



Confederation of Indian Industry



Larsen & Toubro Limited  
Construction Division

CII – National Award for Environmental Best Practices 2024

## Reducing carbon footprint by implementing the RFID Dispensing Kits, Fuel Sensors & Fuel additives

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# Project Details

**Project Title :** Reducing carbon footprint by implementing the RFID Dispensing Kits, Fuel Sensors & Fuel additives





# Trigger of the Project

- The construction industry is a significant contributor to greenhouse gas emissions, primarily due to its heavy reliance on fossil fuels. The Fossil fuel consumption in construction industry is widely spreader over and sometimes it is being hidden under other industry. Integration of total consumption gives huge impact on increase of carbon emission.

## In L&T Construction:

- Having a large fleet of 40,000+ assets ranging from Heavy Duty crawler cranes, Piling Rigs, Straddle Carrier, Tunnel Boring Machines, Diesel Generators, to Transit Mixers etc., comprising of 400+ different makes and models engaged across L&T Construction projects. Out of these majority of the assets are Fuel consuming assets (Diesel Operated), which consumes >16 Crores Liters of Diesel per year.
- Handling large volume of fuel in barrels are prone to dilution, contamination and presence of impurities which is leading to reduction of engine efficiency, unburnt fuel & excess emission
- The idea for this solution was developed, evaluated & implemented by various management levels with continuous focus & monitoring.



- Solution is newly developed to match the requirements of Construction equipment
- New Concept: Digital Fuel Chain (Dispension → Consumption → Controlling → Monitoring) using Fuel Bowsers with RFID based Fuel Distribution Management System (FDMS) → Bluetooth enabled Fuel Level Sensors (FLS) → Additive (Bio-Diesel) → IoT & Gateway Devices (Realtime monitoring)
- Clean Fuel → Less Emission & Clean Environment: FDMS system is having water separator, primary & secondary filters to remove the contamination and impurities from Fuel.
- IoT & Gateway Device: Identification & Controlling of Equipment engine idle hours.
- Fuel Level sensors provides the real time consumption and its pattern.
- Additives cleans the inner components of the engines, ensure 100% fuel burnt and reduces the emission



#### **Date of Commencement:**

- 1<sup>st</sup> Phase: Jan'23 (RFID based Fuel Dispension) with digital Control
- 2<sup>nd</sup> Phase: Apr'23 (Fuel Level Sensors)
- 3<sup>rd</sup> Phase: Jan'24 (Fuel Additive)
- 4<sup>th</sup> Phase: Digital monitoring both individually & consolidated



# Major Milestones

Jan'23

## Kick Started – Fuel Solution & IoT (FDMS)

Key projects identified & trail test conducted in 10 Projects across Pan India

Dec'23

## 83% Implementation

309 RFID based Fuel Bowers deployed at Project sites. 6,500 FLS units installed in Construction equipment

Apr'24

## Current Status

360 FDMS units  
8,000 FLS units  
100% Digital monitoring

Apr'23

## Fuel Level Sensor (FLS)

FLS implemented in Major assets across project site with 1,000 FLS units

Jan'24

## Fuel Additive Implementation

Additives implementation Kick off

# Operational Change in Fuel Dispensation

Before



Bunk



200 Litres Barrel



20 L oil can



Equipment

→ → →



Capturing transactional data and Analytics

After



Fuel Station



Mobile Bowser

- Vehicle with Fuel Tank
- Fuel pump with flow meter
- Nozzle with RFID reader



RFID Authentication

RFID fitted in equipment fuel tank



RFID enabled nozzle dispensing fuel from Bowser to equipment after reading RFID tag fitted in eqpt. fuel tank

# Reduction measures taken based on Digital Monitoring

- Using IoT, equipment performance data is captured and being used in selection of right equipment which is fuel efficient, less carbon emission & non-polluting.
  - Identification of equipment during new procurement & hiring
  - Identified high fuel consuming equipment & taking necessary remedy action to control emission
  - Identification of equipment engine idle running with the help of IoT/Gateway data through automated triggers and minimise the idle running.
- Identification of sub-optimal DG sets and despec them
- Deployment of Hybrid / Electrically operated Construction equipment.
- Encouraging the usage of wind, solar & electrical energy as a replacement for fossil fuel.
- Implementation of Fuel additives which are biodegradable fuel economy enhancer, environment friendly, non-toxic and has no chemicals, alcohols, spirits and solvents.

