



**CENTINELA**  
ANTOFAGASTA MINERALS

# Centinela - Site Visit

December 7<sup>th</sup> 2016

Luis Sánchez  
Chief Operating Officer



ANTOFAGASTA PLC

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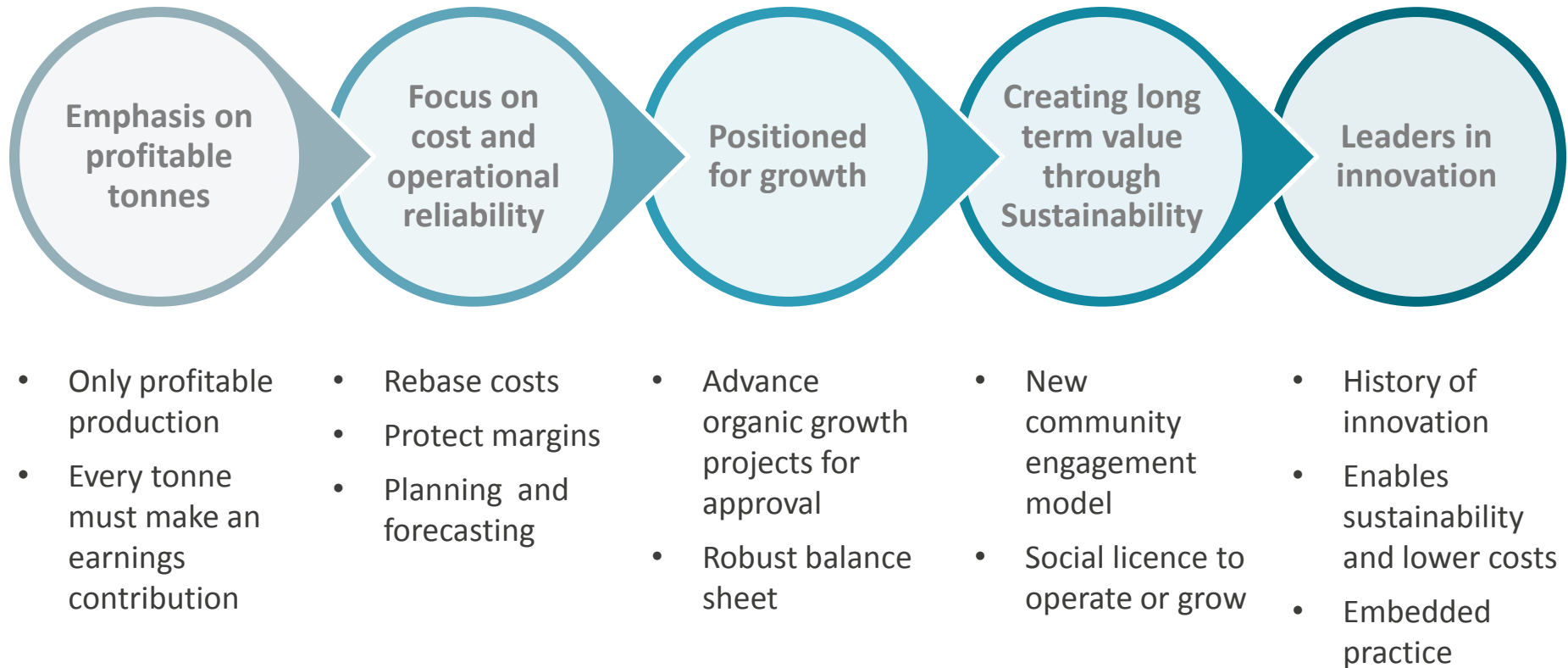
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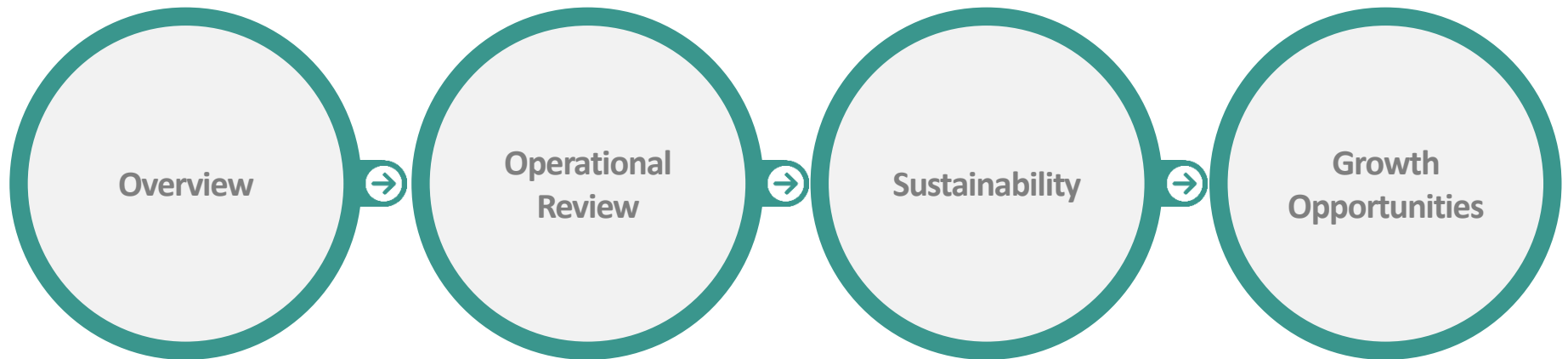
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# Key Messages





# Safety first - 24 months with zero fatalities



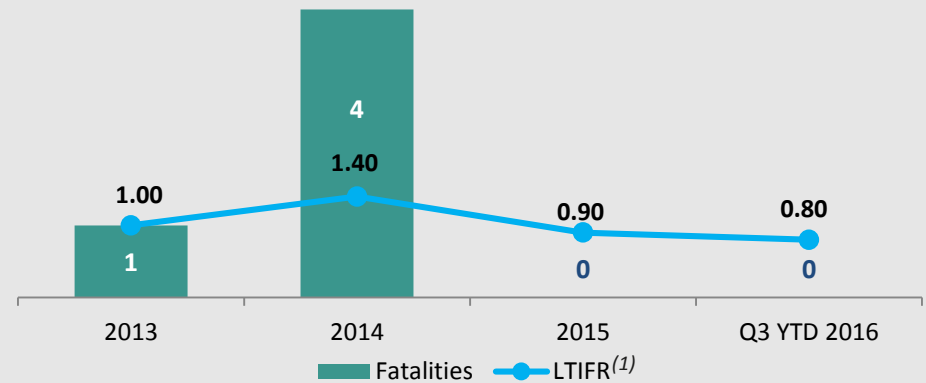
- Committed to zero fatalities
- Similar LTIFR compared to last year
- New safety and occupational health model being extended to contractors
- Regular senior management site visits to reinforce Safety First

