Godrej Appliances GreenCo Journey

Mr Prasad Pendse
General Manager
Godrej Appliances, Shirwal

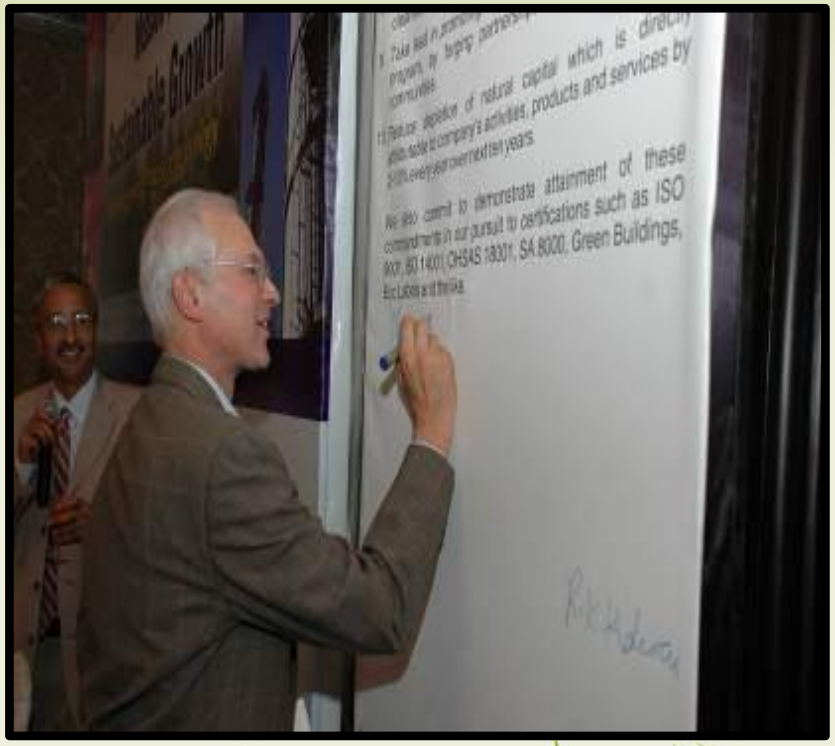
GreenCo Journey so far

- ✓ Voluntarily signing for Mission on Sustainable Growth
- ✓ 1st GreenCo Assessment (Shirwal) : October 2013 – Gold Certification.
- ✓ GreenCo Reassessment (Shirwal) : May 2014 – Platinum Certification.
- ✓ GreenCo Reassessment (Mohali) : January 2015 – Platinum Certification.
- ✓ Recertification at both location in Dec. 2019 : Upgraded GreenCo certificate to Platinum Plus.

Mandatory Requirement 1 – Management System for GreenCo

Leadership & Strategy

- *One of the first signatory to CII initiative " Mission on sustainable Growth"*
- *Commitment to reduce resource intensity & emissions, discharge & waste generation by 2%- 6% every year.*



Leadership & Strategy

Godrej Good & Green – 2020 Goals

Activities that address needs of underserved population

Good & Green

Activities that address environmental issues

Beyond Business: Building a More Inclusive and Greener India

By 2020 Godrej will...

Ensuring Employability	Creating a Greener India	Innovating for Good & Green Products
Train 1 million rural & urban youth in skilled employment	*30% Reduction in Energy Consumption, Zero Waste to landfill, Carbon Neutrality, Positive Water Balance, 30% Renewable Energy Use*	*Have a third of our portfolio revenues comprising Good and/or Green Products and Services*

- Fueled by employee engagement & volunteering
- taking good & green and more around the area of operations by initiating community development

3 I G&G Governing Council I 1st December 2015

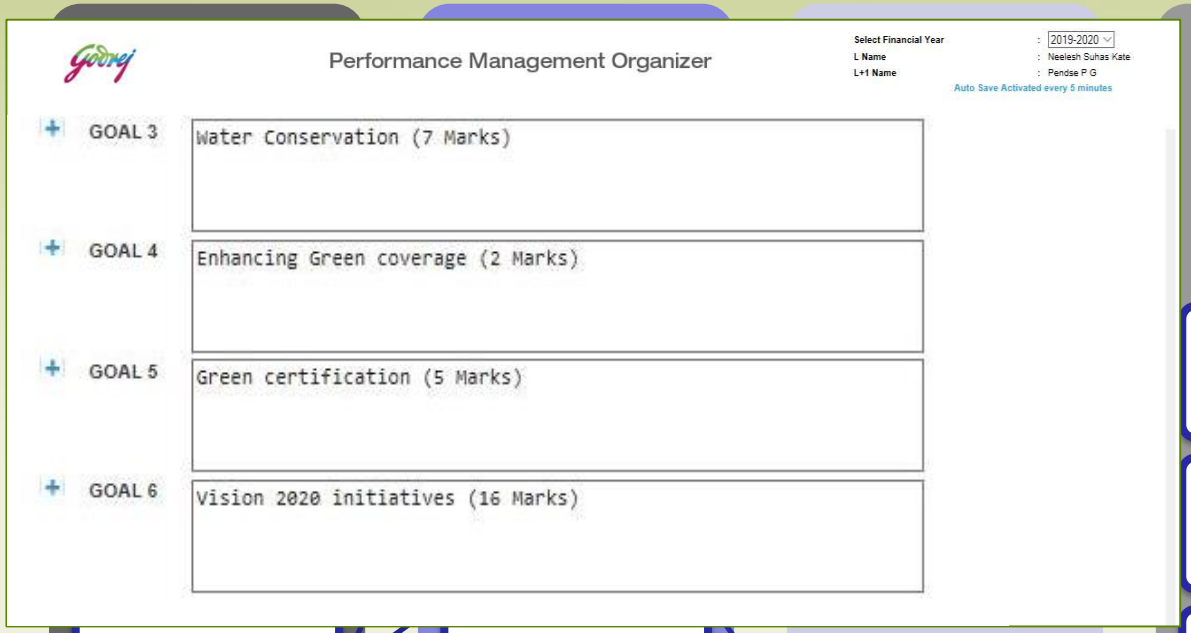
Good & Green Targets are formulated from MSG & GreenCo
And same is percolated to each business unit.

Good & Green and GreenCo

Good & Green Elements	GreenCo Criteria
Creating a Greener India	Energy Efficiency
	Water Conservation
	Renewable Energy
	Green House Gases
	Waste Management
	Material Conservation Recycling & Recyclability
	Green Supply Chain
	Green Infrastructure & Ecology
Creating a Greener India & Innovating for Good & Green Products	Innovation for Environment
Innovating for Good & Green Products	Product Stewardship & Life Cycle Assessment

Deployment

GreenCo Target Cascading



Greenco target is being percolated from Divisional head level to shop floor level.

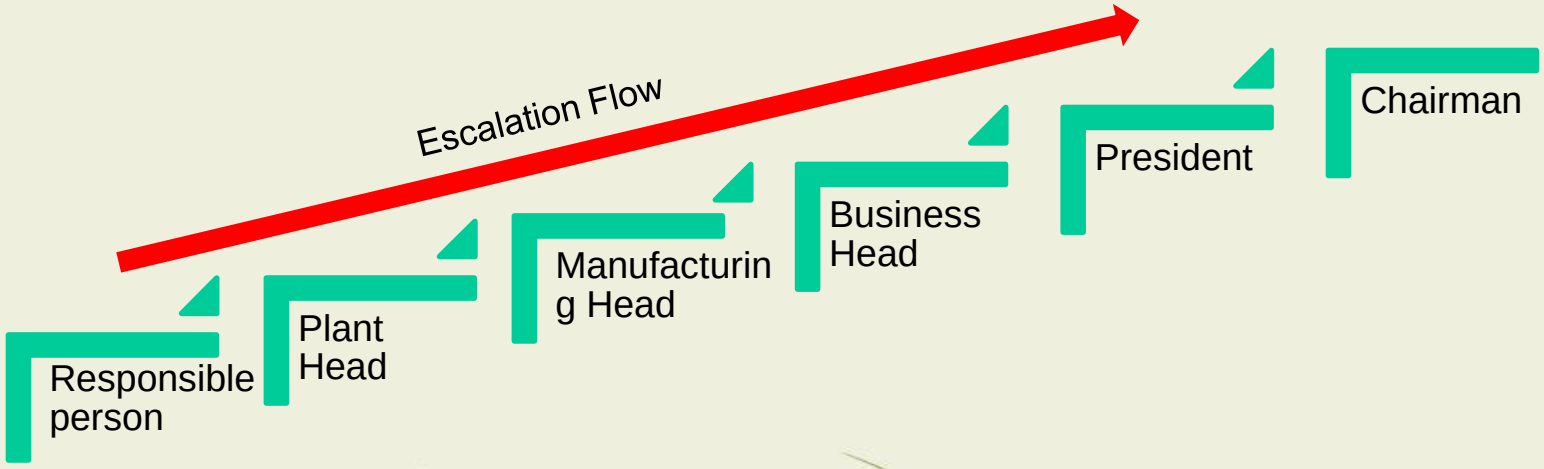
Mandatory Requirement 2 – Robust Systems to address Legal Requirements on Environmental Performance

Our approach for Legal compliance

- External expert third party has been appointed for identifying legal requirements.
- Legal requirement mapping for all locations.
- Legal compliance and deviation reporting matrix prepared.
- Monitoring through online software tool.
- Alerts well before due dates & reminders if compliance is not done.
- Live updates about changes in legal compliance.
- Escalation matrix up to Chairman.

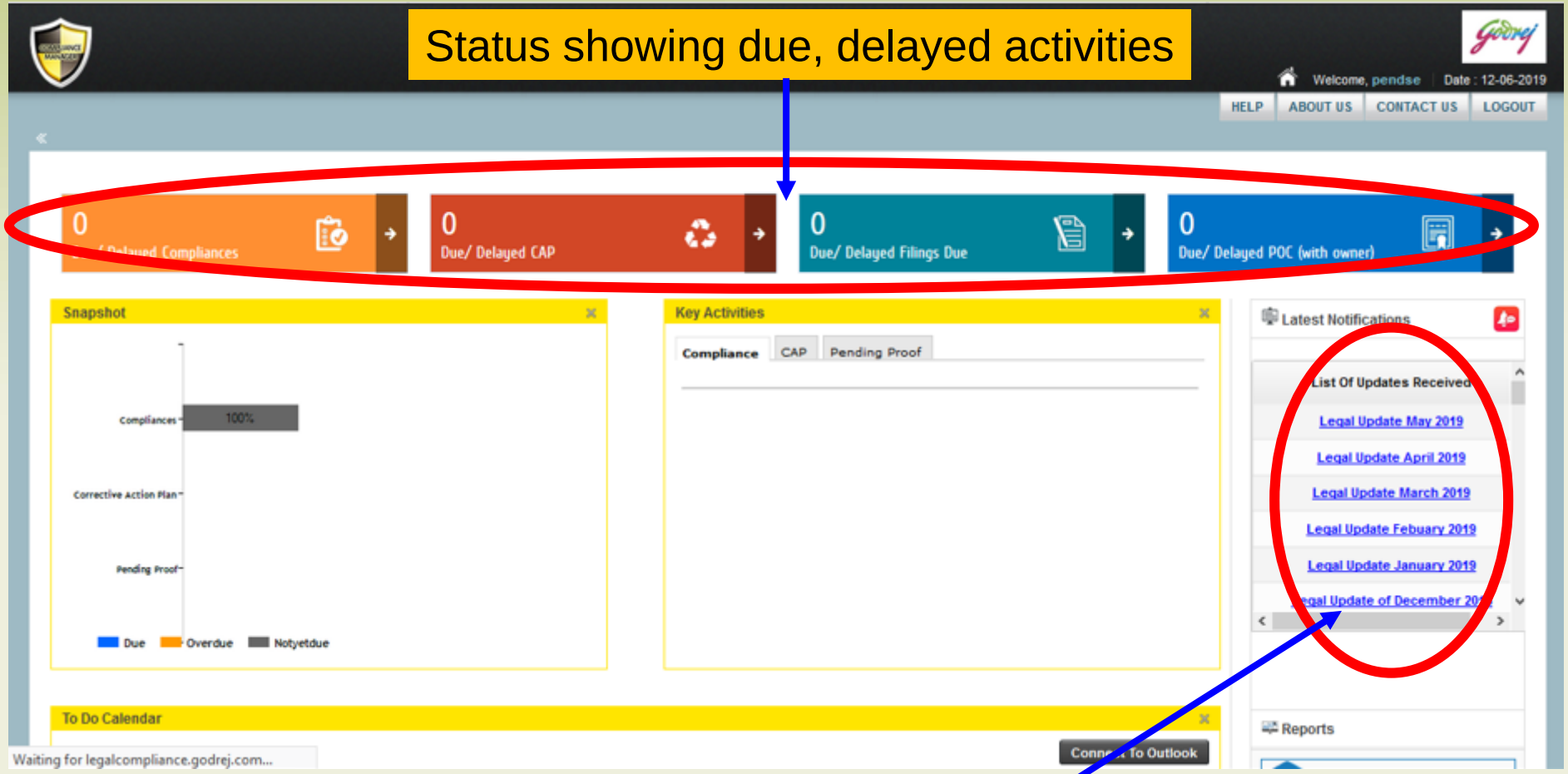
EY Compliance Manger Tool

- Total number of legal compliances identified for the plant - 354
- Total number of environmental & safety legal compliances identified for the plant - 186



Zero Legal Non Compliance

Legal compliance tool Dash board



List of latest updates in legal requirements

Mandatory Requirement 3 – Business Risk Analysis in Context of Natural Resources and Climate Change

GAD ERM Project Journey…

Start

Phase 1

38 meetings conducted across corporate office, plants, branches and manufacturing locations (Shirwal) etc.

Phase 2

12 Functional level rsk registers and **01** entity level risk register prepared and validated with stakeholders identifying **90+** risk events

Phase 3

Conducted workshop with key stakeholders for prioritization of identified **11** entity level risks along with **76** Key Risk Indicators (KRI) with the help of **8x8** matrix scale

Phase 4

Prepared mitigation plan for **10** prioritized risks, **09** KRI dashboard and Standard Operating Procedures (SOP) on risk management exercise for periodic refresh of risks and their appropriate mitigation preparation by business

Preliminary Understanding of business

Read business excellence dockets, functional ABPs and SBPs to develop an understanding of GAD's business, market, people and processes.

