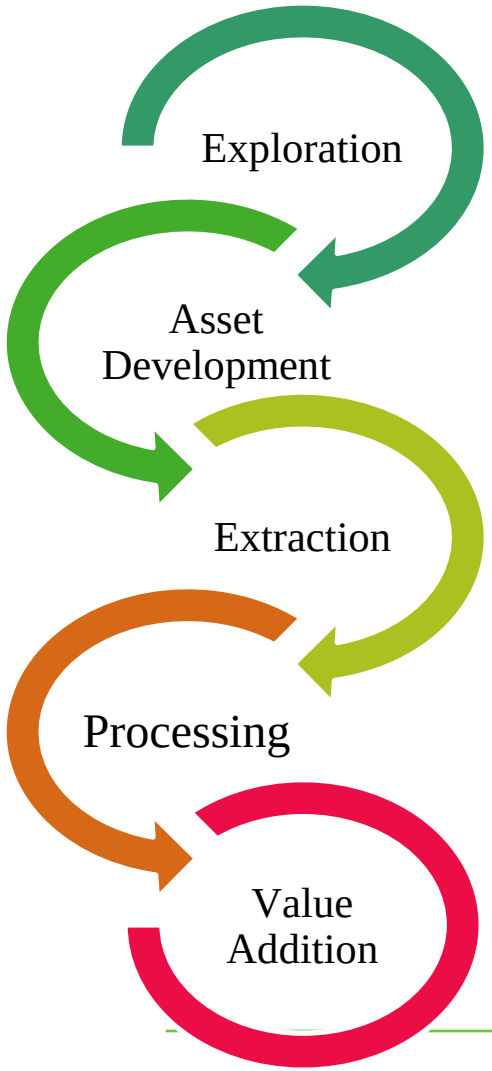
Vedanta Aluminum Jharsuguda- Metal -Dharitri

Vedanta Limited, Jharsuguda

Vedanta- What we do!

Value Chain



Our operations

Zinc-Lead-Silver
India, Ireland, Namibia & South Africa

Oil & Gas
India & South Africa

Iron Ore
Goa, Karnataka & Libera

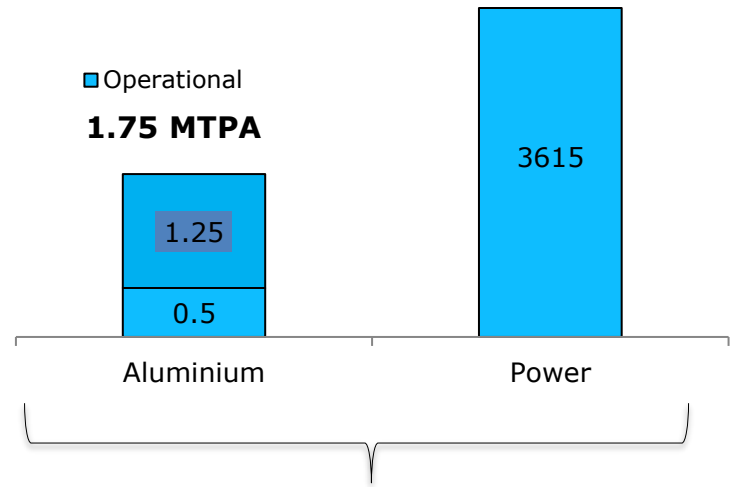
Copper
India, Australia and Zambia

Aluminium
Jharsuguda, Korba (Balco), Lanjigarh

Power
Talwandi, Jharsuguda, Korba, Tamil Nadu

Aluminum- Jharsuguda

Jharsuguda



Our Core Purpose & Values

CORE PURPOSE

Vedanta is a globally diversified natural resources company with low-cost operations. We empower our people to drive excellence and innovation to create value for our stakeholders. We demonstrate world-class governance, safety, sustainability, and social responsibility standards.