## Focus Areas

- Identify and assess fatality and serious injury risks
- Implement critical controls
- Report and investigate near misses
- On-the-ground safety verification by senior leadership

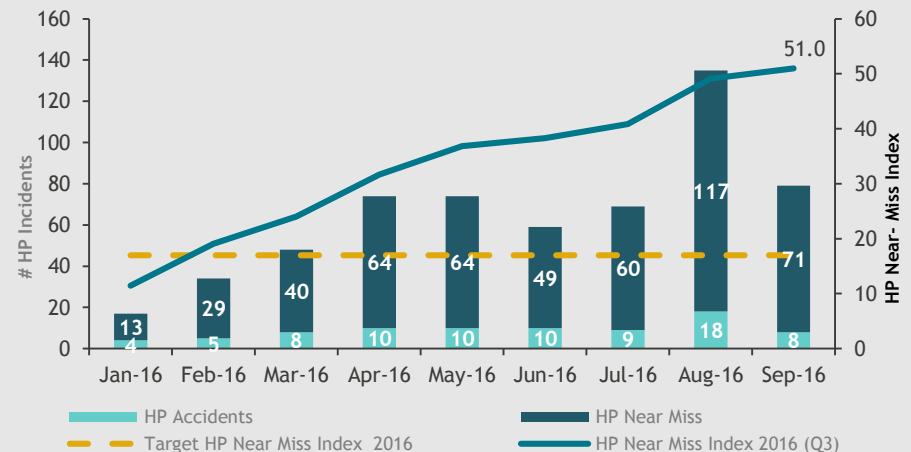
High Potential (HP) Incidents: Total number of HP accidents and HP Near misses  
 \*Near -miss index : Represents total number of high potential near misses for every million hours worked.  
 \*Near -miss index Target 2016: 17

## Safety Performance



1. Lost Time Injury Frequency Rate

## High Potential Accident vs Near Miss (Leading Indicators)





## Overview



# Centinela overview



- **Ownership structure**
  - 70% Antofagasta
  - 30% Marubeni Corp.
- **History**
  - Merged El Tesoro and Esperanza in 2014
  - El Tesoro started production in 2001, Esperanza in 2011
- **Location**
  - 1400km north of Santiago
- **Facilities overview**
  - 4 open pits mined
  - 2 plants (concentrates & cathodes)
- **Production**
  - Copper concentrate and cathode producer
  - Significant by-product gold

	Cu Conc.	Cu Cath.	C1
YTD Q3 016 Production (t)	120,900	39,300	135
Guidance 2016 Production (t)	175,000 - 185,000	60,000 - 65,000	130