Risk Interviews with identified stakeholders

Conducted risk interviewes with the stakeholders to understand their activities, processes, interface with other business functions, their challenges and their roadmap to achieve their identified strategy

Preparation of Risk Register

Preparation and validation of functional and entity level risk register

Risk Prioritization

Set up workshop with key stakeholders to facilitate prioritization of identified entity level risks

Mitigation Plan

Faciltate preparation of mitigation plan for prioritized risk events from assigned risk owner

EY Differentiators:

EY Discover Database | EY Benchmarking Tool | EY Risk Universe Repository

G&B CRM Project Insights | EY External Sources

Environment Risk Register - Energy

Operational Head

Hussain Shariyar

Mitigation Owner

Mr. Hussain Shariyar
Mr. Sunil Beloshe
Mr. Neelesh Kate
Mr. Prasad Pendse
Mr. Madhav Khanolkar
Mr. Sanjay Pargaonkar

Key Risk Indicator

Lead

Machine wise SEC – daily Real time monitoring of energy consumption and Solar Plant efficiency, Alerts from systems, abnormalities identified in audits.

Lag

1.Product wise SEC - fortnightly/monthly , RE Share,
2.Nos. of energy conservation projects completed,
3.Nos. of audit done.

Preventive

Risk of high power cost and power availability.

Contributing Factor

1. Increase in volumes.
2. Backward integration.
3. Inadequate training to operators.
4. Use of old machines and technology.
5. Increase in power tariff and change in tariff rules.

Mitigation Plan

Existing Measures

1. Implement energy conservation projects - Low and medium investment projects.
2. Benchmarking within same industry & adopt best practices.
3. Conduct energy audits.
4. Standardize SOPs and train operators.
5. Upgrade machines and adopt new energy efficient technologies.
6. Focus on use of RE source to eliminate fossil fuel.

New/Planned measures

1. Implement energy conservation projects - High investment projects.
2. Benchmarking with other industry and sector to adopt best practices.
3. Conduct focused energy audits.
4. Use of IoT and digitization to minimize dependability on operators.
5. Procurement of energy efficient machines.
6. Focus on use of RE source to eliminate electrical power from the grid.

Environment Risk Register - Water

Operational Head

Hussain Shariyar

Mitigation Owner

Mr. Hussain Shariyar
Mr. Sunil Beloshe
Mr. Neelesh Kate
Mr. Prasad Pendse
Mr. Madhav Khanolkar
Mr. Sanjay Pargaonkar

Key Risk Indicator

Lead

Specific Water Consumption (SWC) per appliances and per capita - daily, Real time monitoring of water consumption and Departmental score cards, Alerts from systems, abnormalities identified in audits.

Lag

Department wise SWC - monthly , Nos. of water saving projects completed, Nos. of audits done.

Preventive

Water availability from external sources.

Contributing Factor

1. Increase in volumes.
2. Backward integration.
3. Inadequate training to operators.
4. Scarcity of water globally.

Mitigation Plan

Existing Measures

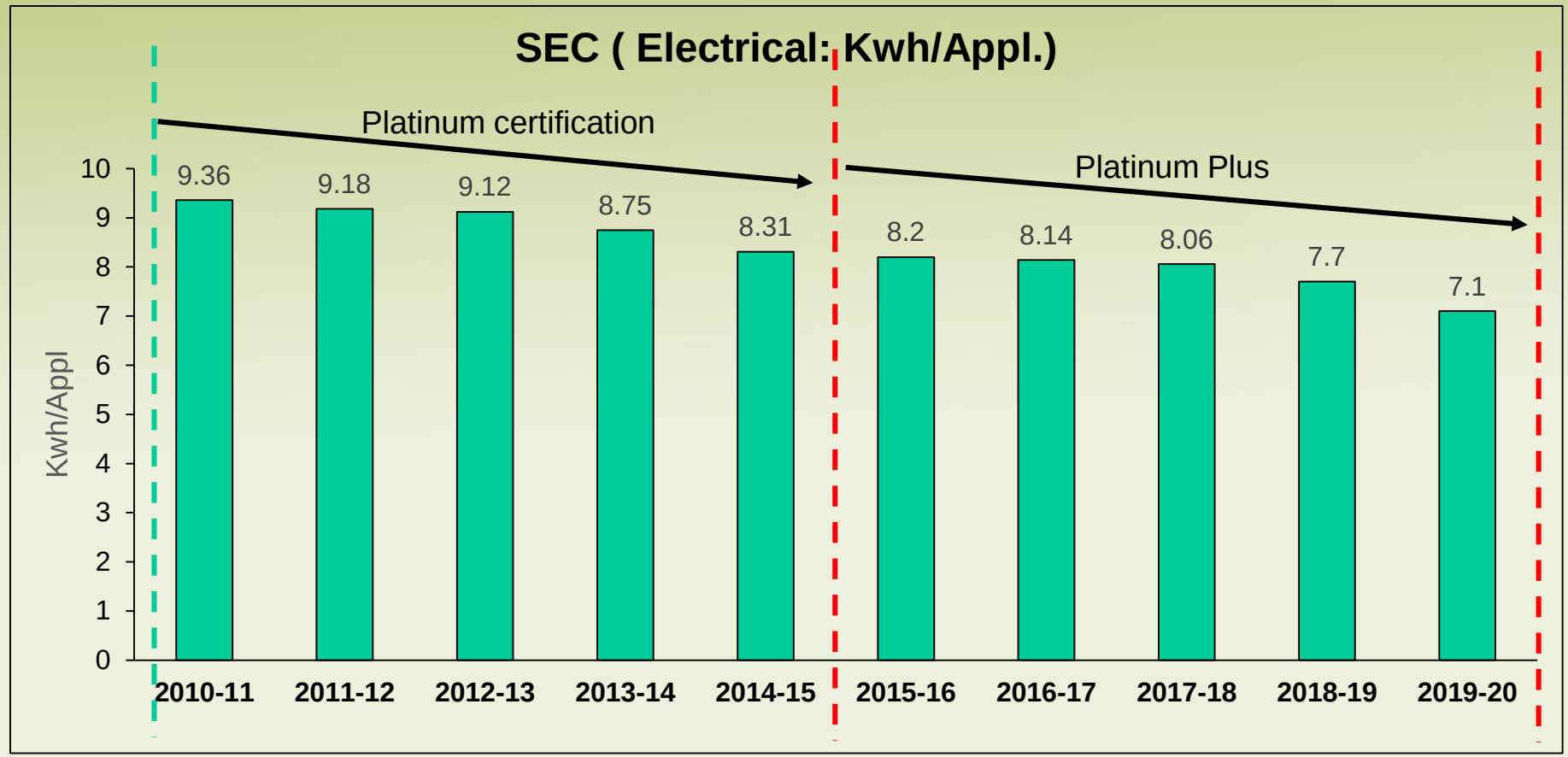
1. Implement water conservation projects - Low and medium investment projects.
2. Benchmarking with other industries through CII data & adopt best practices.
3. Conduct water audits.
4. Standardize SOPs and train operators.
5. Focus on use of technologies which eliminates or minimize the water requirement.
6. Rain water harvesting and water bodies.
7. Recycling effluent water for toilet flushing.
8. Ultra water saving faucets and taps.

New/Planned measures

1. Implement water conservation projects - High investment projects.
2. Micro level water consumption monitoring and optimization.
3. Use of digitalization for manual error elimination in measurement and control

1. Energy Efficiency

Result - Specific energy consumption



Approach –

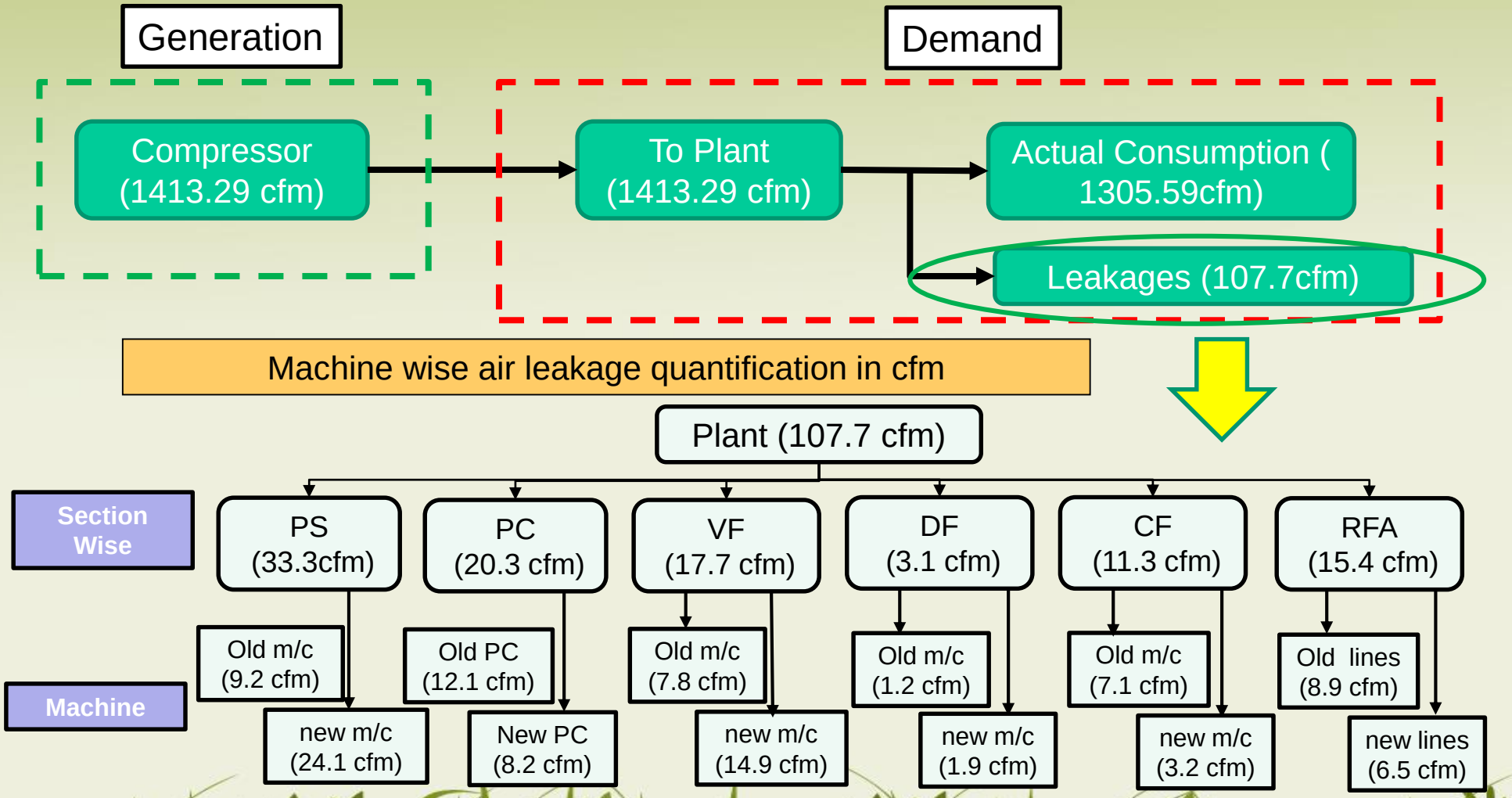
1. Process Benchmarking
2. Equipment Benchmarking
3. Collaboration with vendor.
3. Real time monitoring of energy- eliminating unseen wastage

Air Leakage elimination a new approach

Air leakage study – A New Approach		
Sr. No.	**Before**	**After**
1	Plant Air leakage % calculation based on theoretical formula.	Plant Air leakage % measurement: Based on actual leak measurement in cfm by using flow meter.
2	Section wise calculating of air leakage % of entire plant	Machine wise measurement of air leakage in terms of cfm for the entire plant
3	Air leakage identification through manual sensing & ultrasonic air leak detector.	Air leakage identification through Air leak detector with ambient noise filtration & tagging.
4	Section wise air leakage arresting activity based on max. % leakage of section.	Machine wise air leakages arresting activity based on max. cfm leakage machine.

Machine wise air leakage measurement – a unique initiative

Compressed air balance



We have covered 151 machines during compressed air leakage audit

Equipment wise air leak measurement

Sr. No	Machine Name	Dept	leakages in cfm	No. of leakages identified
1	Press shop machines PB1	PC	0	0
2	Press shop machines PB3	PC	0	0
3	Press shop machines PB4	PC	0	0
4	Press shop machines PB5	PC	13.5	15
5	Press shop machines PB8	PC	1.2	4
6	Press shop machines PB9	PC	0	0
7	Press shop machines PB11	PC	0	0
8	Press shop machines PB12	PC	0	0
9	Press shop machines PB13	PC	0	0
10	Press shop machines PB18	PC	0	0
11	Press shop machines PB20	PC	3.2	8
12	Press shop machines PB21	PC	0	0
13	Roll former m/c 1	PC	0	0
140	vacuum forming machines (Rotary)1	VF	1.9	9
141	vacuum forming machines (Rotary)2	VF	2.1	6
142	vacuum forming machines (Rotary)3	VF	0.9	3
143	vacuum forming machines (Rotary)4	VF	1.3	8
144	vacuum forming machines (Rotary)5	VF	1.2	6
145	vacuum forming machines (Rotary)6	VF	0	0
146	vacuum forming machines (QS Linear PDP-1)7	VF	13.5	21
147	vacuum forming machines (QS Linear PDP, Line-4)8	VF	8.5	17
148	vacuum forming machines (QS Liner Linear, Line-4)9	VF	8.8	14
149	QS SPM for Liner punching	VF	0.2	2
150	vacuum forming 60T TPT 1	VF	3.5	7
151	vacuum forming 60T TPT 2	VF	0.2	2

Machine wise air leakage measurement helped us to prioritise the work

New air leak detector

1. Air leak detector identifies leaks in close proximity up to 4 to 5 feet
2. It is difficult to identify air leakage when plant is in operation due to surrounding noise.
2. It does not have any visual indication for air leak identification
3. We can identify air leakages only in holiday.