OUR VALUES


SAFETY


TRUST


ENTREPRENEURSHIP


INNOVATION


EXCELLENCE

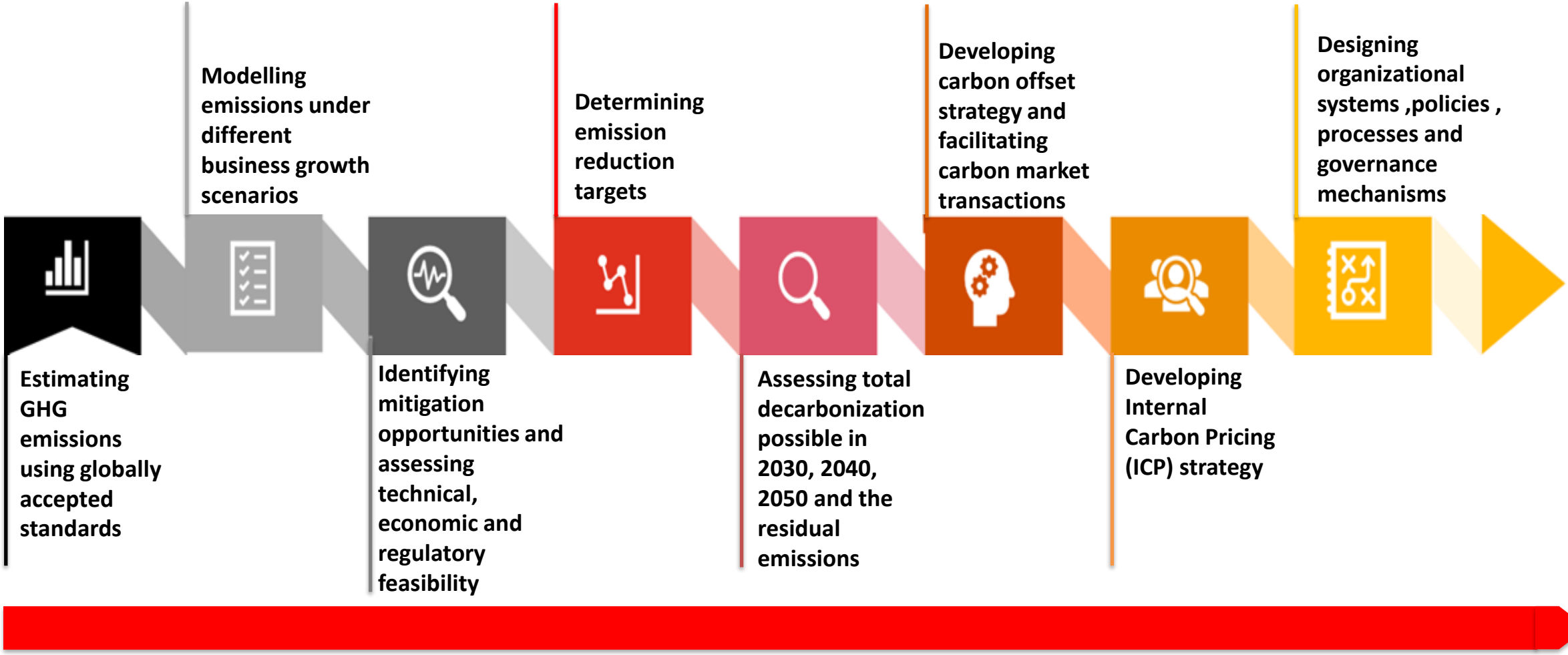

INTEGRITY


CARE

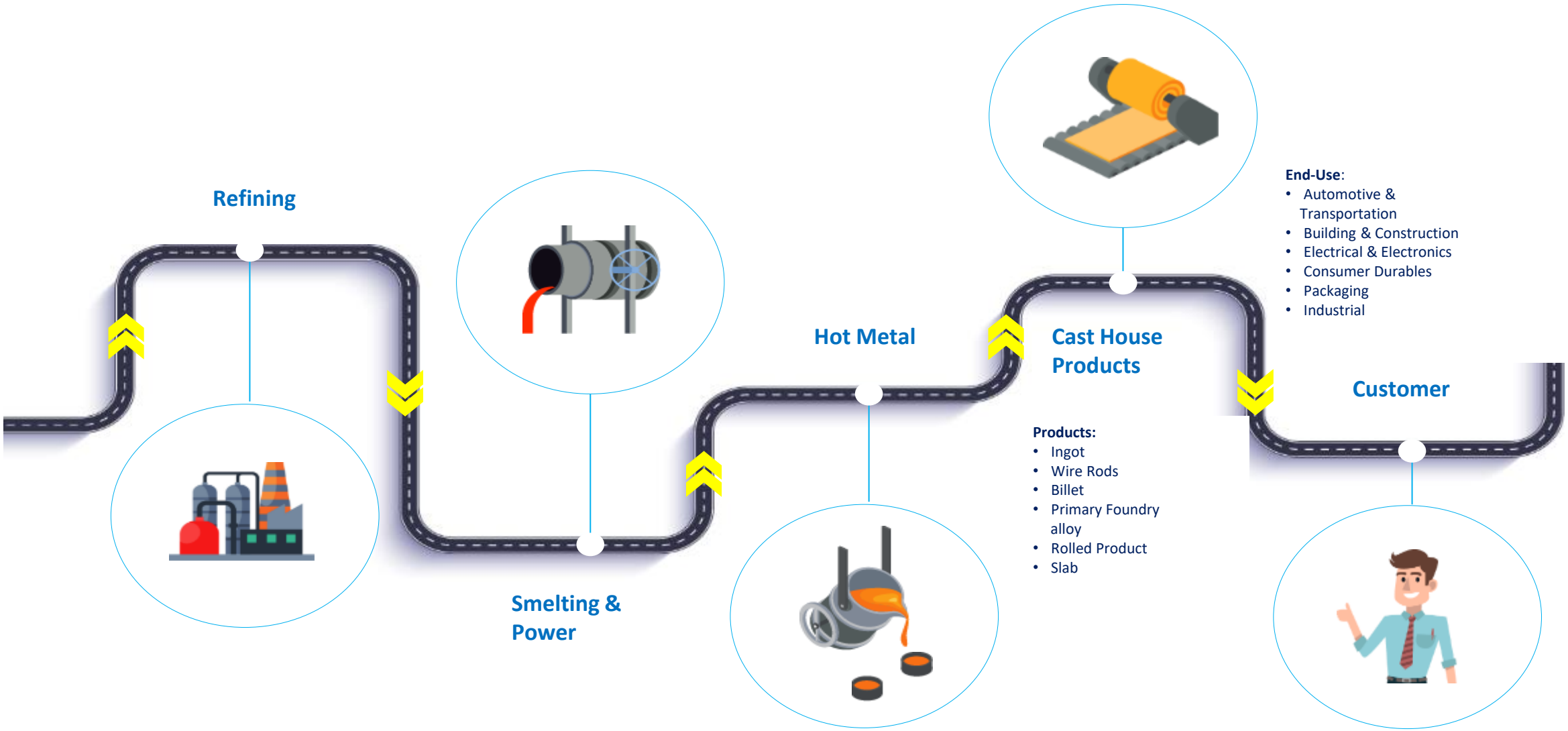

RESPECT

Vedanta's Vision Towards Sustainability

APPROACH ADOPTED



Value Chain



Smelter Overview

Smelter 1	Smelter 2
✓ GP – 320 Prebake Technology ✓ No. of Lines – 2 ✓ No. of Pots – 608 ✓ Pot Amperage – 325 KA ✓ Design Capacity – 500 KTPA	✓ GP – 340 Prebake Technology ✓ No. of Lines – 4 ✓ No. of Pots – 1322 ✓ Pot Amperage – 340 KA ✓ Design Capacity – 1250 KTPA
✓ GAP – 2 Paste Plants (Outotec GMBH, Germany) ✓ Bake Oven – 4 Bake Furnaces ✓ Anode Rodding Plant	✓ GAP – 2 Paste Plants (Outotec GMBH, Germany) ✓ Bake Oven – 6 Bake Furnaces ✓ Anode Rodding Plant
✓ Ingot Casting Mill – 3 Lines ✓ Wire Rod Mill – 2 Lines ✓ Billet Casting Mill – 1 Line ✓ Slab Casting – 1 Line	✓ Ingot Casting Mill – 4 Lines ✓ Wire Rod Mill – 2 Lines ✓ Billet Casting Mill – 3 Line ✓ Cast Bar Mill – 2 Lines ✓ SOW Cast – 1 Line

TECHNOLOGY & EQUIPMENT

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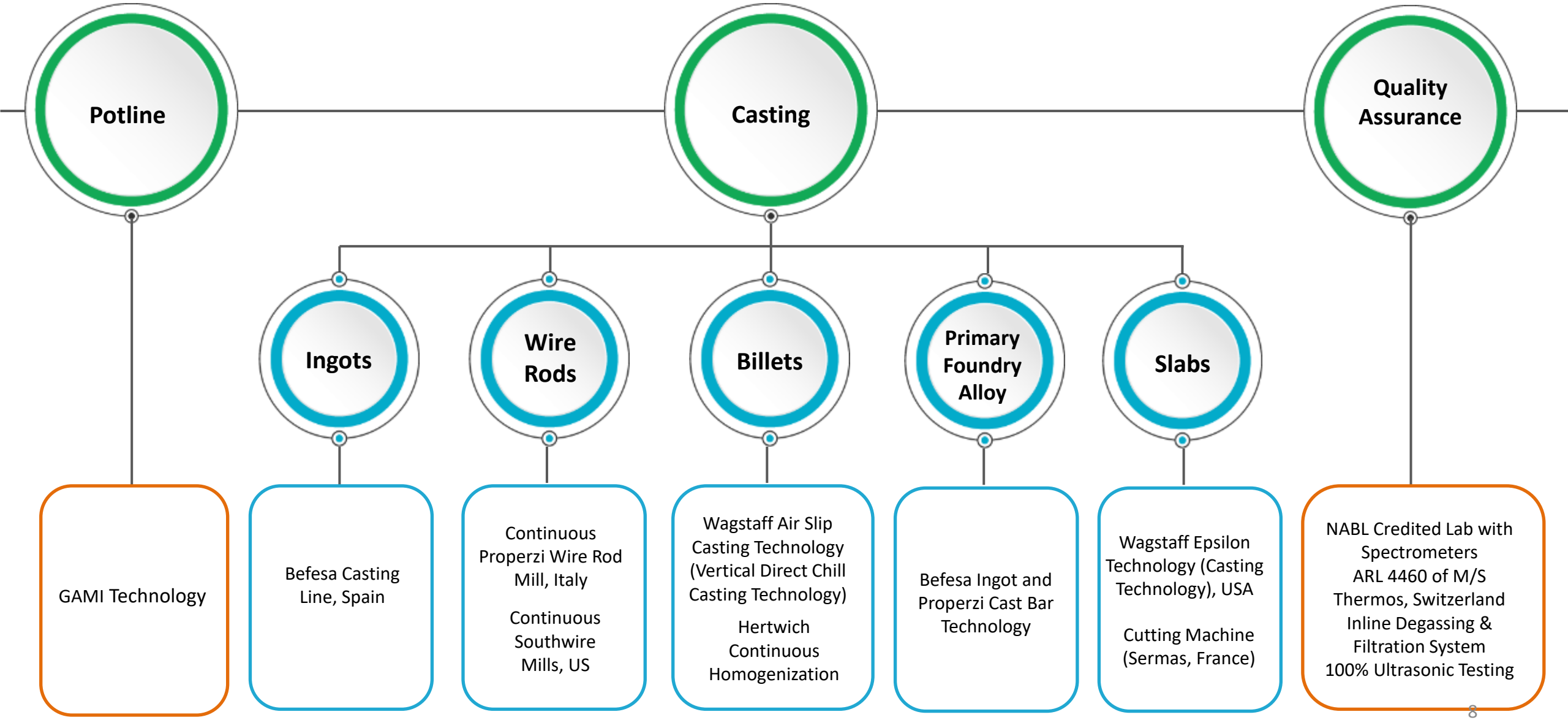
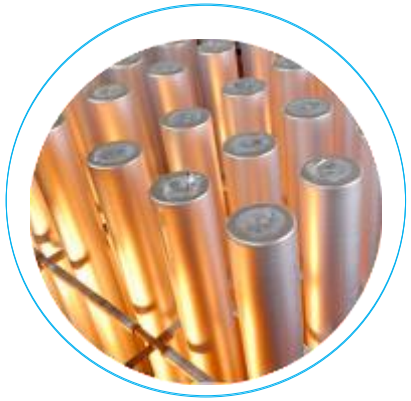
transforming for good



