓					• Fuel Consumption • Energy Consumption • Predictive & Perspective Maintenance
Wheel Loader	✓	✓	✓	✓	✓	✓	✓	✓								• Fuel Consumption • Performance Monitoring • Predictive & Perspective Maintenance
Concrete Pump	✓	✓	✓	✓	✓	✓			✓	✓						• Fuel Consumption
EMS	✓										✓					• Energy Consumption
Transit Mixer	✓	✓	✓	✓	✓	✓		✓								• Fuel Consumption • Performance Monitoring • Predictive & Perspective Maintenance
Mobile Boom Placer	✓	✓														• Fuel Consumption

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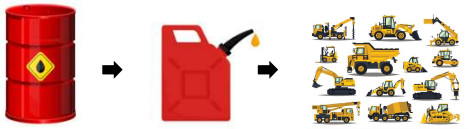
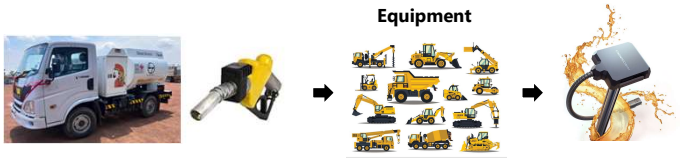
Fuel - Operational Change (Before vs After)

20 Litres Oil Can



200 Litres Barrel **Equipment**

Equipment



Fuel Bowser with RFID Nozzle **Fuel Level Sensor**

Saved **69 Lakh Litres Diesel** worth **64 Cr.**
Reduced **18,367 t CO2e** (FY'24-25) - 2.68 kg CO2/Litre

Alerts & Action to Accruals

Alerts → **Incident** → **Action** → **Accruals**

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Alerts

Alerts - AssetOne -Fuel Removal

LD

L&T Digital [Critical Alerts]
To VIKASH KUMAR SHARMA
Cc DEEPAK SHARMA

If there are problems with how this message is displayed, click h
Click here to download pictures. To help protect your privacy, O

Dear Team,

Following alert is generated for your perusal.
Kindly validate and take necessary action.

Fuel Removal

IC: WS 26-04-2025 08:32:04
Asset Code: 40191ZJH - TIPPER
Job Code: LE200809 - Jalandhar WSP
Lat-Long: NA - NA
Integration Partner: E4E
Registration Number: PB05AB2907
Address: Acme-Forgings

Alert Message:
Fuel Removal 58 Ltr.

Thanks & Regards,
AssetOne Support Team

From: L&T Digital [Critical Alerts] <LNTdigital@lntecc.com>
Sent: 08 May 2025 18:46
To: MUTHU KUMAR P <Muthu_kumar@lntecc.com>; VENKATAKIRAN M <mvkiran@lntecc.com>
Cc: TAJESWARARAO DUPPALA <tejesh@lntecc.com>
Subject: Alerts - AssetOne -Fuel Sensor Disconnected

CAUTION: This is an external email. Do not click links or open attachments unless you recognize the se content is safe.

Dear Team,

Following alert is generated for your perusal.
Kindly validate and take necessary action.

Fuel Sensor Disconnected

IC: BF 29-04-2025 14:44:14
Asset Code: 13716LRH - Transit Mixer - Truck Mounted - 6 Cum - Transit Mixers >= 6 Cum
Job Code: LE23M285 - Prestige Lavender Fields
Lat-Long: 12.977376600 - 77.811221600
Integration Partner: MOBA FLMS
Registration Number: 3328
Address: NA

Alert Message:
Fuel Sensor disconnected from asset KA01AJ4595 near XRH5+9P, Bengaluru, Karnataka 562114, India on time 29.04.2025 08:14:14 PM by MOBA MOBILE AUTOMATION

