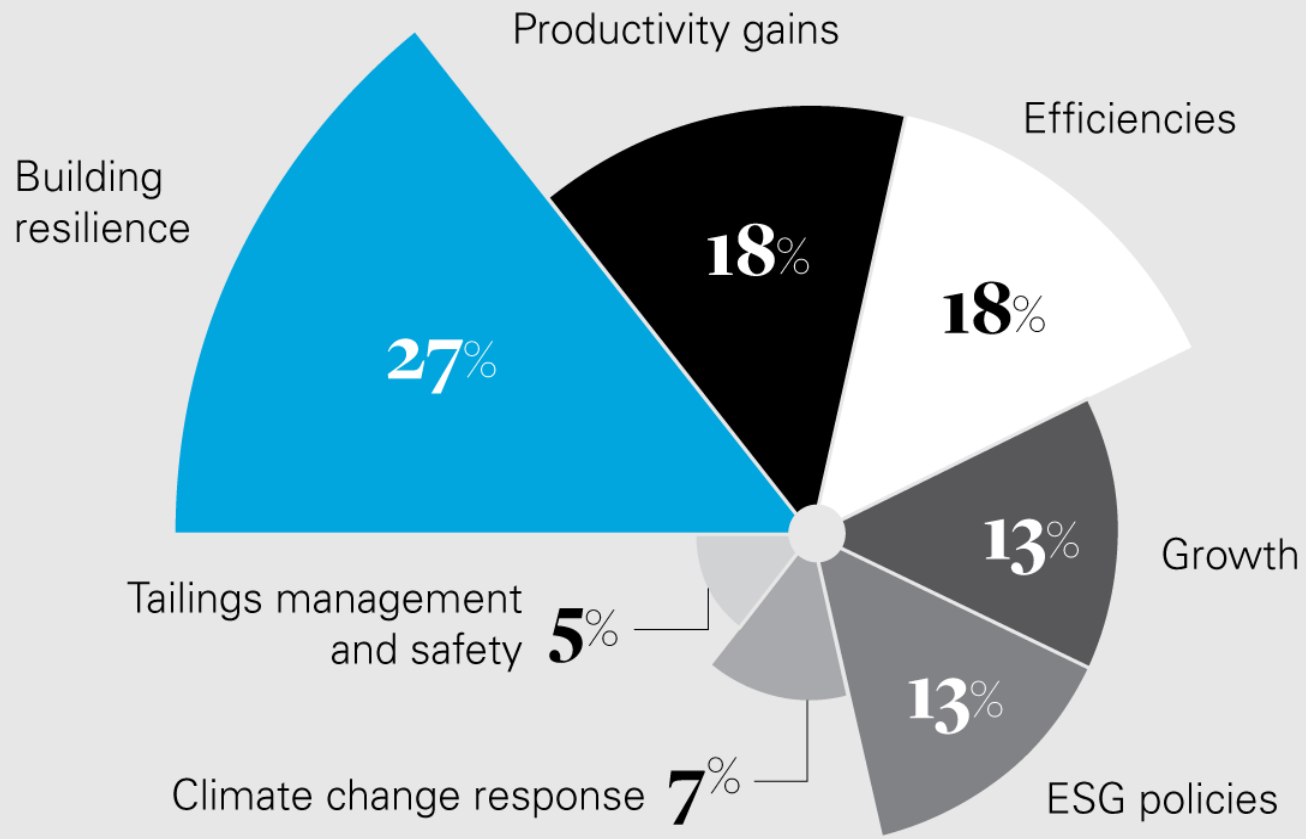
The Engineer, Fine Coal & ESG.