# Centinela Team




ANTOFAGASTA PLC

Denotes presence at presentation


**André Sougarret**  
Chief Executive Officer



**Fabian Suez**  
Sustainability Manager



**Cristian Fadic**  
Maintenance Manager



**Juan Luis Palacios**  
Safety and Occupational Health Manager




**Diego Arrigorriaga**  
Chief Financial Officer




**Rodrigo Salinas**  
Human Resources Manager



**Luis Sanchez**  
Chief Operations Officer




**Rodolfo Navarro**  
Resource, Planning and Development Manager




**Ignacio Muñoz**  
Projects Manager



**Carlos Espinoza**  
Mine Manager




**Luis Pizarro**  
Concentrator Plant Manager




**Juan Carlos Villarroel**  
Hydrometallurgical Plant Manager



**Cesar Jimenez**  
Port Manager



**Patricio Troncoso**  
District Development Manager





# Location Map

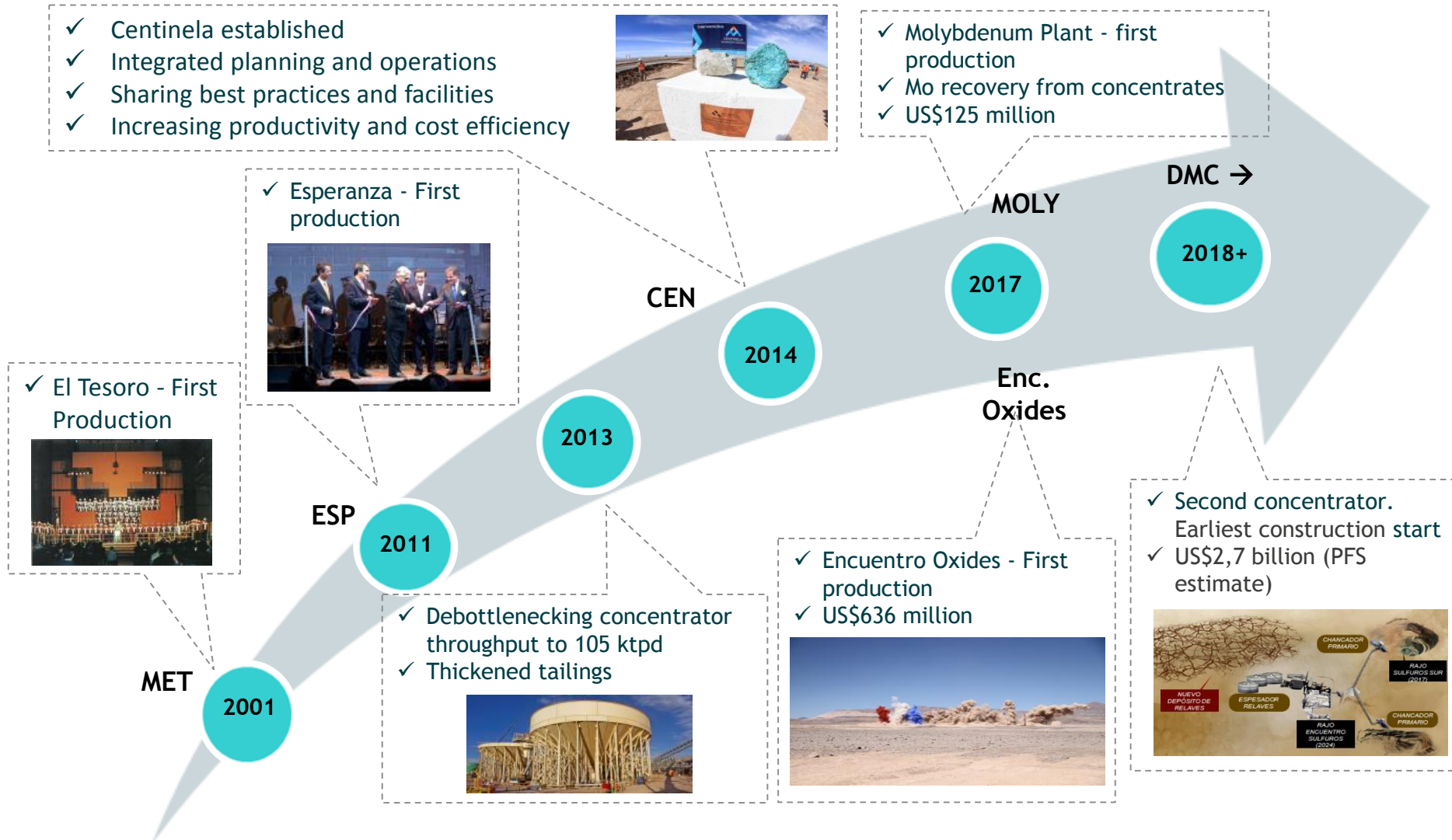




# Site visit



# Development of Centinela



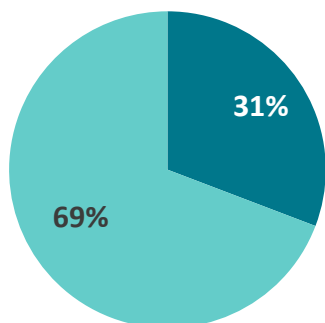


# Reserves and Resources

As of 31 Dec 2015. Resources include measured + indicated + inferred.

## DMC - Sulphides

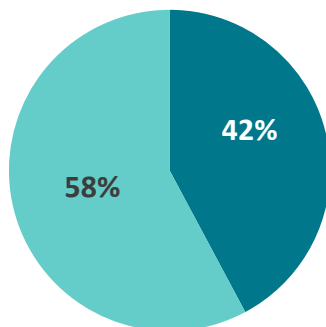
5,980 Mt @ 0.38% Cu



Additional Resources

## DMC - Oxides

720 Mt @ 0.43% Cu



Ore Reserves

Resources CEN+OXE	Tonnage (Mt)	Copper (%)	Moly (%)	Gold (g/tonne)
Sulphides	3215.7	0.38	0.012	0.13
Oxides	517.2	0.43		
<b>Total (1)</b>	<b>3732.8</b>	<b>0.39</b>		

Additional DMC Resources	Tonnage (Mt)	Copper (%)
Sulphides	2761.9	0.38
Oxides	203.7	0.42
<b>Total</b>	<b>2965.7</b>	<b>0.38</b>

(1) As of 31 Dec 2015. Includes 2,144.6 Mt of Ore Reserves:

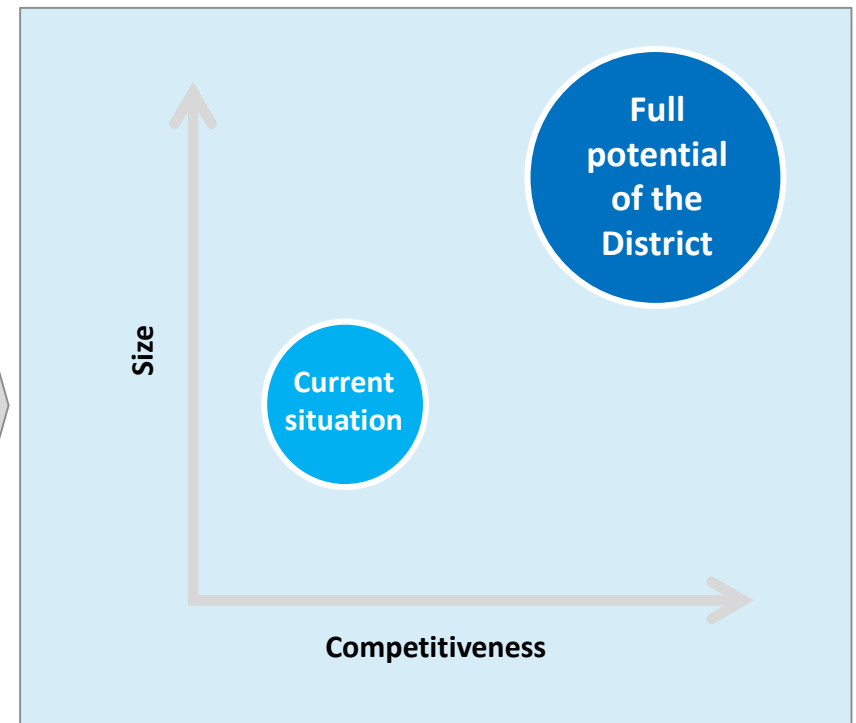
- CEN+OXE Sulphides includes Esperanza and Esperanza Sur Ore Reserves: 1,840.4 Mt @ 0.44%
- CEN+OXE Oxides includes Mirador Oxides, Tesoro + ROM and Encuentro Oxides Ore Reserves: 304.2 Mt @ 0.48%



