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# Vedanta - Zinc Day

30 August, 2017

VEDANTA – ZINC–LEAD–SILVER | OIL & GAS | ALUMINIUM | COPPER | IRON ORE | POWER

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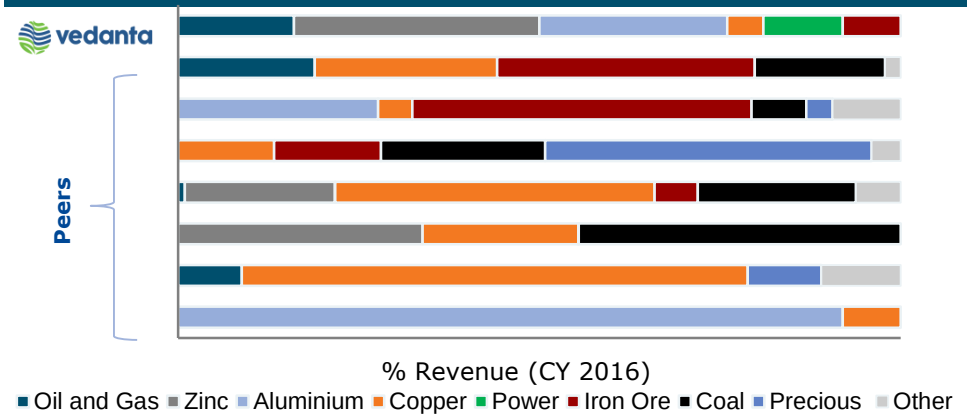
# Introduction

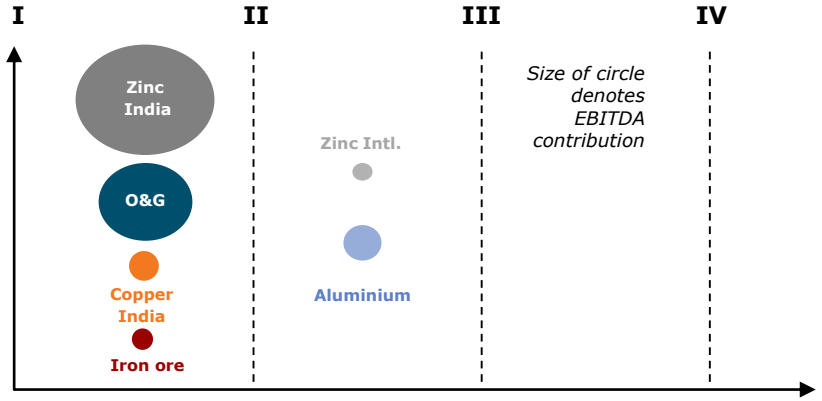
Arun Kumar G.R. –
Group CFO

# Vedanta: A diversified resources company, with low cash cost positions, market leading growth and strong balance sheet

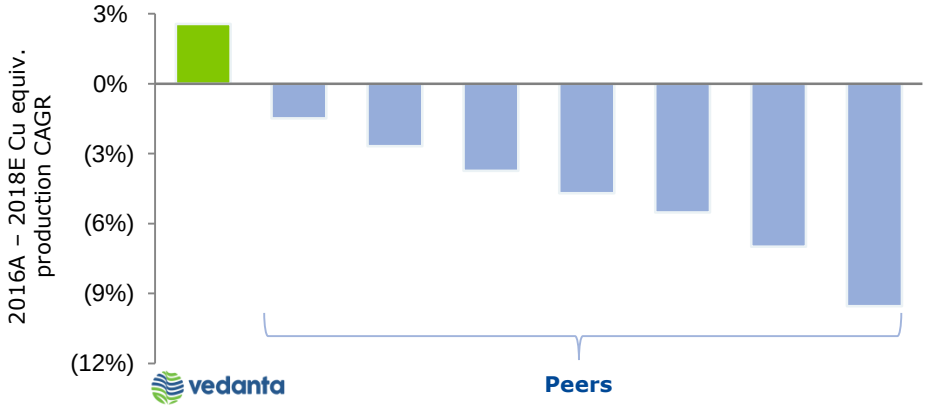
## Commodity diversification[1]



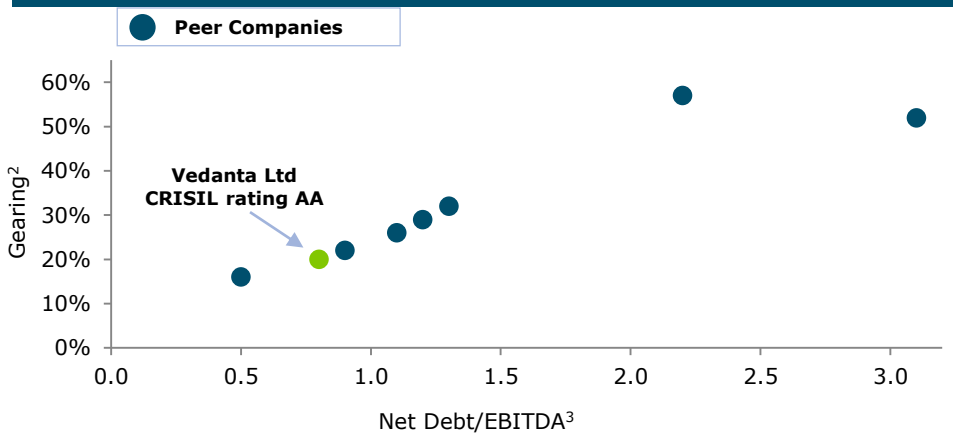

## Attractive cost position




## Sector leading growth




## Strong balance sheet




*Peers include BHP Billiton, Rio Tinto, Anglo American, Glencore, Teck Resources, Freeport and Hindalco*
*Source: Consensus, Company filings, Bloomberg, Wood Mackenzie, CRU for Aluminium ; Company data for Vedanta*
*Notes: 1. All companies have been calenderised to a Dec YE; Glencore revenue split accounts only for their 'Industrial activities'; Revenues from copper smelting for Vedanta Ltd and Hindalco are based on benchmark Tc/Rc*
*2. Gearing is calculated as Net debt divided by the sum of Net debt and Equity (based on reported numbers)*
*3. EBITDA as per CY 2017 consensus estimates*

# A world-class natural resource powerhouse anchored in India

- 6th largest diversified resources company in the world[1]
- Only global player with significant operations, expertise and majority sales in the Indian market – the fastest growing G-20 economy[2]
- Strong Balance sheet: Vedanta Ltd. Net Debt/EBITDA at 0.8x[3] – amongst the lowest and strongest among Indian and global peers
- Completed Vedanta Ltd – Cairn India merger: Simplified group structure with greater financial flexibility to allocate capital efficiently
- Contributed INR 40,000 crores to Government of India in FY17
- 20% gender diverse leadership team; awarded one of the "Top Company to work for in Asia" by ACES, 2016

*Notes: 1. As per CY2016 reported EBITDA*
*2. As per Moody's*
*3. LTM as of June 30, 2017*

# Capital Allocation: Focus on Shareholder Returns

**World class assets and operational excellence to deliver strong and sustainable cash flows**

**Production growth and asset optimization**

### Strong Shareholder Returns

- Announced dividend policy at Vedanta Ltd
  - pass through of HZL's regular dividend, plus
  - minimum 30% pay out of Attributable PAT (ex HZL PAT)
- HZL dividend policy - minimum 30% pay out

### Maintain Strong Balance Sheet

- Continued reduction of gross debt
- Target for AA+ rating from current AA rating (CRISIL)

### Grow Existing Businesses

- Focus on full capacity utilisation and production growth in existing businesses
- Any investment opportunities to clear hurdle rate of return

# Strategic Priorities Remain Unchanged

- Production Growth and Asset optimisation
- De-lever the Balance Sheet
- Simplification of the Group structure
- Protect and preserve our License to Operate
- Identify next generation of Resources

# Health, Safety, Environment & Sustainability

Phil Turner – Group Head, HSE and Sustainability

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**HSE CHARTER**

We will fulfill our duty to protect the safety and welfare of our people and plan to achieve our health, safety and environment goal of zero harm to become the best performer in the resources industry by:

- ✓ Implementing world class standards that deliver our legal obligations and company policies
- ✓ Managing risk in all forms by applying controls and testing their effectiveness
- ✓ Setting priorities and commitments and measuring, monitoring and reporting performance
- ✓ Maintaining an open dialogue with our business partners and stakeholders
- ✓ Applying this discipline every day in every aspect of our business

It's all of our responsibility to ensure that everyone who works on our site returns home safely every day while protecting the environment for our future generations.

**Anil Agarwal**
**Chairman**

**June 2016**

# Our Vision

## Zero Harm

## Zero Waste

## Zero Discharge

# Sustainability: Our Priorities

| |
|---|
| Deliver world class performance by identifying and managing risk and by benchmarking best performance |
| Engage with stakeholders and deliver best social responsibility performance in the resources sector |
| Eliminate fatal accidents |
| Ensure our people are not exposed to harmful levels of toxic substances |
| Deliver best in class performance in air, land, water & waste |
| Manage carbon reduction and GHG emissions in line with Indian and International norms |

# Zinc International: Health, Safety, Environment

SZ safety intervention


BMM 1 000 000 fatality free shifts

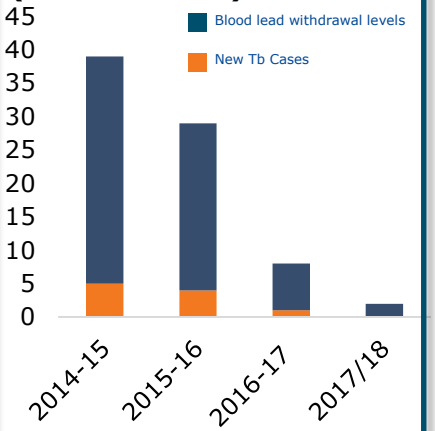
Paper recycle campaign

Voluntary HIV/Aids Testing

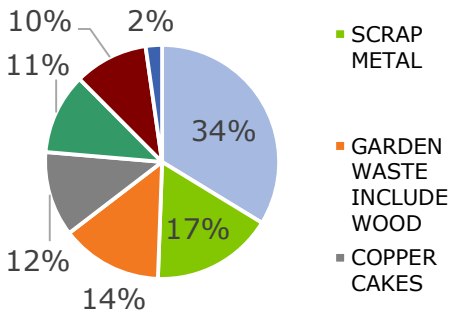
'**ZERO HARM, ZERO WASTE, ZERO DISCHARGE**" to all people and environment

- To be a caring organisation for our employees and **all stakeholders**
- Safety indicators reflective of increasing safety maturity
- Focus on elimination of occupational health diseases
- We look for opportunities to extract value from waste streams generated (~$1.7 m from 200 tonnes of waste)
- We aim for 100% compliance to Internal performance standards and processes

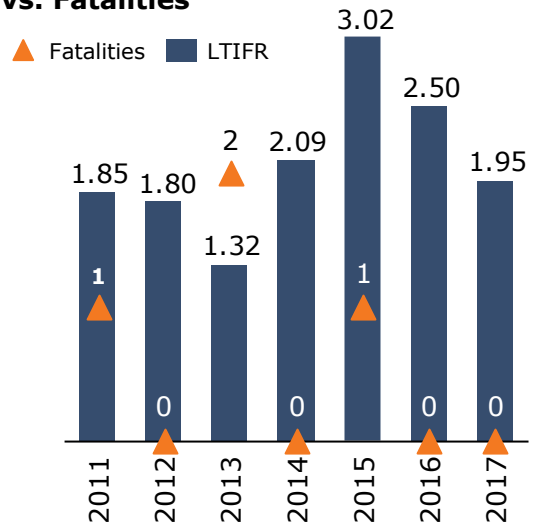
**Occupational Exposure (# of incidents)**



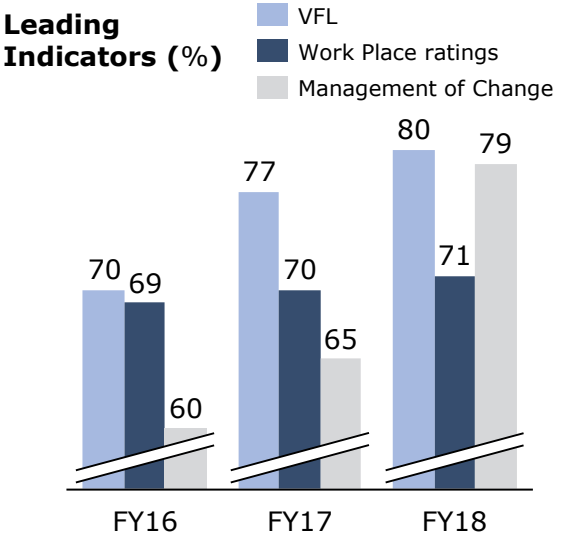

**WASTE TO VALUE**




**LTIFR** (per million man hours worked) **vs. Fatalities**

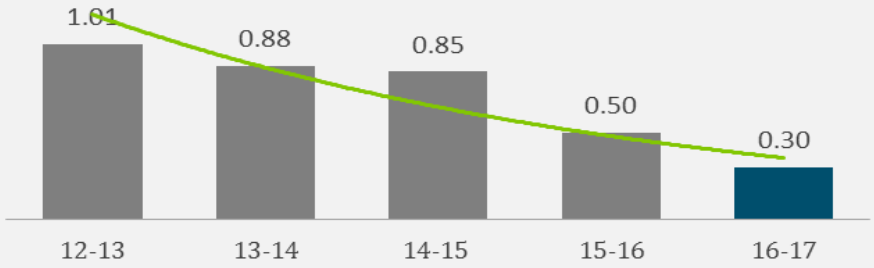



**Leading Indicators (%)**



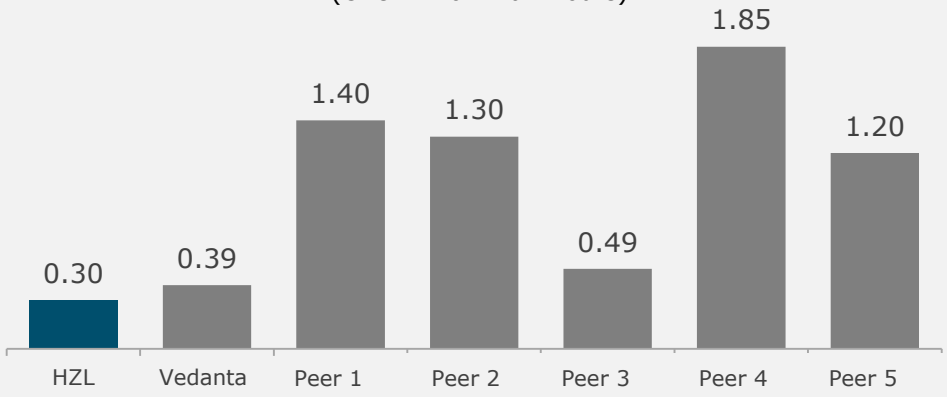
# Hindustan Zinc: Health, Safety, Environment

## LTIFR Trend




- 127% increase in lead indicators reporting last 2 years
- Zero occupational illness cases
- Safety perception score improvement from 62% to 88%

**LTIFR Benchmarking**
(One million man-hours)

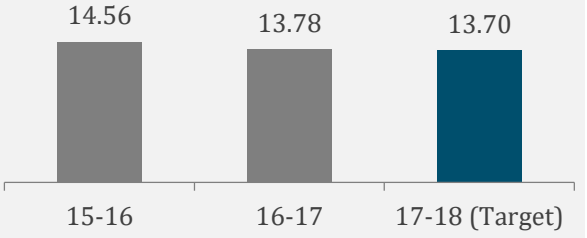



*Source: SD report 2016 of all companies*

## Water Conservation

- Zero discharge
- 33% total water requirement met from recycling/ reuse water (2017)
- Water CDP disclosure 2017

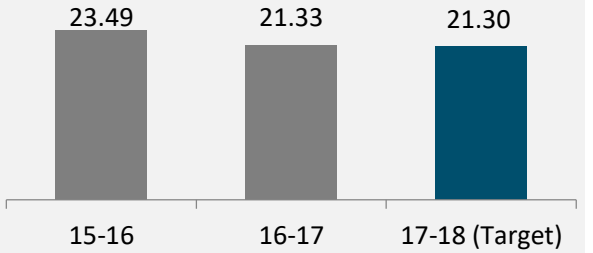
**Specific Water Consumption** ($M^3$ / MT of MIC)




## Climate Change & Energy

- 10 UNFCCC projects
- 325 MW green power
- 9% specific energy reduction (2017)
- CDP disclosure 2017 & Scope 3 GHG emission

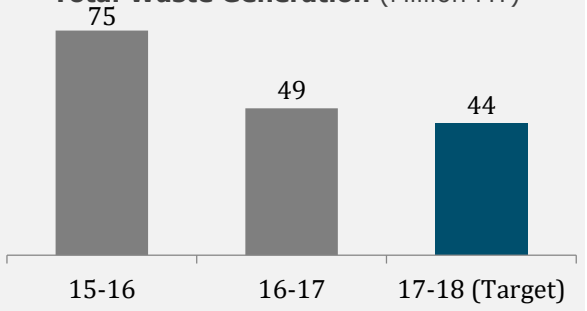
**Specific Energy Consumption** (GJ / MT of MIC)




## Waste Management

- Fumer project for waste minimisation
- Paste fill plant at SKM and RAM UG
- Focus on value from waste
- Paver block from waste

**Total Waste Generation** (Million MT)



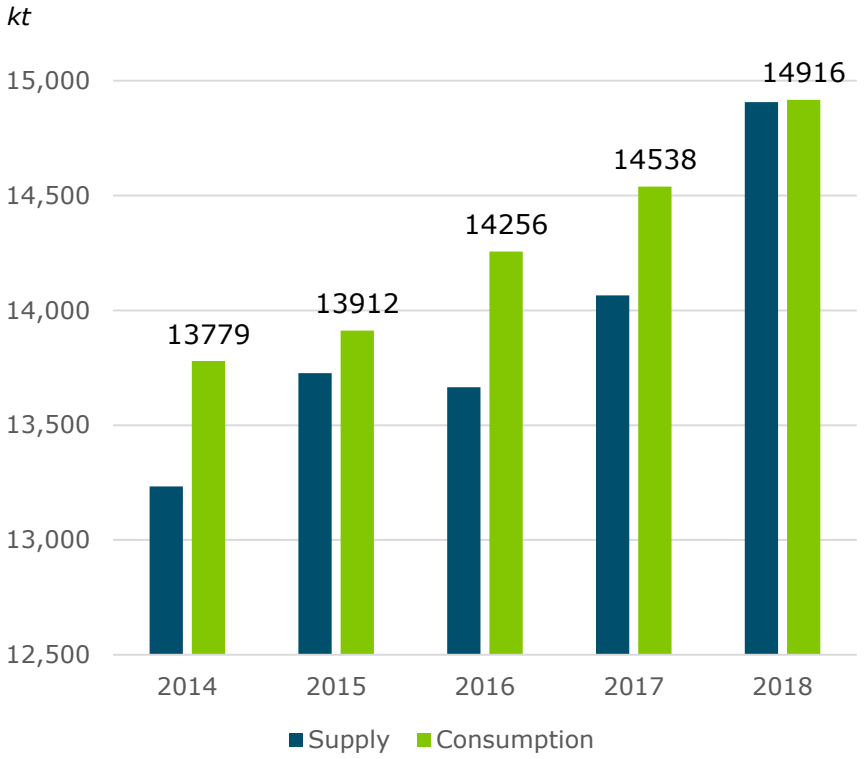

***Waste includes mining waste**

# Zinc Market Overview

Sunil Duggal – CEO, Hindustan Zinc

# Global Zinc Market Overview

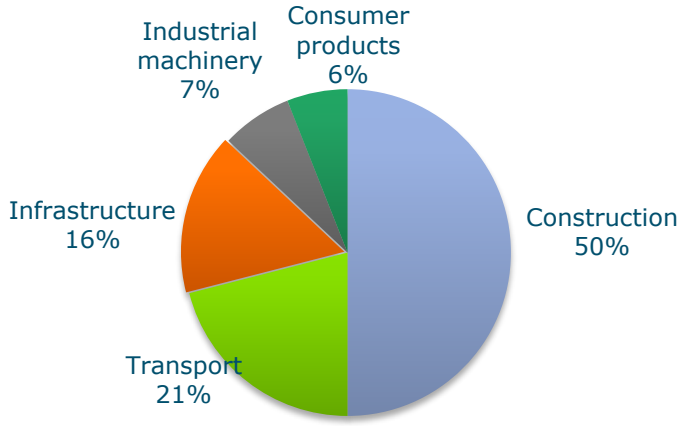
## Refined Market Balance




*Source: Wood Mackenzie LTO Q2 2017*

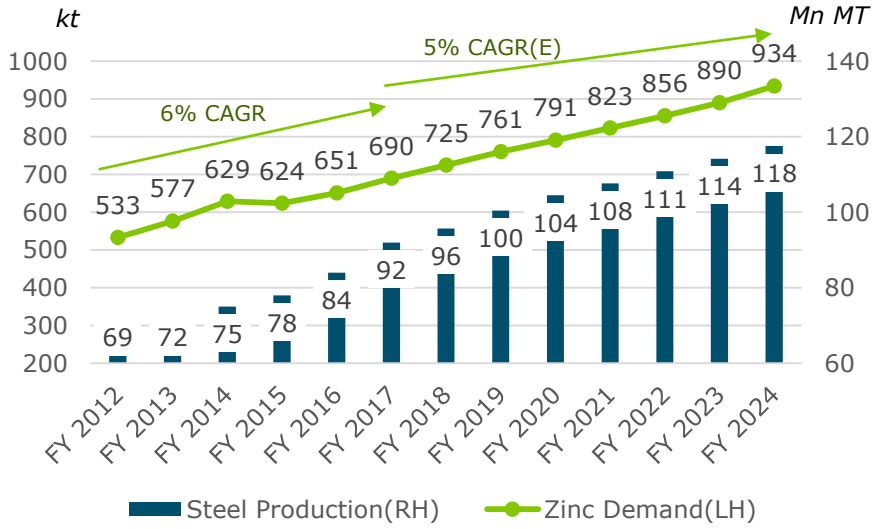
**World -** Steady demand growth at 2.6% in 2018
**China -** *CAGR (2017-2020) of Consumption at 3%*
**India -** *CAGR (2017-2020) of Consumption at 5.1%*

