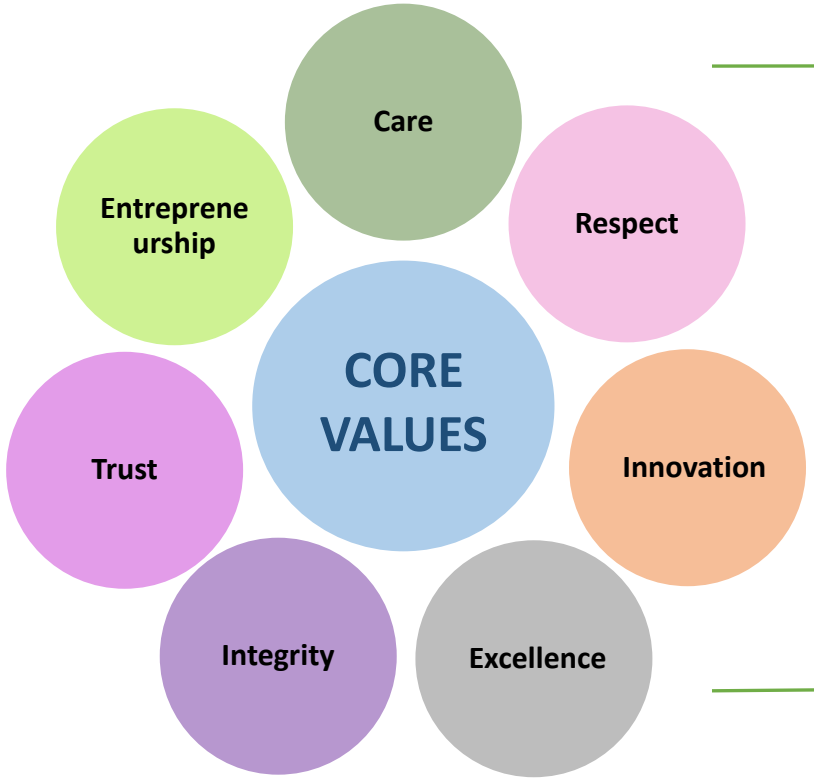


CII Award for Excellence in Energy Management – Metal Sector

Bharat Aluminium Company Limited

Date: 19th Aug'21

WHO WE ARE

Vedanta Resources Limited is a globally diversified Natural Resources Company with interests in zinc-lead-silver, Iron ore, Steel, Copper, Aluminium, Power, Oil and Gas.

Our dynamic portfolio follows a history of consistent geological discovery, technological advancement and sustainable development. With a business model focused on growth, expansion and value creation for our shareholders, positive impact on the community, we operate in and leave a legacy of pride.

Geographically, our operations are centered in India, Africa and Australia with over 65,000 employees.

Vedanta Values are vital part of our culture and an essential underpinning of our growth and success.

We are empowered to drive excellence and innovation; we demonstrate world-class standards of governance, safety, sustainability and social responsibility. Our business was built with a simple mission envisioned by the group's Chairman, Mr. Anil Agarwal – "To create a leading global natural resource company."

INTRODUCTION TO VEDANTA GROUP

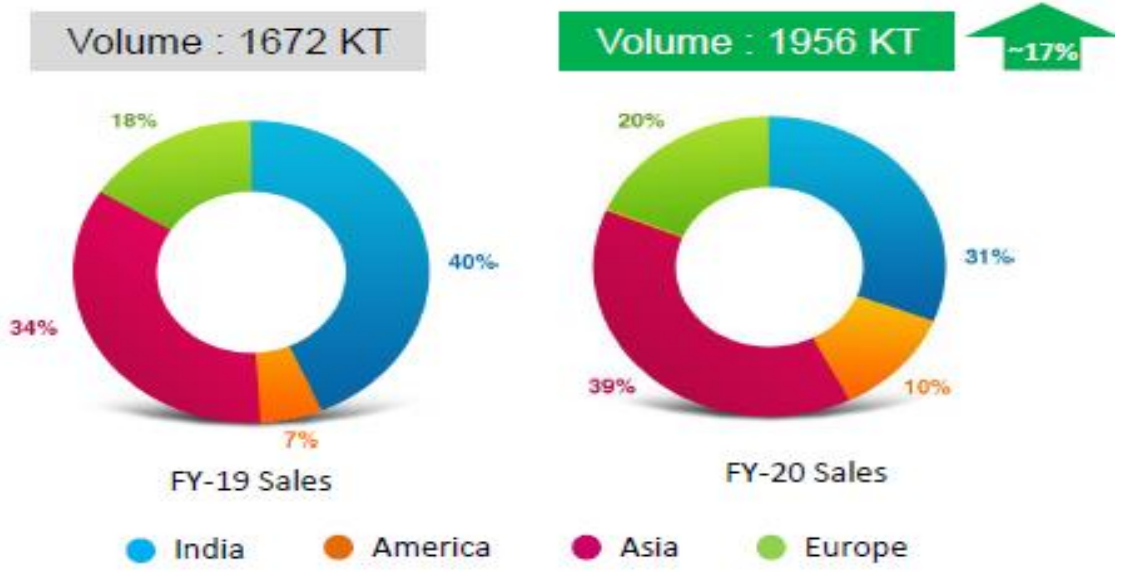
Strong asset positioning

- 2.3 MTPA Aluminium production and capacity across two assets
- World's (ex-China) largest single location aluminium smelter in Jharsuguda
- World's largest wire rod producer
- Long term supply commitments
- Strong distribution network
- ~25,000 direct and indirect employees including ~7000 professionals

Diversified product portfolio

- Billets: 430 KTPA
- AlSi +Slabs: 48 KTPA
- Wire Rod: 480 KTPA
- PFA(AlSiMg): 240 KTPA
- Ingots: 1150 KTPA
- Rolled Products: 44 KTPA

Enabling increased volumes and geographic diversification



PRODUCT PORTFOLIO

Aluminium Billets

Aluminium Wire Rod

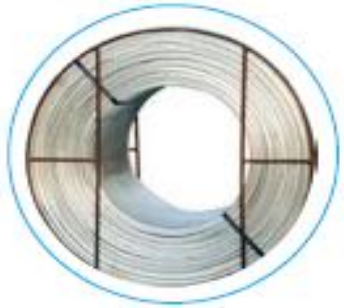
P1020 Ingots

Primary Foundry Alloy

Slabs

Rolled Product

Chequered Sheets



Flip Coils

Busbars

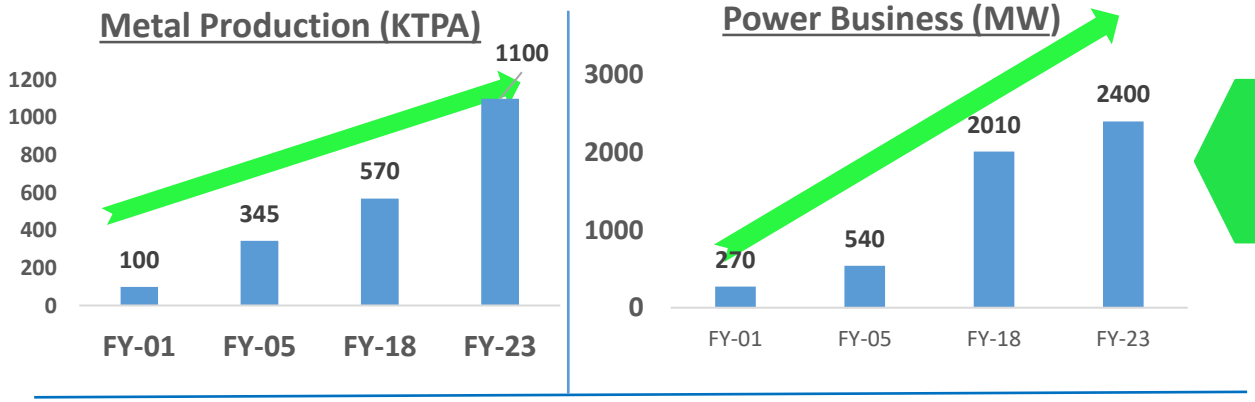
BALCO-A Snapshot

- **Bharat Aluminium Company** (BALCO) has made significant contributions as the **1st PSU** in India's Aluminium sector Incorporated in 1965, **BALCO** is India's first integrated Aluminium business.
- One of the first disinvestments of the Government of India. It now a part of Vedanta Limited, with 51% stake held by Vedanta Limited and 49% held by Government.
- Balco is based in Chhattisgarh State having Captive Bauxite mines in Mainpat and Kawardha, Captive coal mines in Chotia, 2010 MW power generation capacity and 5.7 LTPA Aluminium Smelting capacity at Korba Complex.
- Balco produces Wire Rods, Ingots, Alloy Rods, Alloy Ingots and Rolled Products. Balco is also selling Power to State Utilities & own sister concerns.
- Balco has been India's first to have - Captive Power Plant, to venture into +300 kA Prebake pots, to produce Alloy Rods for conductors used in power transmission industry, to roll material for Aerospace Industry, online riser replacement, busbar insulation in Pot Room, single beam implementation and holds patent for aluminium cell fuse technology.

PANDIT NEHRU THEN PRIME MINISTER OF INDIA SIGNING AGREEMENT WITH USSR.FORMALLY STARTING KORBA ALUMINIUM PROJECT.(FORMER NAME BALCO)

Our Vision

"To be a world class integrated Aluminium and Power producer generating sustainable value for all stakeholders"



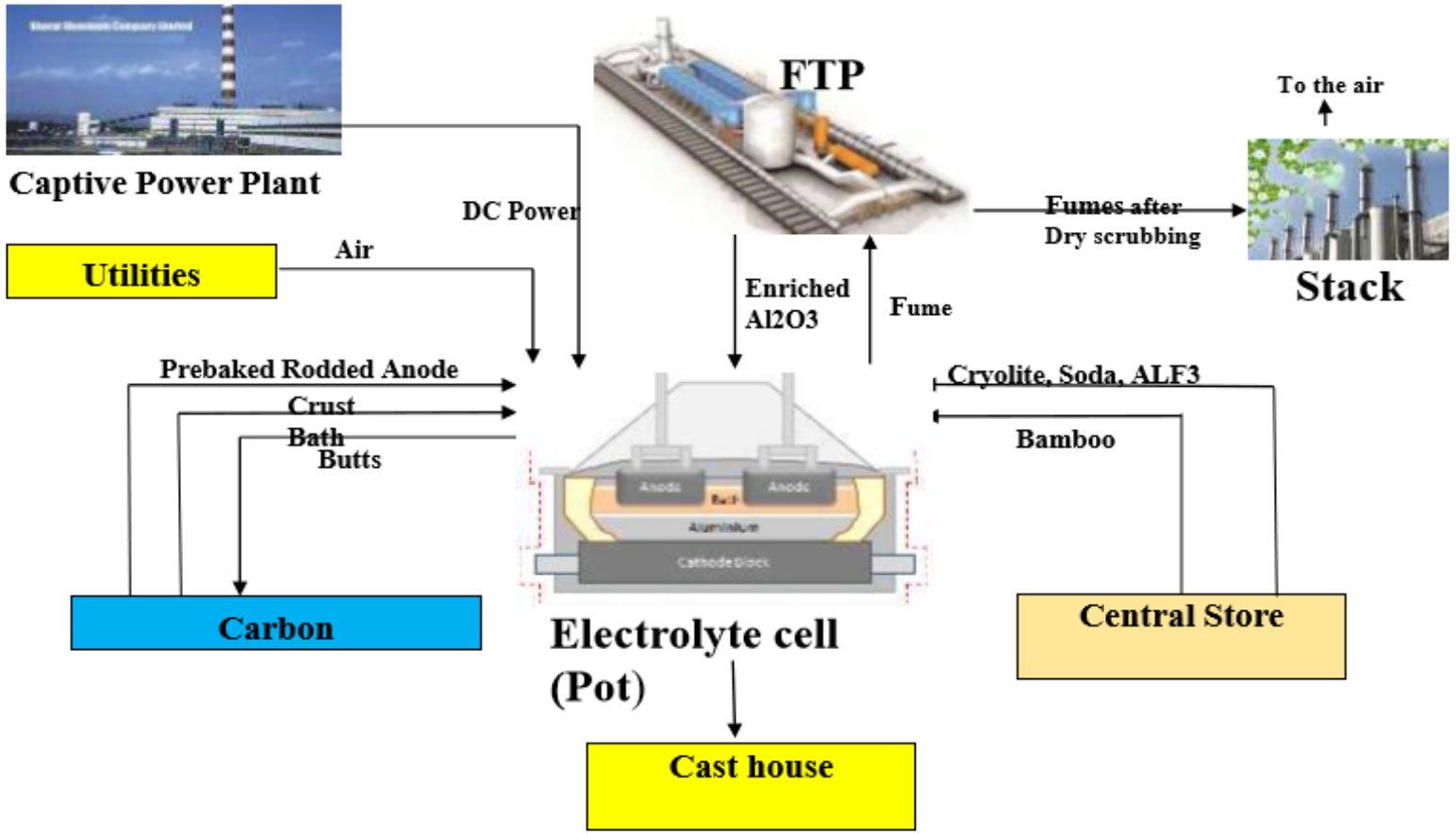
Our Mission

- To be amongst top decile in global cost curve.
- Operational Excellence.
- Ensure resource security with efficient supply chain.
- Effective collaboration with stakeholders.
- Unleash employee potential.
- Build and strengthen brand equity.

