22nd National Award
Excellence in Energy Management

Team Members:

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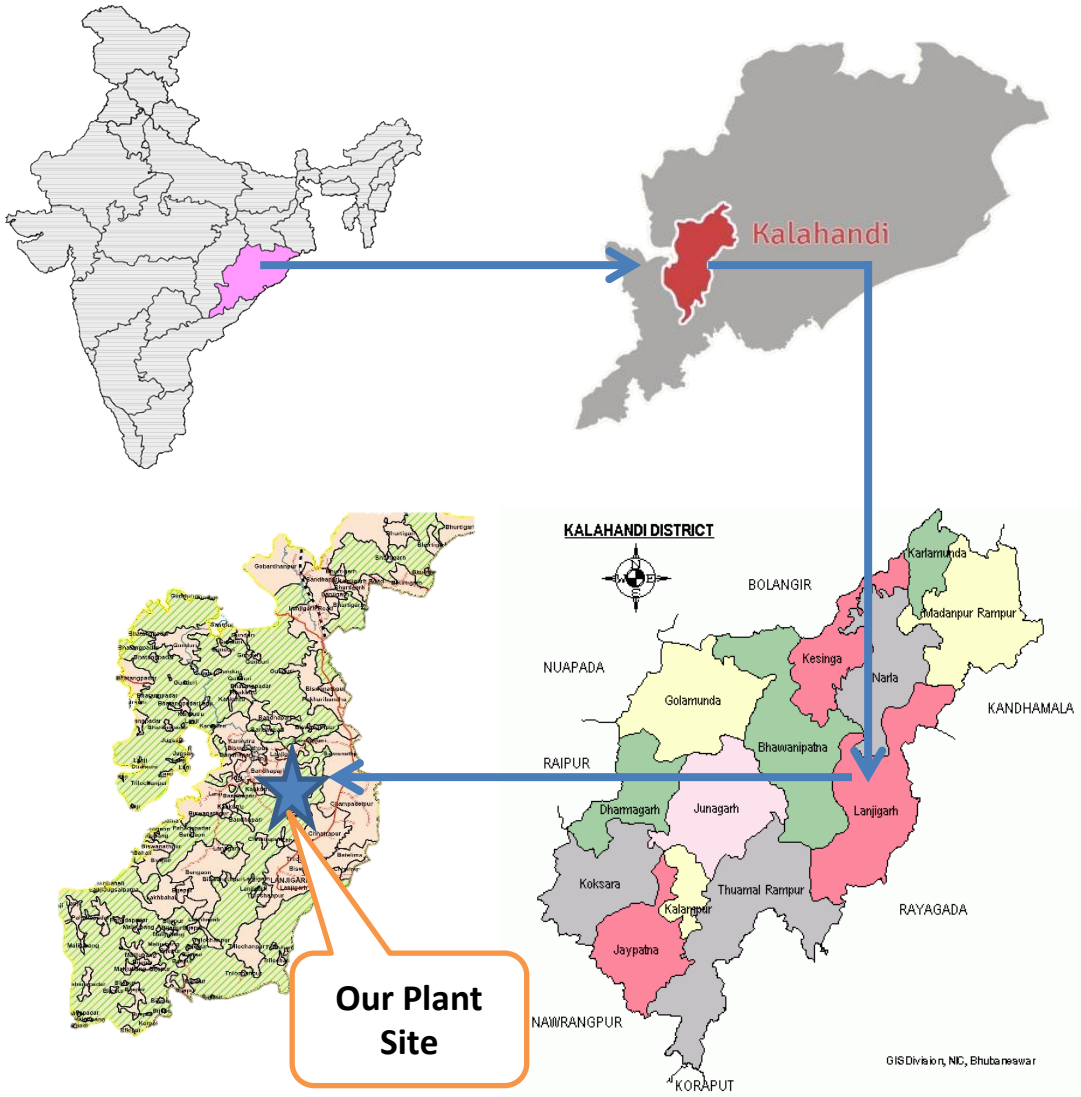
LOCATION MAP & PLANT PROFILE

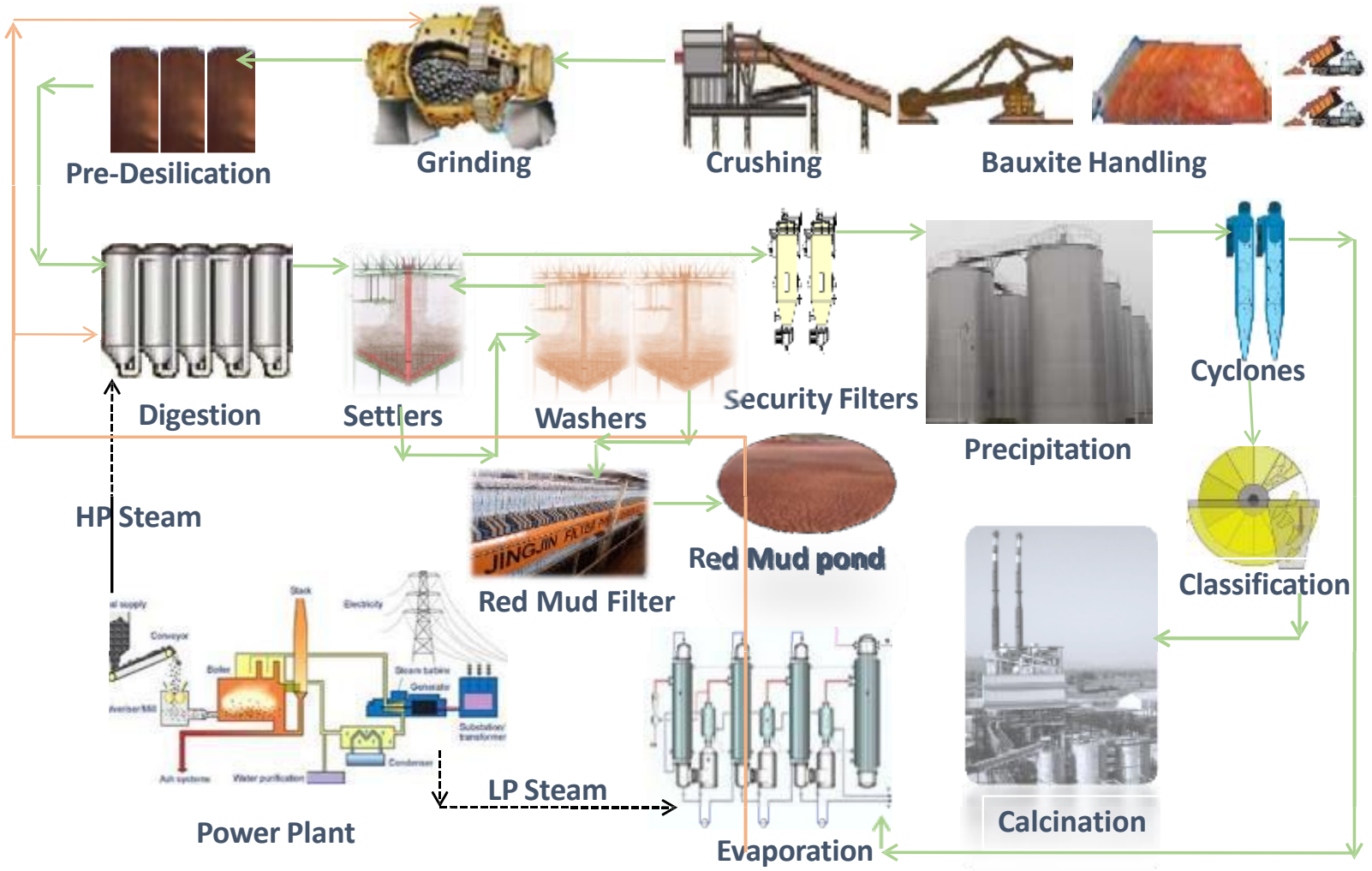
- ✓ 2 MMTPA Alumina production with 90 MW CGPP
- ✓ Expansion is expected : 2 to 6 MMTPA
- ✓ 32 Km long railway line
- ✓ 65 Km water pipeline
- ✓ Dry red mud disposal using press filter

An ISO 9001, 14001 & OHSAS 18001 Certified Company

The 1st organization to be certified as By ISO 50001



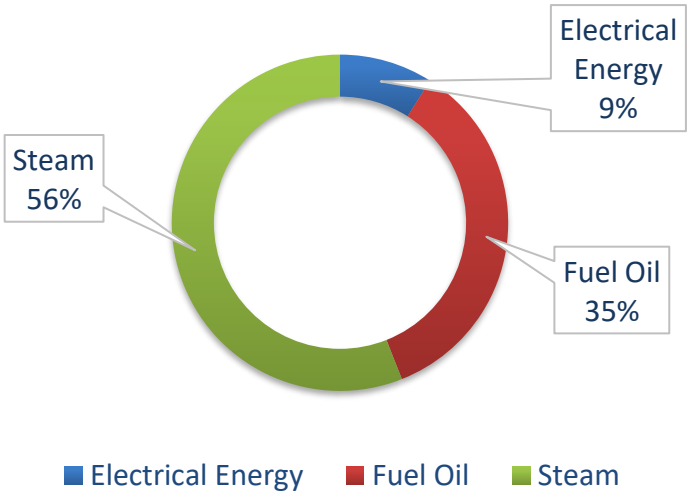
ALUMINA MANUFACTURING PROCESS

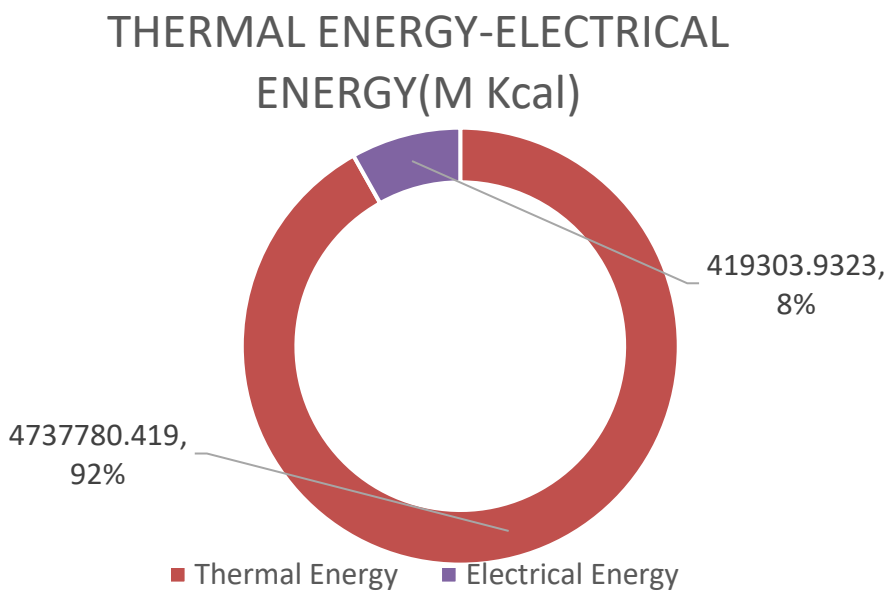


ENERGY CONSUMPTION TREND (FY19-FY21)

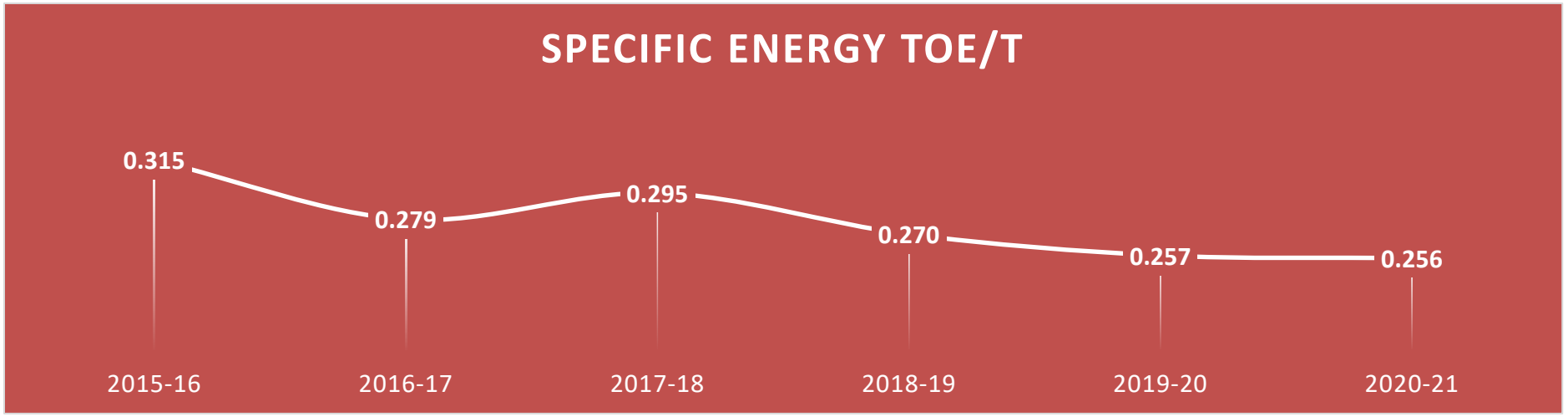
	Hy. Prod.	Alumina prod.	power (KWH/T)	Steam (T/T)	FO (Kg/T)	Total Energy (GJ/T)	Total Energy (TOE/T)
FY 18-19	*1524215*	*1500671*	*235*	*1.85*	*71.3*	*7.53*	*0.27*
FY 19-20	*1825325*	*1810702*	*216.75*	*1.73*	*70.59*	*7.27*	*0.2572*
FY 20-21	**1847778**	**1840893**	**215.66**	**1.72**	**71.13**	**7.25**	**0.2556**