# Implementation Photos - (1 / 2)

Higher ↑ Lower ↓

Least preferable 5.3 LPH

Most preferable 4.2 LPH

₹ 29,700

Monthly Savings\*

CO<sub>2</sub> 888 Kgs

\*Considering running of 300 hrs/month

Higher ↑ Lower ↓

Least preferable Articulated 5.3 LPH

Most preferable Straight Boom 3 LPH

✓ May note fuel consumption is more than 50% for Articulated boom in comparison to Straight boom

₹ 31,050

Monthly Savings\*

CO<sub>2</sub> 928 Kgs

\*Considering running of 150 hrs/month

Higher ↑ Lower ↓

Least preferable 4.4 LPH

Most preferable 2.5 LPH

₹ 51,300

Monthly Savings\*

CO<sub>2</sub> 1533 Kgs

\*Considering running of 300 hrs/month

MMAW	GMAW	SAW
400A	600A	1200A
Welding Time 450 mins*	Welding Time 150 mins*	Welding Time 25 mins*
Energy Consumption 73.2 KWH	Energy Consumption 44.2 KWH	Energy Consumption 20.6 KWH
Emissions 81 Kgs	Emissions 49 Kgs	Emissions 23 Kgs

\*For welding 14mm thickness plate of 15m Length



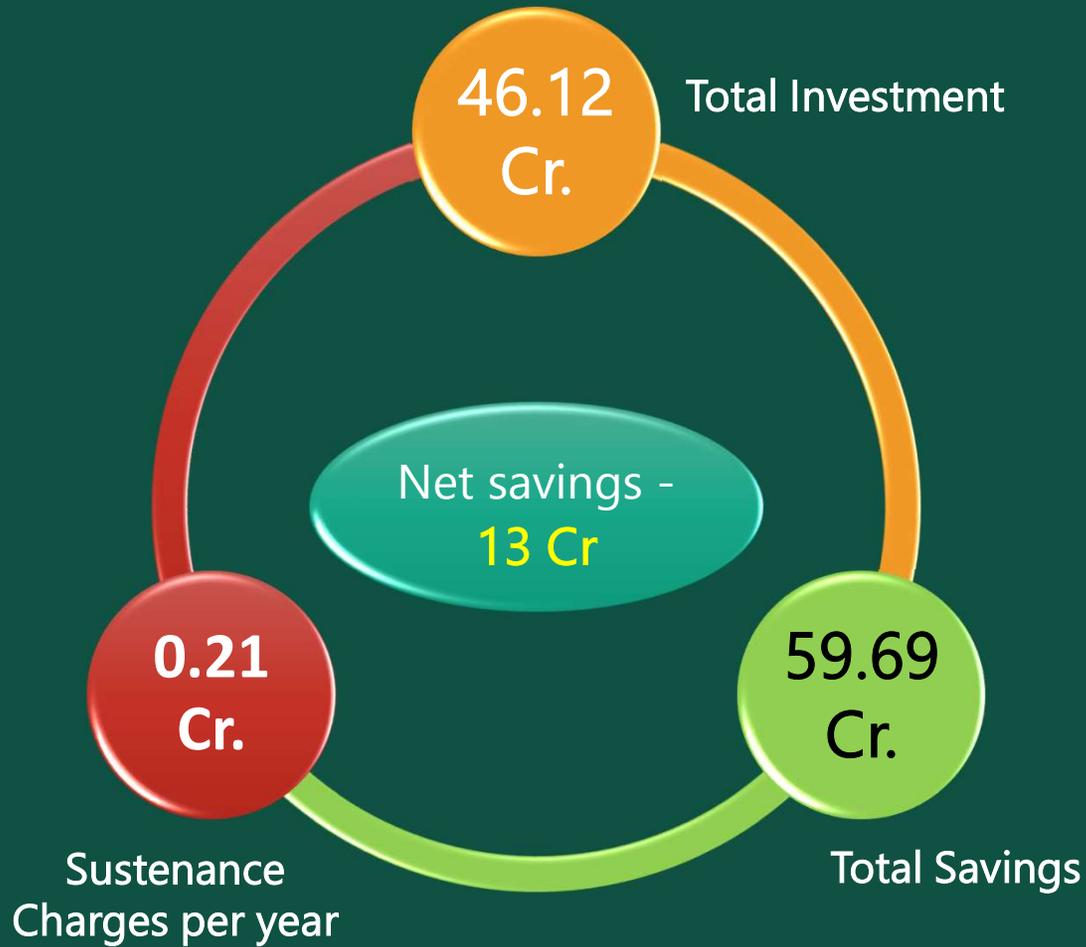


# Implementation Photos - (2 / 2)

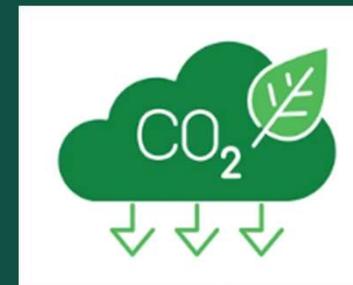




# Tangible Benefits



## Emission Reduction



17,152 t CO<sub>2</sub>e  
(FY'23-24)



# Intangible Benefits





# Replication potential

## Within Group Company

- Fuel being a common resource across L&T, the plan is to horizontally deploy the solution across other Divisions of L&T.
- L&T commitment is to become carbon neutral by 2040. This initiative will help organisation to achieve the target.
- Having improved the operations using the solution, users are more interested to have the solution in their project site.
- This innovation had become a potential guiding light for many innovations ideas.

## Within Sector

- Article published in L&T website: <https://www.larsentoubro.com/corporate/about-it-group/technology-for-growth/connected-machines/>
