



Excellence Initiatives- GreenCo

“Today's care towards ENVIRONMENT will ensure sustenance of Business

tomorrow”

22/03/16 | tk ES India

thyssenkrupp | Steel | Electrical Steel

engineering.tomorrow.together.

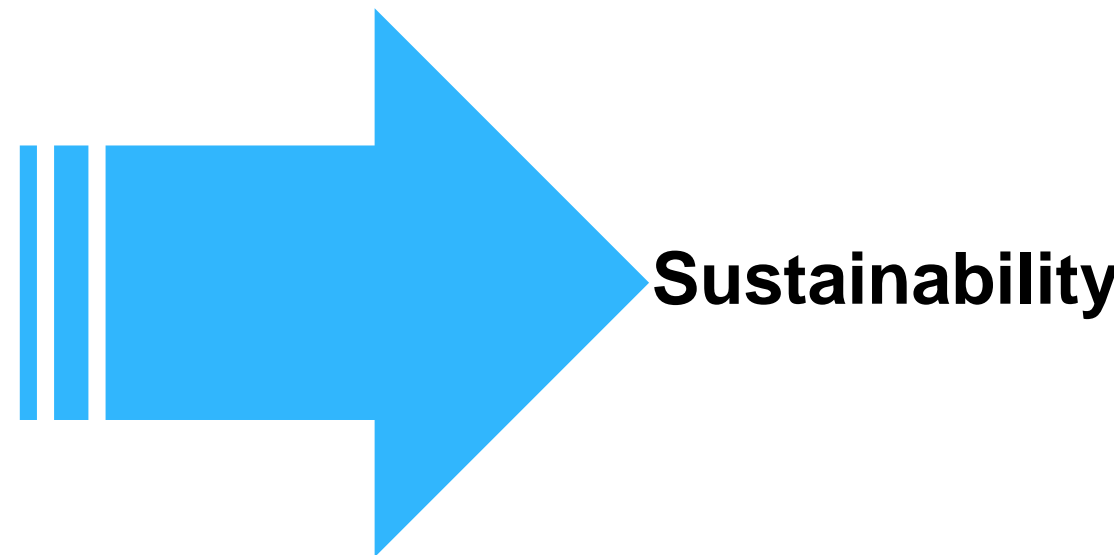


thyssenkrupp

Excellence Initiatives- GreenCo



- **Company profile and production process**
- **Need for Green Rating System**
- **Benefits of the Green Rating System**
- **Journey of tkES towards Green Company**
- **Mission on Sustainable Growth**
- **Green Commandments**
- **Improvement measures**

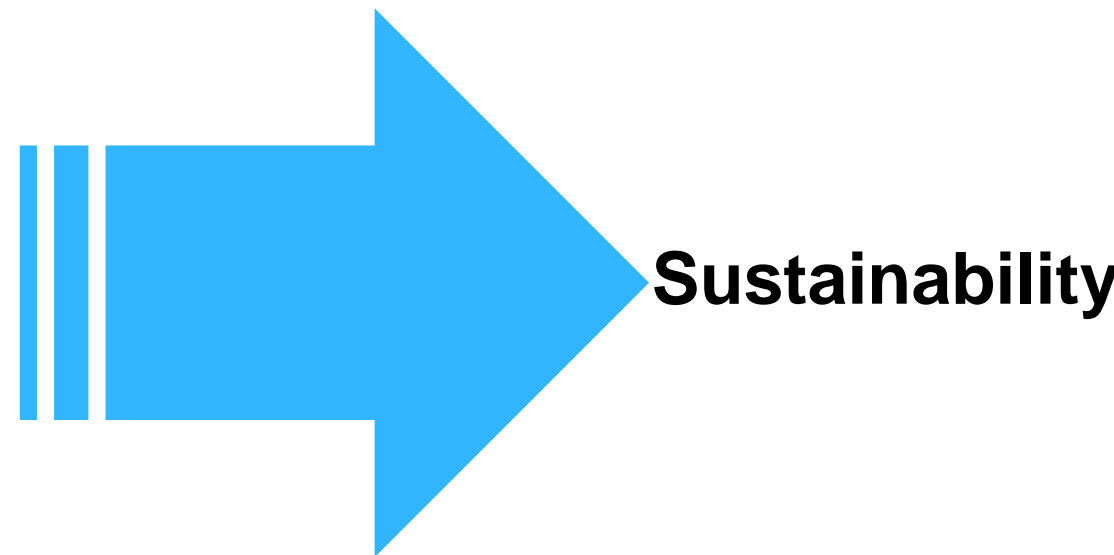


continuous journey

Excellence Initiatives- GreenCo



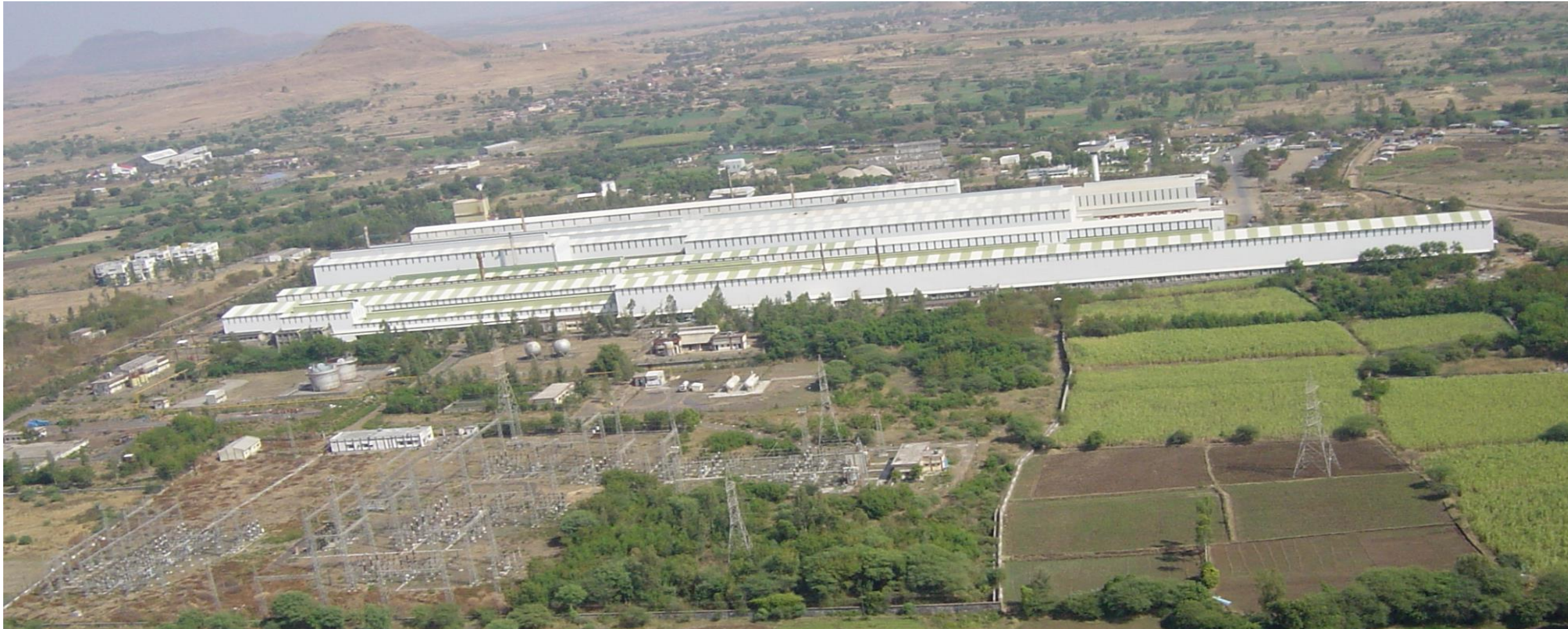
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continuous journey

thyssenkrupp Electrical Steel India (tkES India)

Strategically Located Plant in Western Region Nashik, Maharashtra, India.



- Situated in 6,19,171 Sq. Meters of land.
- Manufactures Non grain oriented and Grain oriented Electrical Steel.
- Finished steel is extensively used by electrical industry.

Nearest Airport: Mumbai about 155 Km / Nearest Railway Station: Nashik about 30 Km / Igatpuri about 20 Km



Nashik plant makes both NGO and GO and the end use of Electrical Steel

NGO

Motors, Drives



Hydro, turbo, wind power generators



Fans, ballasts



Pump motors



Alternators



GO

Power Transformers



Distribution Transformers



Wound Core Transformers



Large UPS



Rectifiers

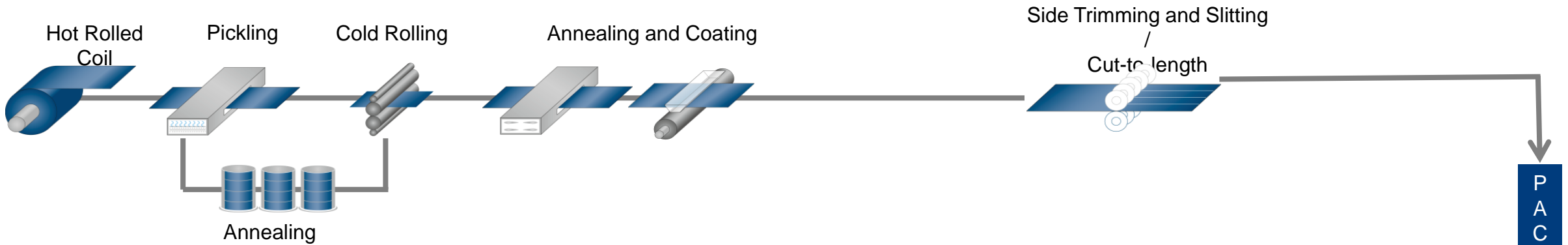


tkES makes Energy Efficient Steel with low core loss

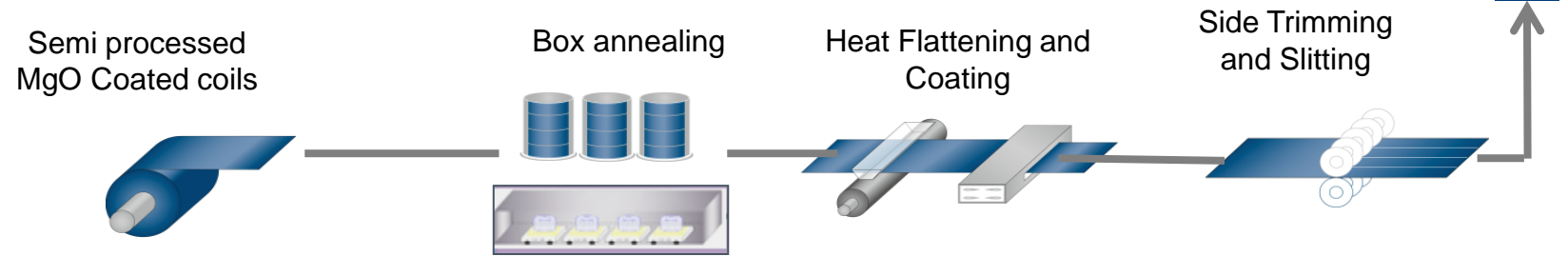


Production process flow

NGO



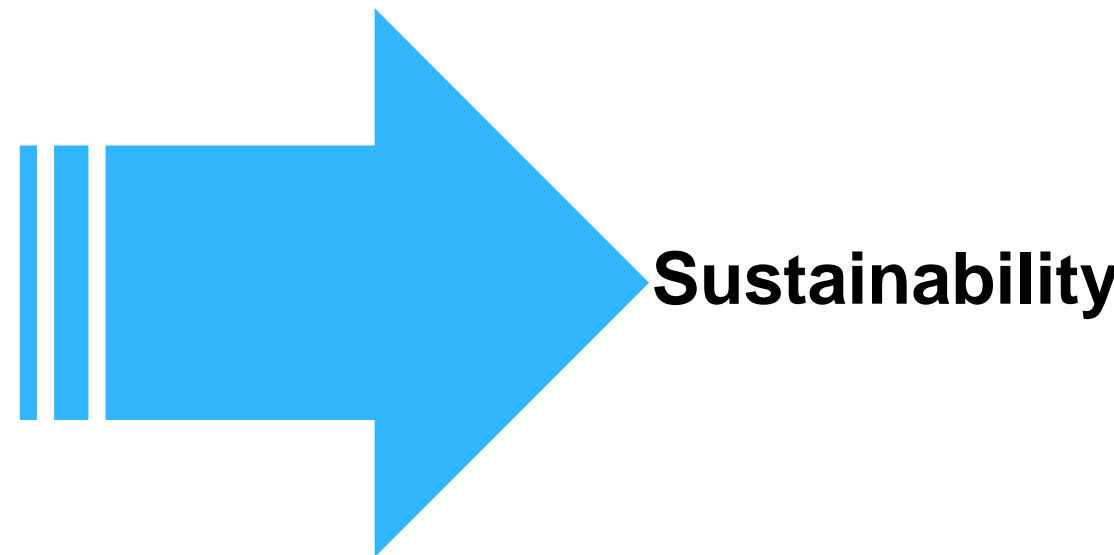
GO



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Need for Green Rating System- “How Green is our Company?”

We had taken many initiatives to reduce our ecological footprint in several areas like energy efficiency, water, GHG, CSR, waste reduction, etc.

Limited reserves - Conservation of Natural Resources

Sustainable business

Common measure on overall green journey for companies

CII have developed the ‘GreenCo rating’ system for evaluating the greenness of companies.

It acts as a mile stone for pursuing green to assess where we stand and help in defining the path forward.