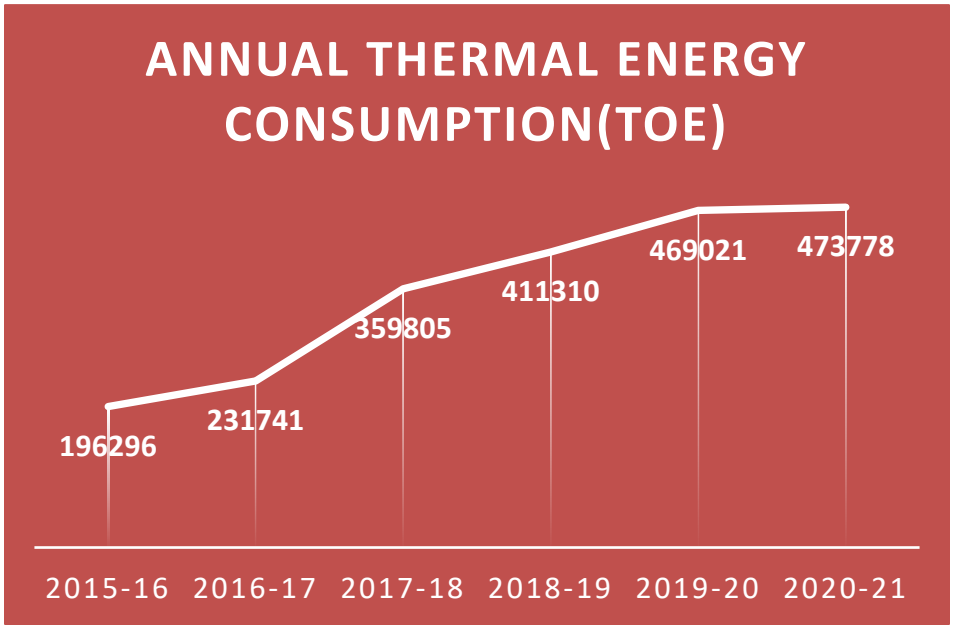
ENERGY BREAKUP-ALUMINA

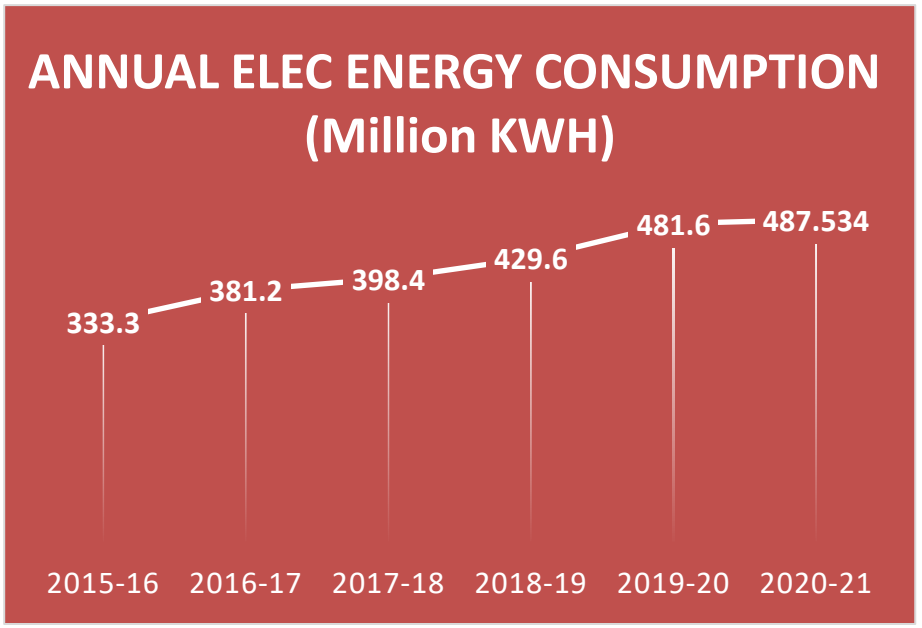




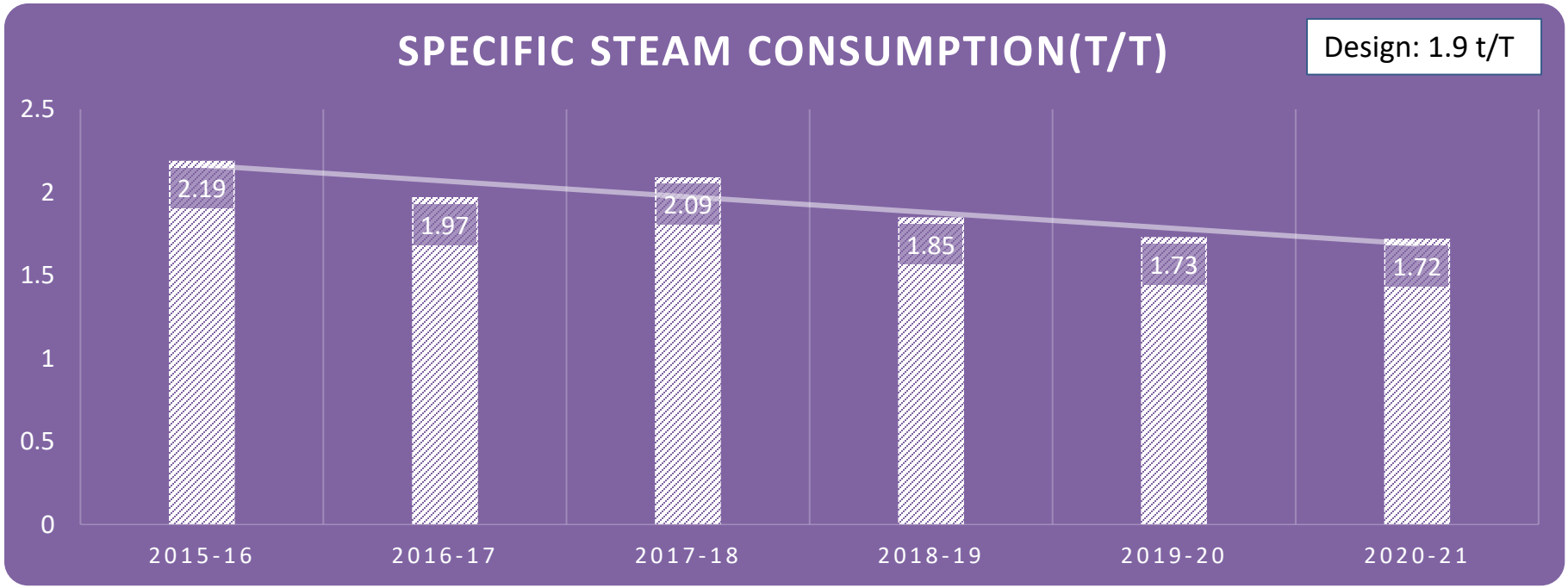
ENERGY CONSUMPTION- Trend







SPECIFIC STEAM CONSUMPTION

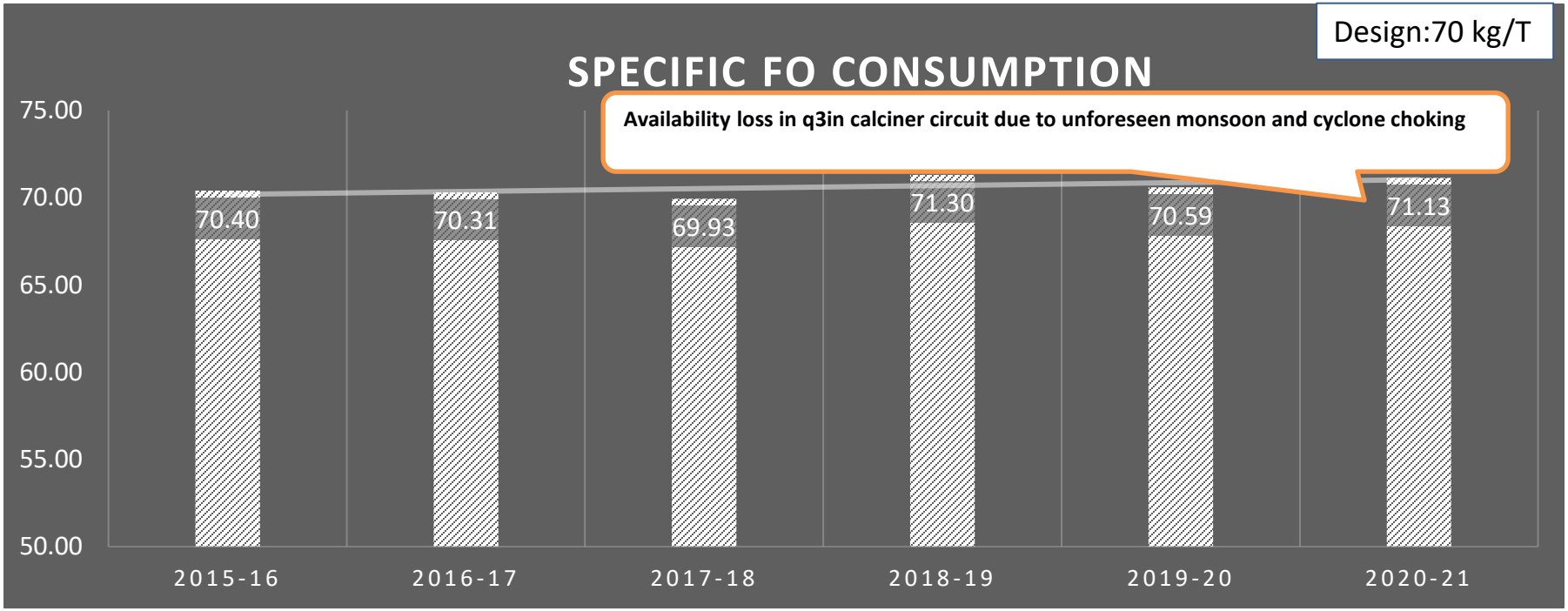


- Use of high-pressure water jet cleaning of evaporation and digester vessel
- Implementation of APC (Automatic process control) in Evaporation to improve steam economy
- Reduction in unwanted dilution
- Adherence to Acid shooting schedule of cal-1,2,3,4
- Adherence to CCL & condensate wash schedule

- Development of fixed schedule for cleaning of evaporation
- Implementation of APC in Digestion units
- Implementation of acid cleaning provision in both evaporation and digestion unit.
- Re insulation of pipes and tanks
- Enhancement of Vacuum system in digestion unit
- Scheduled Cleaning of Hotwell
- Replacement of cal-1,2 distribution plates

- Better capacity utilization
- Improvement in net liq.prod. by 5% wrt to FY'21.
- Re-insulation of tanks and pipelines
- Improvement in steam economy from 3.35 to 3.8 T/T
- Hydro jetting of cal-2 tubes
- Provision of direct CCL line for cal-4,5,6
- MaxHT dosing

SPECIFIC FO CONSUMPTION

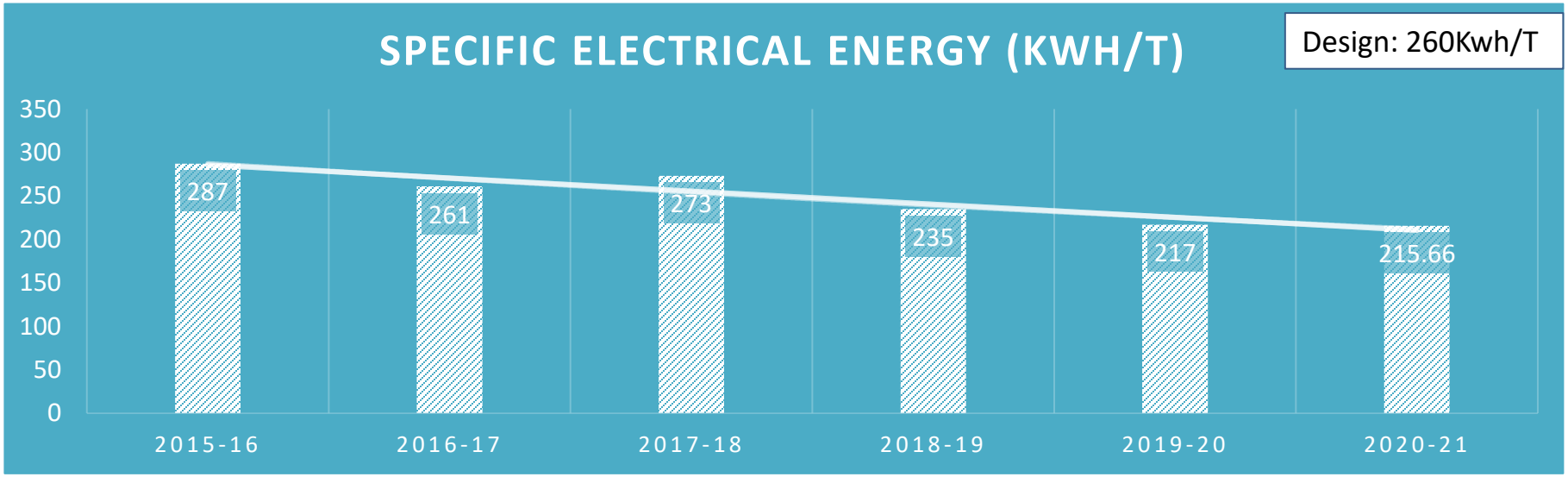


- Calciner main burner nozzle replacement
- De bottlenecking of both Calciner to enhance capacity from 2500TPD to 3000TPD
- HT VFD for Calciner ID fan speed control there by optimizing Calciner operation
- Increase of both calciner atomizing air in burner nozzles(increase up to 6.5m3/hr in each nozzle) for proper atomization in burner