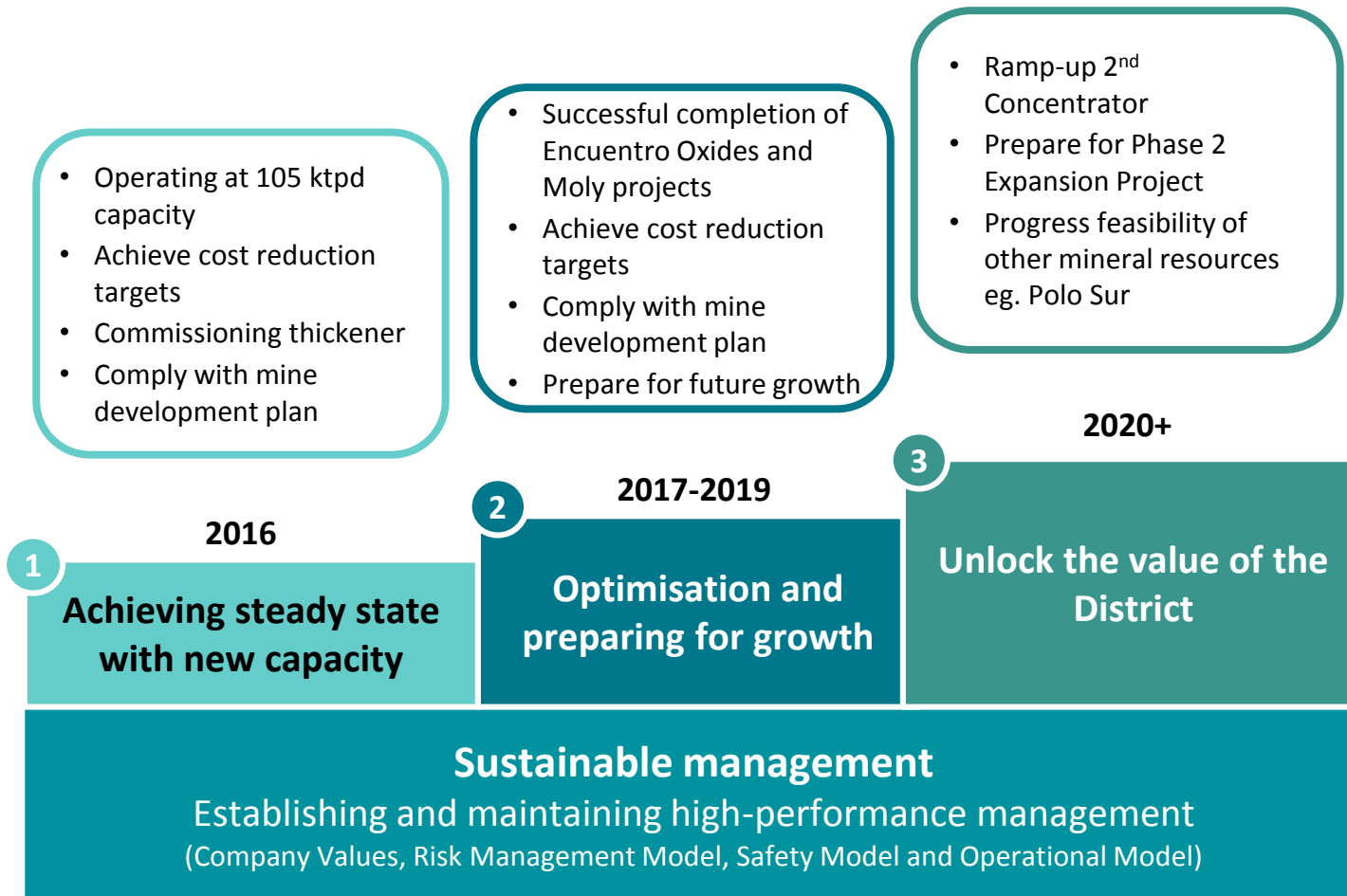
# Centinela's challenge

Our strategy focuses on harnessing synergies while balancing growth and productivity...

...aiming to be an operation of the future capturing the full potential and value of the Centinela District



# Centinela's 3 step development path





# The vision of the Centinela District

The 2<sup>nd</sup> Concentrator monetises the large base of mineral resources that exist in the District

...moving Centinela to its full economic potential

## Production

- Significant increase in copper production
- With molybdenum and gold by-products
- Leverages existing cathodes production capacity

## Mining

- Increase in mine movement
- Increase in number of pits

## Through-put

- Increase the size of crushing and conveyor systems
- New concentrator plant, molybdenum flotation cells and dry area for Encuentro Oxides
- Increase throughput of combined plants

Simplify and optimise our processes

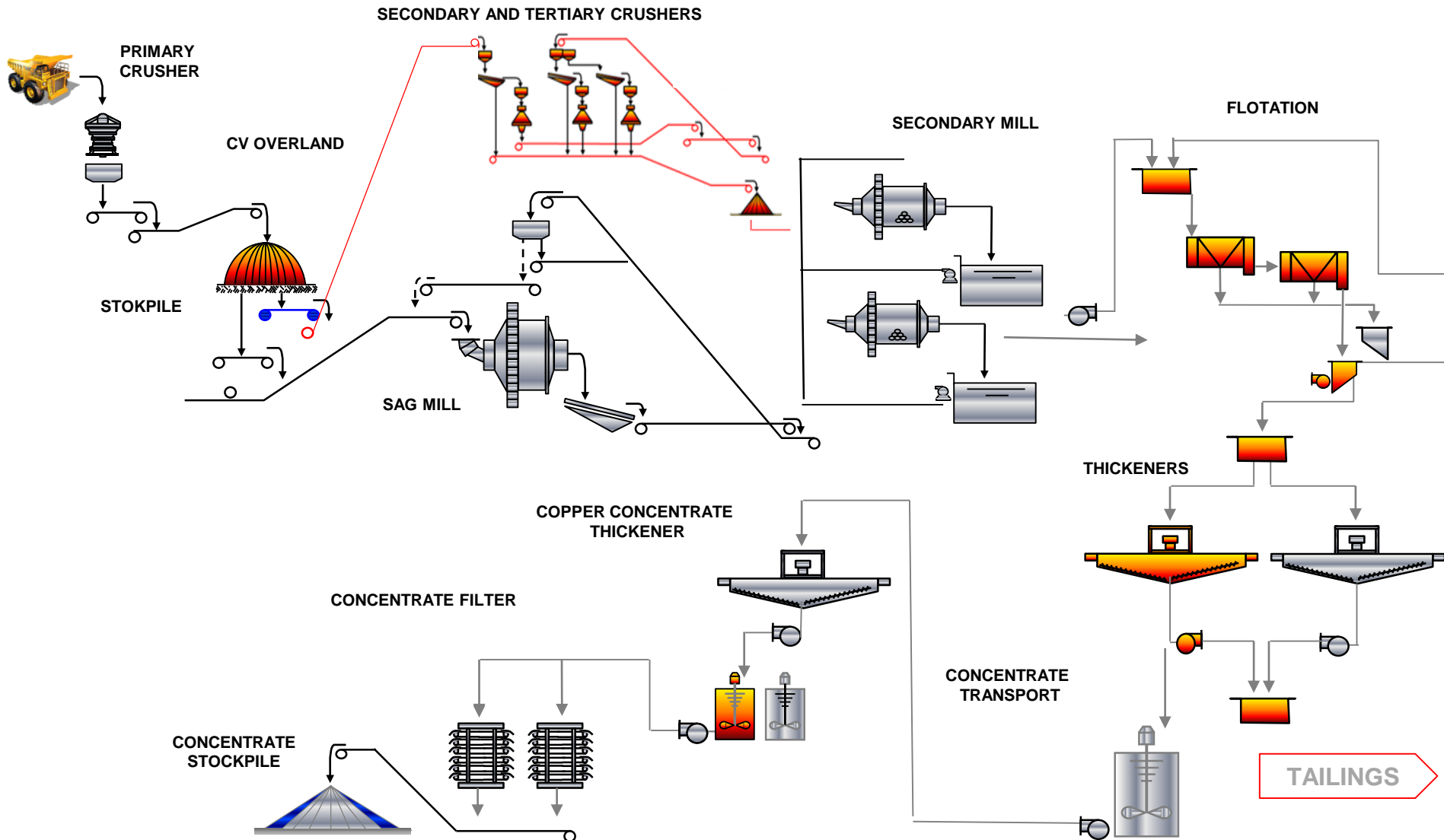
- Stable operation, focus on planning and minimum process variability
- Anticipate potential interference and operational risks
- Maintenance as a core process
- Integrated operation allowing real-time decision making



