

Confederation of Indian Industry
125 Years: 1895-2020

CII National Award for Excellence in Energy Management 2021

**Hindalco Industries Ltd.
Unit : Mahan Aluminium, Singrauli (M.P)**

Team members:

Mr. S.P. Singh – General Manager – Technical Service

Mr. Vijay Bansal - Sr. Manager – Technical Services



Singrauli (M.P) - Hindalco Mahan Aluminum Limited

Production Volume

Hot Metal :- 365 KTPA

Power Generation:- 900 MW

- A flagship company of the Aditya Birla Group
- First unit was commissioned in March,2013 and last unit in September,2016.



150x6 = 900 MW





2009-10

2009-10
Foundation Laid 9th July 2009

2013-14

2013-14
• First Unit Sync.
• First Metal Production

2015-16

2015-16
• Full load generation
• Full Production 3.59 MTPA
• Energy management Team formation
• PAT-II cycles enrollment

2016-17

• 2016 -17 NECA Award
• 2017-18 Carbon & Energy Policy
• 2017-18 Energy Audit- MEA

2017-18

2017-18
• Carbon & Energy Policy
• Energy Audit- MEA

2018-19

2018-19
• Mahan Road Map & Guidelines
• Unit Energy policy
• PAT-II cycle Audit by BEE partners

2019-20

2019-20
• BEE Energy Manager Exam 2nd Rank holder from CPP
• 4 engineers qualified as EM
• ISO 50001 Energy management certification by DNV

2020-21

2020-21
• MEA by External Agency
• “Energy Efficient plant” by CII
• Best Energy efficient plant in Eastern Region Coal by Mission Energy Foundation



FY 19-20

- Coal Energy -13,865,550 Mkal
- Oil Energy 8,514 Mkal
- Total Energy 13,874,064 Mkal

FY 20-21

- Coal Energy -13,363,812 Mkal
- Oil Energy 5,528 Mkal
- Total Energy 13,369,340 Mkal

Coal Energy Reduction ~ 3.62%

Saving Rs 177 Crores in Coal

Oil Energy Reduction ~ 35.07%

Saving Rs 1.7 Crores in Oil

Total Energy Reduction ~ 3.64%

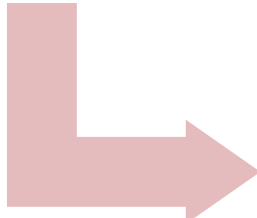
FY 19-20 (Achieved)
Sp. energy :-160.29 GJ/T
Sp. energy :-3.83 TOE/T
Sp. emission : 16.35 tCO2/t

FY 20-21 (Achieved)
Sp. energy :-157.55 GJ/T
Sp. energy :-3.76 TOE/T
Sp. emission : 16.10 tCO2/t

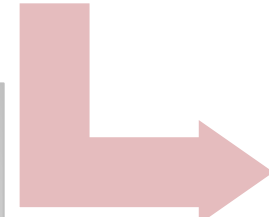
FY 21-22 (Target)
Sp. energy :-155.22 GJ/T
Sp. energy :-3.71 TOE/T
Sp. emission : 15.9 tCO2/t

Area	FY 19-20 MWh/day	FY 20-21 MWh/day	Reduction in MWh/day	% Reduction in Auxiliary Power consumption
CHP	23.17	20.03	3.14	13.6%
AHP	51.18	40.29	10.89	21.3%
Water system	53.32	43.18	10.14	19%
Construction, colony	12.25	11.56	0.69	5.6%
BTG	1013.03	952.46	60.57	6%
Total	1152.95	1067.52	85.43	7.4%

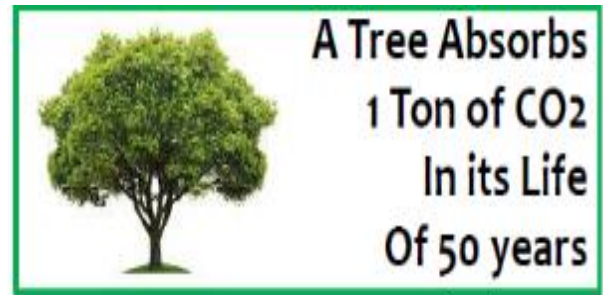
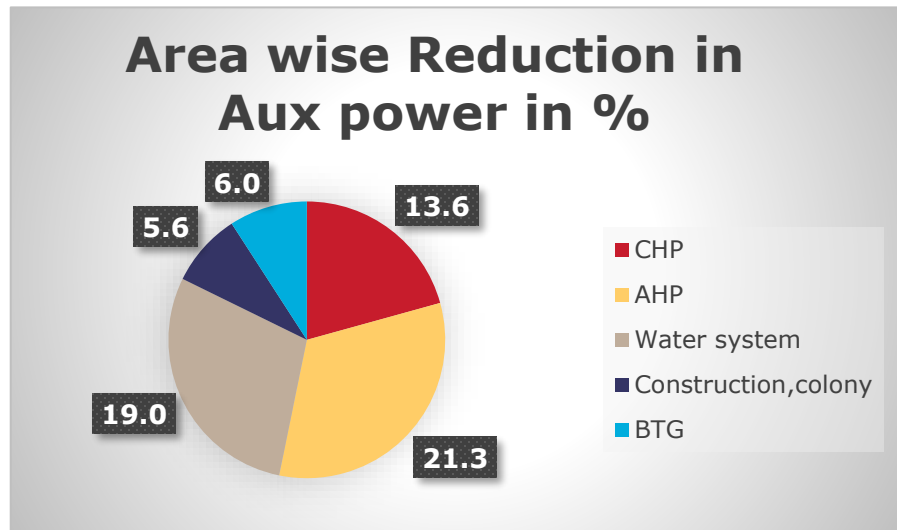
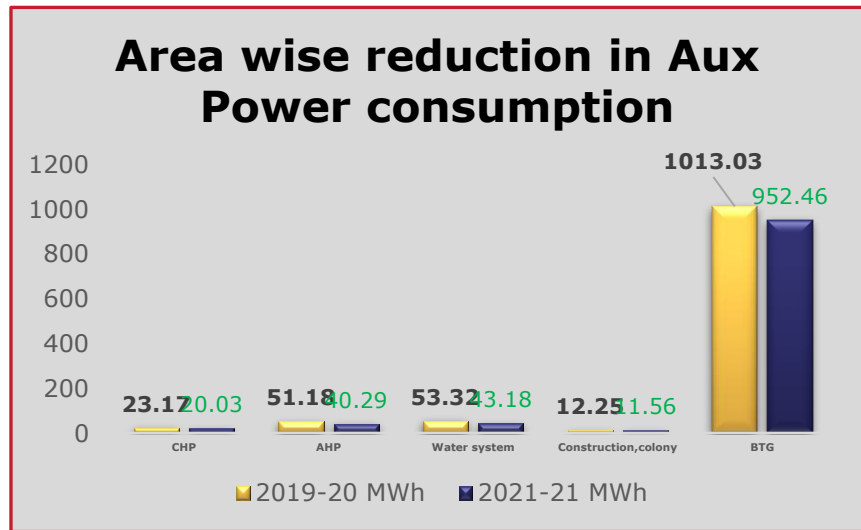
FY 19-20 Average Aux power ~ 1152.95 MWh



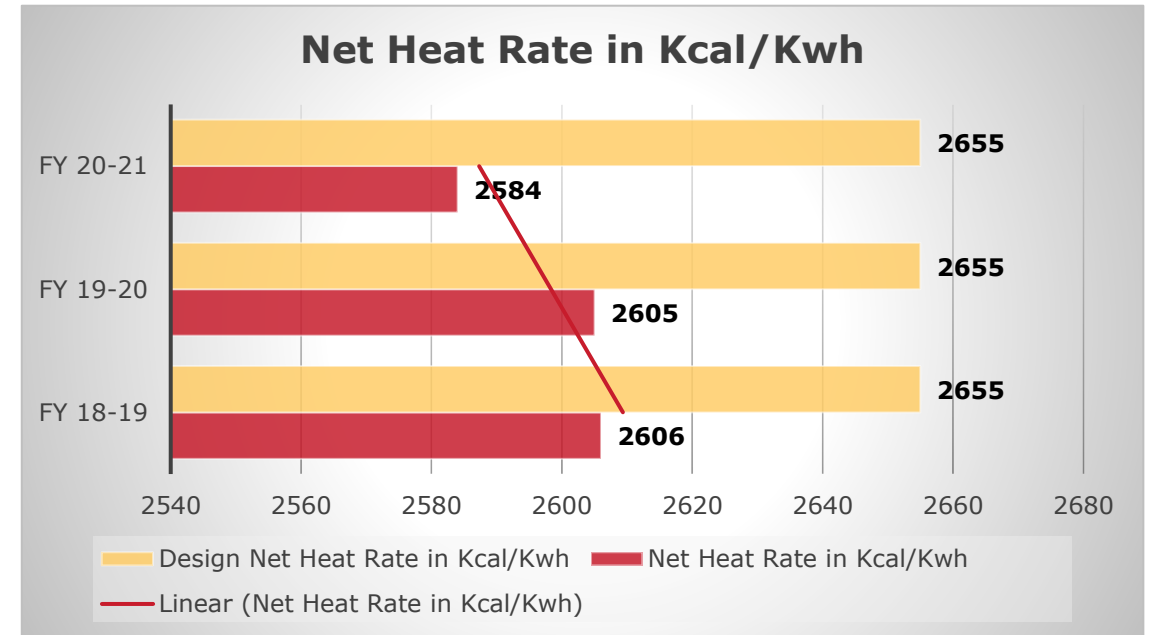
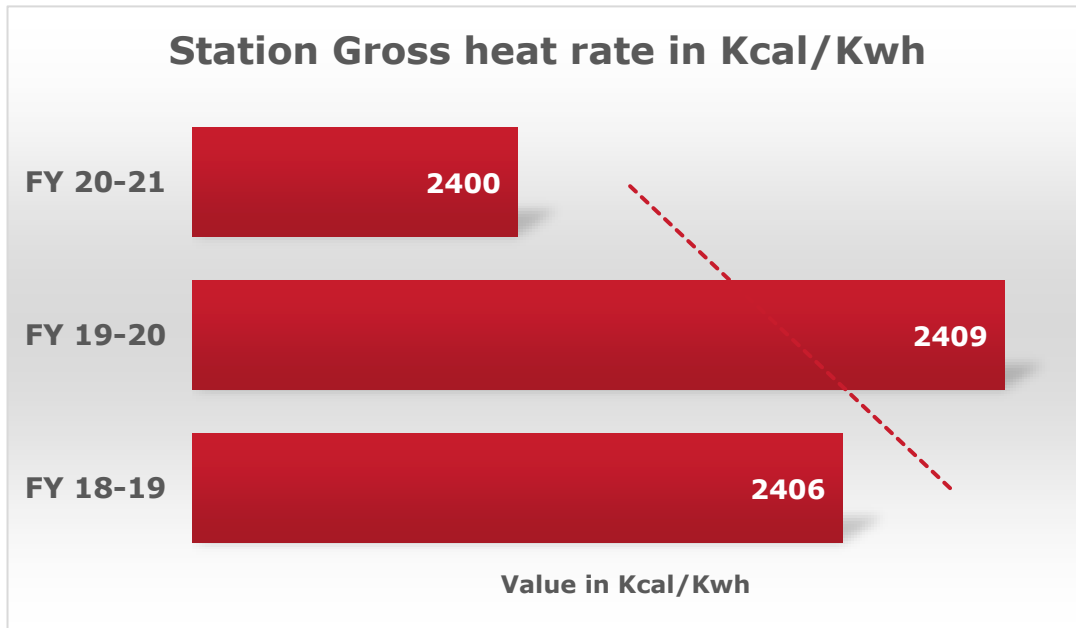
FY 20-21 Average Aux power ~ 1067.52 MWh