## Zinc Demand By Industry




*Source: Wood Mackenzie*

## India Steel Production and Zinc Demand

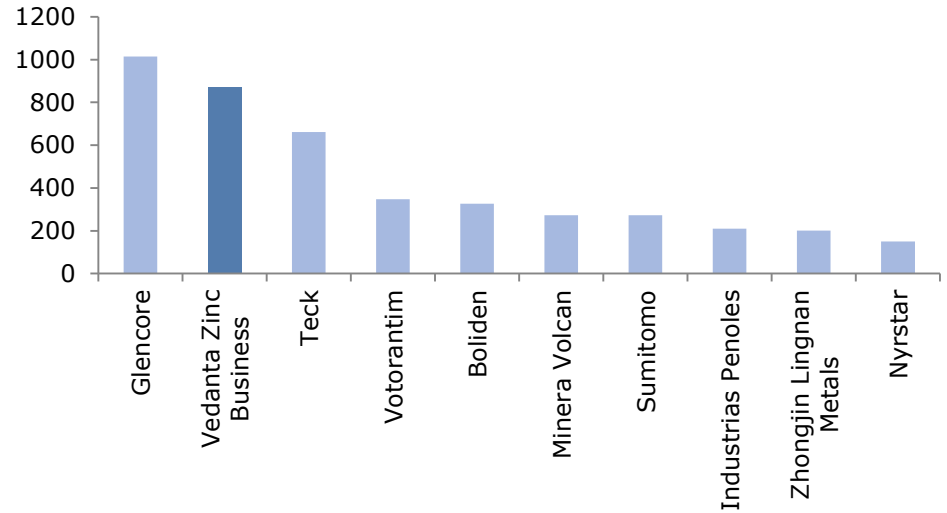



*Source: Feedback Consulting, HZL and Wood Mackenzie LTO Q2 2017*

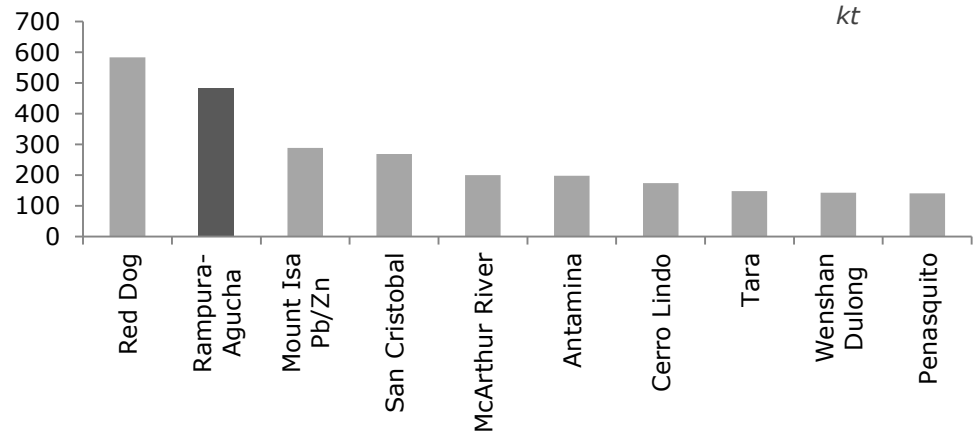
# Vedanta Global Positioning

## MINES - 2016 *kt*

**By Company**

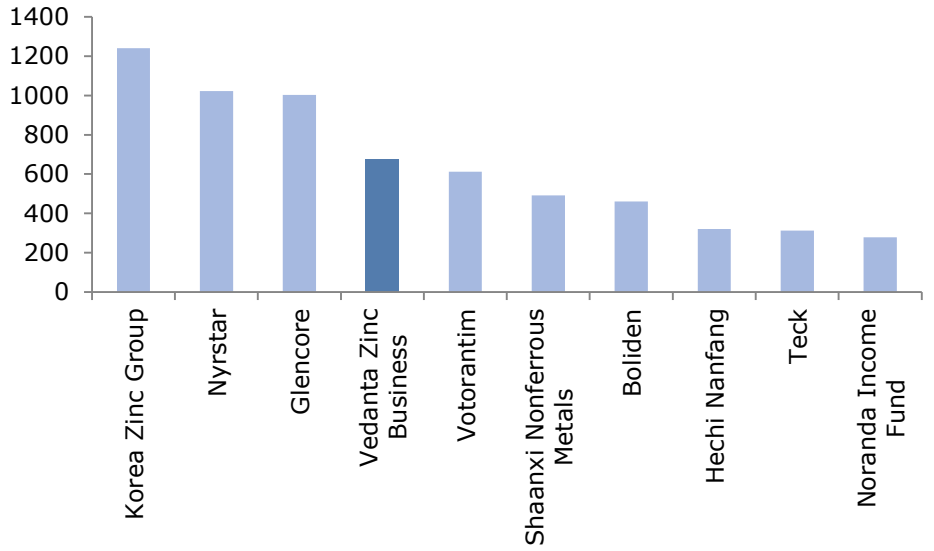



**By Mines**

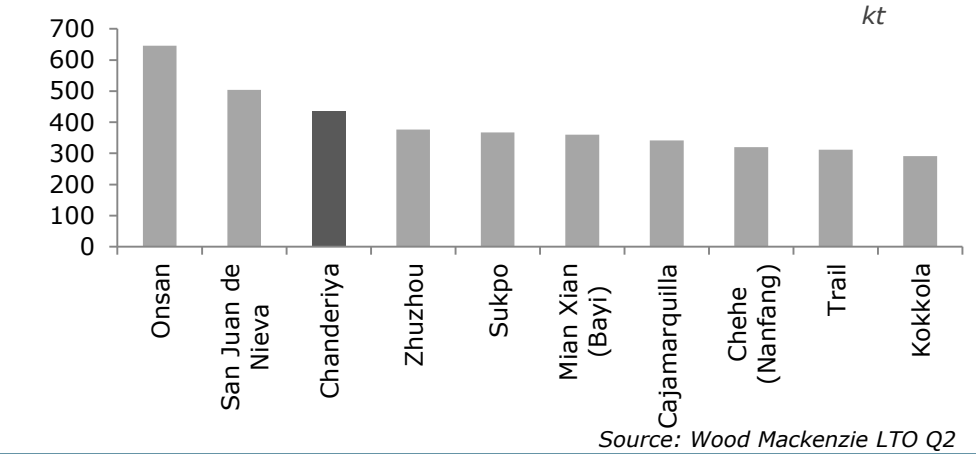



## SMELTERS - 2016 *kt*

**By Company**



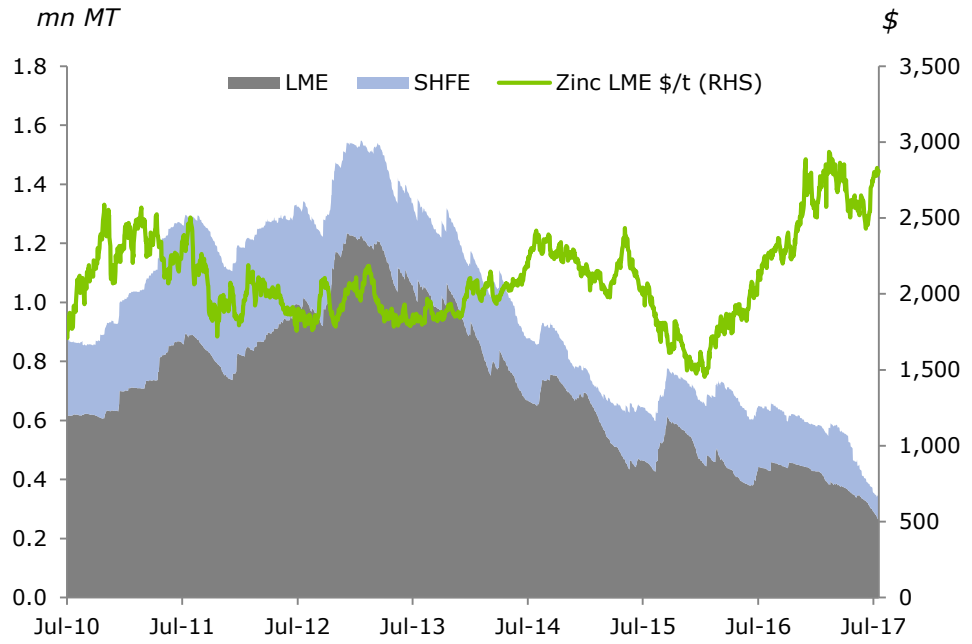

**By Smelters**




*Source: Wood Mackenzie LTO Q2*

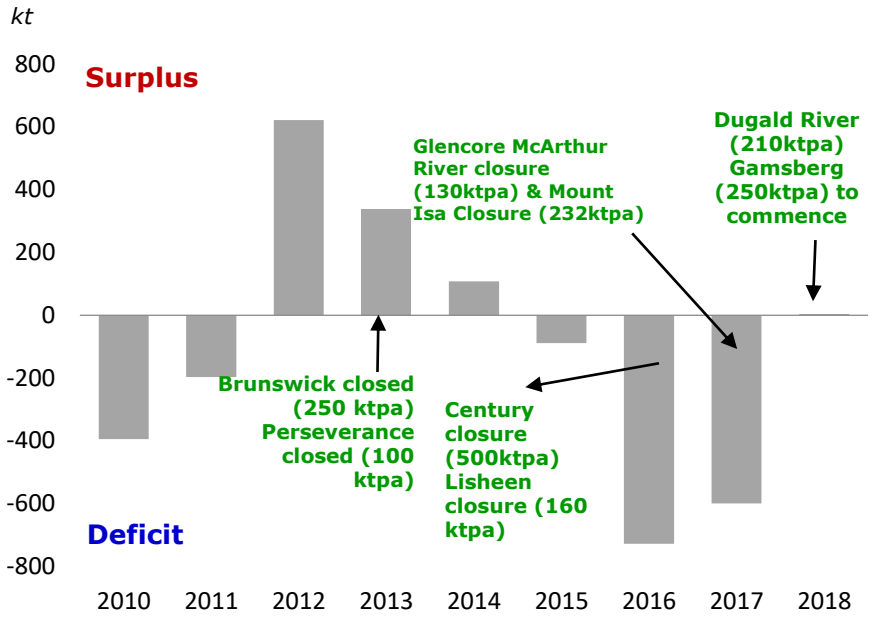
# Strong Fundamentals

**Declining stocks at LME warehouses**




- *Exchange stocks declining: 11 days of global consumption in July 2017; seven year low*
- *Zinc prices strengthening on continued supply deficits and declining inventories*

**Global Zinc concentrate deficit supporting zinc prices**




*Source: Wood Mackenzie LTO Q2 2017*

- *Gamsberg project to start in 2018*
- *2018 growth assumed from resumption of Mt Isa & McArthur River as also Dugald River project*
- *Chinese mine capability to grow by 0.7mtpa by 2021, with a further 1mtpa from new projects*

*Source: Wood Mackenzie LTO Q2 (Conc.)*

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# Vedanta - Zinc Day

## Zinc International

30 August, 2017

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# Zinc International - Agenda

**01**

**Health, Safety & Environment -** Vision to Zero

*Deshnee Naidoo - CEO*

**02**

**Sustainability –** We take people along

*Nora Ndopu – Head of CSR*

**03**

**About us –** Significant footprint with strong track record

*Deshnee Naidoo - CEO*

**04**

**Exploration Potential –** Unrivalled Zn address in Africa

*Markus Schaefer – Head of Exploration*

**05**

**Gamsberg –** Anchor for Growth

*Satish Kumar –VP Projects*
*Liezel Jacobs – Project Manager*

**06**

**BMM –** Enabling a world class Zn complex

*Andre Trytsman – GM*

**07**

**Skorpion –** Surpassing LOM expectations

*Irvinne Simataa -GM*

**08**

**Digitalization & Technology -** Driving efficient growth

*Dave Payne - Head of D&T*

**09**

**Outlook –** The path forward

*Pushpender Singla - CFO*

**Q&A**

# 01
# Health, Safety, Environment-
# Vision to Zero

Deshnee Naidoo - CEO

# Health, Safety, Environment & Sustainability

SZ safety intervention


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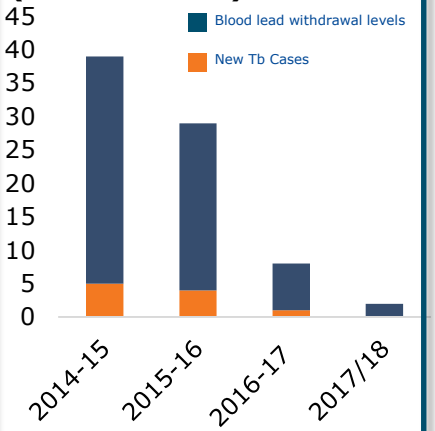


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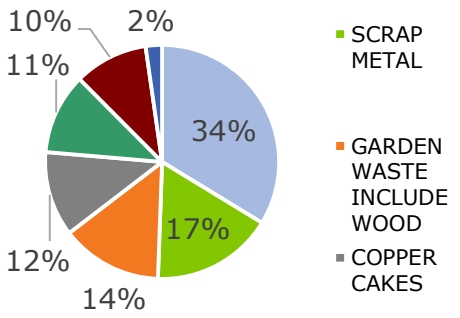


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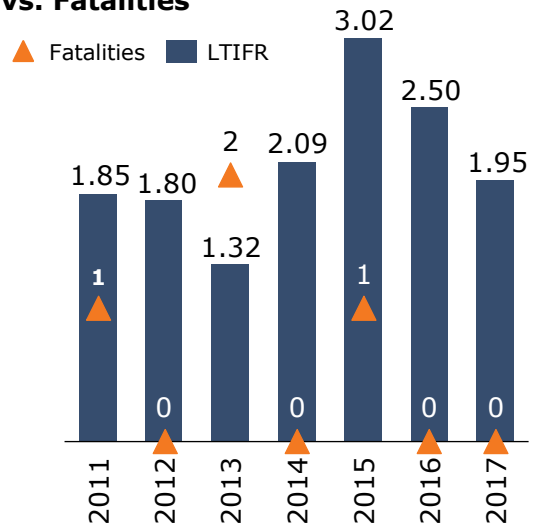
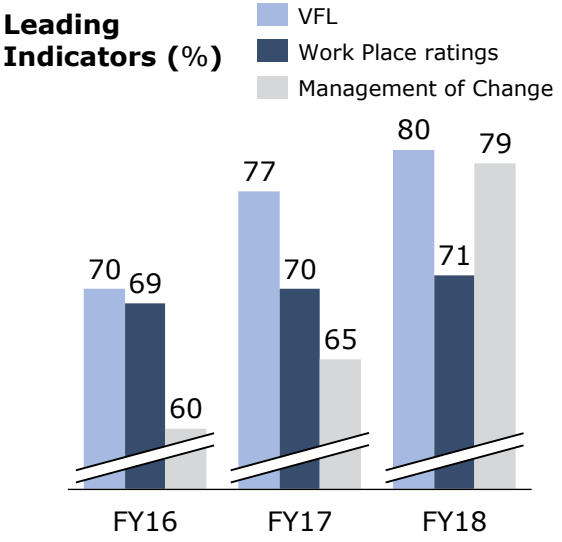



**Leading Indicators (%)**



# 02
# Sustainability - We take people along

Nora Ndopu – Head of CSR

# Sustainability: Commitment to our Community, Environment & Employees

## *CSR*
**Last 5 years spend >ZAR 60 million**

- Livelihood
- Sports
- Health
- Education



## *Biodiversity*
**No net loss**

- Bird Pond at SZ
- Rehabilitation Nurseries

## *People*
**>4000 employees**

- Dedicated Teams
- Community Consultations and awareness


## *Social Licence to Operate*

- Strive for beyond regulatory compliance
- Multi-prong CSR strategy focusing on health, education, sports and livelihood projects
- Preferentially target the empowerment of affected mining communities (women specifically)
- Supported by key stakeholder engagement
- Local employment (Direct labour: 1,497, Indirect labour: 2,675)
- Impacting approximately 40,000 beneficiaries through CSR

# 03
# About us – Significant footprint with strong track record

Deshnee Naidoo - CEO

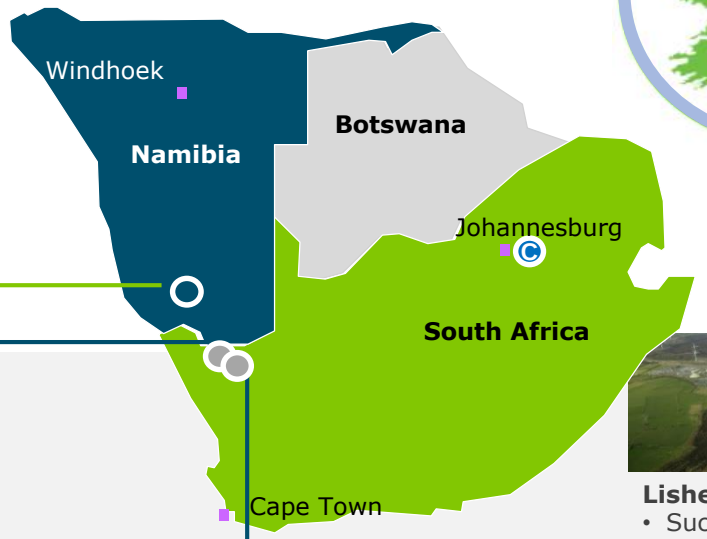
# Zinc International Overview

**ZI's vision is to be the safest, socially responsible 1 Mtpa integrated Zn producer in the 1st quartile of the global cost curve**

**Skorpion Zinc**
- Open pit zinc mine and refinery
- Largest integrated zinc operation in Africa
- R&R of ~26 MT with 2.7 MT of contained metal at average grade of around 9%)
- LoM of 4 years
- Workforce of 1,500
- Refinery capacity of 150 KTPA Special High Grade (SHG) zinc

**Black Mountain Mine**
- An underground operation, mining zinc, lead, silver and copper deposit
- R&R of ~65 MT with 3.1 MT of contained metal a grade of around 5%)
- LoM of 4-5 years
- Workforce of 1,350 (80% of the employees are from the local region)

**Gamsberg Project**
- One of the world's largest known Zn deposits
- R&R of ~215Mt with contained metal of 15.8Mt
- LoM of +30 years
- Phase 1 of project in execution, 400 mil USD capex investment, 250 Ktpa metal in concentrate.
- First production by mid CY 2018.





**Lisheen**
- Successful closure of operations due to end of LOM in 2015
- World-class closure process underway
- Total tonnes and grade mined - ROM (Sept 1999 to Sept 2015): 22.5 MT @ 11.7% Zn and 2% Pb

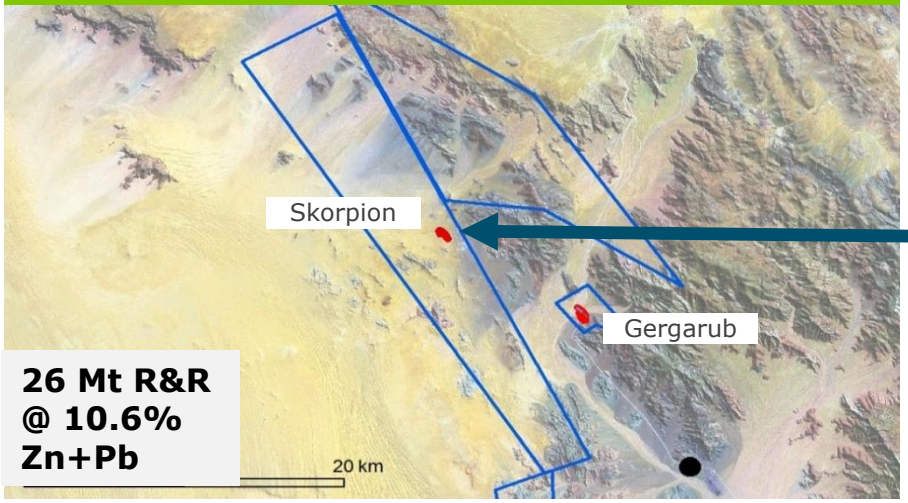
- **HSE progress to ZERO**
- **ZI R&R of 306 MT,**
- **>4,000 employees,**
- **~160,000 tons of Zn (equivalent) in FY18**

# 04
# Exploration potential – Unrivalled Zn address in Africa

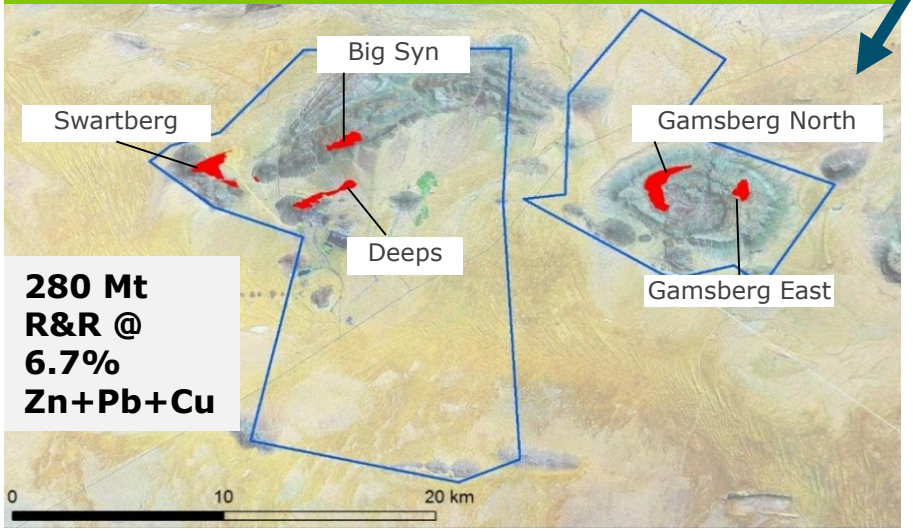
Markus Schaefer – Head of Exploration

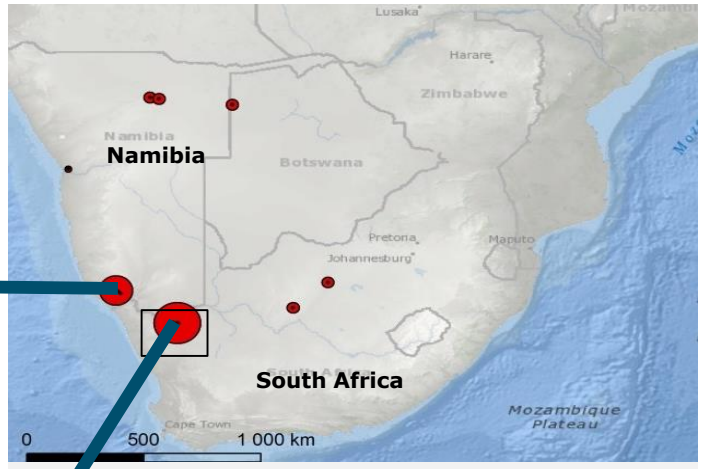
# Southern African Zinc Cluster
## Unrivalled Opportunity for Long-Term LOM & Organic Growth