Product Portfolio



ALUMINIUM BILLETS

Automotive, Building & Construction, Electrical

ALUMINIUM WIRE ROD

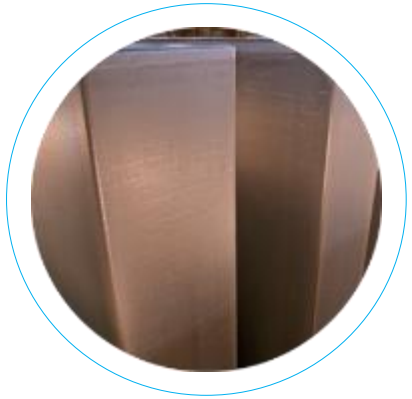
Electrical

P1020 INGOTS

Automotive, Electrical, Building & Construction, Re-melting

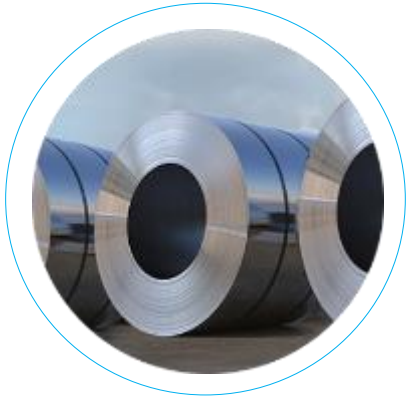
PRIMARY FOUNDRY ALLOY INGOT

Automotive (Alloy Wheels, Cylinder Heads)



SLAB

Building & Construction, Cold & Hot Rolling



ROLLED PRODUCT

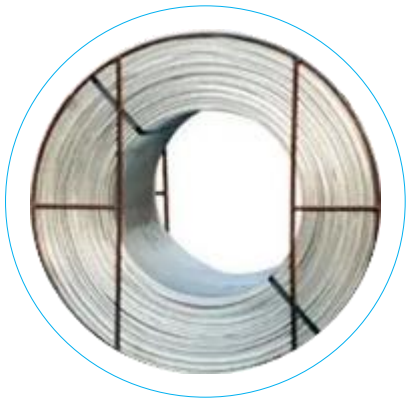
Automotive, Insulations, Bus Bars, Power Projects, Electrical, Packaging

SOW INGOTS

Automotive, Electrical, Building & Construction, Re-melting

T-INGOTS

Building & Construction, Automobile, Transportation, Electrical, Household Appliances, Re-melting



FLIP COILS

Steel Manufacturing

HOT/LIQUID METAL

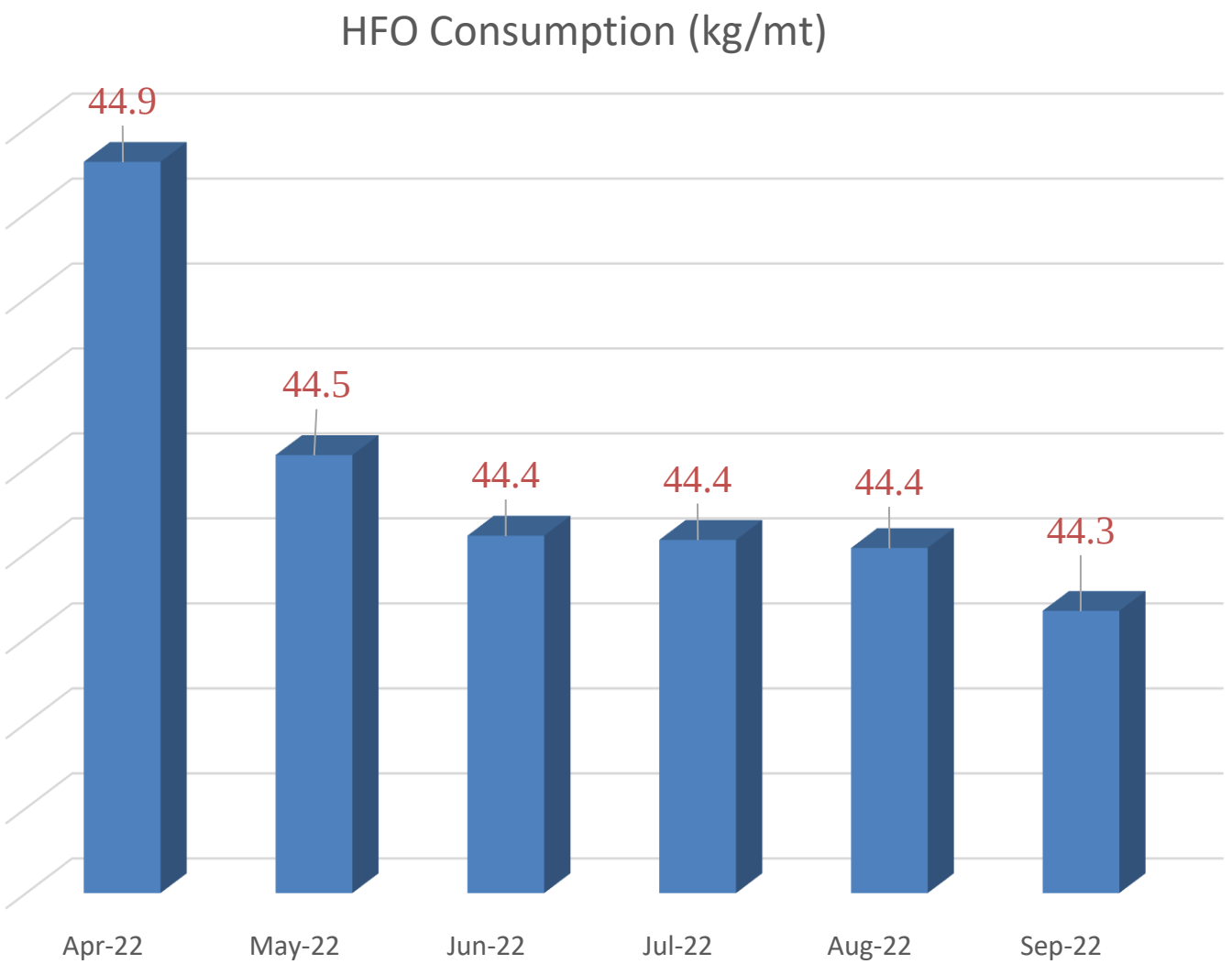
Any Application

Key Projects Driven in Vedanta Jharsuguda

Sl No.	Initiatives
1	Reduction of specific HFO consumption -44.9 kg/Mt to 44.3 kg/MT.
2	Increase in Green Anode plant Throughput-35 TPH to 37 TPH
3	Anode Stub Hole Modification- 5 mv of Voltage saving
4	100 % Graphitization Journey-13000 kWh/MT
5	Vedanta Lining Design-200 units saving in Power
6	Installation of RUC Cathodes- 265 Units saving in Power
7	Energy Saving Initiatives-LED Installation
8	Energy Saving Initiatives-VFD Installation
9	India’s largest Electric Forklift Fleet Deployed- Step Towards Net Zero emission
10	Environment Initiative

Reduction of Specific HFO Consumption- 44.9 Kg/MT to 44.3 kg/MT

The control of combustion for heavy oil is essential to ensure energy efficiency (an optimum fuel consumption) and anode quality during the baking process.