Thanks & Regards,
AssetOne Support Team

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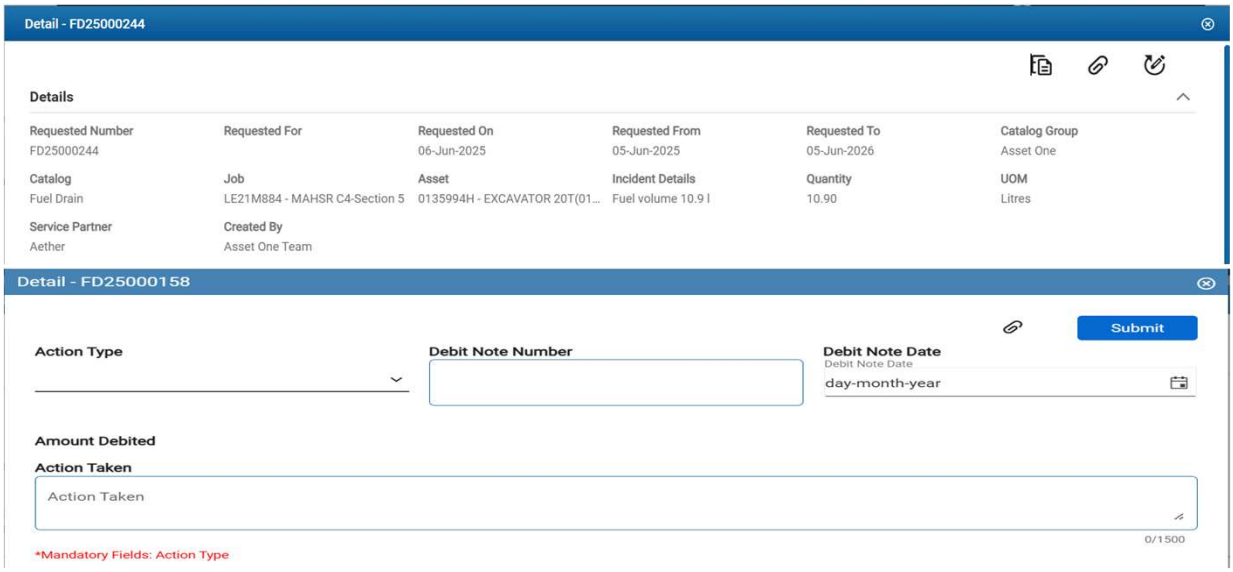
Incident



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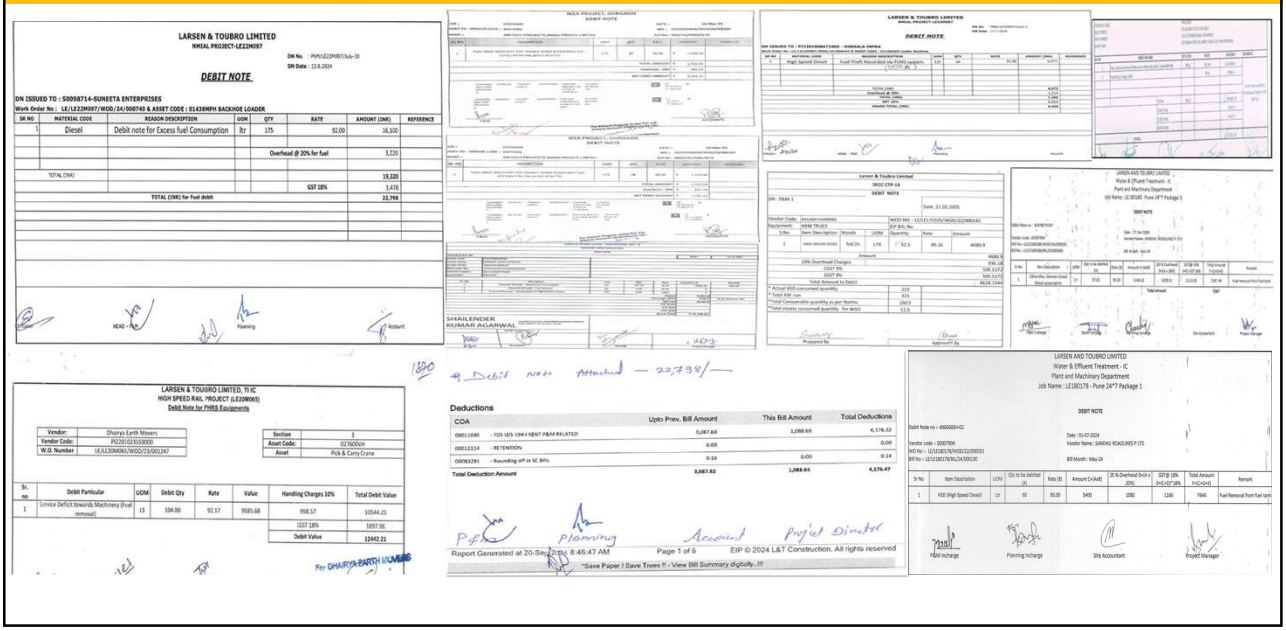
Action