1. Air leak detector identifies leaks from distance of 3 to 4 meter.
2.This detector helps eliminating plant ambient noise and focusses on air leakage noise
2. It has a audio visual indicator as well to locate air leakage.
3. We can identify air leakages in normal working days also.

With new equipment we are able to find minute air leakage on normal working day

New findings from machine wise air consumption measurement

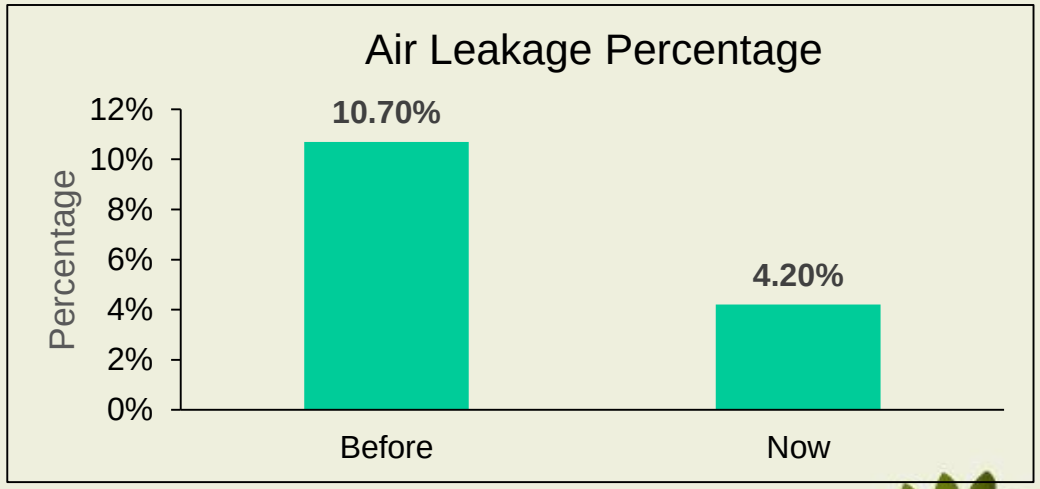
1. **Average and peak consumption of each machine.**
2. Adequacy of air pipe line based and peak air demand.

Generally every one selects pipeline size based on air consumption mentioned in manual.

3. Air cooler and oil cooler Efficiency measurement by thermography.

New Project identified

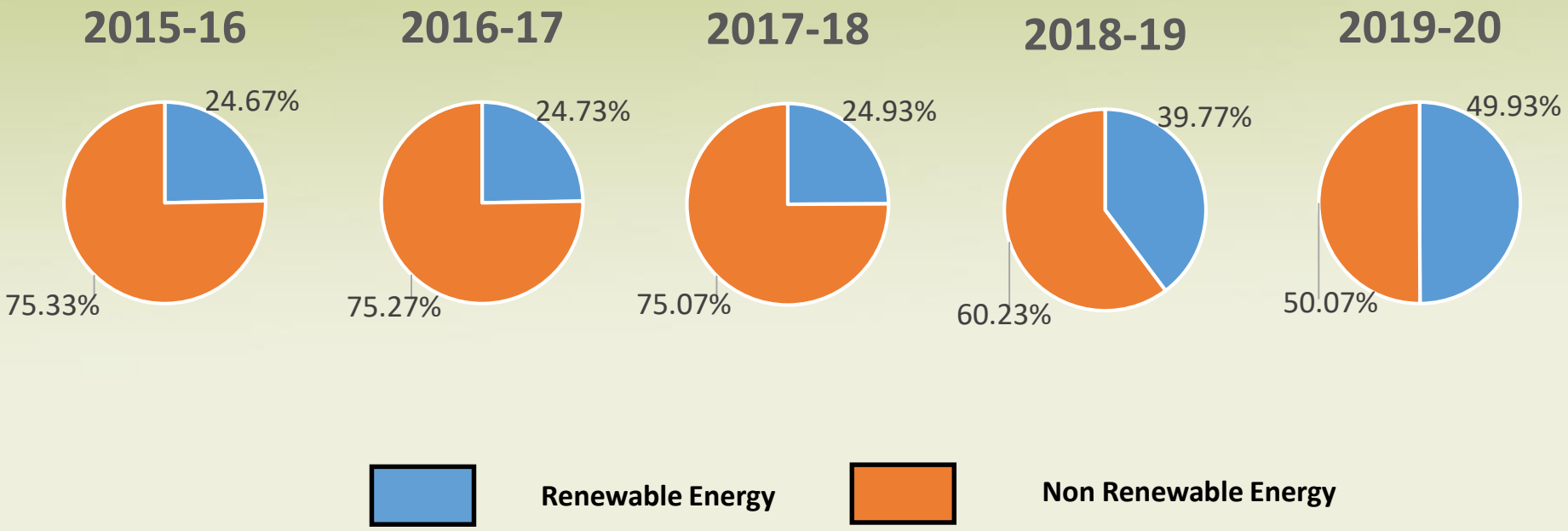
Sr. No.	Project Details	Status
1	Increase Pipe line size at High Pressure	Completed
2	Ring route for High Pressure Line	Completed
3	Air Cooler & oil cooler cleaning frequency based on periodic thermographic and actual temperature.	Completed
4	Automatic air compressor selection as per plant demand	Completed



Intermittent production stoppage because of pressure drop is eliminated

2. Renewable Energy

On-site Renewable Energy Generation

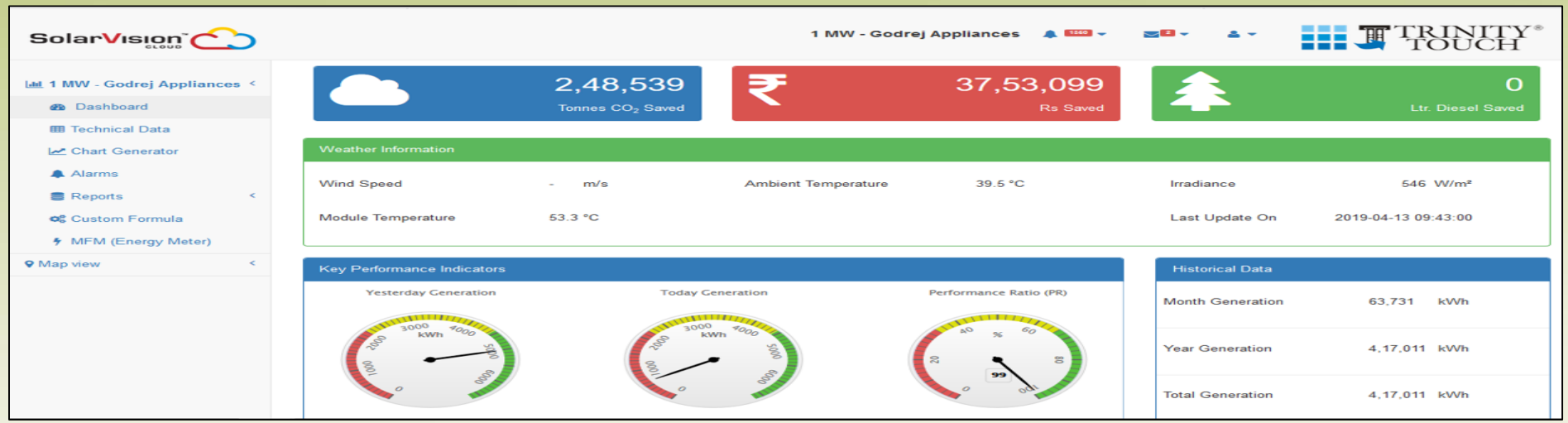


Approach –

1. On-site RE generation for Electrical Energy.
2. Improve Solar Panel efficiency.
3. Use of digitization to improve performance ratio.

Year on year our Renewable Energy Share is increasing – This year share is 50%

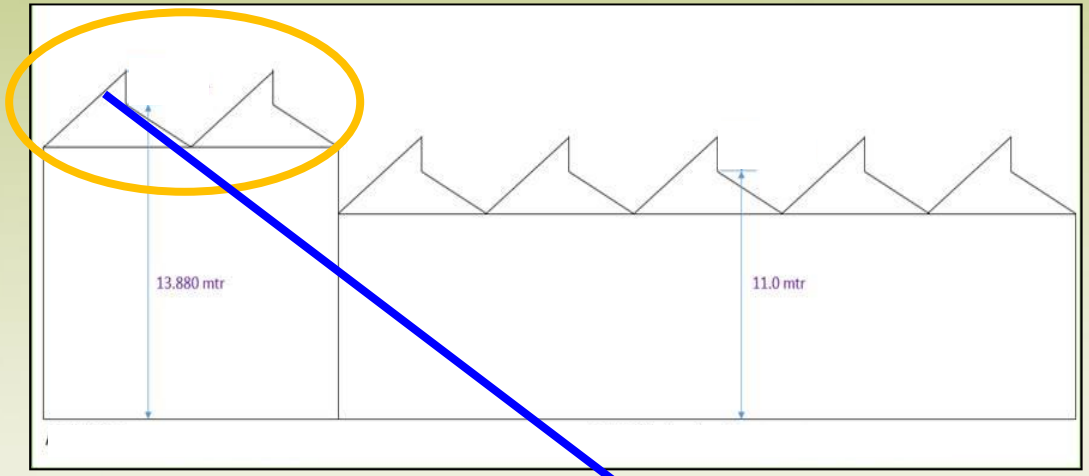
Maximise generation by use of IOT



Real time monitoring of Plant Performance & various parameters

- AC Power/Current/Voltage, DC Power/Current/Voltage, Inverter & panel Temperature, weather conditions – wind, ambient temperature
- Inverter wise performance monitoring.
  - Helps to decide panel cleaning schedule.
  - Helps to pin point issues in circuit.
- Standard Analysis.
  - Irradiance vs Actual Generation.
  - Actual vs Rated Energy.
- Customised Analysis –
  - We can select any 4 parameters to know interrelation
- Trends – Daily, weekly, monthly yearly. Graphical, excel, pdf.

Time based cleaning of solar panels



Dust accumulation is not same on all roofs due to difference in height of the roof & location with respect to end of the building.

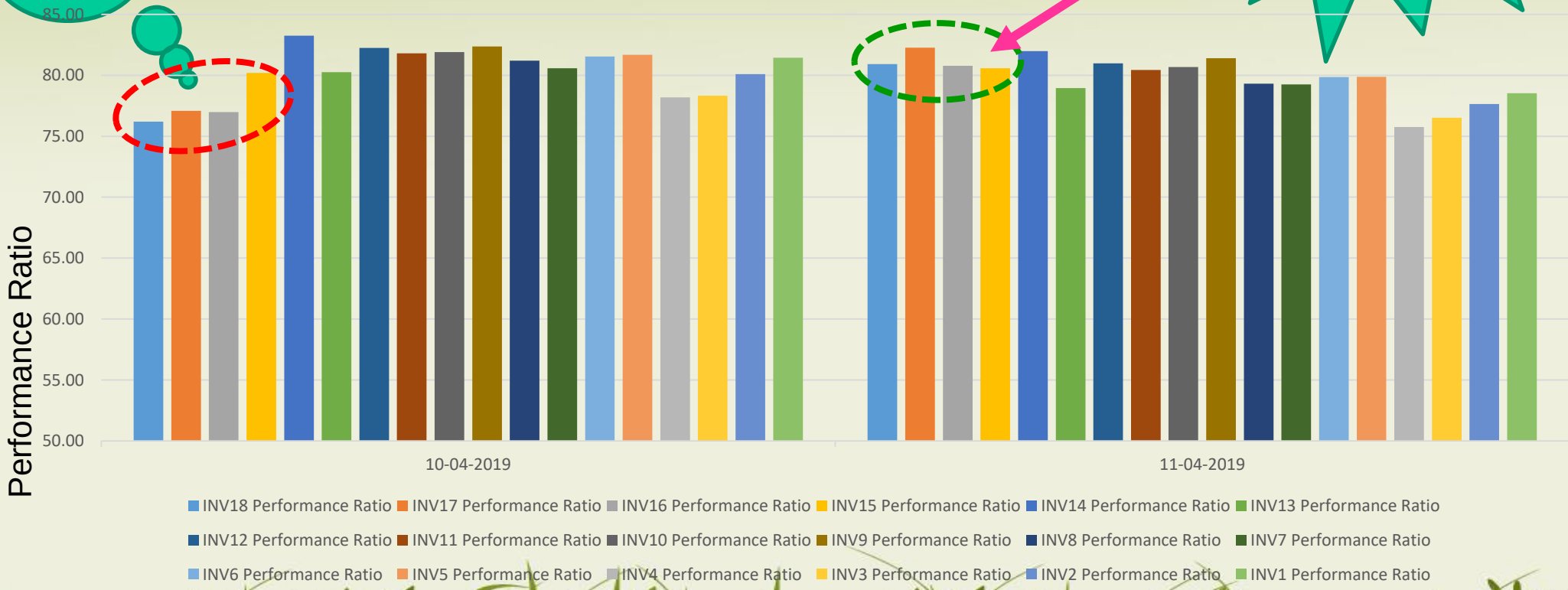
Time Based Cleaning does not ensure high performance all the time.