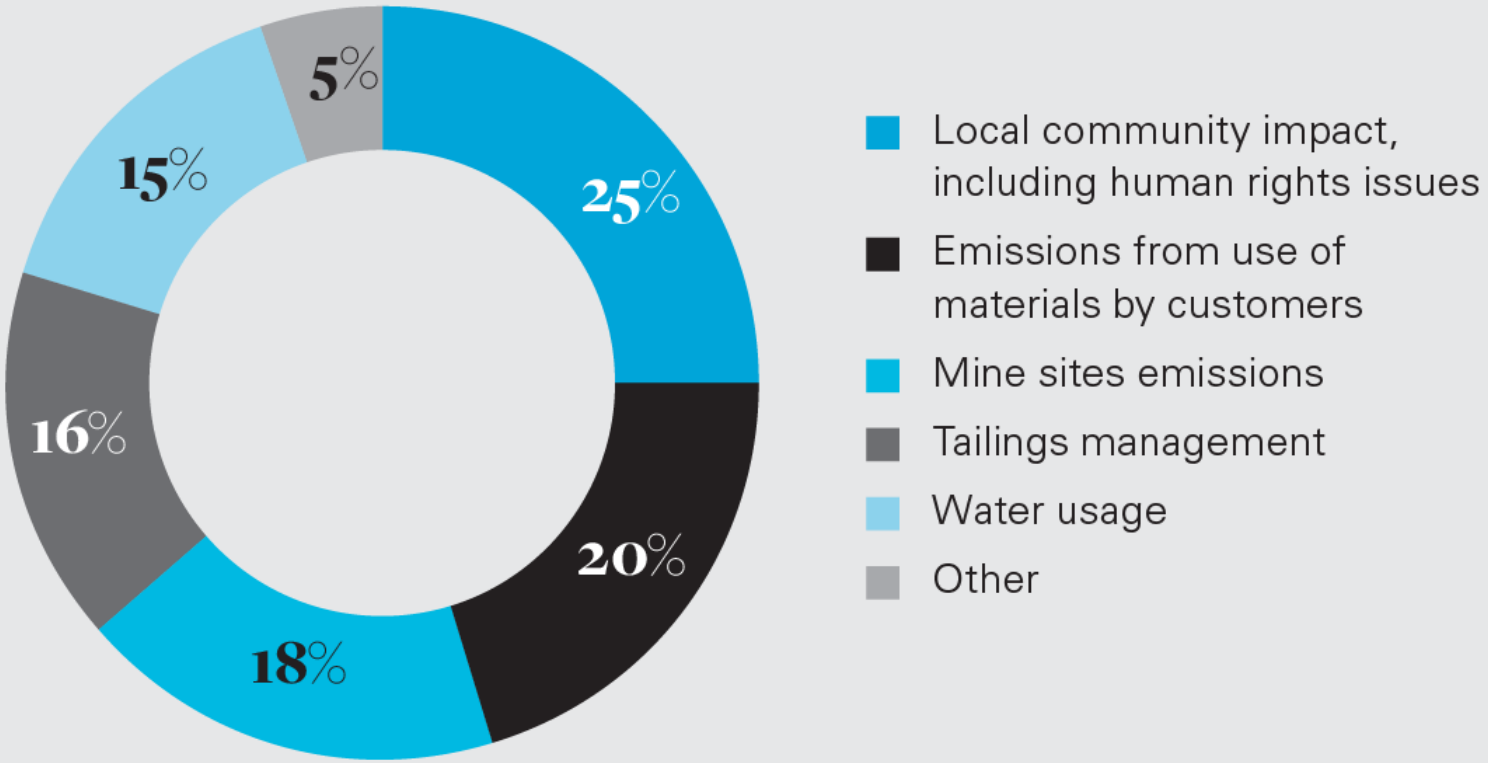
People.Planet.Recovery.

Post-COVID-19, what will be the main priority for the mining sector?



Source: White & Case extraordinary COVID-19 mid-year mining & metals survey, 2020

What area of mining & metals will face the most scrutiny from investors and regulators related to ESG and sustainability issues?



Source: White & Case 2022 Mining & Metals market sentiment survey

PURPOSE

- What is ESG?
- Fine Coal Challenges
- Fine Beneficiation Technology Considerations
- ESG and Clean Coal Possibilities

"How do process professionals show that they care for people, planet and a circular economy?"

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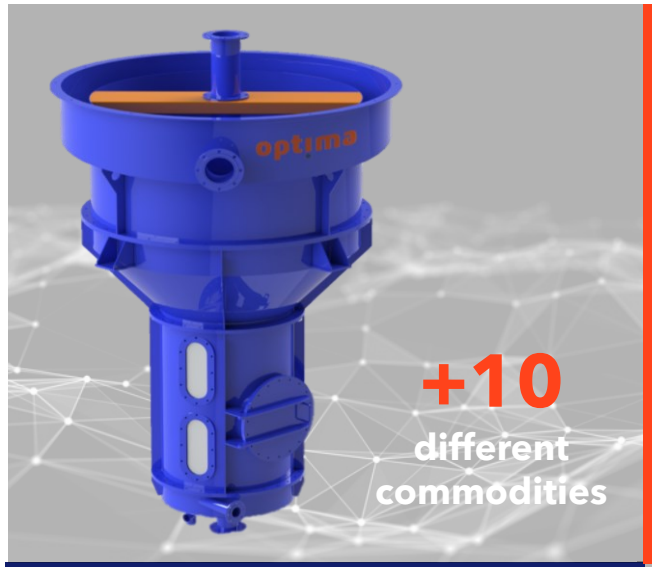
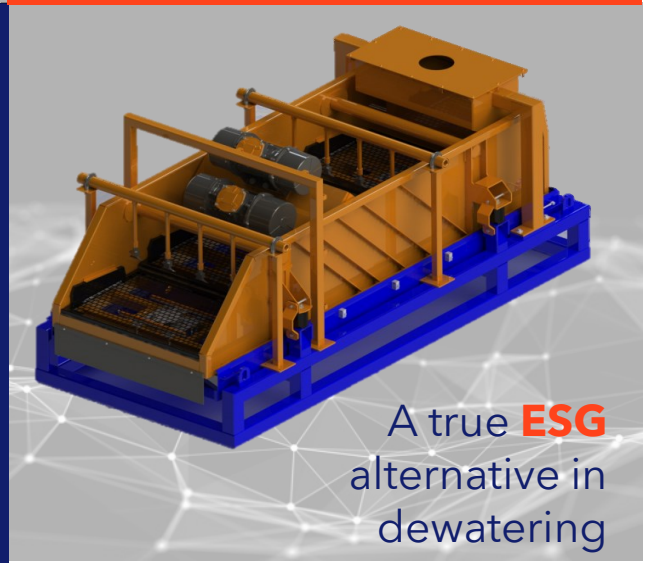


2 In-house developed technologies

7 Unique Applications

Fine **mineral separation technology** and **engineered systems provider**



"We are changing the future of fine coal beneficiation"