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Accruals

RE: IOT FLMS Alerts IC-wise and BU-wise

SONU DAS
To THIRUVASAGAM A
Cc NEERAJ KUMAR; Mahesh Aravind Chikodi; JANAKI RAMAN S; PRADEEP PAUL ALPHONSE

Reply | Reply All | Forward

Tue 29-04-2025 17:21

LTC Internal Use

Hi Thiru,

In response to the critical fuel removal alerts received via Asset One from the field IoT sources (Soubhagya and LTIM), I would like to update you on the actions taken so far:

- Till March 25, we have recorded approximately **87,566 litres** of drain alerts.
- Out of this, approximately **73,000 litres** of diesel has been successfully recovered.
- Around **9,500 litres** of alerts have been identified and declared as **false** after thorough site verification.
- We have been **regularly debiting vendors** for the losses incurred, and so far, **around 95%** of the fuel theft cases have been recovered.
- A few **bills are pending at site level**, and **some debit note acceptances** are also awaiting final closure. These are under active follow-up and will be closed shortly.

I am currently compiling a detailed summary, which I will share with you very soon for your reference.
Thank you for your support and understanding. Please feel free to reach out if you require any further details in the meantime.

Thanks & Regards,

Sonu Das
Digital Officer - P&M,WWW SBG
Chennai-HQ , L&T Construction,
9778480043,7008069741
Manapakkam-Chennai-600089

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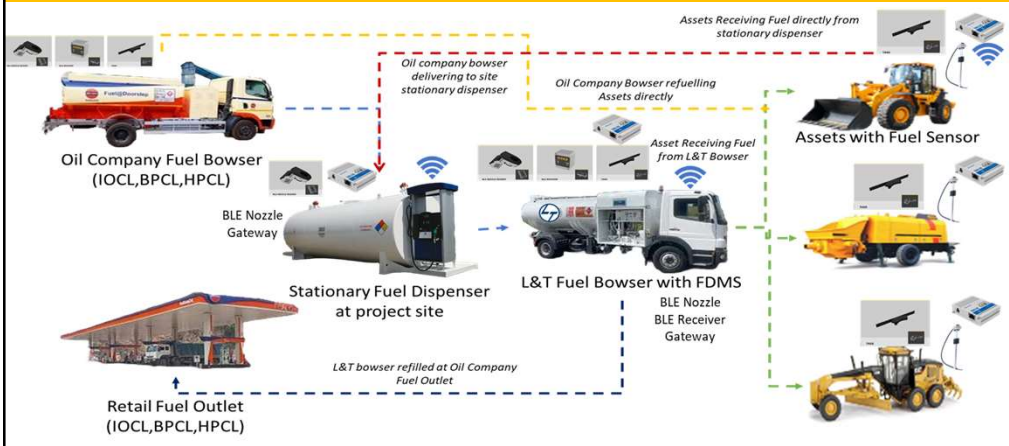
Fuel Chain



Fuel Dispensation
Data Monitored
Bowser Dispensed Qty
Bowser Asset & Job Code
Dispensed Asset & Job Code
Asset Type
HMR/KMR Reading
Transaction Type (Master/RFID)
Dispenser Type (Bowser/Static)
Remaining Fuel in Bowser
Location

Fuel Consumption
Data Monitored
Asset Code & Job Qty.
Consumption Qty
Asset Refuel Event
Asset Drain Event
HMR and KMR
Location
Transaction type (L&T Bowser/Retail Bowser/Static)

Scope: Projects with **>5 KL/month fuel consumption** are monitored

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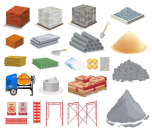
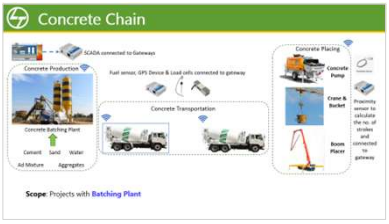
Concrete - Operational Change (Before vs After)

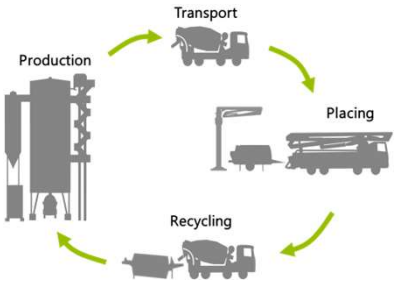


Raw Materials

Batching Plant

Concrete Placement





Saved **36,000 Cum. Concrete** worth **16 Cr.**
Reduced **1,542 t CO2e** (FY'24-25) - 42.83 kg CO2/Cum.