- Use of dewatering aid to reduce moisture in hydrate, thereby decreasing FO consumption
- Replacement of refractory of calciner-1 to avoid heat loss
- Re-insulation of ducts and pipelines
- Thermography to identify heat loss
- Stepwise reduction of P04 temp and operating it in range of min 30C
- GCV and moisture analysis of fuel (>10150 Kcal/kg)

- >95% operation in APC optimization for better optimization of calciner parameters
- A/F ratio to be maintained (12.2-12.5)
- Adjustment of P01 flap gate for both calciner for PO3 temp maintenance (50-60 C difference))

SPECIFIC ELECTRICAL CONSUMPTION

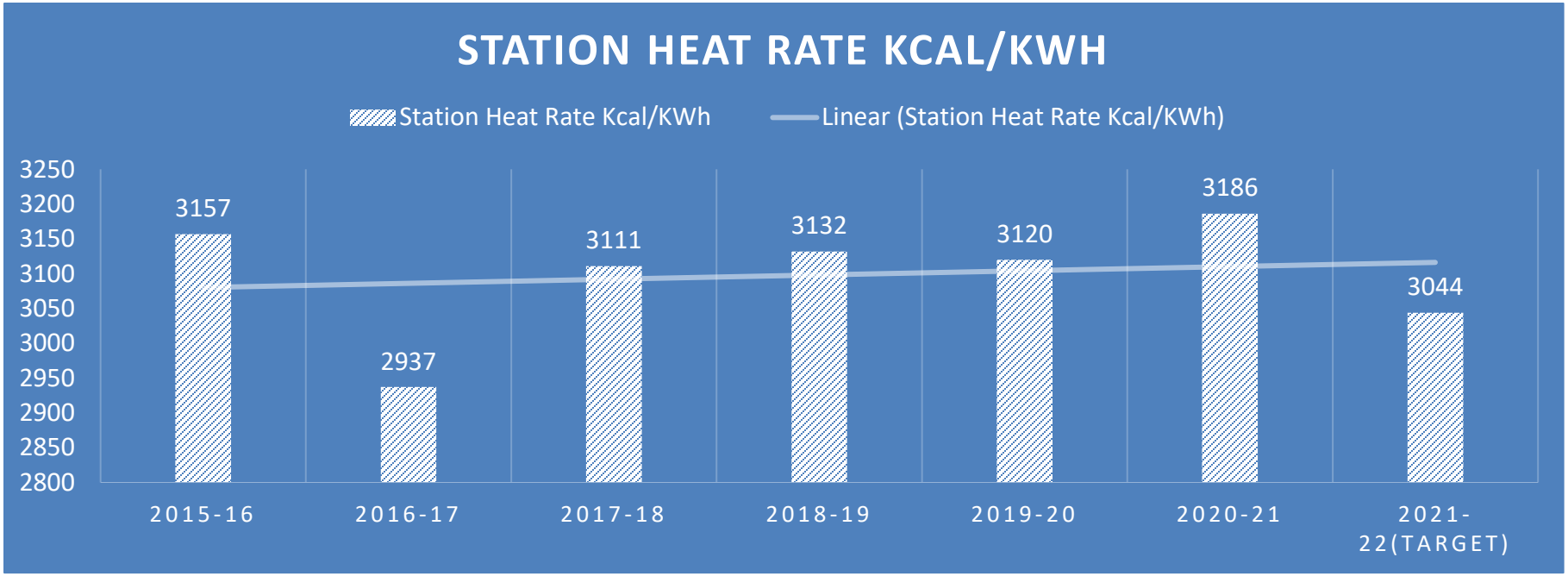


- Conversion of ID fan motor from DOL to VFD
- Pulley modification in mill liquor pump
- Delta to star conversion in light loaded motors
- VFD for condensate, PDS recirculation pump motor
- Direct line from wash water tank to washer 4 and 5
- Ball mill throughput improvement in Mill 1 and 2 from 220TPH to 250 TPH
- Two coal mill operation instead of design 3 coal mill operation

- HT and LT capacitor bank installation in substations and switchgears to improve PF from 0.85 to 0.92
- Coal mill vane wheel assembly modification in CGPP (2 Nos)
- Energy Optimization by downsizing HAL MP Blower in calcine
- Replacement of 5 Numbers ISC in PPT thereby improving liquor productivity
- LED lighting for offices and substations
- Roof Top Solar Power plant for plant and colony (280Kwp)

- Replacement of 3 no's 500KW motor by energy efficient motor
- 100KWp roof Solar power plant
- Capacity utilization
- Cooling tower fan modification in CGPP (2 Nos)
- Installation of 250KW screw compressor
- pulley modification in 45PU 2001/2001A in secondary feed pump
- 6000 LED lights

REDUCTION IN SHR

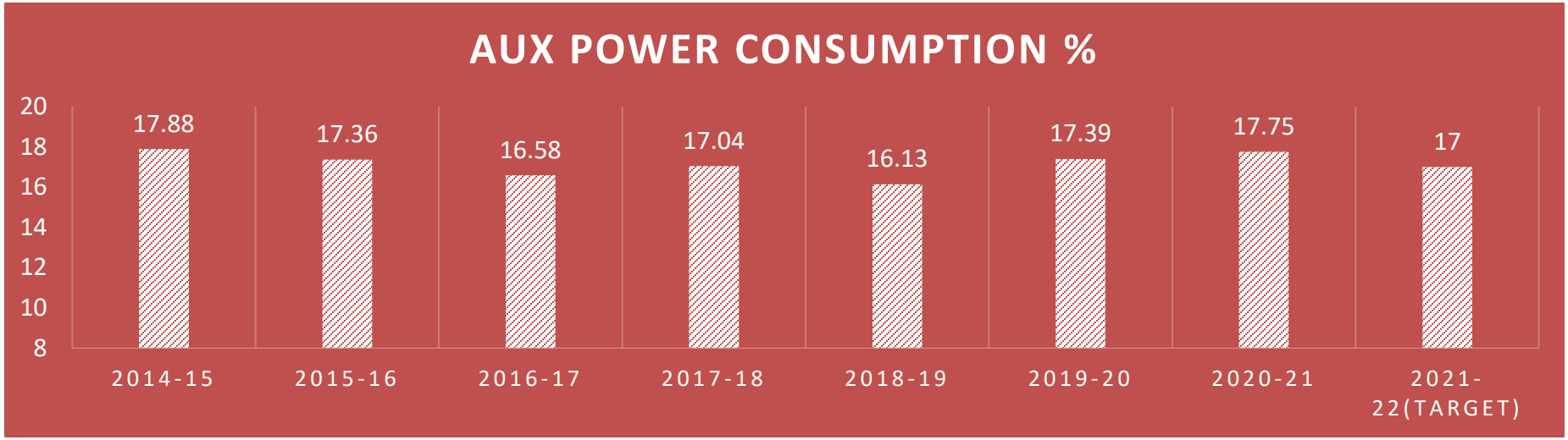


- Minimized outages by installing grid islanding scheme, isolation transformer, load shedding scheme, study & relay coordination
- Turbine AOP auto start logic modification
- Maintaining make up tank temp. during low RC flow by charging aux steam
- Maintaining feed water temp just above the design temp results in increase in boiler efficiency

- Optimization operation of compressed air.
- Installation of generator rotor in Turbine#3 to increase the efficiency
- Replacement of Junior Economizer coil resulting reduction in flue gas temp.
- Increase in Coal Mill outlet temp. from 50 deg C to 65 deg C
- Turbine #1 performance improved by replacing MP & LP guide blades
- Fine tuning of boiler combustion with high Imported coal mix

- Improvement in vacuum from -0.73 kpa to -0.85 kpa
- Combustion optimization and reduction in unburnt carbon
- Fine tuning of governing system in all the turbines
- Maximization Turbine loading from 21 MW to 27MW
- Improvement in Return condensate

REDUCTION IN APC

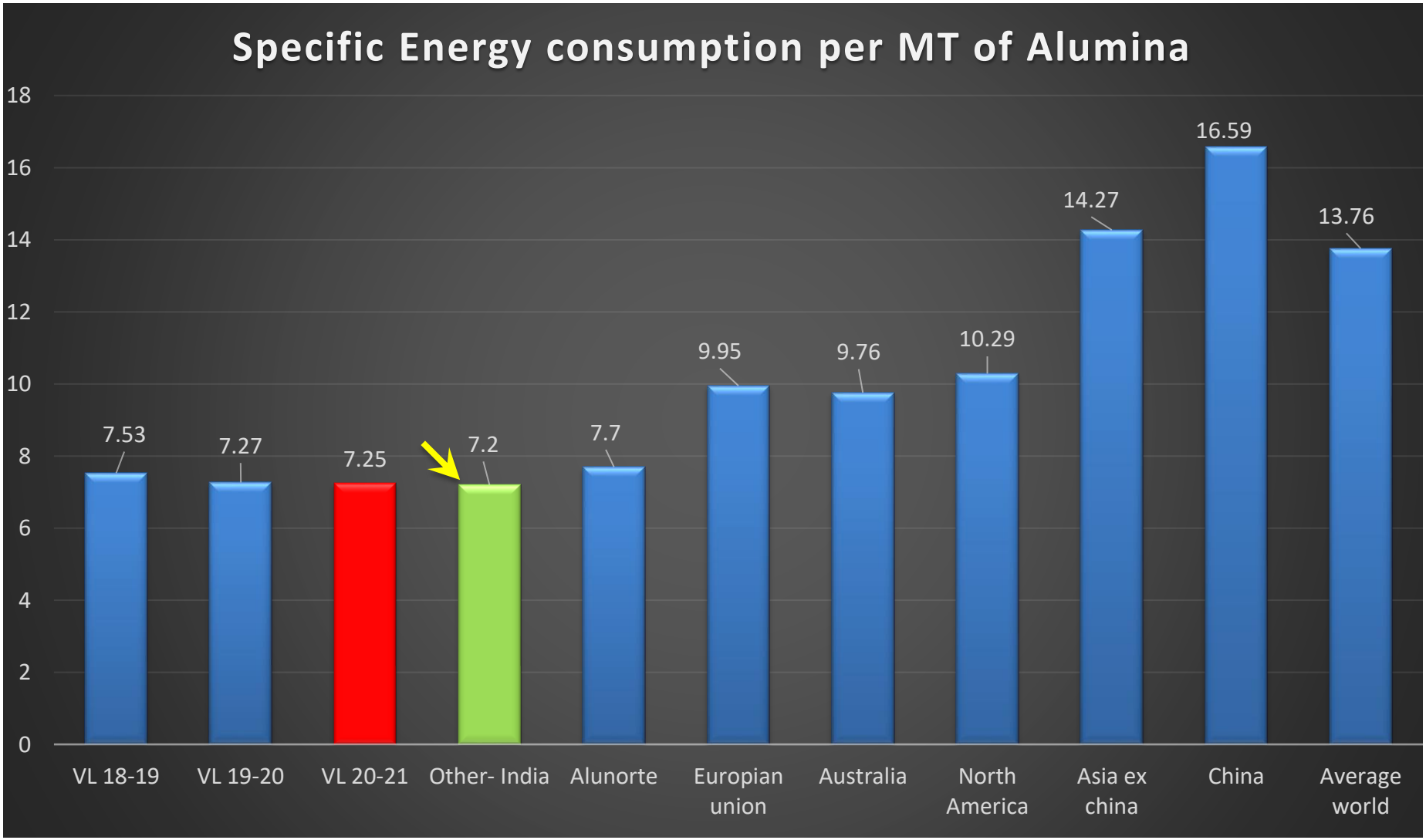


- Cooling Tower Refurbishment
- Replacement of fixed drives with VFDs
- Installation of capacitor banks to improve Power Factor
- Reducing feed water pressure drop across the FRS
- Installation of low head Industrial cooling water pump
- Increasing in belt utilization factor

- Optimization in operation of two coal mill instead of design of three coal mill
- ESP hopper heater through EPIC3 control system
- Improvement in generator power factor from 0.80 to 0.87
- Internal modification of coal mill in the Boiler through in-house.
- Single CW pump operation

- Installation of LED lights
- Installation of solar power at township
- Replacement of recirculation and de-superheating valve in BFP
- Installation of new blade hub assembly to reduce the power consumption CT fan
- Anticorrosive coating in the CW pump impeller and casing internal