- Tebogo Kale

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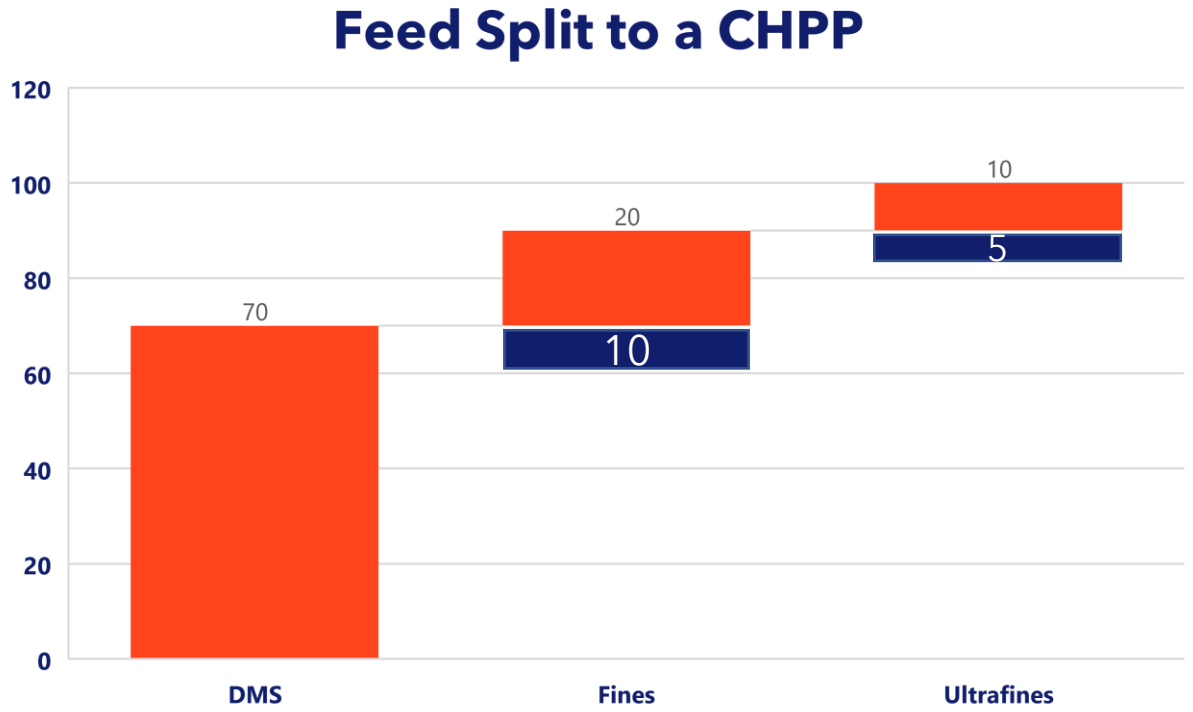
FINE COAL

Dilemma

Differences in crushing end products

Fixed Jaw Crusher

Impact Rock Crusher



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FINE COAL

Challenges

ENVIRONMENTAL

- Handling
- Construction
- Disposal
- Rehabilitation

PROCESSING

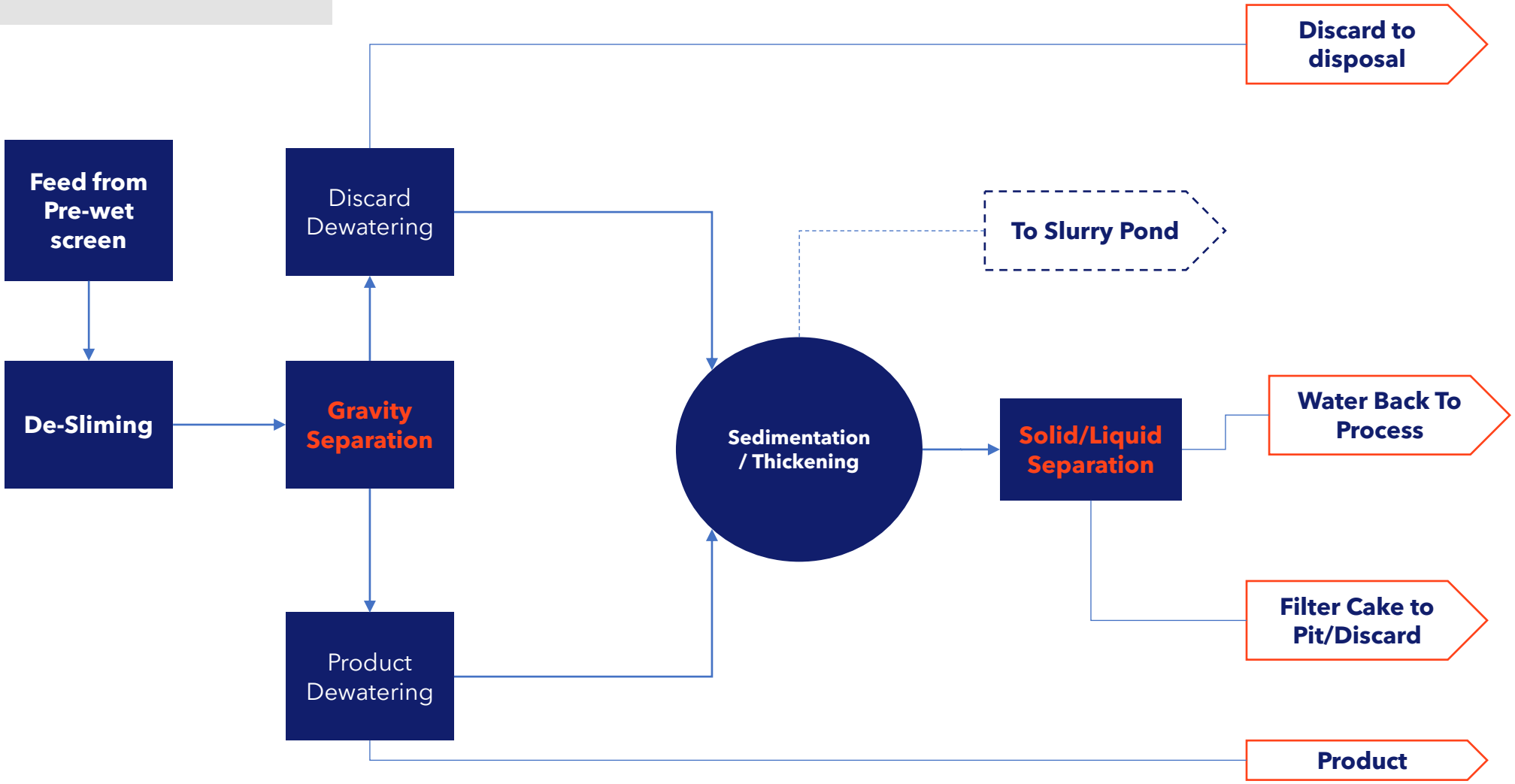
- Undersized thickeners
- Black water
- Thickener High torque
- Product Quality & Moisture