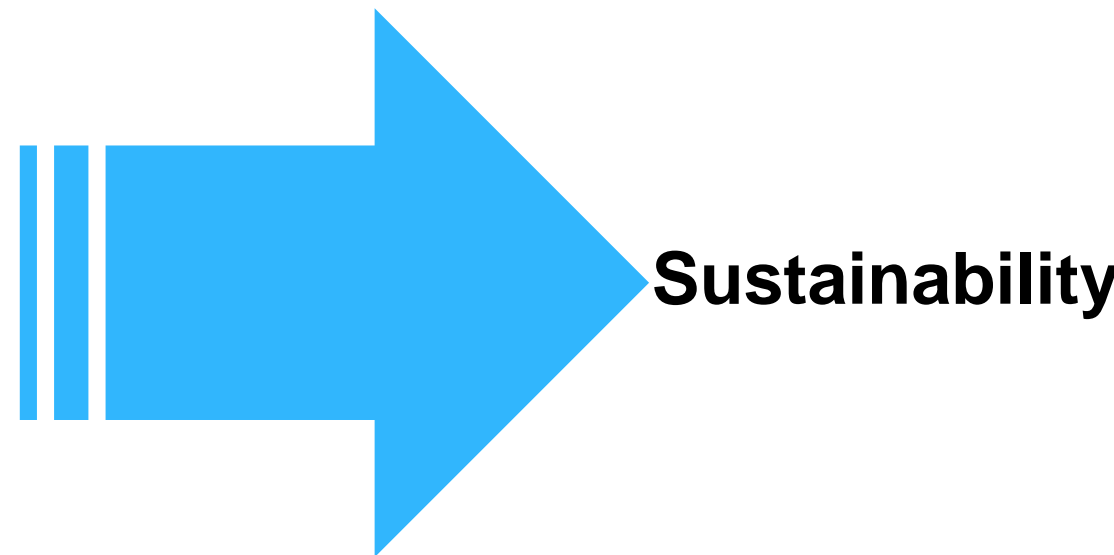
Understood the benefits of Green Rating System during development stage of Green rating system as a core committee member.



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continuous journey

Benefits of the Green Rating System

Focus on all area of sustainable business growth (Resource Conservation)

Energy Efficiency

Water Conservation

Renewable Energy

Waste Management

Material Conservation, Recycling and Recyclability

Green Supply Chain

Green House Gases Reduction etc.

Assessment with other industrial practices

Communicate corporate commitment to all stake holders

Benchmark the best practices on National and International level

Long term targets in each initiative

Involvement of all employees

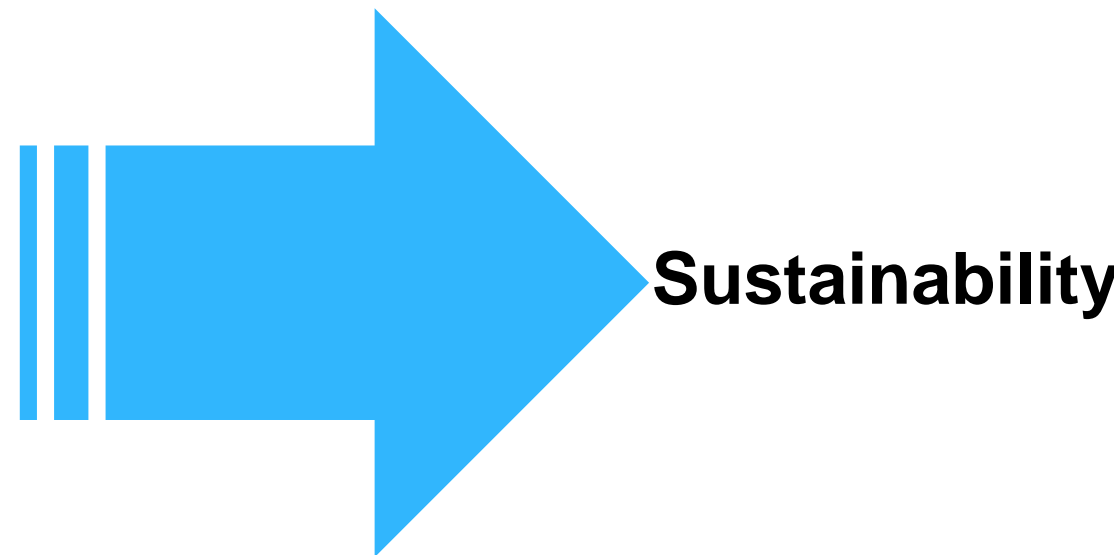
Corporate Green Image



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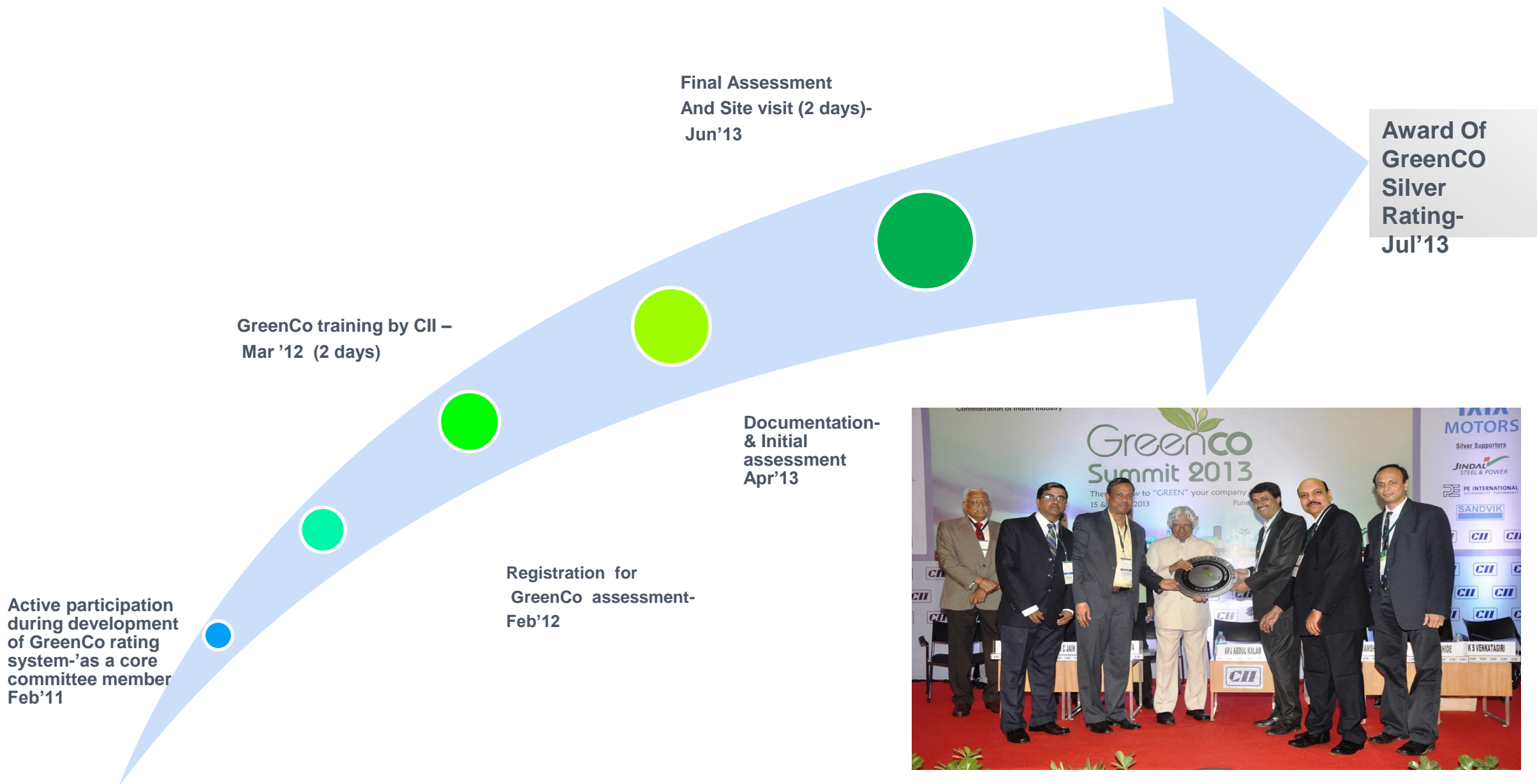


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Journey of tkES towards Green Company



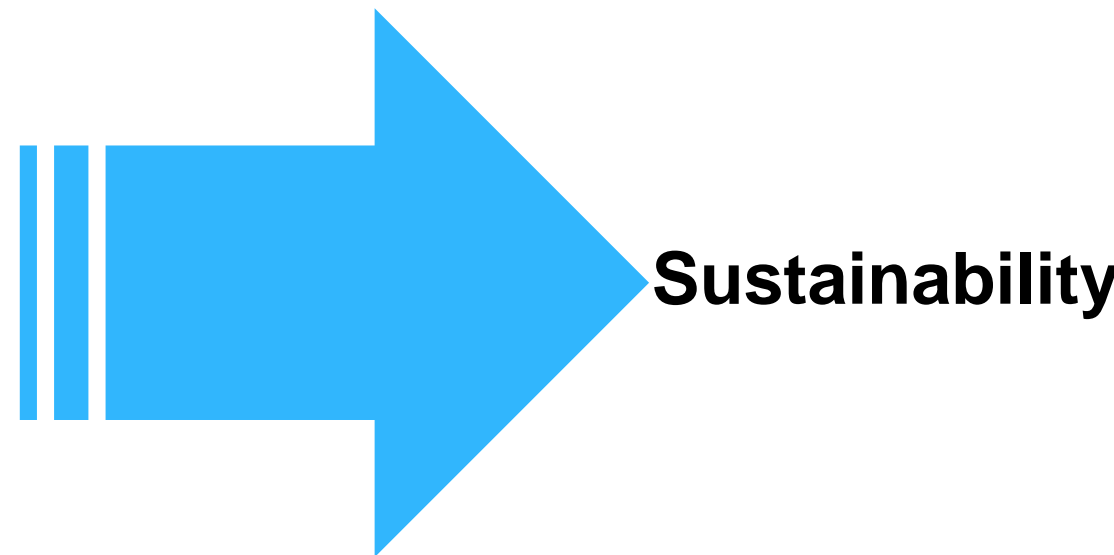
First Steel company to receive GreenCo Award



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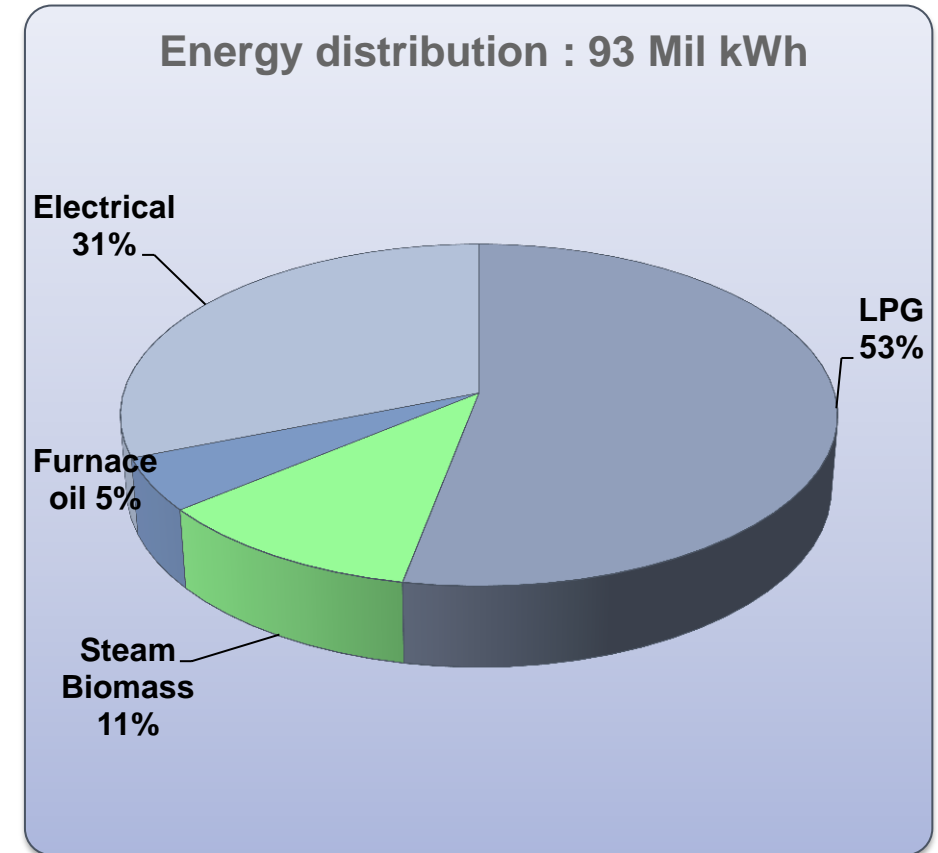


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Mission on Sustainable Growth and Energy Distribution