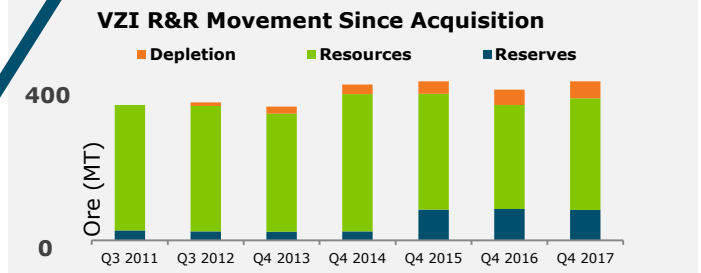
### Southern Namibia Cluster

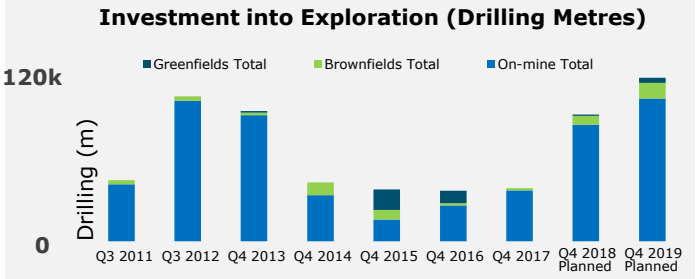



### RSA/Northern Cape Cluster




### High value Resource Base to enable long LOM and expansions

- Total of 21.5Mt of Metal in R&R

### Best Zn Address in Africa

- Extensive tenement portfolio (>5,000km$^2$)
- Opportunity to double R&R

### Aggressive Exploration Programme

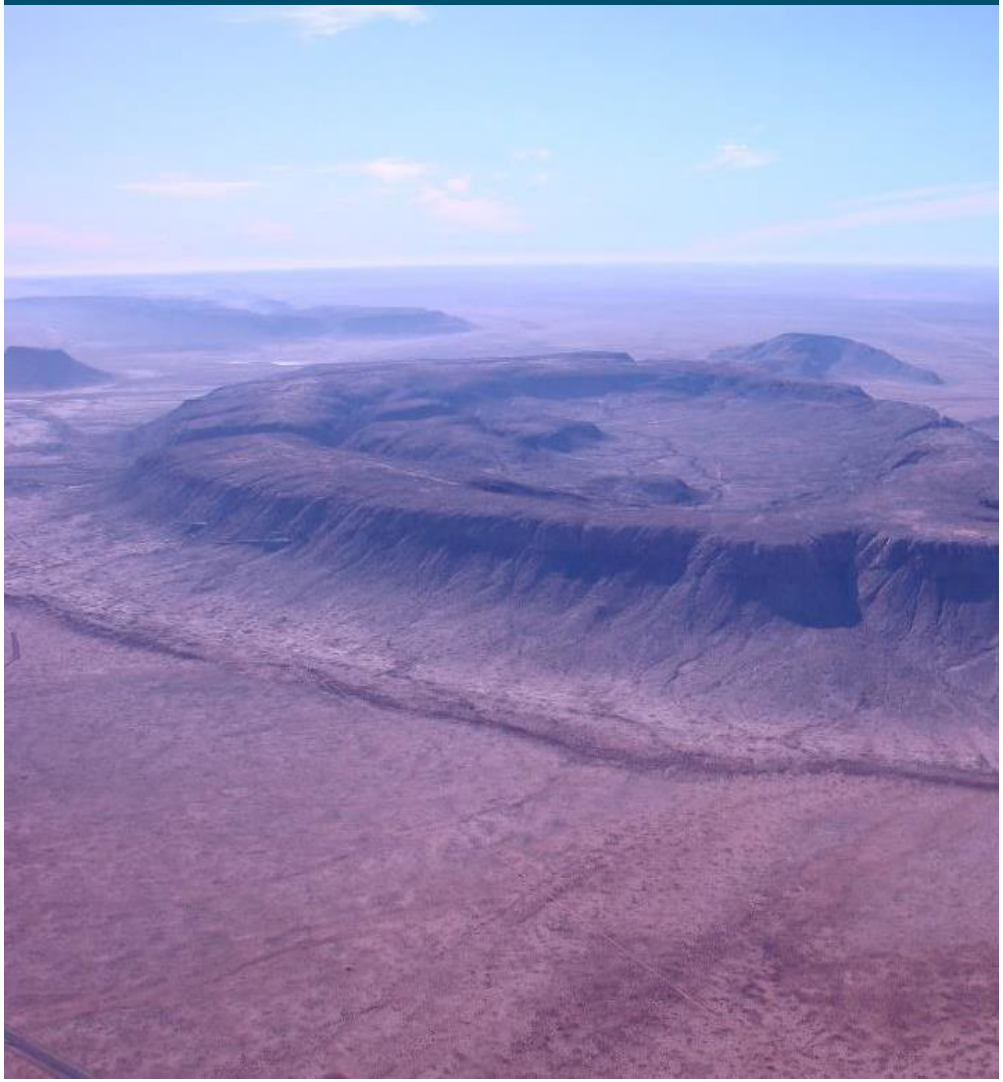
- R&R including depletion has increased by 11% since acquisition to 24.4Mt metal
- Exploration throughout downturn. Significant step-up in 2017
- Use of state of the art technology (geophysics) – high discovery rate

# 05
# Gamsberg - Anchor for Growth

Satish Kumar – VP Projects
Liezel Jacobs – Project Manager

# Gamsberg – Journey till Date

## Before



## Now

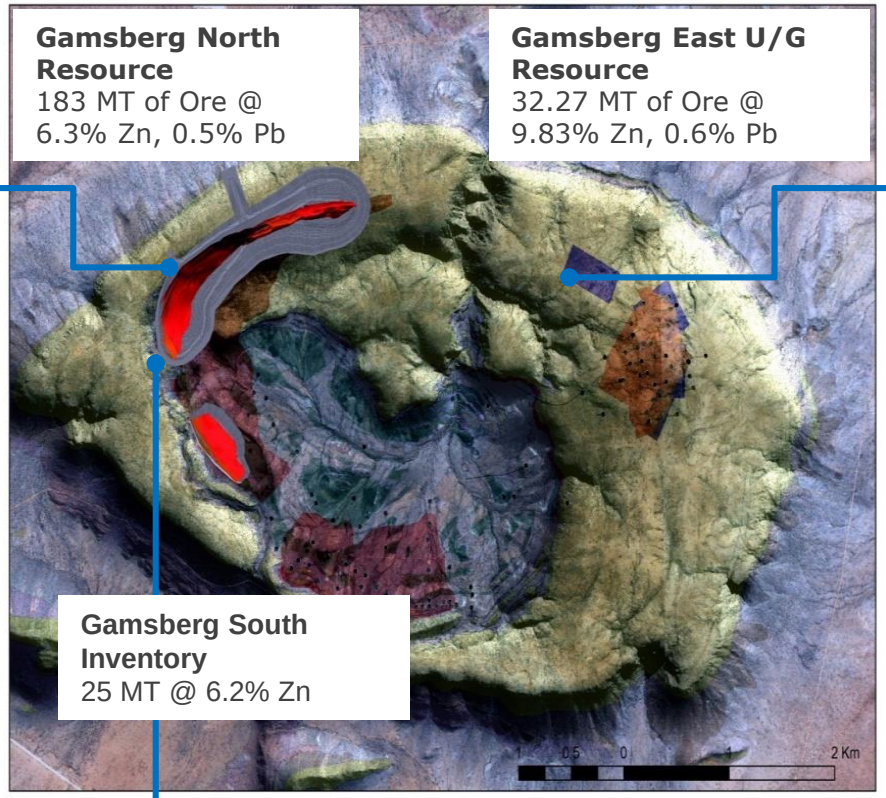
# Gamsberg – Anchor for Zinc International Growth

## Total Potential for Gamsberg 250 KTPA to 450 KTPA to 600 KTPA

### Phase 1 Project In Execution

#### *Gamsberg Project (Phase 1)*

- Current project (open-pit mine, concentrator and related infrastructure) 4 MTPA ROM : **250 KTPA MIC**
  - **US$ 400 mn** investment,
  - 4 MTPA ore, 250 KTPA MIC
  - **First production by Mid CY 2018**, 6-9 months of ramp up to full capacity.
  - COP at US$ 1,000-1,150/ton, First quartile of cost curve.
  - ~ 1,500 jobs during construction, 850-900 jobs once operational




#### *Gamsberg U/G (Phase 3)*

- New underground option for Gamsberg East 2.5 MTPA
- Potential Expansion of Gamsberg North open pit to U/G
- +150 KTPA MIC

#### *Gamsberg Mega Pit (Phase 2)*

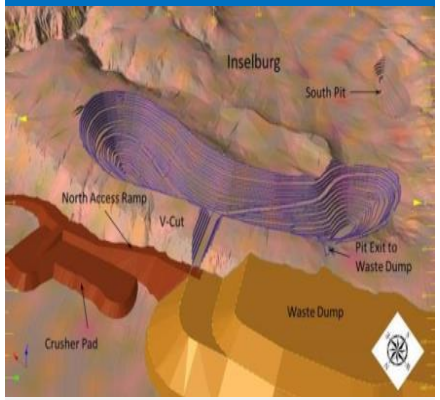
- Expanded open pit by 4 MTPA ROM
- 2nd concentrator stream of 4 MTPA
- Additional metal production - **200 KTPA MIC**

#### *Gamsberg Extension areas (Beyond Phase 3)*

- Good Potential
- Extensive drilling required to firm up potential

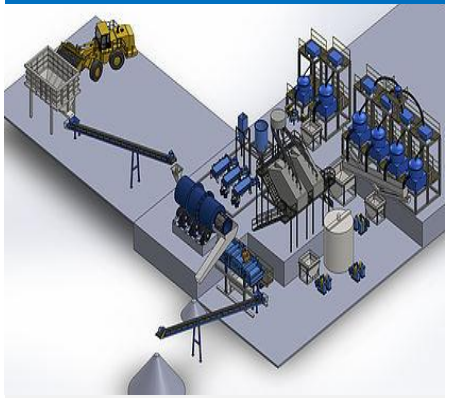
# Gamsberg Phase 1 – Project Scope & Capital Optimisation

## Gamsberg Open-Pit layout



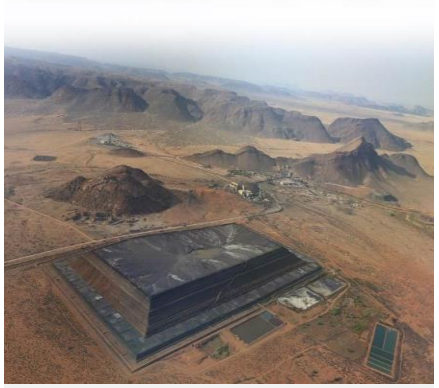

- Open pit – Drill and blast, load and haul
- Pre-stripping 65 -70 MT, Ore production @ **4 MTPA**
- Total mining @ **35 MTPA** rate

## Gamsberg Concentrator



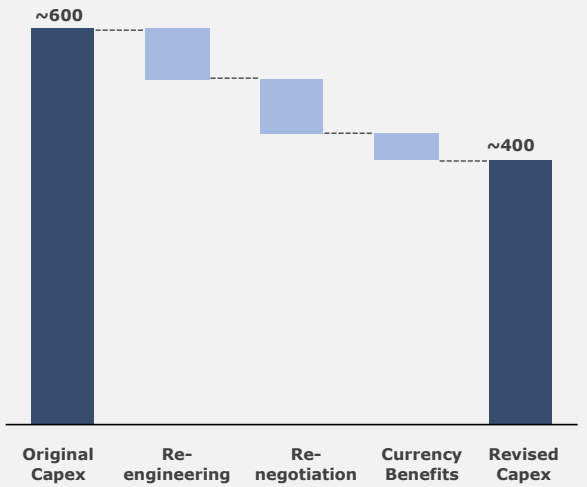
- **4 MTPA** Ore feed capacity
- **250 KTPA MIC Production**
- Crushing, milling, flotation, dewatering, utilities and tailing pipe-line to tailing storage facility

## Gamsberg Tailings



- Construct tailings dam to store **3.55 MTPA** of tails
- Located 3.2 km north of the plant
- Dam will have HDPE liner

## Capex Optimisation ($ mn)

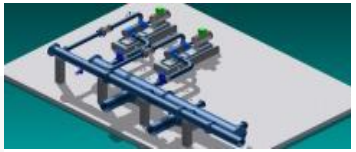



- ***Original Gamsberg capex was reduced from ~$600 mn to ~$400 mn by:***
  - *Value engineering*
  - *Re-negotiation*
  - *Exchange rate benefits*
- **COP improvements of ~10%**
- **Improved project financials**

## Support Central Facilities

### Power

### Water Package



### Building Infrastructure

- **Power: 40 MVA** transmission line from ESKOM sub-station (20 km), 66/11 KV MRSS at Gamsberg
- **Water:** New pipeline from Orange River (38 km) **13 MLD**
- **Building & Infra:** Offices and building infrastructure, para-medics, etc
- **Housing: 350** housing units in phases

### Biodiversity

- 85,000 plants relocation
- Acquire habitat (12,900 Ha) as per Biodiversity Offset agreement

# Gamsberg Phase 1 – Project Execution Philosophy

## Gamsberg – the new way of delivering projects in Vedanta

- An outsourced approach
- Leveraging owners engineers and external skills
- Lean project structure
- Minimum number of packages
- High governance standards
- Latest technology & digitalisation initiatives

| | |
|---|---|
| 1 ***Outsourced Model*** | • Mining - Fully outsourced including operations and infrastructure<br>• Mining - Variable cost model based on output<br>• Plant & Infrastructure – Fully turnkey with least number of packages<br>• Plant & Infrastructure - Complete system performance/process guarantees |
| 2 ***Capex Optimisation*** | • Capex reduced from US$ 600 mn to US$ 400 mn<br>• Collaboration with EPCs and equipment vendors to reduce cost<br>• Value/re-engineering by EPCs and owner's engineer |
| 3 ***Organization Structure*** | • Lean owner organisation structure<br>• Project technical specialists outsourced with project objectives KPIs<br>• Engineering and construction management support from owner's engineer |
| 4 ***Governance*** | • All licenses and permits in place<br>• Packaging philosophy - minimum number of orders<br>• Contract quality and contract management |
| 5 ***Technology & Digitalization*** | • Latest technologies – Woodgrove SFR for flotation<br>• Increased recoveries/reduced resource consumptions<br>• Digitalisation roadmap. |

# Gamsberg Project Progress on Target for First Production by Mid CY2018

## Mining

- ☑ First blast, Prestart mining commences July 15.
- ☑ Mining contract outsourced – Aveng Moolmans Dec 16 .
- ☑ North access ramp completion, Start of Bulk pre-stripping April 17.
- ☑ Pre-stripping volume ramped up to 3.5 MT per month June 17.
- ☑ Pre-stripping >25 MT of 65 MT completed as on July 17.

- First ore production – Early 2018
- Completion of pre-stripping, Bulk ore production – Mid CY 2018

## Tailings Facility/Bulk Water

- ☑ Tailing facility progressing on schedule (12 ha of HDPE liner installed against 110 ha total)
- ☑ Water pipeline installation on schedule. 20 km of pipe delivered (6/38 km installed)

***All major ordering with major commitments completed - Bulk mining, Plant & Infra and Tailings Dam . More than 80% of the capex committed. All contractors mobilised at site. More than 1,200 employees at construction site***

## Plant

- ☑ EPC order with EL Bateman Oct 16
- ☑ Civil works progressing - Concrete bases for SAG and Ball mills completed Aug 17
- ☑ All long lead equipment ordered and being manufactured. SAG & Ball mills dispatch Oct 17.

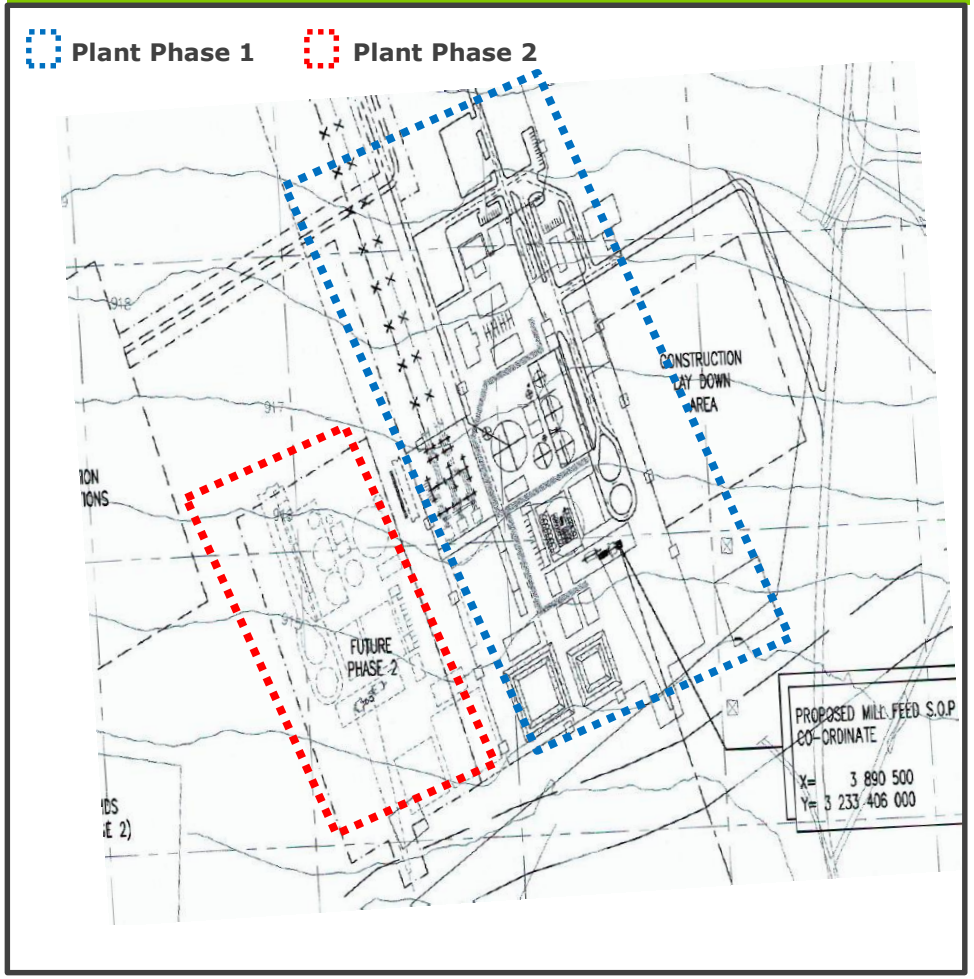
- First ore feed, Start of production – Mid CY 2018.
- 6-9 months for full production ramp up.

## Other

- Biodiversity - ~85 000 plants relocated (2015)
- Housing being constructed in anticipation of operational requirements
- >100 houses being constructed

# Gamsberg Phase 2 is Enabled by Phase 1

**Phase 2 at** Gamsberg increases the capacity from 4 MTPA to **8 MTPA** and reaches **450 KTPA metal in concentrate** capacity by developing a larger open pit mine, an additional 4 MTPA concentrator plant and associated infrastructure.