UNINTENDED CONSEQUENCE

- Silt traps

Fine Coal Tech.

Flowsheet



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Fine Coal Tech.

Considerations

SOUTH AFRICAN ESG-BASED TECHNOLOGIES

Technology Development

» Locally developed tech.

Criteria

» Clean Coal Quality
» Water only
» Recovery and Reuse of water
» Renewable energy-ready
» Low carbon footprint
» People friendly
» Cost

Hindered Settlers - Optima Classifier™

» Particle Size: -4mm
» Carbon Footprint: 25 tph/m^2
» Water only process
» Low Electricity consumption
» Low Water Consumption
» Low Cut Points
» Automated density control

Spiral Concentrators - MX7

» Particle Size: -2mm
» Carbon Footprint: 9 tph/m^2
» Water only process
» No Electricity consumption
» No Water Consumption
» High Cut Points
» Manual control

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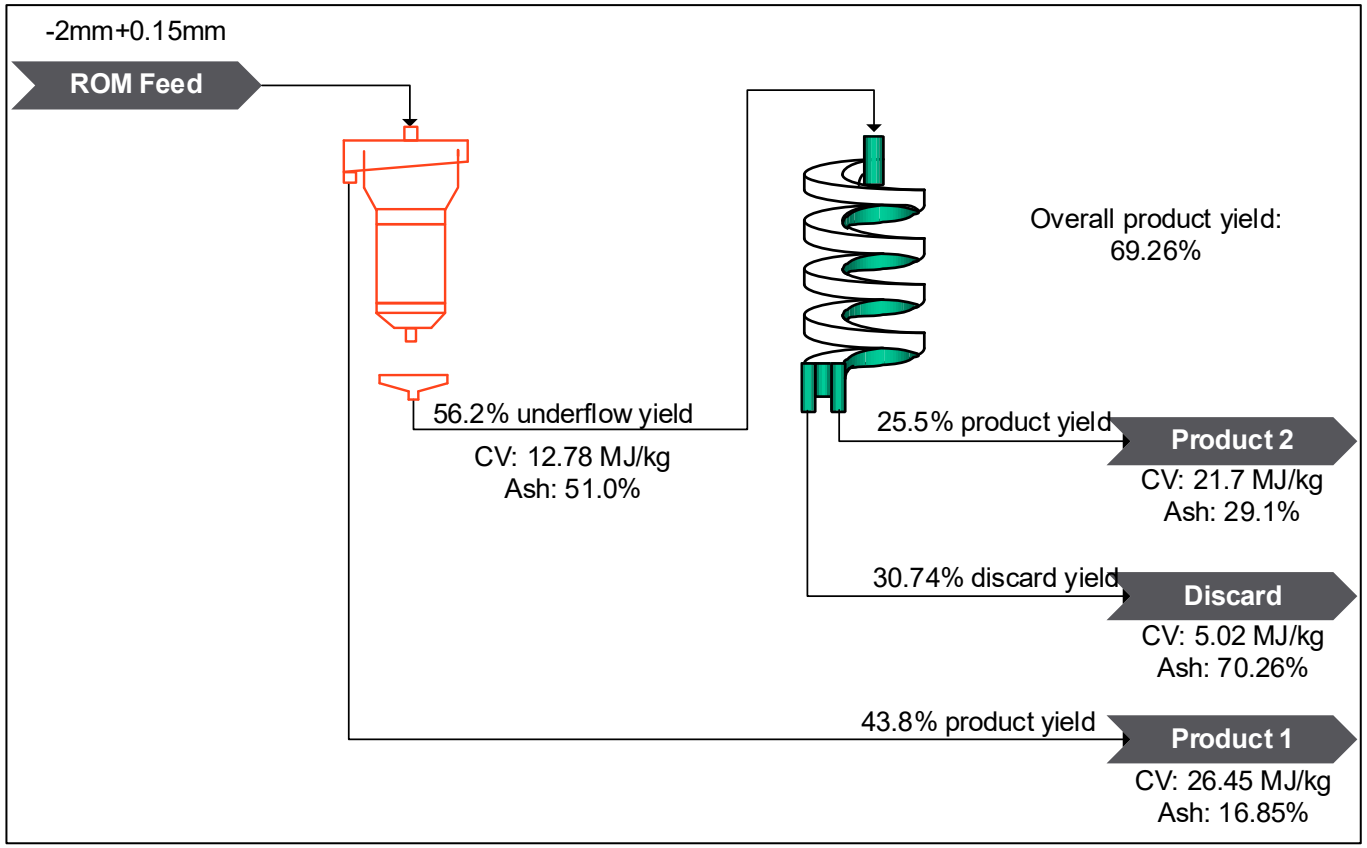
Fine Coal Tech.