Our Core Values

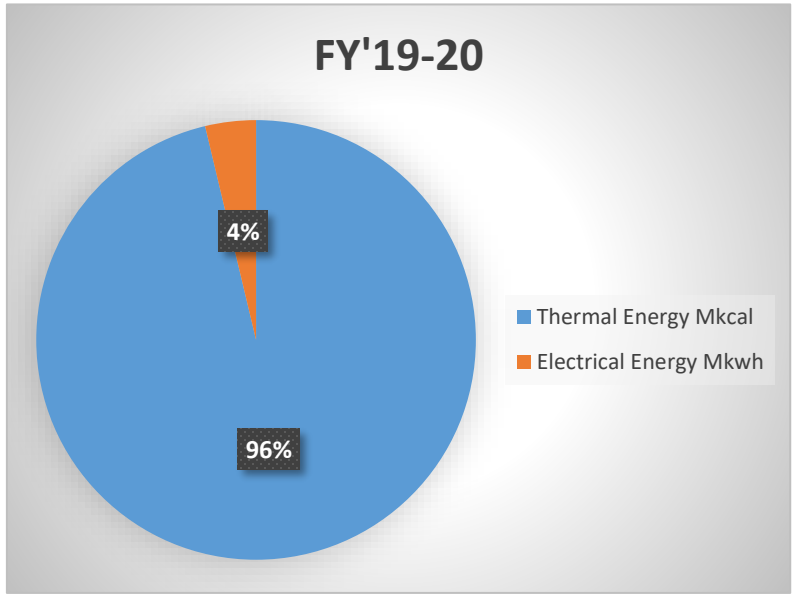
- Care
- Respect
- Innovation
- Excellence
- Integrity
- Trust
- Entrepreneurship

Pot line Process Flow



Technology Provider –

Potline1 GAMI (320KA),
Potline2 GAMI (340KA)



Prebaked smelting processes (Hall Heroult) involve electrolytic reduction of the Alumina by Carbon to Hot metal and Carbon dioxide.

$$2\,Al_2O_3\,(dissolved) + 3C(s) \longrightarrow 4Al(l) + 3CO_2(g)$$

BALCO - Finishing Capacity

CAST HOUSE#1	WRM - 60,000 MT ICM - 90,000 MT
CAST HOUSE#2	SOW INGOT – 50,000 MT ICM – 200,000 MT
CAST HOUSE#3	WRM– 200,000 MT ICM – 175,000 MT
RP	RP – 74,500 MT

Wire Rod
Type : EC / Alloy
Coil Weight : 1-2.5 Tons;
Alloy Rod , Flip Coils

Ingots:
EC Grade, CG Grade; Alloy Ingots. AlSi T Ingots; Saw Ingots
Size : 740 mm x 170 mm x 114 mm

Rolled Products:
Hot Rolled Coils & Plates
Alloy : 1xxx, 2xxx, 3xxx, 4xxx, 5xxx, 6xxx, 8xxx
Cold Rolled Coils, Strips & Sheets
Alloy : 1xxx, 2xxx, 3xxx, 4xxx, 5xxx, 6xxx, 8xxx
Slabs
Size : 410 mm x 1270 mm,
410 mm x 1540mm,
410 mm x 1620 mm
Busbars
Width: 500-1620 mm, Length: 2000-5000 mm, Thickness : 220-410 mm

Energy Objectives

ENERGY OBJECTIVES (FY 22) :

- Reduce Net AC Power consumption for

  Potline-1 (13095 KWH/MT to 13007 KWH/MT) - 87 kWh MT
  Potline-2 (13468 KWH/MT to 13281 KWH/MT) -187 kWh/MT

- Reduce Auxiliary Power Consumption of potline-1 from 440 to 400 KWH/MT-40 kWh/MT

- Reduce Auxiliary Power Consumption of Potline-2 from 500 to 472 KWH/MT - 28 kWh/MT

ENERGY OBJECTIVES (Vision FY23)

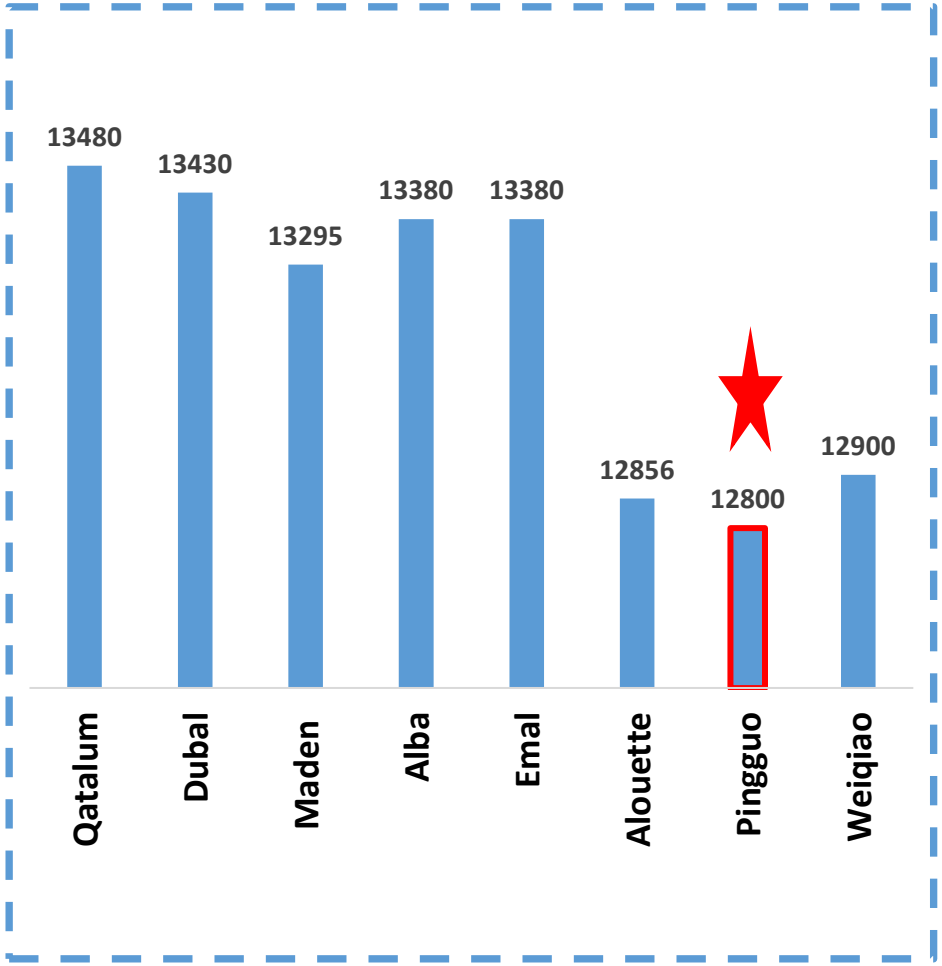
- Reduce Net Power consumption – 12865 kWh/MT of Al

- Reduce Auxiliary Power Consumption of potline-1 -60 kWh/MT

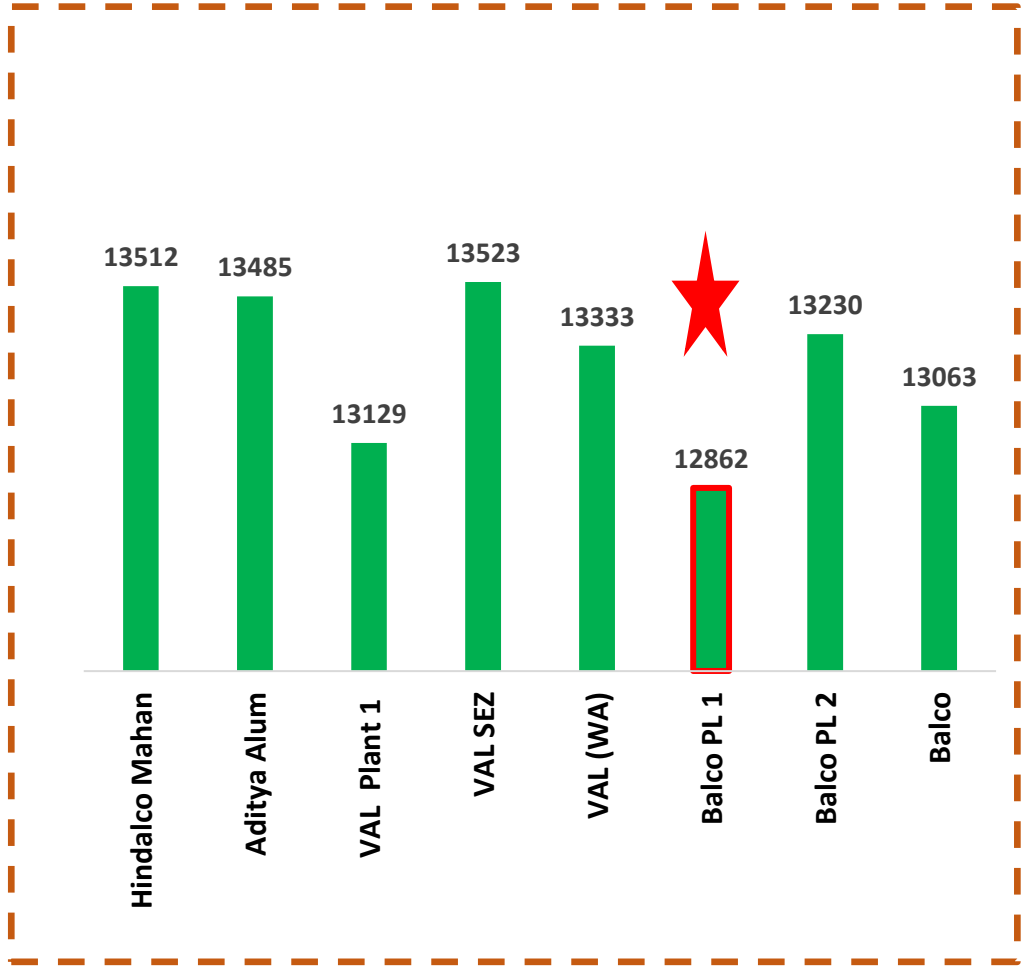
- Reduce Auxiliary Power Consumption of Potline-2 - 22 kWh/MT

:

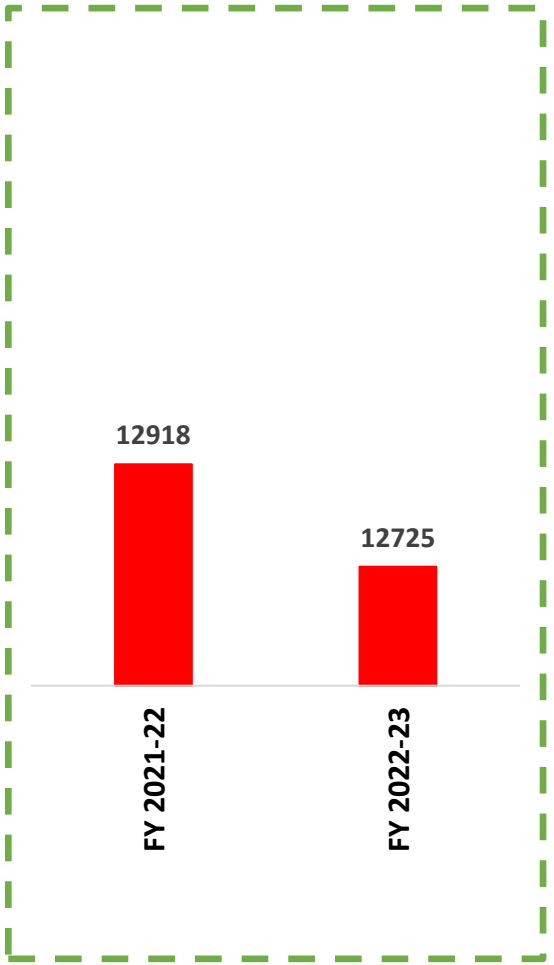
Pot-line DC Specific-Power kWh/MT & Benchmarking



International Benchmark



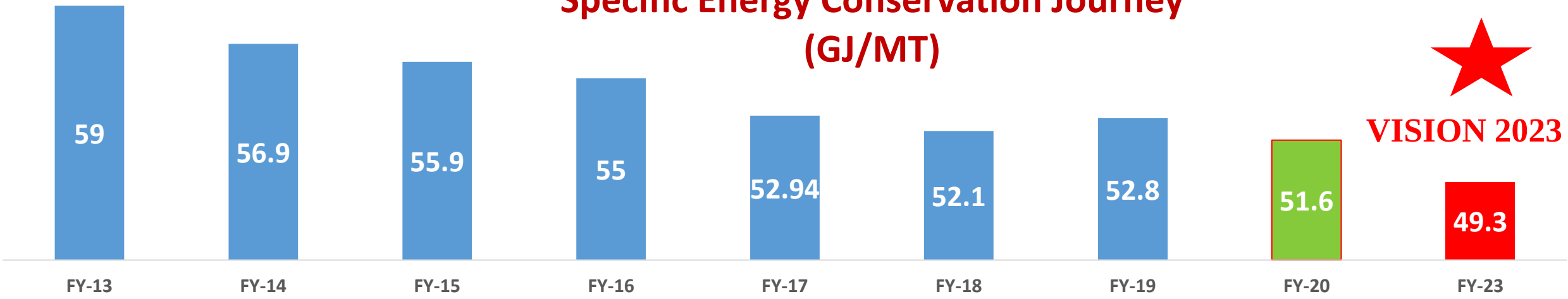
National Benchmark



BALCO Vision

** Balco is benchmark in Indian & Gulf smelters in DC Specific Power Consumption

Specific Energy Conservation Journey (GJ/MT)



S. No.	Major Projects / Action Plan for Vision FY23	Power Saving	Unit	Target Completion
1	Installation of 100% graphitized Cathodes	228	Kwh/MT	Mar-22
2	Up gradation of Pot-control system in Pot-line 2	417	Kwh/MT	Mar-22
3	Replacement of conventional motors with energy efficient motors	230	Kwh/MT	Mar-22
4	Cast iron sealing in cathode	30	Kwh/MT	Mar-23

Project Title:

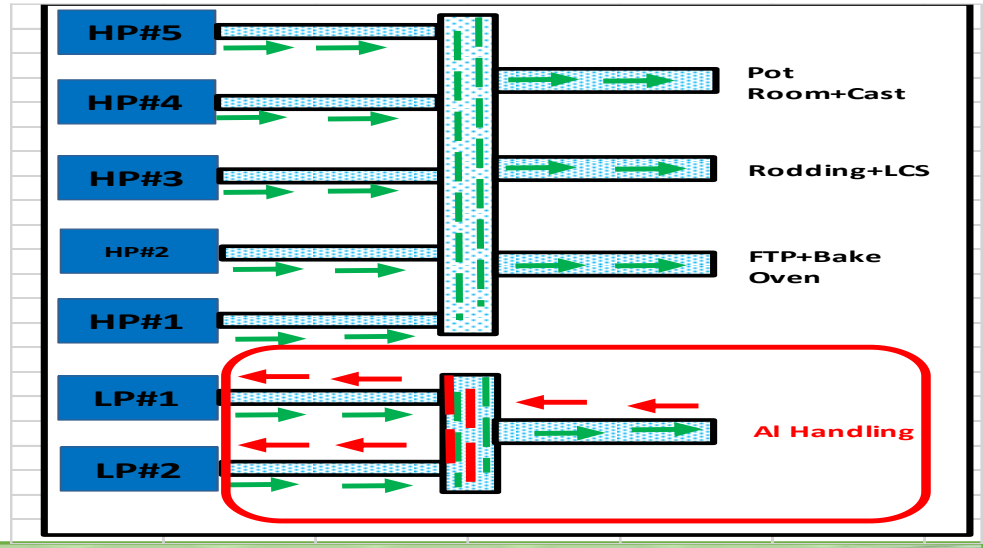
Conversion of HP compressor to LP compressor

Project Details:

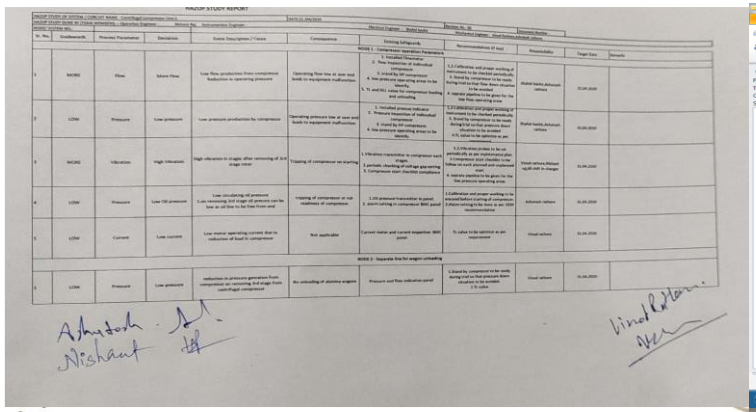
- Presently we have three stage centrifugal compressor (high pressure) in which stage wise compress air and generate required pressure for whole plant areas i.e approx. 6.0 bar.
- After which, flow and pressure analysis was done. In which we found some areas which can be run with low pressure compressor.
- Modification analysis was done for conversion analysis of 3 stage compressor to two stage compressor with proper piping system.
- After completion of project power consumption trends were analysed.