PERFORMANCE BENCHMARKING



Data: CRU, 'SEC based on bayer circuit and calcination only

PERFORMANCE BENCHMARKING

vedanta
transforming elements

BENCHMARKING WITH UTKAL ALUMINA REFINERY FOR FY20				
Particulars	UOM	Lanjigarh	Utkal	Remarks
		FY20 YTD		
Production:				
Hydrate Production	KT	1825	1675	Month's best achieved & Annual production figs are higher for Lanj than Utkal
Calcined Alumina	KT	1811	1693	
Specific Consumption:				
Bauxite	T/T	2.92	3.18	Higher THA in Lanj Feed bauxite due to Import mix
Caustic	kg/T	68	51	YTD Comp: With Utkal's THA of 37% & RS of 1.76%, Lanj soda loss specific consumption would be 63 kg/T as against Lanj actuals of 68 kg/T (5kg/T of loss) Design Difference wrt To Utkal : Higher Solids profile at Clarification unit of Utkal at ~1100 gpl as gainst Lanj's 800 gpl However, 2 kg/T gap closure plan in process soda loss has been considered in BP FY21 (from YTD of 13.2 kg/T to 11.2 kg/T in FY21 with 3rd Evaporation & DBNK SW operational benefits
Steam	T/T	1.73	1.77	Month's best achieved & YTD Specific consumption for Steam is lower for Lanjigarh than Utkal
Energy	kWh/T	217	173	Design Difference: Utkal precip circuit designed at higher yield of 90 gpl wrt Lanjigarh, Lanj best achieved at 85 gpl and YTD at 81 gpl in FY20 ; Higher TOC in EGA bauxite leading to productivity loss upto 5 gpl However, YTD of 210 kwh/T has been considered in BP FY21 (Improvement by 7 kWh/T)
Fuel Oil	kg/T	70.6	69.9	CLO usage at Lanjigarh having lower GCV as compared to conventional FO(CLO having overall cost benefits wrt to reduced price as compared to FO) Higher fines due to EGA bauxite charge at Lanjigarh leading to high moisture in hydrate & hence high FO consumption
Efficiency:				
Alumina Recovery	%	93.2%	94.5%	Utkal has higher recovery by 1.3% due to 1) Single source feed bauxite as against Lanj at 3-4 mix source of bauxite 2) MHA in feed bauxite <1% as against Lanj at 2-2.5% (RTA had MHA to the range of 4-5% as well which was fed in the month of Nov & Dec'19) 3) Higher G/H ratio in EGA bauxite leading to reversion losses 4) BOP RP is maintained at 1.250 in Utkal as against Lanj at 1.295 (potential production increase in Lanj at the cost of recovery)
Net liquor Productivity	gpl	81	90	Design Difference: Utkal precip circuit designed at higher yield of 90 gpl wrt Lanjigarh, Lanj best achieved at 85 gpl and YTD at 81 gpl in FY20 Higher TOC in EGA bauxite leading to productivity loss upto 5 gpl
Digestion productivity	gpl	105	131	
Bauxite Quality:				
THA	%	40.2%	37.0%	Single Source OMC bauxite for Utkal
RS	%	2.15%	1.76%	Single Source OMC bauxite for Utkal

ROAD MAP TOWARDS BENCHMARK

- ✓ Improvement in precipitation productivity to minimize specific energy consumption >10%
- ✓ Further Improving evaporation rate and calciner energy
- ✓ Alternative energy source like use of LPG instead of FO and coal.
- ✓ Reducing total energy consumption through improved methods of calcination, cogeneration and process improvements
- ✓ Achieve substantial energy efficiency gains by introducing APC and digitization
- ✓ Optimizing the efficiency of the overall process and capacity utilization
- ✓ Proposal of installation of 20MW solar power plant.
- ✓ Implementation of zero waste projects to minimize global GHG emissions

ENCON PROJECTS OF LAST 3 YEARS

Year	No of Proposals	Investments(Cr)	Savings(Cr)
2018-19	3	1.95	11
2019-20	7	1.16	10
2020-21	5	1.46	0.8

Sl.No	Title of Project	Year	Total Annual Savings (Rs million)	Investment Made (Rs million)	Payback (Months)
1	Replacement of 2000Nos LED lights at refinery	2020-2021	1.03	3.2	36
2	Revival of faulty steam traps across Alumina Refinery	2020-2021	5	0.7	2
3	Reduction of steam per MW generation	2020-2021	1.8	10	55
4	Running Optimization of Make Up Pump	2020-2021	0.094	0	0
5	240 nos of Highway LED fixtures in place of low efficiency bulb	2020-2021	0.147	0.7	57
Total FY20-21			**8.071**	**14.6**	**150**

ENCON PROJECTS OF LAST 3 YEARS

Sl.No	Title of Project	Year	Total Annual Savings (Rs million)	Investment Made (Rs million)	Payback (Months)
1	Installation of 100 Kwp Solar panel at admin buildings	2019-2020	0.5	4.0	96
2	Break Even point attainment by replacement of oversized pumps in White area	2019-2020	7.7	0	0
3	Running combination of Pump 1 & 2 at lanjigarh pump house station	2019-2020	0.159	0	0
4	VFD conversion of MOL pump _ 62_pu2004	2019-2020	0.23	0.5	26
5	VFD conversion of Lime transfer Pump_ 62_pu1004	2019-2020	0.23	0.5	26
6	VFD conversion of DW pump 73_pu008	2019-2020	0.368	0.6	19
7	LED lights for office and substation	2019-2020	3.0	6.0	16
Total			**9.671**	**11.6**	**183**

Sl.No	Title of Project	Year	Total Annual Savings (Rs million)	Investment Made (Rs million)	Payback (Months)
1	Replacement of recirculation valve in BFP	2018-2019	9.4	0	0
2	LED lighting for office	2018-2019	0.52	1.4	32.31
3	Energy Optimization by downsizing HAL MP Blower	2018-2019	1.11	0.546	5.9
	Total 2018-2019		**11.03**	**1.946**	**38.21**

INNOVATIVE PROJECT-1

PROJECT TITLE :

Reduction in Specific Fuel Consumption by using Emulsified Fuel Oil

Background

Key Issues

- ***Poor Combustion leads to wastage of energy and increase in emissions.*** : Furnaces, Boilers, Marine Engines and Power Generators operate on low efficiency (40-75%) and high emissions of Particulate Matter, SOx and NOx.

Solutions

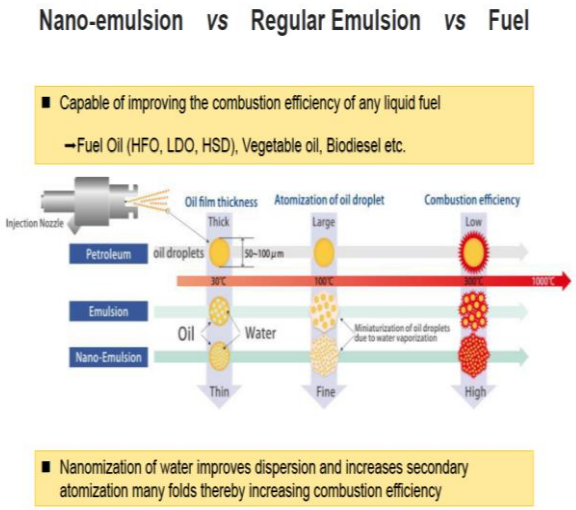
- Nano-size water droplets are dispersed uniformly in the liquid fuel by Japanese Nano-technology. Before the oil can reach its burning temperature of over 500 deg C, millions of nano-size water droplets in each oil drop explode resulting in thousands of small oil drops in much finer vapor thus approaching gas like combustion behavior.

- By reducing the oil droplet size in the combustion zone, burning efficiency of liquid Fuel can be improved and consumption can be reduced anywhere between 7-20% (cost savings). Particulate Matter reduces by upto 80%, NOx by 40%-80% and SOx by over 15% (emission savings).

INNOVATIVE PROJECT-1

Nano-Emulsification:

In order to make liquid fuel vapour behave more like gas, water-in-oil Nano-emulsions undergo a secondary process of atomization after the initial atomization by the burner in furnaces or boilers or even IC Engines. This Secondary process makes the oil droplets incredibly small and their combustibility approaches that of gases thus improving burning efficiency and reducing emissions at the same time. This improves the combustion efficiency as well as reduction in emission.



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Nano Emulsiflier NEFS 300

NEFS300 / NEFS1000 Fuel Oil Emulsifier

The NEFS is a nano-technology based emulsifying machine with a capacity variants of 300 litres per hour & 1000 litres per hour.

Emulsified Fuel Oil (EFO) comprises liquid fuel with a customizable quantity of water and additives. However, **additives are not required** in our process for emulsifying Residual Oil (HFO, FO, Bunker, LSHS). For distillate oils only, 0.3% additive may be needed.

EFO may contain between 10~30% of uniformly dispersed water in liquid fuel. The **diameter of water droplets is controlled between 100~500 nm** (0.0001~0.0005 mm).

Use of EFO provides a **significant improvement in combustion efficiency.** This is achieved by exploding water droplets embedded inside each oil drop and thus vastly increasing surface are of oil available for burning. This process is called secondary atomization.

The nano-emulsions produced by NEFS Emulsifiers result **in significant fuel savings as well as the reduction of PM, NOx and SOx.**

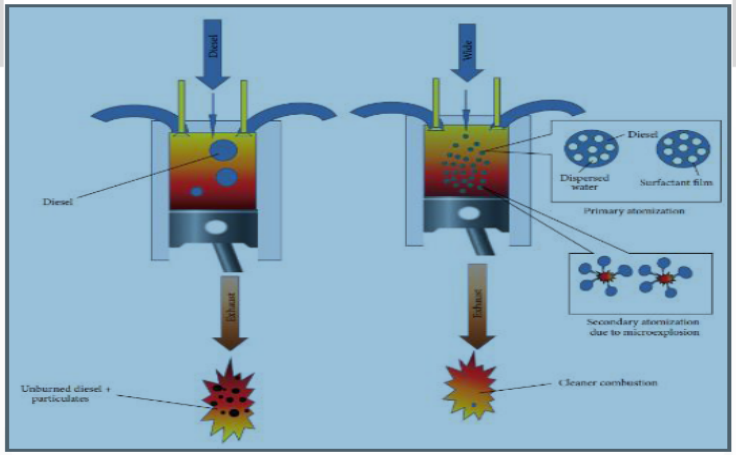
How an Emulsion works

1 Transfer of Heat

Heat is transferred to the surface of the fuel droplets by convection and radiation.

2 Different Evaporation Rates

Since water and oil have different boiling temperatures, the evaporation rates of these two liquids will be different.



In a Water in Oil (W/O) emulsion, water remains embedded inside the fuel droplets.

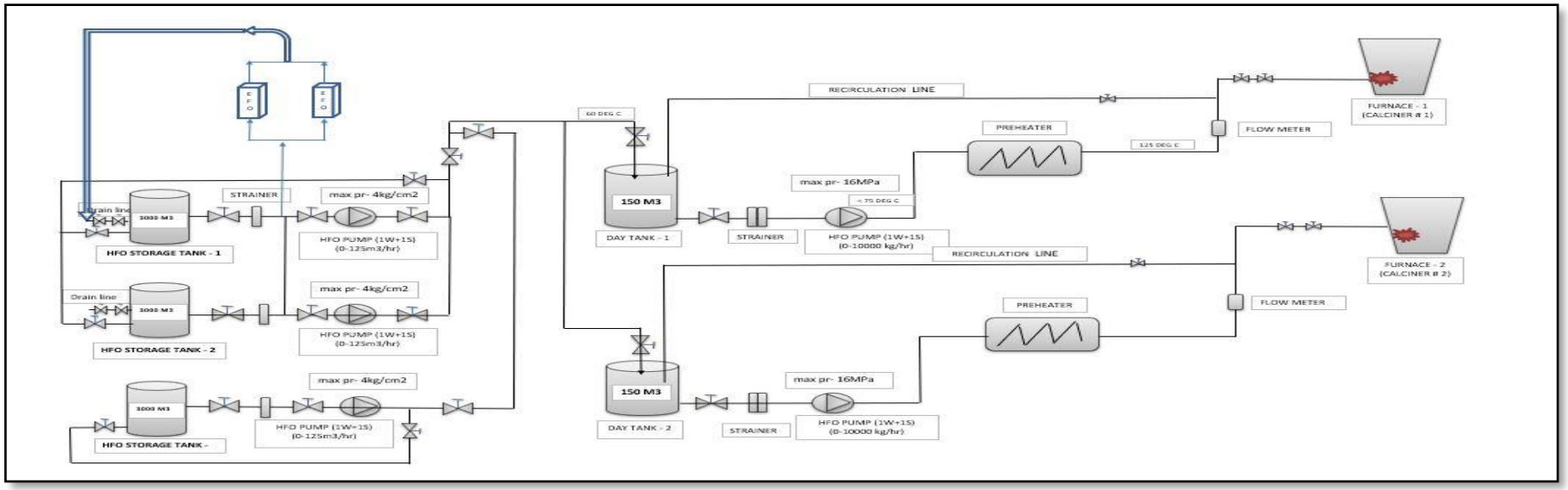
3 Water Molecule Explosions

As a result, the water molecules reach their superheated stage faster than the oil causing them to explode getting torn up into very fine particles.