Energy cost : 65 Cr. Rs.
/annum

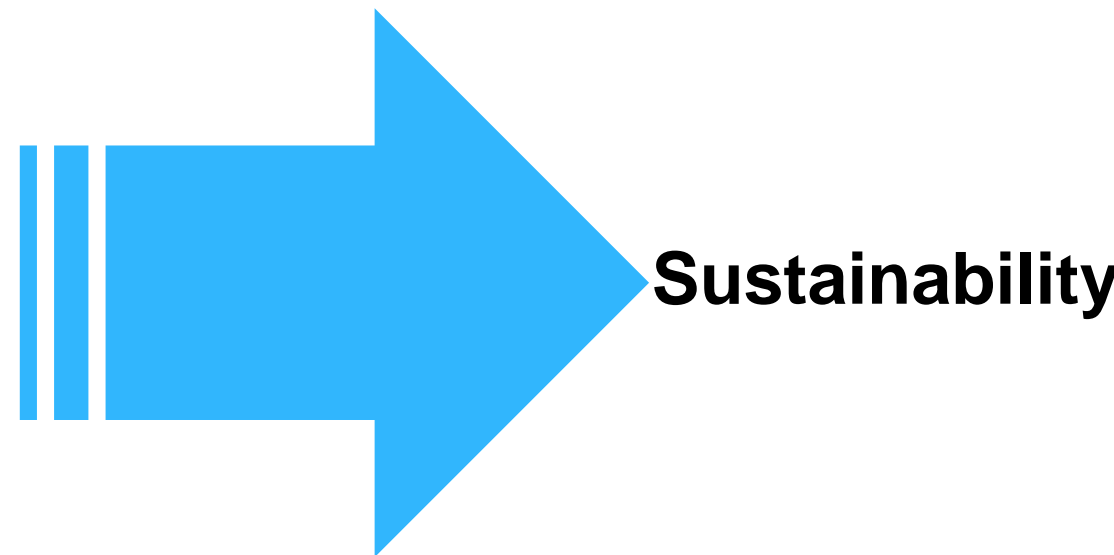
Commitment to reduce energy intensity and emissions, discharge and waste generation by 0.5 to 1% every year for ten years



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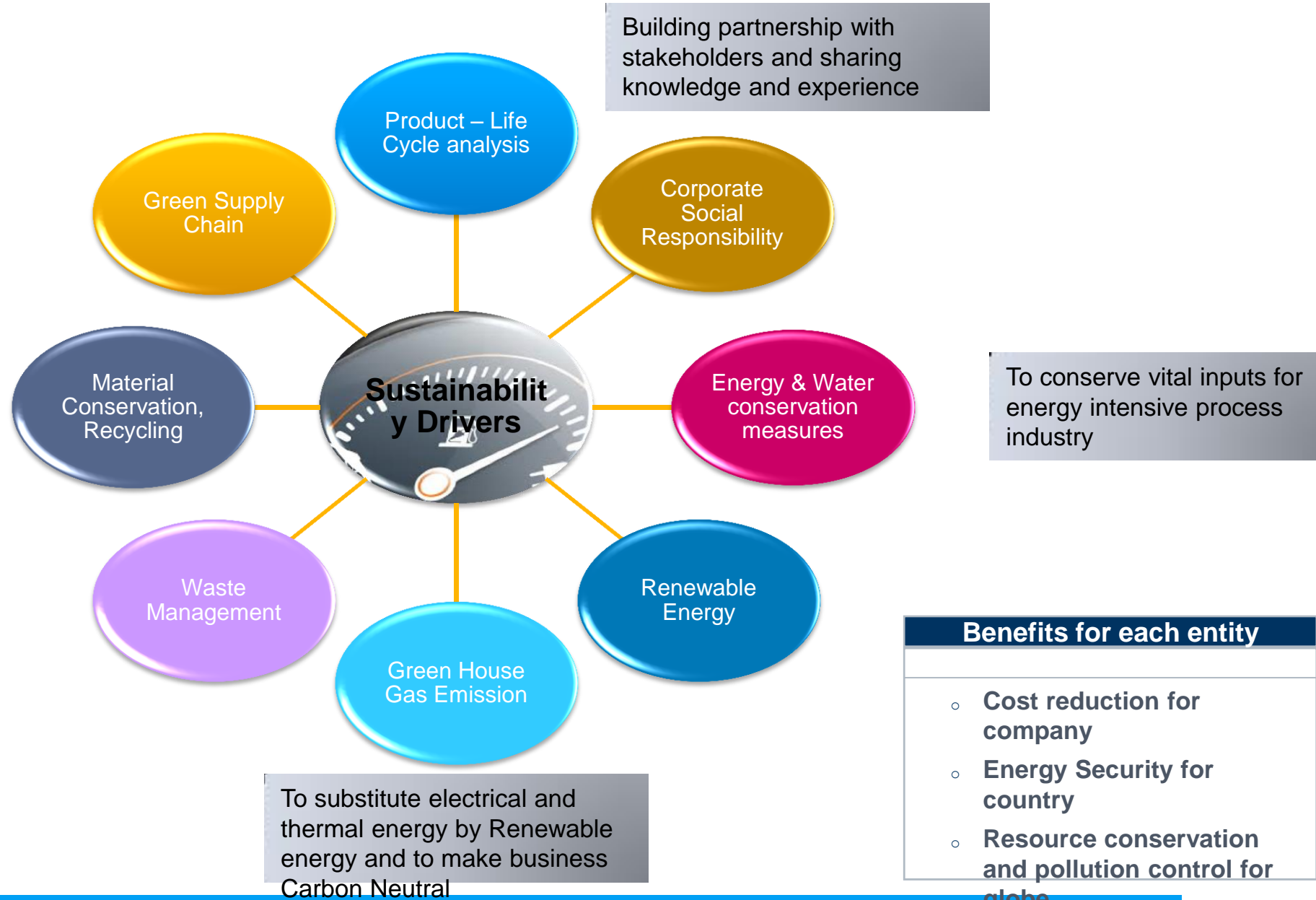


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Green Commandments



“Today's care towards ENVIRONMENT will ensure sustenance of Business tomorrow”



Continual Improvement measures- Tangible

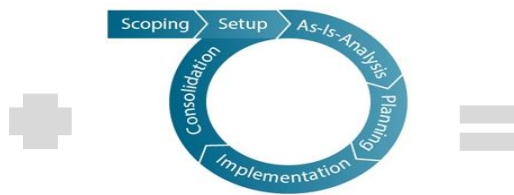
Energy & Water

Idea generation



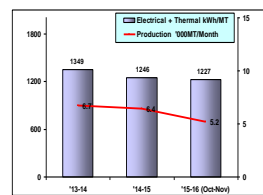
- External audits
- Participation with CII & MEDA
- Success stories other plants
- New technology
- Employee participation

Systematic approach



- Core Group from all departments
- Project feasibility study
- Implementation and tracking
- Monitoring energy consumption
- Weekly & Monthly review

Optimum uses



- Reduced specific energy
- Reduced CO2

Department Improvements

Workplace achievement



- Known area
- Domain knowledge
- Experienced crew
- Challenges
- Present performance

Group efforts



- Team work
- Group discussions
- Test runs
- In house implementation
- Job satisfaction

Goal



- Improved processes



Factory Suggestions

Support system



- Soft system for evaluation
- Evaluation by Section Head
- Mutual agreement
- Display of data at workplace

Workforce



- Participation working crew
- Small improvements
- Competitive environment
- Job satisfaction

Motivation



- Cash rewards
- Improved processes

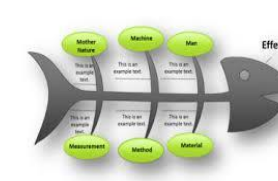
Lean Six Sigma

Adoption



- Trained employees
- Projects on energy, yield, cost & down time reduction
- Two waves per annum
- 10-15 projects per wave

Execution



- Use of statistical tools
- Domain knowledge
- Gemba visits
- Periodic reviews

Sustainable business



- Energy savings
- Yield improvements
- Cost savings
- Improved processes

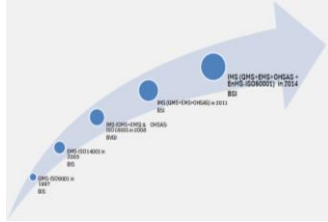
Focused approach towards Sustainability - continuous journey



Continual Improvement measures- Intangible

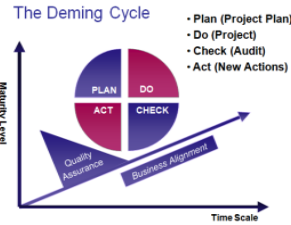
Management Systems

Policy & Standards



- Integrated Policy
- Quality
- Environment
- Health & Safety
- Energy

Implementation



- Control procedures
- Audits
- Implementation
- Reviews
- Certifications

Continual



- Quality product
- Legal Compliance
- Risk reduction
- Self sustenance

Safety

Resources



- PPEs
- Fire detection system
- Fire protection systems
- Public address system
- Trained crew

Approach



- Monitoring First aid cases
- Unsafe condition elimination
- Encourage to report Near miss incidences
- Trainings & weekly reviews

Indicators (14-

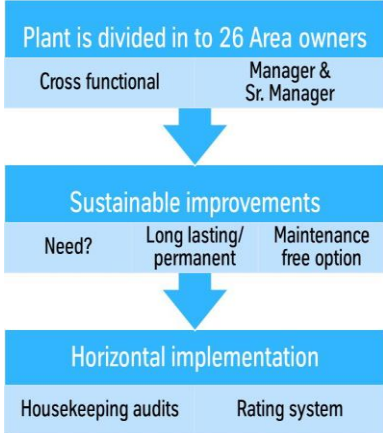
4303 Hours	575 Nos.	Reportable Accidents
↑ Knowledge sharing	↑ Elimination of Unsafe Conditions	↓ 1 No.

- Improved safety
- Risk reduction
- Boosts morale



Housekeeping

System



Approach



Benefits

- Eliminates accidents & Fire Hazards
- Maintain safe healthy work conditions
- Saves time, money, materials, space & efforts
- Improves productivity & quality
- Boosts morale
- Reflects a well run organisation

Corporate Social Responsibility



Focused approach towards Sustainability - continuous journey



Integrated Management System



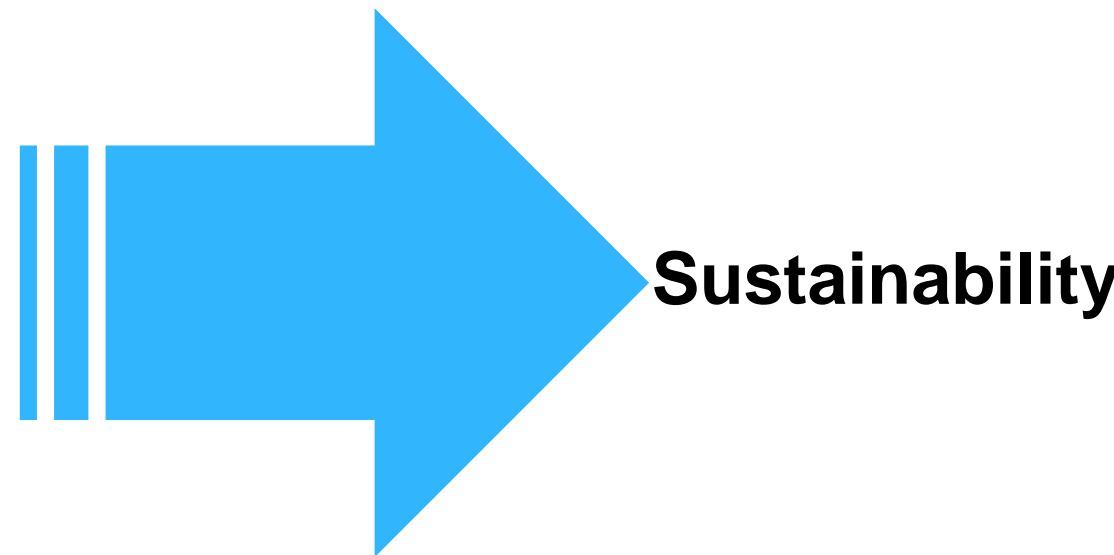
- All Material Safety Data Sheet on Intranet in SOFT form
- All applicable Legal Acts & Rules on Intranet in SOFT form
- Auto update of common Department objective's achievement level
- Five internal audits per year (Checklist- SOFT form)



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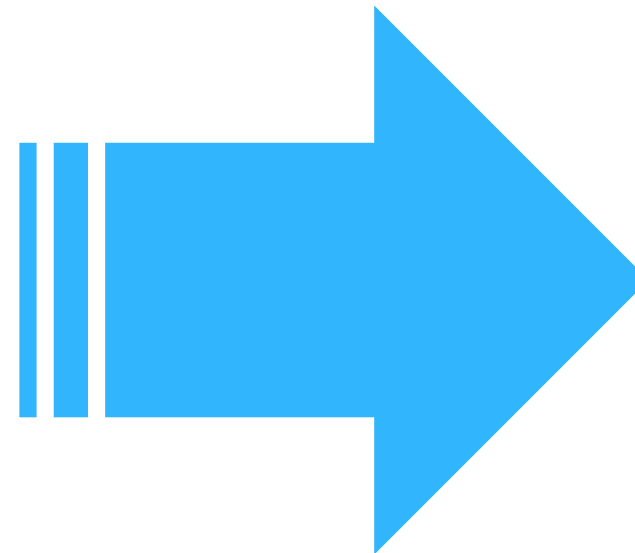
continuous journey

Excellence Initiatives- GreenCo



■ Improvement measures

- Energy Conservation
- Renewable Energy
- Water Conservation
- Department Improvement Initiatives
- Lean Six Sigma projects
- Factory Suggestion Scheme
- Environment Management
- Achievements



Sustainability

Energy Conservation Initiatives

Electrical measures

1. Unity Power Factor
2. Process optimization
3. Variable speed drives for pumps and fans
4. Energy Efficient pumps and motors
5. Optimization of distribution transformers
6. Switch off pumps, fans, lights during idle time
7. Stopping vent from Nitrogen gas plant
8. LED street lighting & tube lights
9. FRP blades in all three Cooling tower fans
10. Delta to Star connection in motors

Thermal measures

1. Electrical to LPG heating at TADL
2. Waste heat recovery from furnace exhaust
3. Furnace temperature optimization
4. Gas flows optimization at TADL
5. Decanting vapors from LPG tank
6. Reuse of vent hydrogen from Hydrogen gas plant