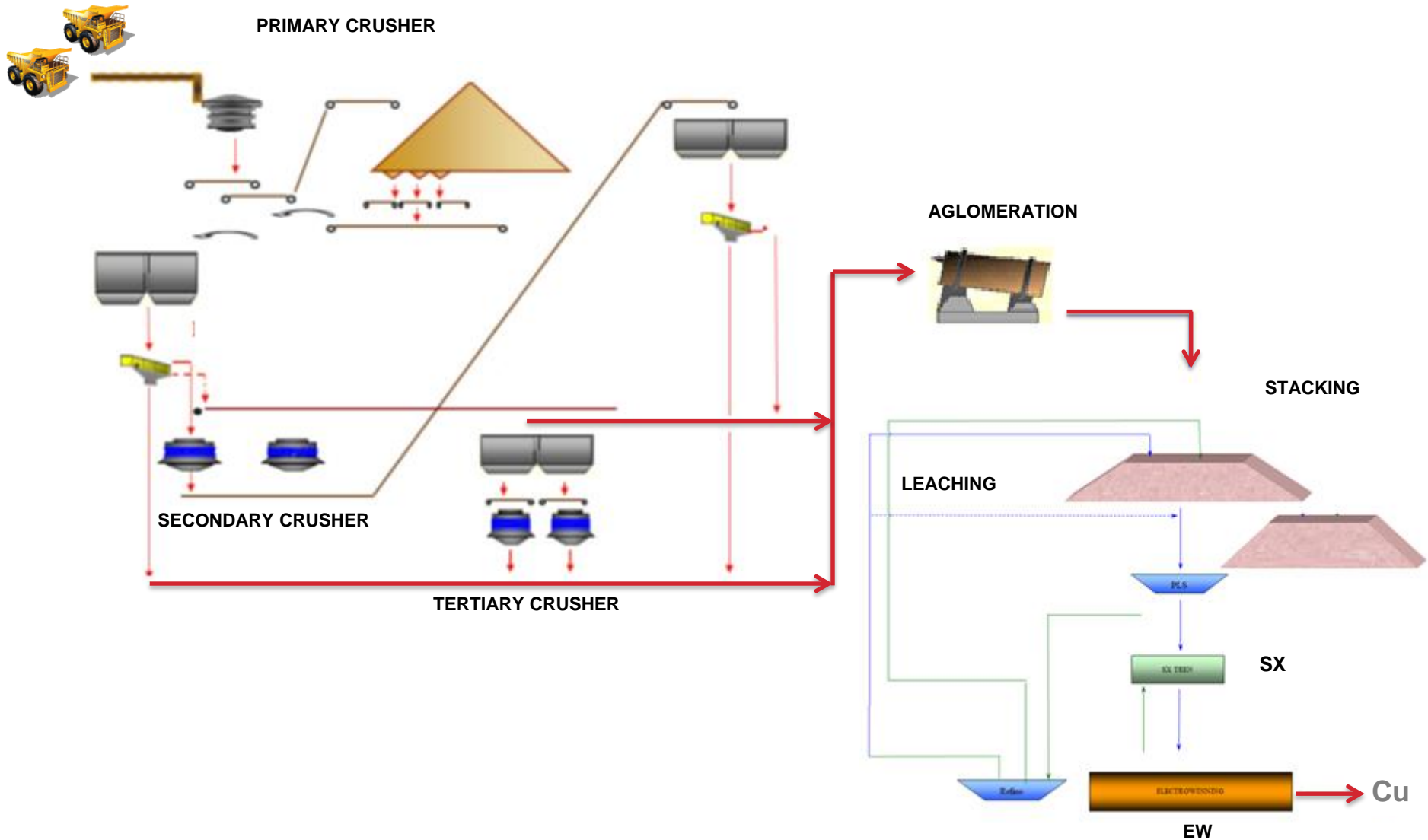
## Operational Review



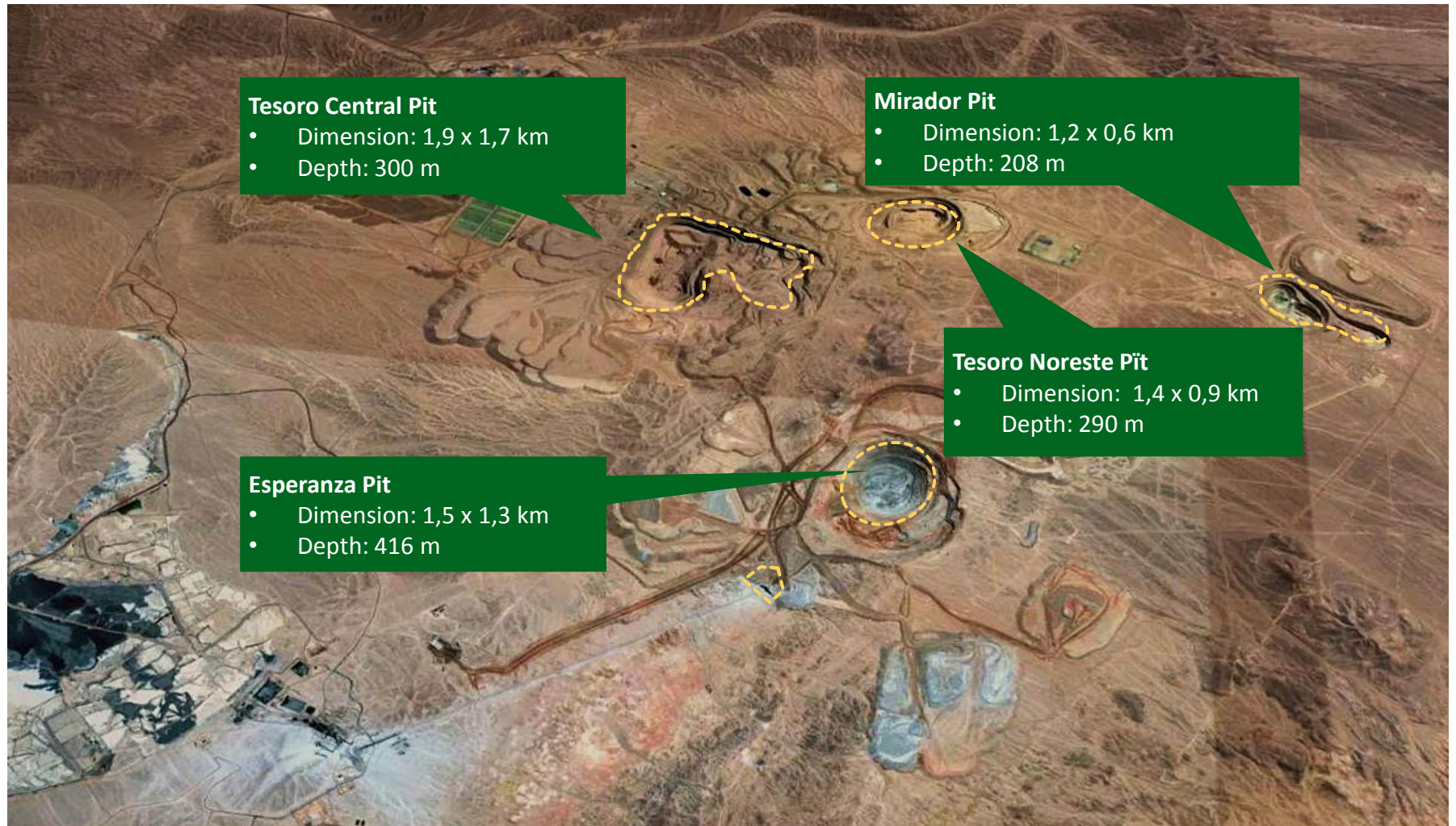
# Flow sheet for the concentrate plant



# Flow sheet for the cathodes plant







## Tesoro Central Pit

- Dimension: 1,9 x 1,7 km
- Depth: 300 m

## Mirador Pit

- Dimension: 1,2 x 0,6 km
- Depth: 208 m

## Tesoro Noreste Pit

- Dimension: 1,4 x 0,9 km
- Depth: 290 m

## Esperanza Pit

- Dimension: 1,5 x 1,3 km
- Depth: 416 m

# Fleet and mining equipment

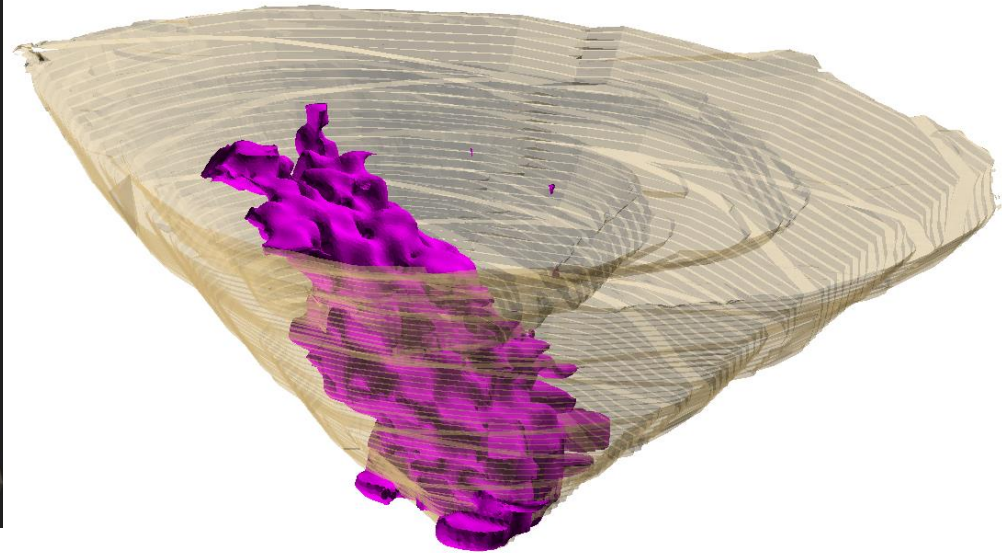
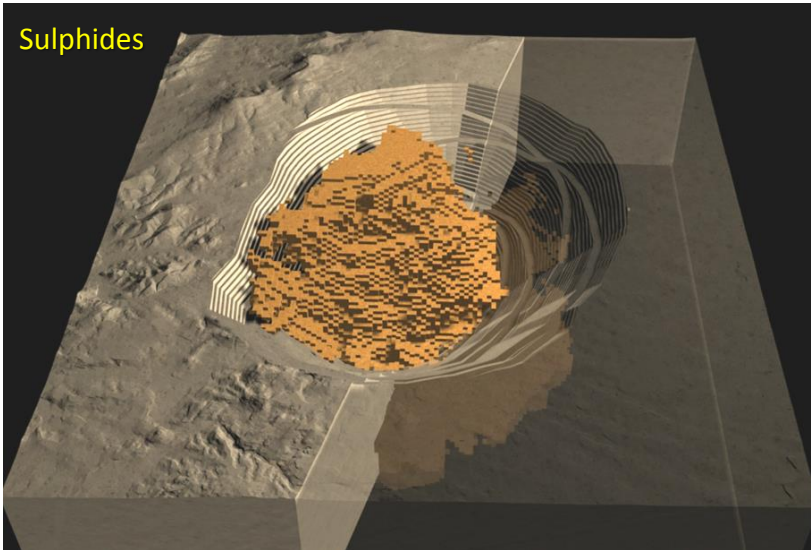
Type	Brand – Model	N° of Units
<b>Drilling</b> <ul style="list-style-type: none"> <li>• Diesel drill</li> <li>• Support drill</li> </ul>	<ul style="list-style-type: none"> <li>- Atlas Copco Pit Viper PV351 production drill rigs</li> <li>- Atlas Copco DMM3 production drill rigs</li> <li>- Atlas Copco ROC L-8 down-the-hole crawler</li> <li>- Atlas Copco ROC D560 surface drill rig</li> <li>- Atlas Copco ROC D45 surface drill rig</li> </ul>	15
<b>Loading</b> <ul style="list-style-type: none"> <li>• Electric shovels</li> <li>• Front-end loaders</li> <li>• Ancillary equipment</li> </ul>	<ul style="list-style-type: none"> <li>- P&amp;H 4100 XPC electric rope shovels</li> <li>- Komatsu PC8000 diesel hydraulic shovels</li> <li>- Komatsu PC5500 diesel hydraulic back hoe</li> <li>- LeTorneau L2350HL front-end loader</li> <li>- LeTorneau L1350HL front-end loader</li> <li>- Caterpillar 994 Front-end loader</li> </ul>	16
<b>Haulage</b> <ul style="list-style-type: none"> <li>• Trucks</li> </ul>	<ul style="list-style-type: none"> <li>- Caterpillar 797F / 797B haul trucks (360 tonnes)</li> <li>- Komatsu 930SE haul trucks (330 tonnes)</li> <li>- Caterpillar 793F / 793C haul trucks (230 tonnes)</li> </ul>	74