4 Improved Combustion

Smaller oil particles burn completely resulting in more thermal energy being released and a reduced need for excess combustion air

INNOVATIVE PROJECT-1



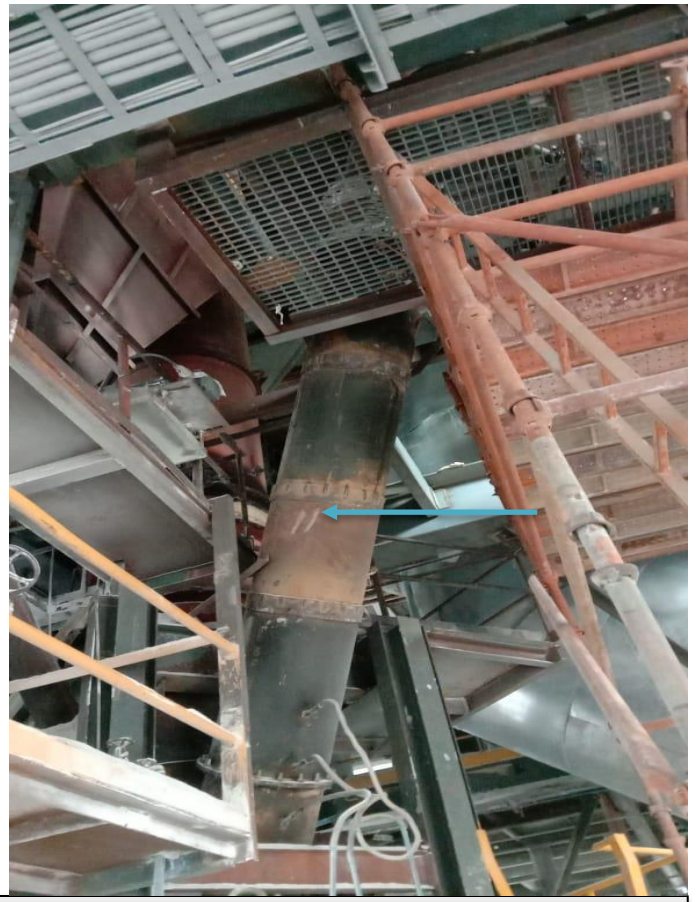
HFO layout after EFO connection

Results

1. 7-10% Reduction of specific FO consumption
2. 0.5$/T of calcined alumina
3. Reduction of carbon footprint
4. Improvement of Burning efficiency of calciner

ADOPTION OF TECHNOLOGY-1

- Modification of down comer pipeline (increment of ID from 348mm to 398 mm)
- Frequent blockage of Co1 above feed rate 198 TPH due to low cross-sectional area because of air flow blockage in fluidization points at C01 down comer resulting in blockage with alumina
- Production enhancement from 2600T to 2900 T for both Calciner Train 1 with overall production increment to 5900T from 5600T
- Capacity enhancement



MODIFICATION OF CO1 DOWNCOMER PIPELINE

ADOPTION OF TECHNOLOGY-2

- Performance Rate(Before implementation):

Vacuum < 0.75 bar

Specific steam consumption is 8.10 T/MW

Performance (After implementation Vacuum increased 0.85 bar

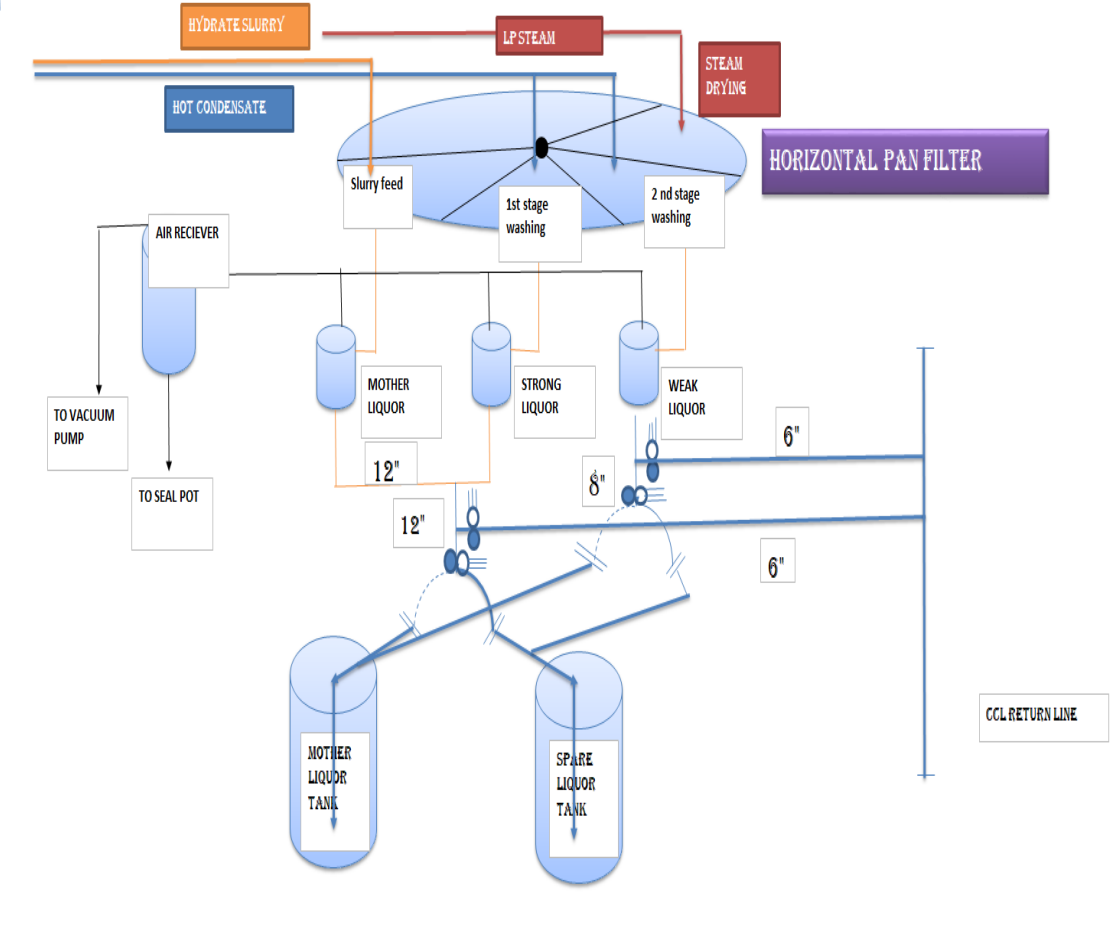
Reduction of steam consumption by 0.10 T/MW

- Benefits :
- Improved Turbine throughput & Vacuum
- Specific steam consumption
- Cost saving towards reduction in steam charging from PRDS @20 TPH – 2.00 crs per annum
- Cost saving towards reduction in Power Import from WESCO@ 50 Mwh per month – 0.70 crs per annum

CHEMICAL CLEANING (SULPHAMIC ACID)OF CONDENSER TUBES CLEANING FOLLOWED WITH HYDROJETTING

ADOPTION OF TECHNOLOGY-3

- Chemical cleaning of Pan Filter by introduction of online blind system
- Non availability of Periodical chemical cleaning in Pan filters as CCL of filters can only be possible during calciner shutdown leading to deteriorations of pan filter performance resulting higher moisture and L soda in product hydrate , increasing sp. FO consumption
- Installation of Quick Blind
- Moisture Reduction oof PAN filter from 6.3% to 5.5%
- Reduction of specific FO consumption by 0.2Kg/T



QUICK BLIND FOR PAN FILTER SYSTEM

ADOPTION OF TECHNOLOGY-4

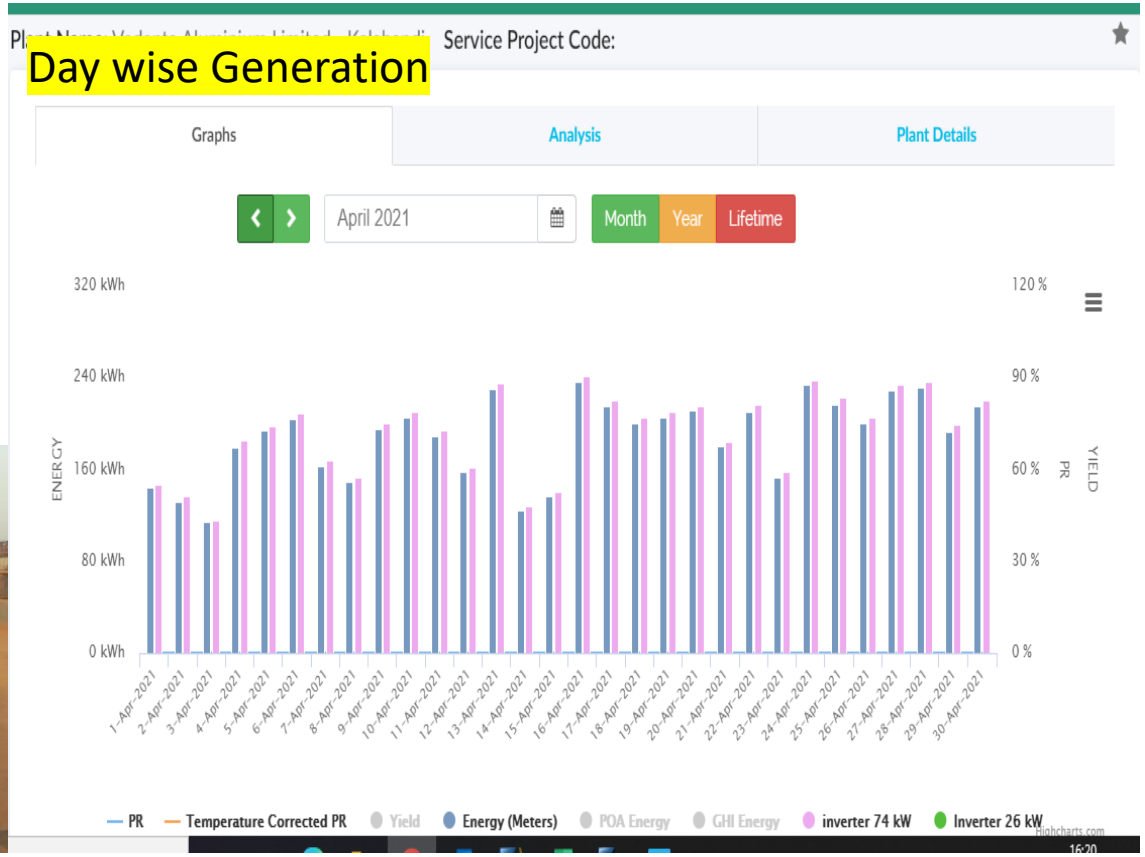
- Installation & commissioning of 4 no. of new higher efficiency Inter-stage coolers
- 43-HX-1006/2004/2005/2006
- Improved process control of input & in process variables
- Reduction in specific energy consumption by approximately 2 KWh/T through reduction in recirculation load
- Reduction in specific steam consumption by around 0.02 T/T through reduction in recirculation liquor flow in Digestion
- Reduction of specific FO consumption by 0.1Kg/T

REPLACEMNT OF 4 NO. OF ISC IN PPT CIRCUIT

USE OF RENEWABLE ENERGY

Solar Power Station in Adm. Bldg.

Solar Power Station in HR Bldg.

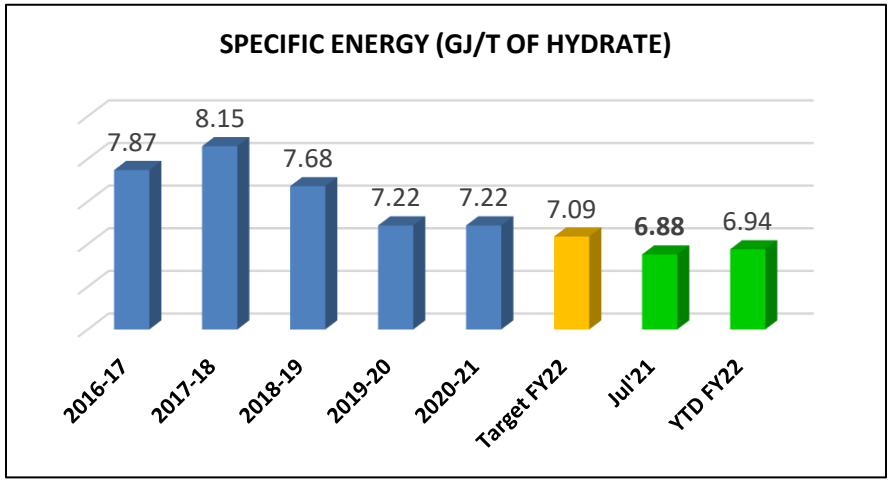


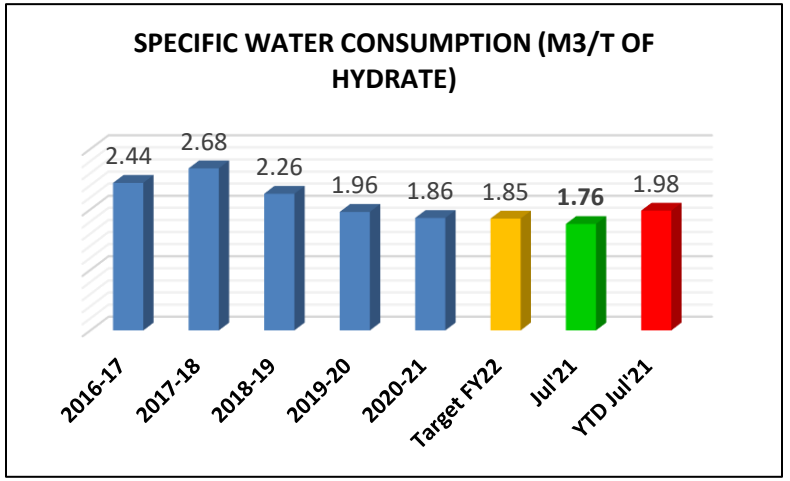
Technology	Type of Energy	Onsite/Offsite	Installed Capacity (MW)	Generation 2018-19 (million kWh)	Generation 2019-20 (million kWh)	Generation 2020-21 (million kWh)	% of overall Electrical Energy
Photovoltaic (P'	Eelctrical	Onsite	0.38	0.34014467	0.4409018	0.409513	0.08