Action plan Taken

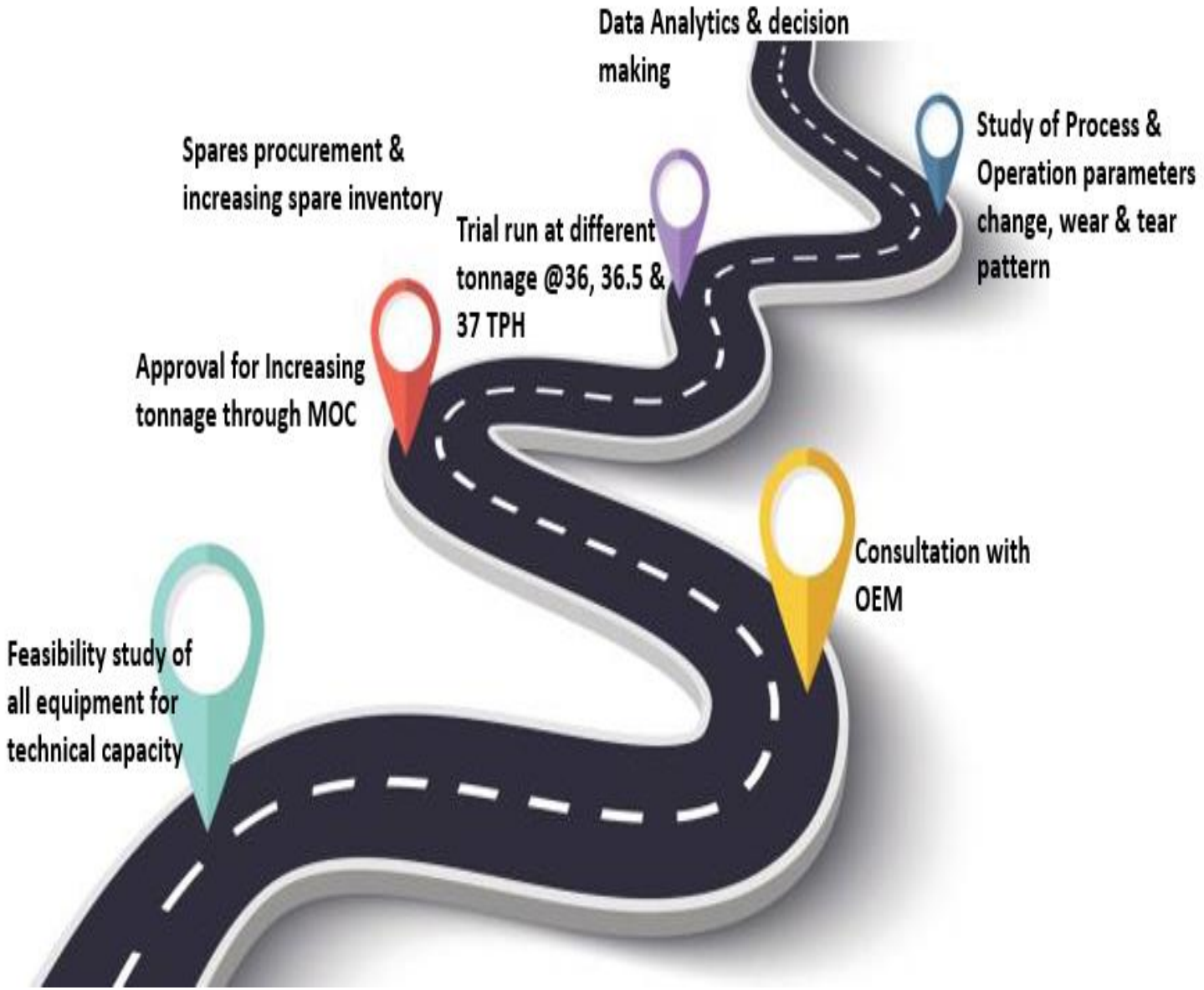
- Reduction in leakages by improving sealing in furnaces
- Improvement in side flue wall and cross-over temperatures
- Optimization of firing curve in both pre-heating and heating zones and in operational practices
- Negative & positive pressure optimization for complete combustion of pitch volatiles in pre-heating zone
- Usage Emulsified Oil instead of Heavy Furnace Oil during firing

Increase in Green Anode plant Throughput-35 TPH to 37 TPH

One major step taken in carbon is an “Increase In Green Anode Plant throughput from 35 tph to 37tph” resulting in 4500 nos. more anode production over capacity without affecting anode quality parameters.

Anode quality parameter comparison

Anode quality	@35.0 TPH	@37.0 TPH
Apparent Density (g/cm3)	1.584	1.584
Air Permeability(nPm)	0.47	0.51
Electrical Resistivity(µΩm)	59.0	58.9
Flexural Strength(Mpa)	11.54	11.48



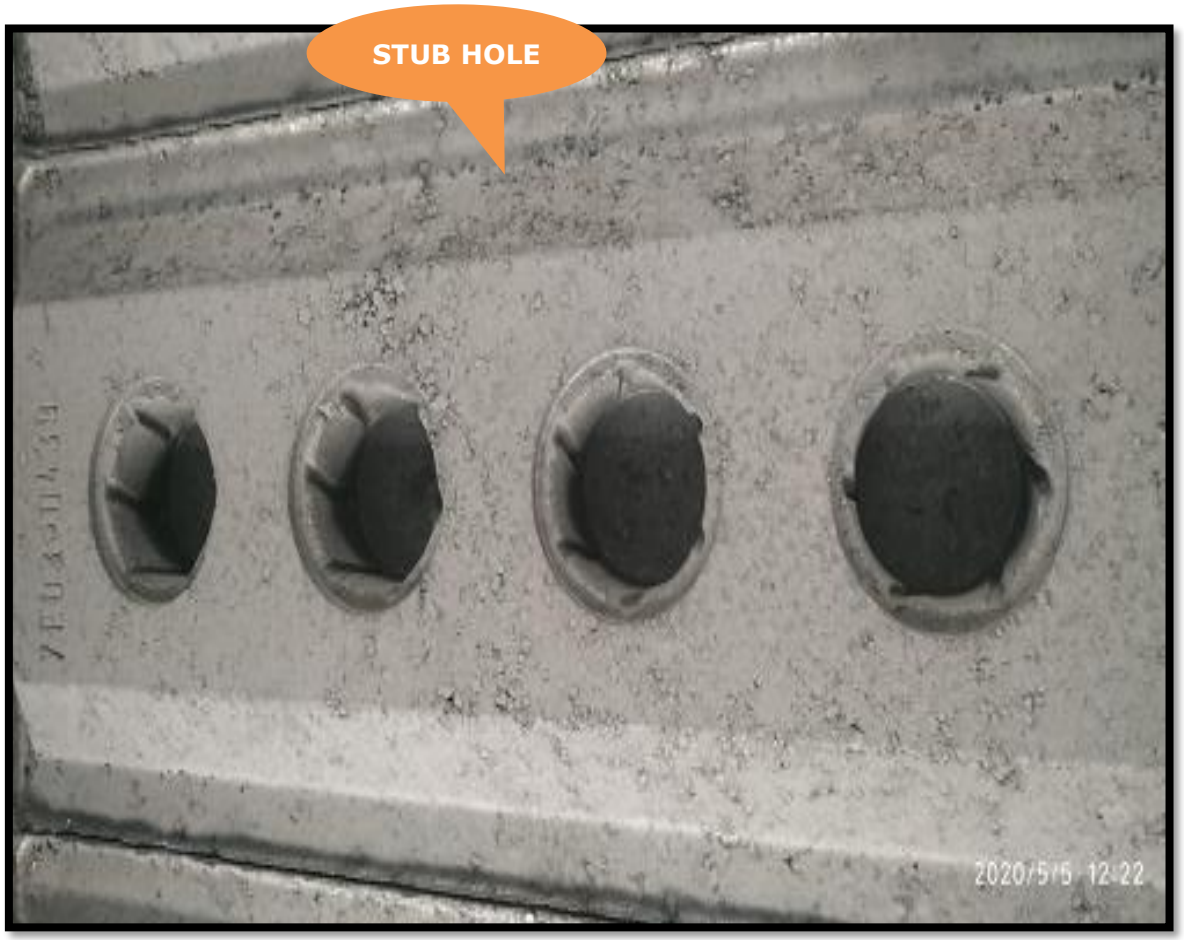
SEC reduced by 10%

Anode Stub Hole Modification- 5 mv of Voltage Reduction

Total 4 numbers of stub holes in one anode, which are formed by stub hole formers fixed with Vibro compactor cover weight in GAP. To take a trial all eight stub hole formers are changed in two Vibro compactors of GAP 1 and anodes are tracked up to the pot line for performance tracking.