## Phase-1 set up enables faster and capital efficient Phase-2 project execution

Regulatory approvals, biodiversity offset requirements and land readily available

Good understanding of the ore body

Mining infrastructure designed for expansion

Current **mine design/layout** incorporates the bigger open pit scenario. mine plan easily optimisable for 8 MTPA pit

**Waste dump area, mining infrastructure** already planned and designed for bigger pit

**Outsourced model** of mining operations gives flexibility to expand the mining production rapidly

All plant and infrastructure design considering the **modular approach** for easier expansion with minimum interface

Current layout considers additional **4 MTPA concentrator**

**Water and power** infrastructure available

**Tailings dam** – Needs only modular expansion

**Technology and innovation** used for setting up of the plant enables efficient scale up

**Experienced project team** already set up

**Project execution approach** – Outsourcing model with end to end responsibilities , business partners , already mobilised aware of the repeat orders

While the intention retrofit the Skorpion refinery to take Gamsberg concentrate, the volumes of Phase 2 may **warrant Gamsberg' s own refinery**

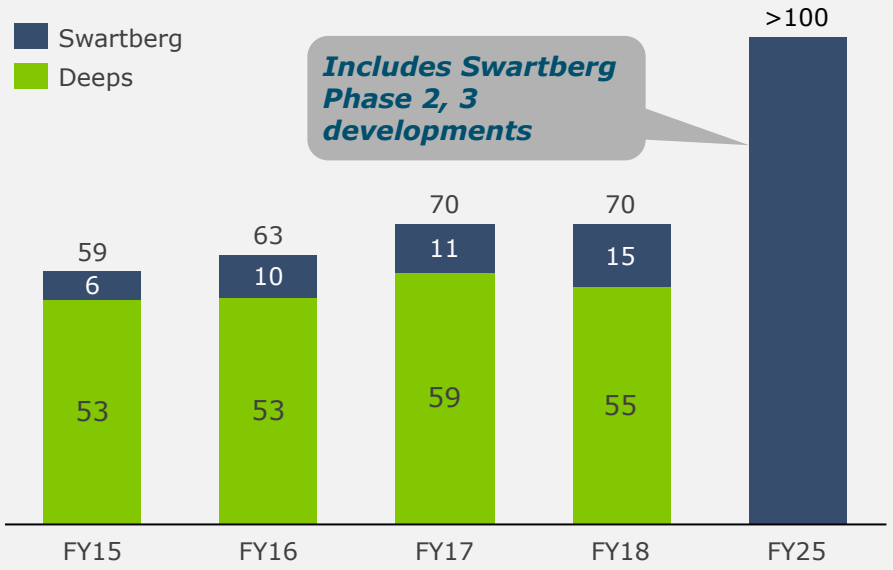
# 06
# BMM – Enabling a world class Zn complex

Andre Trytsman - GM

# BMM Operations Step Up & Growth Opportunity

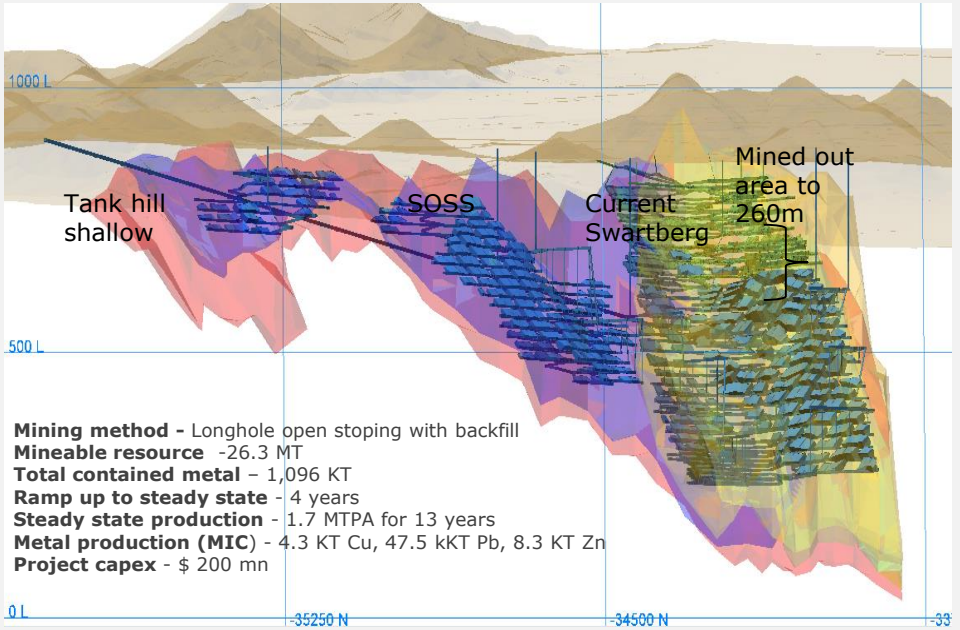
## BMM Operational Performance is Trending Positively…

### Production per year, Metal (Zn & Pb) in concentrate




- BMM has performed exceptionally over last 4 years, despite:
  - Decreasing working areas (from 10 to 5)
  - Increasing workplace congestion
- Specific initiatives over last 2 years include:
  - Backfill placement up by >80%
  - Long hole mining up by >190%
  - Mining productivity up by 10%
  - Milling throughput up by 11%

## ..and can be Further Enhanced with Swartberg Phase 2




**Mining method -** Longhole open stoping with backfill
**Mineable resource** -26.3 MT
**Total contained metal** – 1,096 KT
**Ramp up to steady state** - 4 years
**Steady state production** - 1.7 MTPA for 13 years
**Metal production (MIC)** - 4.3 KT Cu, 47.5 kKT Pb, 8.3 KT Zn
**Project capex** - $ 200 mn

### Black Mountain Complex – Operational readiness

- Strong Future complex moving toward 500kt ZnEq - Gamsberg 450kt, Swartberg 75Kt
- Synergy benefit on combined Black Mountain Complex (BMC) - Shared overhead structure, Commercial and Shared Infrastructure
- Combined operating model - outsourcing of Gamsberg vs owner operation on current operation. Opportunity to ensure optimal operation.
- Efficiency improvements via higher level of automation and digitalisation.
- Establishing a world class Zinc complex increases our ability to attract and retain the best talent.

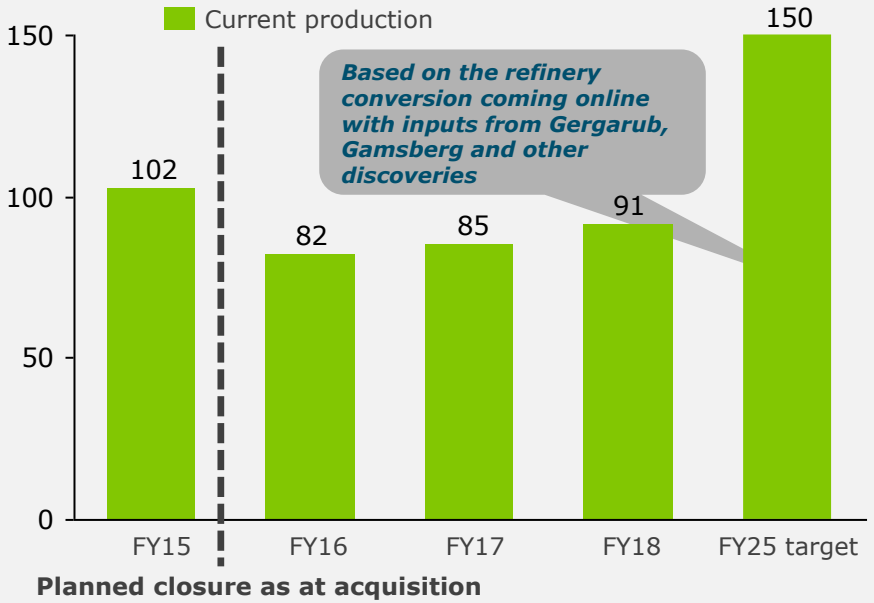
# 07
# Skorpion - Surpassing LOM expectations

Irvinne Simataa - GM

# Skorpion Zinc's Increased LOM Certainty & U/G Potential

## The delivery of Pit 112 has created more certainty around SZ….

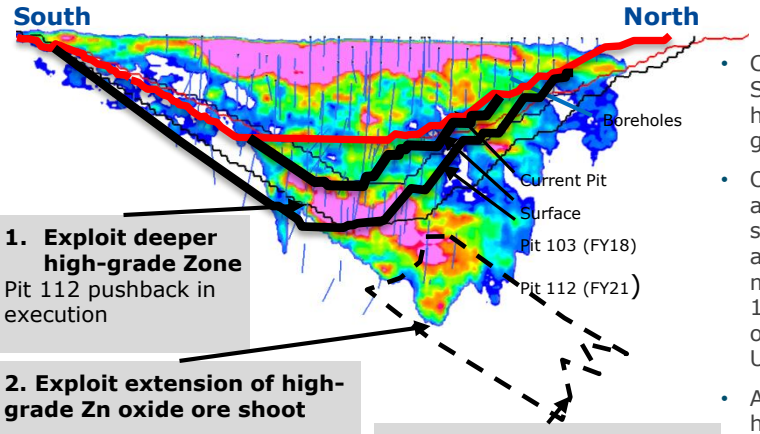
### Production per year, Zn metal




**Planned closure as at acquisition**

- Skorpion has continued to deliver due to:
  - Extension of life from 0.5 to 4 years via the Pit 112 pushback
  - Successfully outsourced mining to Basil Read Namibia in April 2017 and transitioned from owner mining to contractor mining to enable successful execution on the life extension project
  - Mining productivity up by 33% and total rock mined has increased by 83% YoY
  - Continued investment in plant maintenance (e.g. acid plant, crushing etc)
  - A targeted operational improvement programme to further enhance throughput and recovery within the refinery and reach nameplate capacity of 150 000 tpa

## …With further potential at Pit 112 and the planned refinery conversion




**1. Exploit deeper high-grade Zone**
Pit 112 pushback in execution

**2. Exploit extension of high-grade Zn oxide ore shoot**
Underground oxide mining, post-pit 112

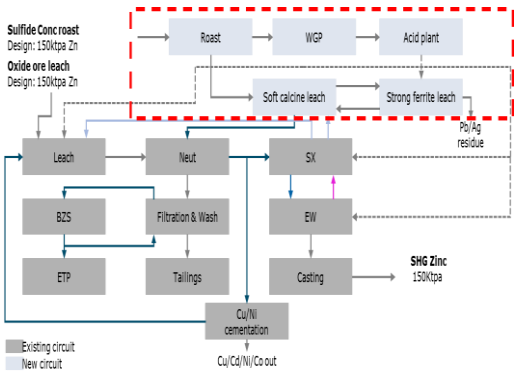
Current drilling confirms continuation at high grade

**3. Transition into Zinc sulphide**
In parallel with U/G oxides

Historic intersections of >20m >10% Zn equiv.

- Currently mined Skorpion orebody highly variable in grade and geometry
- Orebody bulges out at depth, hosting a significant accumulation of metal (hence Pit 112), resource still open at depth (hence UG study).
- Average Zn grades as high as at beginning of LOM.

### Refinery conversion




***Current Status***

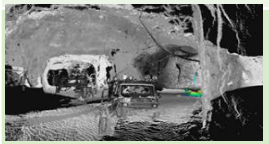
- Current refinery need to be converted to process sulphide concentrates.
- Techno commercial feasibility/Basic Engineering completed.
- ~160 million USD Capex.
- Project ordering & construction work timelines aligned to Skorpion open pit 112 extension (oxide resource)

# 08 Digitalization & Technology - Driving efficient growth

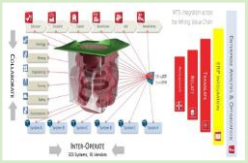
Dave Payne – Head of D&T

# Enabling Growth Through Digitalisation

**The Digitalisation of Gamsberg is the step change in our journey and will be the springboard from which we can transform the rest of our business**

| BMC Initiatives | |
|---|---|
| Change of Mining Method from predominantly C&F to Long Hole |  |
| Latest mining equipment |  |
| Automated Rod Charger |  |
| In-hole survey (Gyro) |  |
| Maptek Isite 3D laser scanner |  |
| BMC Magnetite Project |  |

| SZ Initiatives | |
|---|---|
| Screening of high Ca Stockpile ROM to reduce calcium content |  |
| Optimising the ROM ore blending strategy |  |
| Change from Shovel to Backhoe for ore mining |  |
| Skorpion Marginal Grade Stockpile |  |
| Skorpion Cu Stockpile |  |

| Gamsberg Digitalisation Roadmap | | |
|---|---|---|
| ***Collaborative Ore Movement*** |  | • Increase flexibility & execution of mine plan<br>• Enhanced contractor management<br>• Increased control on mill feed |
| ***Asset Intelligence*** |  | • Increase reliability/availability /utilisation<br>• Reduce maintenance costs<br>• Increase production |
| ***Operational Intelligence*** |  | • Stabilise & optimise operations<br>• Increase throughput & recovery<br>• Near real time decision making |
| ***Personnel Monitoring*** |  | • Increase safety & reduce incidents<br>• Increase efficiency<br>• Increase quality & production |

# 09
# Financial outlook – The path forward

Pushpender Singla – CFO

# ZI Outlook

**Reserve & Resource**

**>300Mt Ore**

***High value Resource Base 306Mt (22Mt Metal) to enable long term sustained Production and Growth***

- R&R on acquisition 286Mt. Addition of 44Mt (>15%) including depletion
- Converted 63Mt Resource to Reserve (>20%)

**Skorpion & Black Mountain**

**>200Kt Production**

- ***FY2018: Production of c.160 KT @ < CoP of $ 1,500/t***
  - Skorpion c.90 Kt & Black Mountain c.70 Kt
  - Focus on further reducing COP through operational and cost initiatives
- **FY19 & FY20: Plan to increase production to c.200 Ktpa by ramping up Pit 112**
  - Skorpion c.130 Kt & Black Mountain c.70 Kt

**Gamsberg**

**250Kt Production@ ~$1000/t**

- **Project on track and progressing as per plan**
  - First production by mid CY2018 and on budget for capex target of $400 mn
  - FY19 production expected to be 100 Kt+, with ramp-up to 250 Kt by FY2020
  - Targeted COP of $1,000-1,150/t, placing ZI in 1st quartile of global cost curve

**Indicative Consolidated Outlook**

| | FY18 | FY19 | FY20 | FY21 | FY22 |
|---|---|---|---|---|---|
| Prod (Kt) | 150-160 | 240-260 | 410-430 | 430-450 | 440-460 |
| COP (U$/t) | <1500 | <1200 | <1100 | <1000 | <900 |

# Gamsberg video

https://youtu.be/KKpDTXCszGU

# Vedanta - Zinc Day

## Hindustan Zinc Limited

30 August, 2017


# Hindustan Zinc - Agenda

**01**

## Corporate Overview

Amitabh Gupta, CFO

**02**

## Social Responsibility – Giving Back

Neelima Khetan, Head CSR

**03**

## Delivering 1.2 mtpa

Naveen Singhal, Director Projects

**04**

## Resource-Driven Growth

Scott Caithness, Head Exploration

**05**

## Silver – Fastest Growing Portfolio

Sunil Duggal, CEO

**06**

## Way Forward

Sunil Duggal, CEO

**Q&A**

vedanta
transforming elements

# 01
# Corporate Overview

Amitabh Gupta, CFO

# Corporate Overview

***2nd*** largest zinc-lead miner globally with ***12 million+ MT*** of ore production capacity

Rampura Agucha: ***2nd*** largest zinc mine globally

***4th*** largest zinc-lead smelter globally: ***1 million+ MT*** of production capacity

***18th*** largest silver producer of the world*

***One of the lowest cost*** zinc producers in the world

***3 mines*** with ***five-star*** ratings by Indian Bureau of Mines

***Vision: To be the world's largest and most admired zinc-lead & silver company***

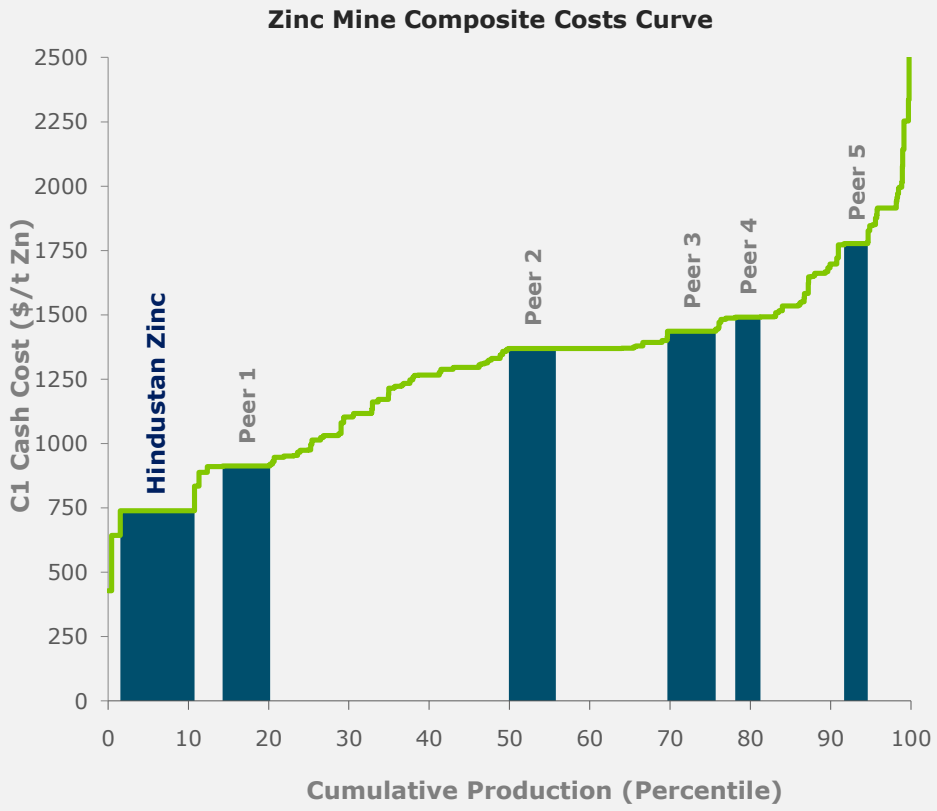
*Rankings source: (1) Wood Mackenzie, Long-Term Outlook Q2 2017*
*(2) For HZL related data, actuals for FY 16-17*
** Source : Thomson Reuters*

# What Differentiates Us?

## Core Strengths

1. Captive mines with R&R base of 404.4 million MT ensuring mine life of 25+ years
2. Integrated metal production supported by captive power plants
3. Low cost of operations driven by quality assets and recovery from waste
4. Market leadership in India with strong presence in emerging economies of Asia

## Among the Lowest Cost Producers of Zinc



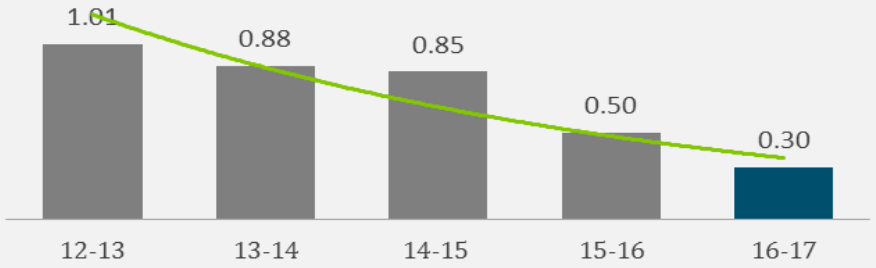

Note: C1 cash cost includes by-product credits

*Source: Wood Mackenzie Research (Q2 2017)*

**Leading the Way with Fully Integrated Operations**

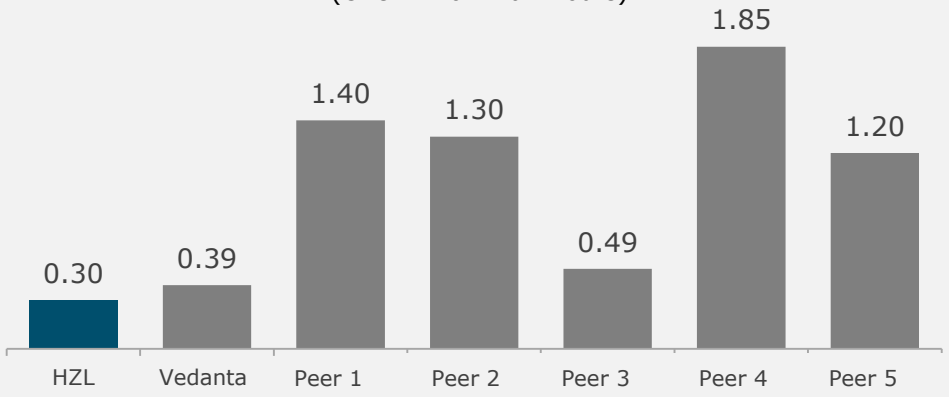
# Safety & Environment – Vision Zero Harm

## LTIFR Trend




- 127% increase in lead indicators reporting last 2 years
- Zero occupational illness cases
- Safety perception score improvement from 62% to 88%

**LTIFR Benchmarking**
(One million man-hours)

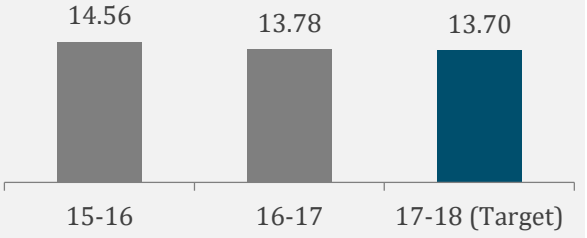



*Source: SD report 2016 of all companies*

## Water Conservation

- Zero discharge
- 33% total water requirement met from recycling/ reuse water (2017)
- Water CDP disclosure 2017

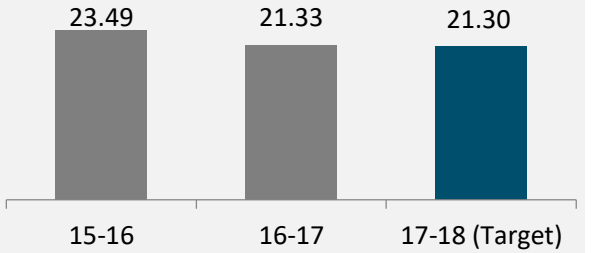
**Specific Water Consumption** ($M^3$ / MT of MIC)




## Climate Change & Energy

- 10 UNFCCC projects
- 325 MW green power
- 9% specific energy reduction (2017)
- CDP disclosure 2017 & Scope 3 GHG emission

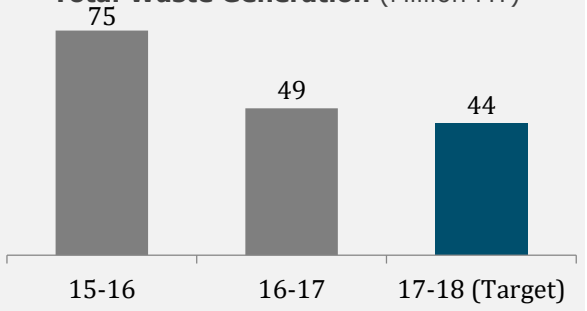
**Specific Energy Consumption** (GJ / MT of MIC)




## Waste Management

- Fumer project for waste minimisation
- Paste fill plant at SKM and RAM UG
- Focus on value from waste
- Paver block from waste

**Total Waste Generation** (Million MT)




***Waste includes mining waste**

# Portfolio of Tier - 1 Assets

## Rampura Agucha Mine

***Reserves*** : 49.7 mn MT
***Resources*** : 50.3 mn MT
***Reserve Grade*** : Zn 13.9%, Pb 1.9%
***Current Ore Capacity*** : 6.15 mtpa