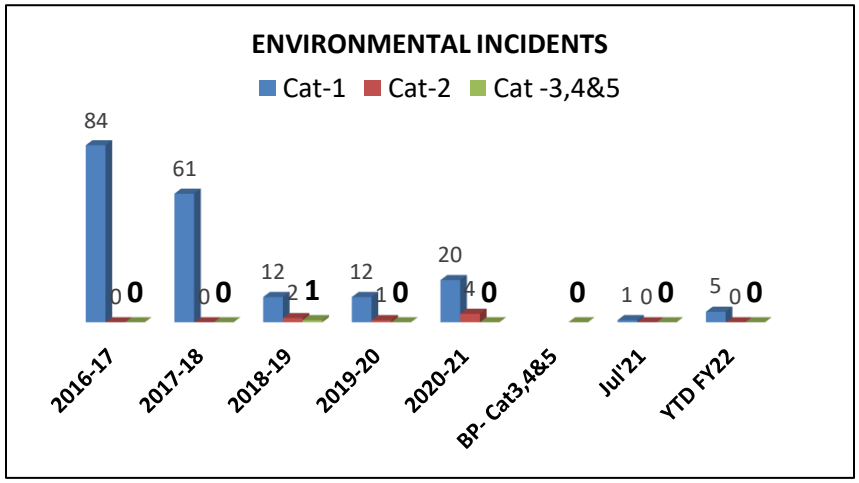
UTILISATION OF WASTE

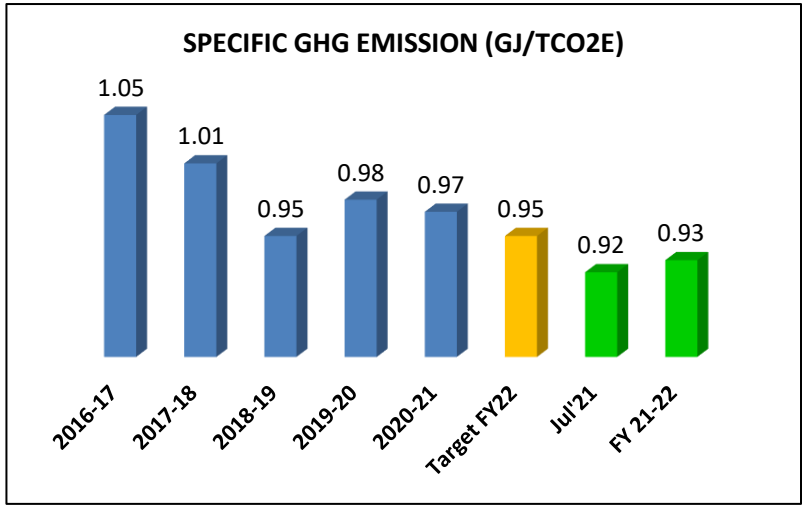
- **Dry disposal of Red mud** into the BRDA by filtration of high conc. Slurry into the **RMF** & thereby recovery of caustic soda
- Recovery of **vanadium sludge** and sale to authorized recycler.
- **100% Fly ash utilization** in road making, brick manufacturing, land filling, dyke strengthening etc.
- Utilization of **Red mud by sending to cement industry** .
- Utilization of **Red mud in Gabion wall** for enhancing the storage life of BRDA.
- Utilization of Red mud in installation of wick drain for enhancing the storage life of BRDA.
- Sale of **Lime grit** to brick making units.
- Processing of food waste in **Biogas Plant** to produce cooking gas
- Utilization of Bio compost from Sewage treatment plant in Horticulture & gardening.
- Utilization of bio Compost of garden wastes
- Disposal of E-waste, Used Batteries, Used Oil to authorized recycler.
- **Spent resin** is incinerated in the Boiler furnace along with coal
- All plastic, wooden, rubber ,metal scraps segregated from the source & being sold to recyclers.

GHG INVENTORISATION









AIR QUALITYCONTROL & MONITORING SYSTEMS

Water sprinklers at bauxite handling

Dry fog system at bauxite handling

Water sprinklers at Coal handling

Continuous Ambient Air Quality Monitoring Station (CAAQMS)

CEMS at Power Plant

CEMS at Calciner

AIR QUALITY MANAGEMENT

Dust suppression system	• Fly ash Disposal through HCSD (High Con. Slurry Disposal) to Ash Pond • Covered conveyers for Bauxite & Coal & pipe conveyer for Alumina • Dry fog system at transfer points of Bauxite Handling Area and Coal Handling Plant • Water Sprinkling by using rain gun, mist canon, water tanker at Bauxite yard, Red Mud pond, Fly ash
Emission Control system	• Online ESP with bag filters at CPP to achieve PM level < 50mg/Nm3 • Online ESP at Calciner stacks • Online Wet Scrubbers at Lime handling Plant • Online Bag Filters on Alumina storage silo
Monitoring system	• Continuous Emission Monitoring Systems(CEMS) installed in stacks to monitor emission & real time data is getting transmitted to CPCB & SPCB. • Six nos. of CAAQMS (Continuous Ambient Air Quality Monitoring Systems) are installed in & around the site to monitor ambient air quality & real time data is transmitted to OSPCB. • Environmental air quality & Stack emission monitoring is being conducted by NABL Accredited third party approved laboratory as well

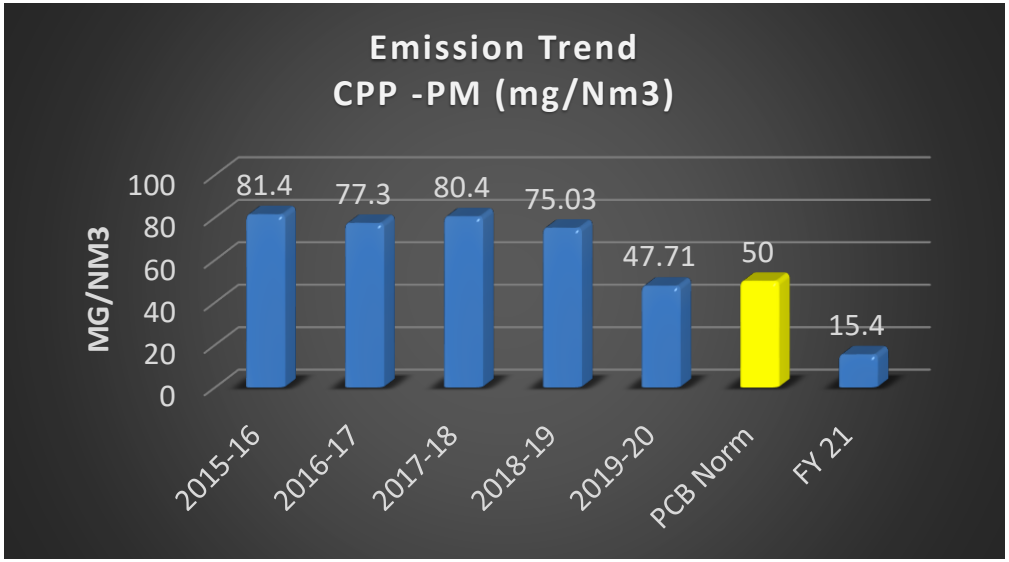
AIR QUALITY MANAGEMENT

Continuous Ambient Air Quality Monitoring Station (CAAQMS)

CEMS at Power Plant

CEMS at Calciner

Water sprinklers at bauxite handling



Bag Filter Installation completed in FY20.

WATER QUALITY MANAGEMENT

Effluent Management

- Site is Zero Liquid Discharge & Reuse of all process wastewater in system
- Reuse of Treated Sewage Water for Horticulture in Refinery & Township
- All process ponds like BRDA (RMP), PWL, Caustic pond, Storm water pond & Ash pond are used for rainwater collection & reuse.

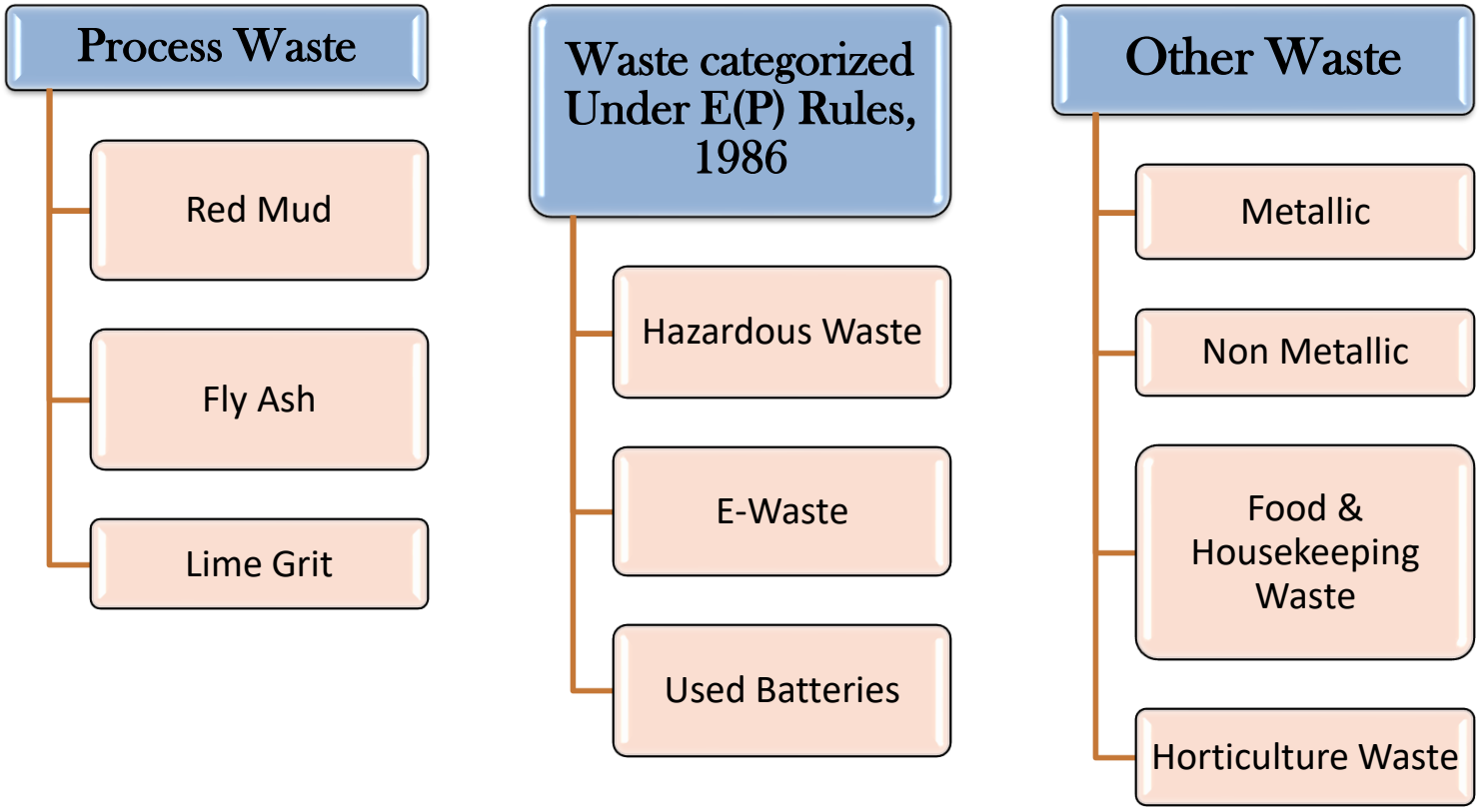
Water pollution Control

- Separate Storm Water and Caustic Drains
- Alkali resistant RCC Flooring, Steel Lined Sump pit, trenches of all process areas
- HCSD processing of red mud in Red mud filtration unit to prevent wet disposal in pond

Water Quality Monitoring

- Daily Monitoring of Surface water quality in & around refinery
- Daily monitoring & analysis of treated domestic wastewater
- Seasonal Monitoring of environmental water quality parameters of ground water, surface water in & around the refinery

Waste generated by the site is broadly divided in the following three categories and channelization of the same as per the SOP for each of the wastes-



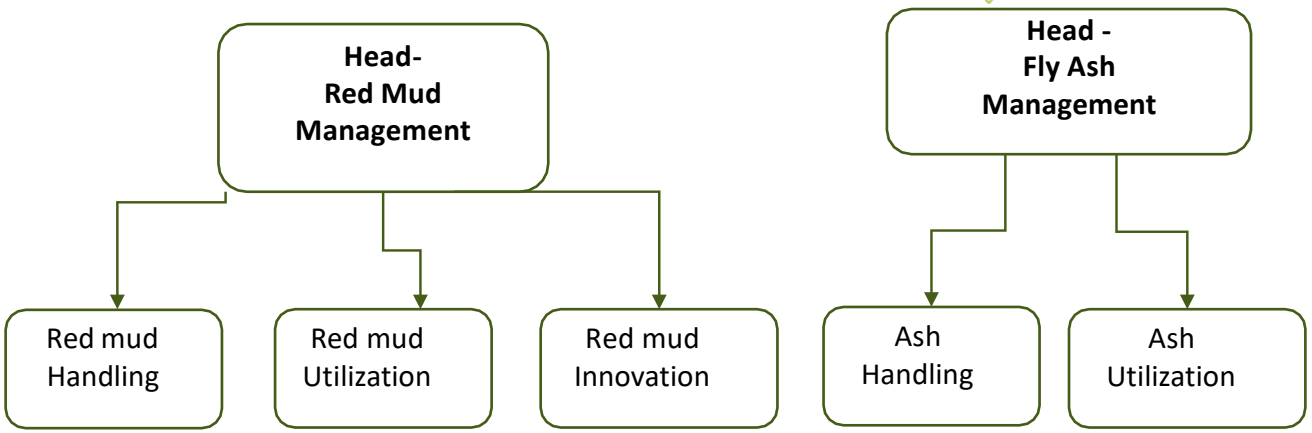
PROCESS SOLID WASTE MANAGEMENT – VLL

- Major raw materials : Bauxite, Caustic Soda and Lime
- **High volume low toxicity wastes : Red Mud, Fly Ash** & Lime Grit
- Robust Management in place for Red Mud and Fly Ash.