KEY CHANGES MADE

Particulars	UoM	OEM design	Modified Design
Height	mm	115	120
Outer diameter	mm	195	205
Flute width	mm	T: 28/20, B: 26/18	T: 24/16, B: 20/11
Flute angle	deg	15	15
Height of top flute ring	mm	10	10
Height of bottom flute ring	mm	8	8



GREEN ANODE

Anode Stub Hole Modification- 5 mv of Voltage Reduction

Financial gains (Stub Hole Design Modification)	UOM	Formula	Gain from 1910 pots
Basline STC at pot line	mV	a	83.7
MSH STC at pot line	mV	b	78.8
Decrease in Pot Voltage per unit decrease in MSH	mV	c=a-b	4.9
Decrease in DC kWh/MT of Al with unit mV decrease in pot voltage	KWH/MT of Al/mV	d	3.2
Total Annual Savings	Million $		**0.42**
Considering Exchange Rate	INR/$		80
Annual Payback	INR (in cr)		3.07

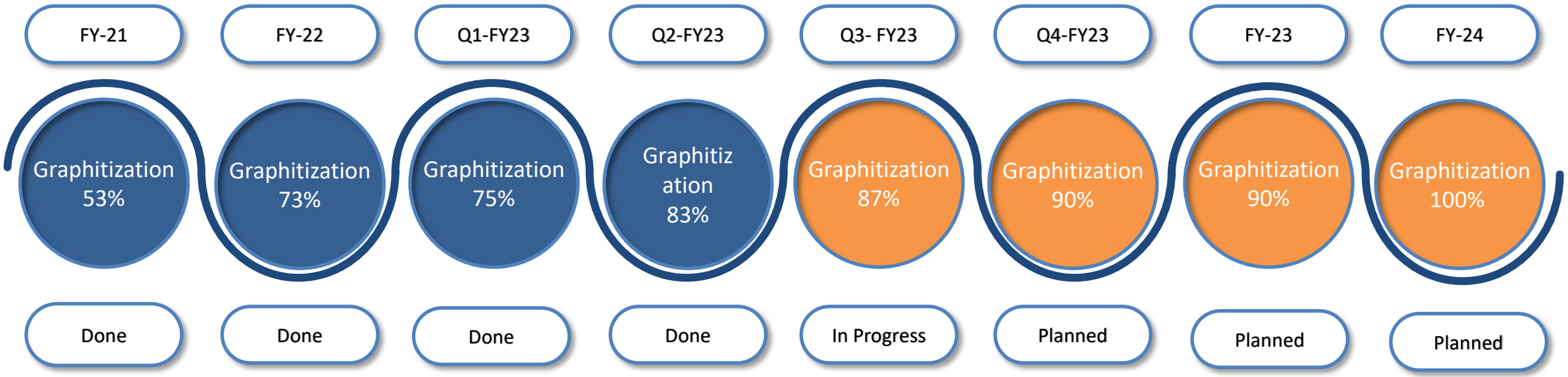
100 % Graphitization Journey-13000 KwH/MT

In smelting, pot Carbon is used as Anode and Cathode block for necessary electrolysis.

Existing cathodes are of 50% graphite content which consumes more power due to less conductivity same is replaced with 100% graphitized cathodes which is having better conductivity and hence high energy conservation.

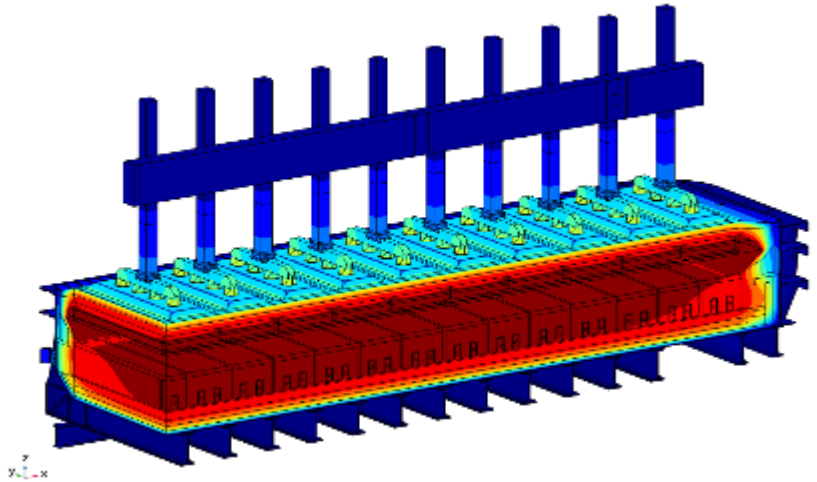
Benefits of implementation:

- Resistivity reduced from **26 ohm-cm to 12 ohm-cm**.
- Operating Voltage decreased from **4.206 V to 4.110 V**
- CVD (Cathode voltage drop) decreased from **385mV to 265mV**.



Vedanta Lining Design-200 units saving in SPC Power

- **Development of indigenous lining design**
  - ✓ Novel lining design including the **insertion of copper collector bars** has been developed with the help of modeling & simulation in collaboration with **CAETE, Brazil**.
  - ✓ Modelling and Engineering expert is on-site for supervising the pot build-up and start-up.
  - ✓ Pot build-up is in process under the supervision of the CAETE team.
  - ✓ Trial to be conducted in 10 pots for gauging practical feasibility.
- **Key Benefits**
  - ✓ Potential SPC reduction: ***200 units***
  - ✓ Current creepage capability: **+20 kA**



VLD Thermal Model

Installation of RUC Cathodes- 265 Units saving in SPC Power

Problem Statement:

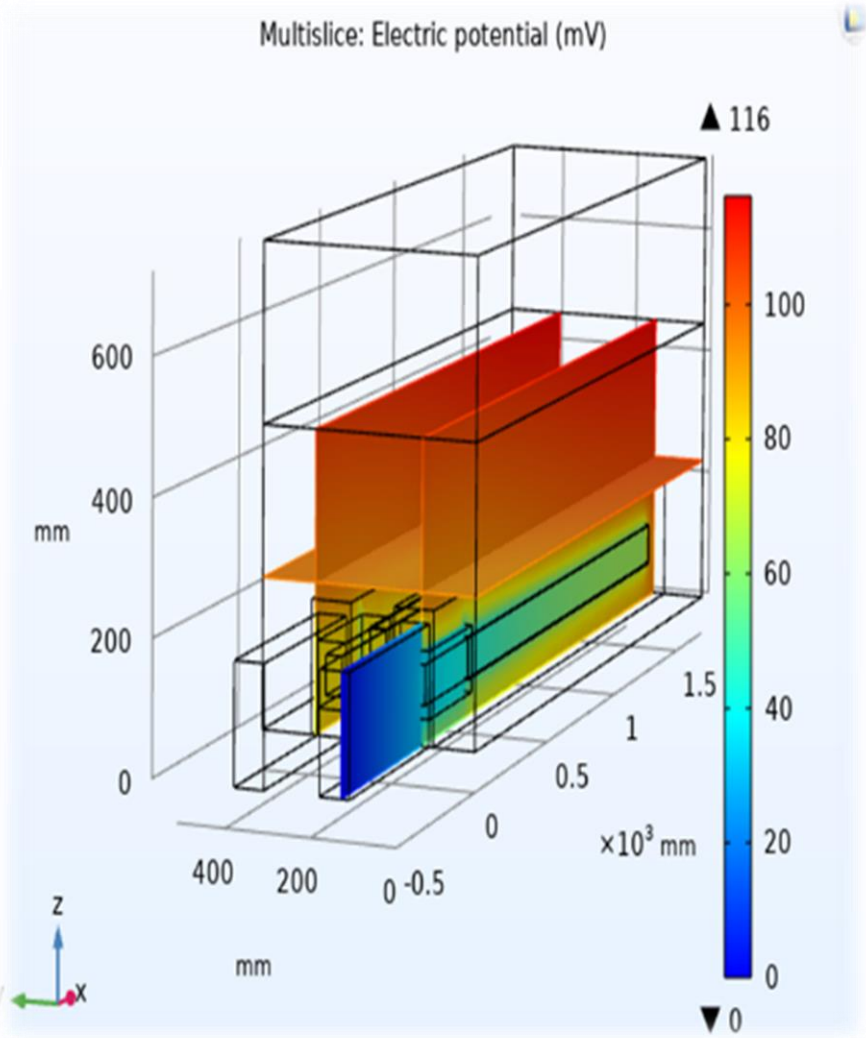
- Limitation of existing lining design for current creepage.
- Higher CVD in existing lining design