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Concrete Chain

SCADA connected to Gateways

Concrete Production

Concrete Batching Plant

Cement Sand Water

Ad Mixture Aggregates

Fuel sensor, GPS Device & Load cells connected to gateway

Concrete Transportation

Concrete Placing

Concrete Pump

Crane & Bucket

Boom Placer

Proximity sensor to calculate the no. of strokes and connected to gateway

Scope: Projects with **Batching Plant**

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Energy - Operational Change (Before vs After)

Disparate, proprietary and **siloed systems**

Inefficient or manual processes to gather and report data

Lack of **actionable insights**

Limited ability to **optimize processes** in a timely, effective manner

Current phase for ESG

Water

Monitor water consumption at all sources and availability

Water Consumption Intensity in KL/Rs. Crore

Storage Tank | Water Sump | Borewell

4-20mA

Flow Meter

IoT Gateway

Energy **Analyze & manage** energy consumption at site

Total Energy Intensity in GJ/Rs. Crore

HT Transformer

Main Distribution Panel

Smart Meter

RS485

IoT Gateway

GPRS

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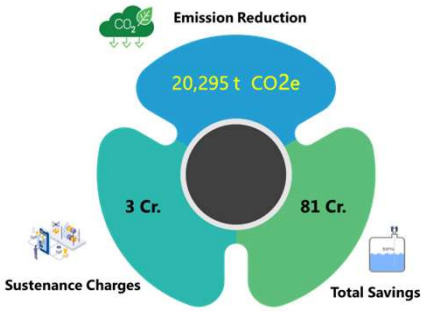
Tangible Benefits thru four Digital Solutions

Equipment **Connected 15,000+**
Saved **1.5 Lakh Litres Diesel** worth **1.3 Cr.**
Reduced **386 t CO2e** (FY'24-25)

Handled **17 crore litres** of high-speed diesel
Saved **69 Lakh Litres Diesel (4%)** worth **64 Cr.**
Reduced **18,367 t CO2e** (FY'24-25)

Managed **0.4 crore cum.** of Concrete
Saved **36,000 Cum. Concrete (1%)** worth **16 Cr.**
Reduced **1,542 t CO2e** (FY'24-25)



Parameters	UOM	Baseline	FY'24-25 Actual	Target
Electricity Consumption Intensity	GJ/Cr	95	70	72
Water Consumption Intensity	KL/Cr	126	108	88
Electricity improved over Baseline			27%	
Water improved over Baseline			14%	

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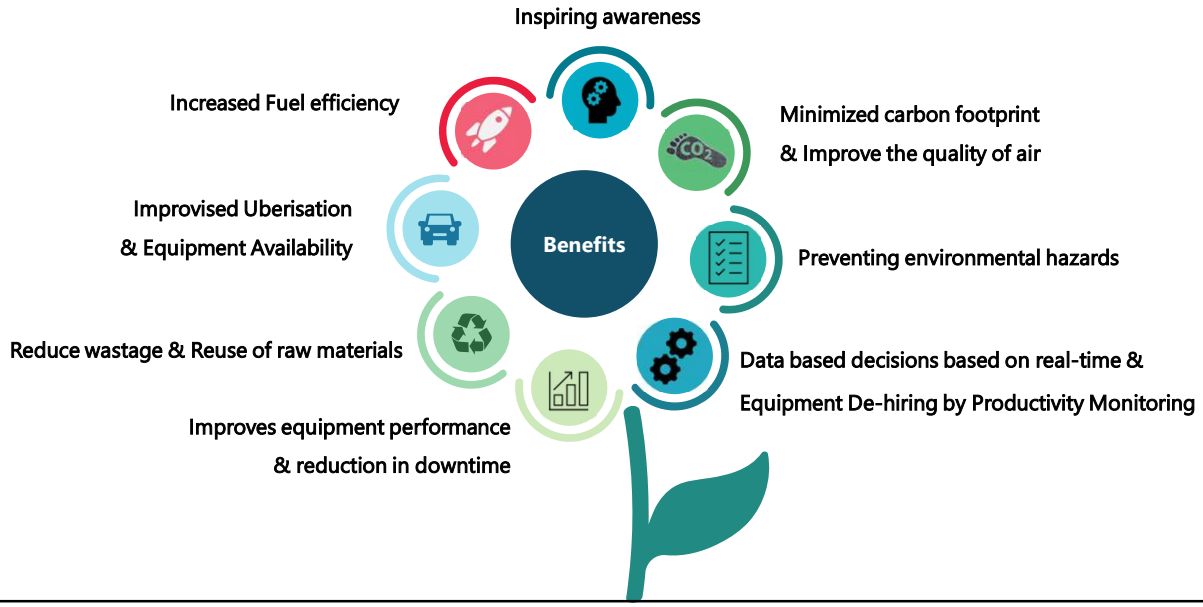
Intangible Benefits thru four Digital Solutions