Renewable measures

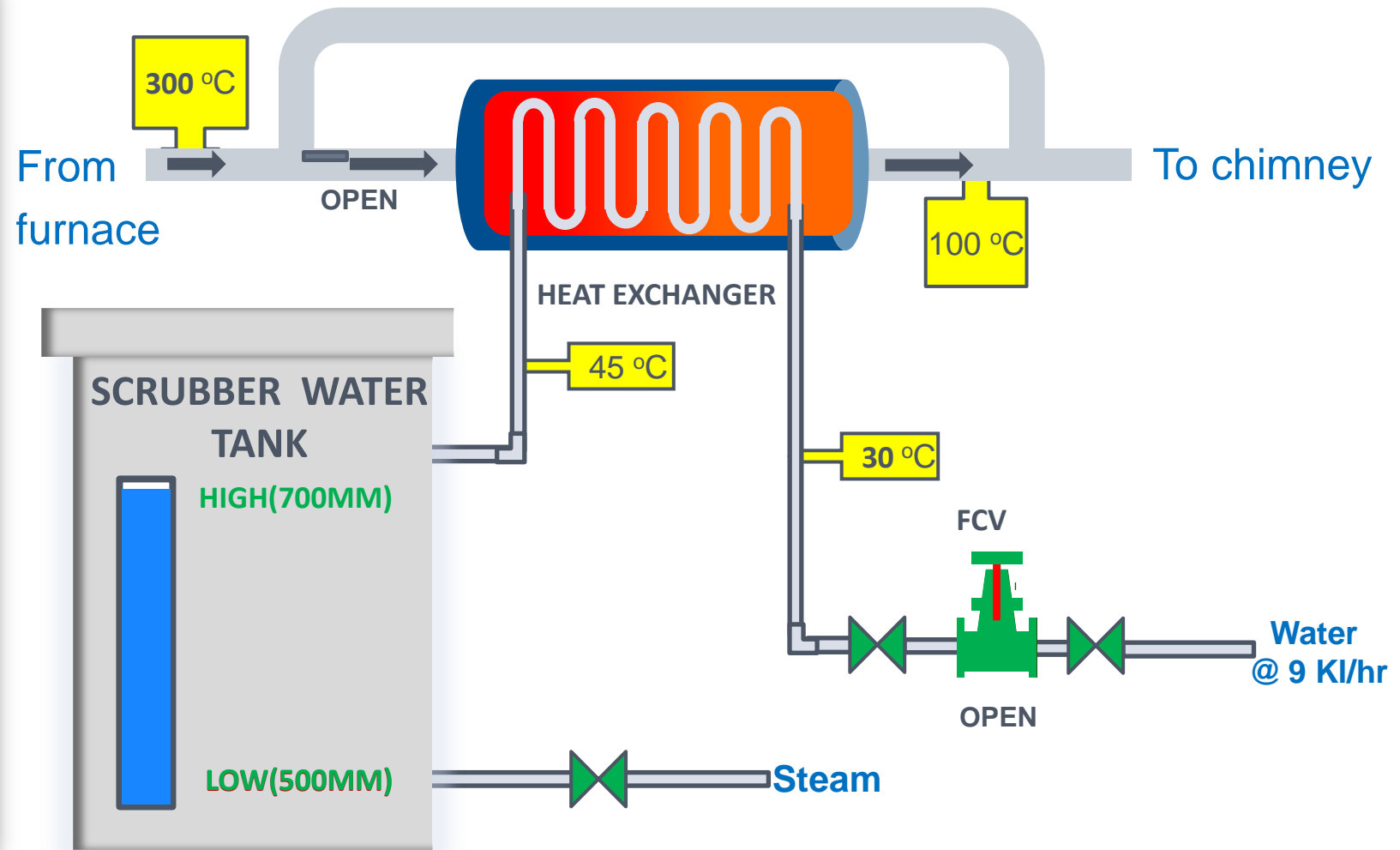
1. Biomass fuel at boiler
2. Translucent sheets
3. Solar water heaters
4. Powerless ventilators

Improvement in energy efficiency by implementing energy saving measures

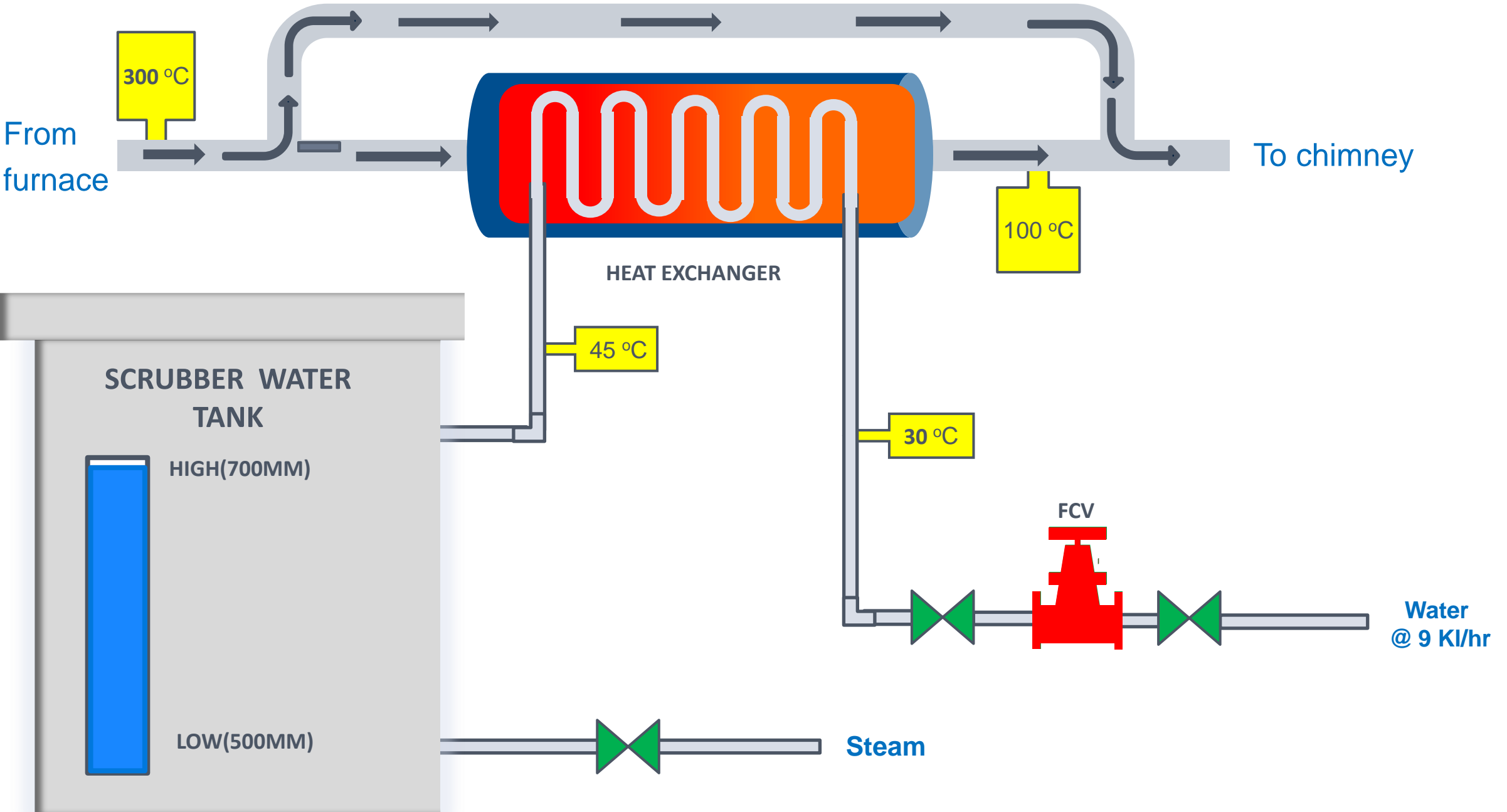


Installation of Waste heat recovery system at TADL

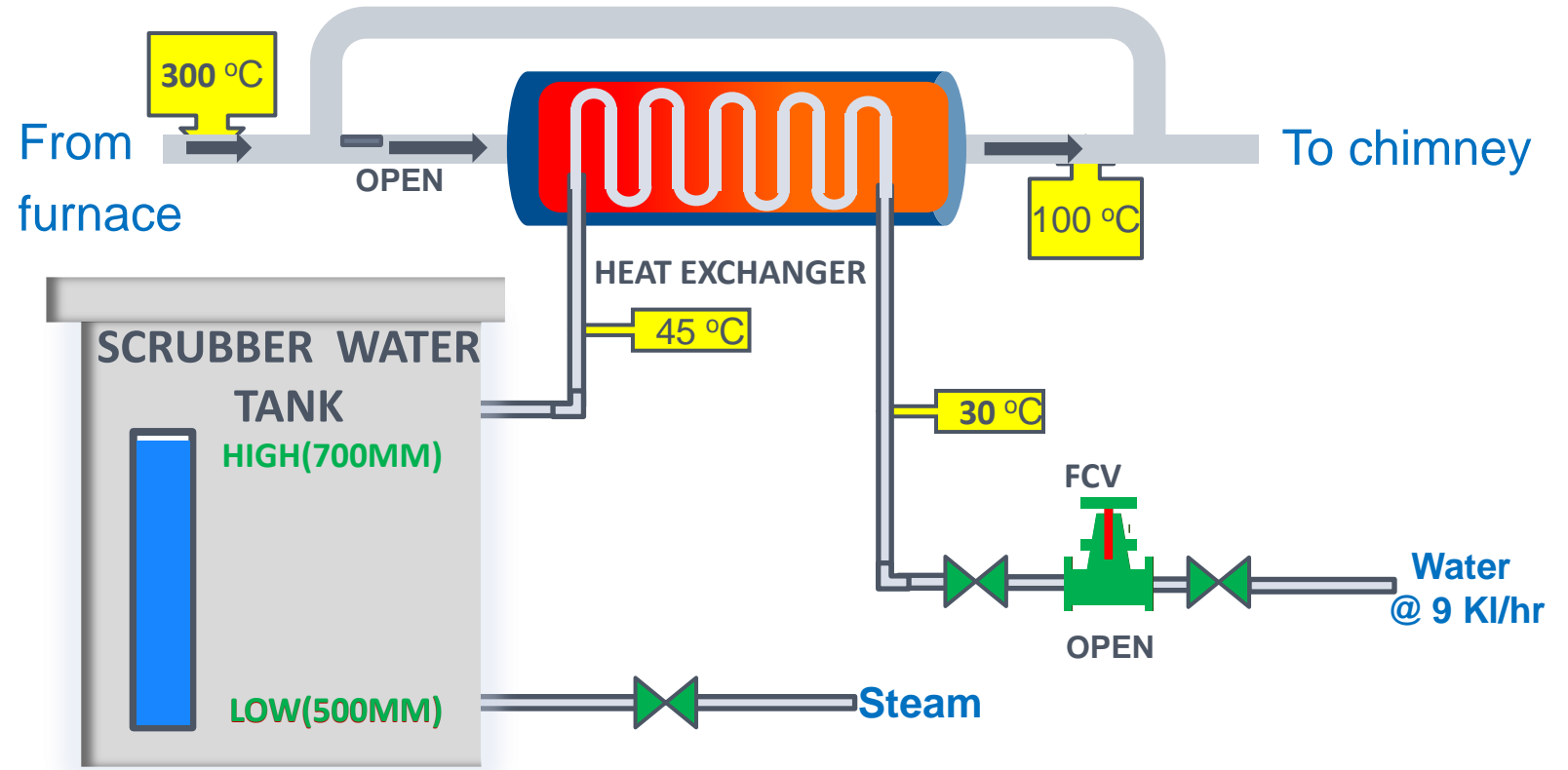
- ❑ Tandem Annealing and Decarb line is used for annealing of Cold Rolled Non Grain Oriented steel at 1,000°C
- ❑ Hot flue gases from LPG fired burners were discharged through chimney
- ❑ Installed shell & tube heat exchanger to recover heat from furnace exhaust to make hot water used in Scrubber



Installation of Waste heat recovery system at TADL



Installation of Waste heat recovery system at TADL



Before Steam Kg/MT	After Steam Kg/MT	Diff. Kg/MT	Annual Production (MT)	Annual savings		Investment Lacs Rs.	Payback Months
				FO - KL	Lacs Rs.		
120	84	36	61,060	175	41	45	13

Harnessing Waste heat for making hot process water



Reduction in gas consumption from 519 to 375 M³ / hr

Area :- Tandem Annealing And De-carbonizing Furnace

Date of Implementation :- Mar. 12

This furnace is 300 M long & is used for annealing of CRNGO steel at 1,000 Deg. C. in protective atmosphere of Nitrogen & Hydrogen gas.