Saving of 85.43 MWh ~ 7.4% of average Aux power



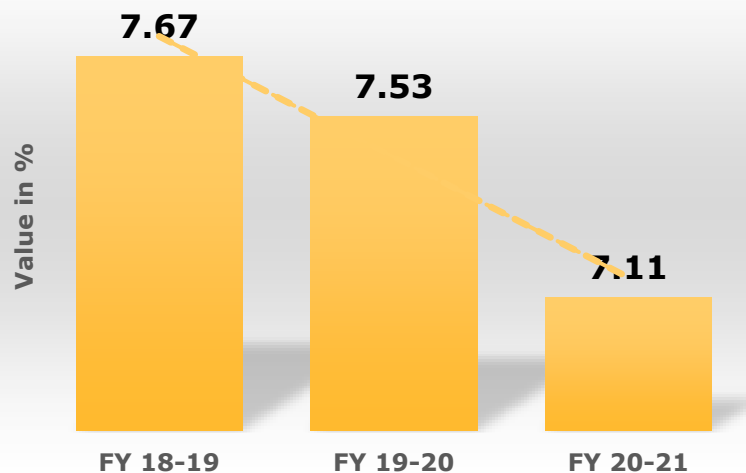
Parameters	unit	FY 21
Power Generation	MU	5451
Plant Load Factor	%	69.1
Plant Availability	%	83.75
Gross Heat Rate	Kcal/kWh	2400
Auxiliary Power Cons	%	7.11
Boiler Efficiency (Station wise)	%	86.83
Turbine Efficiency (Station wise)	%	2084
DM water cons.	%	0.62
Specific Raw water cons.	ltr/kWh	2.351
Specific Oil Cons.	ml/kWh	0.10



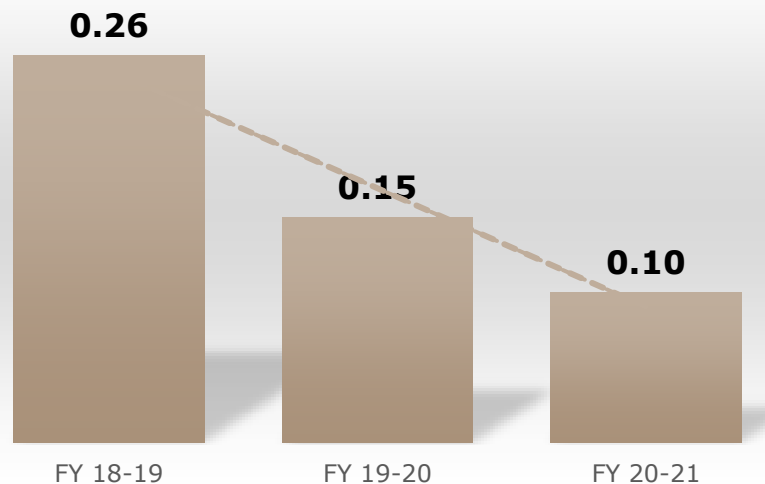
Heat Rate Improvement initiatives taken during FY 21

1. Condenser vacuum improvement (5 mm Hg) by arresting air ingress from LP area, Cooling Tower fills cleaning, modification of cooling water pumps impellers and optimization of CT fan blade angle.
2. Vacuum improvement by improving CW water quality through NOB(Non oxidizing biocide) and hypo dosing.
3. Condenser backwashing during unit running condition.
4. Boiler Efficiency improved (0.2%) by arresting the air ingress across APH, sealing the gap between baskets, coal burner tip replacement/repairing.
5. Net Heat rate reduced from previous year due to improved auxiliary power consumption.

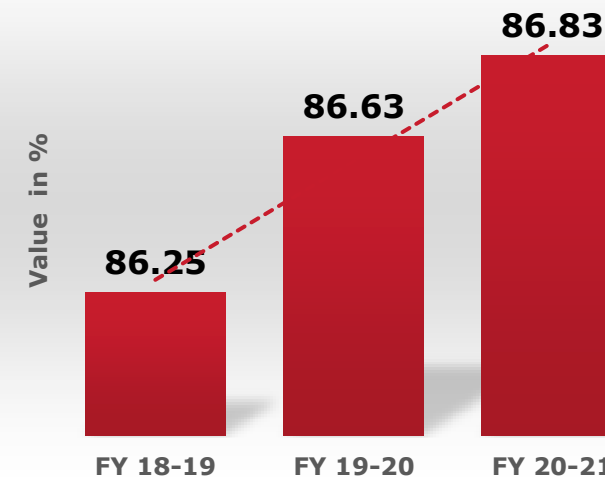
Auxiliary Power Consumption in %



Sp. Oil consumption



Station gross Boiler efficiency



A. APC Initiatives

- Mill operation reduced from 4 to 3 based on feeding coal quality
- Operation of 3 pumps between 2 units
- Optimizing main plant compressors power consumption.
- Increasing coal feed factor of CHP conveyors
- Reduction of AHP specific power consumption

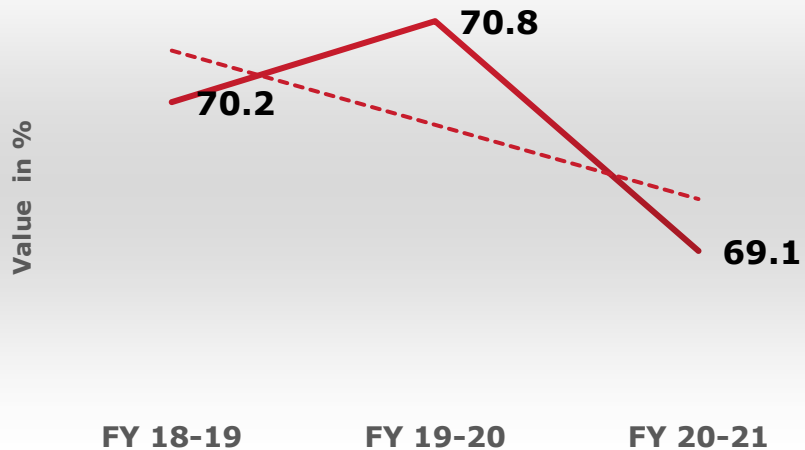
B. Specific Oil Consumption

- *Reduction in unit startup time by hot water flushing, condensate dumping & erection of bypass line for main steam silica*
- *Clubbing oil gun trial with PM activity*
- *Ensure air blaster healthiness of coal bunkers in rainy seasons*
- *Periodic Coal bunker cleaning*
- *Covering coal heaps during monsoon*

C. Boiler Efficiency

- Reduction in Dry flue gas losses
- Reduction in Unburnt losses
- Reduction in Mill reject losses
- Reduction in cycle make up

A. Plant Load factor %



Highlighter

A. PLF low due to low smelter demand during Covid

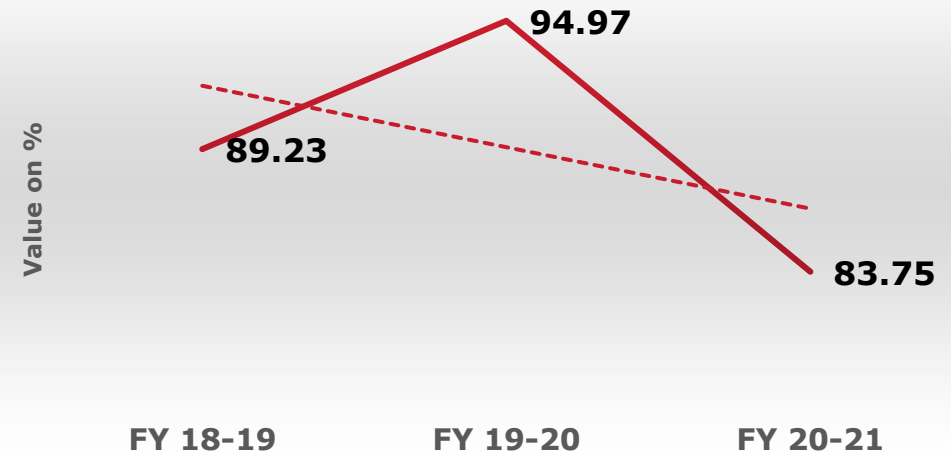
B. Long shutdown of Unit-5 due to COVID 19 Unit-3 unplanned shutdown for Generator stator winding failure

C. Raw water consumption has reduced with compare to FY 19-20.

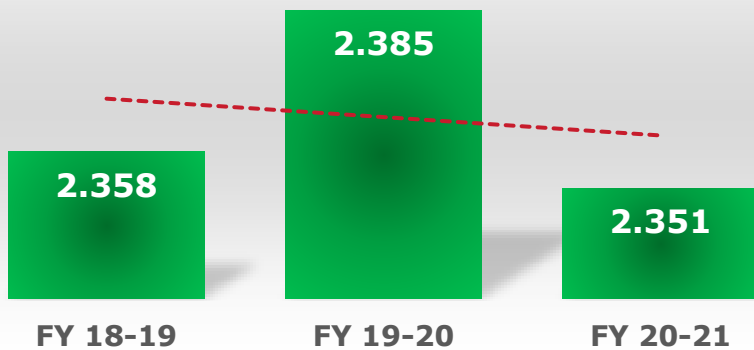
- 1. No fresh water make up for AHP operation*
- 2. De-ashing time changed from 8 hrs. to 12 hrs.*
- 3. Water Audit on monthly basis.*