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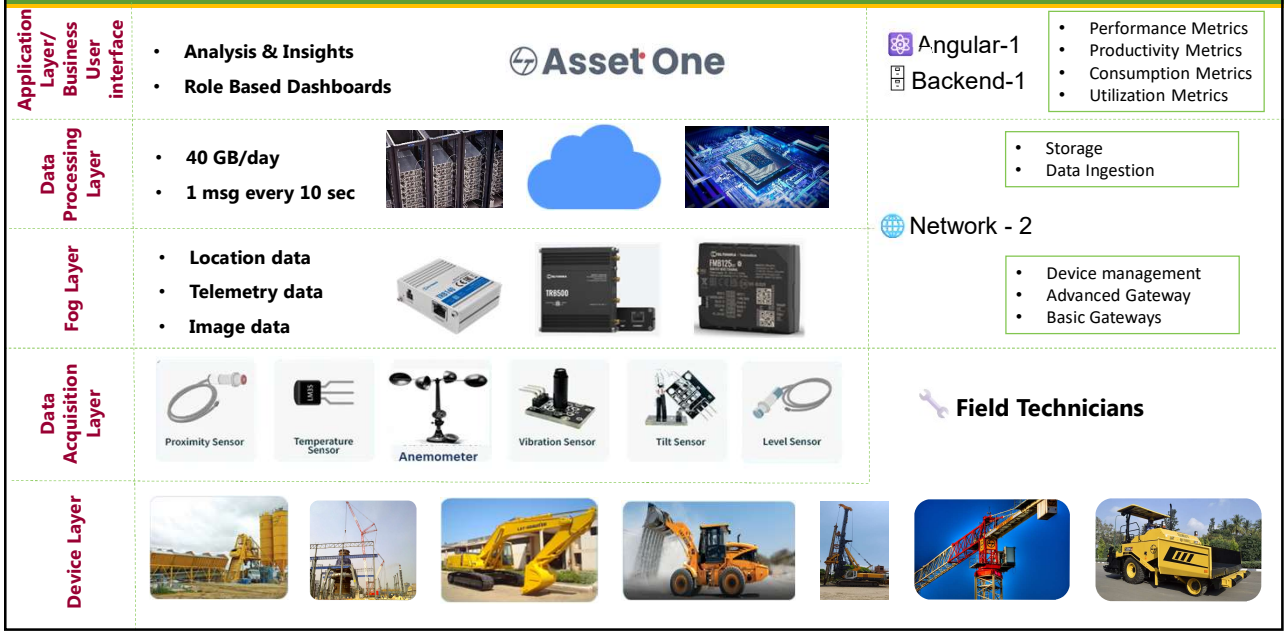
Uniqueness of the Project



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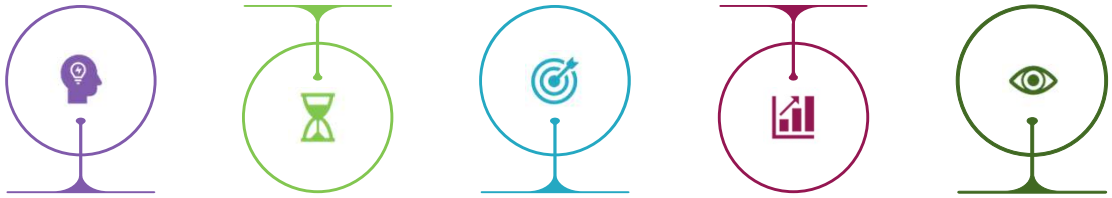
Major Milestones