Wind direction

Condition based cleaning of solar panels

Inverter wise Performance Ratio is tracked & panel cleaning decision is taken based on PR value. Low PR for inverters 15 to 18

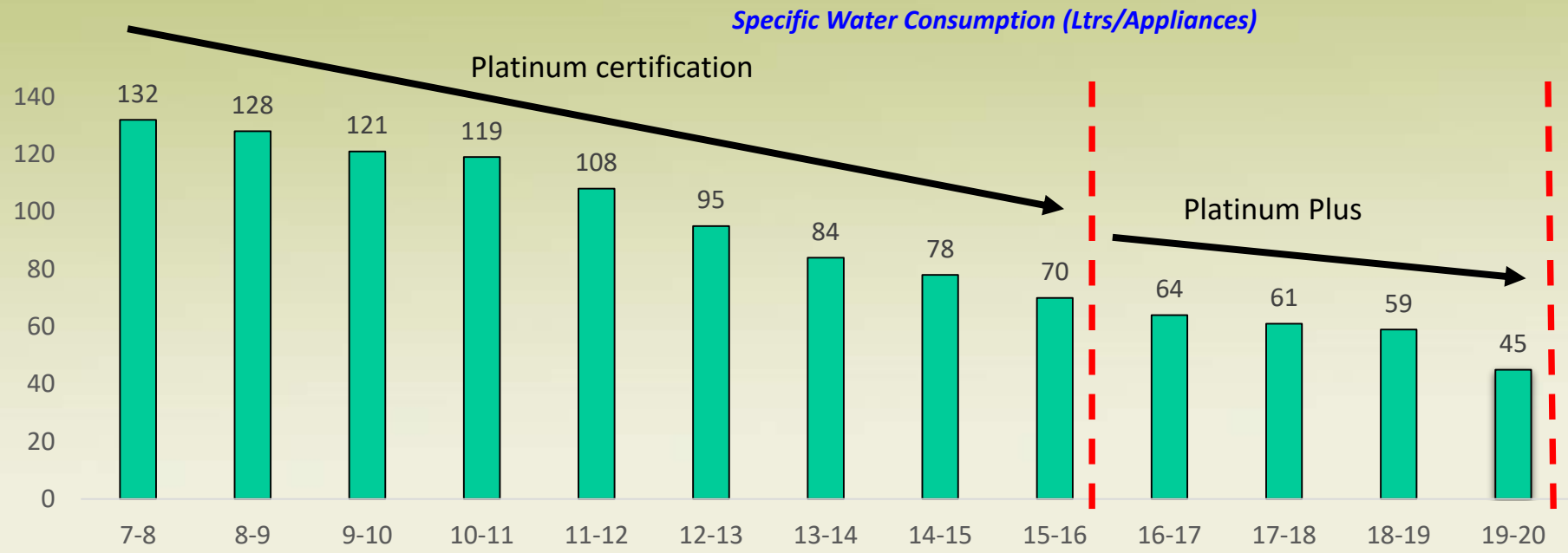
Performance Ratio improved



Condition based cleaning ensures high performance always and optimises resources

3. Water Conservation

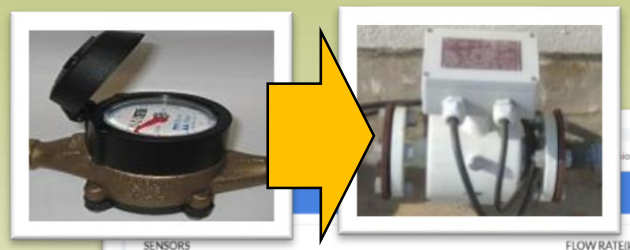
Result Specific Water Consumption



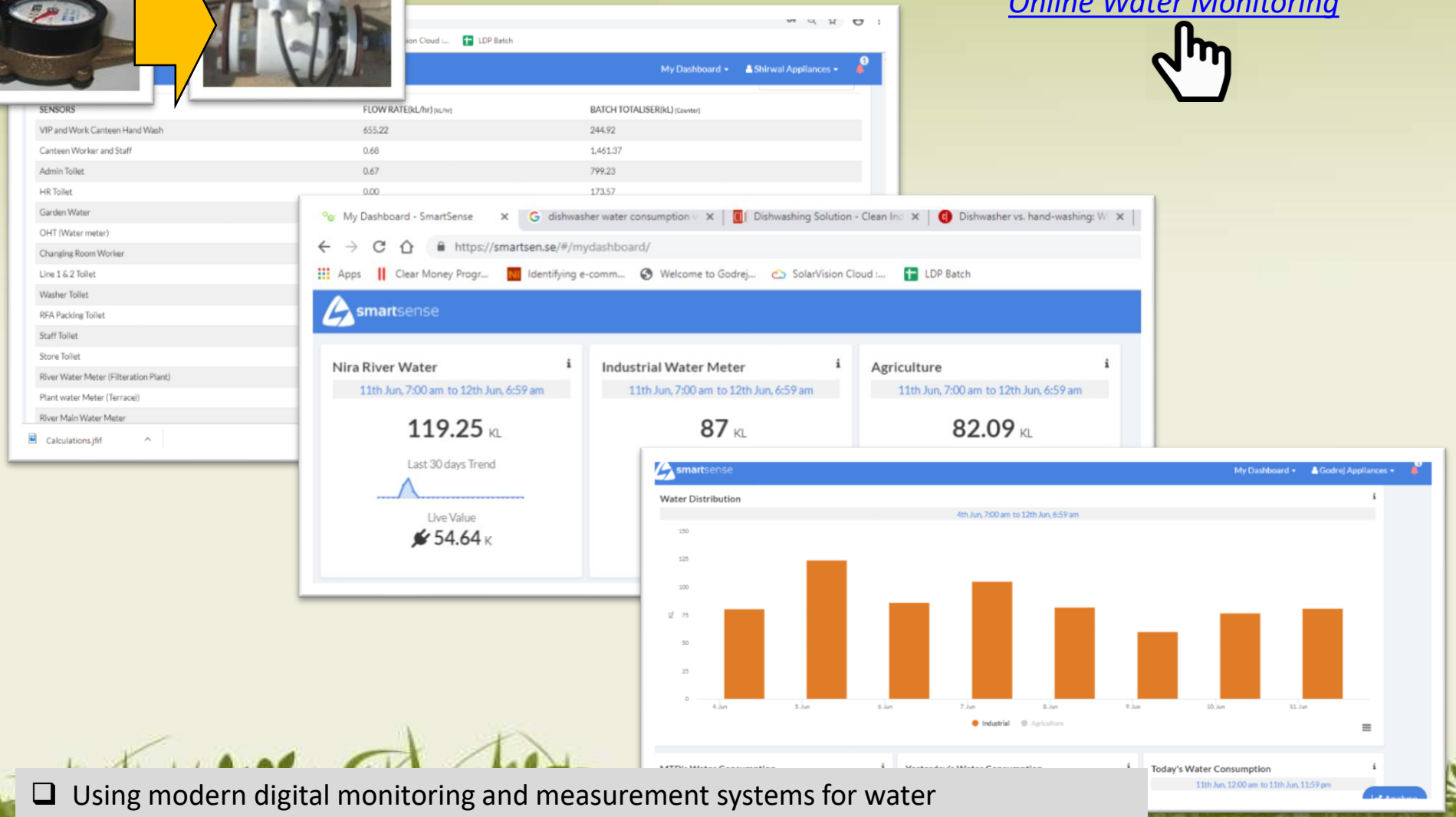
Approach –

1. Monitoring as per usage, domestic and process separately.
2. More focus on reuse and recycle.
3. Continuation of reduce approach.
4. Real time Monitoring through digitisation
5. Benchmarking.

Real time water consumption monitoring



[Online Water Monitoring]



- Using modern digital monitoring and measurement systems for water
- USP : SMS alert generations and helping proactive approach in case of leakages

Sprinklers for solar panel cleaning

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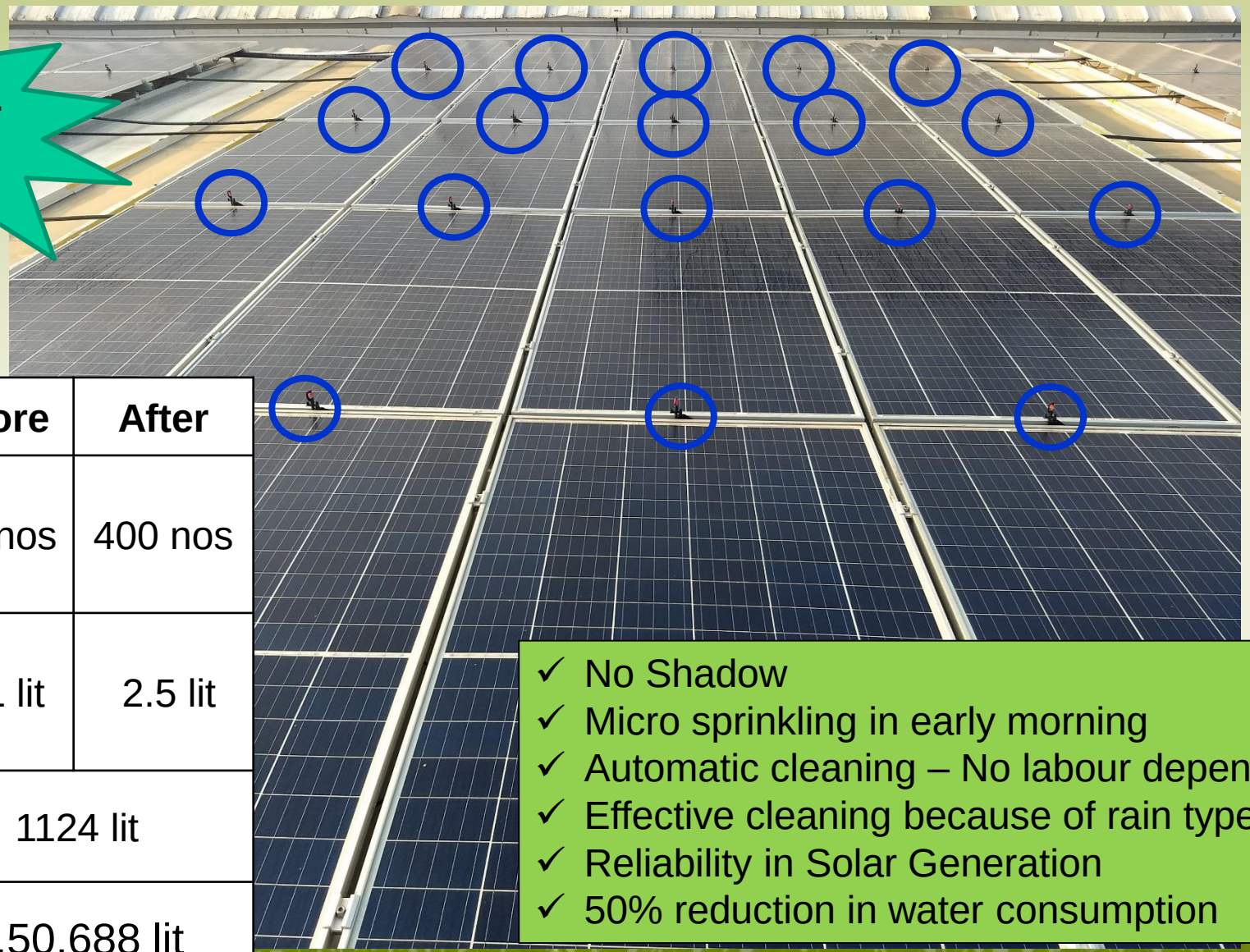
Beneficial for RE and WC



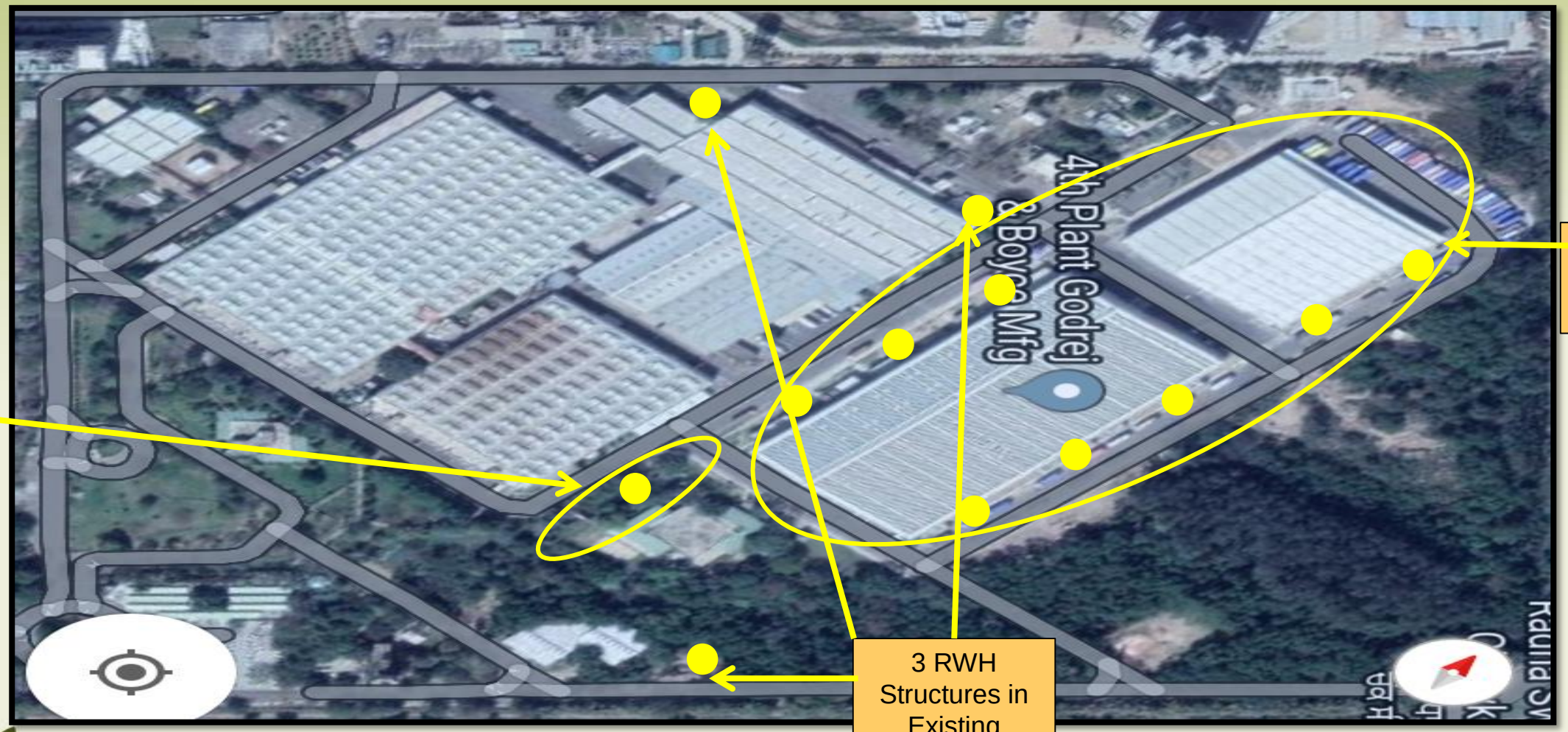
Description	Before	After
No. of panels cleaned per day	400 nos	400 nos
Water Consumption per panel	5.31 lit	2.5 lit
Daily Water saving	1124 lit	
Annual Water Saving	3,50,688 lit	