D. Cycle make up slightly increase due to unplanned start up of Unit#3 & 5

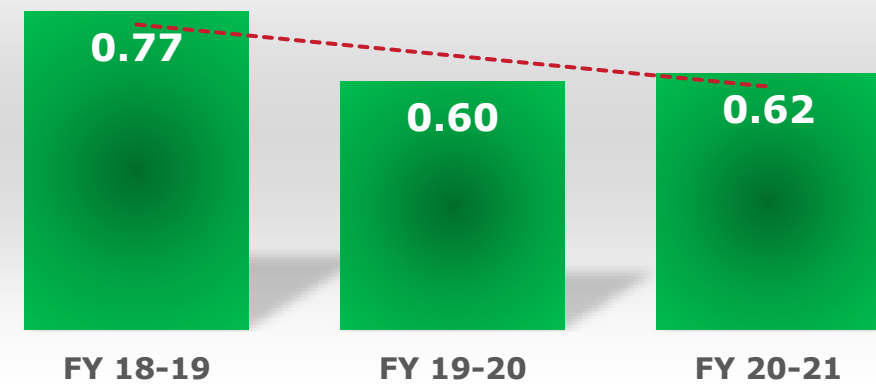
B. Plant Availability factor



C. Raw water consumption (Ltrs/kWh)



D. DM make up %



National Benchmarking

PARAMETERS	UOM	National Best	Mahan Aluminium	Reference
Gross Heat Rate	Kcal/kWh	2450	2400	Ref: BEE Improving Thermal power Sep 18
Turbine Heat Rate	Kcal/kWh	1970	2084	
Aux Power consumption	%	6.92	7.11	
Plant load factor	%	80	69.1	
Plant availability factor	%	84	83.75	Reference 135-150 MW range
Sp. Oil consumption	ml/kWh	0.1	0.1	

Inter Unit Benchmarking

PARAMETERS	UOM	ADITYA FY 21	MAHAN FY 21
Station Gross Heat Rate	Kcal/kwh	2415	2400
Boiler Efficiency	%	85.93	86.83
APC	%	7.66	7.11
Specific Oil consumption	ml/Kwh	0.16	0.10

Short term vision:

- Implementation of EnCon Projects as per MEA audit.
- Digitalization
- Exploring latest technologies and advanced software
- 100% Ash utilization
- Commission of 35 MWe Solar PV plant
- Commissioning of FGD system

Benchmarking





GROSS HEAT RATE

- Replacing of fill pack of cooling towers
- Overhauling of Boiler & APH seal replacement



SP. OIL CONSUMPTION

- Further optimization of unit start up time
- Hot water flushing
- Sustaining the unit without oil support in case of top mill tripping



AVAILABILITY

- 100% PM compliance
- Root cause analysis of repeated failures
- Training to maintenance team on RCM (Reliability centered Maintenance)



1



AUXILIARY POWER CONSUMPTION

- De – staging of boiler feed water pump
- Duct modification by CFD study to reduce ID fan power

3



SP. DM WATER CONSUMPTION

- Arresting valve passing during unit overhauling
- Reduction of unit start up time
- Optimization of soot bowing

5



SP. RAW WATER CONSUMPTION

- Installation of flow meters at Major consumers
- Water audit
- Survey of under ground pipe lines

Energy Saving Projects planned in FY 22

Sl. No.	Details of identified Energy saving projects	Annual Electric saving Million kWh	Annual thermal saving M kcal	Investment in Rs million
1	Fill pack for cooling tower - 14 cell		5604	21.70
2	PHR Gain due to Boiler Overhauling Unit-5		921.6	1.00
3	PHR Gain due to Boiler Overhauling Unit-3		3686.4	1.00
4	PHR Gain due to Boiler Overhauling Unit-6		5529.6	1.00
5	PHR Gain due to Boiler Overhauling Unit-2		6451.2	1.00
6	Auxiliary saving by pressure reduction of flue gas path in Boiler #5	0.056		2.00
7	De-staging of boiler feed pump	0.864		2.00
8	Efficiency improvement of raw water pumps	0.288		0.20
9	Efficiency improvement of Gopad river water pumps	0.432		0.30
10	Boiler -1&2 Duct modification by CFD to reduce ID fan Power	0.540		2.00
11	Increasing 5A/B conveyor loading factor	0.438		0.30
12	Increasing 7A/B conveyor loading factor	0.438		0.30
13	5 No's of High mast LED replacement	0.105		0.20
14	Installation of VFD in AHP - Seal water pump or LP pump	0.131		0.08
15	ASTRO Timer installation in High mast and outdoor lighting	0.035		0.10
16	LED replacement in BTG & CHP	0.088		0.20
17	VFD installation in LDO Forwarding pump	0.07		0.10
	Total Saving potential	3.48	22193	33.5

Year	No. of proposals	Electricity (Million Kwh)	Annual thermal saving M kcal	Savings (Rs in millions)	Investment (Rs Million)	Payback Months
FY 21-22	17	3.48	22193	32	33.5	12

FY 18-19

No. of projects :4

Saving in lakh Kwh:31.86

Total Savings in Million Rs :11.18

FY 20-21

No. of projects :12

Saving in lakh Kwh:84.8

Total savings in Million Rs :89.54

FY 19-20

No. of projects :13

Saving in lakh Kwh:142.29

Total savings in Million Rs :135.13

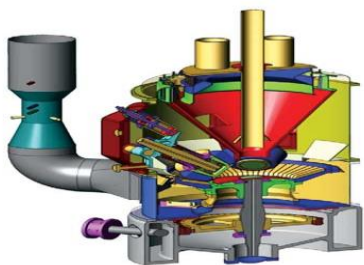


Problem Definition: High Mill reject and its impact on boiler efficiency

- Boiler losses are of two types:-Controllable & Non-Controllable.
- Mill Reject loss is one of the component of Boiler loss. Which was around 0.2% approx.
- Focused to reduce this losses below 0.1%.

Challenges in Coal Mill

- Difficult to identify underperforming mills
- Stand by mills must be available to ensure consistent operation.
- Preventative maintenance to be complied in parallel.



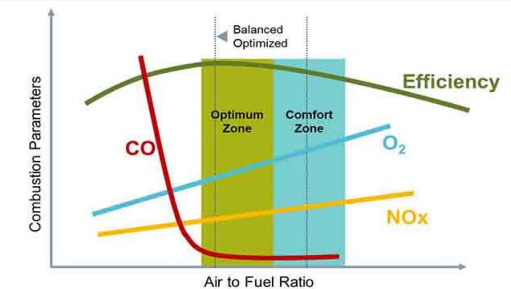
Challenges in Mill Reject handling System

- Non Reliability of MRHS Level Probe failures,
- Operation of system in timer mode
- Choking of pyrite hoppers
- Dome valve seal failures etc.



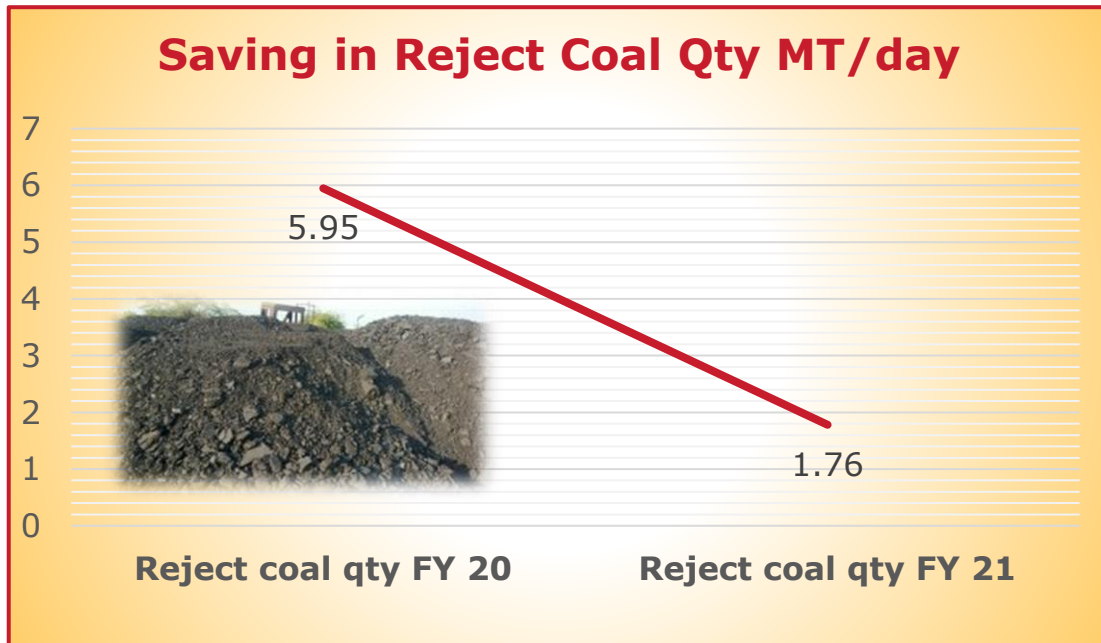
Challenges in Operation

- Maintaining air fuel ratio
- Accumulation of coal and clinker formation in air duct.
- Monitoring of reject quantity



Results :