Jun'23 - Advanced IoT / Other Digital solutions

- Installed advanced kits in 4,000 Key equipment
- Installed 1500 Fuel Level Sensors (FLS)
- Set up 60 Energy Management System (EMS)
- Started developing In-house digital platform

Jun'24 - All Digital applications in one platform

- 13+ IoT plaforms to One platform
- L&T Own data for internal usage
- Real time data monitoring & Data based decision making
- Digitally monitoring & Controlling the emissions



Jan'23 - Kick Started Basic IoT & Gateway

- Equipment identified & installed Basic Solutions in 15,000 equipment
- Trail test conducted & deployed 20 RFID based fuel bowsers (FDMS)

Mar'24 - Scaling up with 90% implementation

- Kick Started L&T's Own Digital Platform
- Advanced kits in 8,000 equipment
- 435 FDMS / 8300 FLS / 250 EMS units
- Blending Bio-diesel / Adding Fuel Additives

Aug'25 – AI Implementation

- Derives factors to control emissions and operating costs during tendering, planning, mobilizing, and execution phases.

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Replication potential

Within Group Company

- Fuel, cement and steel are shared resources across L&T, and the plan is to extend the solution horizontally across other divisions.
- L&T is committed to becoming carbon neutral by 2040, with these initiatives supporting that goal.
- Improved operations through the solution have increased user interest in deploying it at more project sites.
- Real-time performance monitoring and instant analysis enable leaders to make timely, data-driven decisions using the platform.

Within Sector

- Demonstrations of digital solutions have helped clients evaluate outputs before approval.
- OEMs have started integrating IoT solutions in their manufacturing processes.
- Discussions are ongoing with OEMs to develop electric and battery-operated construction equipment.

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Challenges & Mitigation during implementation

New equipment & its warranty clause

- ✓ Agreements have been made with **multiple OEMs** & established Standard Operating Procedures for installing IoT devices in both owned and hired equipment, ensuring the **warranty terms remain unaffected**.

Large-Scale Construction Project Coverage

- ✓ Expanding the **Digital Field Force team** by delivering VR-based training through in-house faculty and service providers to fresh ITI candidates, enabling them to **install and troubleshoot** the digital solutions across project sites.

Limited wireless communication & seamless connectivity

- ✓ Long-range **industrial Wi-Fi router** was implemented to resolve network issues, **extended the built-in data storage** capacity from 1 to 7 days.

Adaption to technology

- ✓ Conducted **multiple training sessions** for Maintenance and Execution teams to highlight the benefits of various digital solutions and reinforce procedures aimed at **lowering the carbon footprint**.
- ✓ Equipped operators and service crews with training to **adapt to new technologies** while educating subcontractors and hiring agencies about the digital solutions available and the **consequences of any malpractice**.

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Priority plan

- Plan to develop an AIM (Asset Inspection and Maintenance) application leveraging real-time data to predict equipment-specific preventive maintenance schedules, aiming to significantly reduce unplanned downtime, lower repair costs, and boost equipment efficiency.
- Intend to create AI-driven analytics based on IT-OT data for predictive maintenance, facilitating timely sourcing and repairs.
- Identify new opportunities and develop innovative solutions to reduce carbon emissions.
- Aim to progressively increase the percentage of biodiesel blending to enhance equipment performance and further reduce carbon emissions.

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Major Learnings

- Revisiting the solution (Hill terrain projects & Concrete Pump)
- Smart meters assisted to reduce demand loads and regulate water consumption according to specific activities.
- Monitoring the performance & productivity helped to demobilize & despec the sub-optimal used equipment.
- Implementing decarbonization strategies, fuel additives, and biodiesel helped reduce carbon emissions.
- Identifying and minimizing engine idle time led to lower fuel consumption, thereby reducing both emissions and operational costs.
- Marking activity wise Concrete requirement helped to produce the required quantity. With real-time monitoring enabling excess concrete to be used for temporary works or recycled.