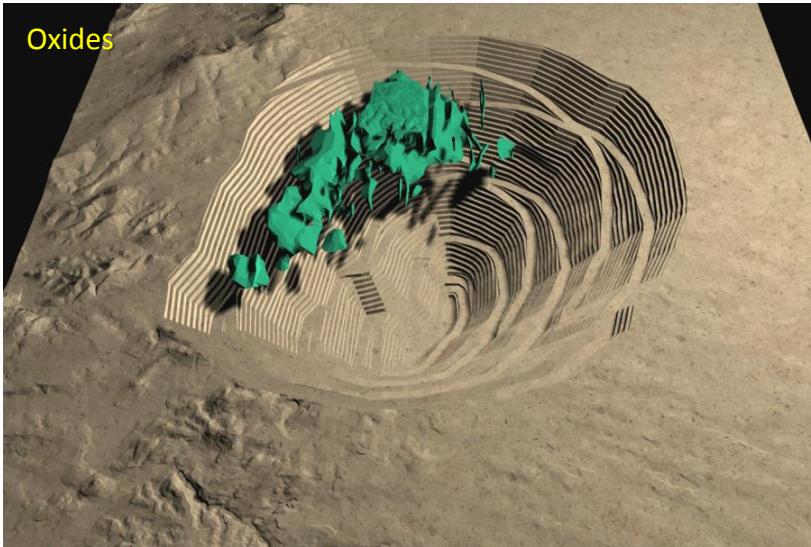


# Esperanza pit main challenges

Sulphides



Oxides



- Waste-to-ore ratio
- Grade variability

# Centinela has realised savings of approx. US \$ 190M



Services  
Productivity



Operational  
Budget &  
Maintenance  
management



Organisational  
Effectiveness



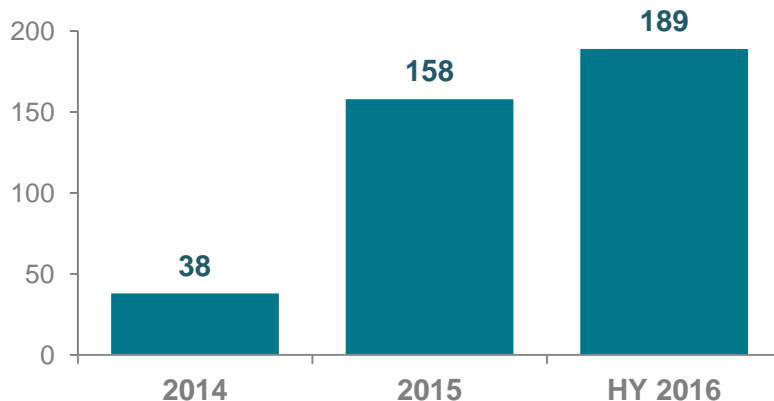
Energy  
Efficiency

**MORE IDEAS  
MORE PRODUCTIVITY**



## Accumulated Cost Savings

US\$m [Excluding FX and input price savings]



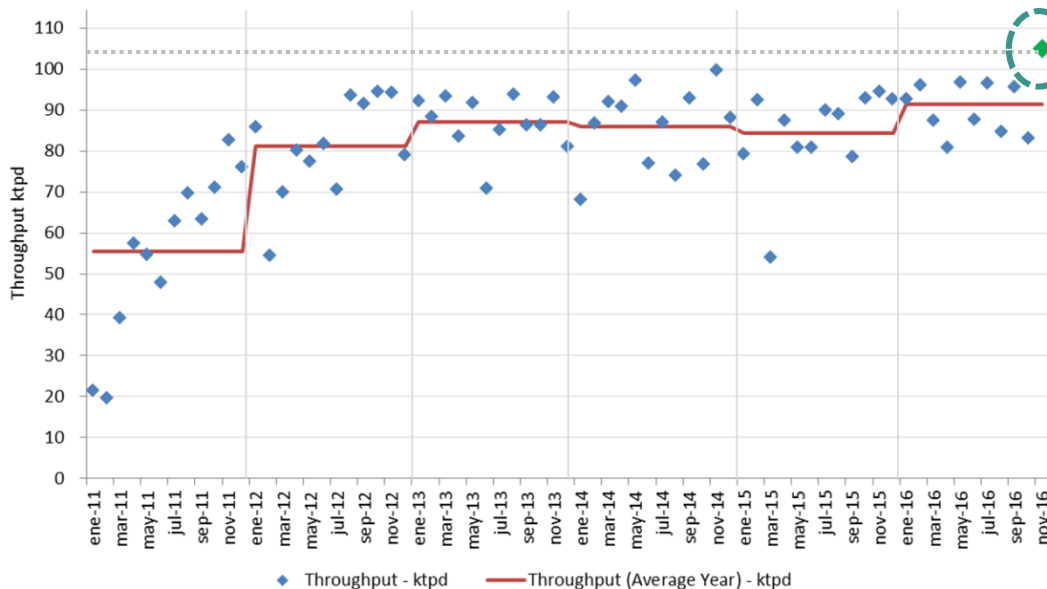
## Savings Achieved By



- Centinela Merger: Shared infrastructure, one Management team and integrated mining fleet
- Improve contracts productivity and synergies in main services
- Reduce general expenses (travel, consultants)
- Increased productivity (Cu tonnes/worker)
- Ensure profitable contribution from every tonne

# Concentrator Plant - Throughput

Progress	
<b>Tailings</b>	
1. Increase thickening capacity: 3 new paste thickeners	1 operational, 2 ramping up
2. Improvements to existing high-density thickeners (new rakes)	Completed
<b>Crushing</b>	
1. Additional 20 ktpd crushing capacity: secondary and tertiary plant	Completed
<b>Flotation</b>	
1. Improvements to slurry distribution and conveyor belt systems	Completed
2. De-bottleneck existing flotation and concentrate circuit	Completed



**105 ktpd was consistently achieved in November 2016**



Sustainability





# Pioneering the use of sustainable technologies

## Thickened tailings

- Thickeners to maximise use water
- Largest application in technology in the world



Efficient use of  
land and water

## Use of raw sea water

- Sea water transported over 140km from Esperanza port
- Operation adapted to operate with salt content without reduction in recoveries



100% sea water  
used in concentrate  
production

## Thermosolar plant

- Solar power used to heat solutions in recovery process
- Pioneered technology which has become an industry standard



Savings ~50% of  
fuel oil used in  
heaters

## **Economic Viability :**

- Simple process with larger equipment
- In search of synergies
- Innovation & improvement as permanent practices

## **Innovation for environment:**

- First thermosolar plant of industrial scale in the mining industry
- 100% use of sea water without desalination in the concentrator
- Large scale thickened tailings operation

## **Social responsibility:**

- Continuous dialogue with diverse range of stakeholders
- Local employment and training
- Projects contributing to the local development in Sierra Gorda, Mejillones and María Elena
- 11% of the workforce are female