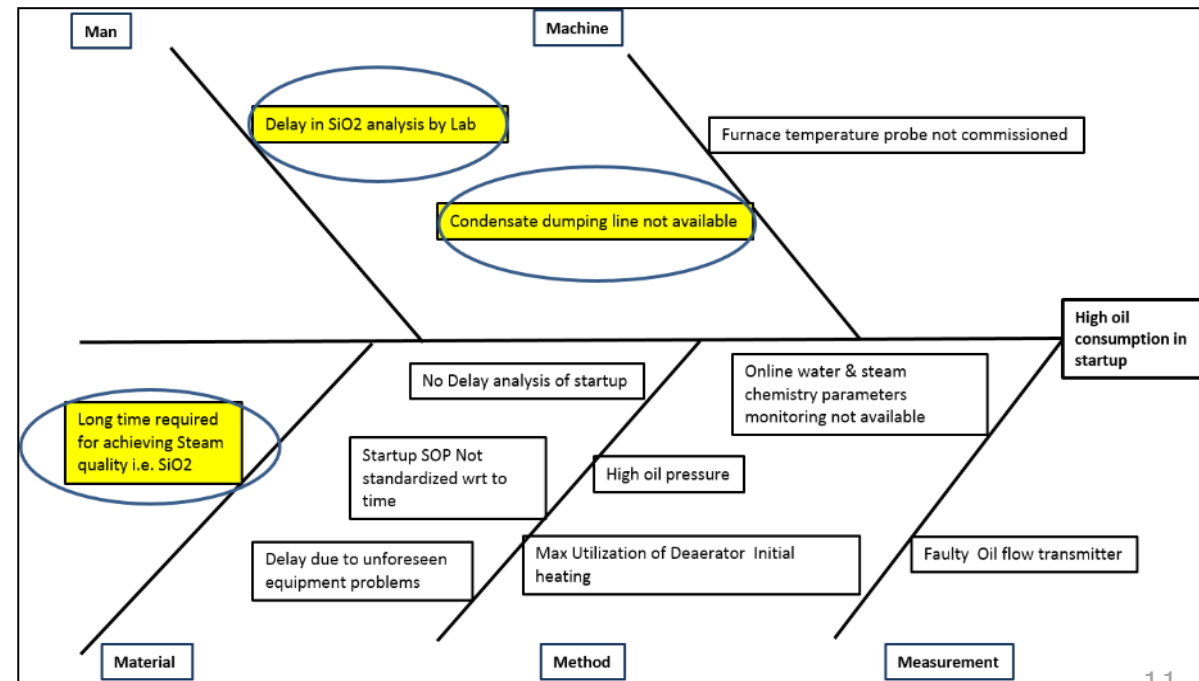
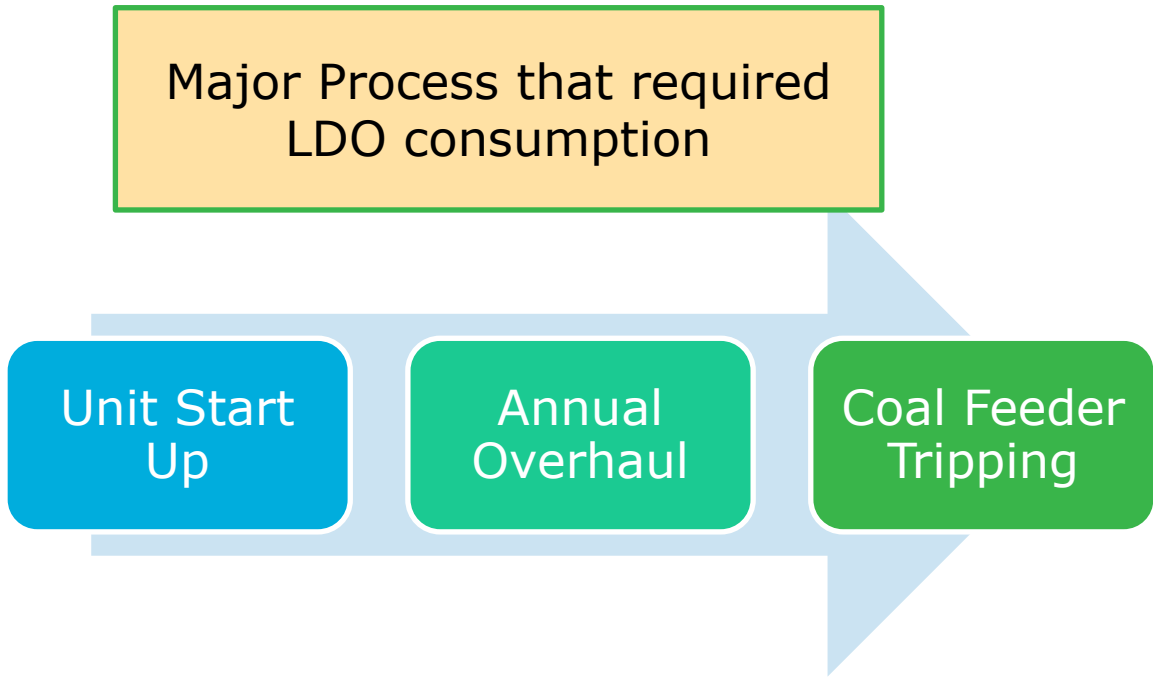
- Loss in Boiler efficiency due to Mill Reject before this projects was : 0.16% (Average of FY 20)
- Loss in Boiler efficiency due to Mill Reject after this projects is : 0.09% (FY 21)
- Mill reject loss has reduced 0.07 % for FY 21
- Reject Coal CV reduced from 1630 kcal/kg (FY 20) to 1614 kcal/kg (FY 21)
- Reject coal qty. reduced from 5.95 MT/day to 1.76 MT/day



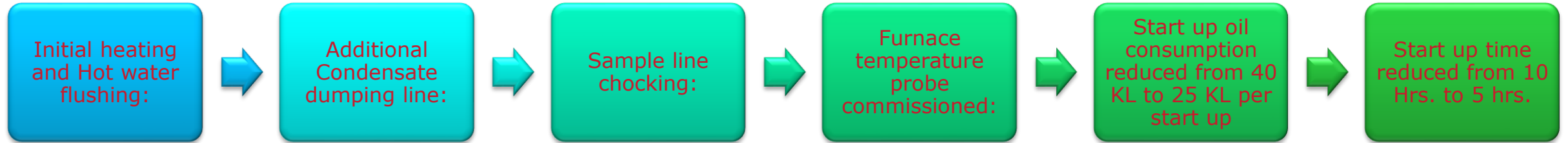
Description	FY 20	FY 21	Savings in Coal Reject
Daily Coal Reject qty MT/day	5.95	1.76	4.19
Yearly coal Reject in MT	1964	581	1383
Coal GCV kcal/kg	1630	1614	16
Energy in MKcal	3201	937	2263

- LDO or light diesel oil is secondary fuel in our plant and primary fuel is coal. LDO is used during startups, equipment tripping for process stabilization.
- Oil consumption in **FY 20** was **841 KL** worth **4.2 Crore**. It is a high value item for our power cost as well as a precious natural resource.

Use of QC tools like Fishbone analysis and Pareto analysis to identify major reasons for increase in time and oil consumption during Unit startup and coal feeder tripping

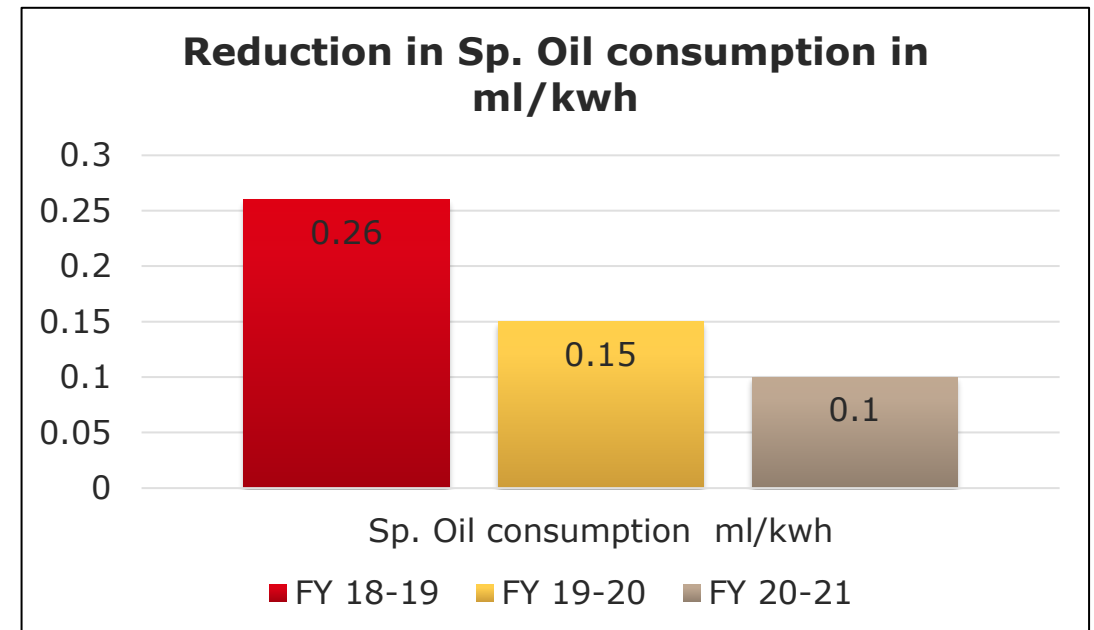
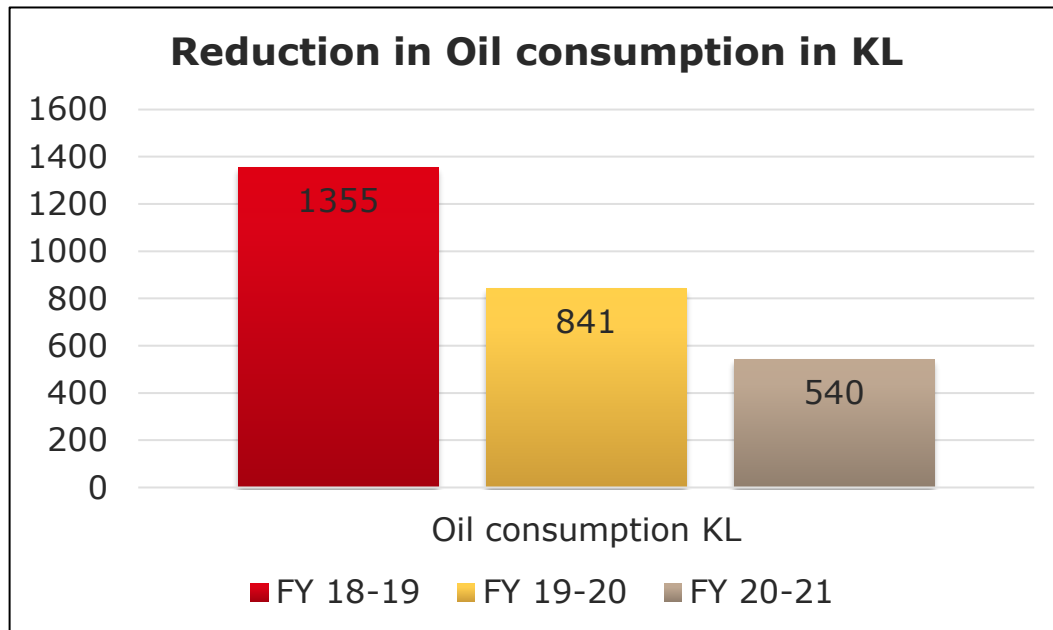