Compressor house

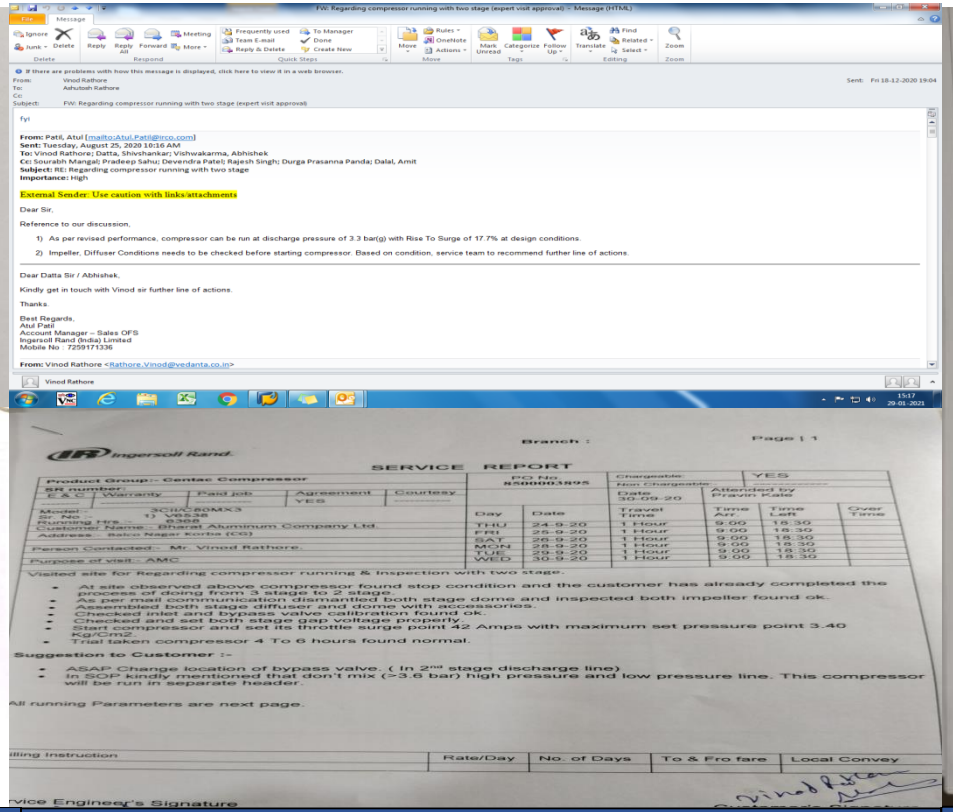
Pipeline Network



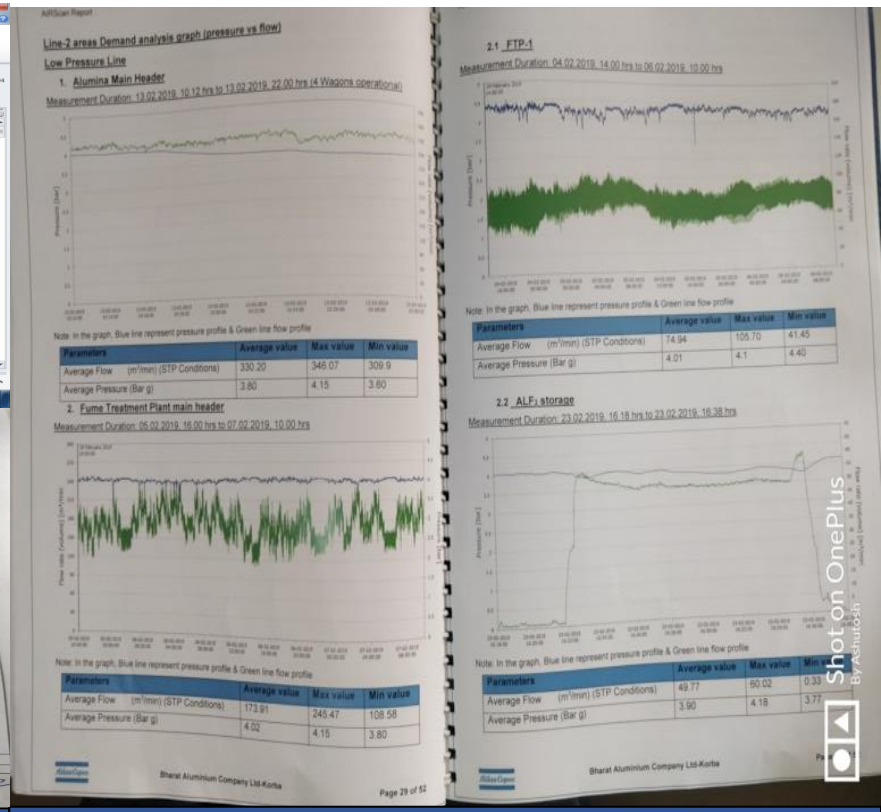
Analysis



HAZOP & MOC



OEM Clearance & Service Report



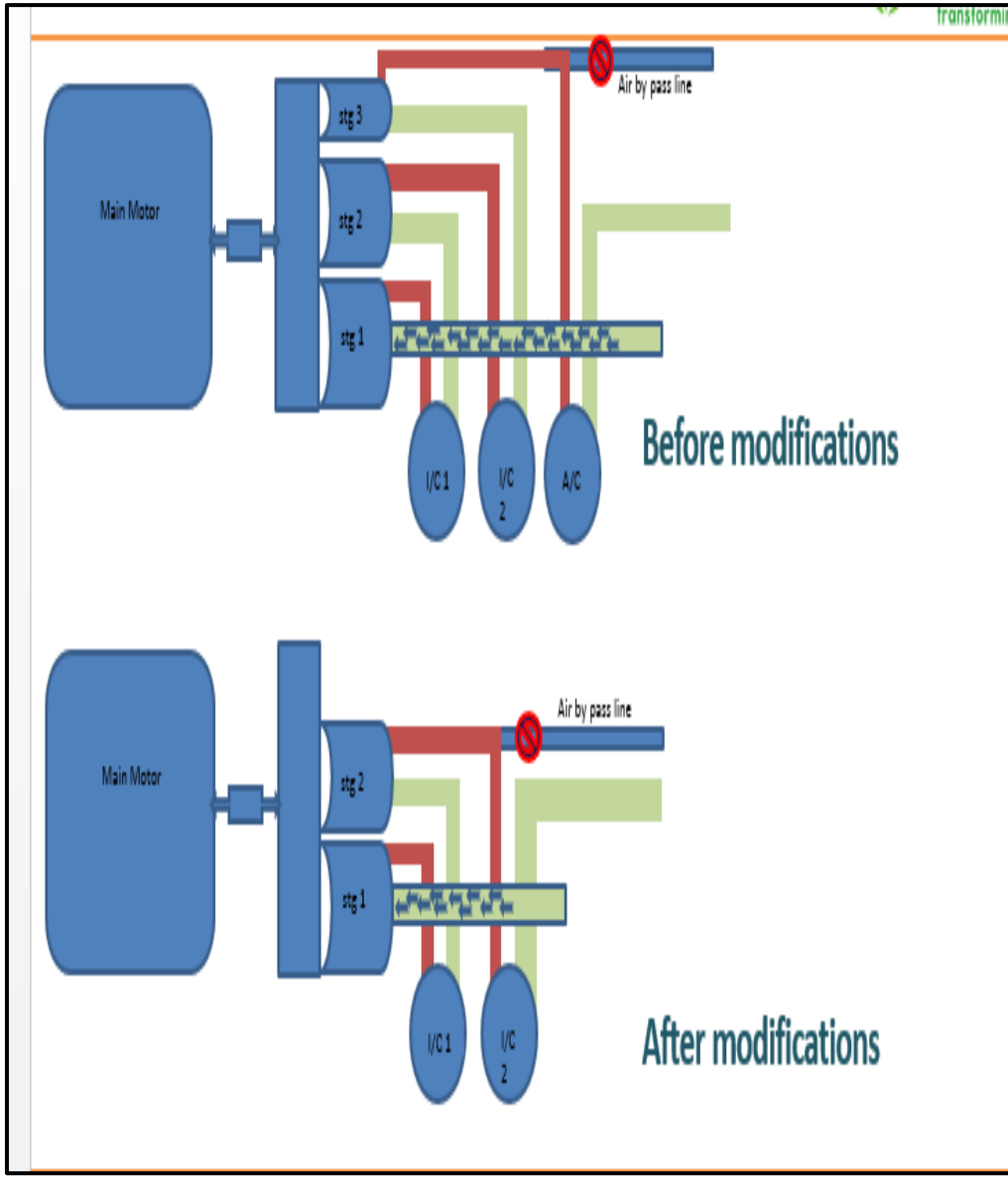
Area wise Flow study

- From detail analysis of compressor design capacities, efficiency, study of pipeline network, FTP pressure and flow requirement. It was found that we can run Alumina handling and FTP operations with LP compressed air .
- Feasibility analysis of Compressor modification from HP to LP
- Analysis of Power consumption of compressor house.

Action Plan

In-house modification with our own resources.

- MOC Making and approval for implementation in shop floor
- Fabrication and modification of suction and discharge pipe lines.
- Arrangement to dummy oil line and third stage.
- Shutdown of FTP and alumina handling to interconnect pipeline
- Fitting of 10 inch valves in both the pipeline HP and LP line.
- Taken clearance from OEM and changed BMC (panel) logic/ parameters
- Successful trial was taken and all the operations ran smoothly.
- Data calculation for Power consumption of compressor house.
- By these calculation and implementation we found that we can save approx. 16 MWH/day by utilizing low power consuming compressor for FTP operation instead of high power consuming compressor as used previously.

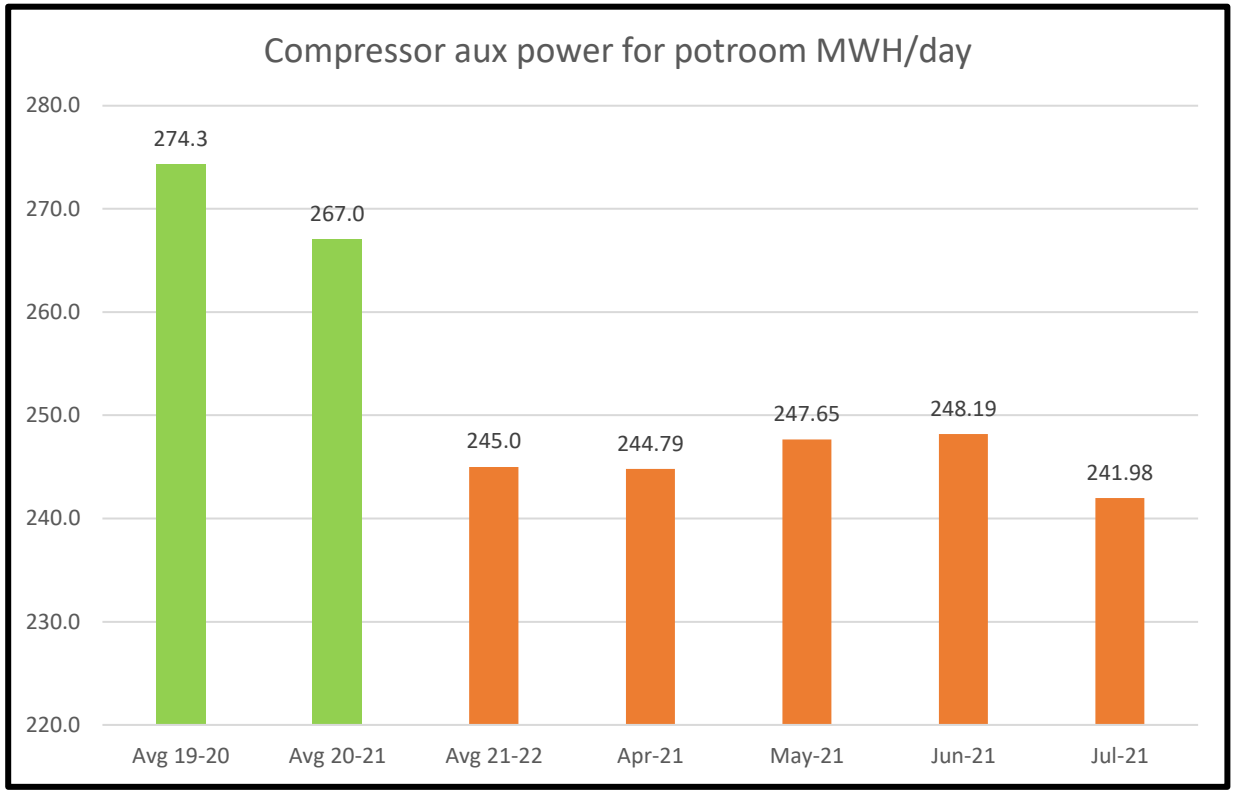


Power Saving calculation

- 1 day power consumption by HP compressor:29MWH /day
- 1 day Power consumption by LP compressor :19MWH/day

- Total per day power consumption saved by two compressor
- : 20 MWH
- Saving got more volume by converted compressor to decrease Avg. running of HP compressor.
- : 10 MWH
- Cost Saving Annual :30MWH*2600 INR/MWH*365:43200 INR
- Hence **Annual Saving** :**2.85 Cr.**

- **Safety:** Risk Reduction of alumina Bulker bursting from High pressure to low pressure.



Month	Avg 19-20	Avg 20-21	Avg 21-22	Apr-21	May-21	Jun-21	Jul-21
Compressor aux power for potroom MWH/day	274.3	267.0	245.0	244.79	247.65	248.19	241.98

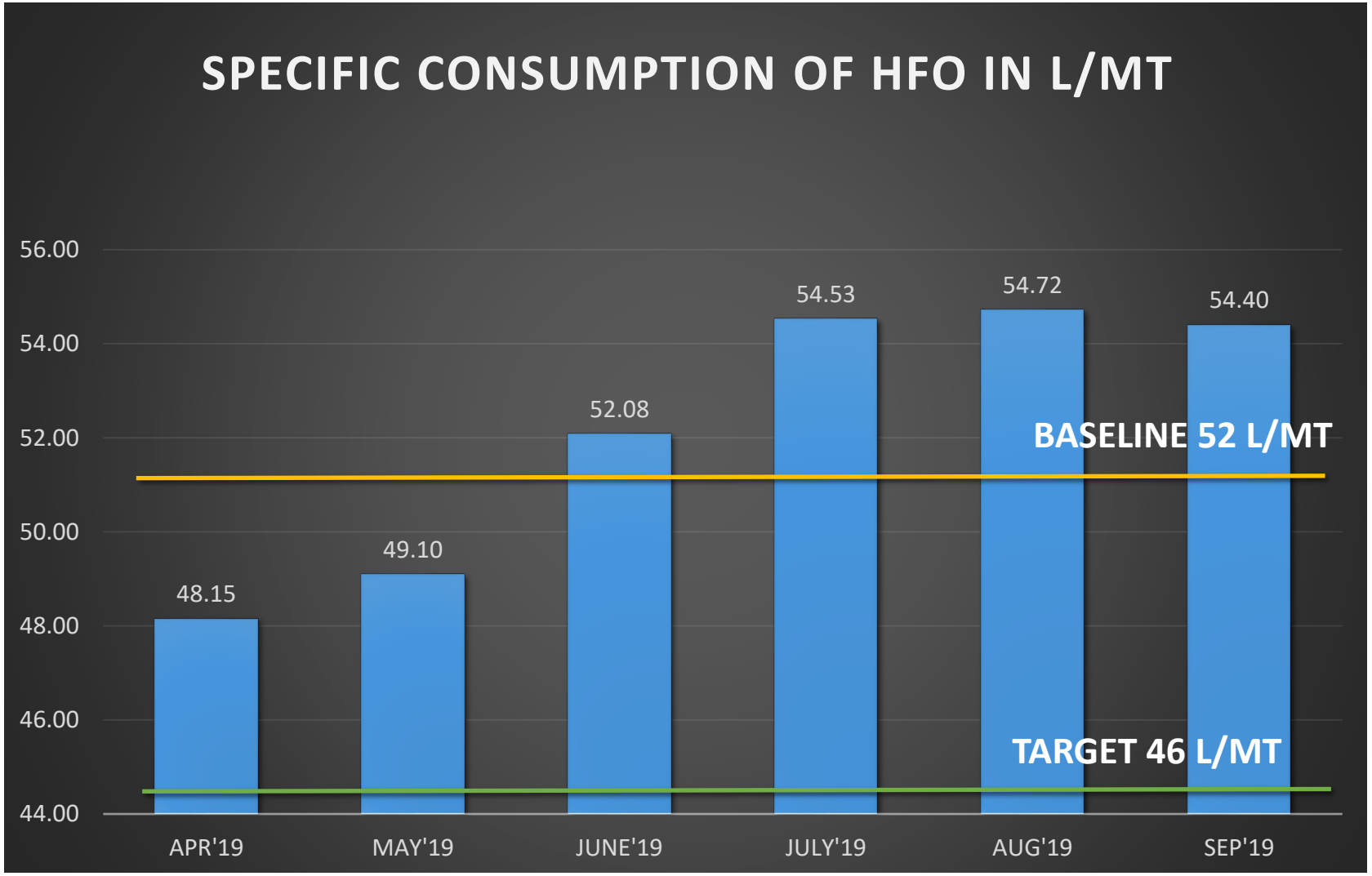
Project Title:

SPECIFIC CONSUMPTION OF HFO IN L/MT

Project Details:

High HFO consumption leads to high COP of baked anodes. HFO consumption for H1 2019 is 52L/MT and it is opportunity to reduce it to target 46 L/MT. The reduction of 6L/MT of HFO consumption for baking 1MT of anode will give us potential saving of 1.2 Cr.