## Kayad Mine

***Reserves*** : 5.4 mn MT
***Resources*** : 1.7 mn MT
***Reserve Grade*** : Zn 7.8%, Pb 1.1%
***Current Ore Capacity*** : 1.00 mtpa

## Sindesar Khurd Mine

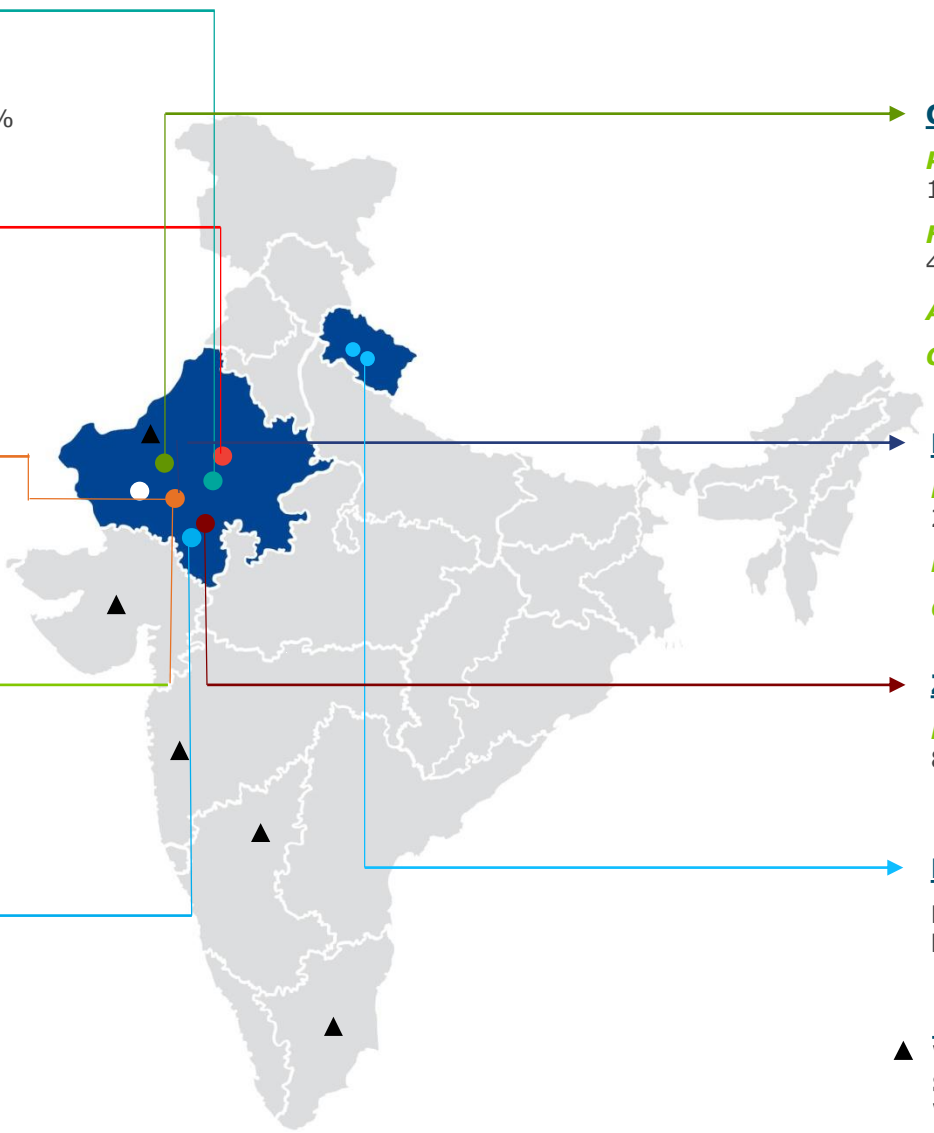
***Reserves*** : 35.6 mn MT
***Resources*** : 87.2 mn MT
***Reserve Grade*** : Zn 4.2%, Pb 2.9%
***Current Ore Capacity*** : 4.50 mtpa

## Rajpura Dariba Mine

***Reserves*** : 9.0 mn MT
***Resources*** : 50.3 mn MT
***Reserve Grade*** : Zn 6.3%, Pb 1.5%
***Current Ore Capacity*** : 0.90 mtpa

## Zawar Mining Complex

***Reserves*** : 9.5 mn MT
***Resources*** : 85.7 mn MT
***Reserve Grade*** : Zn 3.3%, Pb 1.8%
***Current Ore Capacity*** : 4.00 mtpa
***CPP*** : 80 MW



## Chanderiya Smelting Complex

***Pyrometallurgical Lead Zinc Smelter***: 1,05,000 MTpa zinc and 35,000 MTpa lead

***Hydrometallurgical Zinc Smelter***: 4,20,000 MTpa zinc

***AusmeltTM Lead Smelter***: 50,000 MTpa lead

***Captive Power Plant***: 234 MW

## Dariba Smelting Complex

***Hydrometallurgical Zinc Smelter***: 2,10,000 MTpa zinc

***Lead Smelter***: 1,00,000 MTpa lead

***Captive Power Plant***: 160 MW

## Zinc Smelter Debari

***Hydrometallurgical Zinc Smelter***: 88,000 MTpa zinc

## Pantnagar & Haridwar

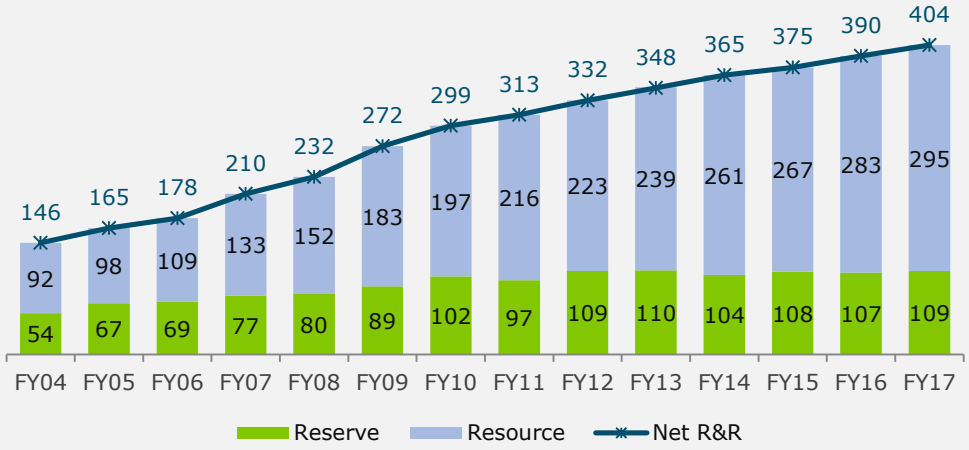
Processing and refining of zinc, lead and silver

## Renewable Power

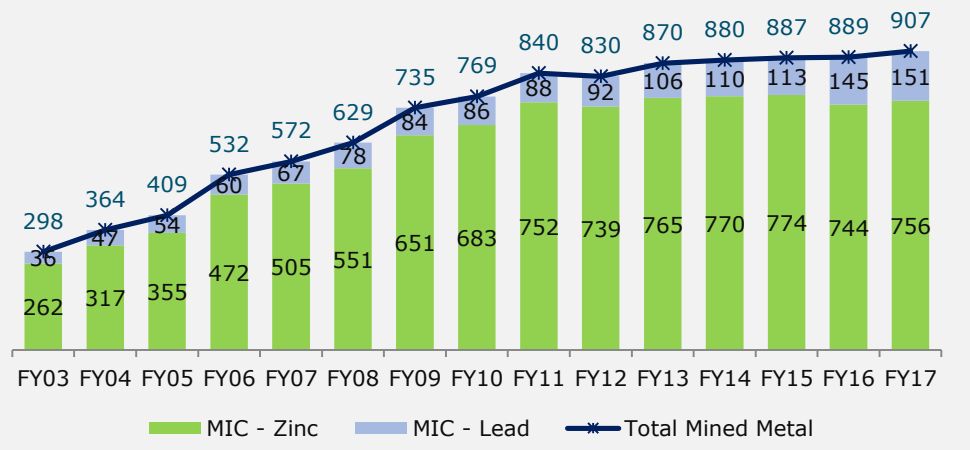
**Wind:** 274 MW
**Solar:** 16 MW
**Waste heat recovery:** 35 MW

# Strong Track Record of Growth

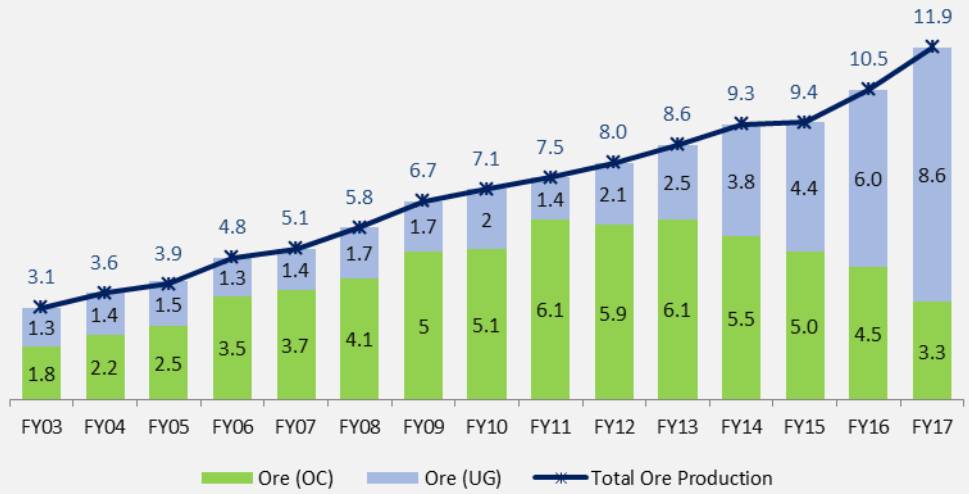
## Reserves & Resources (mn MT) – 2.5X Growth



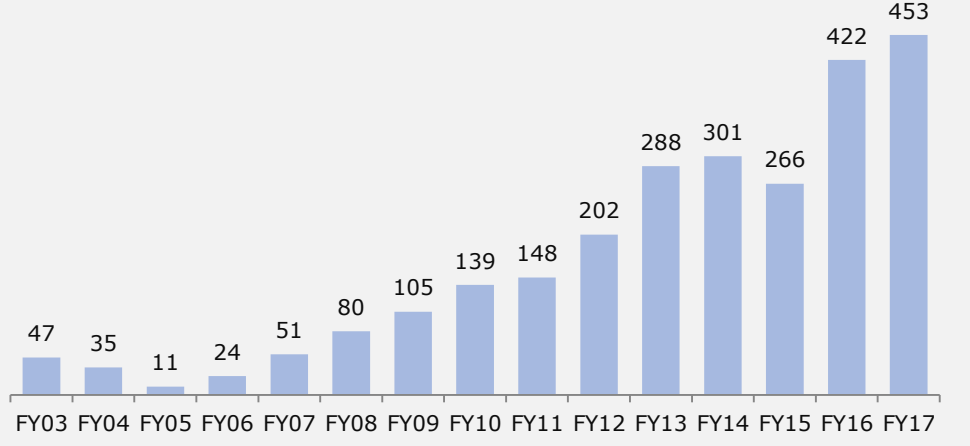

## Mined Metal (kt) – 3X Growth




## Ore Production (mn MT) – 3.5X Growth



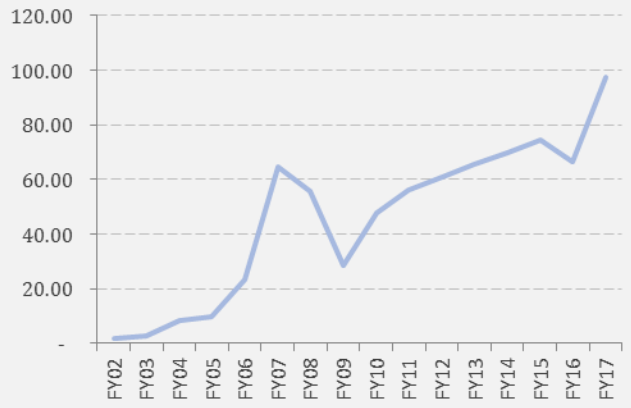

## Silver Metal – Integrated Saleable (MT) – 9X Growth



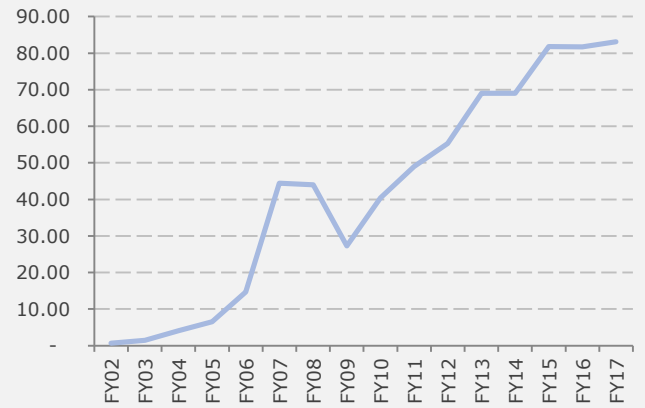

**Multi-fold growth since disinvestment**

# Robust Financial Performance

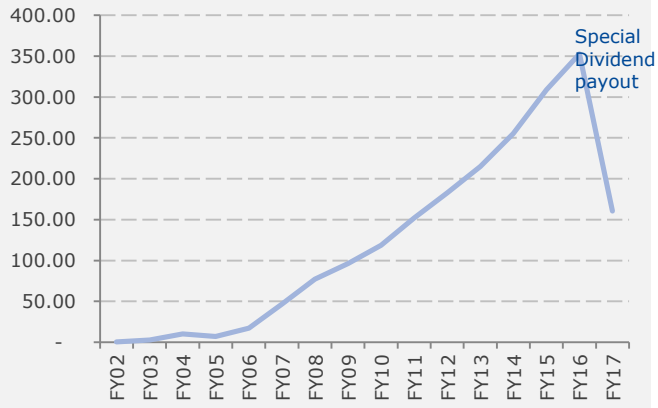
## EBITDA
Rs. bn




## PAT
Rs. bn

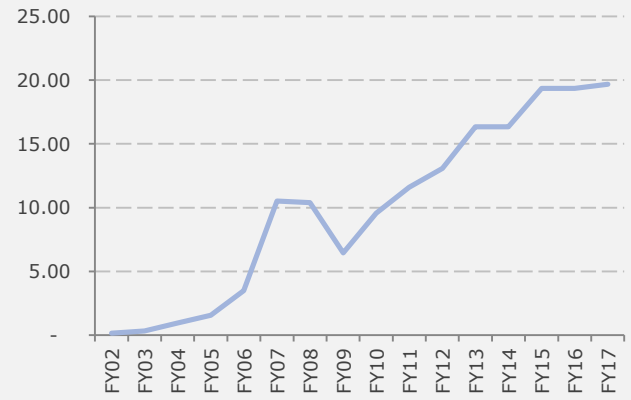



## Cash & Cash Equivalents*
Rs. bn

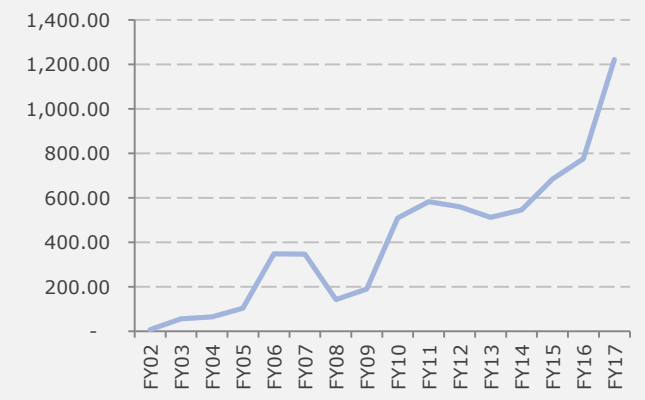



*net off dividend accounts & temporary borrowings; includes investments at fair value & interest accrued thereon

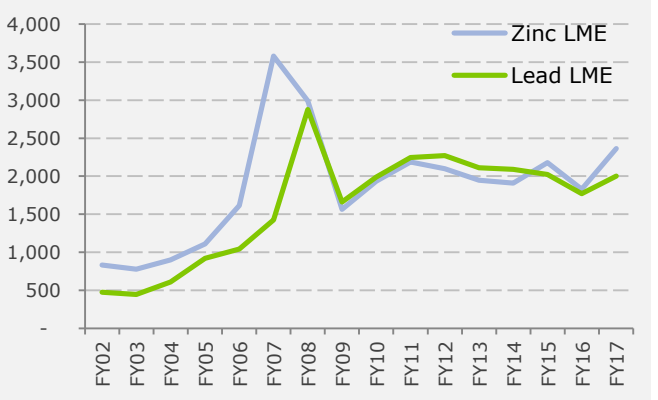
## EPS
Rs.




## Market Cap
Rs. bn

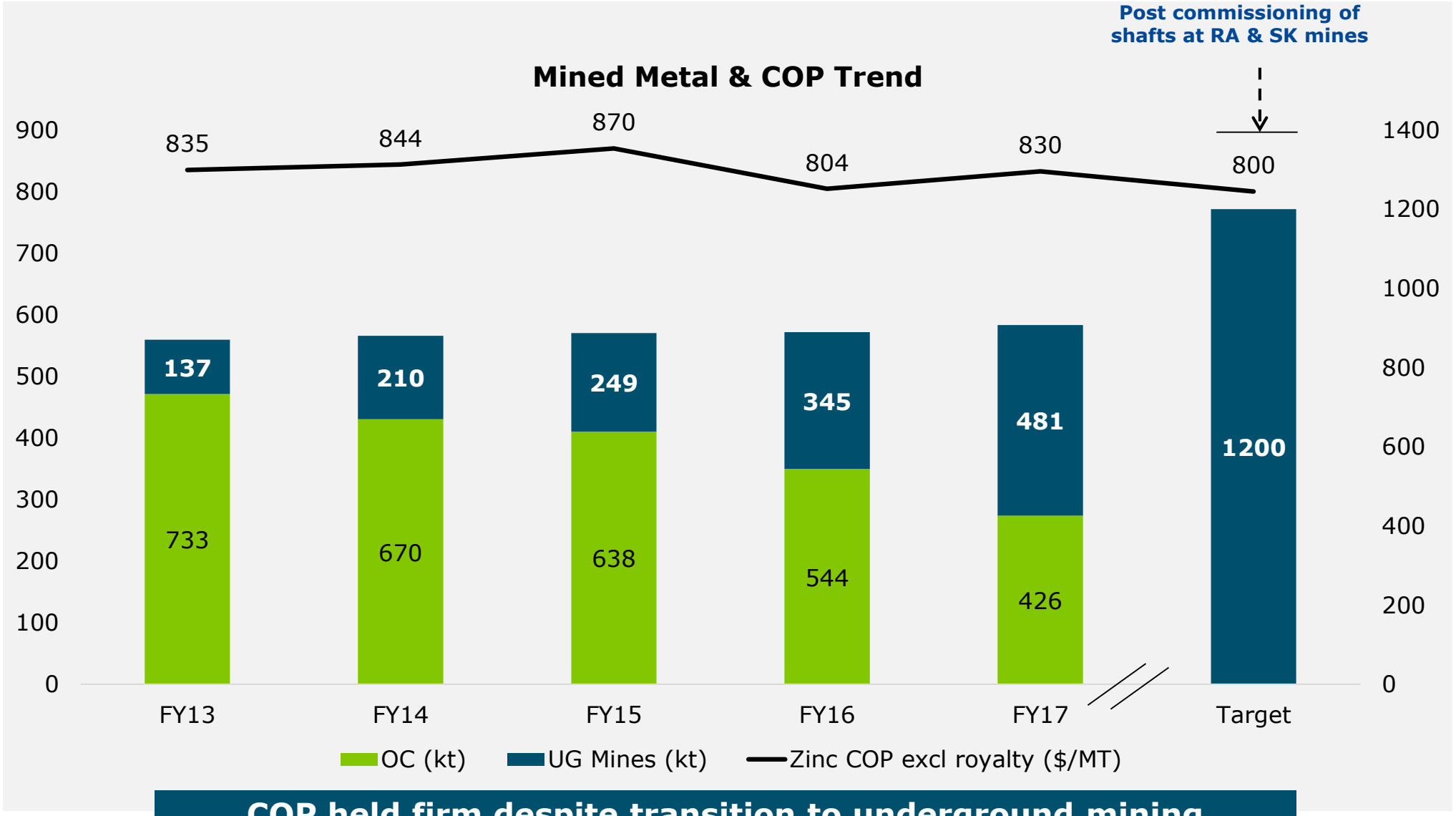



## LME Price
$/MT




**EBITDA CAGR 28% despite Zinc LME growth of only 7%**

# Cost Journey




**COP held firm despite transition to underground mining**

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# 02
# Corporate Social Responsibility

Neelima Khetan
Head CSR

# Corporate Social Responsibility


## Vision

To enhance the quality of life and economic well being of communities around our operations.

## Goals

- To positively & holistically impact the quality of life of the communities living around our areas of operation.
- To work in partnership through a multi-stakeholder approach for innovatively, effectively and efficiently addressing development challenges.
- To emerge as a thought leader, creating benchmarks of good practices in CSR across Rajasthan & country.