Key Initiatives taken for reducing oil consumption in Startup are:



Results :

There is reduction in 302 KL oil consumption in FY 20-21 with comparison to FY 19-20. The cost saving is **1.7 crore**/annum



Project – Renewable Solar Power - 35 MW

Commissioning Target : Oct '21

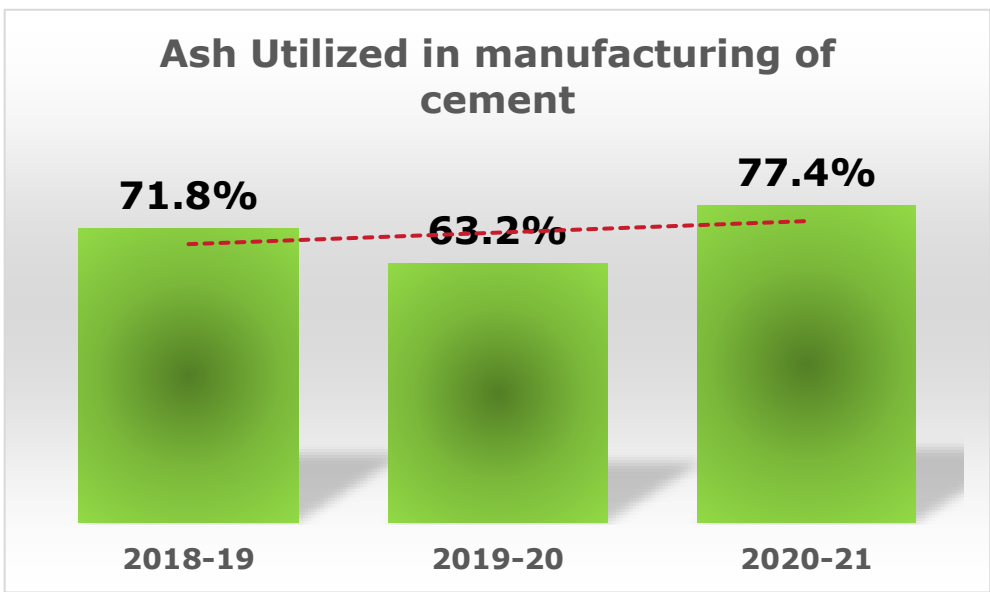
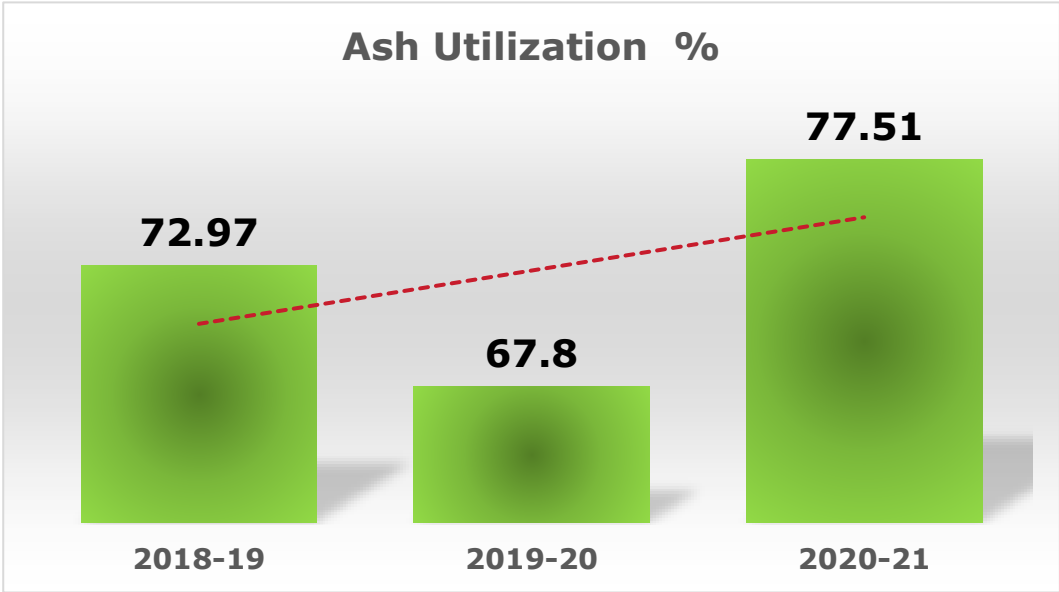
Technology : Solar Energy Photovoltaic cell

Jobs completed : Erection completed for 18.5 MW modules, Inverter installed, transmission line work completed

Status: Work in Progress



Technology (Electrical)	Type of Energy	Installed Capacity (million kCal)	Usage (million kCal)	% of overall thermal energy
Electrical	Solar Energy	NA	NA	NA



1st Fly ash disposal through Rake started on 28th Oct'20. Total 18 rakes dispatched during the year.

In House Fly ash brick manufacturing plant. Fly ash Brick plant commissioned on 27th Jan'21



8. Environment Management -Ash Utilization

Particulars	UOM	2018-19	2019-20	2020-21
Ash Stock in plant(Yard+pond)	Tons	1689727	2028910	1820231
Ash Generated	Tons	1258003	1294050	1274115
Ash Utilization	%	72.97	67.8	77.51
Ash Utilized in manufacturing of cement/	%	71.8%	63.2%	77.4%
Ash Utilized for Fly ash Brick	%	0%	0%	0.11%
Ash Utilized for Mine Filling	%	0%	0%	0%
Ash Utilized for Road pavement	%	1.17%	4.63%	0%
Ash Utilized in other areas	%			
Ash loading side bed leveling	%	0	0	0.26%
Internal construction activities	%	0	0	0.14%

Ash Handling through Various Methods

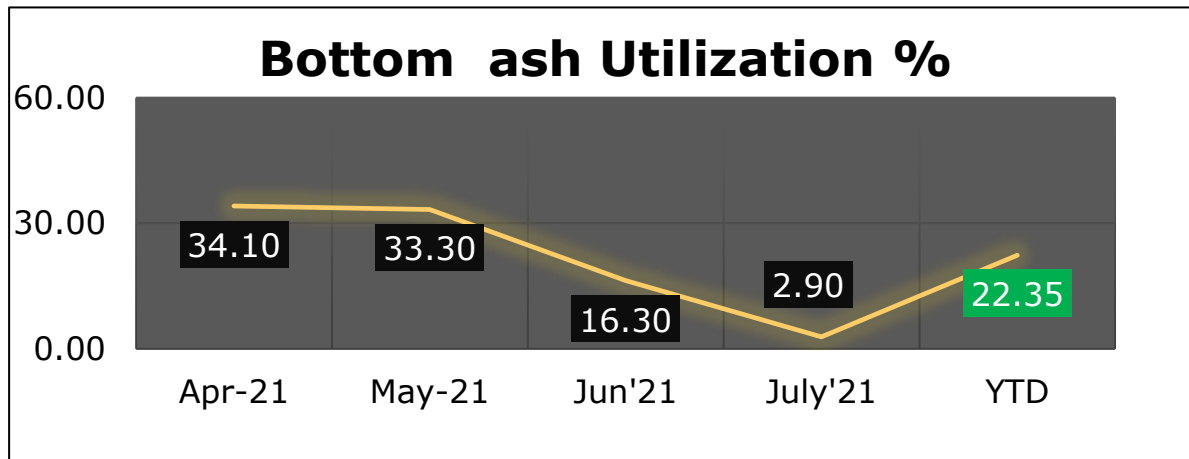
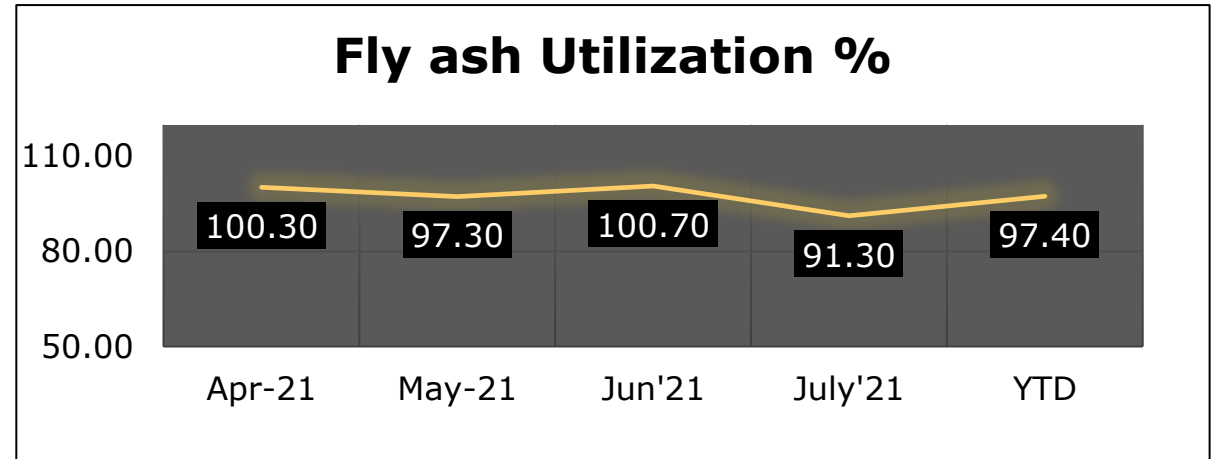
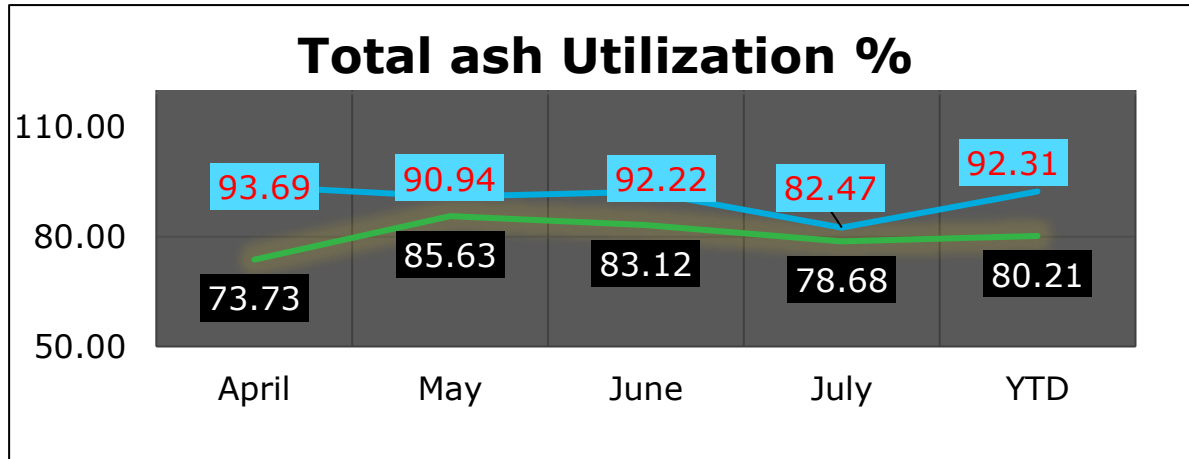
Ash Handling through (Wet Method)	%	10
Ash handled (Dry Method)	%	90
Ash handled (Semi wet))	%	0

Salient Features:-

- Long term agreement with M/s. Prism cement and UltraTech cement.
- Ash utilization in land reclamation and road construction
- Ash utilization in brick plant .