Innovation-SPECIFIC CONSUMPTION OF HFO IN L/MT



STATEMENT

High HFO consumption leads to high COP of baked anodes. HFO consumption for H1 2019 is 52L/MT and it is opportunity to reduce it to target 46 L/MT. The reduction of 6L/MT of HFO consumption for baking 1MT of anode will give us potential saving of 1.2 Cr.

VARIABLES

INPUT VARIABLES

- Flue wall condition
- Burner condition
- Peephole cover condition
- Thermocouple drum condition
- Headwall condition
- Cross over condition

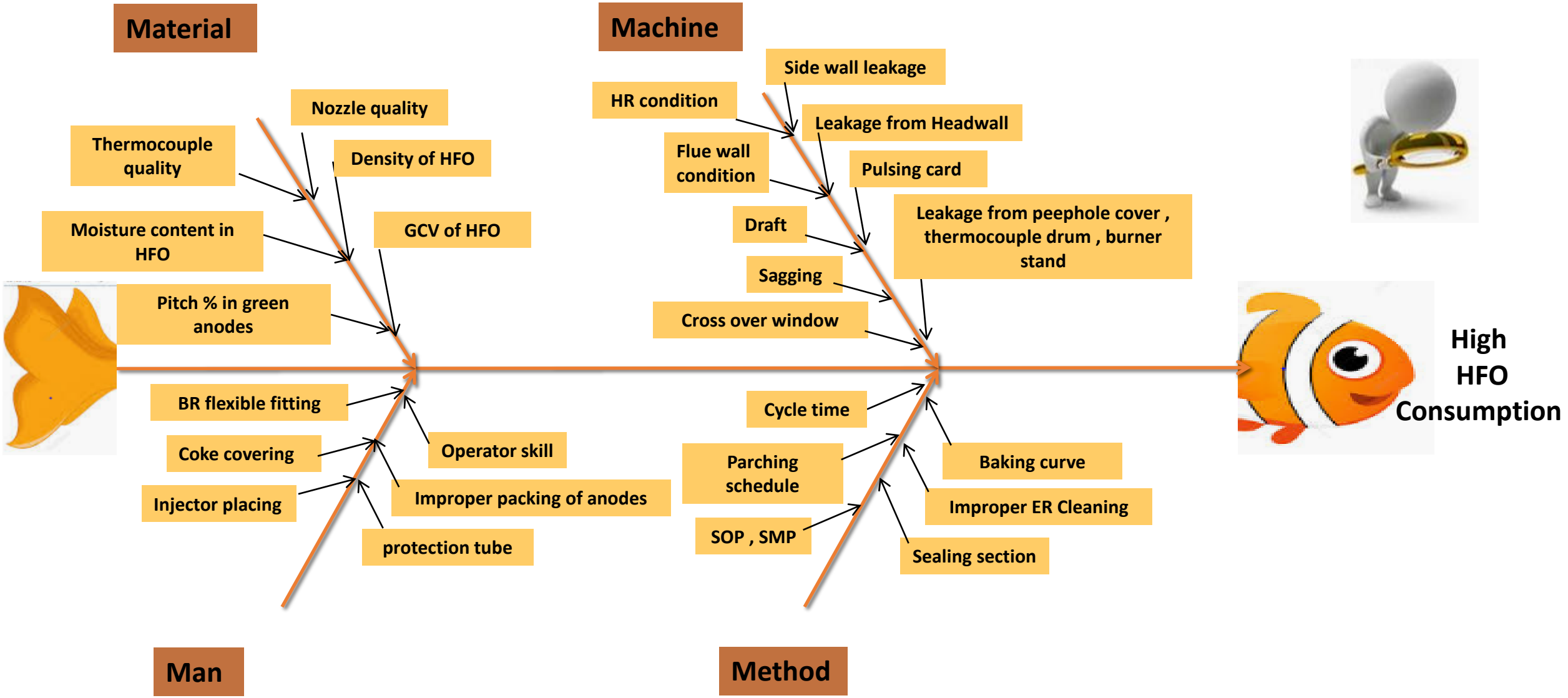
PROCESS VARIABLES

- Baking curve
- Ramp stoppage
- Refractory maintenance
- TPR
- Leakages

OUTPUT VARIABLE

- Specific consumption HFO

PROBLEM DIAGNOSIS



PROBABLE CAUSES: PRIORITIZATION MATRIX

SL .	PROBABLE CAUSES	QUALITY	COST	SAFETY	ENV	EFFECTIVE FACTOR
1	Side wall leakage	3	9	3	3	18
2	Head wall leakage	3	1	3	3	10
3	Pulsing card	3	1	3	1	8
4	Peephole cover , TC drum and burner stand	3	9	3	1	16
5	Cross over window	3	3	3	1	10
6	Sagging	1	3	3	1	8
7	Draft	3	3	3	1	10
8	Flue wall condition	9	3	9	1	22
9	HR condition	3	9	9	3	24
10	G.C.V. of HFO	3	1	3	1	8
11	Density of HFO	3	1	3	1	8
12	Nozzle quality	3	3	3	1	10
13	Thermocouple quality	1	3	3	1	8
14	Moisture content in HFO	3	3	3	1	10
15	Pitch % in green anode	3	3	3	1	10
16	BR flexible fitting	3	1	3	1	8
17	Coke covering	3	3	3	1	10
18	Injector placing	3	3	3	1	10
19	Operator skill	1	3	3	1	8
20	Improper packing of coke	3	3	3	1	10
21	Protection tube placement	6	3	3	1	13
22	Cycle time	3	9	3	1	16
23	Parching schedule	3	1	3	1	8
24	SOP , SMP	3	1	9	1	14
25	Baking Curve	3	3	3	1	10
26	Improper ER cleaning	1	3	3	1	8
27	Sealing section	1	3	3	1	8

S No	Action plan	Responsibility	UOM	Target
1	Peep hole cover repairing Target - 1500 peep hole/month or as per schedule	Soumoditya	NO	1500
2	Head wall repair (20/month)	Soumoditya	NO	20
3	Overhauling of all burner stand (Target -54/month or as per schedule)	Seemant	NO	54
4	Thermocouple, TPR, ZPR drum insulation repairing (Target - 54/month or as per schedule)	Soumoditya	NO	54
5	Ring maintenance (100% compliance)	Soumoditya	%	100
6	No of ER damper running in off mode (0/day). Total Damper-72	V Sreeraj	NO	0
7	Flue wall straightening to be done 150 no /month	Sreejana	NO	150
8	Use of modified thermocouples for anode tempearture measurement	V Sreeraj	NO	-
9	ZPR Pressure- BO-1-	V Sreeraj	Pa	10
10	Checking of crossover duct bricks condition quarterly	Sreejana	NA	Quaterly
11	Blanket filling in crossover expansion joint	Sreejana	NA	Quaterly
12	Patching of crack in crossover duct	Sreejana	NA	Quaterly
13	Thermal Imaging of cross over	Sreejana	NA	<120 DegC
14	Double section jump at crossover section	Soumoditya	NA	NA
15	Packing of high heighted anodes in crossover section in furnace 1 and 2	Soumoditya	NA	720 anodes
16	End headwall replacement	Soumoditya	NA	3/month from Jan'21

SMS trigger generated if

Heating ramp 1 pulsing goes above 120 pulse/min for 1hr

Heating ramp 2 pulsing goes above 150 pulse/min for 1hr

Heating ramp 3 pulsing goes above 120 pulse/min for 1hr

Report generation to analyze the fire parameters from DMS

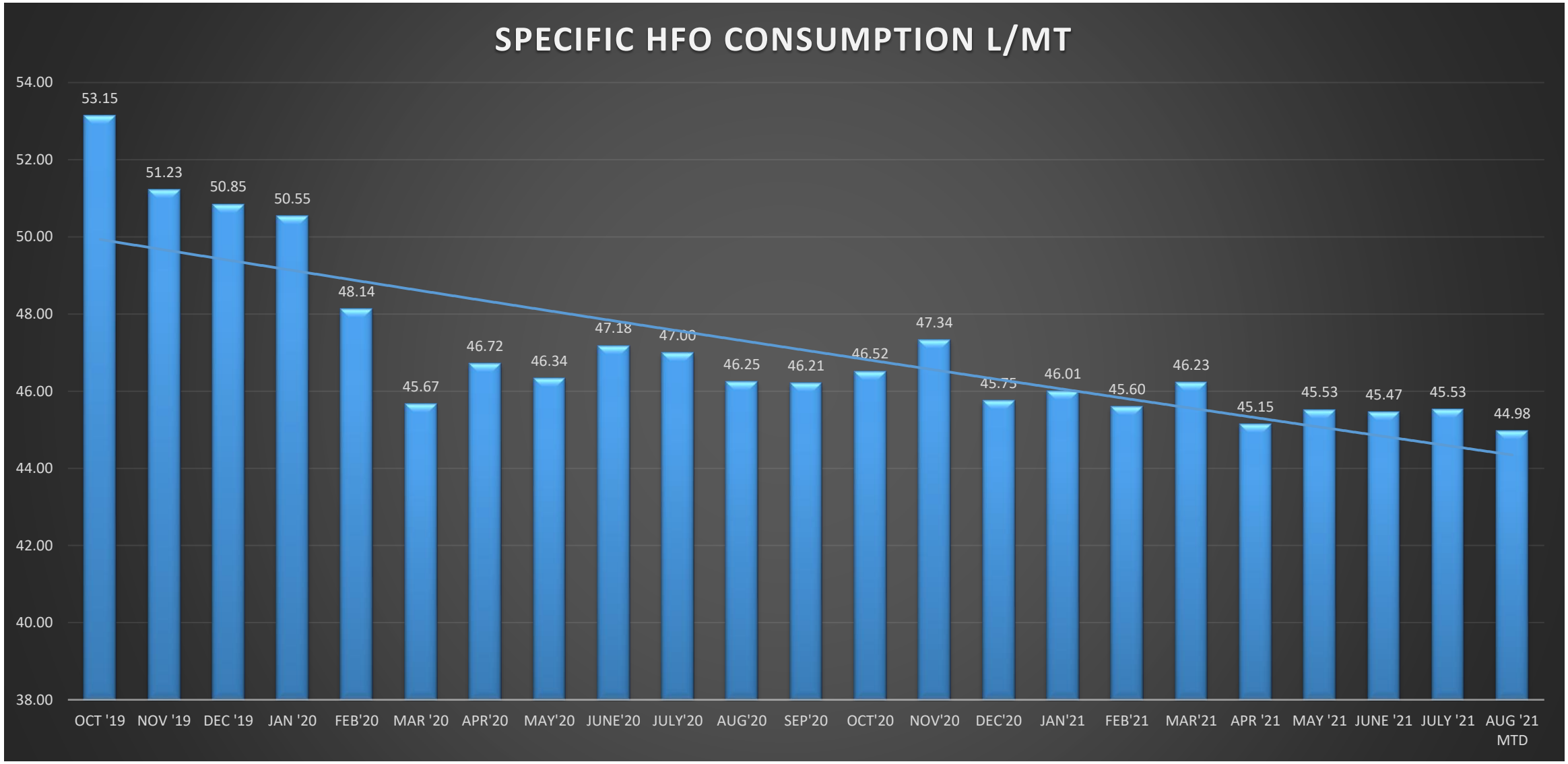
Ramp wise and section wise HFO pulsing trend and report