Verdict

Results- OPC and SX10 Combined Circuit



Optima Classifier™

Product mass yield = 43.8 %

CV = 26.45 % MJ/kg

Ash =16.85 %

SX10 Spiral

Product mass yield = 25.5 %

CV = 21.7 % MJ/kg

Ash =29.1 %

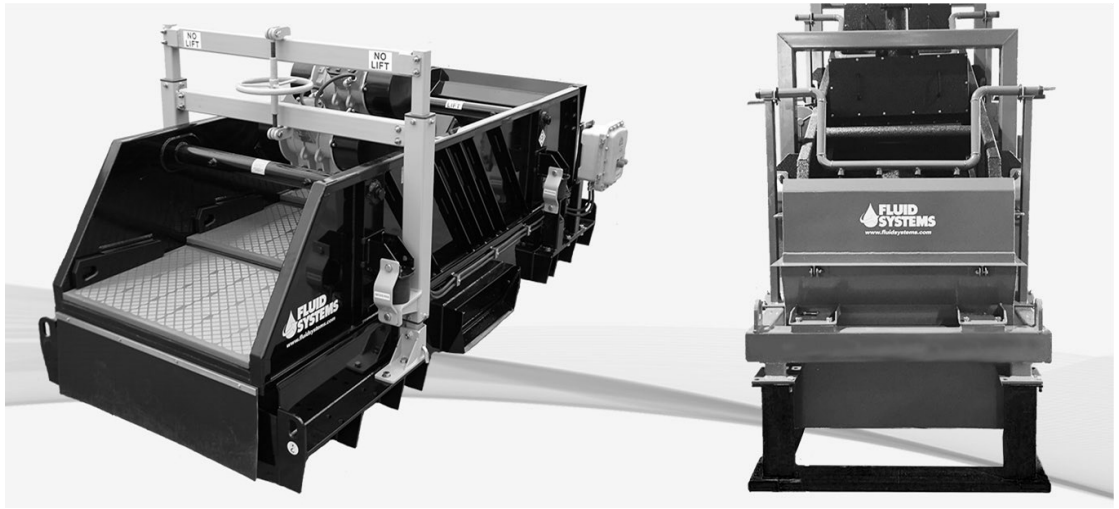
Overall Yield = 69.26 %

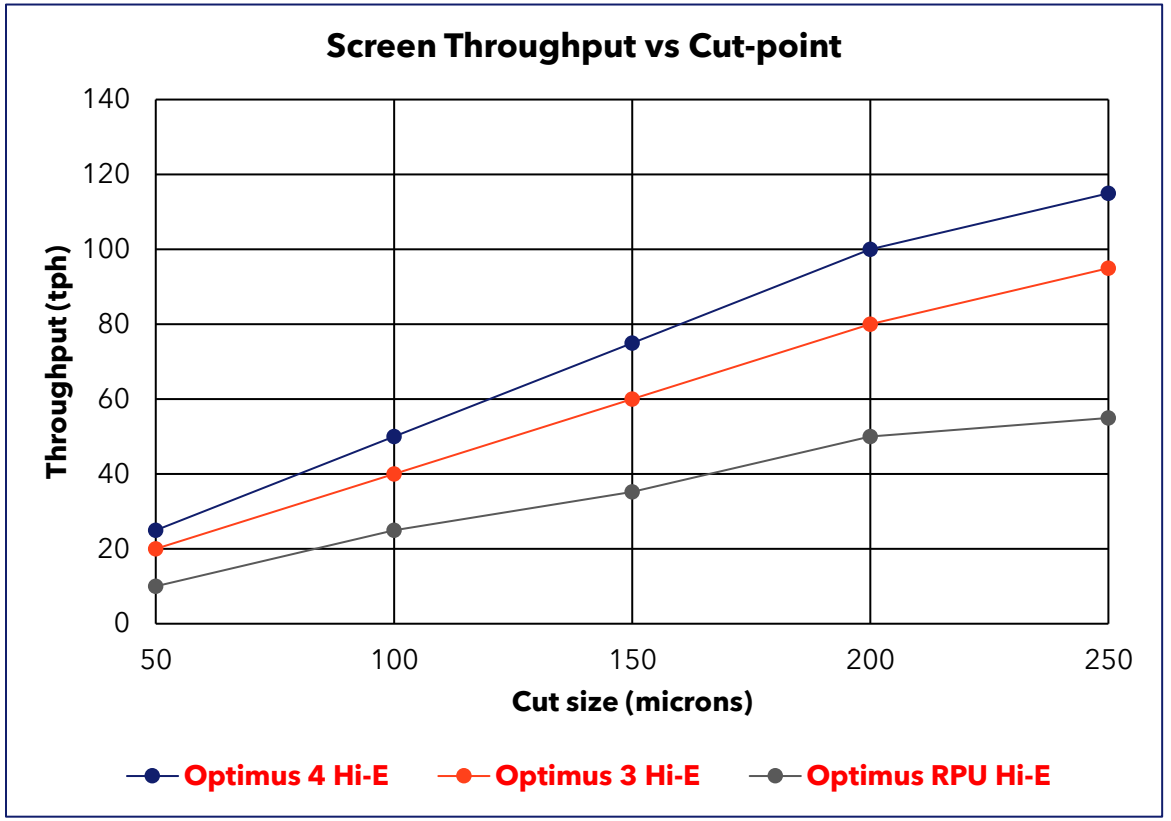
DEWATERING

Reuse natural resources

» **Particle Size:** -0,050mm

» **Differentiator:** Up to 15Gs





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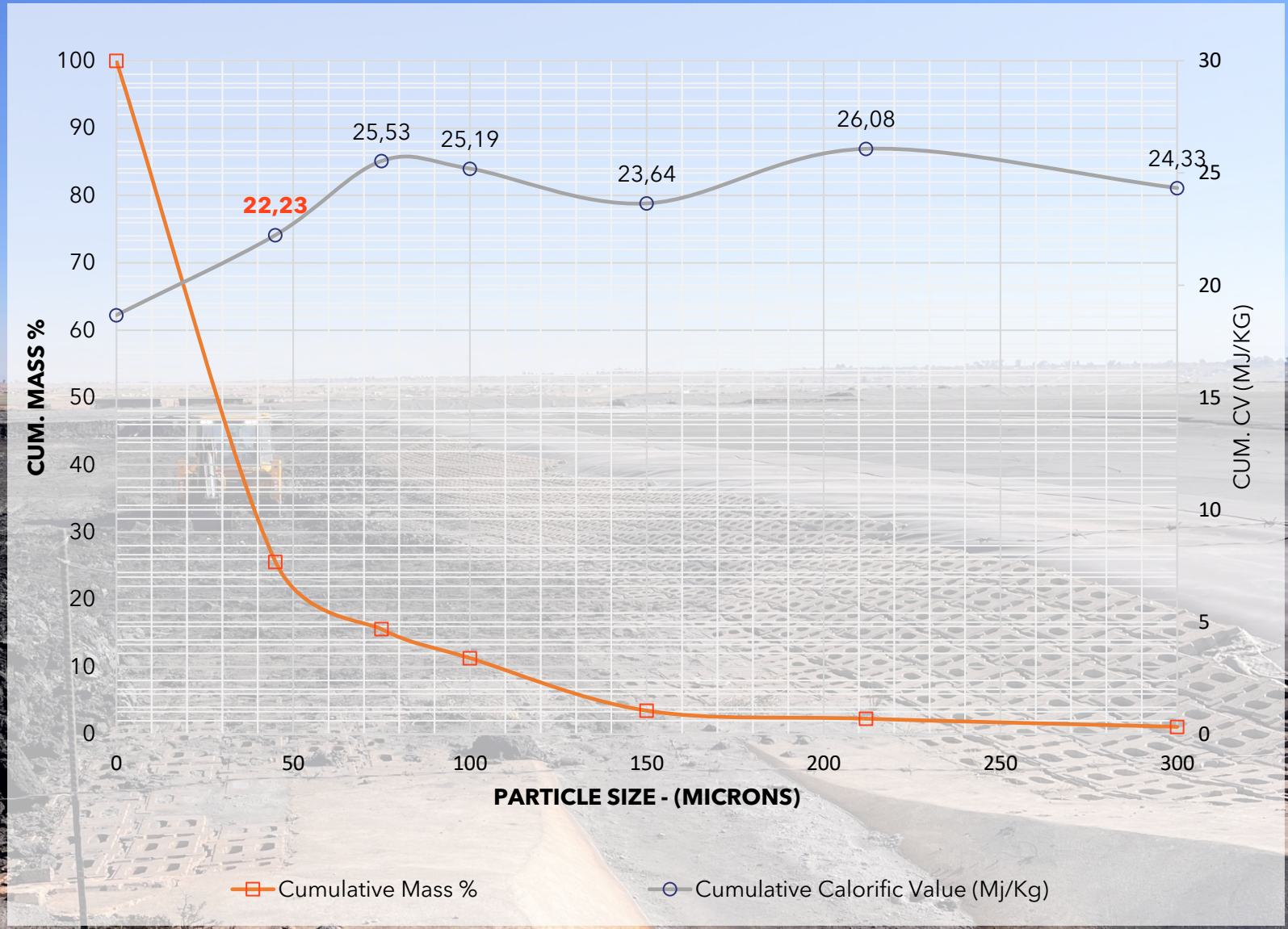
DEWATERING

Reuse natural resources

“What about Fine Coal Dewatering?”



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DEWATERING

Reuse natural resources

Belt Filter Press

- Low Installed cost
- High Floc. usage
- Continuous process
- Clear water production
- Medium to low moistures
- Medium OPEX (floc.)
- Medium Capacity

Plate & Frame Filter Press

- High Installed cost
- No Floc. usage
- Batch process
- Produces clear water
- Lowest moistures
- High OPEX
- Low capacities

Vacuum Belt Filter

- Medium Installed cost
- No floc. usage
- Continuous Process
- Produces clear water
- Medium to low moistures
- Medium OPEX (vacuum pumps)
- High Capacity

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DEWATERING

Reuse natural resources

» **Particle Size:** -0,050mm

» **Differentiator:** Up to 15Gs

	Mass (%)	CV (MJ/kg)	Ash (%)
Feed	100	19.2	33.6
Product	22	25.1	18.5
Discard	78	17.7	36.3