Ash Generation & Utilization (%) : FY 22



100% Fly ash utilization :

- Entire fly ash supply to cement vendors through bulkers and rakes
- Use of fly ash in brick plant -10 lakhs bricks per annum
- Technical support to near by external fly ash brick manufacturers

To increase Bottom ash utilization

- More bottom ash utilization in road construction
- Rake disposal to cement plants - 10 rakes per month

TARGET ASH UTILIZATION FOR FY -22 IS 95%

- Total area of the plant and township is 3104 Acre .
- Area required for green belt development (33% of 3104) acre is 1024.32.
- Green belt and garden developed in 1050.68 Acre.
- Compliance status as on July,2021 is 33.85 %.
- Planted 10.29 Lakhs trees in 1013.3 Acre.
- The average survival of green belt is 74.15 %
- We have developed landscape garden in 37.65 Acre.



8. Environmental Management - Emission

Particulars	UOM	2018-19	2019-20	2020-21
Total CO2 Emission per KW of Generation	Ton/kW	1.10	1.03	1.01
Current SOx Emissions at Full Load*	mg/Nm3	488.0	444.0	370.0
Current NOx Emissions at Full Load*	mg/Nm3	217.0	222.0	191.0
Particulate Matter *	mg/Nm3	31.0	38.0	40.0
Mercury* *	mg/Nm3	0	0	0

Best practices adopted for Emission control and monitoring

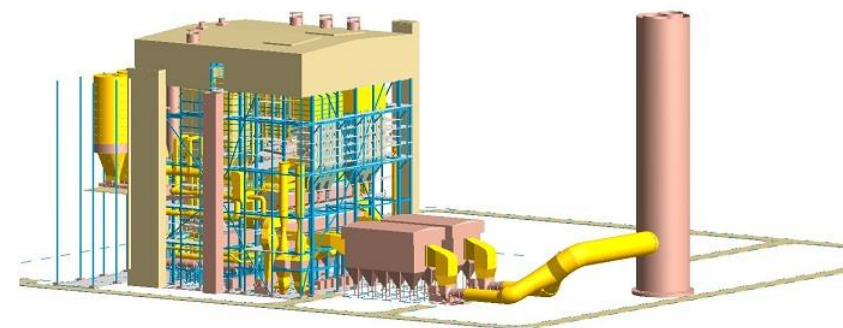
- Continuous Emission monitoring system
- Separate Over Fire Air (SOFA) system
- Burner modification
- Coal nozzle tip modification
- Dust suppression system at CHP.



Flue gas Desulphurization (mg/Nm³)

- Purpose-To Control the Sox level below 600 mg/Nm³
- Technology :Semi Dry Flue gas Desulphurization system
- Target Commissioning –FY 22
- Target Emission:- 600 mg/Nm³

Status : Implementation is under progress



Suspended Particulate Matter (mg/Nm³)

To Control the spm below 50 mg/Nm³

- Technology : High frequency three phase transformer & Micro pulse
- Emission: Below 50 mg/Nm³

Status: Completed

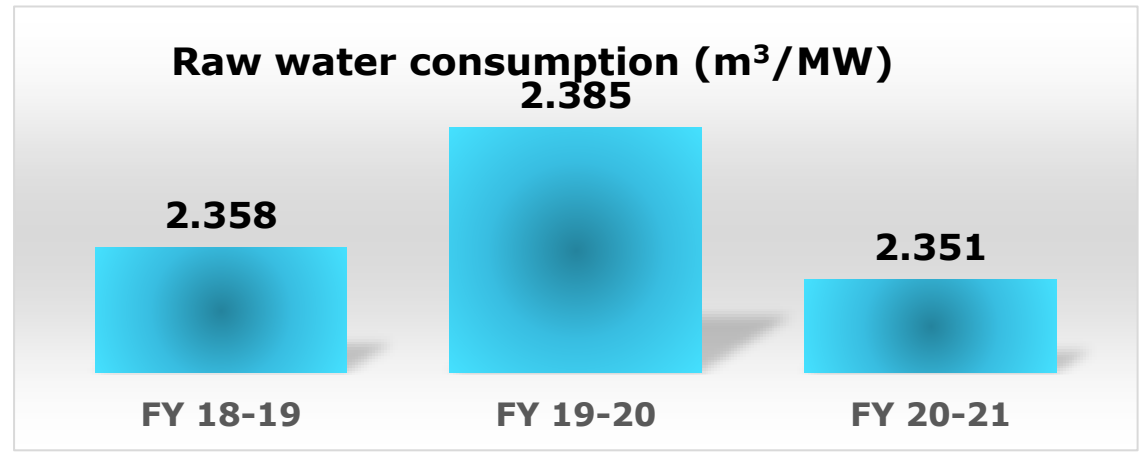
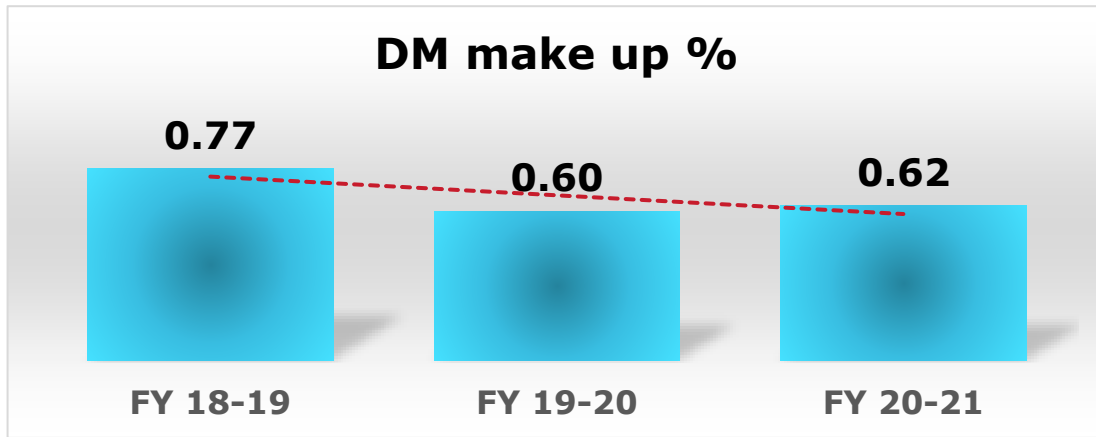


Project – De- Nox (mg/Nm³)

To control the Nox below 290 mg/Nm³ @ 6 % O₂

Technology : The new combustion system consists of new Burner tips and Separate Over Fire Air (SOFA) system. Completed in Unit#3

Status: Completed (Presently Nox value in other units is within limit)



Our plant is ZLD plant.

Initiatives to reduce water consumption :

Silica analyzer commissioned for Strong Base Anion(SBA) and Mixed Bed at DM Plant for Online Monitoring of Silica.



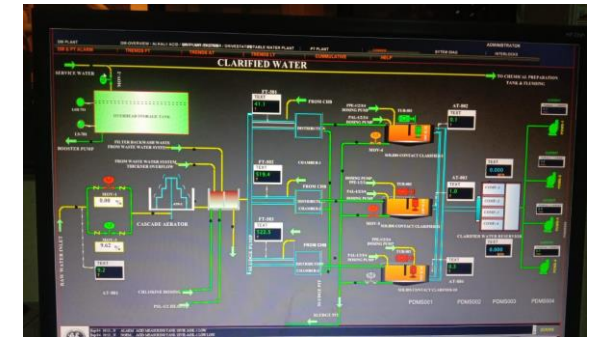
New Turbidity meter installed and commissioned for Raw Water for online monitoring




MOV installed & commissioned for AUTO operation at CHP pump house service water line to reduce the water overflow and wastage of service water.