Entry Seal



Exit Seal

CHANGES USING DMAIC:-

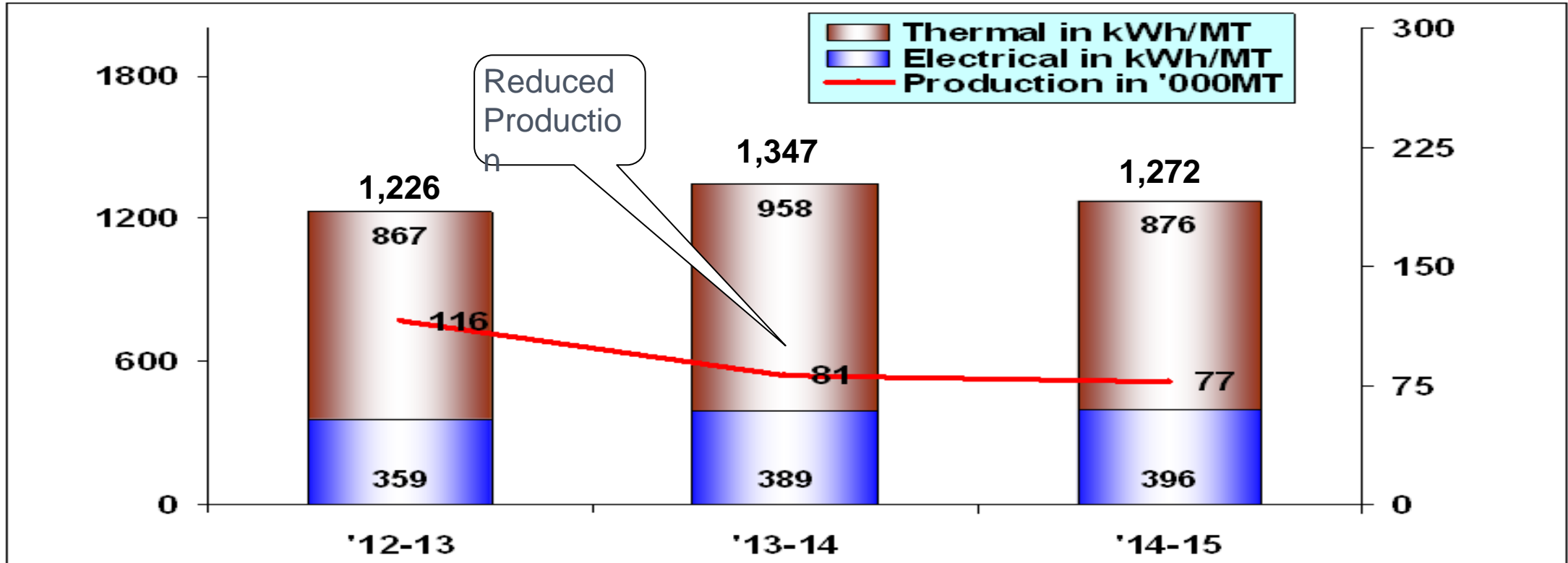
- Replacement of Entry & Exit sealing.
- Optimized of H₂ flow for different grades
- Optimized opening of furnace vent valve
- Closed all sampling ports with valves.
- Blocking of exhaust gas flow from damaged radiant tube
- Change of damaged furnace roll gaskets

	Nitrogen gas Flow Nm ³ /hr	Hydrogen Flow Nm ³ /hr	Total Gas Nm ³ /hr
Base line	346	173	519
Target	250	150	400
Achievement	225	150	375

Gas flow (Nm ³ /Hr)			Annual savings			Investment
Before	After	Saving	Electrical Lacs kWh	LPG	Lacs Rs.	Lacs Rs.
519	375	63	3.25	85	66	80



Specific Energy Consumption trend (SEC).






Product	AVG. SEC kWh/MT	Product Mix (%)		
		12-13	13-14	14-15
Electrical steel CRNGO	1,284	77	77	81
Mild steel	496	18	18	13
Electrical steel CRGO	1,704	5	5	6

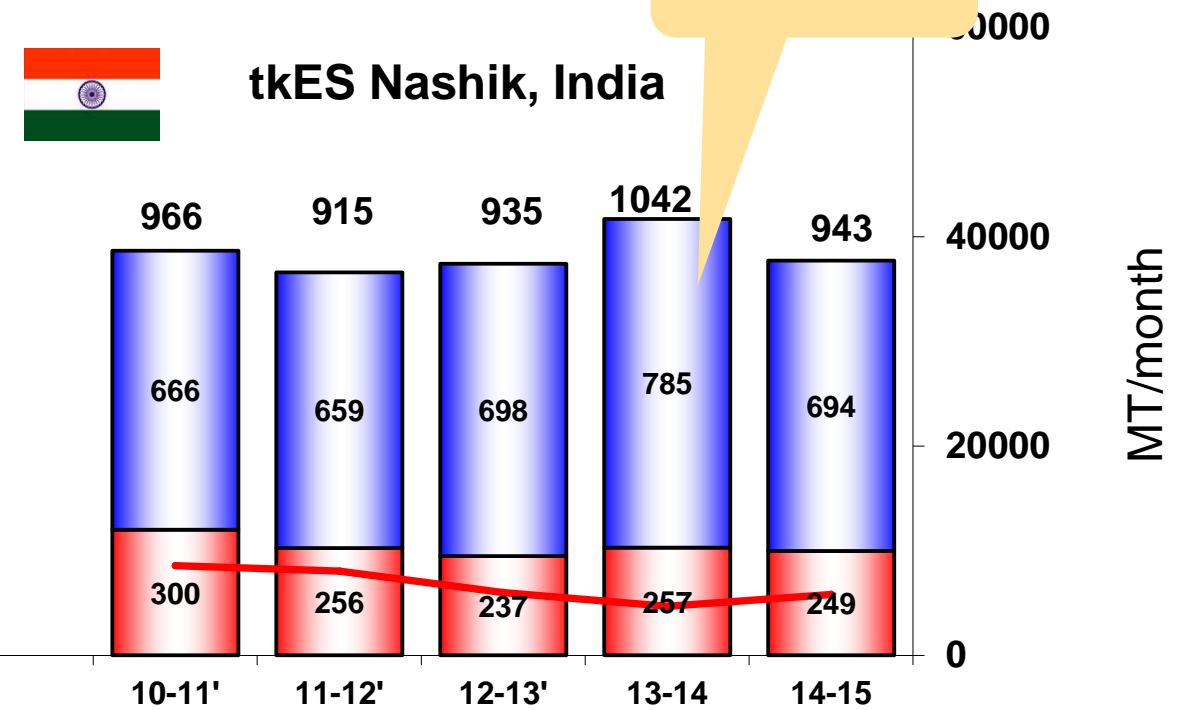
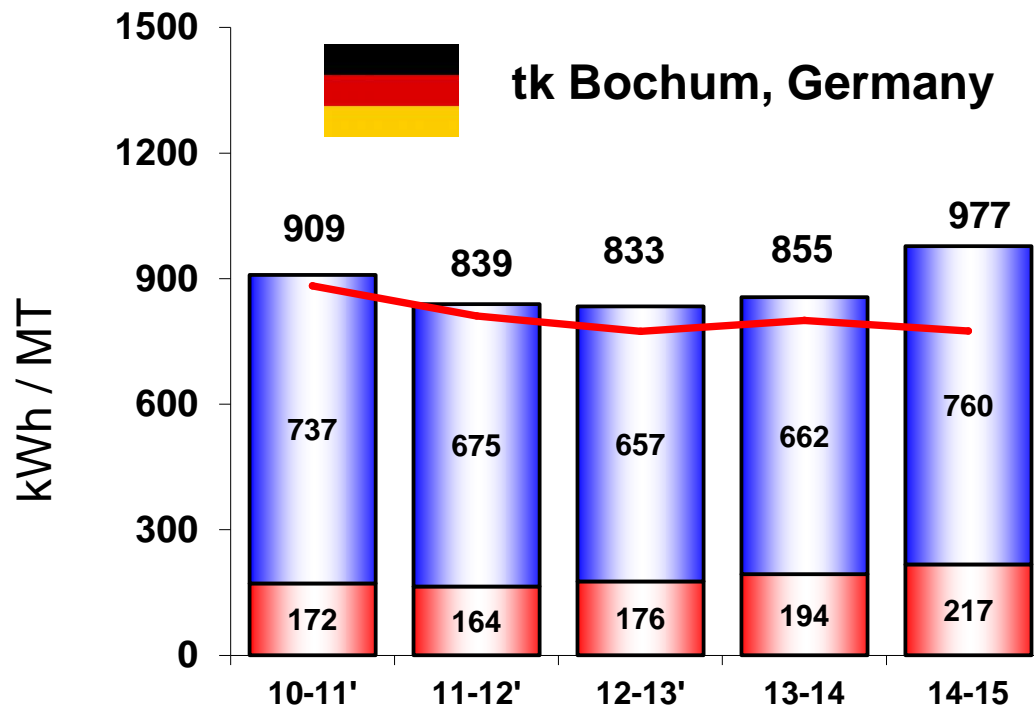
SEC is reduced by 6 % in 14-15 as against 13-14



Comparison of energy consumption norms for CRNGO

Product mix (%)	Bochum, Germany					tkES India				
	Year	10-11	11-12	12-13	13-14	14-15	10-11	11-12	12-13	13-14
L Si (< 0.6%)	8	9	9	9	8	24	26	32	23	41
M Si (1.3 to 1.8%)	76	74	74	73	69	50	47	48	51	41
H + VH Si (> 2.4%)	16	18	17	18	23	26	27	20	27	17

	Thermal (kWh/MT)
	Electrical (kWh/MT)
	Production (MT)/month



Low production volume

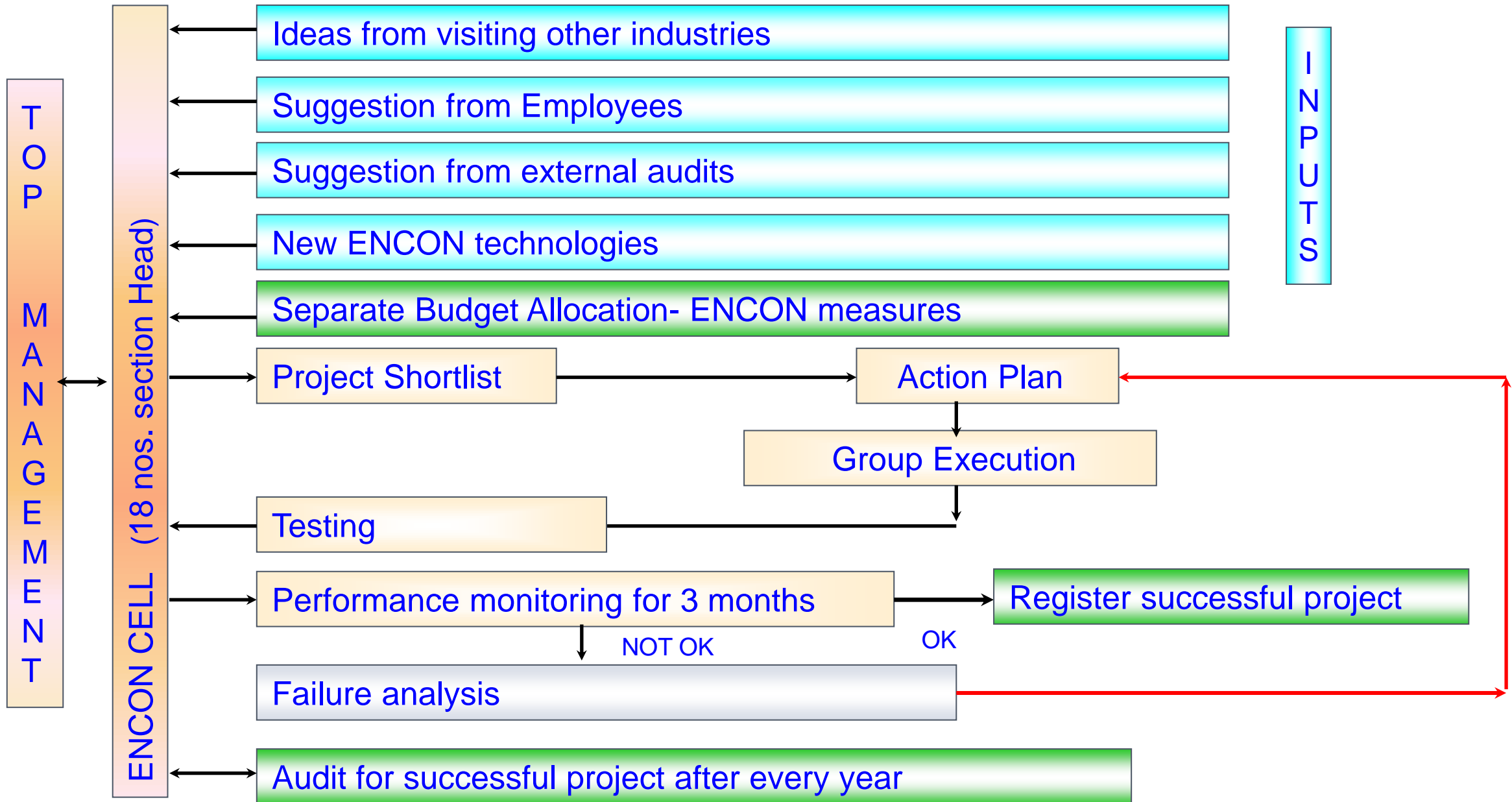
Reasons for variation:-

1. This difference is mainly due to higher production volume effect. (5,261 vs 31,940 Mt/ month)
2. There are three separate lines for producing each grade (low, medium and high Si) as against one common line at India.
3. Compact furnace design

SEC for CRNGO is reduced by 9.5 % in 14-15 as against 13-14 at tkES



Management of energy conservation programs



❖ Annual Performance Report

Energy consumption and energy conservation measures

❖ Monthly Specific Energy Consumption Report

Variation analysis as against expected consumption

❖ Monthly Consumption Report

Electrical consumption for all equipments

❖ Monthly Utility Report

Fuel, steam and gases consumption for all equipments

❖ Daily Energy Consumption Report:-

Equipment wise specific consumption of Electricity, LPG, Furnace oil, Nitrogen and Hydrogen for main equipments.