## Reach

Over half a million people in Rajasthan; positively impacting lives of more than 100,000 households

**HZL is proud to have had an unbroken social license to operate for the last 5 decades**

# Principles & Focus areas

## Core Principles

**Neighbourhood Communities**
Our first and foremost commitment

**The Partnership Multiplier**
Work, as much as possible, through strong and credible local partners

**Impact Centric**
In almost everything we do, we focus on impact rather than on spends

**Strong Governance**
Multi-tiered and objective governance structures and routines

## Thematic Areas


Education


Sustainable Livelihoods


Women's Empowerment

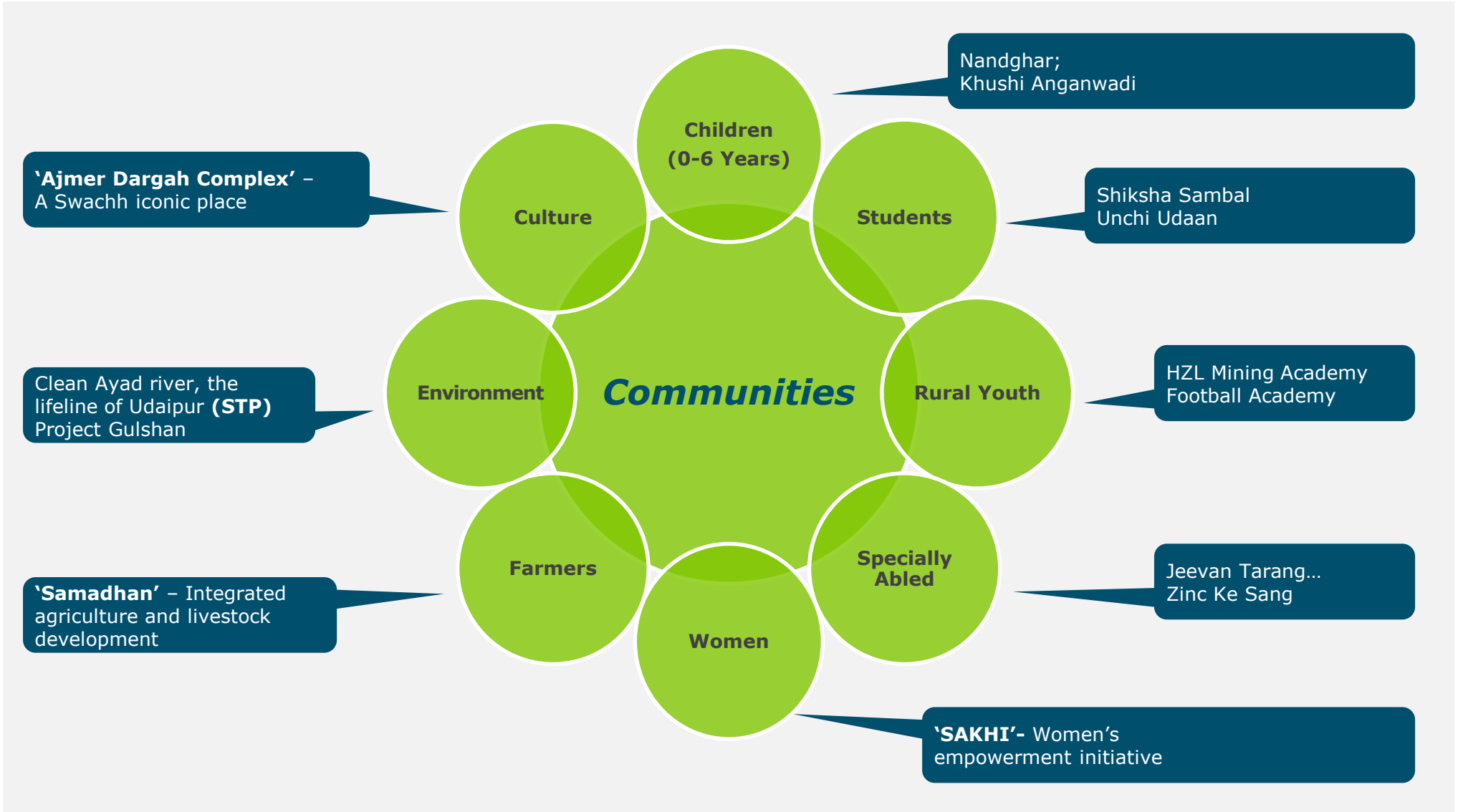

Health, Water & Sanitation


Sports & Culture


Environment


Community Assets Creation

# Touching Lives of Neighbourhood Communities



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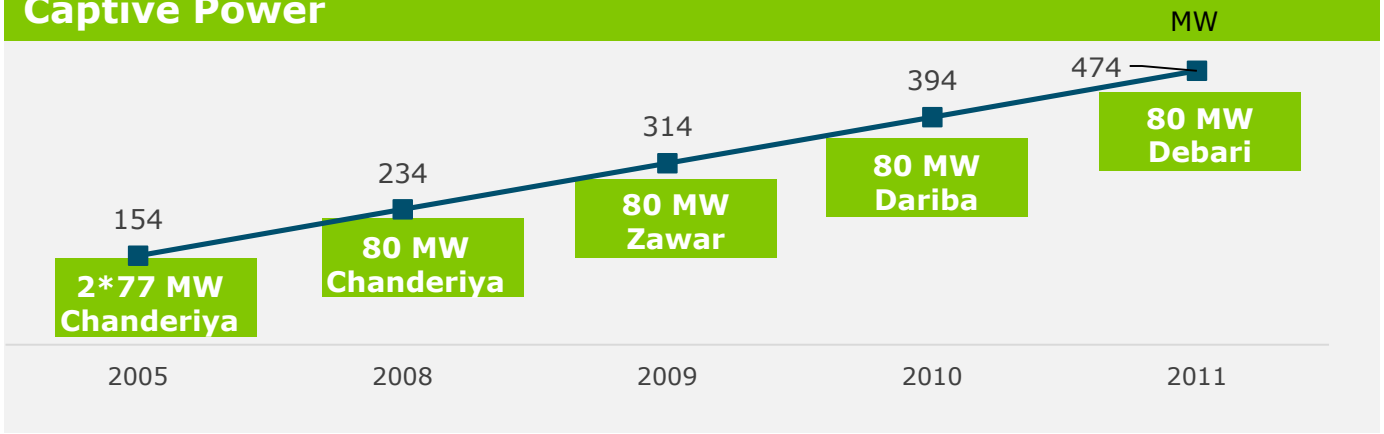
# 03
# Delivering 1.2 mtpa

Naveen Singhal
Director Projects

# History of Project Delivery

## Captive Power




## Smelters

***2005***
**Zn Hydro-1** at Chanderiya (170 kt)

***2006***
**Ausmelt** at Chanderiya (50 kt)

***2008***
**Zn Hydro-2** at Chanderiya (170 kt)

***2010***
**Zn Hydro-3** at Dariba (210 kt)

***2012***
**Pb Smelter** Dariba (100 kt)
**Silver refinery** Pantnagar (500 MT)

## Mines

***2005***
**RA OC** 2.3 to 3.75 mtpa

***2007***
**SKM** 0.3 mtpa

***2009***
**RA OC** 3.75 to 5 mtpa

***2010***
**RA OC** 5 to 6 mtpa

***2012***
**SKM** 0.3 to 2 mtpa

***2013***
Production commenced at **Kayad Mine**

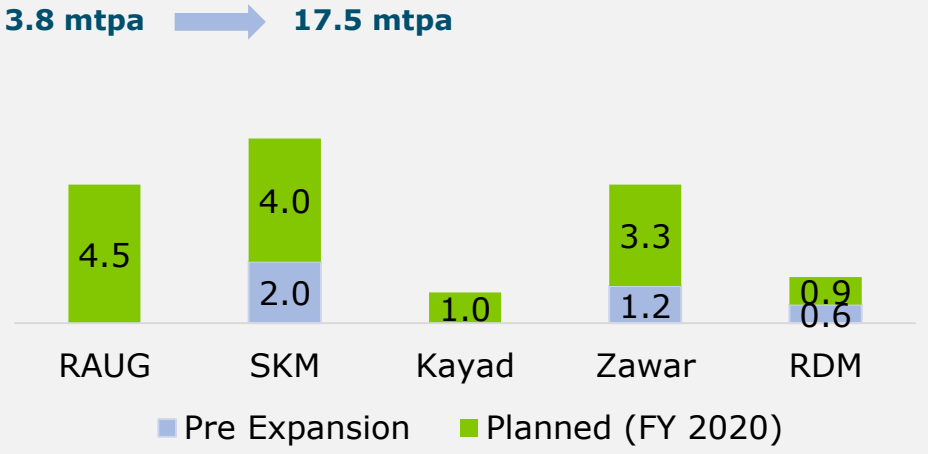
***2016***
**SKM** 2 to 3 mtpa

***2017***
**SKM** 3 to 3.7 mtpa
**RAUG** 1.4 mtpa
**SK Mill** commissioned

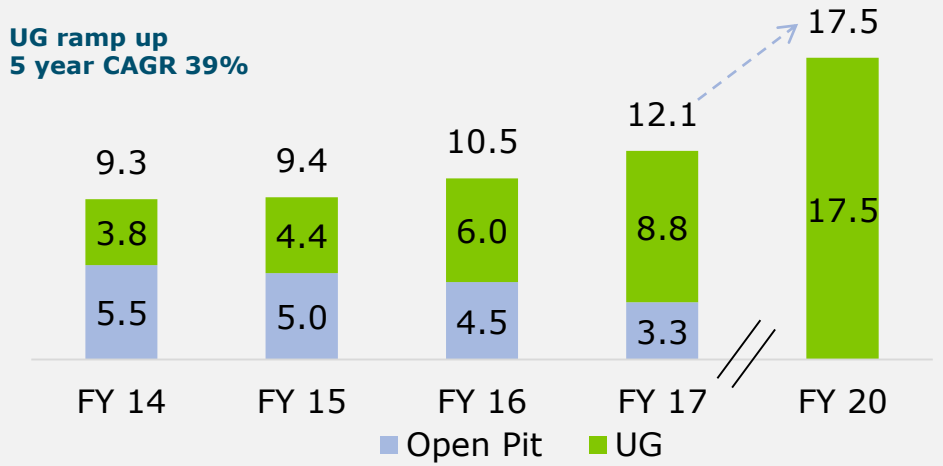
# Mine Expansion Project Overview

- Mine expansions in sync with increasing R&R
- Five major projects to increase MIC capacity to 1.2 mtpa, including RAM OC replacement
- Transition from Open Cast to UG mining
- Smelters' debottlenecking to remain integrated
- Six year capex of $1.6 bn; ~$1 bn spent

## Underground Mines Capacity Expansion



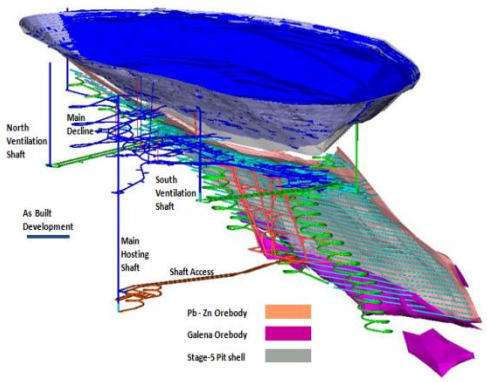

## OC to UG Transition



# Underground Mines – concurrent expansion

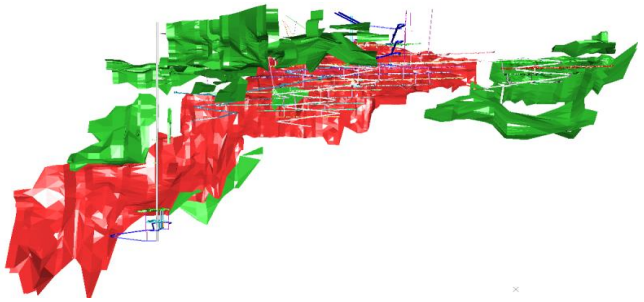
## Rampura Agucha – a mine in transition

***Reserve & Resource*** : 100.0 mn MT



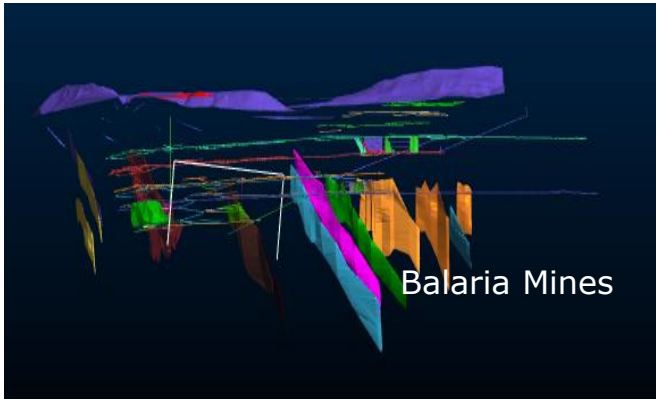

## Sindesar Khurd Mine – satellite lenses

***Reserve & Resource*** : 122.8 mn MT



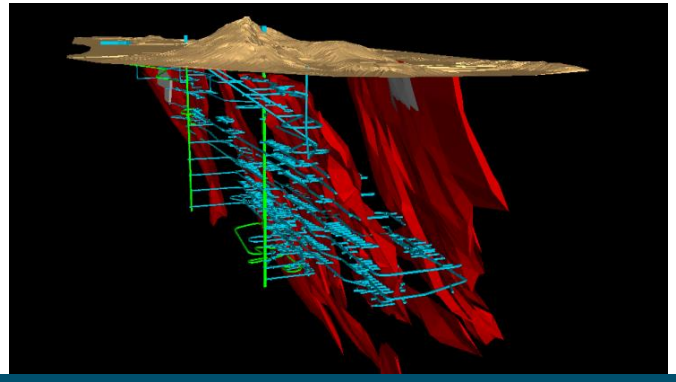
## Zawar – integrating multiple mines

***Reserve & Resource*** : 95.2 mn MT



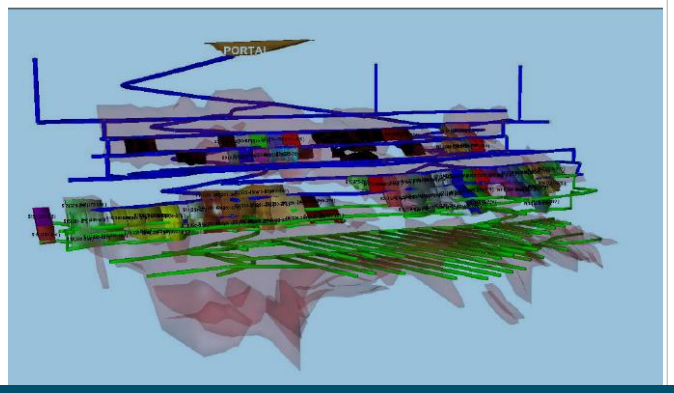

## Rajpura Dariba Mine – upgrading a legacy

***Reserve & Resource*** : 59.3 mn MT



## Kayad Mine – near mine exploration

***Reserve & Resource*** : 7.1 mn MT




**Diverse ore bodies require different mining solutions**

# Project Philosophy

**Robust Mine Plan**

- LOMP, Mining schemes by AMC, Australia and reviewed by Golder, Canada
- Rock Mechanics & Stability Study by AMC - Beck, Australia
- ***Central Design Center*** - act as a think tank for adapting best mining design / practices

**World-Class Infrastructure**

- ***Safety -*** Rescue chambers, Gas Leak Detectors, Emergency escape systems
- ***Communication -*** Leaky feeder systems, Pitram mine Monitoring
- ***Ventilation -*** Development of Independent ventilation circuit by using Raise bore
- ***Shafts -*** 7.5 mtrs dia , 1 km deep shaft for man, material & ore hoisting
- ***Workshop -*** Fully equipped at surface & Underground for equipment maintenance by OEM
- ***Pastefill -*** Most Modern and efficient back filling

**Best-in-Class Execution Partners**

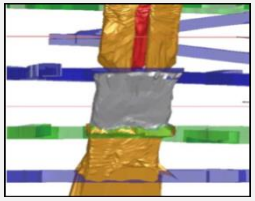
- ***Shaft Sinking -*** METS - Shaft Sinkers, South Africa; NFC- ENFI - CC5, China
- ***Mine Development -*** Barminco, Australia; AAC – Reliant, Peru; Indian contractors, Expats
- ***Mining Fleet -*** Atlas Copco – Sandvik – Normet, Sweden; Catter Pillar, USA
- ***Raise Boring -*** Bergteamet, Sweden; Atlantis, South Africa
- ***Paste Fill Plant -*** Golder Associates, Canada

**Talent Pool**

- ***Experienced expats*** on board for handholding, mentoring & training HZL team
- ***Mining academy -*** Skill development and enhancement of local youth in UG operation
- ***Skill development*** and competency building of existing manpower pool

# Technology & Innovation in Mines

## Technology Initiatives



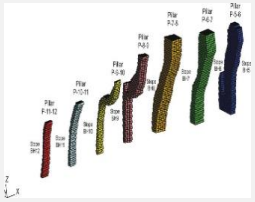
***Cavity Monitoring System:*** Stope scanning identifies and minimises deviation


***Refuge Chamber:*** First of its kind in the country, provides a safe refuge during UG emergency

***Mobile Carrier Rig:*** Eases mobility of exploration drills

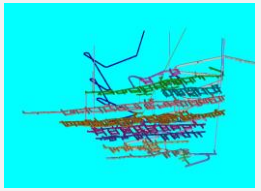
***1500 KW Ventilation Fan:*** First of its kind in the country, provides best UG working environment.

## Mine Planning

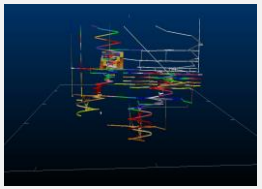


***Measurement 3D numerical modelling for stope and pillar design***

***In-situ stress measurement***



***3D design using datamine***



***Schedule simulation using 5D planner***

***Shaft sinking modelling***

## Mine Operation

***Best-in-class mining equipment***

***Virtual reality and simulation-based training***

***Mine digitisation and tele remote***

***3D scanning with laser scanner***

***Electronic shot firing***

**Accelerated focus on safety & productivity leveraging technology**

# Smelters – Equipped for 1.2 mn MT

## Process & Technology

| Metal | Process | Technology |
|---|---|---|
| ***Zinc*** | Hydro Metallurgy | Outokumpu roast-leach-electro winning technology |
| | Pyro Metallurgy | Imperial smelting technology |
| ***Lead*** | Pyro Metallurgy | Imperial smelting technology |
| | | Ausmelt Top Submerged Lance technology |
| | | SKS, bottom blowing technology |

## Smelter Debottlenecking

***Phase 1 : December 2017***

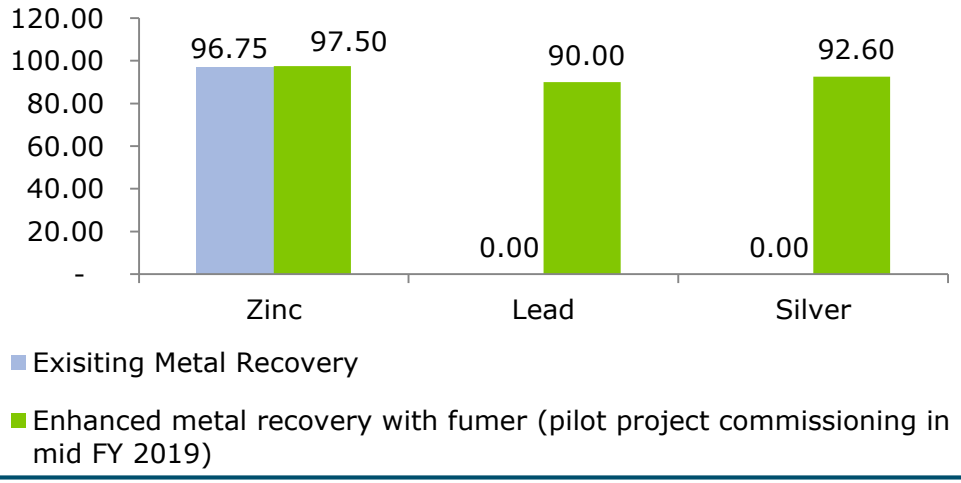
- Cell house operation @ 200 KA from 180 KA
- Upgradation of Roaster leaching circuits
- Mechanisation of cell house at Debari zinc plant

***Phase 2 : December 2018***

- Expansion of Dariba zinc cell house
- Leaching & purification circuit debottlenecking @ Dariba
- Oxygen enrichment in roasters to increase throughput