ACTION PLAN - CLONING IMPROVEMENT

vedanta
transforming elements

S No	Action Points	Responsibility	Target date	Quantity for trial	Status - 31.07.2020	Status - 07.08.2020	Status - 17.08.2020
1	Section and heating ramp wise consupmtion tracking to be done	V Sreeraj	23.07.2020		Done for fur 2	Done for fur 2	
2	Program to be installed in Heating ramp to stop the ramp when final anode temperature and soaking time is achieved	V Sreeraj	20.07.2020		BO-1 : done BO-2 : done	BO-1 : done BO-2 : done	BO-1 : done BO-2 : done
3	Pulse duration of BO 1 and BO 2 to be checked	Sudipta Seal	16.07.2020		Checked found ok , 65 miliseconds	Checked found ok , 65 miliseconds	Checked found ok , 65 miliseconds
4	Section and fwl wise TPR readings to be checked	V Sreeraj	10.08.2020		Template shared. IT team working on it.	Template shared. IT team working on it.	
5	Total count of pulsing done by injectors in a heating ramp to be collected and analyse				Done for fur 2	Done for fur 2	Done for fur 2
6	Mass flow meter to be installed in BO 2 for separate HFO consumption readings of furnace 3 and 4.			3 nos	Enquiry floated for procurement	Enquiry floated for procurement	Enquiry floated for procurement
7	Furnace operation compliance to be increased (placing of protection tube, leakages, etc.)				Daily tracking done via WhatsApp group of shift incharges.	Daily tracking done via WhatsApp group of shift incharges.	Daily tracking done via Whatsapp group of shift incharges.
8	Online mositure detection system for HFO circuit to be explored			1 nos	To be explored	To be explored	To be explored
9	Mositure detection system to check moisture in oil from tanker directly			1 nos	To be explored	To be explored	To be explored
11	Ramp stoppage data to be collected and action to be taken	Sudipta Seal	Continous		Tracking started	Tracking done on daily basis	Tracking done on daily basis
12	Crossover headwall brick replacement	Soumoditya	31.12.2020		PR raised for bricks	PR raised for bricks	PR raised for bricks
13	Expansion gap filling in cross over duct	Soumoditya	Quaterly Fur 2 - Aug'20		Fur 1 - July'20,Fur 2 - Apr'20, Fur 3 - May'20,Fur 4 - June'20	Fur 1 - July'20,Fur 2 - Apr'20 Fur 3 - May'20,Fur 4 - June'20	Fur 1 - July'20,ur 2 - Apr'20 Fur 3 - May'20,Fur 4 - June'20
14	Thermal imaging of cross over duct	Soumoditya	Monthly		Fur 1- 80-97,Fur 2 - 80-95,Fur 3 - 90-110 Fur 4 - 85-100		F1 – 90C -105C ,F2 –90C -100C F3 – 80C - 95C, F4 – 75C - 85C
15	Volume of HFO in a pulse to be calculated for each HR	Keshav	10.08.2020		F4 - HRCM 33	F4 - HRCM 33 F2 - HRCM 22,23,24,25	F4 - HRCM 33 F2 - HRCM 22,23,24,25,26,27
16	Feasibility of using emulsified HFO to be checked and trial to be taken	Kuldip	15.09.2020				
17	HFO consumption for crossover sections to be analyzed and compared with each other.	Sreejana	10.08.2020				
18	Schedule furnace shutdown duration to be analysed and optimise	Soumoditya	30.08.2020				
19	Side wall insulation repairing/ rebuilding to be planned according to TPR analysis	Soumoditya	Continous				
20	Higher HFO consuming heating ramp to be overhauled (Injectors, burner stand and thermocouple stand	Keshav	31.08.2020				
21	Burner and thermocouple stand to be replaced according temperature tracking	Keshav	Continous				Burner stand - 15 Thermocouple stand - 46
22	F2 crossover sec 18 to be checked and corrected	Soumoditya	04.08.2020		NA	Done	NA

PRESENT TREND



ELECTROLYSIS PROCESS -

The aluminum is produced extracting it from the aluminum oxide (Al2O3), called also alumina, through an electrolysis process driven by electrical current. The process uses as electrolyte a molten salts called Cryolite (Na3AlF6) capable of dissolve the alumina. Carbon anodes are immersed into the electrolyte (usually referred as the "bath") carrying electrical current which then flows into the molten cryolite containing dissolved alumina. As a result, the chemical bond between aluminum and oxygen in the alumina is broken, the aluminum is deposited in the bottom of the cell, where a molten aluminum deposit is found, while the oxygen reacts with the carbon of the anodes producing carbon dioxide (CO2) bubbles. The alumina reduction process is described by the following reaction

$$2Al_2O_3 + 3C \longrightarrow 4Al + 3CO_2$$

Once passed through the bath, the electrical current flows into the molten aluminum deposit and is then collected by the bottom of the pot, usually called "cathode“

Optimisation of Pot micro voltage -

- In Aluminium smelting power is one of largest cost bucket as well as constraint to high Carbon emission
- So inline with our Chairmen's vision about reduction of GHG we are committed to reduce Consumption of power in smelter
- The larger part of consumption is **pot DC voltage gain** by this projection we have identified our losses benchmarked and optimized the following elements -

I. Clamp drop

II. Pot Micro voltage

III. Bus bar Voltage

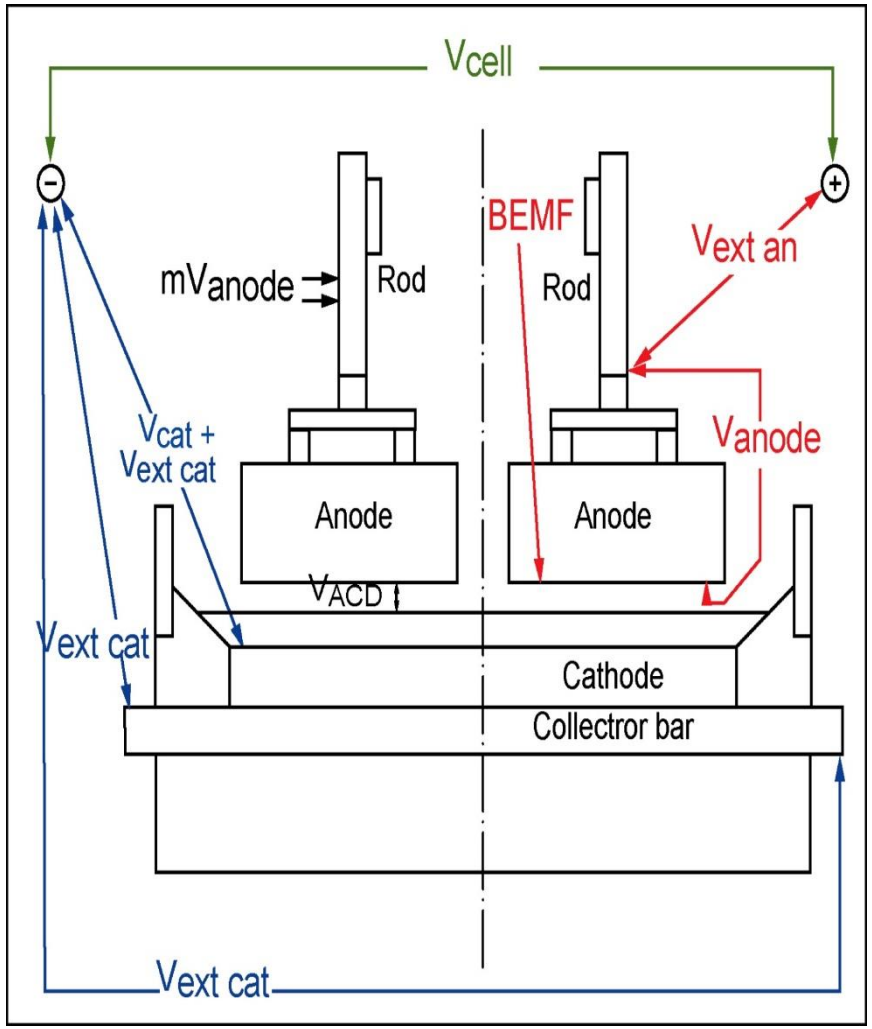
IV. Anode Drop

DESCRIPTION

The Cell voltage is the sum of the all drops which are present in pot like anode drop, bath voltage drop , Clamp drop ,Cathode voltage drop , voltage drops in external to the cell.

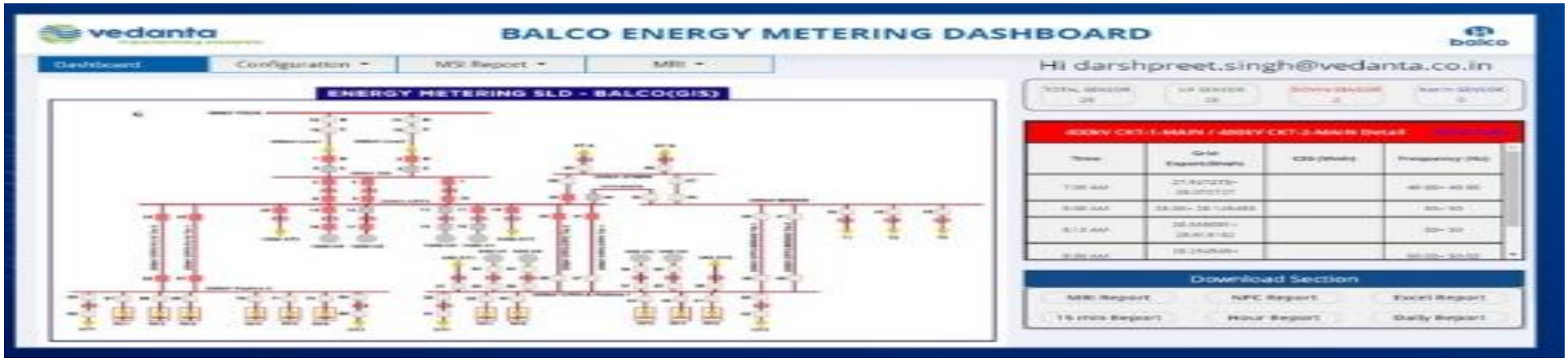
Voltage breakup are as follows,

Parameter	Unit	Voltage
Anode voltage Drop 1.Anode stem drop 2.Welding joint drop 3.Yoke Drop 4.STC 5.Carbon block Drop	V	0.348
Clamp drop	V	0.015
Cathode voltage Drop	V	0.300
External busbar voltage Drop	V	0.232
Bath Voltage Drop	V	1.550
Decomposition Voltage	V	1.670
Total Cell Voltage	V	4.115



MRI Energy Meters Automation & Dashboard”

- **Key Benefits** -
- Live portal for all MRI energy Meters
- Zero Human intervention in report generation
- Automatic Report generation in all required formats and Auto scheduling Feature
- Provision of Bulk MRI and Single MRI with one click
- SLD presentation on UI dashboard with all meters