- Extending hand to hire vendors / sub-contractors who are working with L&T to establish this solution in their organisation.
- Made agreement with OEMs to provide this as an inbuilt solution.



# Spreading Benefits

**Environmental Benefits:** Communicate the environmental benefits of fuel solutions, such as reduced greenhouse gas emissions, improved air quality, and protection of ecosystems, to raise awareness and motivate action. Highlighting the positive impact on climate change mitigation and public health can garner support from policymakers, communities, and individuals

**Community Empowerment:** Engage local communities in the planning, development, and implementation of fuel solutions to ensure their needs and priorities are addressed. Empower communities to participate in decision-making processes, advocate for clean energy initiatives, and benefit from the economic and social opportunities associated with the transition.

**Education and Training:** Provide education and training programs to build capacity, skills and knowledge required to leverage the initiative benefits. This could involve conducting workshops, organizing webinars, or arranging one-on-one mentoring sessions.

**Incentives and recognition:** Implementation of incentives or recognition to motivate and reward employees who actively implement the initiative as part of Environmental Social and Governance (ESG) best initiatives.

**Continuous improvement and feedback:** Establishing mechanisms to gather feedback and monitor the impact of the project over time. Using this feedback to make necessary adjustments, identify areas for improvement, and iterate on the project's implementation.