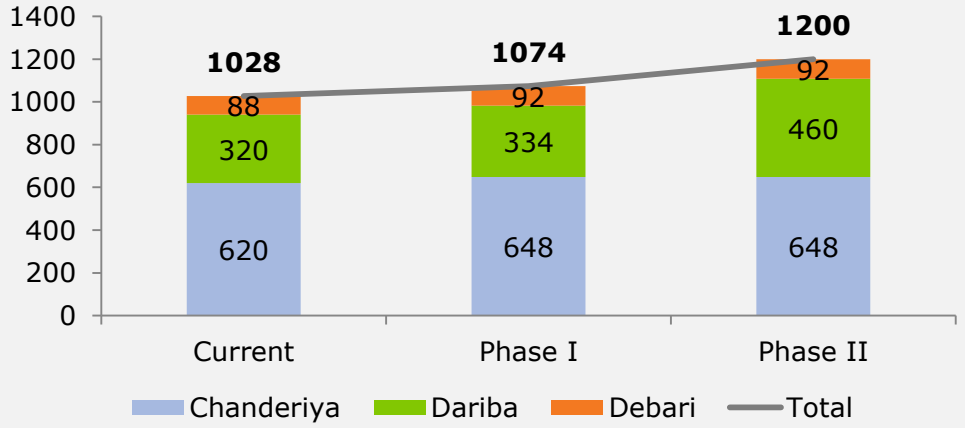
## Metal Recovery in Hydro

Metal recovery %




## Smelter Capacities After Debottlenecking

kt

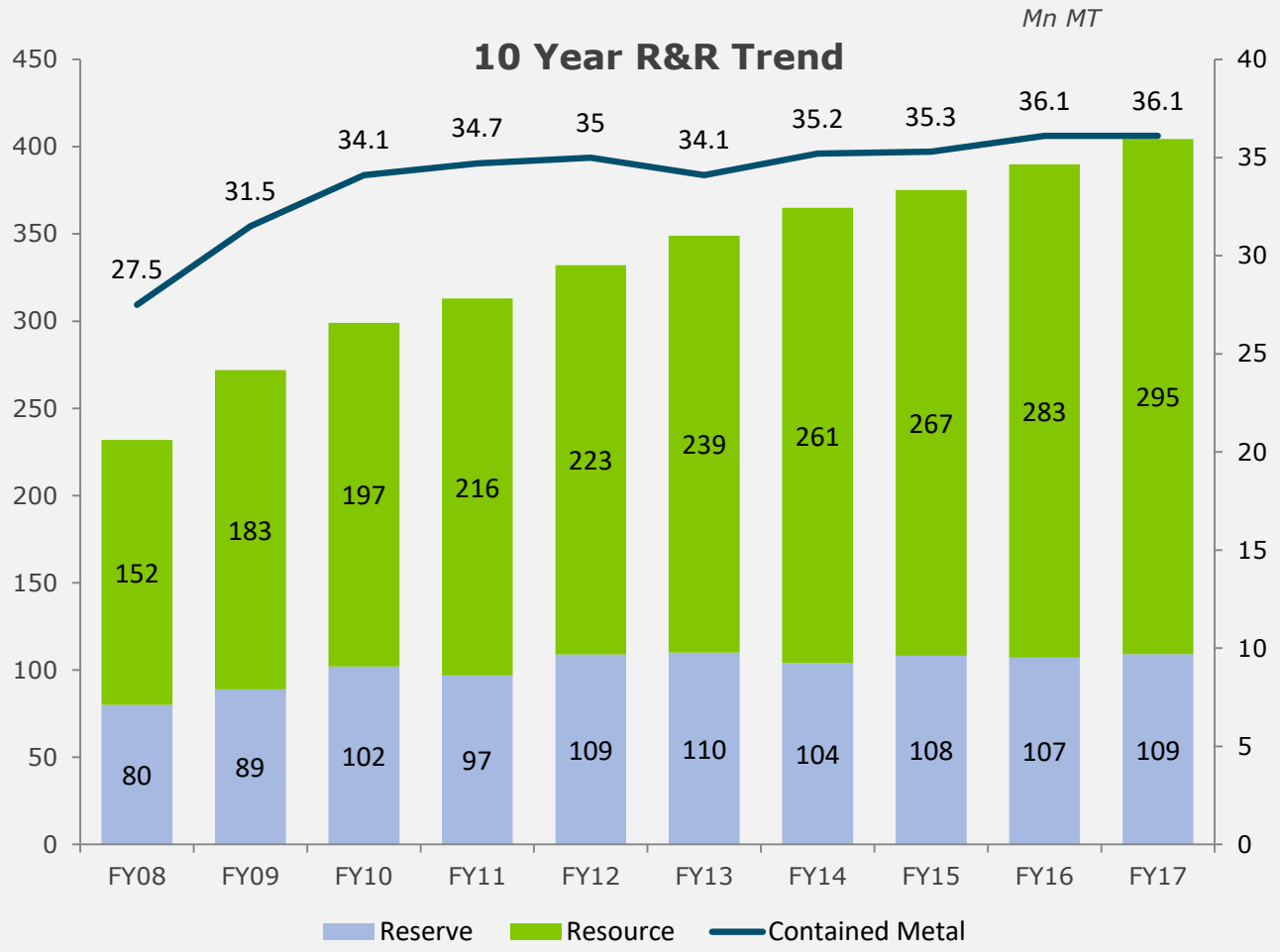


# 04
# Exploration

Scott Caithness
Head Exploration

# Exceptional Exploration Success

## Sustained Commitment to Exploration → Strong Track Record of R&R Addition

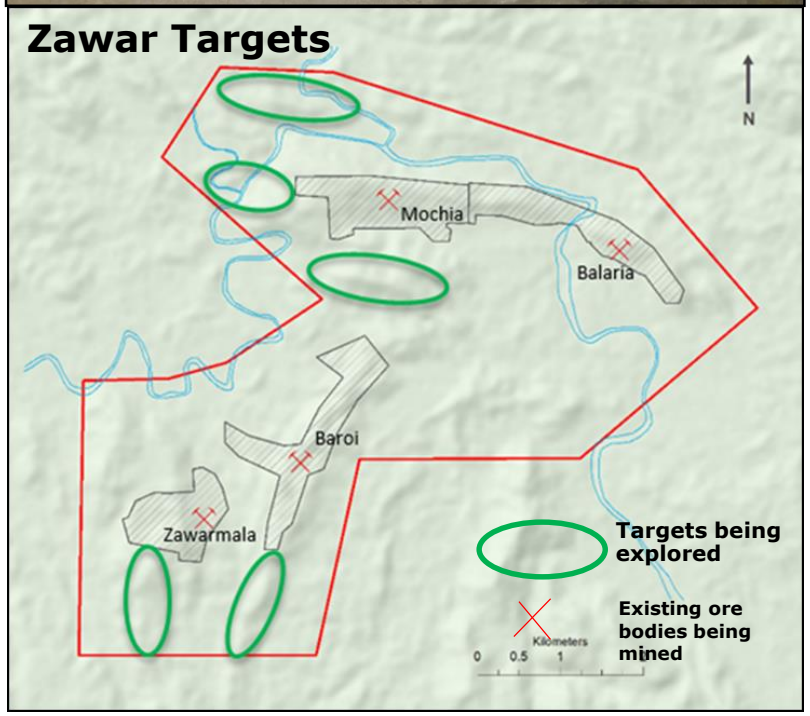



- R&R 404 MT in 2017 - underpins 25+ years of production at current rate
- R&R estimation to the JORC standard and audited by international consultants
- Drill 80,000+ metres pa to add new resource tonnage
- Clear exploration strategy to grow R&R
- Use of latest global technologies

**Every year since disinvestment, we have added more than depleted**

# Resource-Driven Growth

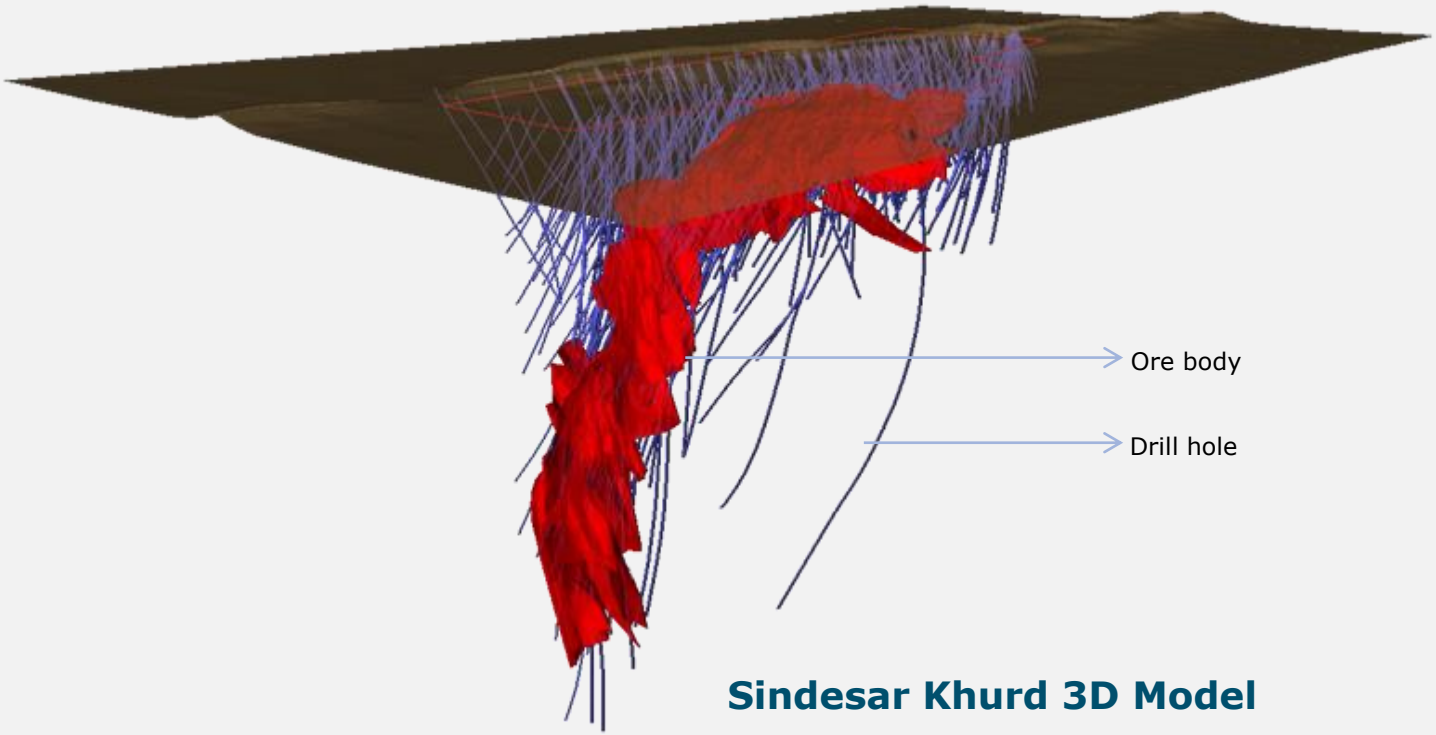
- All deposits remain 'open' either at depth or along strike
- New exploration targets could exist within held MLs
  - Zawar in-mine bonanza silver – 2-8 metres zones grading+5oz/t Ag
  - New prospects in all MLs
- Zawar has 5 new prospects
  - Exploration potential for 50-80 mn MT of 4-6% Zn+Pb
  - +5km of prospective geology, strong Zn+Pb in soils and ancient mine workings
  - Next steps - Surface geophysics, forest clearance and drilling
- More than 20 valid ML, PL and RP applications provide potential for greenfield discoveries

# Exploration Technologies

## Using Global Leading Exploration Technologies

- Modern drill rigs and motorised directional drilling
- Drilling and geochemical data management software
- 3D visualisation software packages
- Geophysical techniques




**Sindesar Khurd 3D Model**

**High speed drill rig at Kayad Mine**

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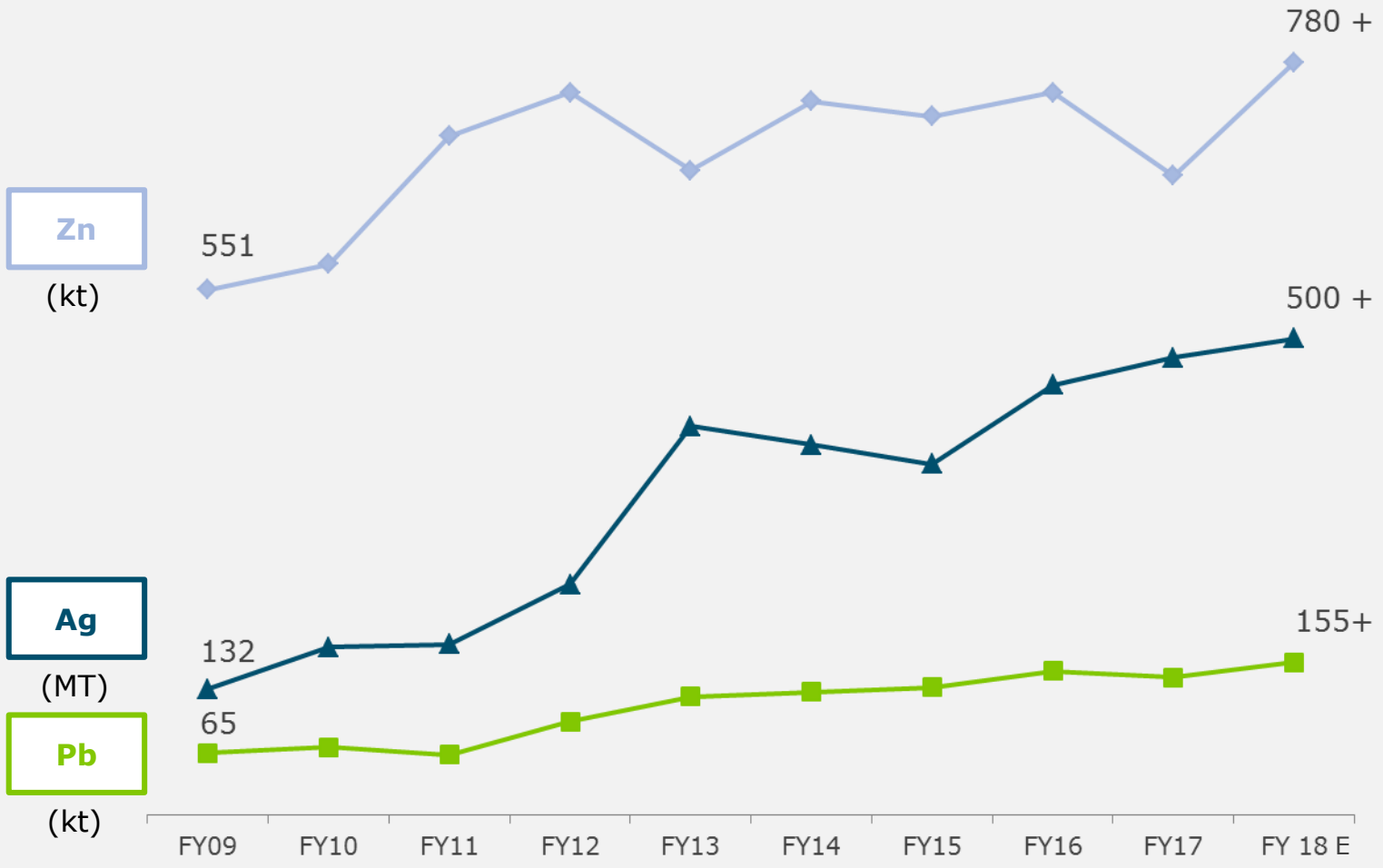
# 05
# Silver

Sunil Duggal
CEO

# Silver – Fastest Growing Portfolio of Hindustan Zinc

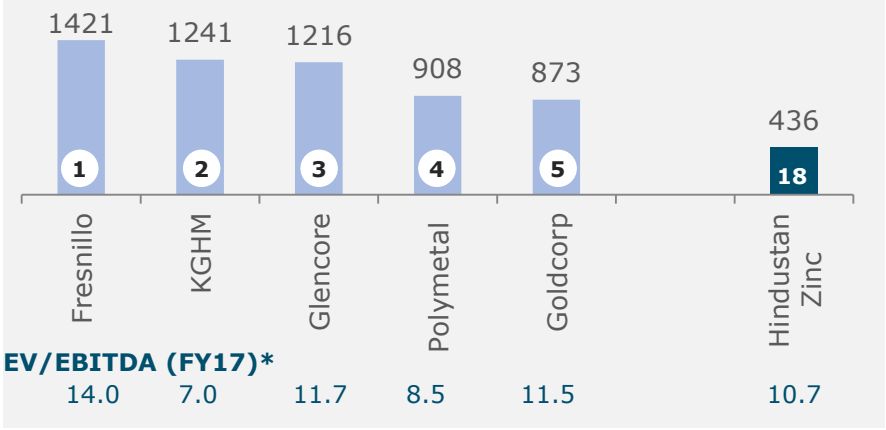
## Strong Management Focus to Drive Silver Portfolio




*Refined metal includies captive consumption*

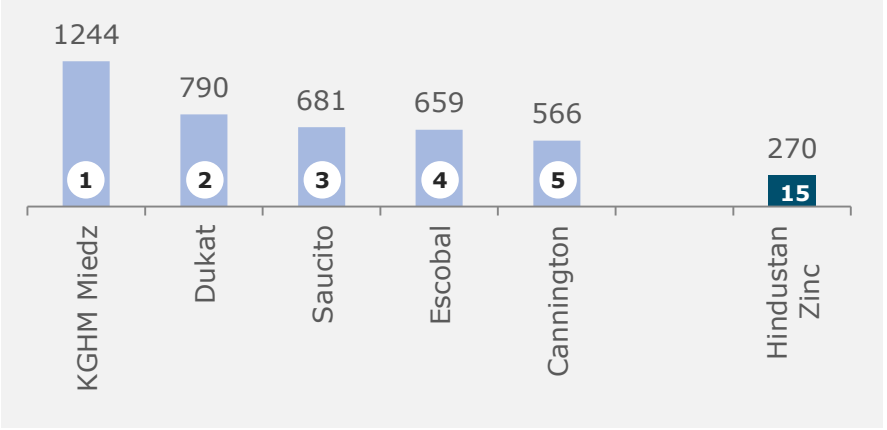
# Silver Portfolio – Growth

## Global Production (MT) Ranking 2016



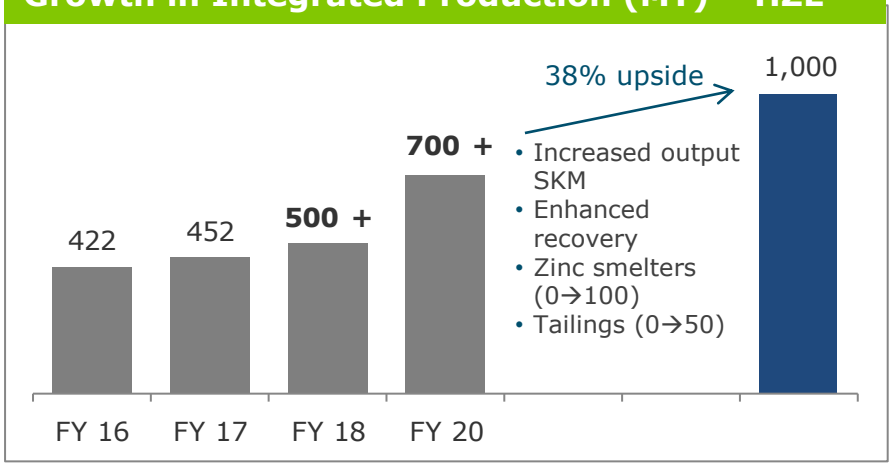

*Source : Metals Focus and *Reuters*

## Global Production (MT) Ranking 2016 - Mines

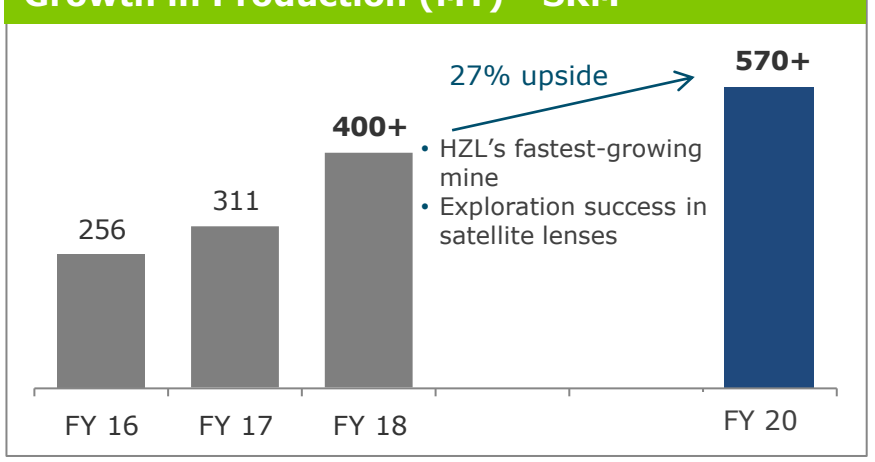



*Source : Metals Focus*

## Growth in Integrated Production (MT) – HZL

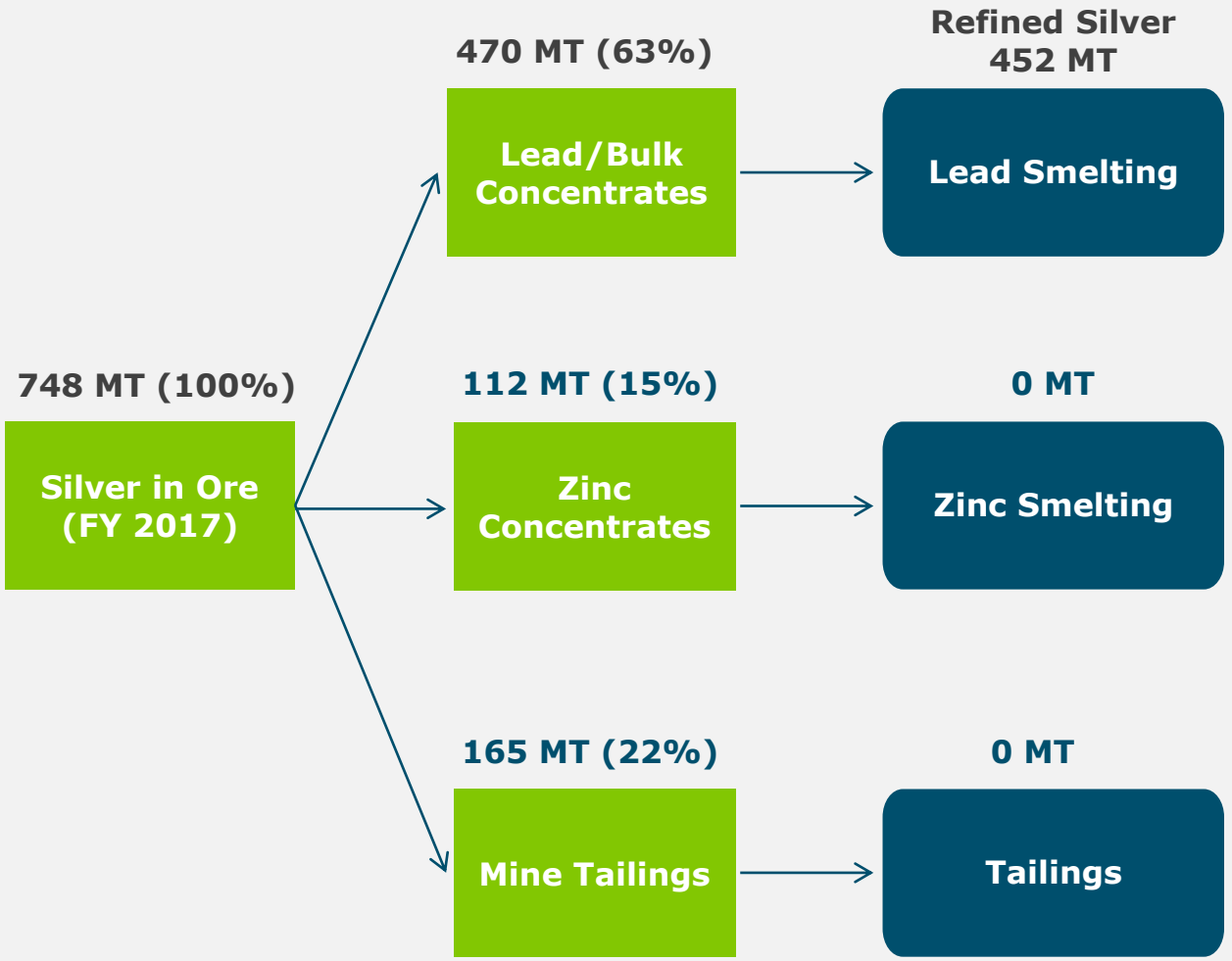



## Growth in Production (MT) - SKM




**Hindustan Zinc Poised to be Among 'Top 5 Silver Companies'**

# Silver Portfolio – Realising Potential of 1,000 MT




## Key Focus Areas

***Mining (452 → 850)***

- Focus on silver-rich deposits → ongoing
- Achieving benchmarked recoveries in mines;
  - Prefloat, flash float → May 18