Major Energy Conservation Projects-2018

S.No	Title of Project	Annual Energy Saving Million KWH	Investment Million INR
1	Increase in Potline1 Current Efficiency from 94.11% to 94.39% to save 42 KWH/MT	8.32	NIL
2	Cathode upgrade & Process optimization in Potline-1 in FY 19 (89KWH/MT).	26.53	616
3	Pot controller modification in Potline-1 to save 219 KWH/ MT(GAMI)	66.25	200
4	Auxiliary Energy Consumption reduction in to save 16 KWH/ MT	9.87	NIL
5	Cathode upgrade & Process optimization in Potline-2 in FY 19.(107KWH/MT).	25.56	682
6	Auxiliary Energy Consumption (inc TL) reduction in to save 15 KWH/ MT	14.76	NIL
7	Replacement of conventional MH400 W roof light fittings with LED 200 W (50 no's)	0.032	0.5
8	Roof light replacement 120 no's with LED. (10 no's per month)	0.068	1.2
9	Replacement of 250 W HPSV to 90 W LED in Street Lights	0.48	1.5
10	Modification in Cooling tower blade with FRP	0.18	1.5
	TOTAL (ROI- 18 Months)	**152.05**	**1502**

Major Energy Conservation Projects-2019

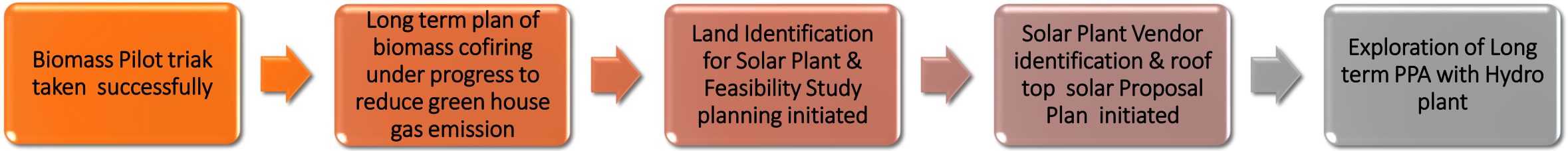
S.No	Title of Project	Annual Energy Saving Million KWH	Investment Million INR
1	Increase in Potline1 Current Efficiency from 94.28% to 94.65% to save 56KWH/MT	11.02	NIL
2	Cathode upgrade & Process optimization in Potline-1 40 pots in FY 20(55KWH/MT).	12.53	304
3	Increase in Pot line 2 Current Efficiency from 93.85% to 94.38% to save 79 KWH/MT	10.98	NIL
4	Cathode upgrade & Process optimization in Potline-2 102 pots in FY 20.(142KWH/MT).	15.55	561
5	Bake oven-Duct leakage arresting in FTP duct leading to a a reduction in ID fan speed by 2 %.	0.12	NIL
6	Ach Potline-2 Reduce the operating pressure of pumps in line 2 compressor pump house by VFD installation)	0.08	1.6
7	GAP- HTM heater oil change	0.08	NIL
8	Foundry -Optimising Temperature set point of all holding furnace	0.01	0.03
	TOTAL (ROI- 18 Months)	**50.37**	**866**

Major Energy Conservation Projects-2020

S.No	Title of Project	Annual Energy Saving Million KWH	Investment Million INR
1	120 (PL 1 : 45 pots & PL 2 :75 pots,) 100% graphitized pots installation & Normalization	79.1	138
2	Reduction in Sp Aux consumptions by 19 kwh/mt (F20 : 479 to BP21 - 459)	3.58	2
3	Auto Cut off EMS whenever furnace tilts up in Cast house 1	0.03	NIL
4	Optimizing furnace temperature set point by operational excellence in cast House 3	0.44	NIL
5	Optimization of annealing furnace cycle time from 9 Hr. to 7 Hr.	0.02	NIL
6	Reduction of compressed air Usage in cast House 3	0.24	NIL
7	Closed loop system in pump house in cast House 3	0.51	35
8	Optimizing furnace temperature set point by operational excellence	0.44	NIL
	TOTAL (ROI- 18 Months)	**84.36**	**175**

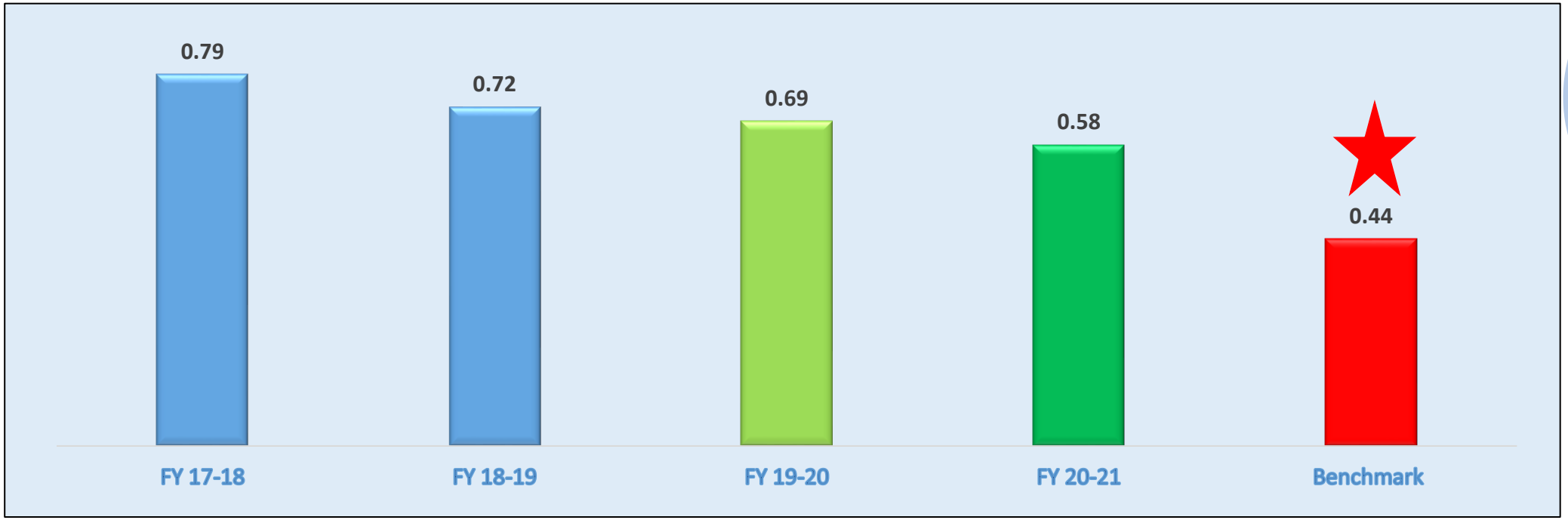
Utilization of Renewable Energy

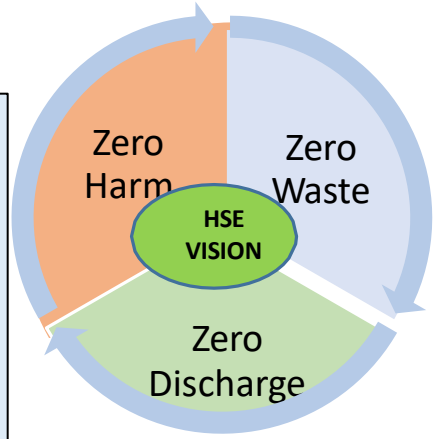
- Installed 33 KW Grid connected Solar power plant.
- Biomass Pilot Trial taken successfully at BALCO CPP#2(4X135 MW) in month of June-20,Total 125 tons of biomass was blended from 3% to 10 %to check technical feasibility as per MNRE guideline line
- 230 acres land has been identified within BALCO and feasibility Study done internally. Vendor exploration Initiated. 1.5 MW roof top Solar.



Identified Land in BALCO for Proposed Solar Plant Installation

Specific Water Consumption (KL/MT)





- Plant 1 water allocation reduction from **0.69 MCM to 0.64 MCM (savings 3.6 Cr in a year)**.
- Designated Consumer under PAT scheme for Aluminum Sector. PAT cycle -1 target over achieved by **0.088 TOE** (awarded 22203 ESCerts).
- PAT cycle-2 Target: **5.0275 TOE/MT** by 2018-19,Till date performance - **3.31 TOE/MT**

Year	Scope 1 emissions KG CO_2/Ton of Final product	Scope 2 emissions KG CO_2/Ton of Final product	Total KG CO2/Ton Final product
2014 - 15	21.00	2.30	23.30
2015 - 16	18.30	0.20	18.50
2016 - 17	18.87	0.03	18.90
2017 - 18	17.32	0.27	17.59
2018 - 19	17.38	0.05	17.43
2019 - 20	17.79	-	17.79
2020-21	17.29	-	17.29

Plantation Drive

Year	Planted	Survived
2015-16	30000	25434
2016-17	30000	25000
2017-18	5000	4500
2018-19	5000	4500
2019-20	15000	12000
2020-21	10000	8000
TOTAL	664100	561218

Plantation Drive

Energy Policy & Certifications

#	Description	Certification	Benefits
1	Quality management system	ISO 9001:2015	Enhanced customer satisfaction and improved customer loyalty leading to repeat business , Increased revenue and market share obtained through flexible and fast responses to market opportunities, Consistency in the delivery of your product or service.
2	Environment Management System	ISO 14001:2015	Identify cost savings with greater emphasis on resource, waste and energy management, Demonstrate compliance with current and future statutory and regulatory requirements.
3	Occupational Health & Safety Management System	ISO 45001:2018	Give signals to our clients and stakeholders that our organization is committed to protecting the needs of all our stakeholders.
4	Energy Management System	ISO 50001:2011	Increase energy cost savings for the organization by reducing costs via a structured approach to managing our energy consumption.
5	Asset Management System	ISO 55001:2014	Better management of risks, Enhanced brand reputation , Improved financial performance.
6	Quality Management System for the automotive industry.	IATF 16949	Ability/helps to enter auto manufacturing market.
7	Information Security Management System(ISMS)	ISO/IEC 27000:2013	Safeguard our valuable data and intellectual property
8	NABL accredited Lab	ISO 17025:2005	Reliable testing, measurement and calibration services
9	Social Accountability	SA8000	Addresses and prevent social and labor risks, motivates worker engagement

vedanta
transforming elements

balco

Bharat Aluminium Company Limited (Balco)

ENERGY AND CARBON POLICY

POLICY NO.:BALCO/POLICY/ 03 | ISSUE NO. : 04 | ISSUE DATE : 26.08.19

Balco acknowledges the global concern on climate change and recognizes energy as one of the most important resource being used in the process of generation of power and manufacture of Aluminium. Balco is committed to improve its energy performance and reduce negative impacts on the environment through its own Energy and Carbon management programme that forms an integral part of its vision for sustainable development and is consistent with its overall Business Vision and Mission.

Balco strives to :

- Adopt and maintain global best practices on Energy and Carbon Management and minimize GHG emissions throughout its operations. We shall define, measure, review and communicate our performance.
- Ensure the establishment of systems and processes necessary to improve energy performance with commitment for continual improvement. Provide a framework for setting and reviewing energy objectives and targets and take corrective and preventive actions for deviations supported by adequate resources;
- Report carbon emissions as per internationally recognized protocols and comply with applicable legal and other requirements with respect to energy consumption;
- Invest in clean energy and maximize benefits of energy from waste recovery. All future purchases of energy equipment's and appliances shall be done considering the Bureau of Energy Efficiency star rating and energy efficiency;
- Foster research & innovative techniques are constantly upgrade to feasible alternate cleaner sources of energy with continuous focus on minimizing energy consumption.
- Ensure energy and climate change awareness at all levels through policy roll-out, Communication and training;
- Consider energy efficiency and carbon emissions for its projects, R&D, investments in line with our commitments to sustainable development;
- Work with our staff, supply chain, wider communities and other stakeholders to demonstrate commitment to GHG and energy reduction principles and practices.

We will measure and report progress against this policy and review performance on a periodic basis to ensure continues management of energy and carbon. The content and implementation of this policy will be reviewed periodically and actions taken accordingly including the sharing of good practices throughout the organization.