MARKETS

LOCAL VS INTERNATIONAL

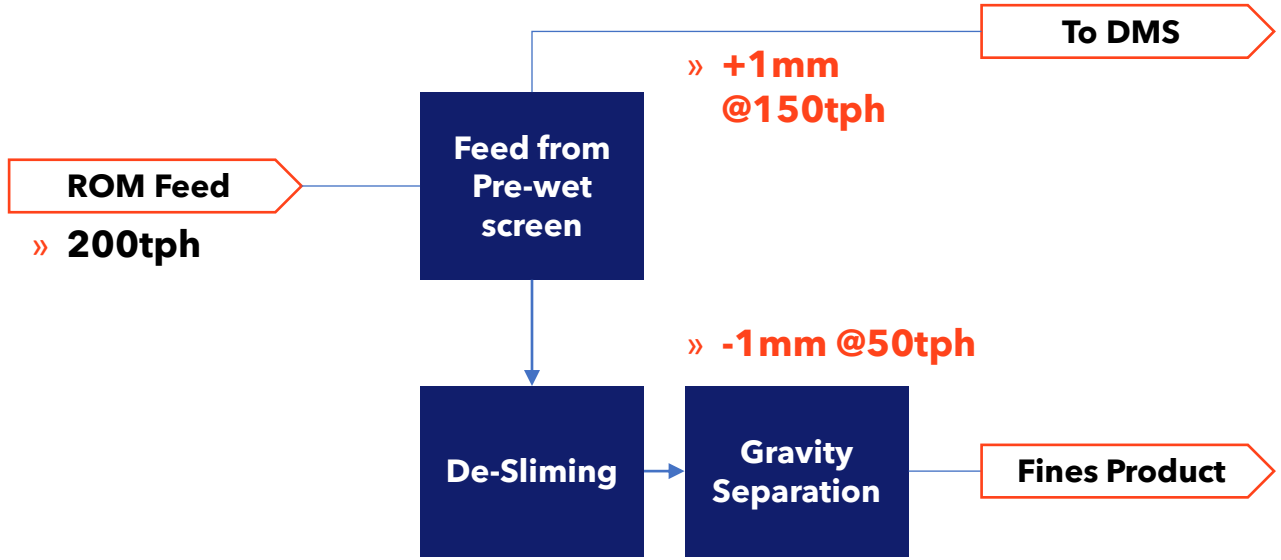
Industry	Size (mm)	Ash (%)	CV (MJ/kg)	Typical Selling Prices (R/ton) (FOT)
Eskom	0x50 (fines limit)	25-33	21	380.00
Brick and Tile	Duff	14.4-21.7	24.56-27.72	900-1,100.00
Metallurgical	Peas, small nuts	8.1.-18.8	25.18-30.36	900-1,250.00
RB1	0x50	15	24.5-25.12 (NCV) (5850 kcal/kg)	1,200.00 ($300)
RB2	0x50	16	24.5-25.12 (NCV) (5700 kcal/kg)	1,000.00 ($250)
RB3	0x50	23	22.2-23.3 (NCV) (5300 kcal/kg)	800.00 ($150)