***Zinc Smelters (0 → 100)***

- Fuming technology → June 18 (first fumer)
- Second/third fumer → April 20 (plan)

***Recovery from Tailings (0 → 50)***

- Reflux classification → June 18 (pilot)

**452 MT FY 2017** → **1,000 MT**

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# 06
# Way Forward

Sunil Duggal,
CEO

# Way Forward

**1.5 mtpa capacity under planning**

- Shaft and decline integration
- Multi-level mining
- Digital transformation
- New prospects & tenements
- R&R addition

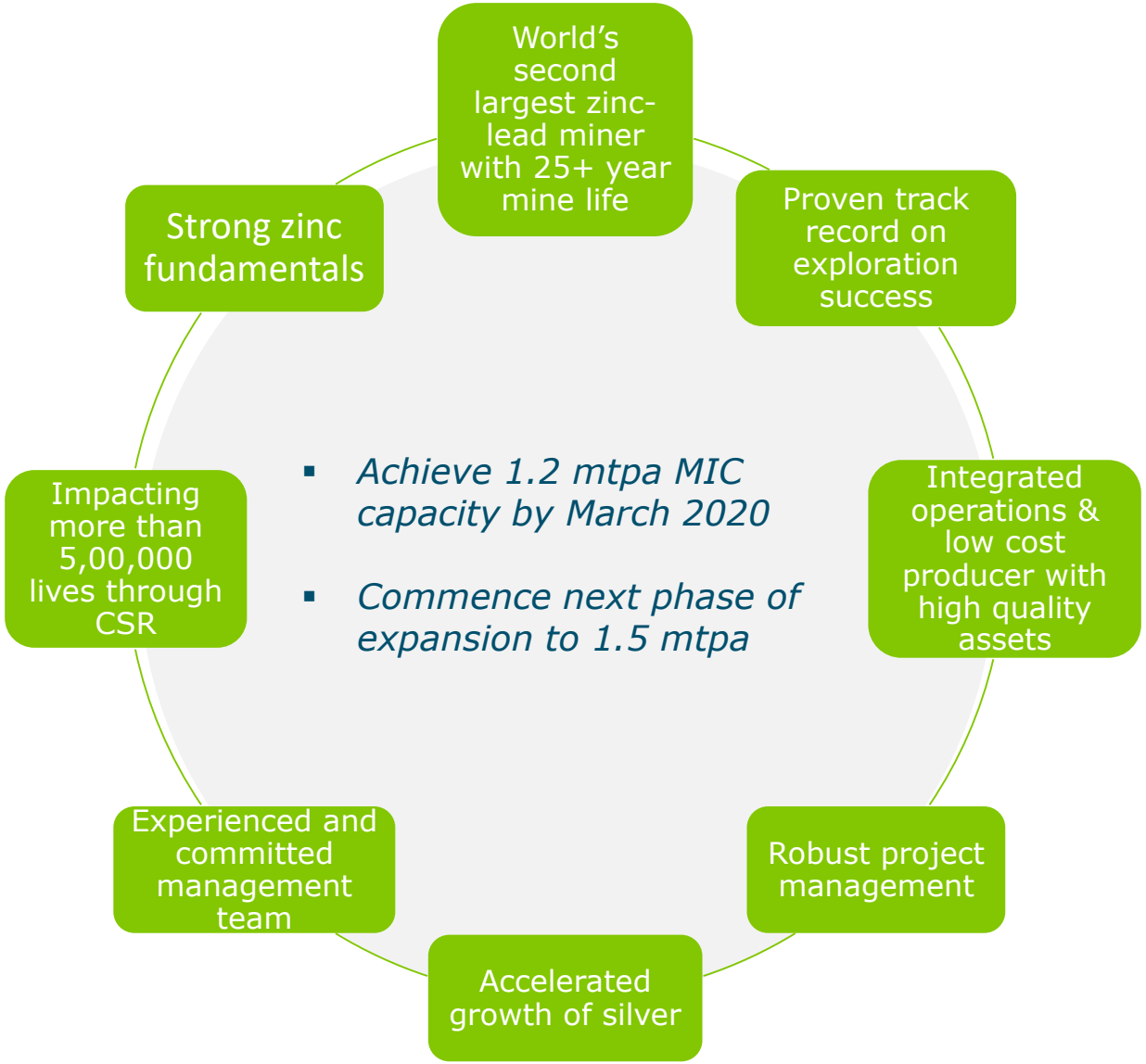
**1.2 mtpa capacity by FY 2020**

- 25+ years of mining R&R with potential of 1.2 mtpa
- Transition to underground mining progressing smoothly
- Shaft commissioning on track for Q3 FY 2019
- Mill & smelter capacity to keep pace
- Reduction in COP on shaft commissioning

**Outlook FY 2018**

- ***Mined metal:*** *Higher than 907 kt of FY 2017*
- ***Refined zinc-lead:*** *950 kt; silver: 500 +MT*
- *Marginally higher dollar COP (excluding royalty)*
- *Project Capex of $350-360 million (including ongoing mine expansions, fumer and smelter debottlenecking)*

# Summary


World's second largest zinc-lead miner with 25+ year mine life
Proven track record on exploration success
Integrated operations & low cost producer with high quality assets
Robust project management
Accelerated growth of silver
Experienced and committed management team
Impacting more than 5,00,000 lives through CSR
Strong zinc fundamentals
Achieve 1.2 mtpa MIC capacity by March 2020
Commence next phase of expansion to 1.5 mtpa


# Thank You

# Sample Financial Working & Sensitivity

| | S. No. | Particulars | | UOM | Value |
|---|---|---|---|---|---|
| INPUTS | 1 | Mined metal production | | kt | 1,200 |
| | 2 | Metal production | - Zinc | kt | 979 |
| | 3 | | - Lead | kt | 173 |
| | 4 | Silver production | | kt | 750 |
| | 5 | Realisation* | - Zinc | $/MT | 2,950 |
| | 6 | | - Lead | $/MT | 2,350 |
| | 7 | | -Silver | $/Troz | 17.00 |
| | 8 | Cost Of Production(COP) | - Zinc | $/MT | 800 |
| | 9 | | - Lead | $/MT | 700 |
| | 10 | | - Silver | $/Kg | 20 |
| | 11 | Royalty | - Zinc | | 13.20 |
| | 12 | | - Lead | % | 19.14 |
| | 13 | | - Silver | | 9.24 |
| | 14 | Exploration and others | | | 30 |
| | 15 | Sustaining capex | | $ mn | 80 |
| | 16 | Project capex | | | 320 |
| SAMPLE FINANCIAL WORKING | 17 | Revenue | – Zinc | | 2,889 |
| | 18 | | - Lead | | 406 |
| | 19 | | -Silver | | 410 |
| | **20** | **Total Revenue** | | | **3,705** |
| | 21 | COP | - Zinc | | 783 |
| | 22 | | - Lead | | 121 |
| | 23 | | -Silver | | 15 |
| | **24** | **Total COP** | | $ mn | **919** |
| | 25 | Royalty | - Zinc | | 381 |
| | 26 | | - Lead | | 78 |
| | 27 | | -Silver | | 38 |
| | **28** | **Total Royalty** | | | **497** |
| | 29 | EBITDA Metal | | | 2,258 |
| | 30 | EBITDA Wind Power | | | 25 |
| | 31 | **EBITDA Total** | | | **2,283** |
| | **30** | **Operational Free Cash**** | | | **1,916** |

**Includes conservative LME & Premium*
***Excludes treasury income and working capital movement*

## Cost Sensitivity

| | EBITDA ($ mn) | |
|---|---|---|
| **Increase in LME** | | |
| Zinc ($100/MT) | 82 | ↑ |
| Lead ($100/MT) | 17 | ↑ |
| Silver ($1/Toz) | 20 | ↑ |
| **Every $10/MT increase in COP** | | |
| Zinc | 9 | ↓ |
| Lead | 2 | ↓ |
| **Every 10kt increase in volume** | | |
| Zinc | 19 | ↑ |
| Lead | 13 | ↑ |

***All the above are individual Sensitivities and assume that the other parameters in the sample calculations stay constant***

# Rampura Agucha Mine

**Open Pit**

***Ultimate Pit Depth*** : 400 metres from surface

**UG Mine**

- ***Planned Production Capacity*** : 4.5 mtpa
- Fully mechanised trackless mining operation
- ***Mining Method*** : LHS with paste fill

**Major Activities**

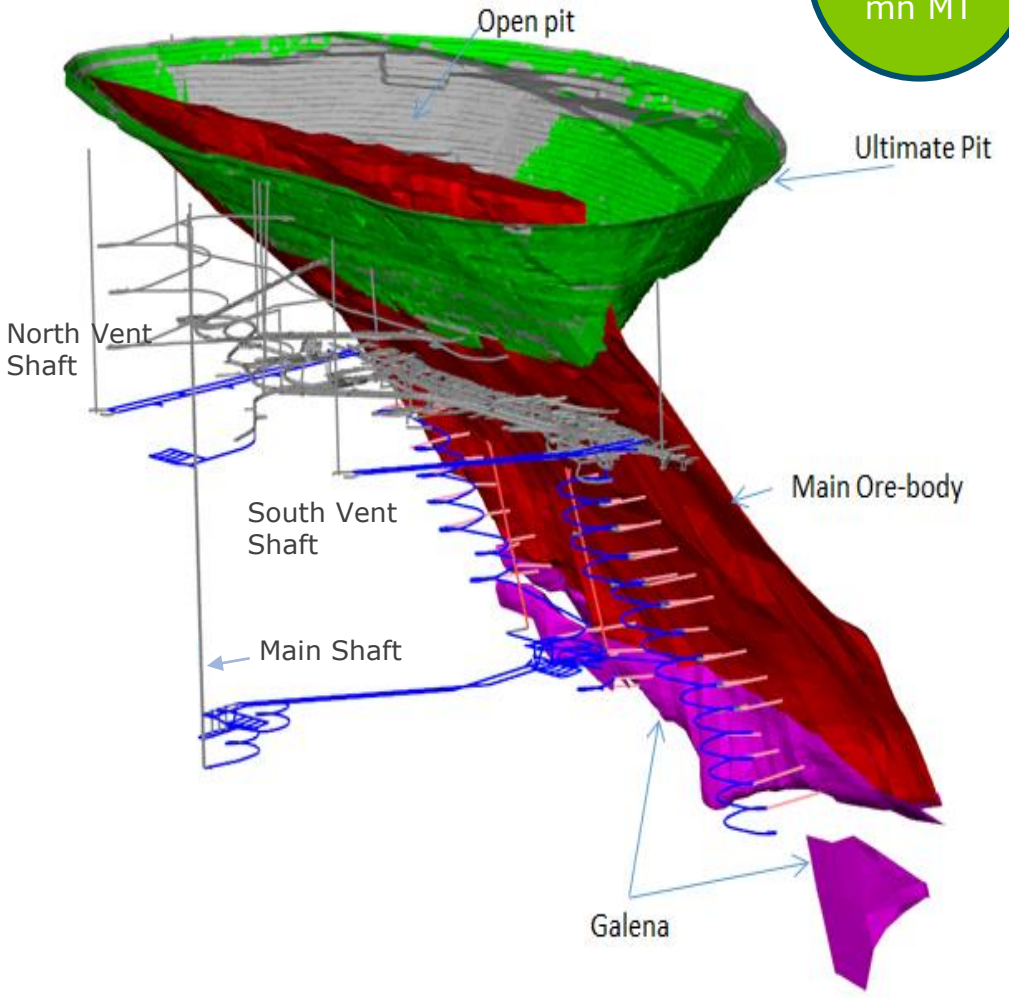
- Decline and ancillary development
- Production shaft and crusher system
- Raise boring
- Paste fill plant
- Surface & underground infrastructures

**Shaft**

- Main shaft 7.5 metres dia, capacity 3.75 mtpa, 955 metres deep
- 2 nos. ventilation shafts of 7.5 metres dia

| Year | Milestone |
|---|---|
| ***2013*** | • North and South ramp started<br>• Main shaft sinking started |
| ***2015*** | • Paste fill plant installed<br>• North vent. shaft completed |
| ***2016*** | • Production from main block<br>• Main shaft sinking completed<br>• South vent. shaft completed |
| ***2017*** | • Shaft winder commissioning |
| ***2018*** | • Main shaft commissioning |

**R&R**
100.0
mn MT



# Sindesar Khurd Mine

**UG Mine**

- ***Planned Production Capacity*** : 6.0 mtpa
- ***Mining Method*** : Long hole stoping with paste filling
- Fully mechanised trackless mining operation

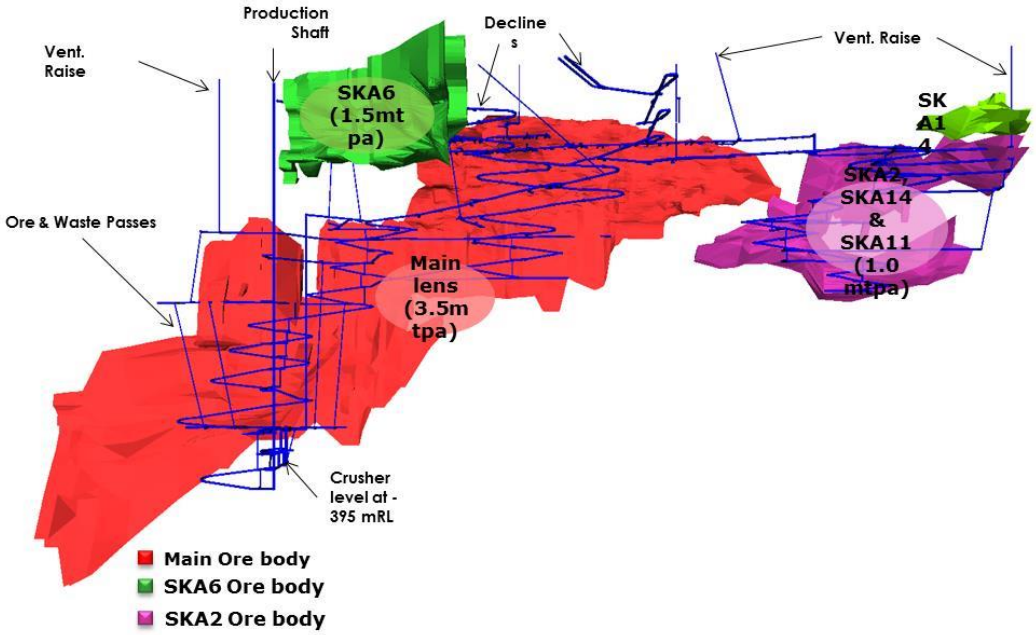
**Major Activities**

- Decline and ancillary development
- Production shaft and crusher system
- Raise boring
- Paste fill plant
- Beneficiation plant
- Surface and underground infrastructures

**Shaft**

- Main shaft 7.5 metres dia, capacity 3.75 mtpa, 1,050 metres deep

**R&R**
122.8
mn MT




| Year | Milestone |
|---|---|
| ***2013*** | • Main shaft sinking started |
| ***2014*** | • South ramp commenced<br>• Paste fill plant started |
| ***2015*** | • Paste fill plant commissioned<br>• Mill DBN (2 to 2.8 mtpa) completed |
| ***2016*** | • Production from SKA6<br>• Main shaft sinking completed |
| ***2017*** | • Production from SKA14<br>• Mill plant (1.5 mtpa) commissioned |
| ***2018*** | • Shaft and winder commissioning<br>• Mill (1.5 mtpa) commissioning |

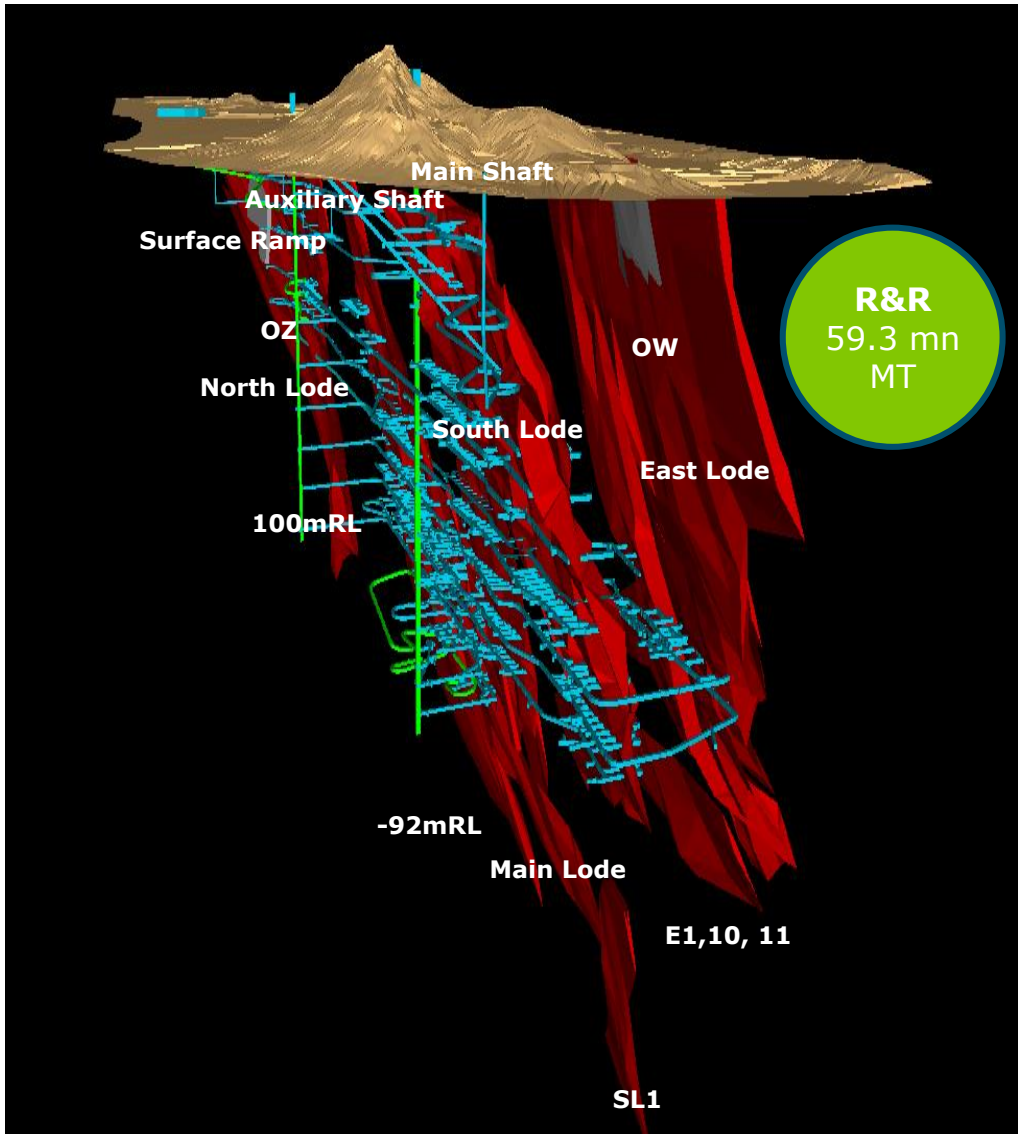
# Rajpura Dariba Mines

**UG Mine**

- ***Access to Mine*** : Through ramp and shaft
- ***Method of Working*** : Blast hole stoping with hydraulic filling
- ***Ore Hauling*** : Through ramp and shaft

**Major Activities**

- Ramp up to 1.5 mtpa ore production capacity
- Decline and ancillary development
- Raise boring
- Hydro fill plant
- Debottlenecking of beneficiation capacity
- Surface and underground infrastructures – new and upgradation



# Zawar Mines

**UG Mine**

- Cluster of 4 mines having independent infrastructure
- ***Access to Mine*** : Through ramp and shaft
- ***Access to Mine*** : Through ramp and shaft
- ***Method of Working*** : Blast hole open stoping
- ***Ore hauling*** : Through ramp and shaft

**Major Activities**

Ramp up to 4.5 mtpa ore production capacity

- Declines and ancillary development
- Crusher system
- Raise boring
- Beneficiation plant
- Surface and underground infrastructures
- Introduction of mechanised mining
- New declines under development for trackless mining

| Year | Milestone |
|---|---|
| ***2015*** | • Mochia, Balaria and North Baroi mine dev commenced |
| ***2016*** | • Surface infrastructure at North Baroi |
| ***2017*** | • North Baroi decline completion<br>• Mill DBN (1.2 to 2.7 mtpa) commissioning |
| ***2018*** | • Mochia decline completion<br>• Mill (2 mtpa) commissioning |
| ***2019*** | • Balaria decline completion<br>• Back fill plant commissioning |

# Kayad Mine

**UG Mine**

- Shallow Ore Body
- ***Access to Mine*** : Through ramp
- ***Mining Method*** : Long hole open stoping with filling
- ***Ore Hauling*** : By 50 T LPDT through ramp
- ***Ore Treatment*** : By 50 T LPDT through ramp

**Major Activities**

- Decline and ancillary development
- Raise boring
- Cement Rock fill plant
- Surface and underground infrastructures