## Growth opportunities



# Growth opportunities



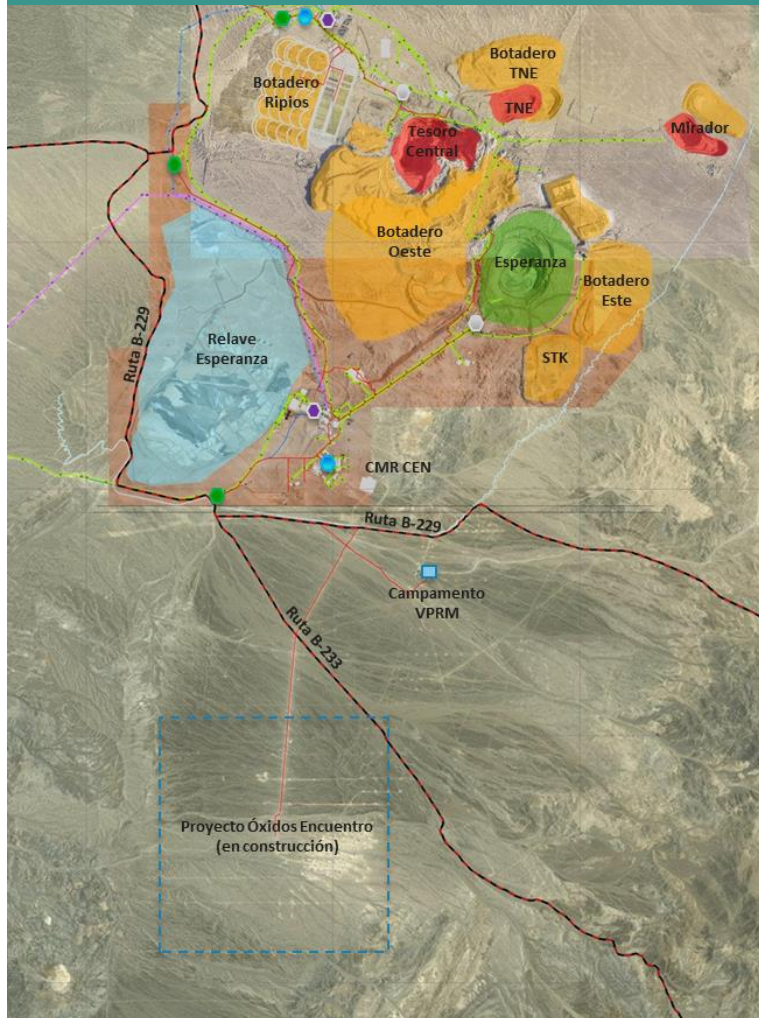
- Encuentro Oxide
  - Starting production in 2017, 8-year mine life. Feed for existing SX-EW plant
  - Full production 50,000 tpa copper
  - Capex : US\$636 million
- Molybdenum plant
  - Construction underway, completion in 2017
  - 2,400 tpa molybdenum
  - Capex : US\$125 million
- Centinela 2<sup>nd</sup> Concentrator
  - Planned 2nd concentrator 7 km from current facilities. In process of EIA and feasibility studies.
  - Phase 1 Production : 140,000 tpa copper
  - Capex : US\$2.7 billion



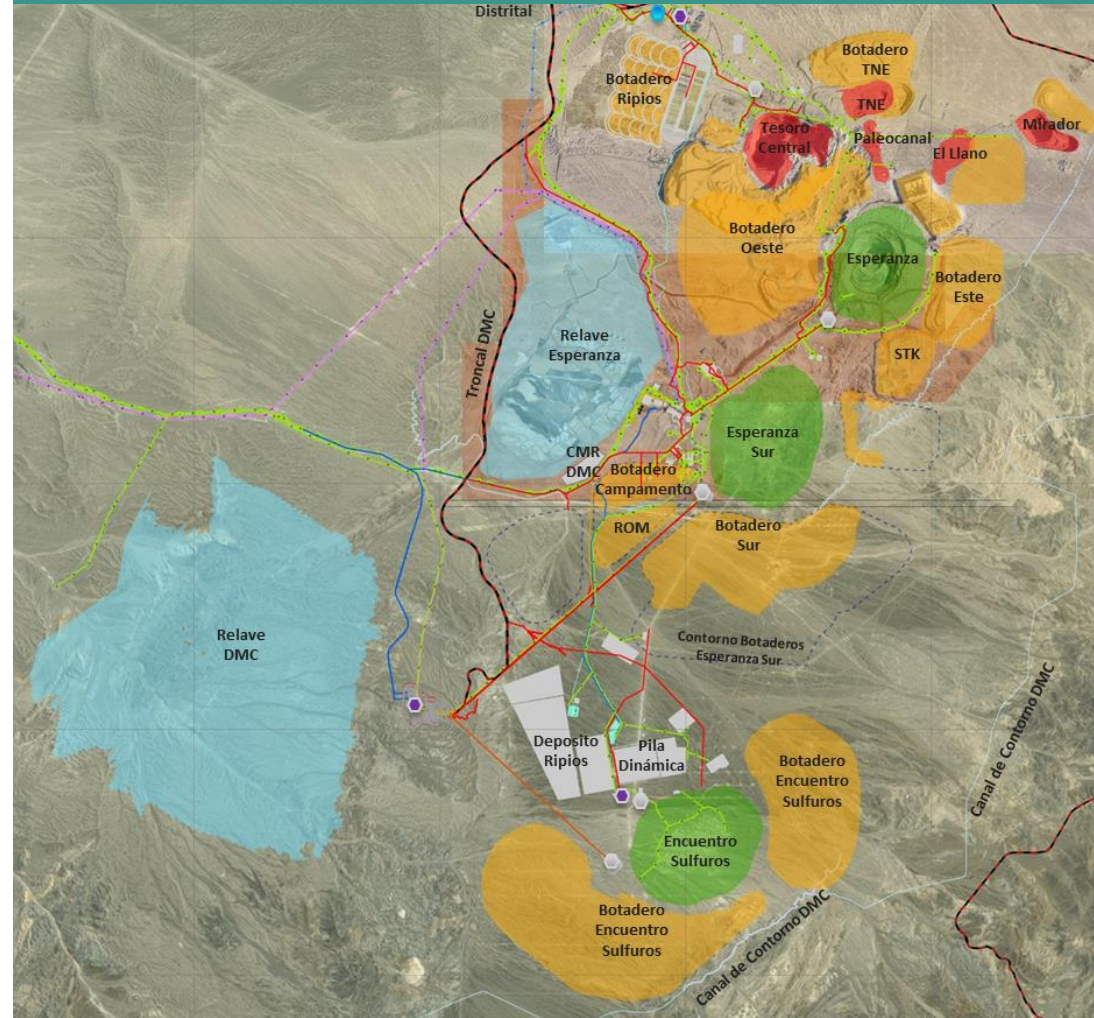


# Our Future - Centinela Mining District 2016

2016



2020+



## World class district with optionality for long term development

- Projects in execution and starting production in 2017:
  - Encuentro Oxides: leverage existing SX-EW plant and pre-stripping for Encuentro Sulphides
  - Moly: improving competitiveness through by-products credits
- 2<sup>nd</sup> concentrator plant in FS stage and advancing permitting successfully

## Operational achievements

- 105ktpd capacity achieved in November 2016
- Mine development plan compliance is ensuring ore availability for future production and improving grade predictability
- First paste thickener operating consistently allowing smooth commissioning of the other two by year end
- Innovation is the core of our business: use of raw sea water, thermosolar energy and thickened tailings

## Successful cost management

- Focus on profitable tonnes: marginal benefit from every source of ore
- Continuous improvement in our cost efficiency: integrated sulphide/oxide management. planning and mine operation, Cost Competitiveness Programme and district synergies
- 2nd quartile cost performance



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