Red Mud- 2.5 MMT/A

Fly Ash- 3.5 Lakh T/A

Lime Grit- 12000 MT/A

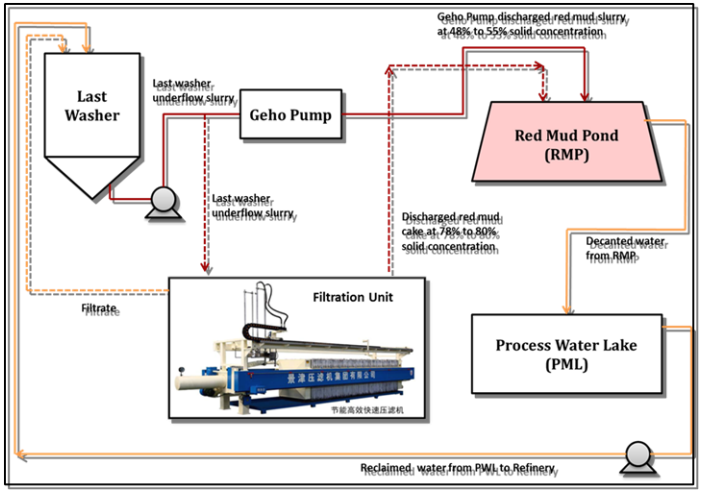


RED MUD MANAGEMENT- RED MUD FILTRATION

- Red mud is generated from the Settler unit of Bauxite Refining Process.
- Red mud in HCS form is feed into the high pressure Filter (RMF) to form Dry Red Mud cake of 20-24 % moisture.
- Dry Red mud cake is stored in the yard in stacking manner.
- **The unique project producing dry red mud through RMF has been commissioned in 2013 with fully automatic plant.**
- **First ever state of the art technology in Alumina refining industry**

Benefits :

- **There is recovery of appx. 8-10 Kg/T of caustic soda being lost in red mud slurry and thus enhance the life of red mud pond which resulted COP savings of 3-4 $/T of alumina.**
- **Reduces the land requirement for storage (Earlier storage in HCSD form)**
- **Eliminates the risk of ground water contamination (Pond bottom HDPE liner, Storm water channelization)**



Settler washer → **Geho Pump** →

Red mud Filtration unit

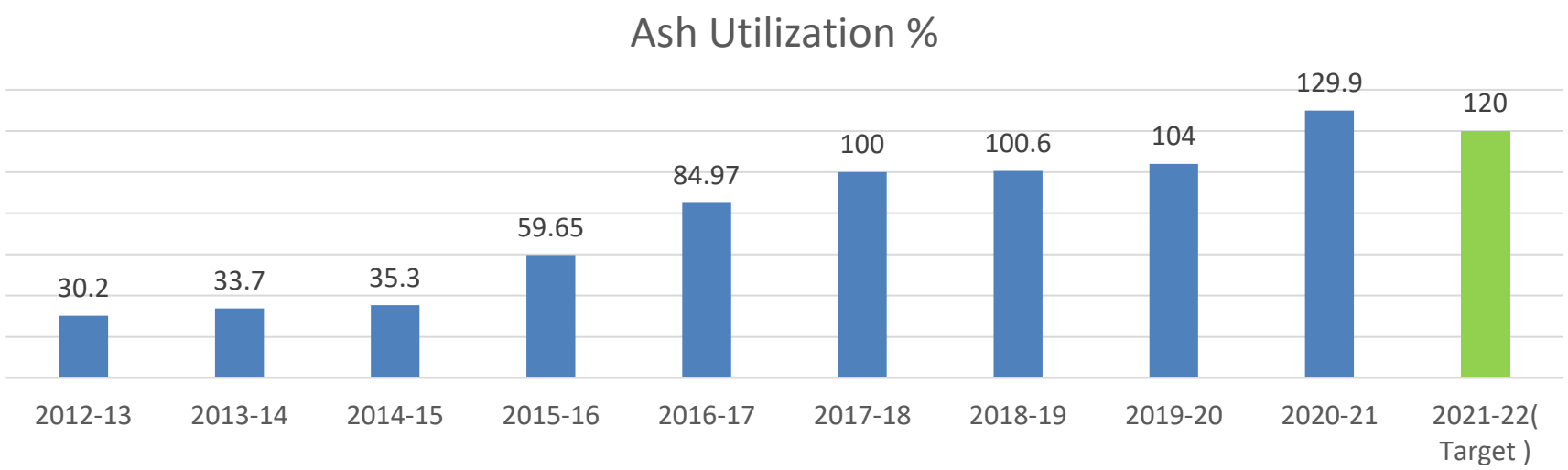
Red mud press Filter

FLY ASH MANAGEMENT

- Site is equipped with 75 MW Co-Generation Power Plant(CGPP)
- Plant generates Ash approximately 3.5 Lakh MT/Annum
- **100 % Fly ash utilization .**

- **<u>Utilisation :</u>**
  - **Given free to the brick manufacturing units in the vicinity of the plant.**
  - **108 local brick manufacturing units are developed & are partnered.**
  - **For road construction inside the plant & in near by villages**
  - **Utilized in dyke strengthening of the tailing dams like BRDA & PWL etc.**

ASH UTILIZATION TREND



- Identified local brick manufacturing vendors
- Technology transferred and demonstrated to Fly Ash bricks industries through the provision of fly ash at free of cost.
- Handholding to the manufactures for making bricks
- Identified low lying areas
- Ash utilized in road construction
- Ash utilized in dyke height of ash pond
- PWL dyje wall rising by utilization of ash

OTHER NON-HAZARDOUS, SOLID WASTE MANAGEMENT

Other Wastes	Utilisation
Housekeeping Waste, Waste Polythenes, waste Gunny bags	Municipality
Food Waste	Biogas Plant
Horticulture Wastes	Vermicompost Pit
Paper/ cardboard	Scrap recycler
Packaging Wood	Scrap recycler
Plastic Scrap	Scrap recycler
Metal Scrap	Scrap recycler
Rubber Scrap	Scrap recycler
Empty Drums (Plastic / Metal)	Scrap recycler
Empty Lime Bags	Scrap recycler

BIOGAS PLANT

- All the food wastes from the plant and township premises is channelized to the Biogas Plant
- The Plant is designed by TERI. Capacity is 640 kg/day .
- Gas generated is utilized in nearby Jawaan Barrack for cooking purposes.

BIOGAS PLANT CAPACITY - 640KG/Day

BIOGAS SUPPLIED TO JAWAN BARRACK FOR COOKING

Solar Power Station in Plant (180 KWp) & Township (200 KWp)

AWARDS & RECOGNITION

Noteworthy Water Efficient Unit- 14th National Award for Excellence in Water Management 2020 organized by CII.

SHE Excellence Award Winner - In Large manufacturing sector organized by CII 2019-20.

Awarded with Indian Green Manufacturing Excellence award – 2017 in Gold category from IRIM India Ltd.

Kalinga Safety Award FY21

RED MUD MANAGEMENT- BEST PRACTICES IN BAUXITE RESIDUE DISPOSAL AREA

1. **Mud Stacking Stability :** 95% compaction by engaging sheep roller.
2. **Stability Analysis of Tailings Dams** :
   - Stability analysis of by M/s IIT BBSR
   - Yearly audit & risk assessment by M/s. Golder associates
3. **Dam break analysis of BRDA & PWL**.
4. **Dust control mechanisms in BRDA** :
   - Top Soil blanketing on the stacking area
   - Water sprinkling by mist canon, water sprinklers, water tankers
   - Grass turfing on the dyke slope
   - Coir blanketing on the slopes of mud stock piles
5. **Innovative Projects taken to enhance life of pond :**

❖ **Wick drain installation in wet mud** area to increase the soil bearing capacity for mud stacking. (Pilot Project has completed for 23,000 Sqm area) – Increases Life of existing pond

❖ **Installation of Gabion wall : Life enhancement of existing pond by space augmentation**

❑ **Red Mud Utilization projects :**

- **Red mud is being sold to cement companies**
- **R & D Projects :**
  - Technology development for utilization of Red Mud for extraction of metal values and residue utilization
  - Mine back filling with Red Mud
  - Partnered with IIT Bombay for utilization of red mud in road construction

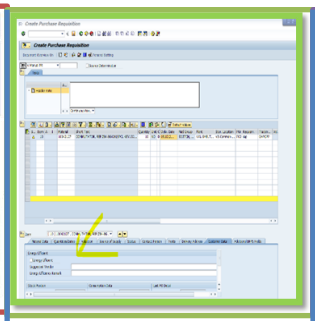
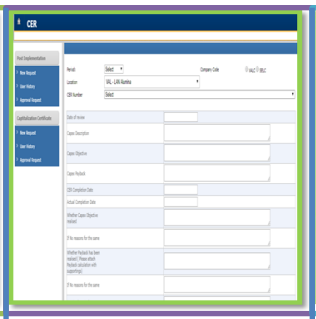
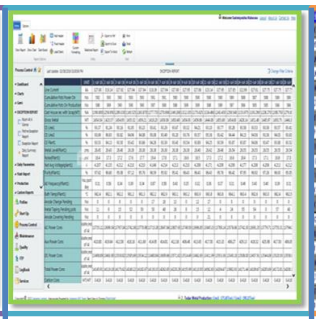
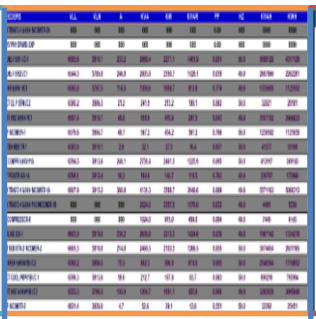
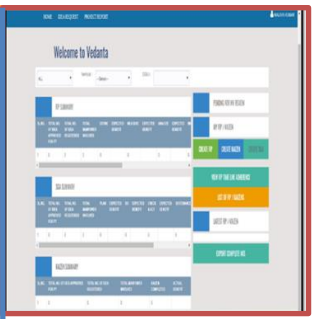
ASH UTILIZATION

Construction of village road with Ash

40

LANDSCAPING - REFINERY

ENERGY MONITORING & DIGITALIZATION

					
BAUXITE CONTROL TOWER	**ENERGY EFFICIENT PROCUREMENT**	**E-CER (CAPEX PROJECT) ENERGY IMPACT ASSESSMENT**	**MES ONLINE** **FLASH REPORT**	**ONLINE ENERGY MANAGEMENT**	**LIEP Portal**

ENERGY MONITORING & QUANTIFICATION

Major Energy Consumers

- Integrated Energy Meters are installed in the Sub Stations
- Related Process parameter are displayed on the screen
- Data is captured from these resources at regular interval

Other Energy Consumers

- Energy consumption is measured by Power Analyzers before & after the Project for quantification of savings
- Flow measurements are taken for quantification of savings before & after the project
- Fuel consumptions are validated by third party auditors every month
- Meters used for all measurements are calibrated as per ISO Standards

People Involvement

Excellence through constant innovation and engagement

- Occupancy control for substations & control stations .
- SCADA system modification for display and monitoring of conveyor idle time .
- In house timer arrangement for lighting systems .
- Numbering system of LED lights at multi purpose halls , conference rooms to segregate the circuit number wise
- Sunroof (Utilization of Day light) at workshop.

PEOPLE INVOLVEMENT

Energy Idea Drop Box on Shop floor

Idea generation Session

Energy awareness in Tool Box Talk.