Real Time View of Water Flow on SCADA at DM Plant





9. Best Practices – O&M Excellence


- 1**  **Boiler Tube Leakages reduction**

By ensuring 100% RT of weld joints and application of Plastic Refractory in burner area.
- 2**  **Effective Coal Management and Accounting**

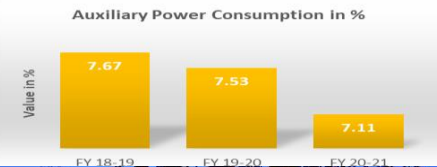
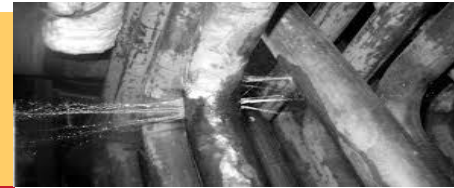
Drone survey on weekly & Total Station survey on monthly basis
- 3**  **100% PM & CBM Compliance**

ZERO critical equipment in RED ZONE since last 1 year
- 4**  **Sp. Oil reduction program.**

Sp.oil consumption has reduced from 0.26 ml/kWh to 0.1 ml/kWh
- 5**  **Reduction in Auxiliary Power Consumption**

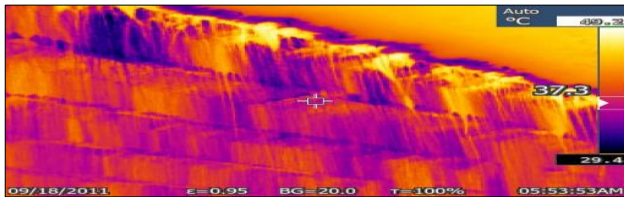
By optimizing the operational procedures
- 6**  **Electrical system audit Before monsoon**

No black out due to electrical fault

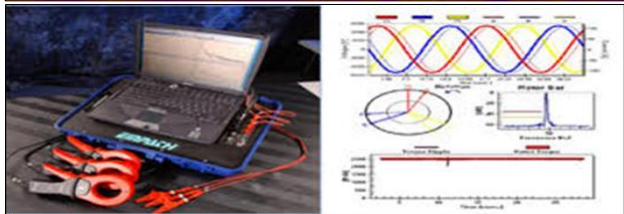




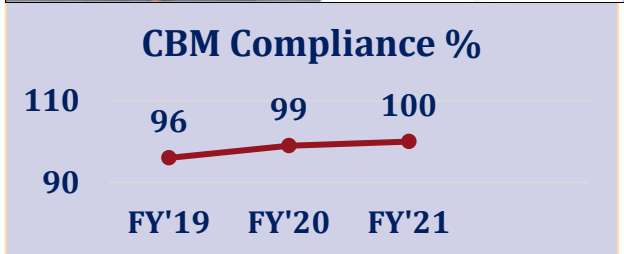
Improved reliability (Zero tube leakages since last two years)



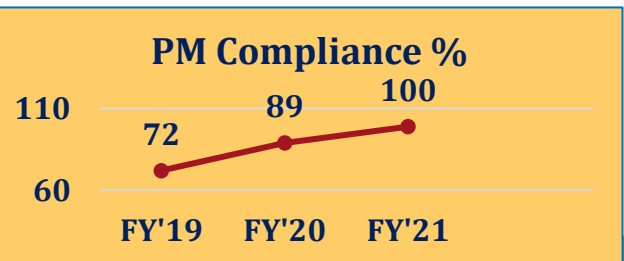
CT Water Temp. Mapping & Coal heap temp by Thermography



Motor Current Signature Analysis



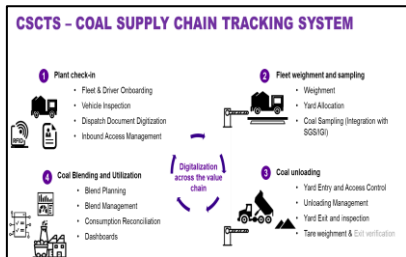
CBM- Vibration Analysis, Oil Analysis, Motor Current Signature Analysis, Thermography.



PM Compliance monitoring.



Digitalization



Coal Supply chain tracking system



LIMS software for coal system mgmt.



On line Energy Monitoring system

3rd Edition-CII National LCA (Low Cost Automation) Circle Competition 2021
Live Presentation Competition
Monday – Tuesday; 26-27 April 2021, CII Virtual Platform

This is to certify that Hindalco Industries Limited, Mahan, Aluminium is position holder (as per below details) in 3rd Edition - CII National LCA (Low Cost Automation Circle Competition) 2021 held from 26 - 27 April 2021 On CII's Virtual platform.

Award Category : Best Case Study on Innovative Application of LCA
Position : Winner

Issuing Date: 28 April 2021
Certificate No. ME-COM-270421_06

Pikender Pal Singh
Executive Director, Confederation of Indian Industry
Head, CII - Centre of Excellence for Competitiveness for SMEs

*This certificate can be verified by connecting with us at cicd@cii.in

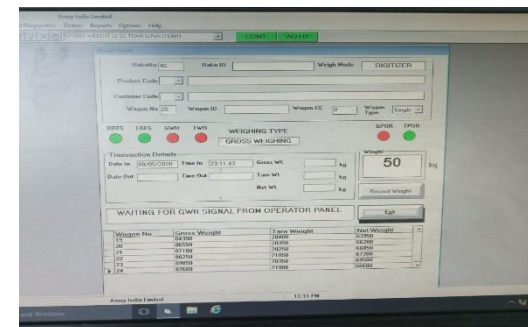
Winner of LCA circle Award by CII



Installation of new BARCO make LVS



KPI Tracking Dashboard



Auto capturing of weight of wagon tippler

From Mines to the end use of point

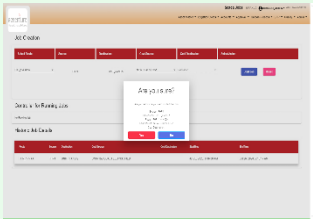
Dashboards & Control Tower



Reporting Layer

Intelligence and Processing Layer

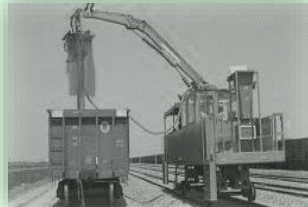
Application Data Staging and Unification Layer



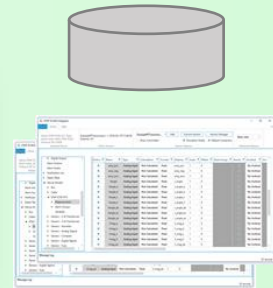
WebUI



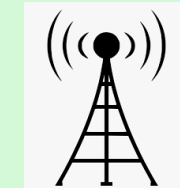
HHD



Auger and LIMS Systems



SCADA and Databases



Field IoT Devices

Operating Interface

Systems and Databases

Participation in National Level Competitions

- Quarterly Kaizen Competitions Winners get a chance to participate in national Level Competitions

Hindalco Industries Limited, Mahan																															
Kaizen Award Scheme																															
<p>Objective: To encourage & recognize employees' creativity, innovation & engagement by way of suggesting and implementing small but continuous improvements in their workarea.</p> <p>Scope of Applicability: This scheme is applicable to all Small Groups of Smelt at Mahan.</p> <p>Submission of the Entries:</p> <table border="1"> <thead> <tr> <th>S N</th> <th>Activity</th> <th>Responsibility</th> <th>Time Line</th> </tr> </thead> <tbody> <tr> <td>1.</td> <td>The Best kaizen of each Small Group (only one) SG Team Leader to be submitted in prescribed one pager.</td> <td></td> <td>Every Quarter</td> </tr> </tbody> </table> <p>Evaluation & Rewarding:</p> <table border="1"> <thead> <tr> <th>S N</th> <th>Activity</th> <th>Responsibility</th> <th>Time Line</th> </tr> </thead> <tbody> <tr> <td>1.</td> <td>Kaizen submitted should be available in Oracle System then only it is going to be accepted for Kaizen Competition otherwise it will be rejected.</td> <td>SG Leader</td> <td>Every Quarter</td> </tr> <tr> <td>2.</td> <td>First screening of Kaizen submitted for Kaizen competition are going to be done by SI Pillar.</td> <td>SI Pillar Convener</td> <td>Every Quarter</td> </tr> <tr> <td>3.</td> <td>After scoring on the basis of certain parameters best 9 nos. of Kaizen submitted for next final level of Kaizen Competition.</td> <td>SI Pillar</td> <td>Every Quarter</td> </tr> <tr> <td>4.</td> <td>Kaizens shortlisted by SI Pillar, that team need prepare a presentation for final round in the standard format.</td> <td>SG Leader</td> <td>Every Quarter</td> </tr> </tbody> </table>				S N	Activity	Responsibility	Time Line	1.	The Best kaizen of each Small Group (only one) SG Team Leader to be submitted in prescribed one pager.		Every Quarter	S N	Activity	Responsibility	Time Line	1.	Kaizen submitted should be available in Oracle System then only it is going to be accepted for Kaizen Competition otherwise it will be rejected.	SG Leader	Every Quarter	2.	First screening of Kaizen submitted for Kaizen competition are going to be done by SI Pillar.	SI Pillar Convener	Every Quarter	3.	After scoring on the basis of certain parameters best 9 nos. of Kaizen submitted for next final level of Kaizen Competition.	SI Pillar	Every Quarter	4.	Kaizens shortlisted by SI Pillar, that team need prepare a presentation for final round in the standard format.	SG Leader	Every Quarter
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S N	Awards & Recognitions	Name of Certifying Body	Year	Theme of the Award																											
1	Special Jury Award at 36 th CII KaiZen Competition	CII , TPM Club India	2020	Restorative Kaizen Category																											
2	Best Fly Ash Utilization Award 2019	Mission Energy Foundation	2020	Won 2 nd Prize																											
3	National Energy Management Award	CII Club India	2020	Energy Efficient Unit																											
4	7 th CII National Poka Yoke Competition	CII Club India	2021	Participation																											
5	CII Maintenance Circle Competition	CII Club India	2021	Autonomous Maintenance Practice																											
6	CII Maintenance Circle Competition	CII Club India	2021	Overall Maintenance management																											
7	CII Maintenance Circle Competition	CII Club India	2021	Innovation in Maintenance Practices																											
8	CII Low Cost Automation Circle Competition	CII Club India	2021	Low Cost Automation																											
9	Best Energy Efficient Plant	Mission Energy Foundation	2021	Won 1st Prize																											

Salient Features:-

- No. of Small Groups – 22 nos.
- Digitization of kaizen reporting.
- Monthly Monitoring on kaizen projects
- Quarterly prize distribution for best KaiZen.
- Reward & recognition – Unit, Cluster & Group level