- ✓ No Shadow
- ✓ Micro sprinkling in early morning
- ✓ Automatic cleaning – No labour dependant
- ✓ Effective cleaning because of rain type effect
- ✓ Reliability in Solar Generation
- ✓ 50% reduction in water consumption

Rain water harvesting - Shirwal

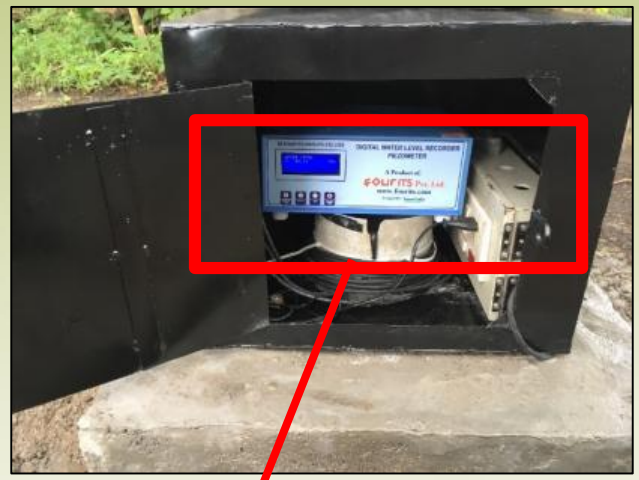
Horizontal deployment during new plant construction

Rain water harvesting - Mohali

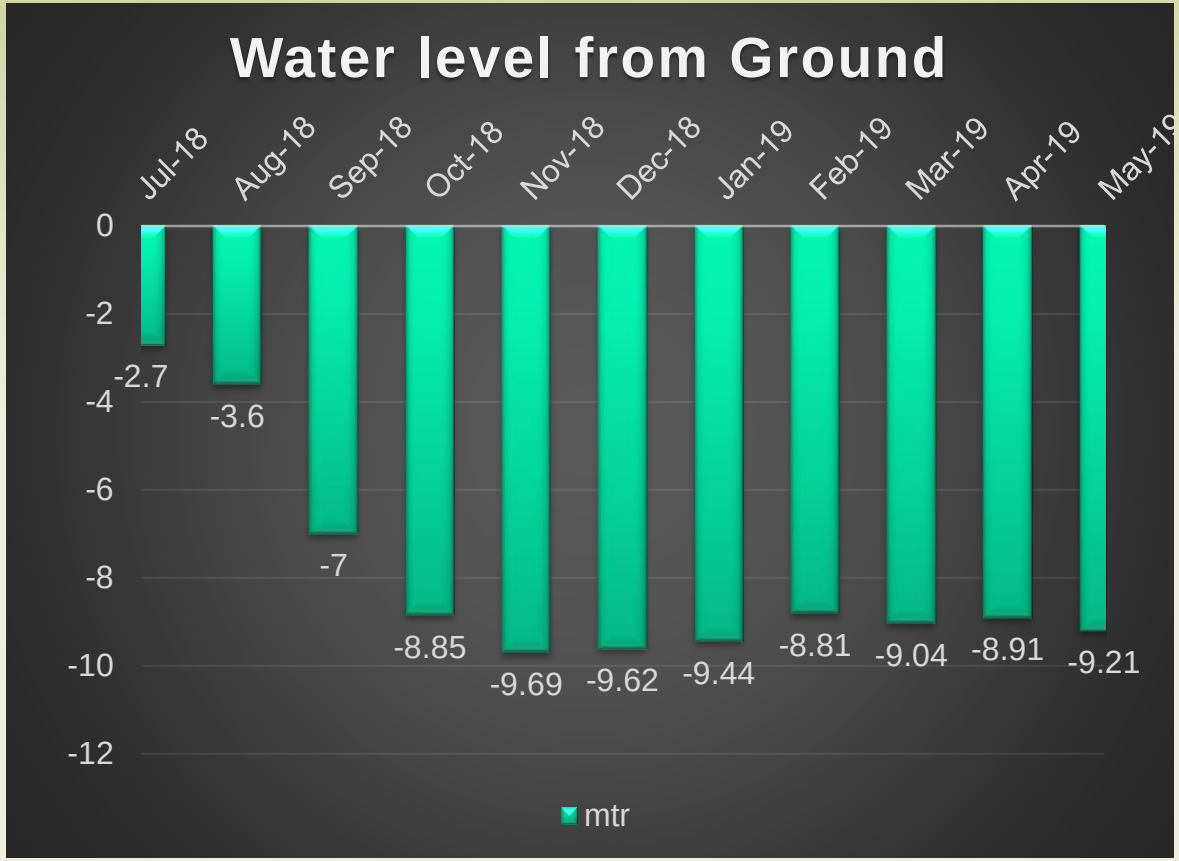


Horizontal deployment during new plant construction

Monitoring effectiveness of Rain Water Harvesting

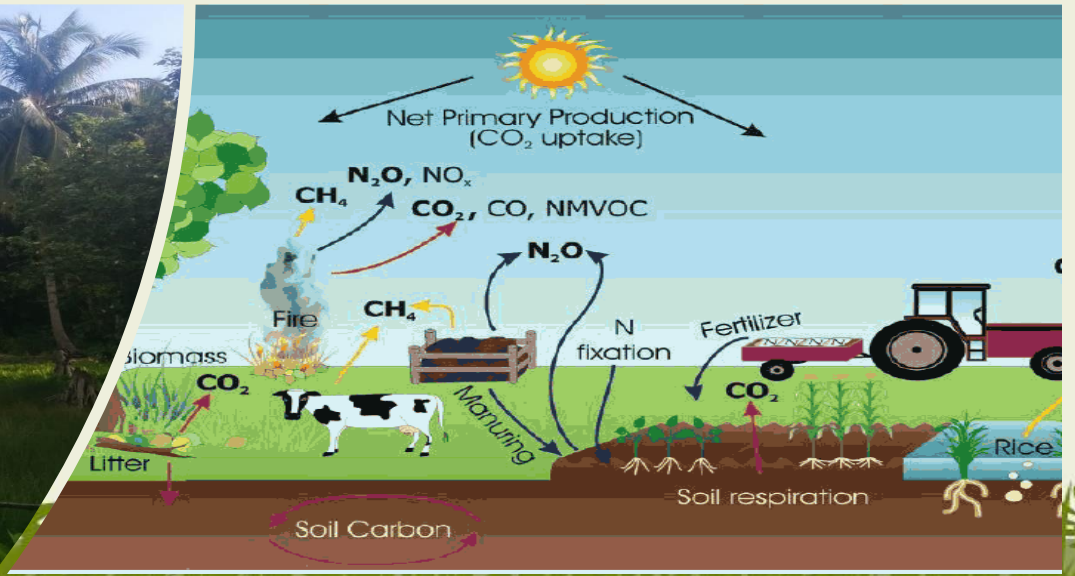


 # Ground Water Table monitoring : Piezometer

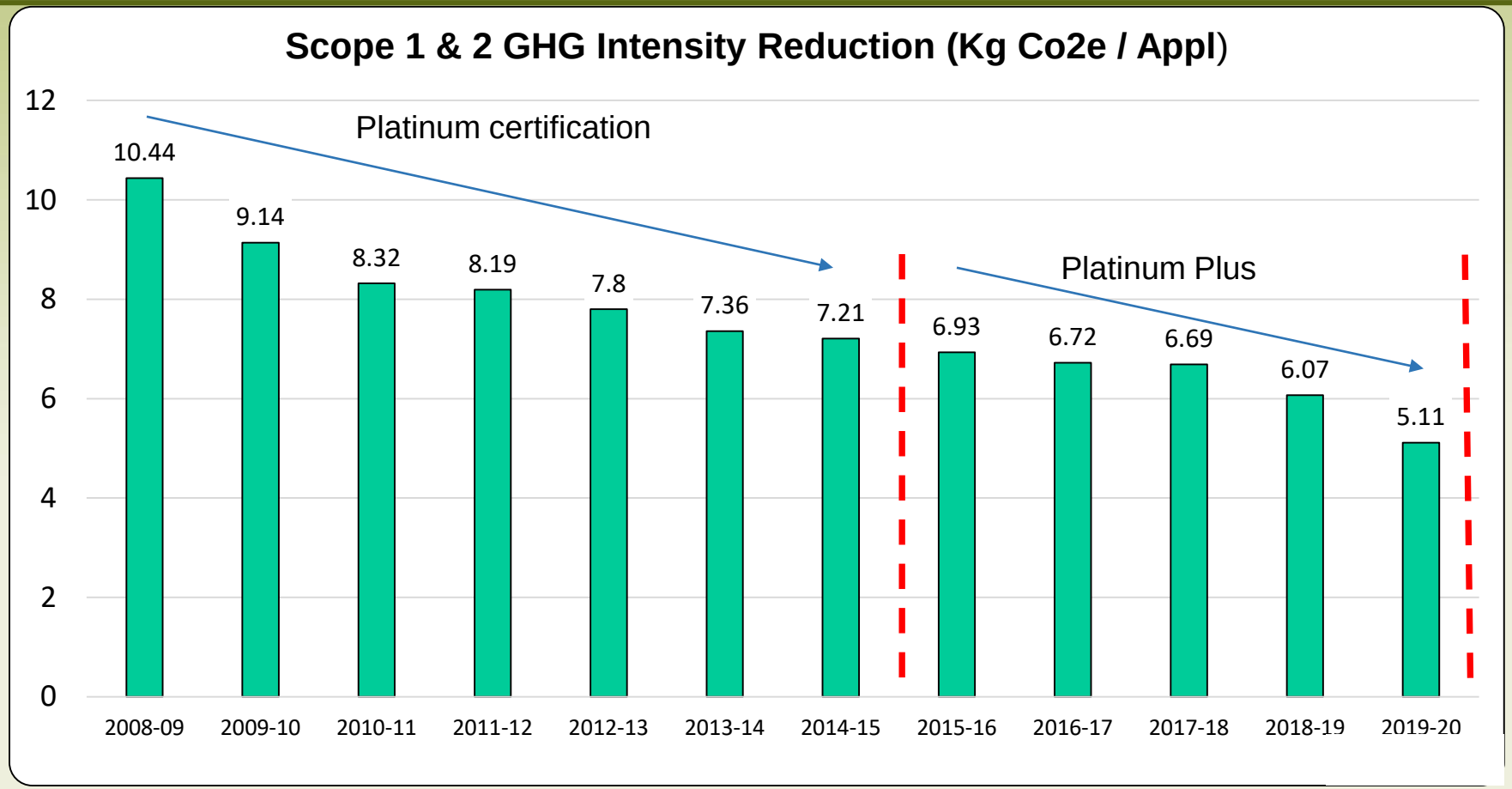


❖ Installed Piezometer in new Tube well to monitor underground water level

4. Green House Gas Emission



Result Specific GHG Emission



Approach

1. Zero Fossil fuel to No fuel in the plant
2. Battery operated vehicles on shop floor
3. Increase renewable energy share

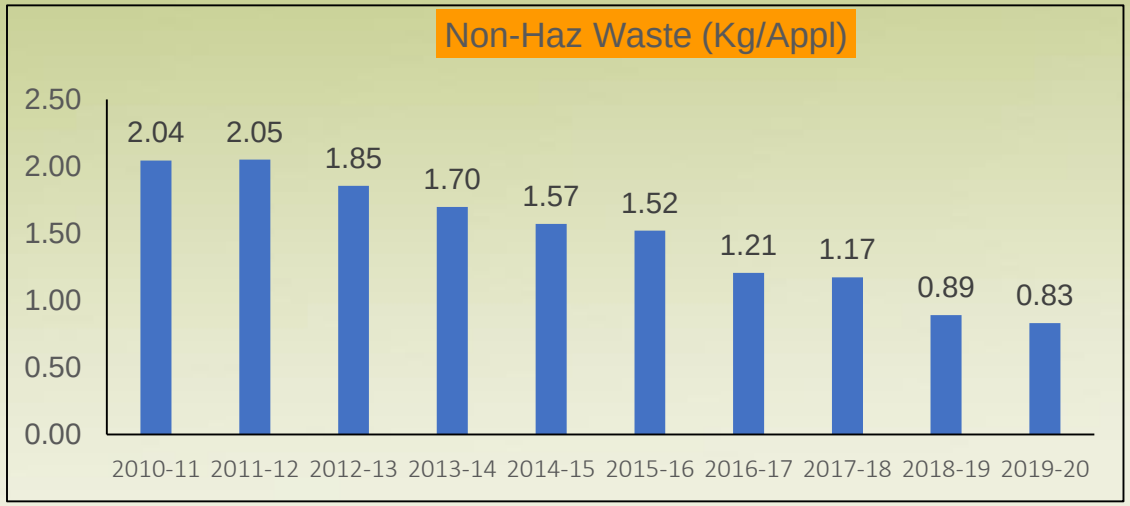
Solar charging for forklift batteries

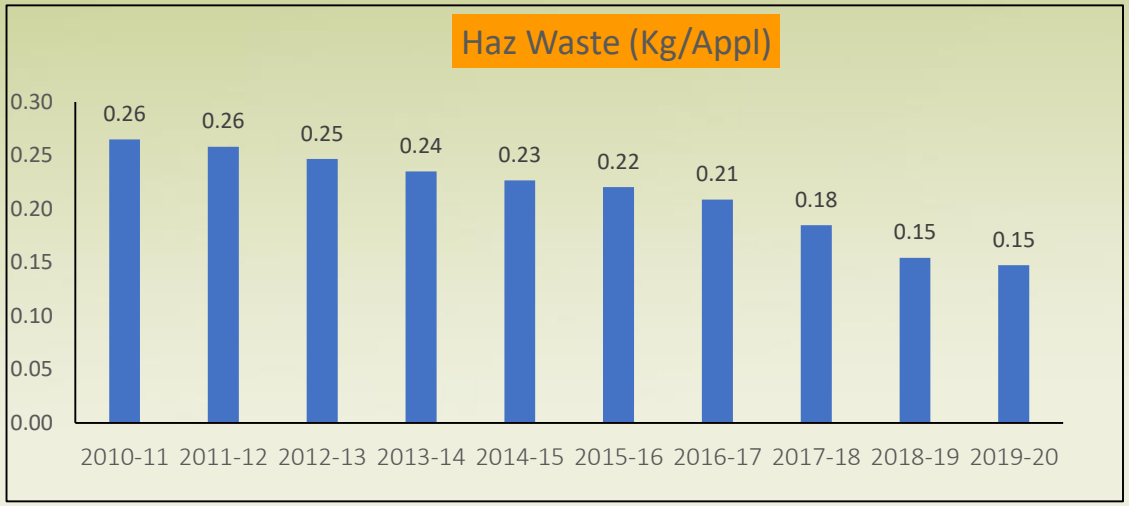
This project is in progress

5. Waste Management

We believe , every thing has a value ..... even waste

Result Specific Waste Generation





Approach –

1) 3R Principle – Reduce, Reuse, Recycle
2) Focus on reduction in generation of waste
3) Zero waste to landfill
4) Value engineering projects
5) Use of IOT for reducing waste