Approach and Solution:

- Collaboration with Tokai Cobex for installation of RUC cathodes
- The RUC lining design is having the current creepage capacity of up to 360 kA which will lead to higher productivity & less SPC

Potential Impact:

- SPC Reduction: 265Units
- Current Creepage: +3.5kA (On Modeling Basis)

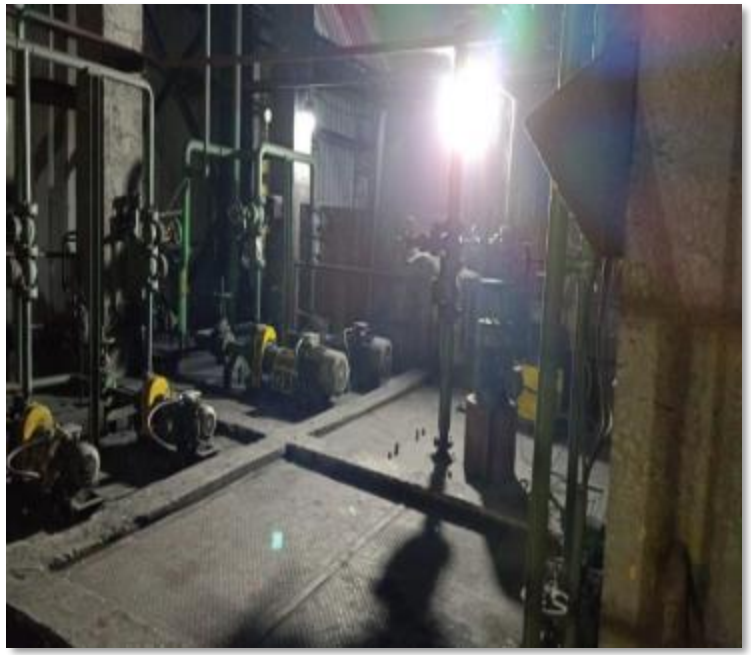


RUC Thermal Model

Energy Saving Initiatives-LED Installation

Lighting is the area where a lot of scope is there for energy consumption reduction. Many initiatives have been taken in all the areas of Smelter-1 like LED conversion, automation of lighting circuit to eliminate idle running of lights, Day time lighting control at shop floor lighting, etc.

Potline-2



Ungrouping area of Bake oven

Rectifier ,Plant 1

Energy Saving Initiatives-VFD Installation

In RPH-1 & 2, there are 3 CT fans one with VFD and the other two are DOL starters. At normal operation, one DOL CT fan and one VFD CT fan run simultaneously. Now one more VFD installation is done and now at normal operation two VFD CT fans run simultaneously at 36.5Hz. This resulted in energy saving of 8kW in each RPH.

Energy saving per Anum- 140160 Kwh

India's largest Electric Forklift Fleet Deployed- Step Towards Net Zero emission

As a step towards net zero emission, it is planned to use battery operated forklift in place of diesel operated. Recently demo trial has been taken, generating savings of 30L/day, and one switchyard battery-operated car was in-house developed in place of diesel operated one.

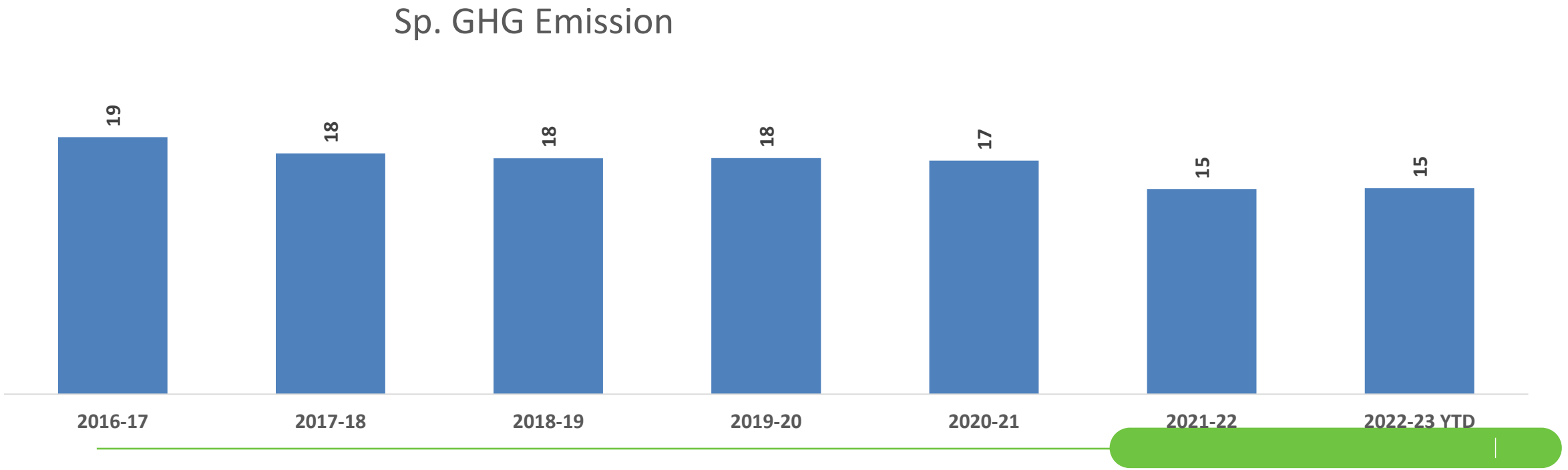
- 27 Lithium ion battery powered electric forklift being operationalized.
- IOT based smart fleet management system for enhanced safety
- Potential for GHG emissions reduction – 690 T of CO_2 annually.
- Reduction in diesel consumption

Vedanta Approach towards Waste utilization

Sl No.	Initiatives Taken
1.	Installation of Mechanical Waste converter done for manure production from food waste.
2.	Dross Refining unit Installation.
3.	Recycling of broken Cathodes in Carbon Plant .
4.	Recycling of used steel stub pins in casting.
5.	Reuse of Refractory (SPL) Waste.
6.	Reuse of used steel collector bars.
7.	Reuse of effluent water for gardening.
8.	Rejected Anode butt utilization.
9.	Incineration of used Bag Filters in Baking Furnaces.
10	Regulated consumption of Contaminated Alumina.

Carbon Footprint Activities

Year	Scope 1 emissions CO_2e (MT)	Scope 2 emissions CO_2e (MT)	Scope 3 emissions CO_2e (MT)	CO_2e MT
2016- 17	1,50,98,803	45,942	3,99,815	1,55,44,560
2018-19	2,18,01,821	26,24,891	7,70,588	2,51,973,00
2019-20	2,28,93,187	8,02,665	3,77,712	2,40,70,583
2020-21	2,39,26,260	5,10,837	-	24437097
2021-22	23895350	1956916	5005928	30858194



Environment Initiative

Battery Operated Forklift

Initiative Description: Deployed 23 Lithium-battery powered electric forklifts at Smelter Plants. Substantially longer life than conventional lead-acid batteries.

