# ENABLING CO<sub>2</sub> REDUCTION

## CEO UPDATE CAPITAL MARKETS DAY JUNE 2019



AMG ADVANCED METALLURGICAL GROUP N.V.

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## FOUR KEY PRINCIPLES

- 1. Find reliable supportive trends
- 2. Manage a portfolio of critical materials and technologies
- 3. Be the low-cost producer
- 4. Defend the market leadership in our niche markets



#### 10 YEAR EBITDA VOLATILITY

- The 10 year average max / min EBITDA multiple of the 9 business units is 7.1
- The 10 year average max / min EBITDA multiple of the total consolidated business is 3.0



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#### ORGANIZING GROWTH

- A-Projects: Routine Organic Growth of Existing Businesses
- B-Projects: Non-routine Expansion of Existing Business Lines
- C-Projects: Transformational Projects



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## CONSTRAINTS OF STRATEGY EXECUTION

- 1. Focus on organic growth projects
- 2. Maintain a conservative balance sheet
- 3. Build project management teams
- 4. Enhance (not diversify) current portfolio
- 5. Make acquisitions through industry consolidation only

IV

#### THREE BREAKOUT TRENDS

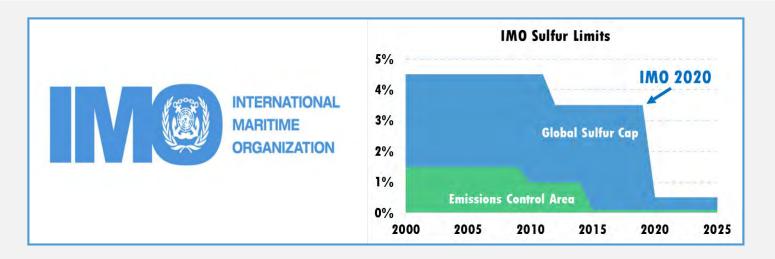
- Rise in Battery Materials
  - > Drivers: electric cars, renewable energy, grid stabilization
- Growth of the Refinery Catalyst Market
  - Drivers: IMO 2020, Middle East refineries
- Shifts in Aerospace Engine Technology
  - > Drivers: weight reduction and higher operating temperatures

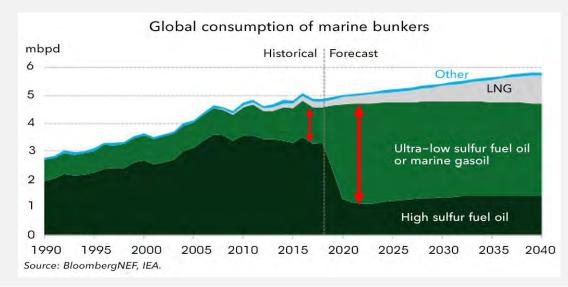
#### MIBRA MINE – MINAS GERAIS, BRAZIL





#### THE GROWTH OF THE REFINERY CATALYST MARKET





Increase in low-sulfur oil consumption necessitates additional fresh resid catalyst, resulting in substantially more spent catalyst (factor of approximately 1.7x)



VII



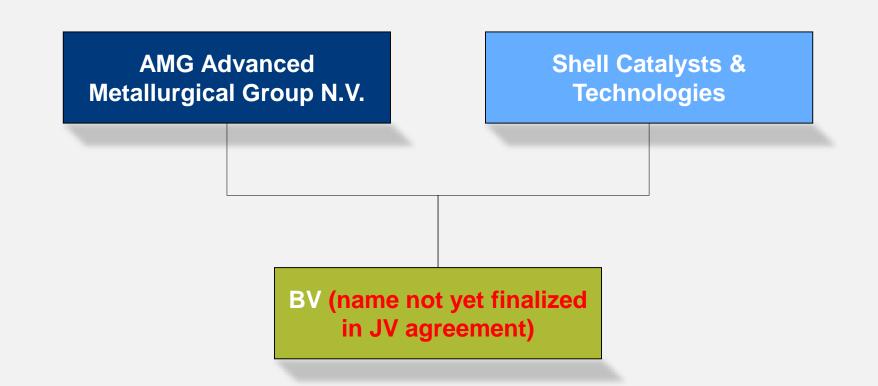
### "CAMBRIDGE I" OHIO





VIII

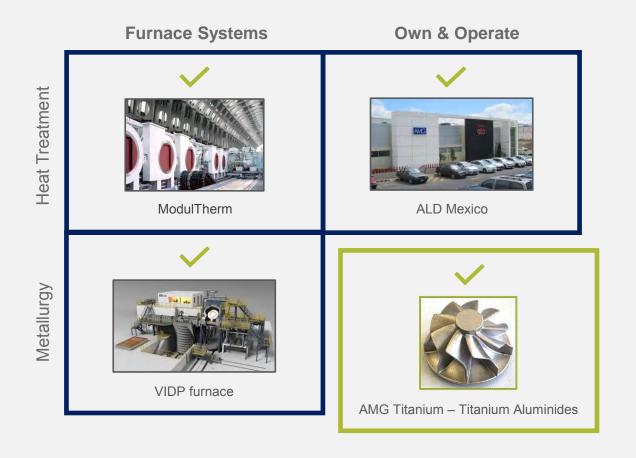
#### JOINT VENTURE: AMG & SHELL



#### Global spent catalyst recycling expansion by end-to-end solutions



#### AMG TECHNOLOGIES





### ENABLING CO<sub>2</sub> REDUCTION

Enabled CO <sub>2</sub> Reduction - 2018				
Division	Business Unit	Net CO <sub>2</sub> Reduction (tons) *	Technology / Product	
Technologies	Engineering	43.5 million	Thermal Barrier Coatings & Turbocharger Wheel Castings	
	Titanium Alloys & Coatings	5.0 million	Titanium Aluminides	
Critical Materials	Vanadium	1.2 million	Steel Alloying / Light weighting	
	Graphite	1.0 million	Graphite Insulation	

## **Total net CO<sub>2</sub> reduction (2018): 50.7 million tons**