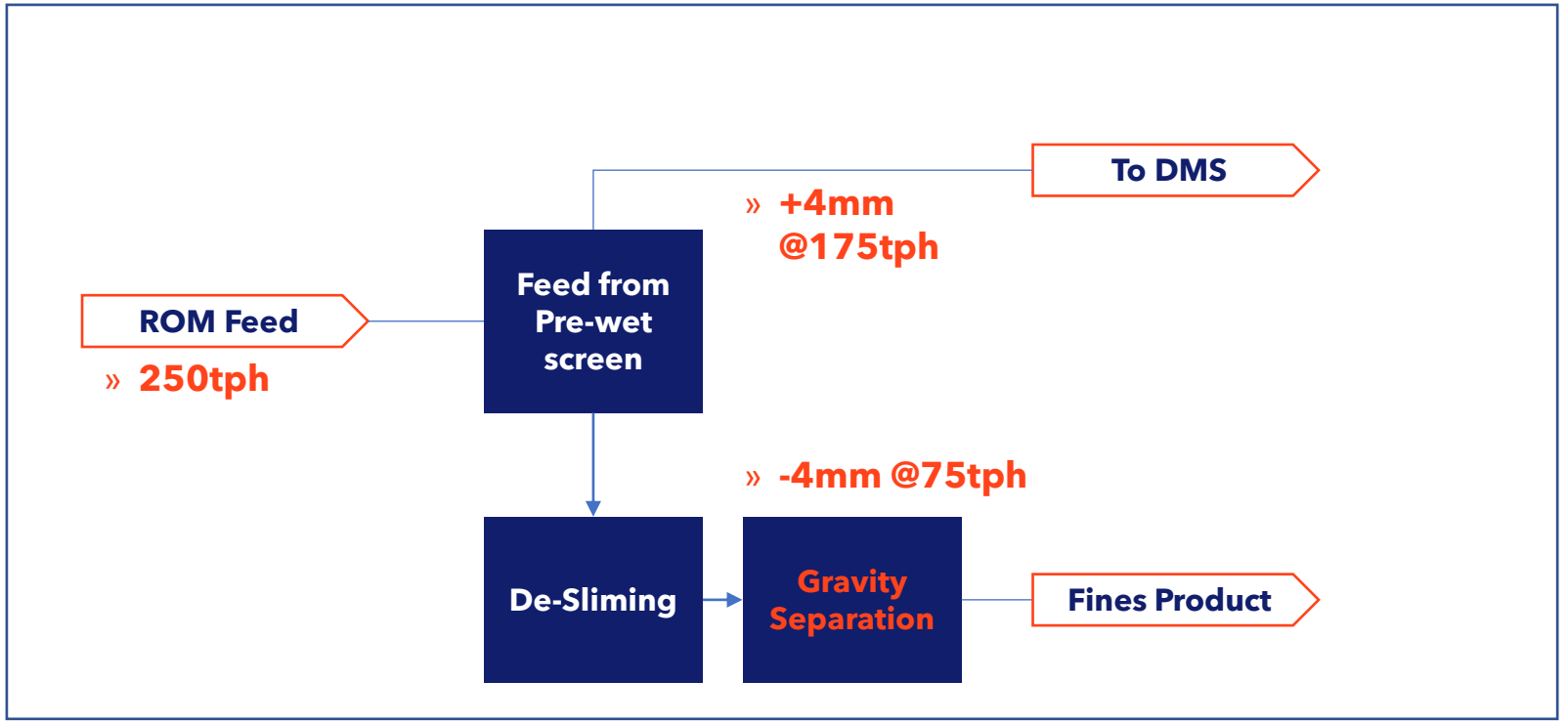
THE OPPORTUNITY

Shifting Size

"What if we could process -4mm with a water only process ?"

- Magnetite cons.?
- Plant Capacity?
- Access to market
- Residual to Eskom





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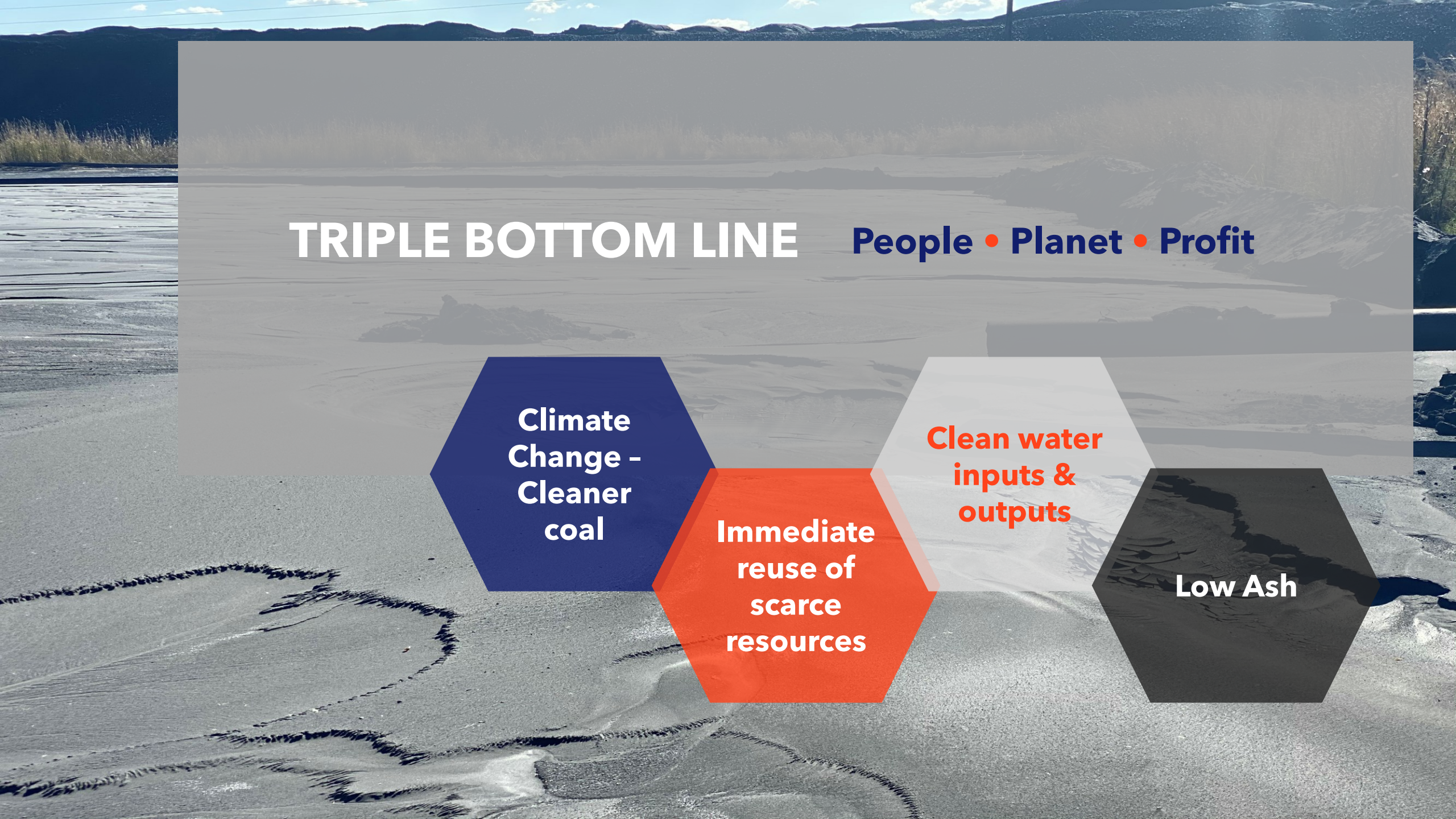
TRIPLE BOTTOM LINE
People • Planet • Profit
Climate Change – Cleaner coal
Immediate reuse of scarce resources
Clean water inputs & outputs
Low Ash


people.planet.recovery.
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