Reduction in diesel consumption by over 2.5 lakh litres annually thereby ensuring GHG reduction of approx. 690 TCO2/yr.

Electric Tanker Pilot Project

Initiative Description:

To decarbonize its vehicle fleet, Electric tanker vehicle for transportation of alumina flagged off. It will reduce diesel consumption by 18000 Litres annually/vehicle thereby reducing carbon emissions by ~50 TCO2e per annum.

Lithium-ion Electric Bikes

Initiative Description: Initiative Description: Transformation of petrol-fueled bikes to Electric Bikes. These 4 e-bikes are completely emission-less and will be used by security team for patrolling in plant and township. It will reduce petrol consumption by 2800 Litres annually thereby reducing carbon emissions by ~4 TCO2e per annum.

Environment Initiative

Fixed Mist Canon in TPP Coal Yard

Initiative Description: Installation of Fixed type mist canon at Coal Handling Plant of 2400 MW TPP resulting in significant improvement in air quality of CHP as well as surrounding areas.

Mobile Mist Cannon

Initiative Description: Deployment of mobile mist cannons (6000 Liters/vehicle) on the plant roads to reduce fugitive emission from vehicles during transportation.

Wheel Wash System at Main Gate

Initiative Description: Installation of wheel wash system at Main gate to reduce fugitive emission from vehicles during transportation of ash and coal vehicles

Environment Initiative

500 m3 ETP at TPP

Initiative Description: Effluent Treatment Plant (ETP) of 500 m3/hr with RO facility installed for treatment of wastewater and regeneration water from DM Plant.

Runaya Dross Processing Facility

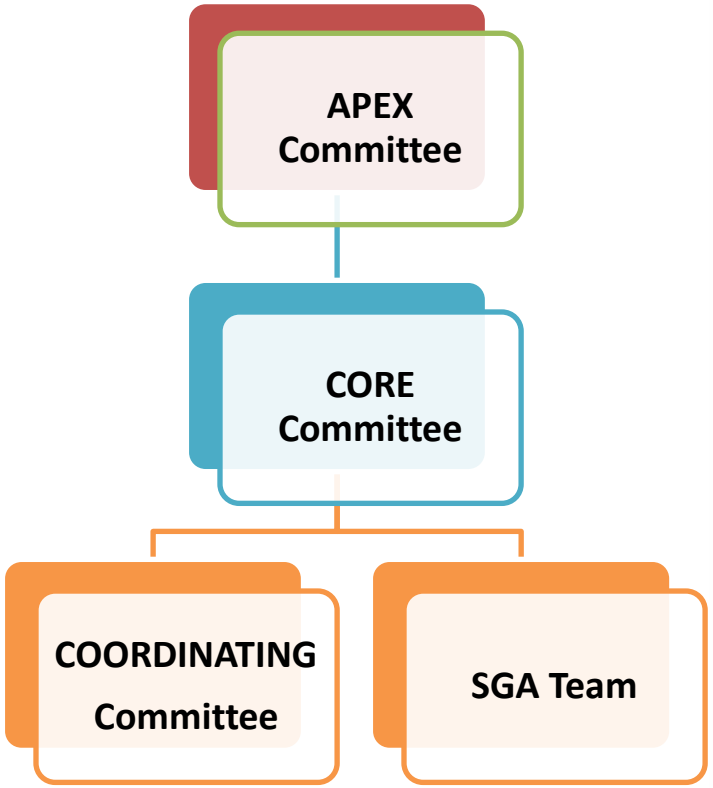
Initiative Description: 33% metal (Al) recovery from Aluminium Dross (HW Waste) through Runaya Dross Processing facility.

Fly ash dispatch through Rail

Initiative Description: Dispatch of fly ash by rail initiated at Jharsuguda

Energy Cell Activities

ENERGY CELL- Formation



"Bottom to Top Approach"

PEOPLE INVOLVEMENT

- E – Test launched to check training effectiveness.
- 100% E-test compliance done.
- SGA Activities along with TQM for Encon improvement.
- Energy Dash Boards maintained.
- Mandatory energy Audit done by CII.
- Online webinar organized through energy efficiency product manufacture

Energy awareness in Tool Box Talk.

Energy awareness Training

War room meetings

ECON Week 2021 Major event Glimpse

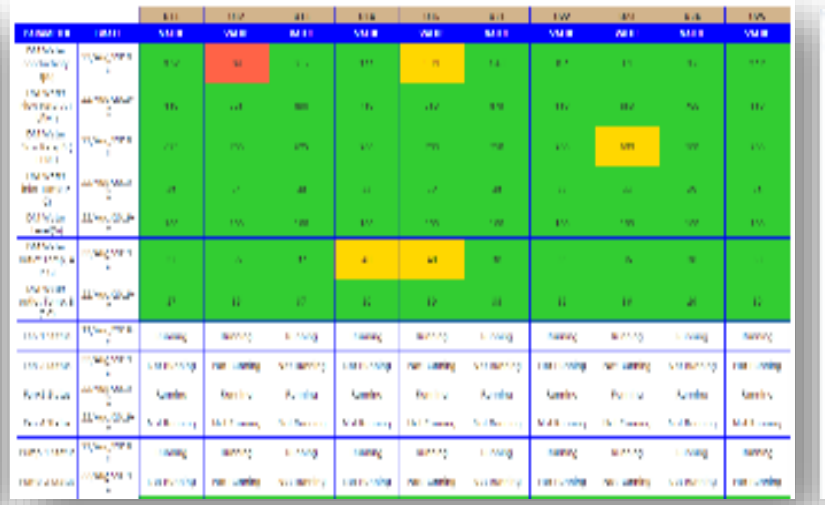
Our Steps Towards Digitalization

MES Online Flash report

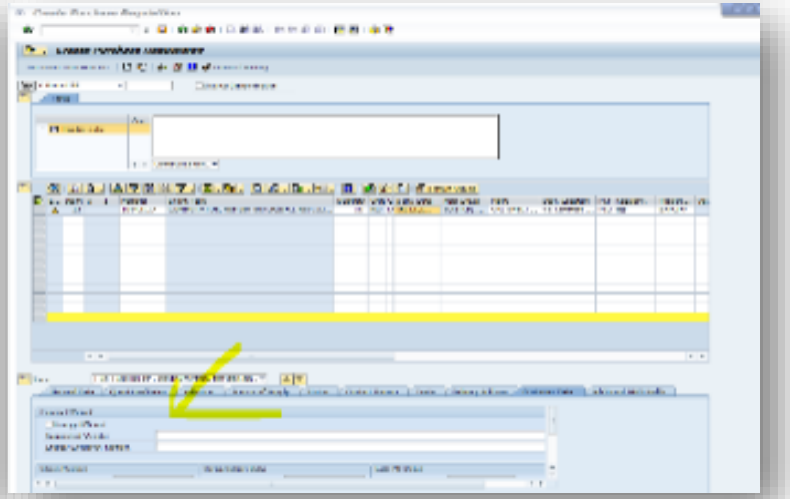
Online solar power generation trend

Online Monitoring of parameter in MES

E-DMS (Document control & Approval)