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Usage of Electrical equipment

Transition – Diesel to Electric

VFD driven Electrical Concrete Pump	Electrically Operated Air Compressor	Battery Operated Wheel Loader	Battery Operated Skid Steer Loader
▪ Shift from scope1 to scope2 of carbon emissions ▪ 60% reduction in energy cost ▪ 35% reduction in M&R cost	▪ Capacity: 120 cfm & 8 bar ▪ Shift from scope1 to scope2 of carbon emissions ▪ 65% reduction in energy cost	▪ Capacity: 1.2 Cum ▪ Shift from scope1 to scope2 of carbon emissions ▪ 60% reduction in energy cost	▪ Capacity: 0.35 T ▪ Shift from scope1 to scope2 of carbon emissions ▪ 68% reduction in energy cost




Energy Optimization

55% Reduction in **Energy Cost**

Emission Reduction

50% Emission reduction **(Shift from scope 1 to scope 2)**

We have also deployed electrical equipment in other categories also

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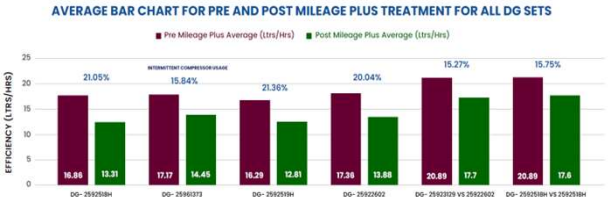
Biodiesel Implementation

Aspect	Current Situation (Without Additive)	After Implementation (With Additive)
Fuel System	Accumulation of deposits in injectors and pumps.	Cleaner fuel system with deposits removed, ensuring smoother operation.
Fuel Efficiency	Higher fuel consumption due to inefficient combustion.	Improved combustion leads to lower fuel consumption.
Engine Performance	Rough engine performance, frequent maintenance.	Better combustion, and more consistent engine output.
Lubrication	Wear and tear on injectors and fuel pumps.	Additives provide lubrication, increasing component life.
Fuel Storage Stability	Risk of oxidation, sludge formation, and microbial growth in stored diesel.	Stabilized fuel with better shelf life and microbial control.
Environmental Impact	Higher emissions due to incomplete combustion.	Lower emissions due to more complete and cleaner combustion.
Operational Cost	High due to fuel waste, frequent repairs, and reduced engine life.	Lower cost from improved efficiency, fewer repairs, and extended engine lifespan.

Aspects	Biodiesel	Diesel Fuel Additives
Fuel Substitute?	✅ Yes	❌ No
Function	Replace diesel fuel with a renewable source	Enhance diesel performance and solve issues
Dose	High (5–100% of fuel volume)	Low (small % or ppm levels)
Primary Benefit	Sustainability and emissions reduction	Engine performance, protection, and efficiency
Common Use	Used in biodiesel blends	Used routinely in maintenance and operations

✓ **Proof of Concept (PoC) Results:**

	Baseline Data	Evaluation Data
	Without DoseEco	With DoseEco
Data Period	09DEC23 to 17JUL24	03AUG24 to 11FEB25
DoseEco added, litres	Not applicable	6.7
Diesel Consumed, litres	13564	13425
HMR, hr	326	353.5
Norms, Litres per hour	41.61	37.98
Fuel Saved		1284 litres (₹115,572)



✓ **Key Benefits:**

- Maintenance Costs ↓
- Breakdowns ↓
- Fuel Efficiency ↑
- Emissions ↓
- Overall Operational Savings ↑

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Installation of Solar Plants

Solar Plant @ Kansbahal

- **Plant Capacity:** 2.5 MW
- **Duration:** 5 months (≈152 days)
- **Electricity Generated:** 7.89 Lac Units
- **CO_2 Emissions Avoided:** ~650 tCO_2

Solar Plant @ NMIAL

- **Plant Capacity:** 1 MW
- **Duration:** till May'25
- **Electricity Generated:** 35.5 Lac Units
- **CO_2 Emissions Avoided:** ~2915 tCO_2

Solar Plants are established in our Permanent establishments & Project Sites

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Thank You

LARSEN & TOUBRO

FREEDOM = BREATHING CLEAN AIR

AS PART OF ITS COMMITMENT TO BECOMING CARBON NEUTRAL BY 2040, L&T ACHIEVED A CUMULATIVE 17% REDUCTION IN DIESEL CONSUMPTION ACROSS FY24 AND FY25.

Celebrating 79th Year of India's Independence

CORPORATE BRAND MANAGEMENT & COMMUNICATIONS, L&T

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