1 Daily Energy Generation report

2 Daily online TG Heat rate and Boiler Efficiency calculation

3 Daily Coal MIS and deviation analysis

4 Daily Area wise Aux power consumption report

5 Monthly Turbine and Boiler performance

6 Monthly condenser performance study

7 Boiler & TG performance before and after overhauling

8 Daily review of deviation in PHR and Boiler efficiency

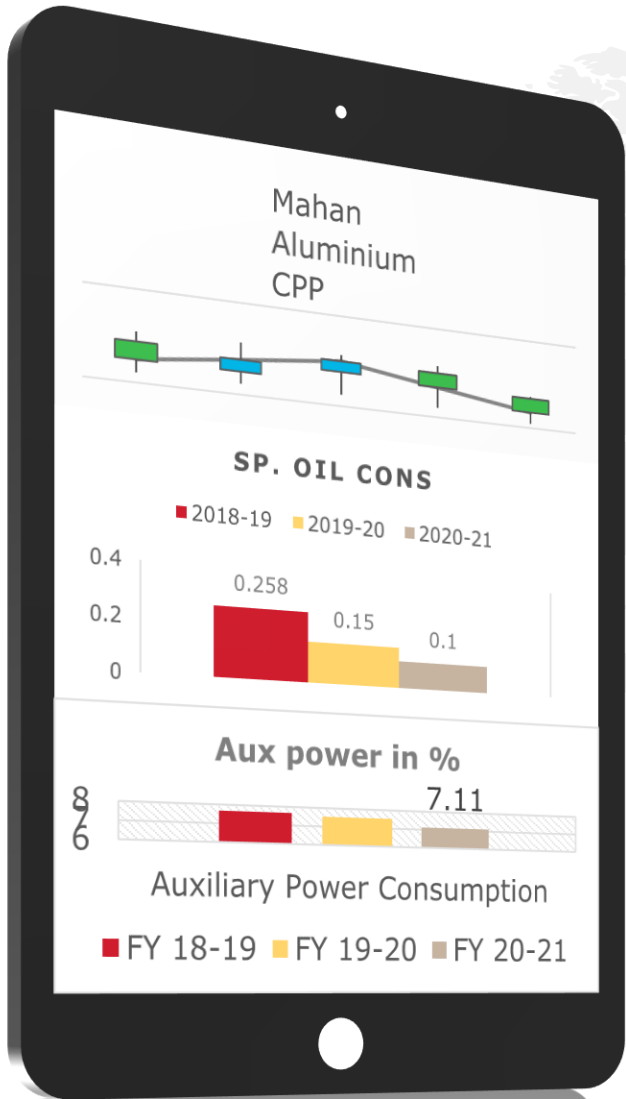
9 Quarterly insulation survey

10 Monthly review with Unit Head and Corporate Team

11 Online monitoring of APH outlet O2

12 Weekly Water, Air, Steam, Oil leakages survey






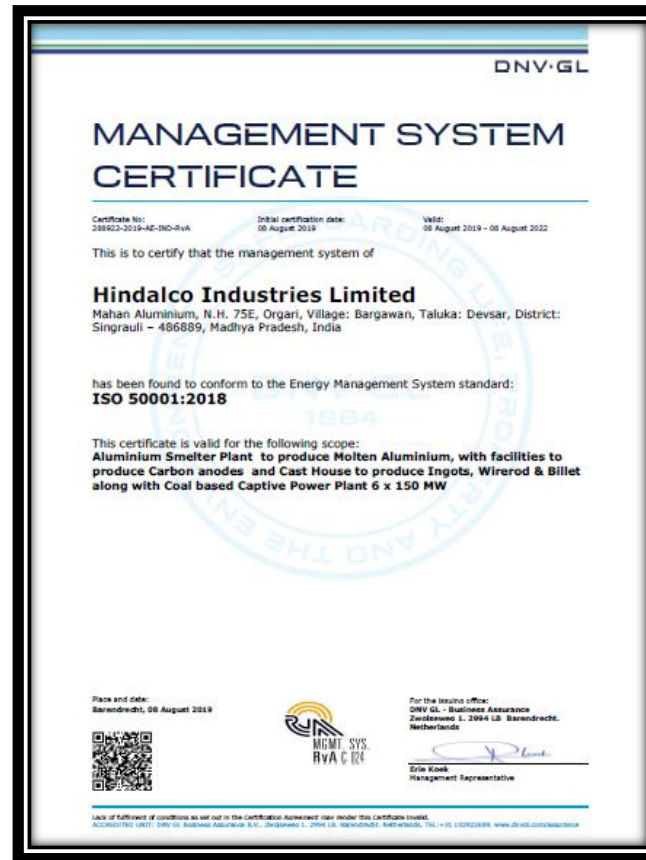
Daily Plant Meeting 

Daily HOD meeting 

Monthly CPP performance review 

Monthly Corporate Energy review meeting 

Monthly status review of EnCon Projects 



Mahan has achieved ISO certification in 2016 & confirming to ISO 9001:2015, ISO 14001:2015 certification in the year 2018. Listed in London Metal Exchange in 2016. Also got certification in ISO 50001:2018 & ISO 45001:2018 in year 2019.



Mahan has aligned its Sustainability Strategy with the group's sustainability matrix.

Sustainability Strategy

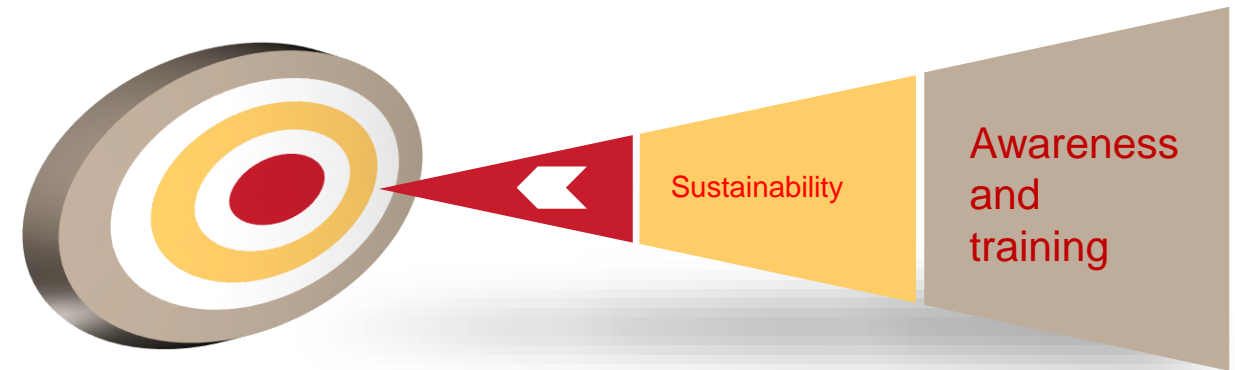
- Business goals and Sustainability goals are shared regularly
- Monthly Energy Webinar for metal Business
- Monthly performance review at Corporate level
- Participation in Biennial ABG *Energy Stride* Competition
- Participation in annual ABG Sustainability Conference

Competitive Environment

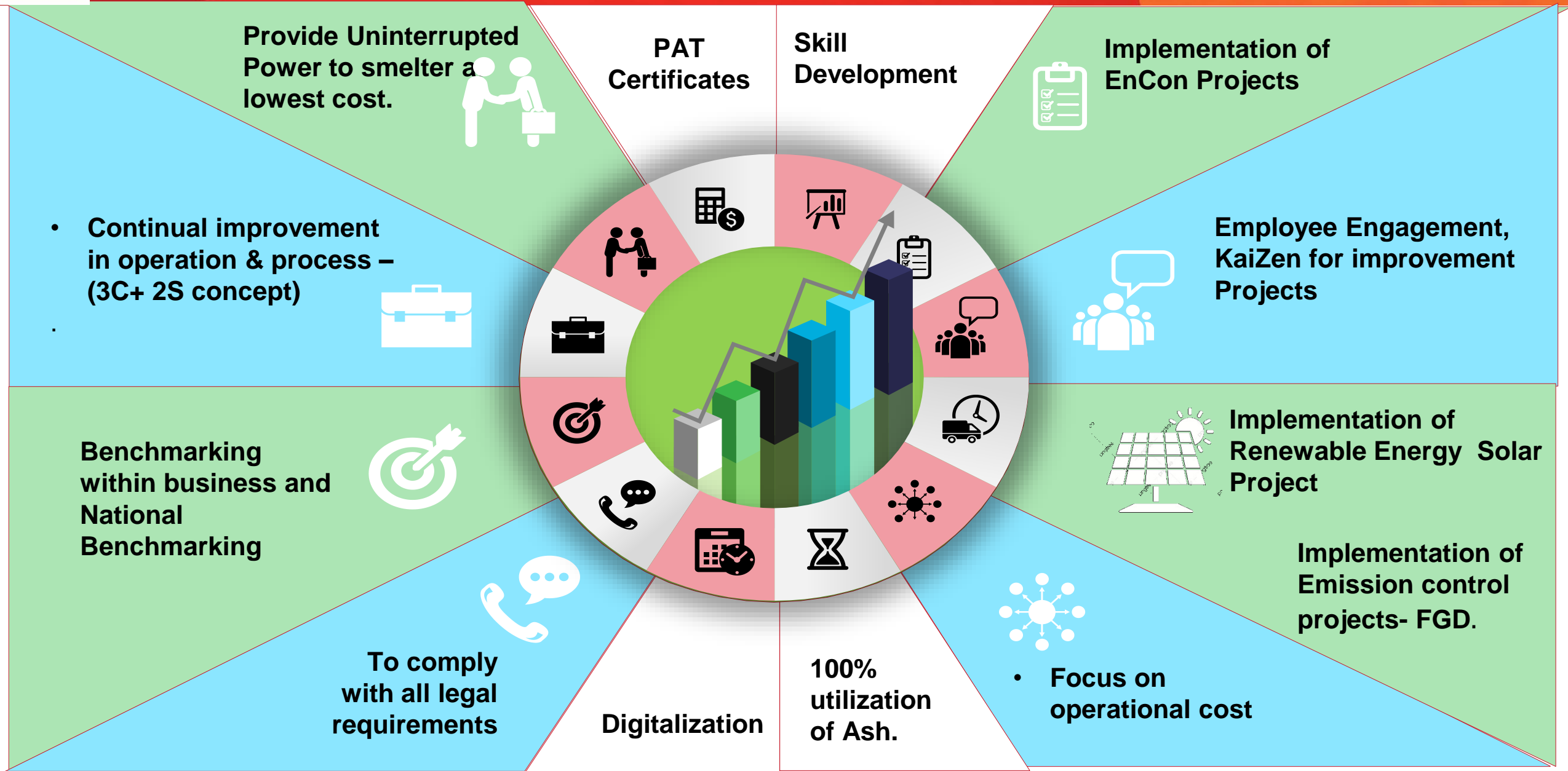
- PRIDE Awards
- Employee of the month award at supervisory level
- Instant Shabashi award at Supervisory level
- Quarterly Kaizen Competition at workmen level
- Best Small Group Awards at Staff & workmen level
- Award for contractual workmen on Independence & Republic day

Awareness and Training

- Annual Energy Conservation Day celebrations on 14th December every year .
- Training on PAT cycle
- Training on Energy Conservation Measures & projects
- Awareness program on ABG Energy and Carbon policy
- Young engineers encouragement for Energy Auditors / Managers certification examinations.



Learning from CII 2020 & Way Forward



ADITYA BIRLA



HINDALCO

Thank You