Key Initiatives : Digitalization the journey towards i- Factory

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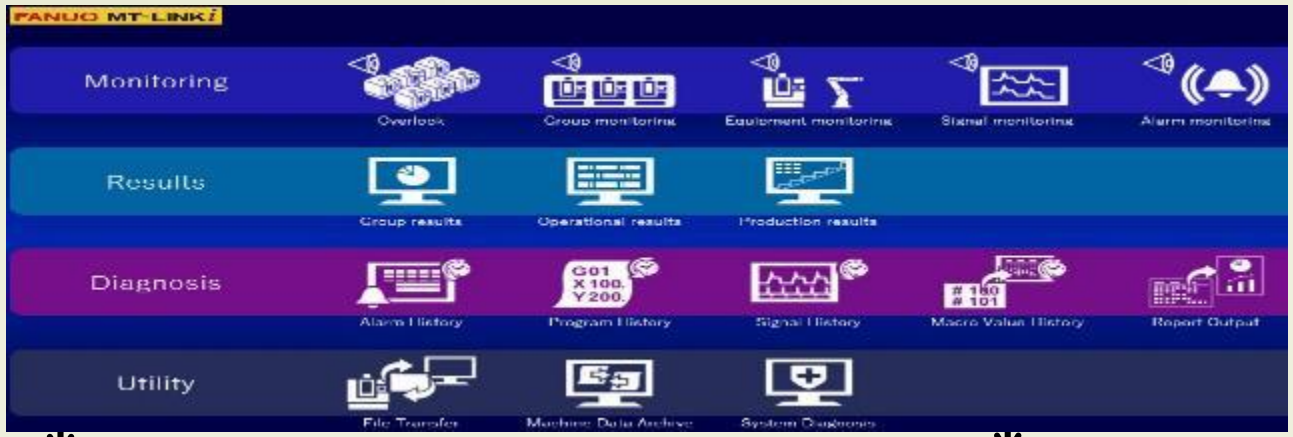
i-FACTORY

- Production Systems
- Intelligent Maintenance System
- Energy Utility System
- Digital Supply chain

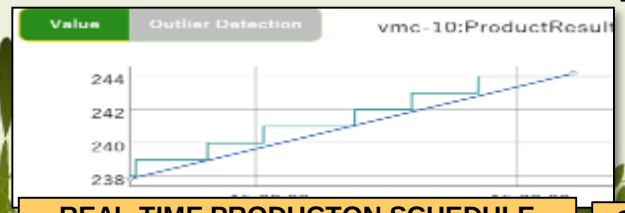
Case Study: Real time monitoring of critical parameters

ETHERNET CABLE FOR COMMUNICATION

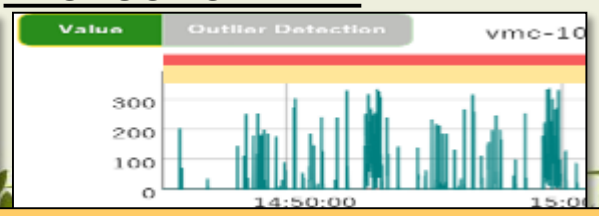
SOFTWARE



PRODUCTION DATA

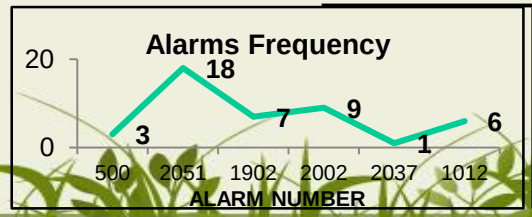


REAL TIME PRODUCTON SCHEDULE VS ACTUAL PRODUCTION DATA

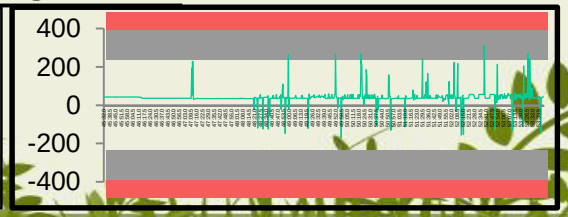


CONDITION BASED TOOL LIFE MONITORING BY MONITORING REAL TIME SPINDLE LOAD PER TOOL

MAINTENANCE DATA



FREQUENCY OF ALARMS DATA



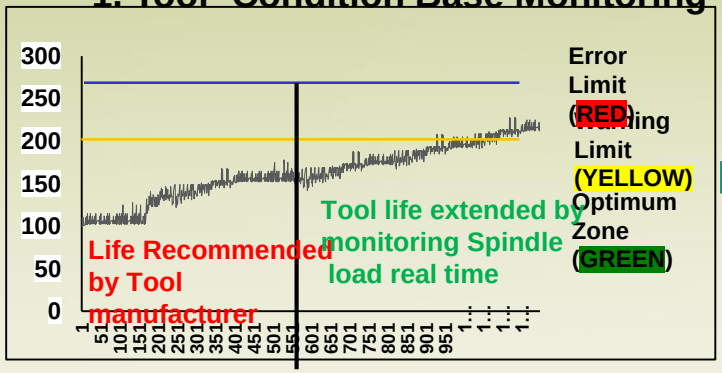
REAL TIME SERVO CURRENT MONITORING

Use of IOT for Waste Reduction

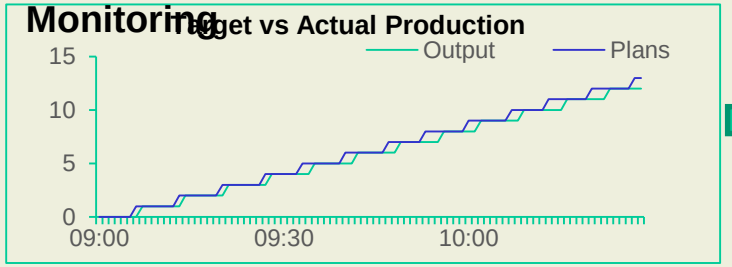
Machines

Real Time parameters Measurement

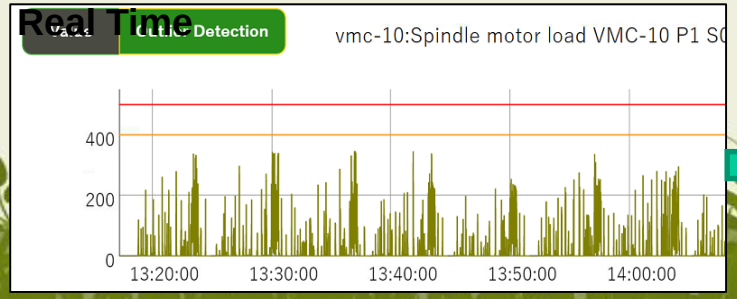
1. Tool- Condition Base Monitoring



2. Real Time OEE and Micro Stoppage Monitoring

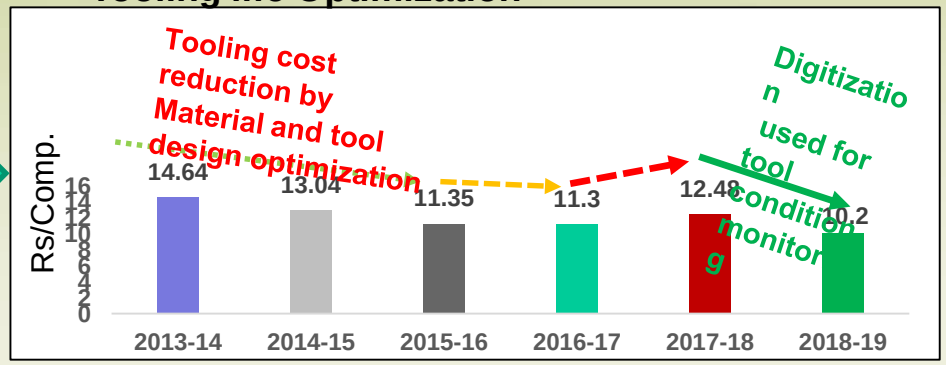


3. Critical Parts Condition Monitoring Real Time

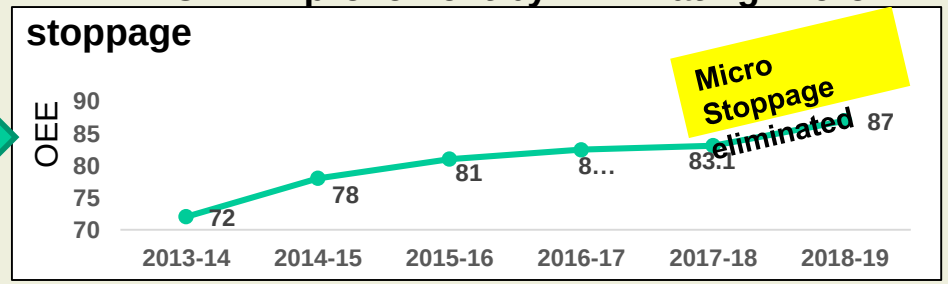


Benefits From Real Time data Monitoring

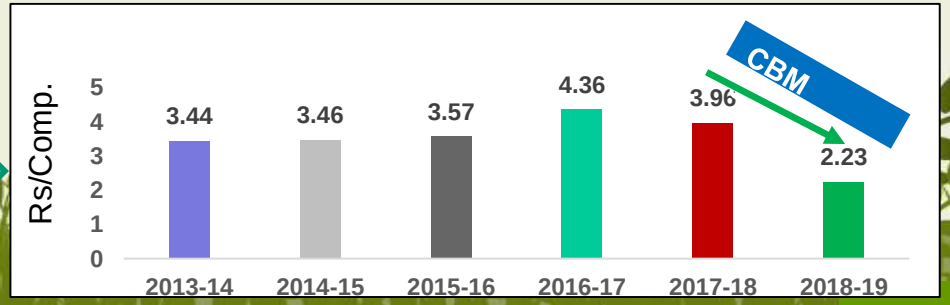
Tooling life Optimization



OEE Improvement by Eliminating Micro stoppage

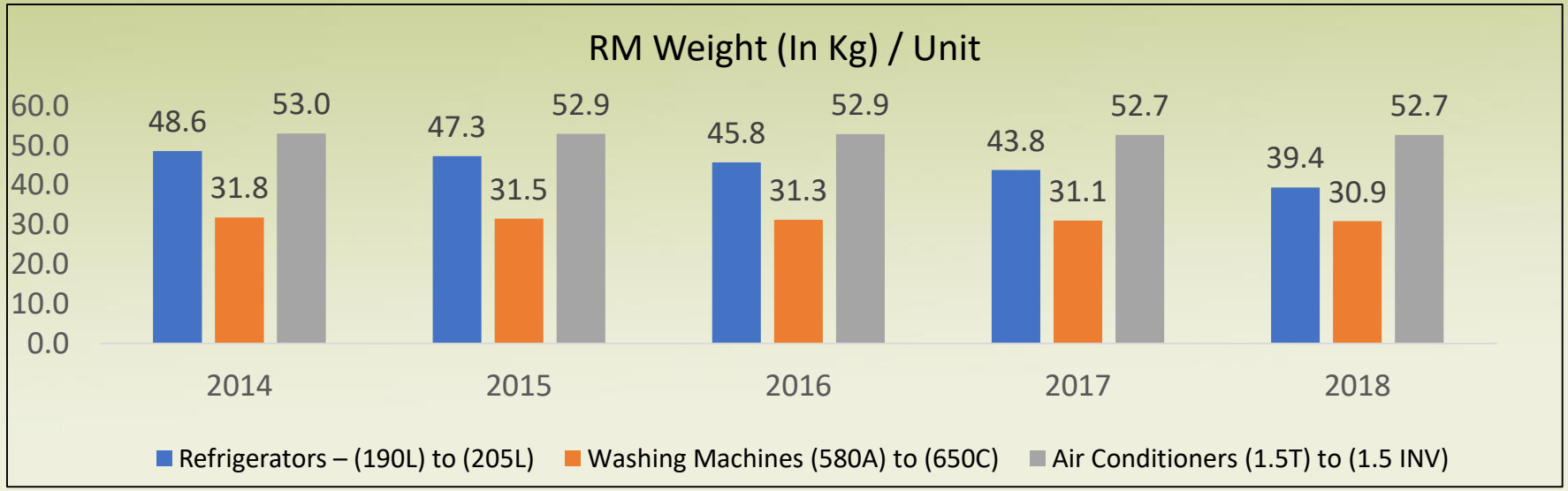


Spare Reduction by part Replacement from TBM to CBM



6. Material Conservation & Recycling

Reduction in specific raw material consumption



Approach –

1. Benchmarking with competitor products and identifying opportunities for improvement for reduction in raw material content.
2. Value Engineering Projects by Technology change
3. Use of alternate materials
4. Use of new processes and technology for reducing input raw material

Introduction of Mini Compressor in Refrigerator

Compressor Commodity Wise Break Up			
SR. NO	**COMMODITY**	**GVI6T2-T**	**I6 MINI**
1	ALUMINIUM	0.0625	0.04
2	COPPER	0.0331	0.0297
3	STEEL	3.6089	1.914
4	CASTING	2.0945	0.902
5	FLAPPER VALVE STEEL	0.0061	0.0021
6	HARDWARE	0.1324	0.064
7	SINTERED IRON	0.1116	0.077
8	BUNDY TUBE	0.0258	0.018
9	GASKETS	0.0012	0.002
10	RUBBER	0.0233	0.011
11	PLASTIC	0.065	0.041
12	STATOR	1.4912	0.769
13	ROTOR	0.5236	0.377
14	OIL	0.2207	0.13
TOTAL WEIGHT(AFTER TEAR DOWN)		**8.4**	**4.4**

Significant reduction in weight of compressor in steel and casting with introduction of most energy efficient design for compressor.
This was possible with new design of small BLDC motor supporting the mechanical assembly.