ABHIJIT PATI
CEO & DIRECTOR, BALCO

Status of EnMS (ISO 50001) Audit Observation

	Year	No. of NC	No. of Observation	Open NC	Open Observation
Balco	15-16	3	17	0	0
Balco	16-17	0	10	0	0
Balco	17-18	0	6	0	0
Balco	18-19	0	5	0	0
Balco	19-20	0	3	0	0
Balco	20-21	0	2	0	0

%Investment for Major Energy conservation projects on Turnover

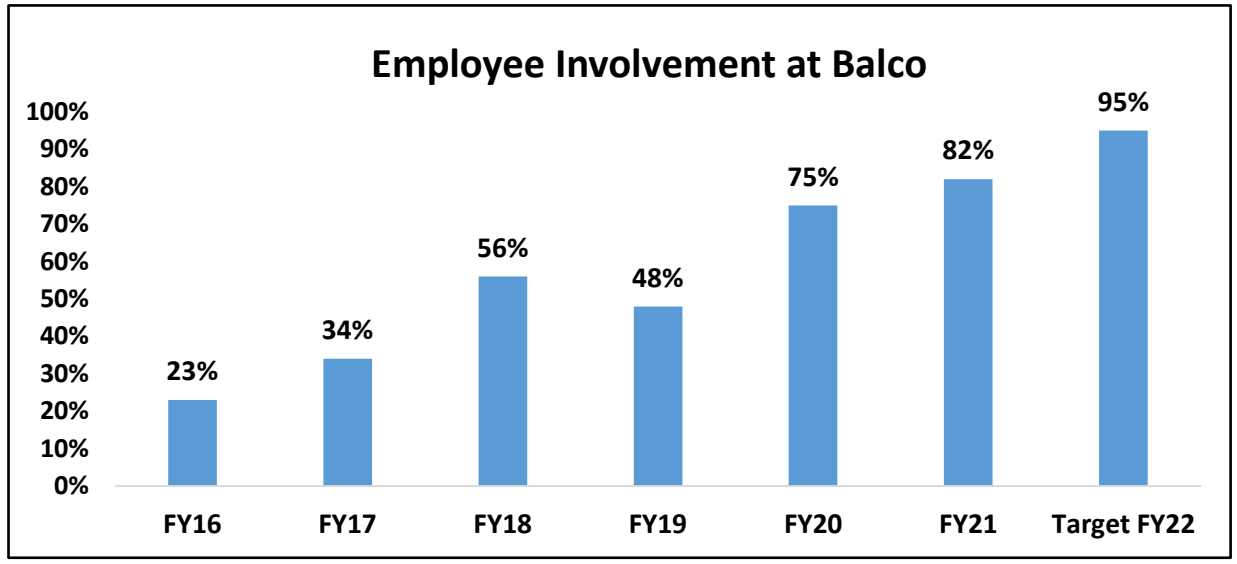
FY	Project Description	Investment (Rs. Crs)	Turnover (Rs. Crs)	% Investment on Turnover	ROI (Months)

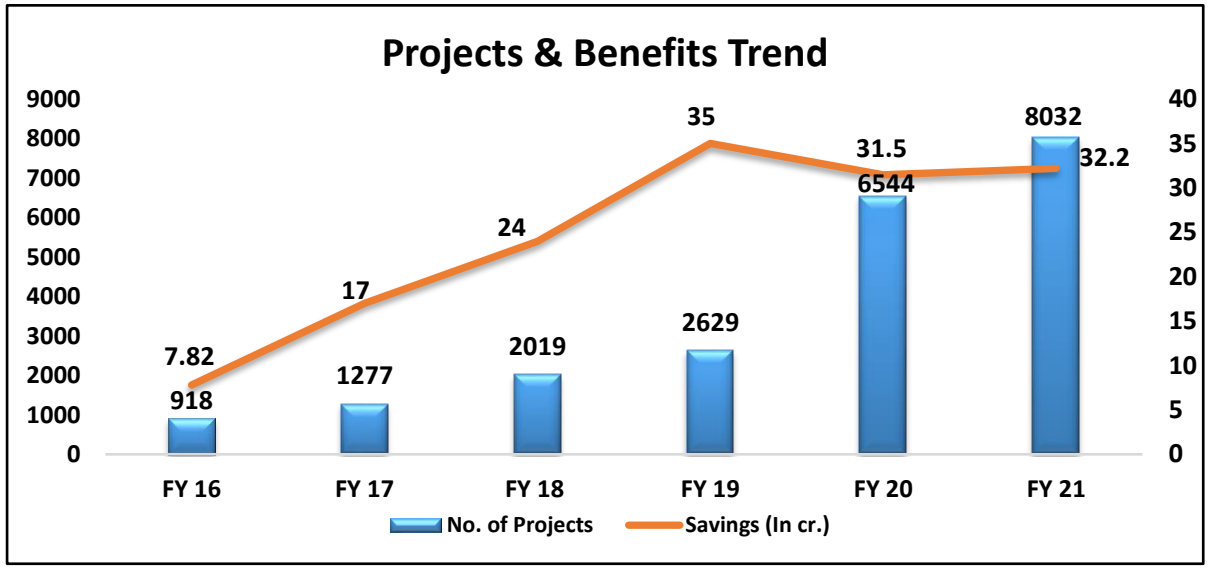
Implementation of Best Practices

Idea Portal & !DEA@BALCO APP for generation of ideas for All Balco & Contract employees.

- Idea generated FY21 – 12461
- Idea accepted FY21 – 3116
- Idea implemented FY21– 5835
- Idea under implementation FY21 – 1215

Energy savings from Employee & Stakeholder Involvement





Details	Unit	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21
QCs & Kaizen Projects Implemented	No.	918	1277	2019	2629	6544	8032
Energy Savings	Kwh	4375000	26892304	59584971	25367013	31381627	
Benefits due to energy savings	Rs. lacs	131	806	1788	887	1098	

Creating Awareness Among Stakeholders

Idea Theme for Jan'21 – Process Optimization

VSM, PFMEA, SQC, PROCESS CAPABILITY, SCORE CARD, COPQ, SIPOC, PRCA, VOC

Lean Six Sigma

Steps of PO
- Process Objective
- Simplify techniques
- Automate
- Analyse Activities
- Exercise
- Implementation Plan

Login in !dea@Balco

R & R CATEGORY
1. Best Idea of the month
2. Max. Idea Generator
3. Quick 5 Ideas

Share your ideas through Idea@Balco mobile app
https://ideaatbalco.app6.in/
Use tag # **PO#** before mentioning the ideas

Balco Emp: Username – Emp No. Gate pass No. Password – KIOSK

Contractor Emp: Username – 110+ Password – 12345

Idea Theme for Feb'21 – Innovation

got an idea

Login in !dea@Balco

Share your ideas through Idea@Balco mobile app
https://ideaatbalco.app6.in/
Use tag # **Inv#** before mentioning the ideas

INNOVATION IS THE ONLY WAY TO WIN

INNOVATION PROCESS STEPS
- Step 1: Define the Problem
- Step 2: Generate Ideas
- Step 3: Evaluate the Ideas
- Step 4: Choose the best Idea / Ideas
- Step 5: Develop the Idea
- Step 6: Implement the Idea
- Step7: Monitoring

R & R CATEGORY
1. Best Idea of the month
2. Max. Idea Generator
3. Quick 5 Ideas

Idea Theme for Mar'21 – Quality

High costumer satisfaction, Reliable product/service, More market share, Benefits of quality, Better efficiency of Operations, Better moral of Workplace, More productivity & profit

Improve Quality. It will automatically improve productivity

R & R CATEGORY
1. Best Idea of the month
2. Max. Idea Generator
3. Quick 5 Ideas

Share your ideas through Idea@Balco mobile app
https://ideaatbalco.app6.in/
Use tag #**QUAL**# before mentioning the ideas

got an idea — Drop me at !dea@Balco

Balco Emp.: Username – Emp. No. Password – KIOSK

Contractor Emp.: Username – 110+ Gate pass No Password – 12345 (Default)

Idea Theme for Apr'21 – HSE

Share your ideas through Idea@Balco mobile app/ portal using this link
https://ideaatbalco.app6.in/

Use tag #HSE# before mentioning the ideas

HEALTH + SAFETY AT WORK

BE A PART OF SOLUTION NOT PART OF THE POLLUTION

Ways to Improve HSE Culture

R&R Category
1. Best idea of the month
2. Max. idea generator
3. Max. idea generator SBU
4. Quick 5 Ideas

WALK SHARE CARE LEARN

Awards

IMEA Future Ready Factory Award (Platinum Category)

RBNQA Performance Excellence Trophy

AON Best Employer Award

The ET 4 Good Award

CII HR Excellence Award

Golden Peacock Award in CSR

Golden Peacock Award in Energy Efficiency Category

Sustainable Business of the Year Award

Energy & Environment Global Environment Award

Best Paper Presentation Award on" Development& Stabilization of A356.2 Alloy Ingot "-IBAAS

Future of Procurement Award

PR Best Practices Award

Sustainability 4.0 Award

D L Shah Award

Corporate Social Responsibility

Strengthened **393** SHG's.

1500+ linked to IGA.

4292 Women benefitted under project

Established Bio-flock for fisheries.

803 acres brought under secured irrigation.

SRI Cultivation in **450+** acres

Wheat Cultivation in **190+** acres

No. of farmers benefitted: **790**

Providing training to youths in 6 trades.

172 trained and **47** placed.

45-60 days training program.

Earning **10.5 K** per month

Door to Door awareness & Group Formations. Digital Awareness

Reached out to **24 K beneficiaries**

28 Adolescent girls group formed.

Currently running **5** Rural Health Post

Catering to the needs of more than **60** villages.

5000+ people benefitted through RHP

12000+ people covered through HIV awareness.

800+ benefitted through programs on women & child.

COVID -19 Relief Initiatives

Reached out to **72,440** people through various COVID relief initiatives

Tertiary Level –

- Established **Vedanta Cares 100-Beded Field Hospital** in Raipur
- Support to the District administration - medicines & medical equipment

Secondary Level –

- Continuous **Sanitization drive** in **30 communities**
- **14K+** Sanitation Kits (Soap, Sanitizer & mask) in **30 communities**
- **Livelihood – 71K +** masks stitched by 122 Unnati SHG women earning **~Rs 3.5 lakh**

Primary Level –

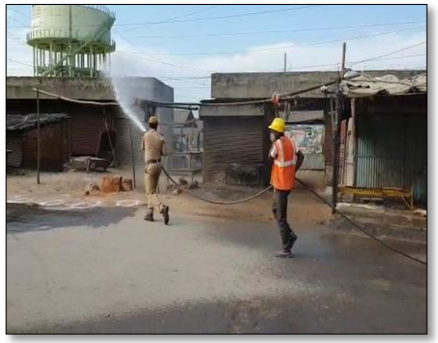
- **Audio & Digital/Print Awareness activities** about Do's & Don'ts, vaccination and testing in both Rural & Urban areas
- **COVID status –**
  - **Vaccination** – 95% of population above 45 years of age ,15% of population between the age group 18-45 years of age.
  - Casualties – 28; Active Cases – 25 to 30

Awareness & Relief activities against Covid -19

Awareness activities about Do's & Don'ts in both Rural & Urban areas with the help of mic & Pamphlets

More than 15 K masks produced by SHG members, earning 75 K.

Pamphlet for awareness generation



Continuous Sanitization drive in 22 Villages and 11 Urban communities.

More than 12000 cooked meals distributed to families dependent on daily wages.

Protection & Cure activities against Covid -19

Sanitation kits including soaps & Masks distributed to 3250 HHs in 6 Panchayat

Created 100 bed isolation hospital in association with District Administration

1000 PPE kits given to AIIMS Raipur

- Providing Farm fresh vegetables.
- Direct link between Farmers and end customers.
- Managed by KKUPCL, a farmer producer company promoted by BALCO.
- 135 customers.

1190 Dry Ration Packets distributed to families under BPL and daily wage.


Employees rewarded for their Exemplary Work

THANK YOU


Chanakya Finalists
with EXCO Team
Good things in business are never
done by one person.
They are done by a group of people


Families visit Balco Plant under
'Project Family Connect'