# Challenges & Mitigation during implementation

- **Wide spread of Construction projects**
  - ✓ Developed fresh ITI candidates through in-house faculty & facilities to handles the equipment and implementing the Digital solutions across project sites.
- **Various makes, models & types of Equipment & its warranty clause**
  - ✓ Made agreements with OEMs and brought Standard Operating Procedure as a part of procurement discussion.
- **Limited wireless communication & seamless connectivity**
  - ✓ Training and support provided to users to ensure the network availability & rectifying the root cause to avoid the repetency. Long reach industrial Wi-Fi router implemented to address the network issues.
- **Operator / Technicians adaption to technology**
  - ✓ Provided training to operators and service crew to become comfortable to new technology & addressing the issues.
- **Inventory & availability of material**
  - ✓ Data being monitored remotely; consumable are being maintained at Region level to support project site needs.

# Priority plan for +1 / +2 year

## ▪ Performance Evaluation

- ✓ Continuous evaluation and monitoring the effectiveness of this solution and generate new ideas & implement new solutions to reduce the carbon emission.
- ✓ Analyze the data collected during the pilot implementation phase to evaluate the effectiveness of the fuel additive solution and extends to all other projects

## ▪ Scaling Up

- ✓ Based on the results of ongoing implementation & pilot solution, determines the feasibility of scaling up the use of solutions in all ongoing project site.
- ✓ Sharing the cost benefit analysis and reduction of carbon emission with stake holders for further deployment.

## ▪ Training & Education

- ✓ Provide Training & education sessions for relevant stakeholders (e.g., execution team, maintenance team) on proper use of fuel solution.
- ✓ Raise awareness amount end-users about the benefits of using the solution and how they contribute to environmental sustainability and cost savings

# Priority plan for +1 / +2 year & Resource requirement

- **Continuous Improvement**

- ✓ Establish a feedback loop and continuous improvement process by analysing the performance and impact of Digitalisation on machineries and adaptation of new digital technologies towards carbon emission reduction.
- ✓ Allocate resources for ongoing monitoring, analysis, and optimization to ensure the technology delivers the desired outcomes and benefits.

- **Resource requirement:**

- ✓ Budget allocation for hardware & software requirement
- ✓ Personnel with expertise in digital tools & technology to resolve the teething issues during implementation
- ✓ Collaboration with external vendors & consultants
- ✓ Dedicated coordination resource team to oversee the implementations



# Best Practices

- ❖ Conversion of Diesel operated Lighting masts into Solar & Hybrid operated lighting masts
- ❖ Illuminating the permanent establishments and office campus using solar & wind-based lights
- ❖ Deployment/Usage of electrically/hybrid operated construction equipment like wheel loader, boom placers, boom lift, transit mixer.
- ❖ Optimum use of fossil fuel, waste reduction & emission reduction
- ❖ IoT implementation in various construction equipment
- ❖ Clean Fuel → Less Emission → Clean Environment: RFID based fuel dispensing & Fuel additive
- ❖ Remote monitoring through mobile app/web
- ❖ Usage of Battery & Solar operated buggies in project sites & offices for conveyance.
- ❖ Usage of electrically operated Cars for local conveyance



# Major Learnings

## ❖ Technological Innovation:

- ✓ Development and adoption of advanced digital technologies played a crucial role in improving fuel efficiency, reducing emissions and diversifying the energy mix.
- ✓ Innovations in Electric vehicles, biofuels and advanced combustion engines in transportation & construction equipment sectors helped in reducing the environment footprint and safeguarding mother earth.

❖ First time re-orientation of such new technology in Construction Industry to show lenience towards carbon emission reduction.

## ❖ Integration of Renewable Energy:

- ✓ Integrating renewable energy sources such as solar, wind, and bioenergy into fuel solutions helps to decarbonize the construction sector.
- ✓ Renewable fuels, such as biofuels and green hydrogen, offer sustainable alternatives to conventional fossil fuels and contribute to mitigating climate change.

❖ Policy Support: Having effective policy and regulatory measures helped to drive the new solution across the projects sites.



*Save Environment for  
Future generation*

**Thank You...**