Compressor: GVI6T2-T

Compressor: I6 MINI

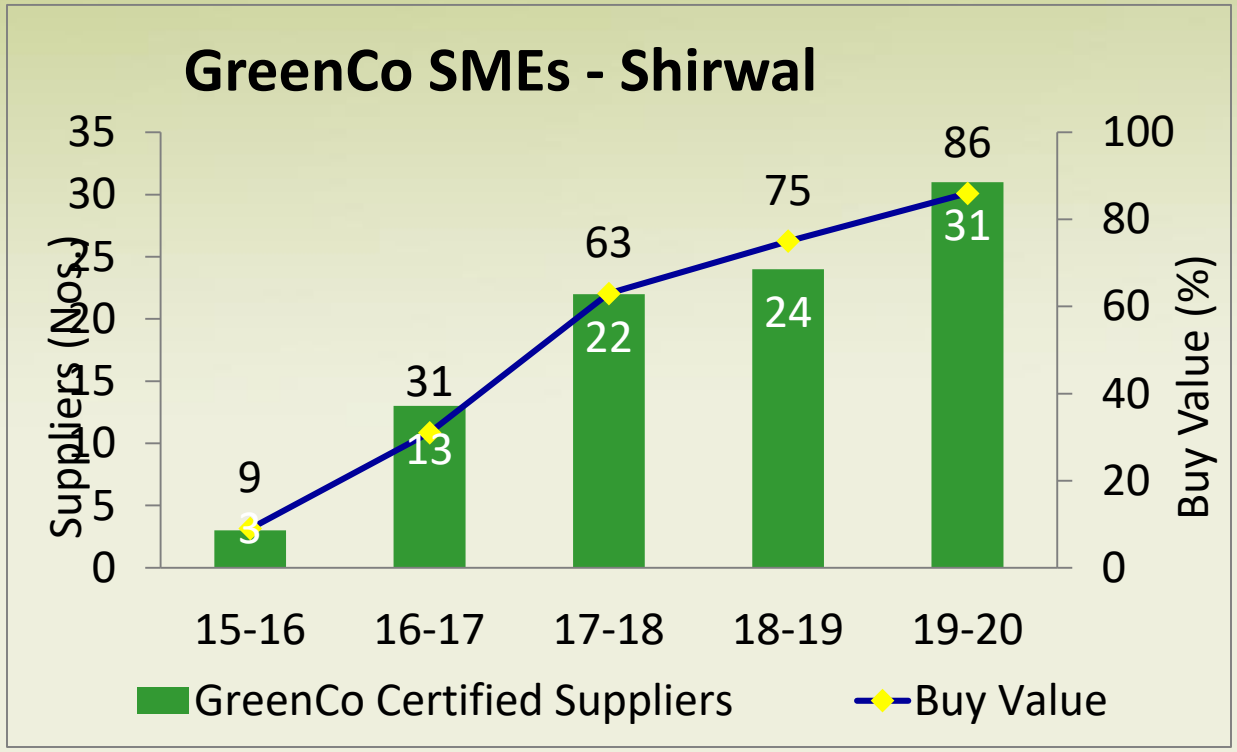
This is an inhouse development
RM Weight reduction by 4 kg

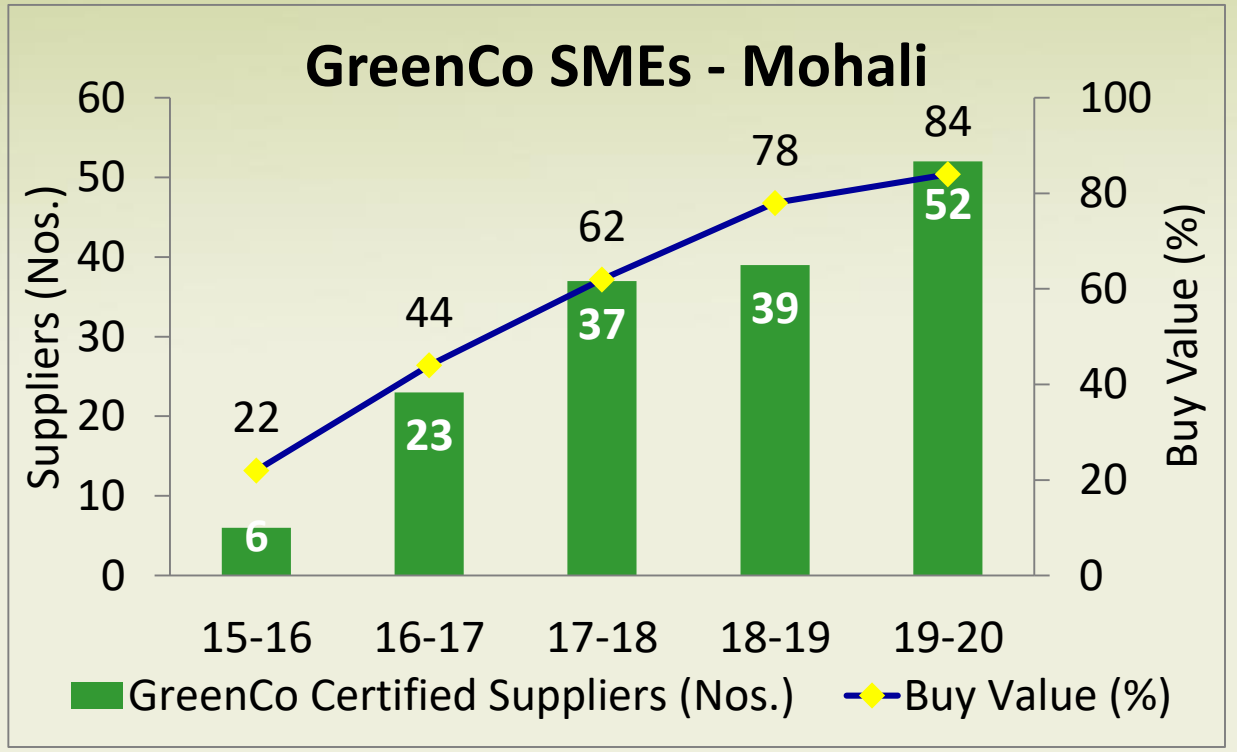
Introduction of Honeycomb packaging

Environment friendly Packaging Material.
We were ready for upcoming changes in regulations.

7. Green Supply Chain

GreenCo Certified Vendors





Year on year GreenCo certified vendors are increasing and they are also applying for up gradation

Supplier Capability Development through Supplier Cluster

Cluster Organization…..

Godrej Team

Head Sourcing

Location Sourcing head
Responsible for driving the cluster

Plant manufacturing head to advice & guide cluster on technical issues

Supplier Improvement Team
Gives input & trainings during weekly visits along with domain experts

Co-owner
Works along with the SIT & review the progress of each supplier

Supplier Team

Top Authority of Supplier
To drive cluster at supplier's plant

Top Authority of Supplier
To interact with Godrej Team for implementation of cluster leanings

An Unique Initiative…..

- No external consultants hired
- Aimed at up gradation of SME sector
- A separate vertical created – SIT
- Implementation of Lean techniques at SMEs plants.

The Guiding Principles…..

- Treat suppliers as:-
  - Extension of our own manufacturing facilities.
  - Our own employees.
- Share & disseminate the learning's from Godrej Operational Excellence
- Use cluster approach with a philosophy of
  - Coming Together
  - Learning Together
  - Practicing Together
  - Progressing Together

The Cluster Roadmap…..

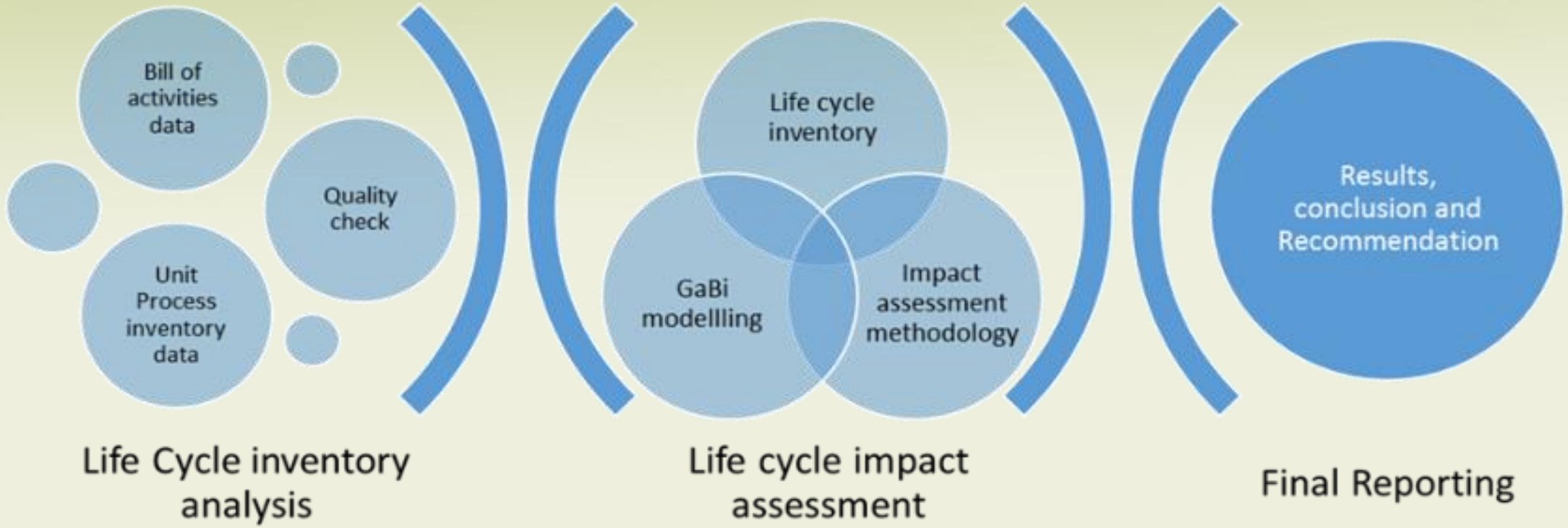
ROADMAP FOR GODREJ SUPPLIER CLUSTER																		DELIVERABLES
SMED Cellular manufacturing Multi-tasking										PRODUCTIVITY IMPROVEMENT								Reduction in c/o time Reduction in throughput time Improvement in labour productivity
CTQ mapping Concept of 100% inspection Quality Alert boards 7 QC tools + QC story CP/ CPk studies Poka Yoke Calibration SOP creation									QUALITY									Reduction in rework (inprocess) Zero defects at customer end Measure cost of Poor Quality
Mapping and monitoring efficiency of - Energy Water Waste Toxicity						GREEN												Reduction in Energy consumption Reduction in Water consumption Reduction in all type of Waste RoHS compliant products and processes
Step 0 to 2							MY MACHINE											Breakdown reduction trend
1S / 2S Red Tag campaign Fixed point photography Jogging track Safety			5 S			1S score worksheet Zero red tag items Before / after photos Boundary walls clear Department Safety Score (DSS), Frequency / Severity rate, No. of accident free days													
Time in Months :			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	

8. Product Stewardship & Life Cycle assessment

LCA study for ascertaining Green products

Methodology adopted for LCA

We adopted standard methodology for Life Cycle Assessment as defined by ISO14040/44:2006



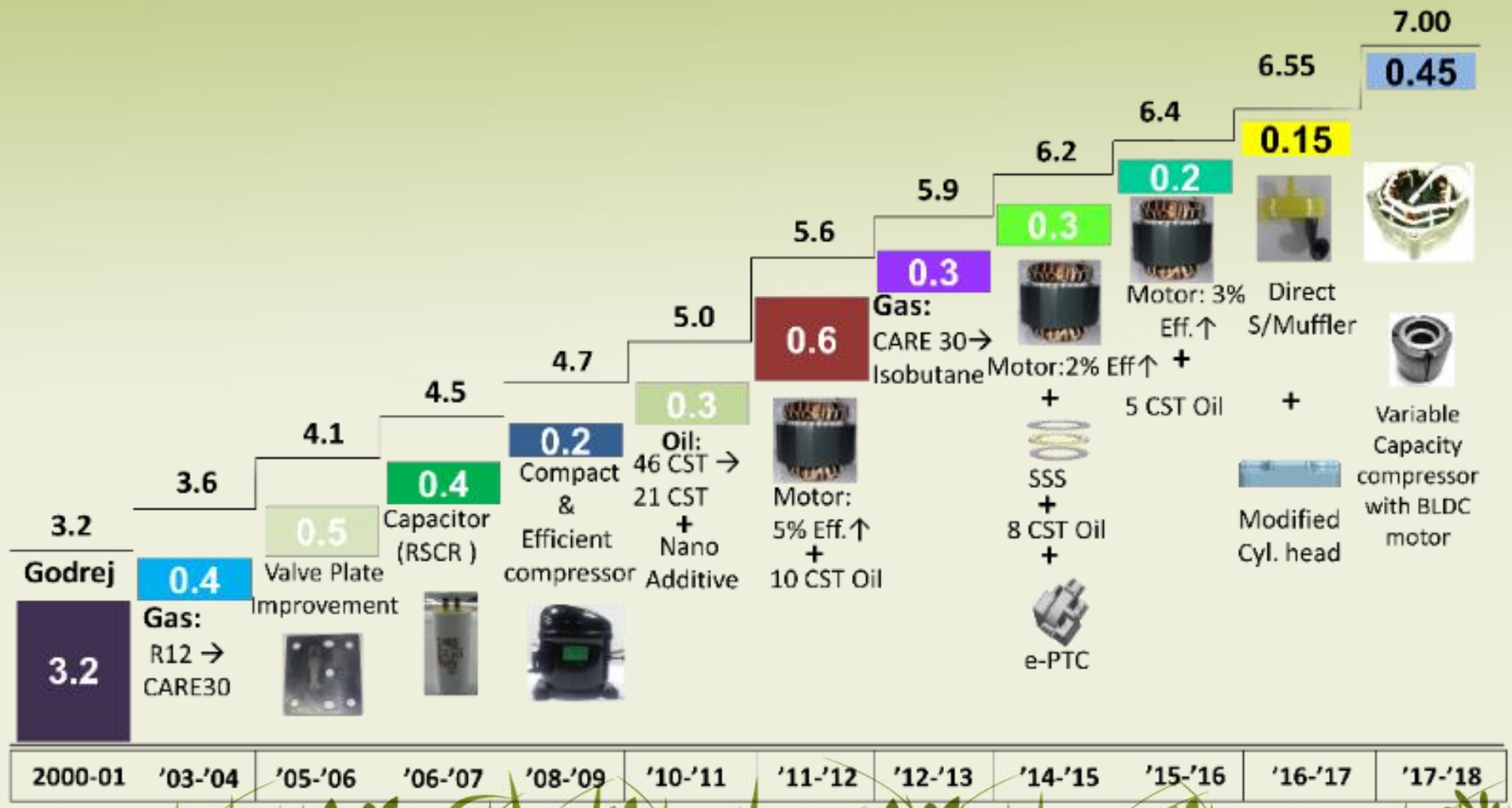
Path followed for the LCA Study

Number of LCA's Conducted so far

Year	2015-16	2016-17	2017-18	2018-19
Plan	1	2	2	9
LCA's Conducted	1	2	2	9
Refers	Edge pro 190 (LCA study by external agency)			SPIN R1 = 3 models (240, 260 & 290 ltrs Frostfree) SPIN R2 = 2 models (330 & 350 ltrs Frostfree)
Washers			GLITZ FATL	ALLURE-1 SAWM 1
AC		GSC12FG8MOG-1T GSC18FG6ROG1.5 T(LCA study by external agency)	GSC12FIXGGPG-1T	GIC12BAH8GGQG-1T=1
Compressor				VCC GVI6T2-T=1