Awards & Recognition for Energy initiatives

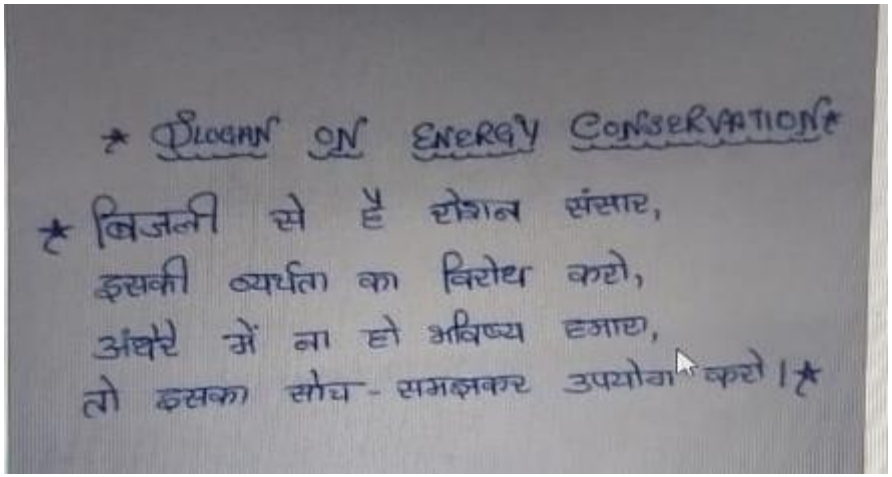
"We value every small contribution"

ENERGY CONSERVATION WEEK

Energy Walk Lead by Senior Management

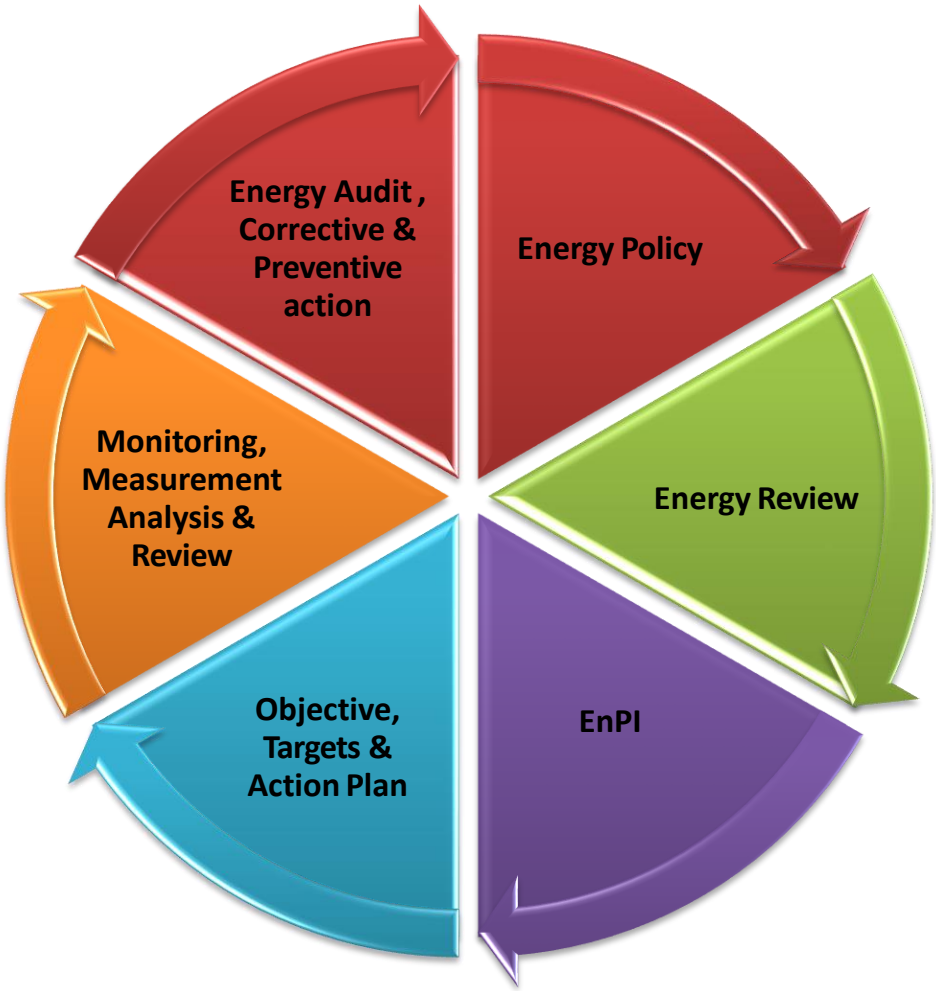
Award Distribution

Competitions held at Schools

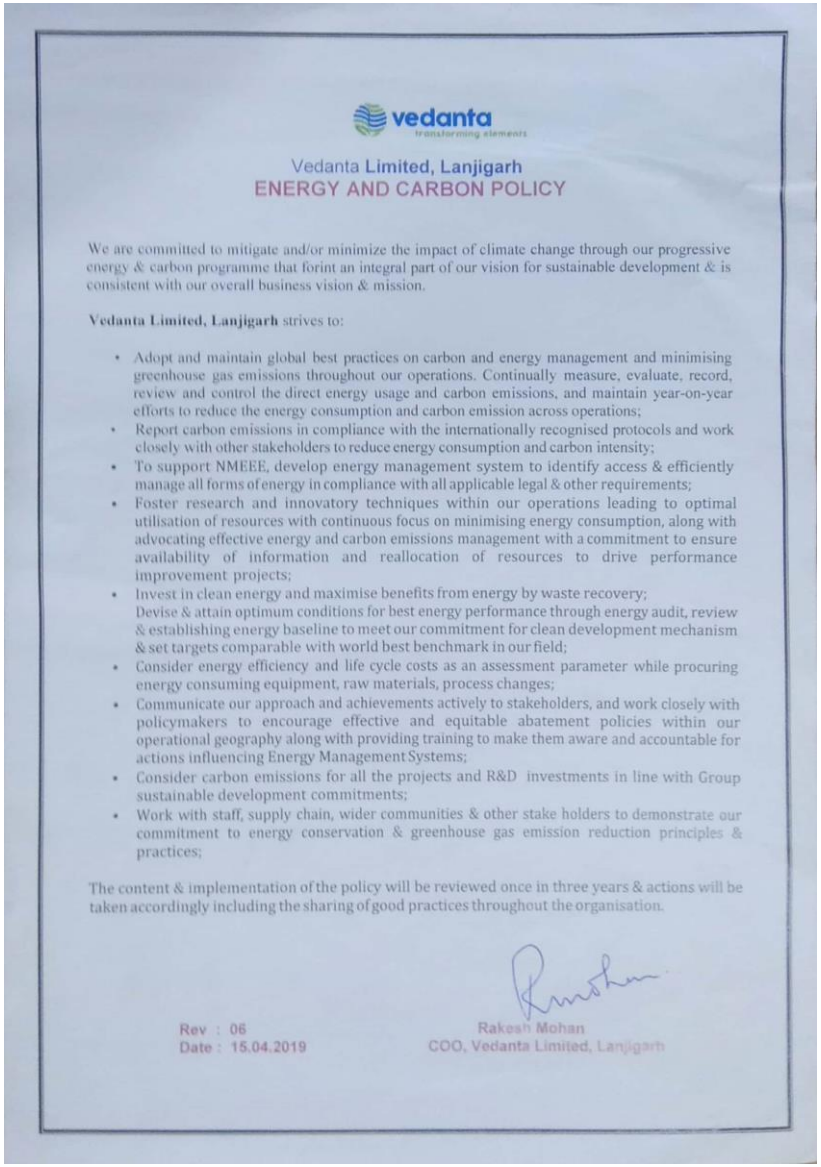


Slogan Competition

ENERGY MANAGEMENT SYSTEM (ISO-50001:2018)



EMS (ISO-50001:2018)



vedanta
transforming elements

Vedanta Limited, Lanjigarh
ENERGY AND CARBON POLICY

We are committed to mitigate and/or minimize the impact of climate change through our progressive energy & carbon programme that forint an integral part of our vision for sustainable development & is consistent with our overall business vision & mission.

Vedanta Limited, Lanjigarh strives to:

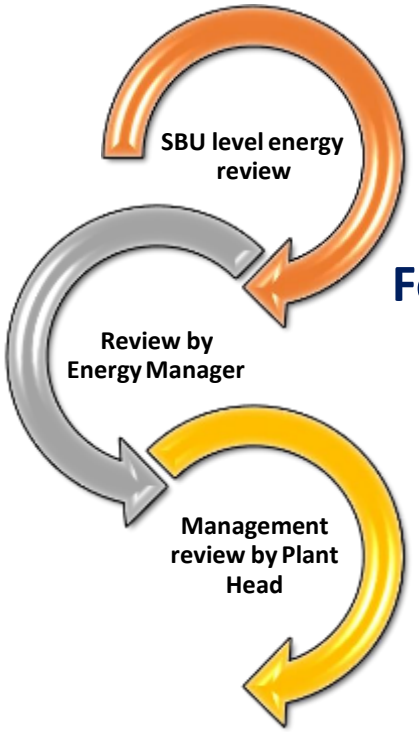
- Adopt and maintain global best practices on carbon and energy management and minimising greenhouse gas emissions throughout our operations. Continually measure, evaluate, record, review and control the direct energy usage and carbon emissions, and maintain year-on-year efforts to reduce the energy consumption and carbon emission across operations;
- Report carbon emissions in compliance with the internationally recognised protocols and work closely with other stakeholders to reduce energy consumption and carbon intensity;
- To support NMEEE, develop energy management system to identify access & efficiently manage all forms of energy in compliance with all applicable legal & other requirements;
- Foster research and innovatory techniques within our operations leading to optimal utilisation of resources with continuous focus on minimising energy consumption, along with advocating effective energy and carbon emissions management with a commitment to ensure availability of information and reallocation of resources to drive performance improvement projects;
- Invest in clean energy and maximise benefits from energy by waste recovery;
  Devise & attain optimum conditions for best energy performance through energy audit, review & establishing energy baseline to meet our commitment for clean development mechanism & set targets comparable with world best benchmark in our field;
- Consider energy efficiency and life cycle costs as an assessment parameter while procuring energy consuming equipment, raw materials, process changes;
- Communicate our approach and achievements actively to stakeholders, and work closely with policymakers to encourage effective and equitable abatement policies within our operational geography along with providing training to make them aware and accountable for actions influencing Energy Management Systems;
- Consider carbon emissions for all the projects and R&D investments in line with Group sustainable development commitments;
- Work with staff, supply chain, wider communities & other stake holders to demonstrate our commitment to energy conservation & greenhouse gas emission reduction principles & practices;

The content & implementation of the policy will be reviewed once in three years & actions will be taken accordingly including the sharing of good practices throughout the organisation.

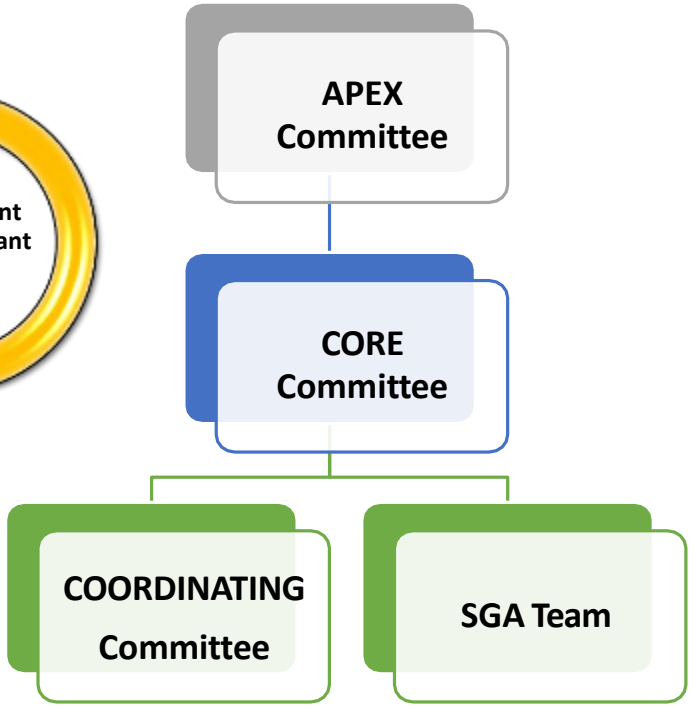
Rev : 06
Date : 15.04.2019

Rakesh Mohan
COO, Vedanta Limited, Lanjigarh

REVIEW STRUCTURE



Formation of Energy Cell



DELETE

ENCON PROJECTS (Ongoing/Upcoming)

Sl No	Project Details	Investment required / incurred (lakh)	Estimated Eelctrical Energy saving in FY 21-22(million KWH)	Estimated thermal saving in FY 21-22(million Kcal)
1	Installation of HT capacitor bank at various substations of plant to improve power factor from 0.86 Average to 0.95	80	1.223262451	0
2	Installation of VFD for G45 PU 0003A, B & C for energy saving	5	0.5184	0
3	Installation of 250KW compressor for capacity optimization	15	1.44	0
4	Bypassing of Distribution transformer of SWR-1.1	10	0.1752	0
5	LED light conversion for conventional lighting across the plant (2000 Nos)	30	0.3066	0
6	VFD conversion for 29 PU 0001B (GQC pump motor)	5	0.1728	0
7	Energy management system for two numbers substation	15	NA	0
8	Replacement of 23 numbers of CACA motor with TEFC motor of higher efficiency	300	0.3312	0
9	BFP recirculation passing valve identified and logic modification is planned	1.85	0.340467	0
10	Boiler#1 APH replacement	700	0.0648	3402
11	CT fills replacement	15	0.864	0

DELETE

ENCON PROJECTS (Ongoing/Upcoming)

Sl no	Reduction in Specific Fuel Oil consumption from 70.4kg/T to 69.8Kg/T Alumina-
1	Pan filter moisture control from 6.3% to 5.5%
2	APC revival in both Calciner after upgradation
3	Calciner-2 throughput improvement
4	Calciner-2 refractory replacement (Annual shutdown)
5	Nyuzai EFO

DELETE

ENCON PROJECTS (Ongoing/Upcoming)

SL NO	REDUCTION OF SPECIFIC STEAM CONSUMPTION FROM 1.72 T/T TO 1.67 T/T ALUMINA-
1	Max HT soda lite scale inhibitor application in Evap 1 & 2
2	Evaporators 1 & 2 Calendria 1 tubes replacement
3	APC remodeling for Evaporation (including commissioning in Evap 3)
4	Frequency revision for calandrias acid cleaning and increase in cleaning duration for Cal 2 & Cal 3/4
5	Maximizing indirect heater operation (from 70% in FY 21 to 80% in FY 22) in PDS to reduce dilution across PDS
6	Reducing LSH operating duration from ~ 38-40 days (actuals in FY 21) to 20-25 days in FY 22
7	Improvement in steam economy of Evap # 3 (from ~ 3.6 T/T to 3.8 T/T) through introducing closed loop acid cleaning facility

AWARDS & RECOGNITIONS

Quality Conclave(CCQC) Awards

Quality Conclave(NCQC) Awards

Excellent Energy Efficient Unit -2019

IMEA Award-Gold category

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Aiming to create a more beautiful, sustainable, clean planet …