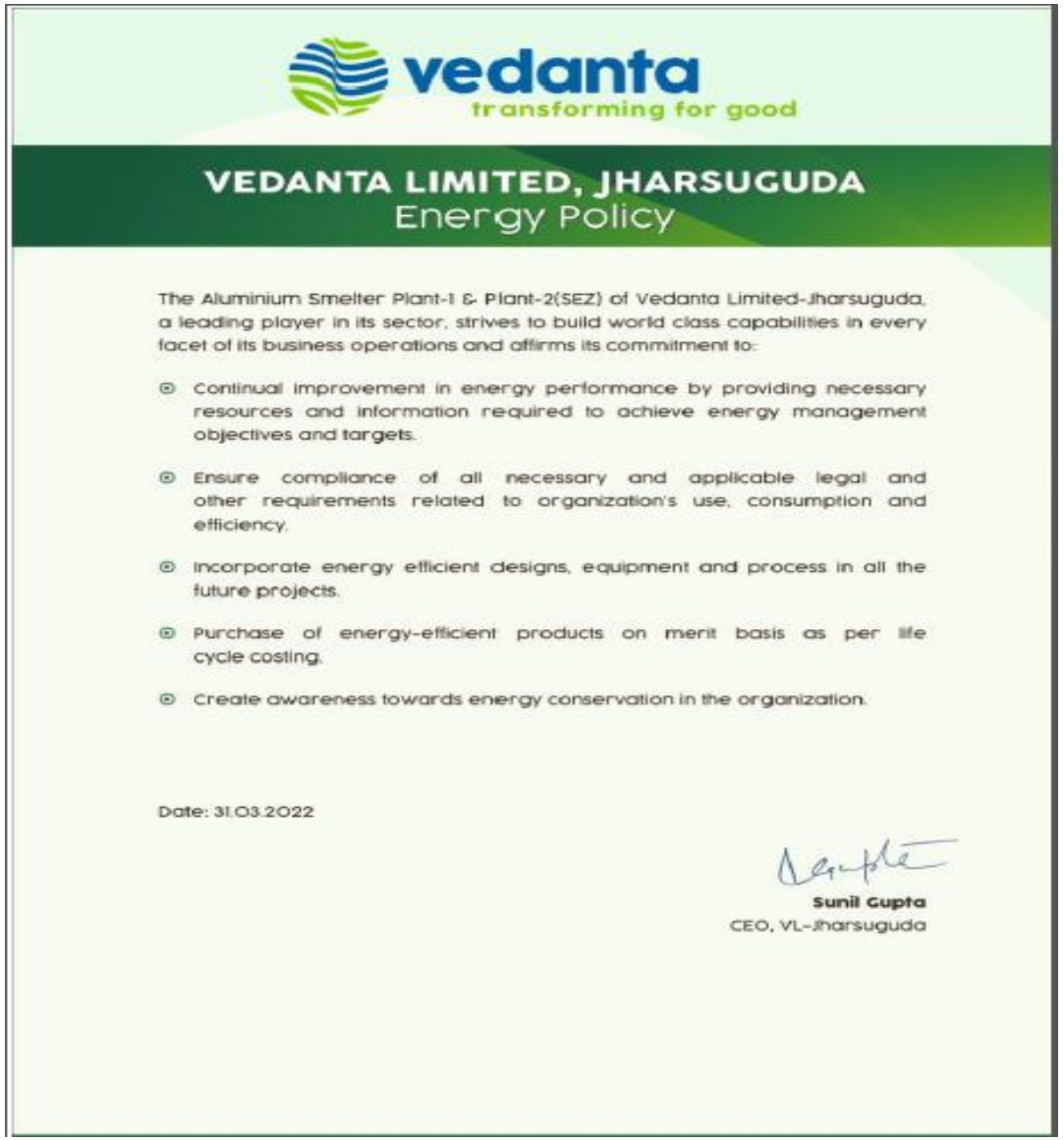


Online Logbook Mobile app



Energy Efficient Procurement Verification

ENERGY POLICY & OBJECTIVES



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VEDANTA LIMITED, JHARSUGUDA
Energy Policy

The Aluminium Smelter Plant-I & Plant-2(SEZ) of Vedanta Limited-Jharsuguda, a leading player in its sector, strives to build world class capabilities in every facet of its business operations and affirms its commitment to:

- Continual improvement in energy performance by providing necessary resources and information required to achieve energy management objectives and targets.
- Ensure compliance of all necessary and applicable legal and other requirements related to organization's use, consumption and efficiency.
- Incorporate energy efficient designs, equipment and process in all the future projects.
- Purchase of energy-efficient products on merit basis as per life cycle costing.
- Create awareness towards energy conservation in the organization.

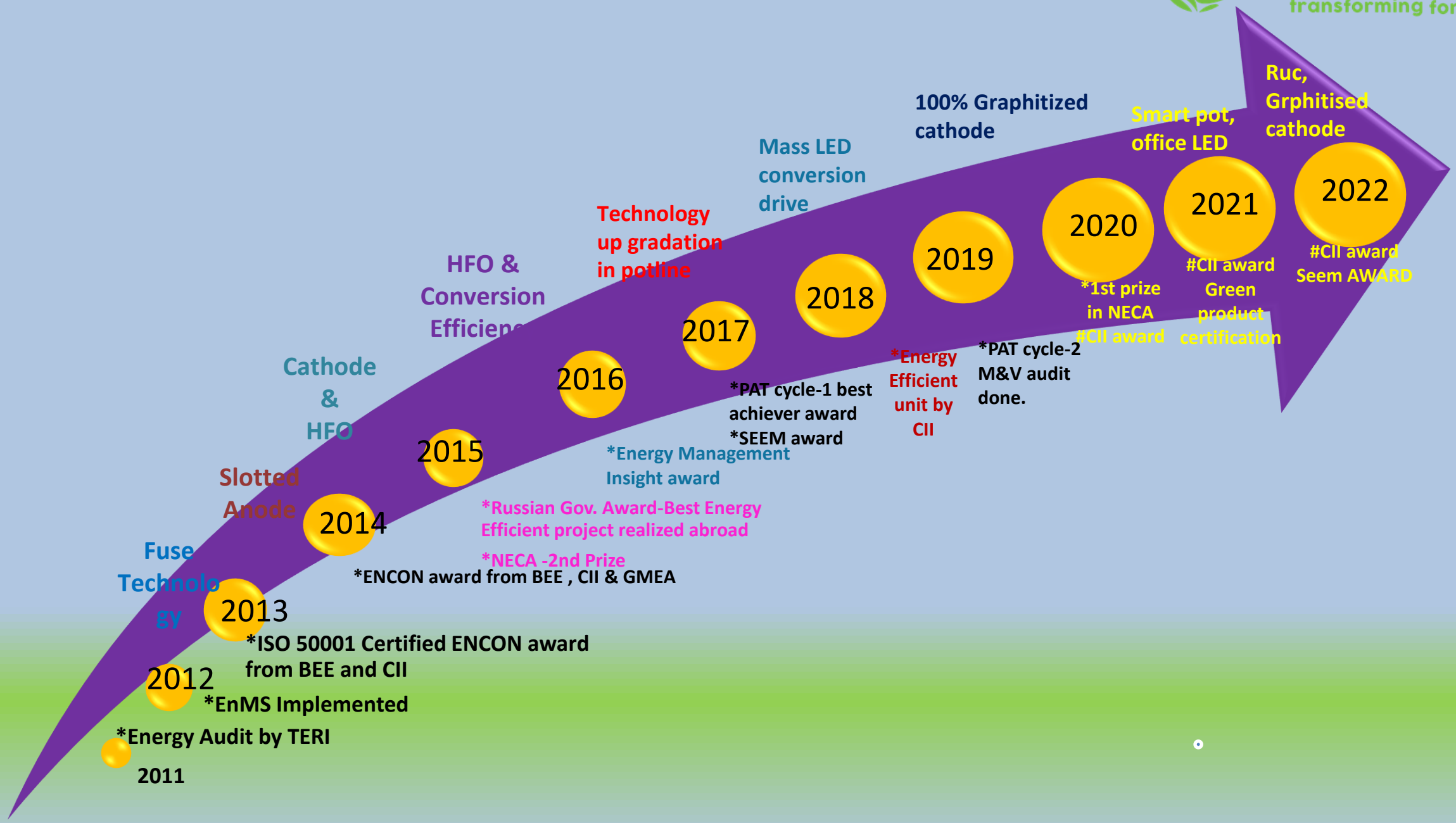
Date: 31.03.2022

Sunil Gupta
CEO, VL-Jharsuguda

ENMS OBJECTIVES

- Reduce DC Energy Consumption
- Reduce Auxiliary Energy Consumption
- Reduce HFO Consumption
- Reduce Diesel consumption

ENCON EFFORTS – A NOTCH UP



Thank You

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