All Product categories are covered for LCAs

Compressor Energy Efficiency Improvement



Year on year improvement in Energy Efficiency

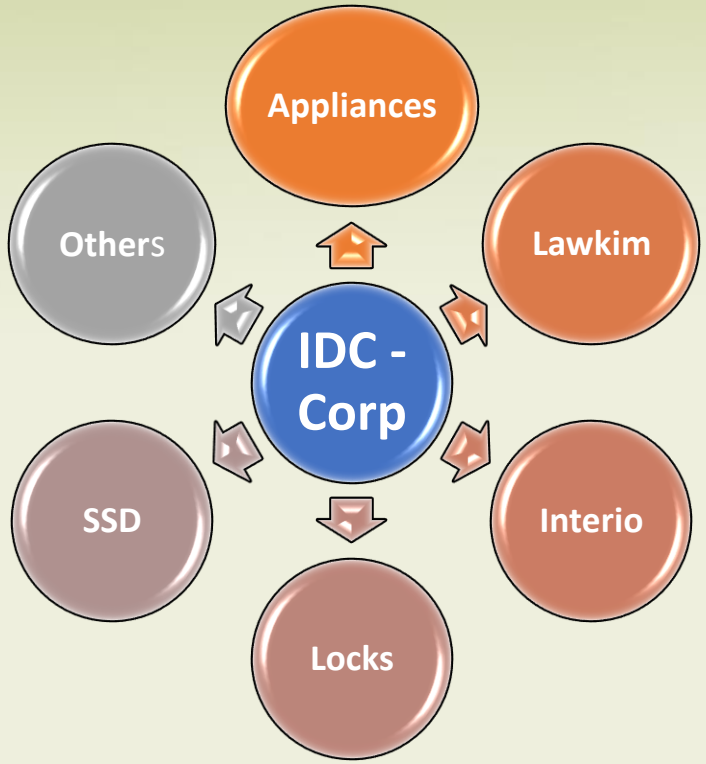
9. Innovation for Environment

Innovation and Design Centre (IDC) at Corporate level

IDC : Its acts as a platform where art, science, engineering and marketing can intersect and work collaboratively

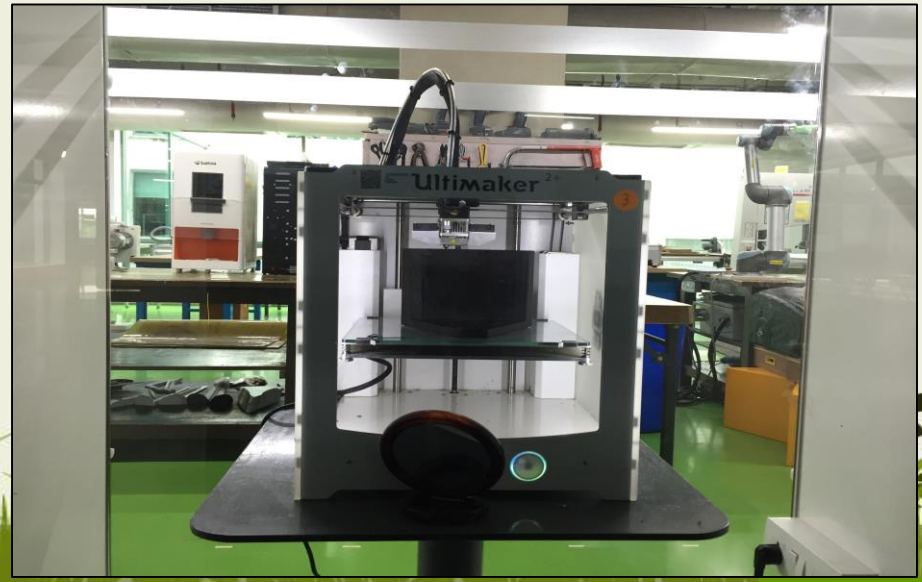
Need IDC:

1. Needed very different skill sets than what we already had in the company
2. Needed skill sets in design, in research, in understanding culture
3. To tune with the global trend of using design as a tool of creative productivity



Team Lead by Innovation Professional and team members of 23 people from different sector ,skill set and experience

IDC Photos



Appliances Innovation Cell - Projects

TEAM Responsibility	Nutricubator	Microgrinder	Cooking Aid	Digital	Cooler	Rotimatic
Urvesh Bharambe, *Product Design*	S					
Jayesh Sawant, *Product Design*	t					
Amit Gaikwad, *Engineering Design*	e					
Rajasekhar Mugada, *Software Architect*	a					
	m					
	a					
	g					
	i					
	n					
	e					

“Leading projects in Appliances Innovation Cell with team.”

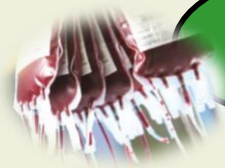
Medical Refrigerator

Special purpose customized Product manufacturing

Medical Refrigerators

Storage of Vaccines

Up to 10 days holdover



Storage of Blood Bags.

Solar Power Enabled

Available in 8 capacities and 35 Variants

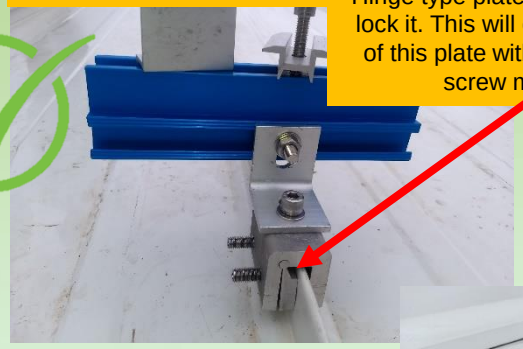
WHO pre-qualified.

Clamps for Solar Panel on roof

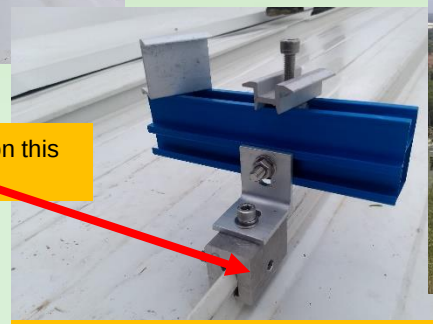
Conventional Clamp of Solar Roof Top

View from Left

Hinge type plate on one side & grub screw to lock it. This will ensure positive engagement of this plate with clamp structure & no grub screw marking on the sheet



Grub Screw required or not on this side



View from Right

Godrej Modified Clamping system for Solar Roof Top

1.5 MW Solar Roof Top Project Godrej Appliances

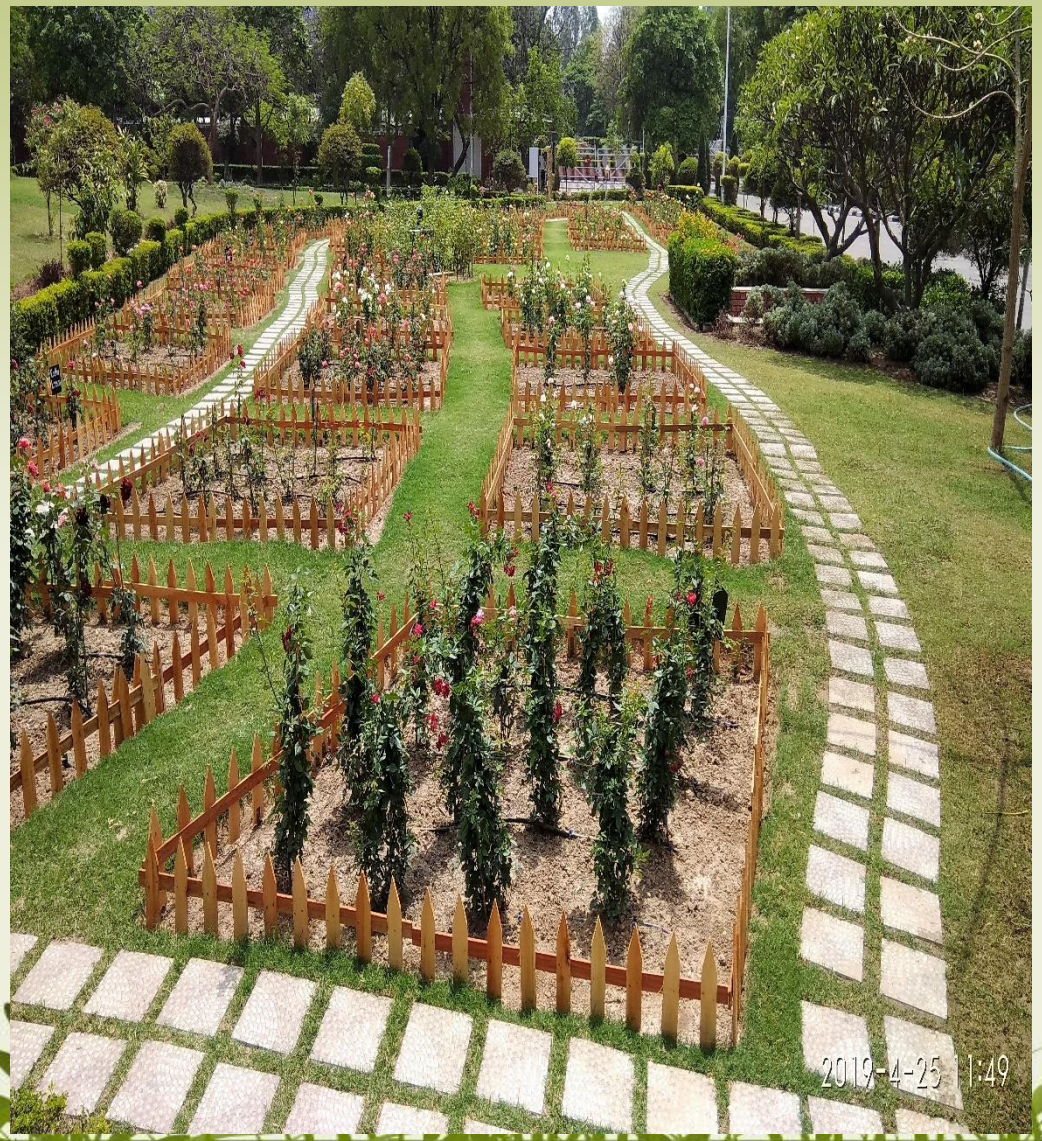
Godrej Modified Clamping system (Total 11250 Clamps) for Solar Roof Top

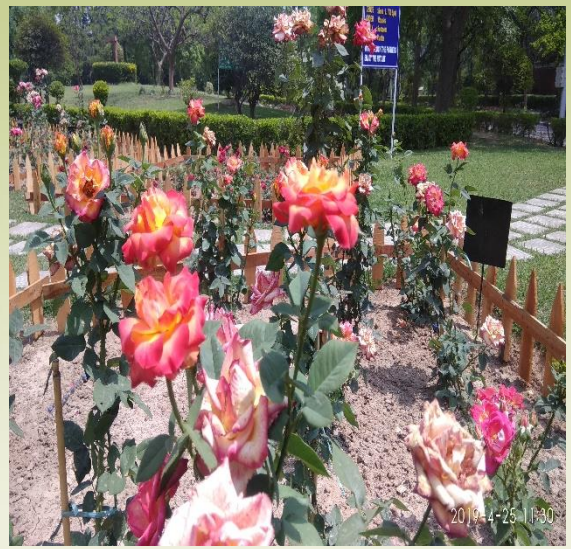
10. Green Infrastructure

Both plants are IGBC Platinum certified

Preserving Biodiversity Butterfly Park @ Shirwal

Preserving Biodiversity Rose Garden @ Mohali





Platinum Plus Requirements

❖ Mandatory Requirements

Credit	Credit Description
Mandatory Requirement 1	Management System for GreenCo
Mandatory Requirement 2	Robust System to Address Legal Requirements on Environmental Performance
Mandatory Requirement 3	Business Risk Analysis in Context of Natural Resources and Climate Change

Credit	Credit Description
Requirement 1	Online Monitoring System and Approach Towards Implementing Industry 4.0
Requirement 2	Implementation of New Technologies and Innovation Cell
Requirement 3	Benchmarking
Requirement 4	Life Cycle Assessment
Requirement 5	Green Supply Chain Strategy
Requirement 6	Water Neutrality
Requirement 7	Carbon Neutrality
Requirement 8	Zero Waste-to-Landfill

Both plants are Platinum Plus Certified

Thank You.