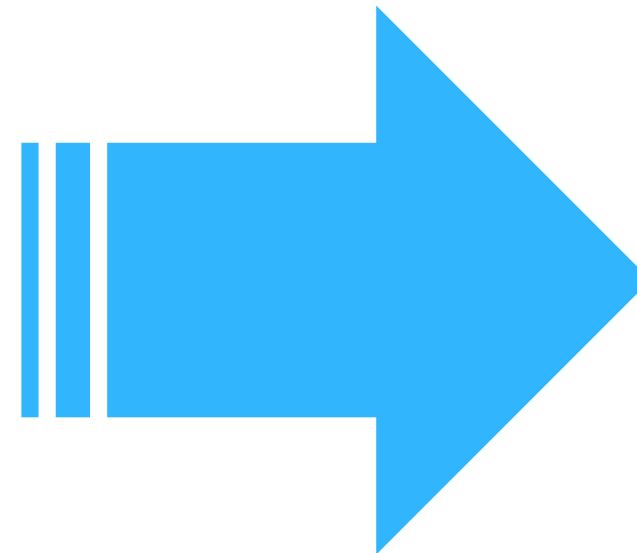


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Sustainability

Renewable Energy projects implemented since 2006 to 2015

Solar water heaters



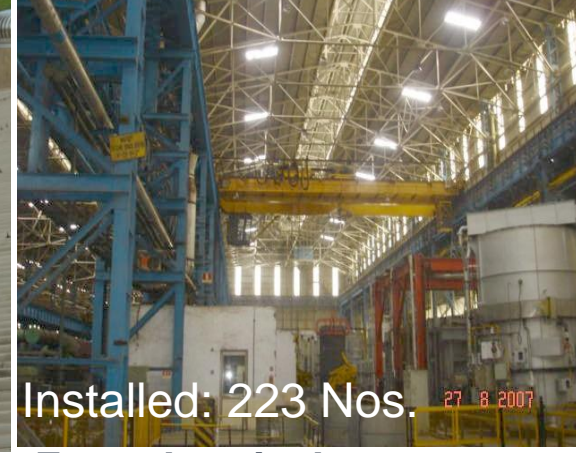
Solar street light



Ventilation blowers.



Translucent sheet



Zero electrical consumption for shed lighting

Boiler conversion on biomass



- ❑ Two furnace oil fired boilers of 14 MT capacity
- ❑ One boiler converted on Biomass fuel in Mar' 2009

Renewable energy contribution is 11 % of total energy consumption

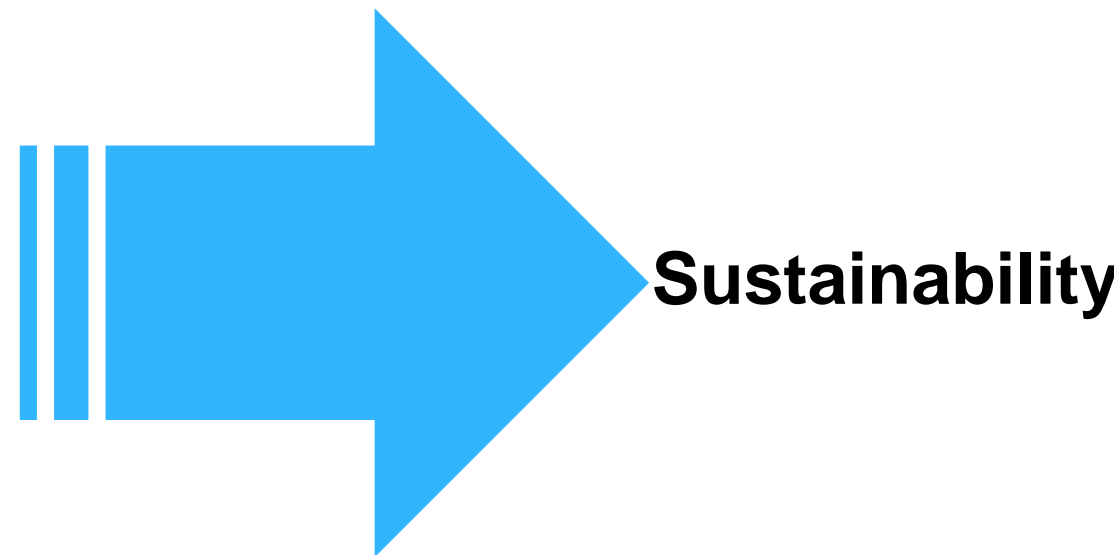


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Sustainability

continuous journey

Rainwater Harvesting in Roof Areas

Average rain fall at this location is 2,750 mm/year



Sr. No.	Rain Water Projects	Year	Collection Area	Annual Water Savings		Investment
			m ²	m ³	Rs. Lacs	Rs. Lacs
1	WTP Pump house & shed roof - raw water	2010- 2011	603	1,012	0.09	0.5
2	Gas plant roof - DM water	2011- 2012	222	248	0.02	3
3	Cooling tower no. 1 &2 –Make up water	2011- 2012	216	698	0.06	0.5
4	Collection pit behind HFCL-raw water	2013- 2014	--	775	0.01	0.7
5	Boiler house roof - DM water	2013- 2014	440	66	0.02	2.36
			1,481	2,799	0.2	7.06

Fresh water saving equivalent to four days consumption



Reduce fresh water consumption by treating reusing waste water generated in plant

Area :- ETP.

Date of Implementation :- 2008-09



Waste water treatment plant

175 m³/day of alkaline waste water treated through neutralization, addition of settling agent, clariflocculation and passing through a sand and carbon filter and softener .



Water Before & after treatment

Soft water recovered and reuse	Net annual Saving	Investment	Payback
M ³ /day	Lacs Rs.	Lacs Rs.	Months
175	2.5	2	10

Published in "OUR CUP OF JOY" by CII



Process Effluent Management

Effluent Treatment Plant (ETP)

❖ Year of implementation:- 2000

❖ Capacity – 850 M³/ Day



Sewage Treatment Plant (STP)

❖ Month of implementation:- Mar. 2007

❖ Capacity – 200 M³/ Day



Waste water is pumped from various locations through out the plant to ETP & STP.

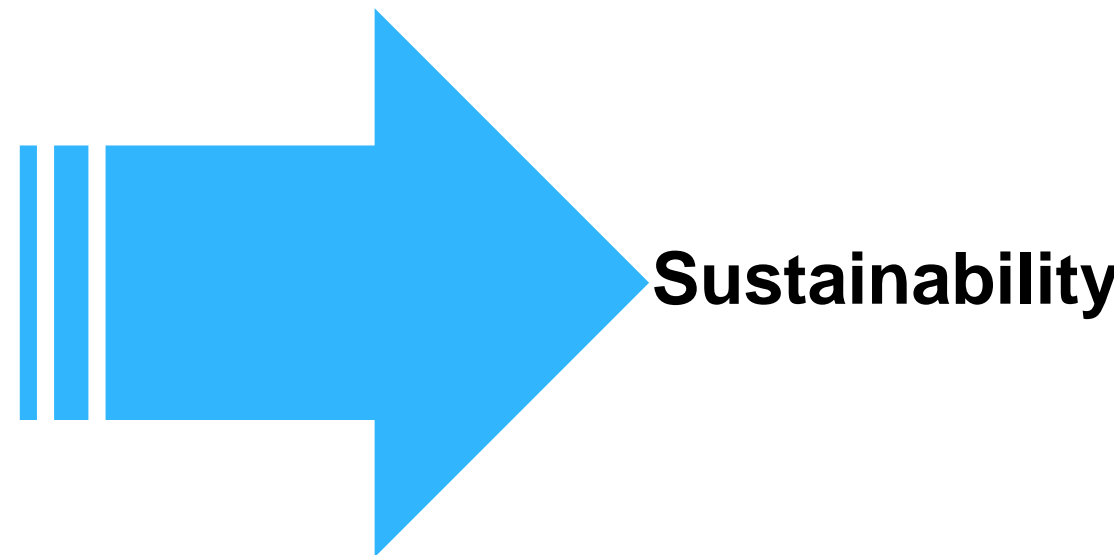


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Sustainability

continuous journey

Departmental Improvement Initiatives

Few Departmental Improvements

Process optimization

- Installation of four roll coater (locally developed) at TADL
- Development PU coated roll as a coating roll for four roll coater at TADL
- Elimination repetitive shaft breakages at crane
- Provided guide wheel to sliding gate to avoid derailment

Safety improvements

- Anti-collision system at EOT cranes -Safety improvement
- Man interference sensor installed to stop auto piling-CTL
- Stand provided for propeller shafts to avoid manual operation at slitter
- Locking arrangement provided to feed table at slitter



Resource optimization

- Reuse of bent support ring after reconditioning at MBAF.
- Carpets replaced with synthetic woollen felt at Slitters
- Use of card board sleeves stopped at HFCL
- Double seal plate to avoid oil leakage from gear box of crane
- One side used papers from are utilised

Automations

- Weld joint position program developed for automatic trans of tension values in control system for coil processing at T
- 220 kV switch yard monitoring through CCTV
- Trolley provided to lift the punching scrap from the bottom of the stamping press.

Development of team work and involve groups for departmental improvements in working area

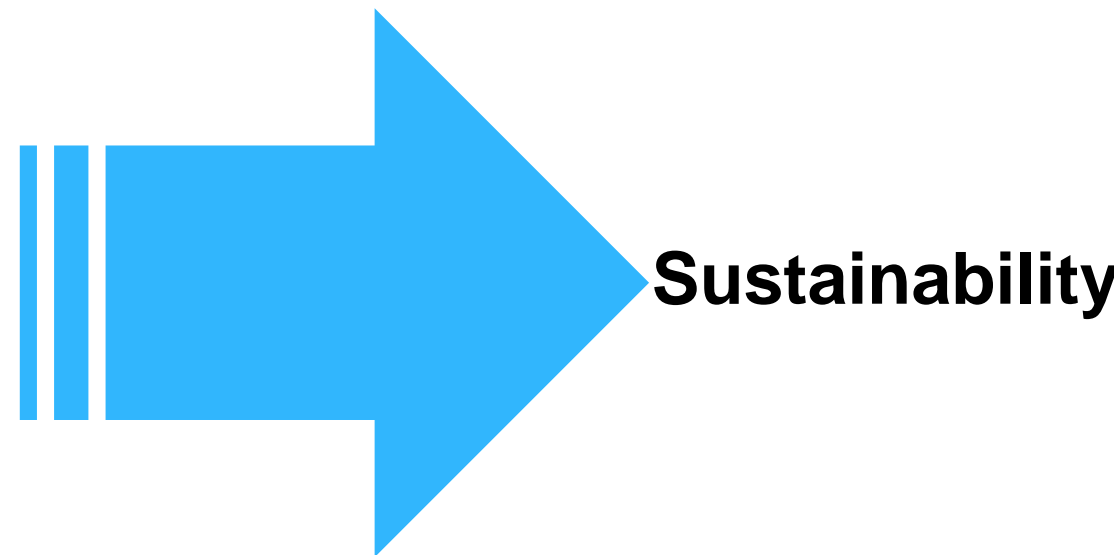


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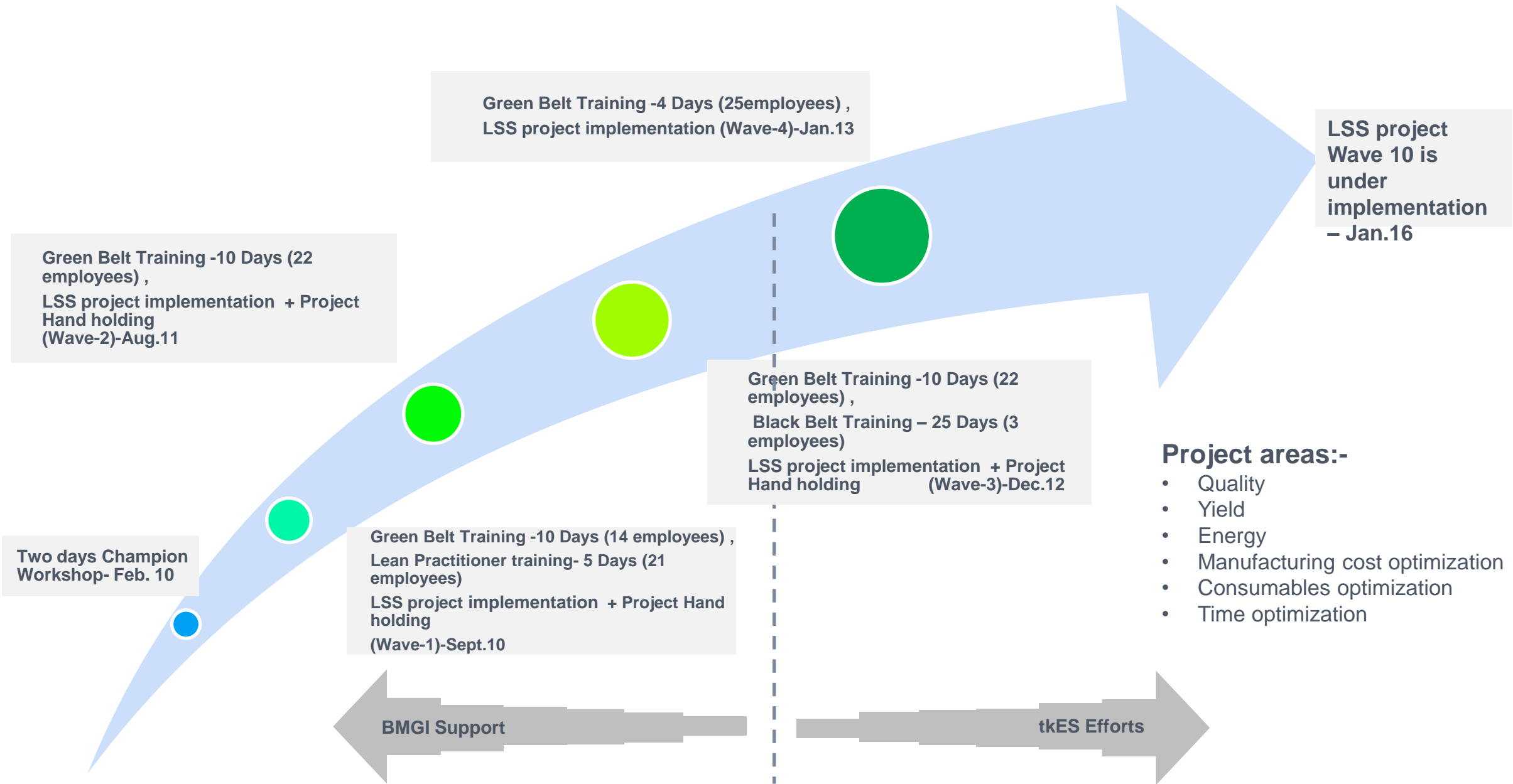
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continuous journey

Journey of Lean Six Sigma at tkES India



Cultural change at tkES



Few LSS projects



Quality

- To reduce coating defects at TADL
- To reduce customer complaints on rust
- To improve first time right in CRGO



Yield

- To reduce scrap generation in CRNGO at Cold rolled Slitters
- To reduce scrap generation in CRGO at Cold rolled Slitters



Energy

- To reduce LPG consumption at annealing furnaces
- To reduce Electrical consumption
- To reduce Steam consumption at TADL, Pickling, HFCL



Manufacturing cost

- To reduce line stoppages due to electrical failures at annealing lines
- To reduce line stoppages due to mechanical failures at annealing lines
- To reduce line stoppages due to operational delays at annealing lines



Consumables

- To reduce coating chemical consumption at TADL
- To reduce packaging cost
- To reduce fresh acid consumption at Pickling

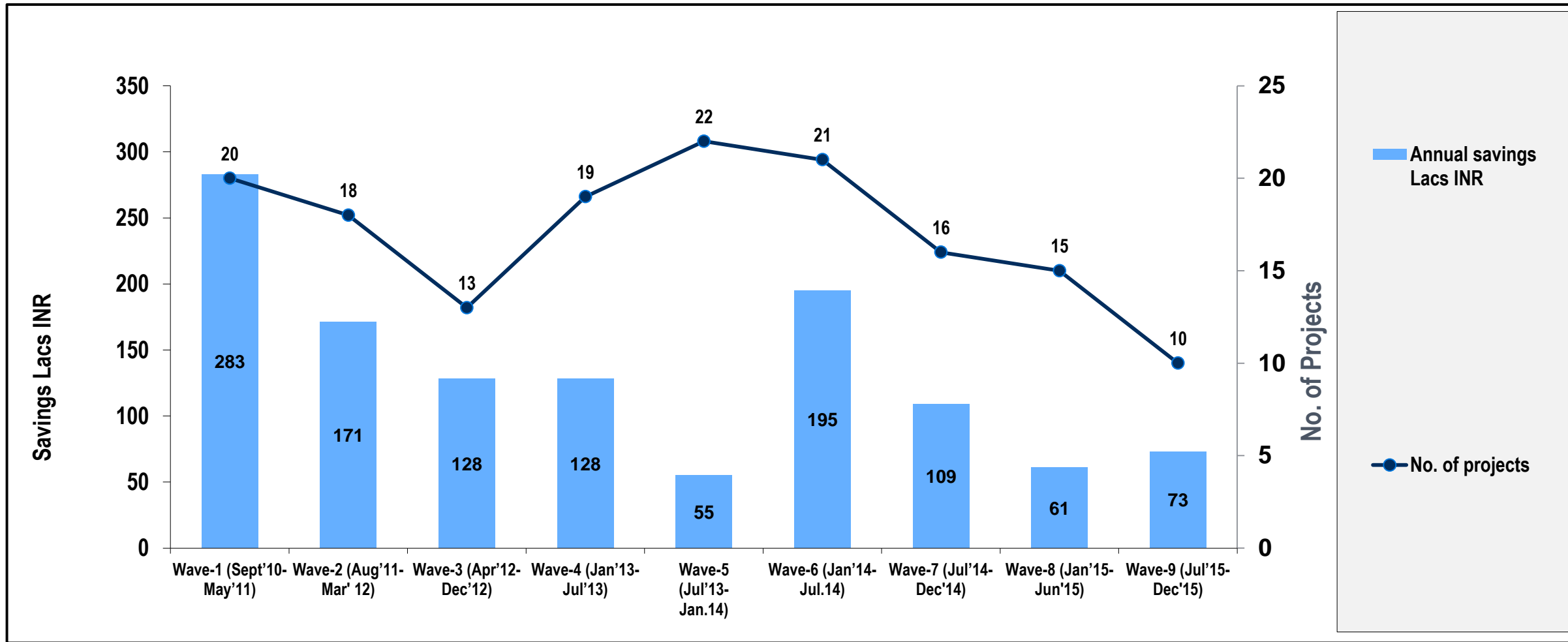


Time

- To reduce turn around time of trucks
- To reduce MTBF of furnace roll failure at TADL
- To reduce MTTR during furnace strip breakage at TADL



Lean Six Sigma – Wave 1 to 9 : Achievements



- ➔ Wave 10 started in Jan.16 with 9 projects & will be completed by Jun.16.
- ➔ 150+ projects completed at the end of Wave 9.
- ➔ Two waves per annum.

Wave 1 to 6 :- Actual savings & Wave 7,8 & 9 :- Projected savings

Average savings of 1.2 Cr. INR per wave

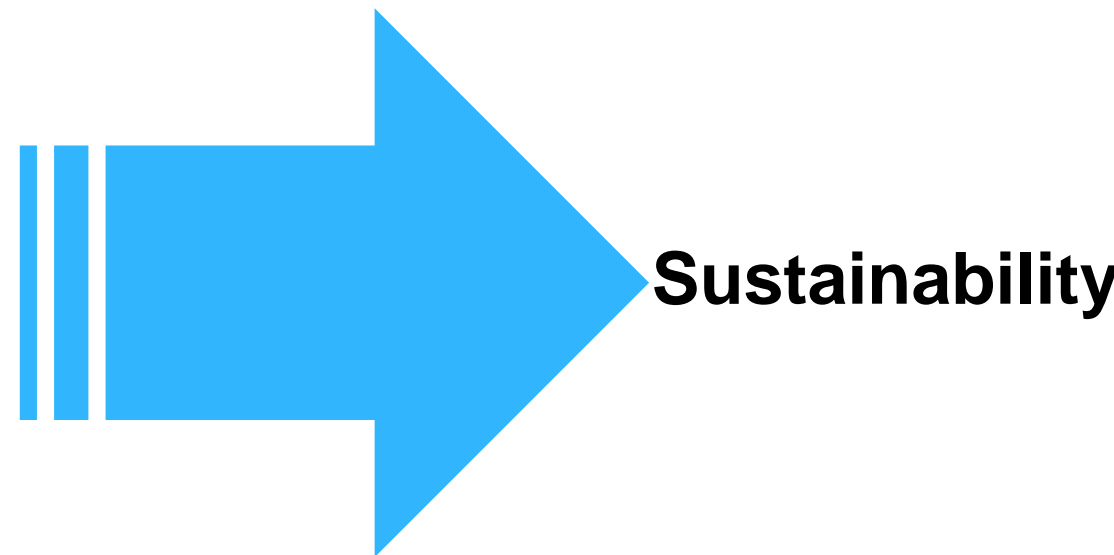


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continuous journey

Factory Suggestion Scheme

Objective: To motivate for small improvements in working area and to promote this culture, recognition with reward

➤ Areas of suggestions:-

- optimize workflows and processes
- save time, material, energy and organizational outlay
- enhance quality and customer satisfaction
- improve safety and health at work, pollution control

➤ Reward on acceptance:-

- Accepted suggestion will be rewarded with 500 Rs.
- Tangible suggestion will be rewarded as per the calculator based on realized savings
- In case of group suggestion it be equally distributed.

Involvement of operating crew in improvement process and rewarding their contribution



Factory Suggestion Scheme: Few FSS implemented in 14-15

Provided uninterrupted power supply for welding machine to eliminate its tripping due to voltage dips which results into line stoppage at TADL

- Productivity improvement

Logic developed to switch off electrical heating before sheet touches to heating element by sensing catenary position to eliminate pickup on furnace rolls at HFCL

- Quality improvement

Carriage assembly conveyor with pneumatic drive was continuously on at Cincinnati machine. Solenoid valve is provided so that motor will become on when carriage is moving.

- Compressed air saving

Timer provided to switch OFF area lighting in day time at MRSS

- Energy saving

Temperature monitoring facility is provided for panel cooling at Pomini grinder.

- Reliability of equipment

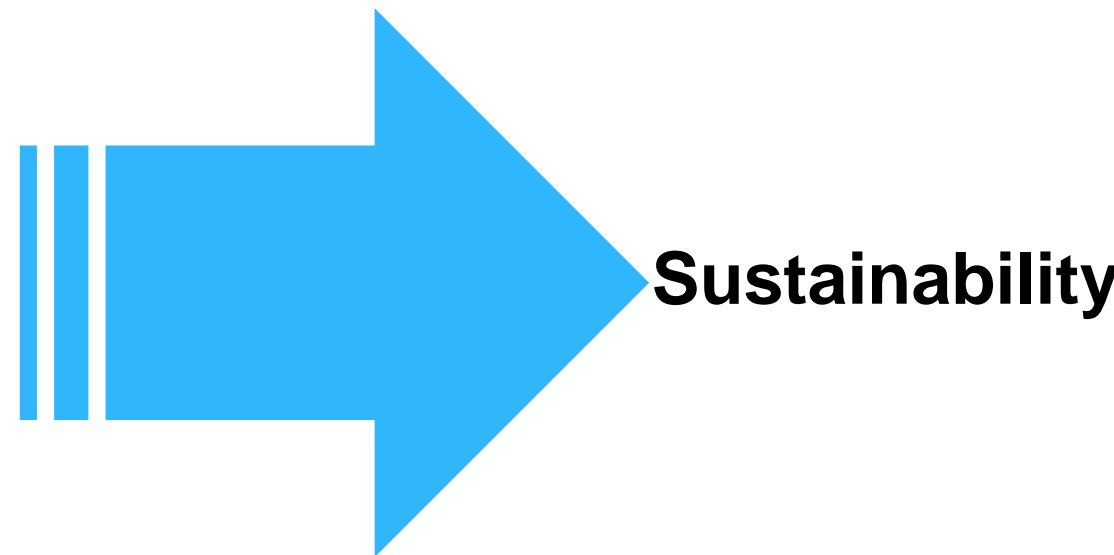


Excellence Initiatives- GreenCo



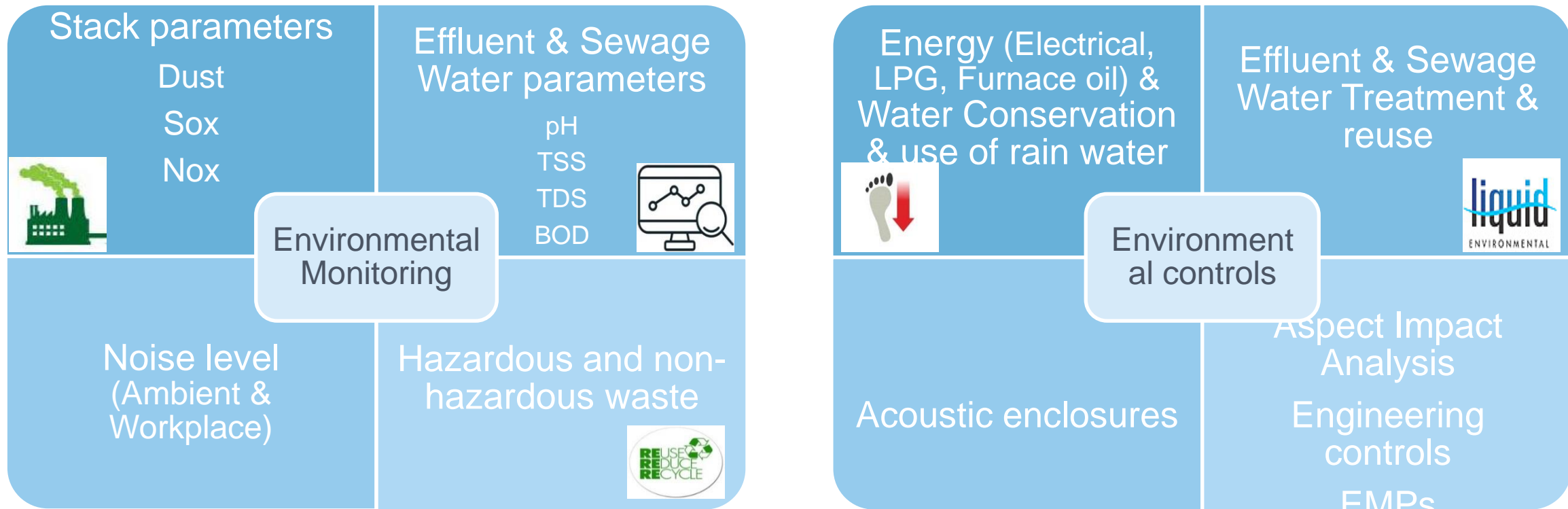
■ Improvement measures

- Energy Conservation
- Renewable Energy
- Water Conservation
- Department Improvement Initiatives
- Lean Six Sigma projects
- Factory Suggestion Scheme
- **Environment Management**
- Achievements



continuous journey

Environment Management



Legal requirements:-

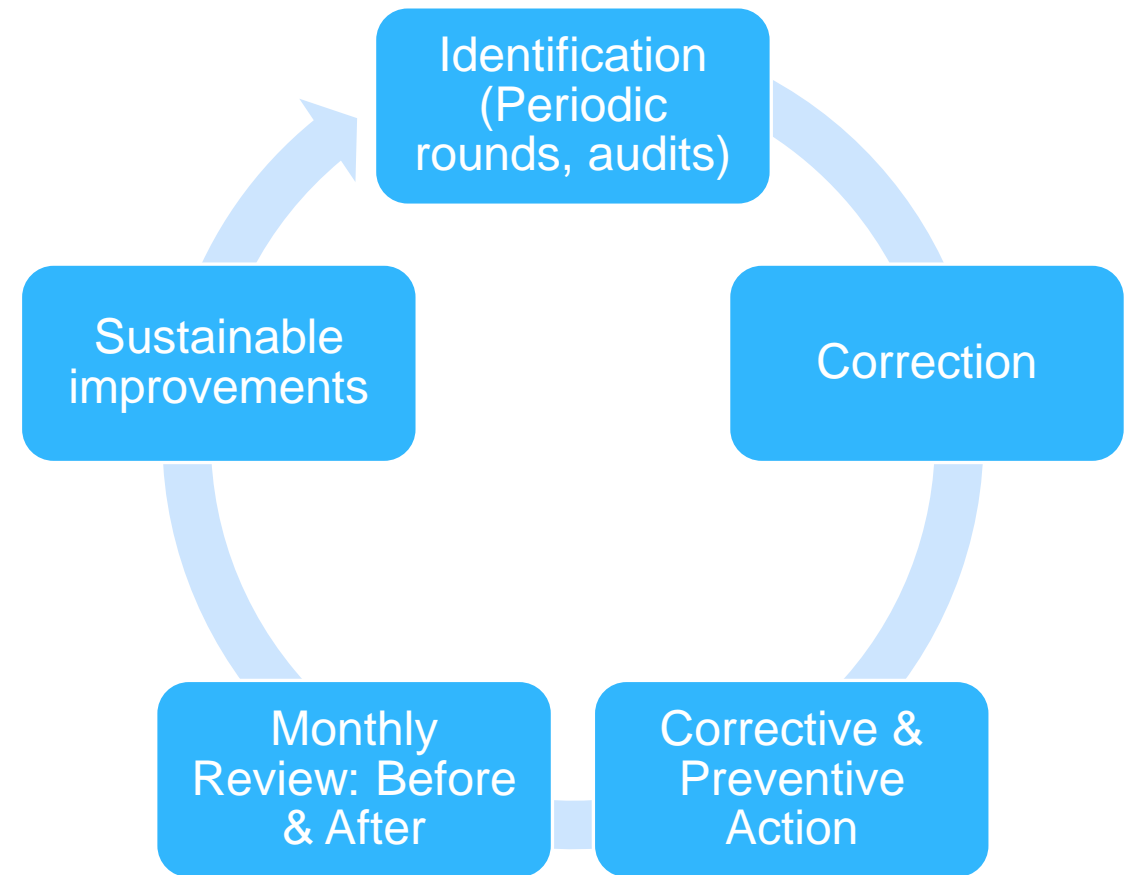
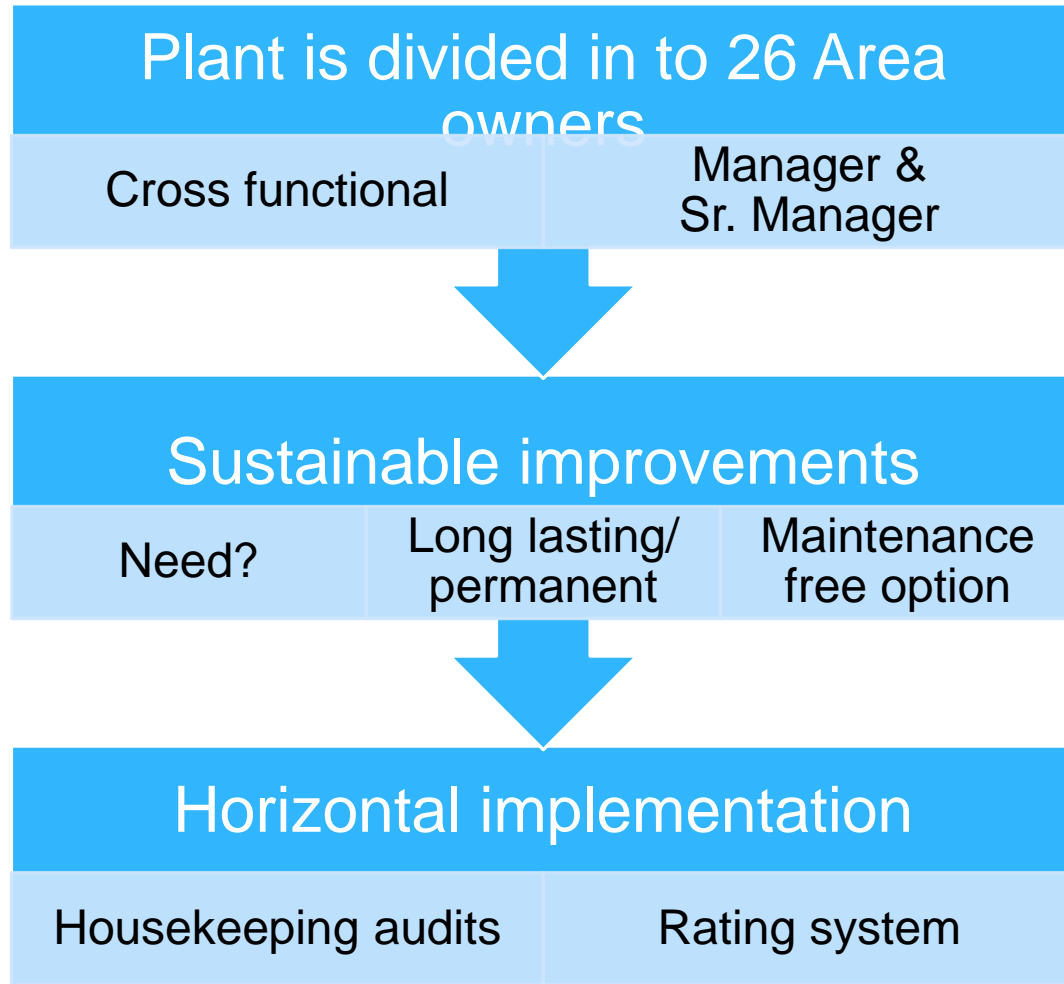
- Monitoring and control of environmental parameters within the limits set by State Pollution Control Board
- Hazardous waste is disposed or recycled to authorised agency approved by State Pollution Control Board
- Environmental data reporting to State Pollution Control Board

Monthly review of hazardous and non-hazardous waste generation
 Environmental data reporting to tk-AG

Reverse Osmosis water treatment plant – (Apr'16)



Housekeeping Management

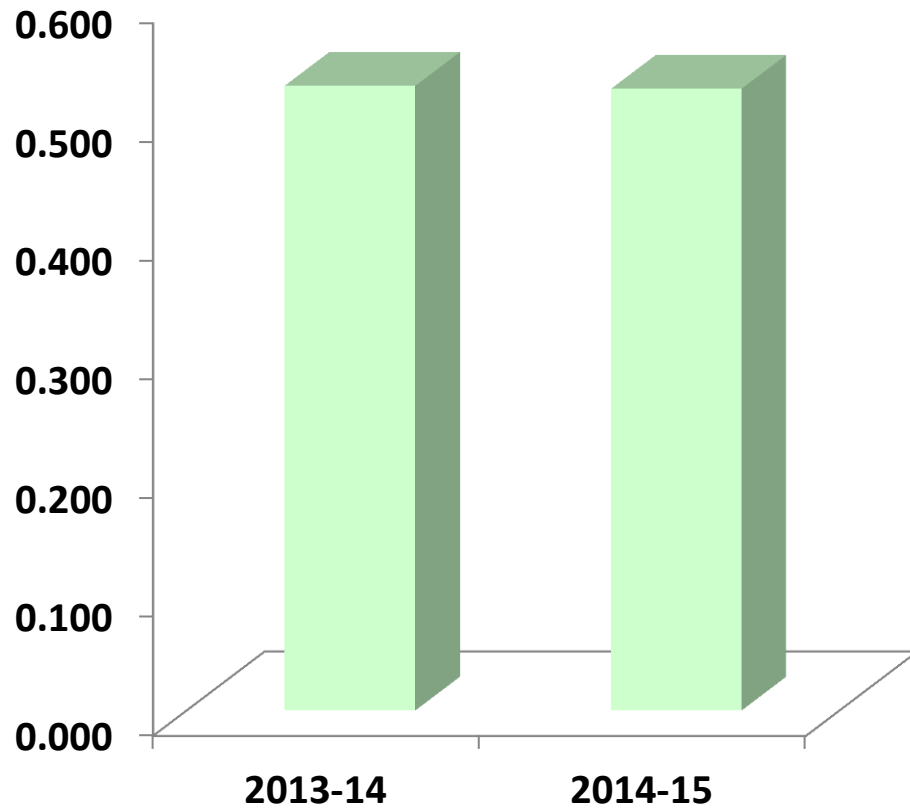


Good Housekeeping: Increases production and efficiency of the operation



Specific GHG Emission intensity trend

**Specific Intensity
(Kg of CO2/ Kg of Production)**



	Unit	2013-14	2014-15
Scope 1 (LPG + FO) Emissions	t CO2	14,250	12,866
Scope 2 (Electricity) Emissions	t CO2	28,415	27,494
Total Emissions	t CO2	42,665	40,361
Production	MT	81,133	77,112
Specific Intensity	kg of CO2/ kg of product	0.526	0.523

Specific GHG emission intensity is reduced by 0.47 % in 14-15 as against 13-14



Indoor and Outdoor Environment Quality



Tree plantation: 12,000 + native and adoptive species



Indoor and Outdoor Environment Quality



- One tree takes up about 0.025 tonne of CO₂ net in a year
- Thus CO₂ sequestered = 12,000 trees X 0.025 = 300 t CO₂

300 t CO₂ sequestered by tree plantation

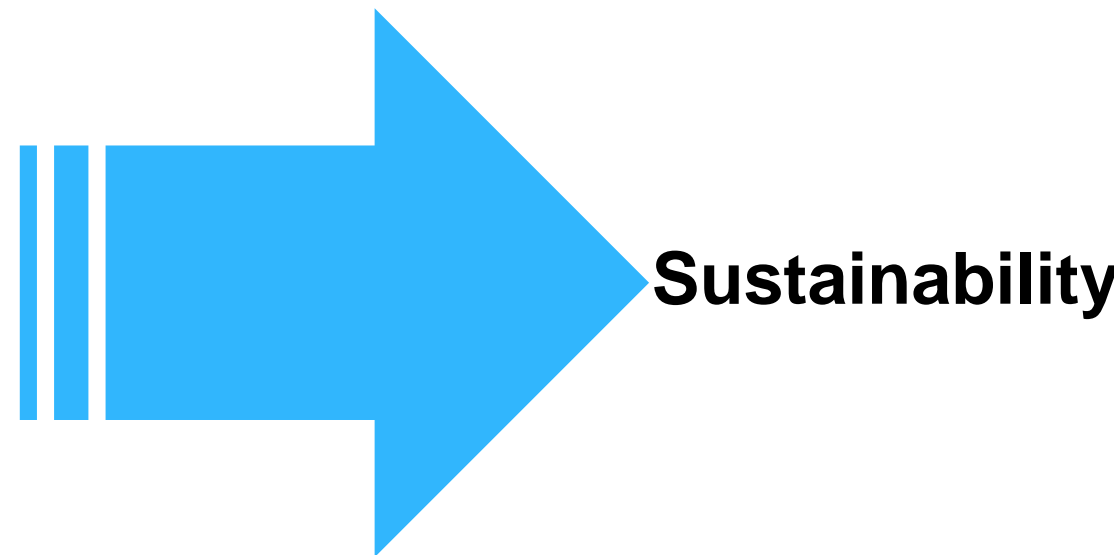


Excellence Initiatives- GreenCo



■ Improvement measures

- Energy Conservation
- Renewable Energy
- Water Conservation
- Department Improvement Initiatives
- Lean Six Sigma projects
- Factory Suggestion Scheme
- Environment Management
- **Achievements**



Sustainability

continuous journey

Achievements

CII- National Level Awards	Year
Excellent Energy Efficient Unit	2006
Most Useful Presentation	2006
Water Efficient Unit	2006
Energy Efficient Unit	2007
Energy Efficient Unit	2008
Green Company- Silver rating	2013
Excellent Energy Efficient Unit	2013
Energy Efficient Unit	2014
MEDA- State Level Awards	
Second prize in Metal & Steel sector	2004
Second prize in Metal & Steel sector	2005
First prize in Metal & Steel sector	2006
Continuous Excellence in Metal & Steel sector	2007-08
First prize in Metal & Steel sector	2008-09
First prize in Metal & Steel sector	2009-10
Second prize in Metal & Steel sector	2011-12
First prize in Metal & Steel sector	2012-13
Third prize in Metal & Steel sector	2014-15




First Steel Company to receive GreenCO Award



Consistent performance - Recognition at State and National level





**Continuous Improvements towards sustainability is
a journey & not a destination**

Thank you for your attention.





Any questions?

