

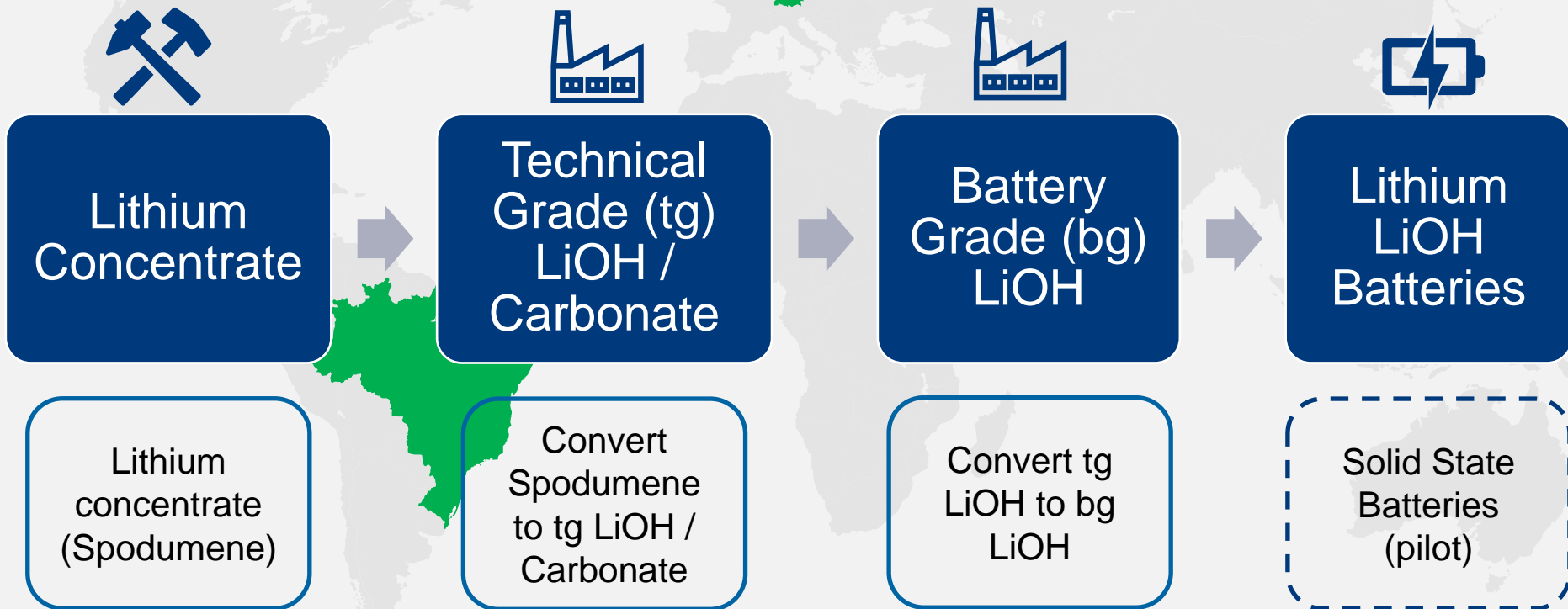


**LITHIUM HYDROXIDE BATTERY-GRADE REFINERY  
BITTERFELD, GERMANY**



# AMG LITHIUM'S VALUE CHAIN

AMG operates a value chain from mining all the way down to hydroxide bg for batteries

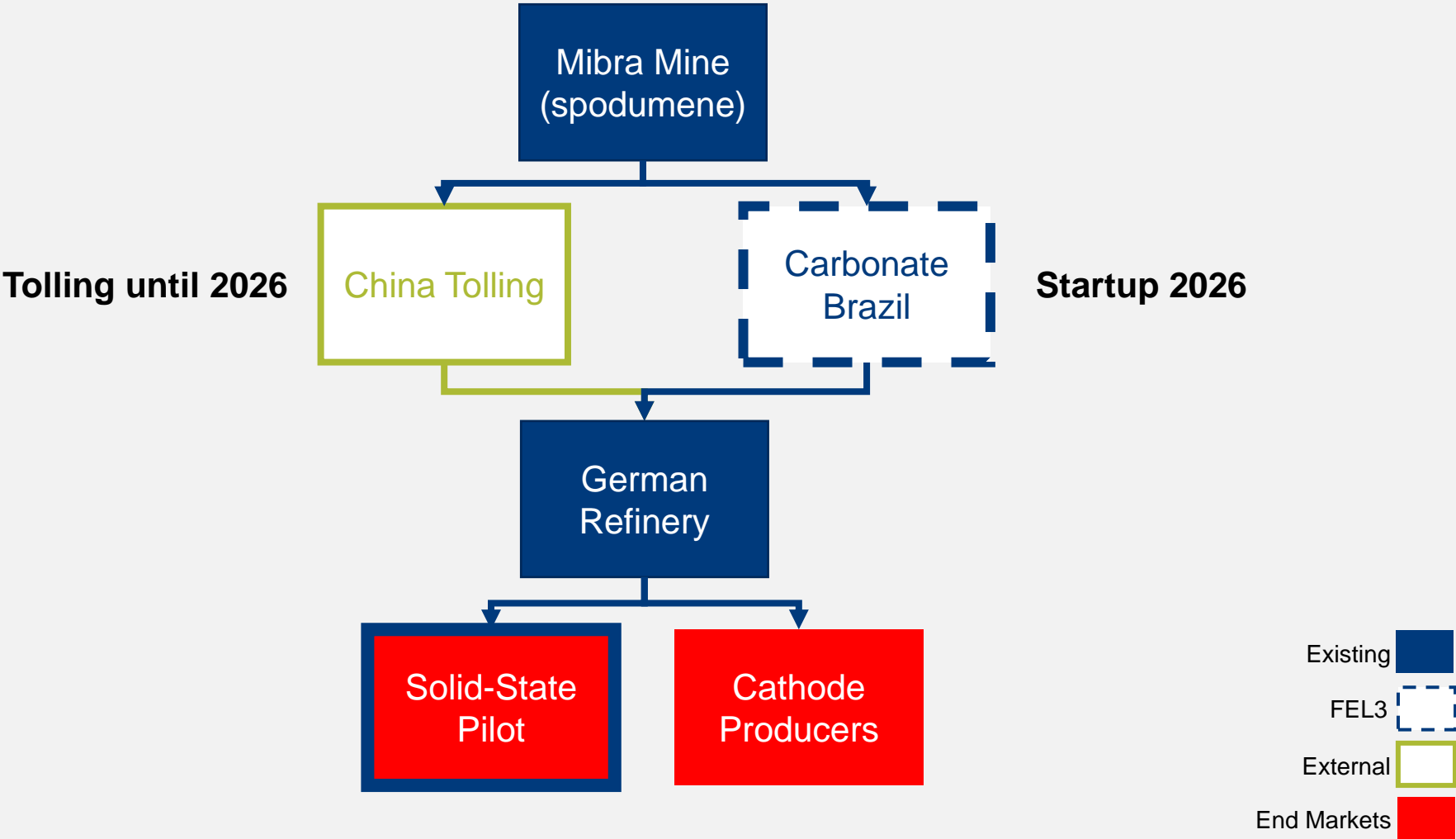


LiOH = Lithium Hydroxide

# THE MIBRA MINE, BRAZIL



# THE BITTERFELD REFINERY, GERMANY, MODULE 1

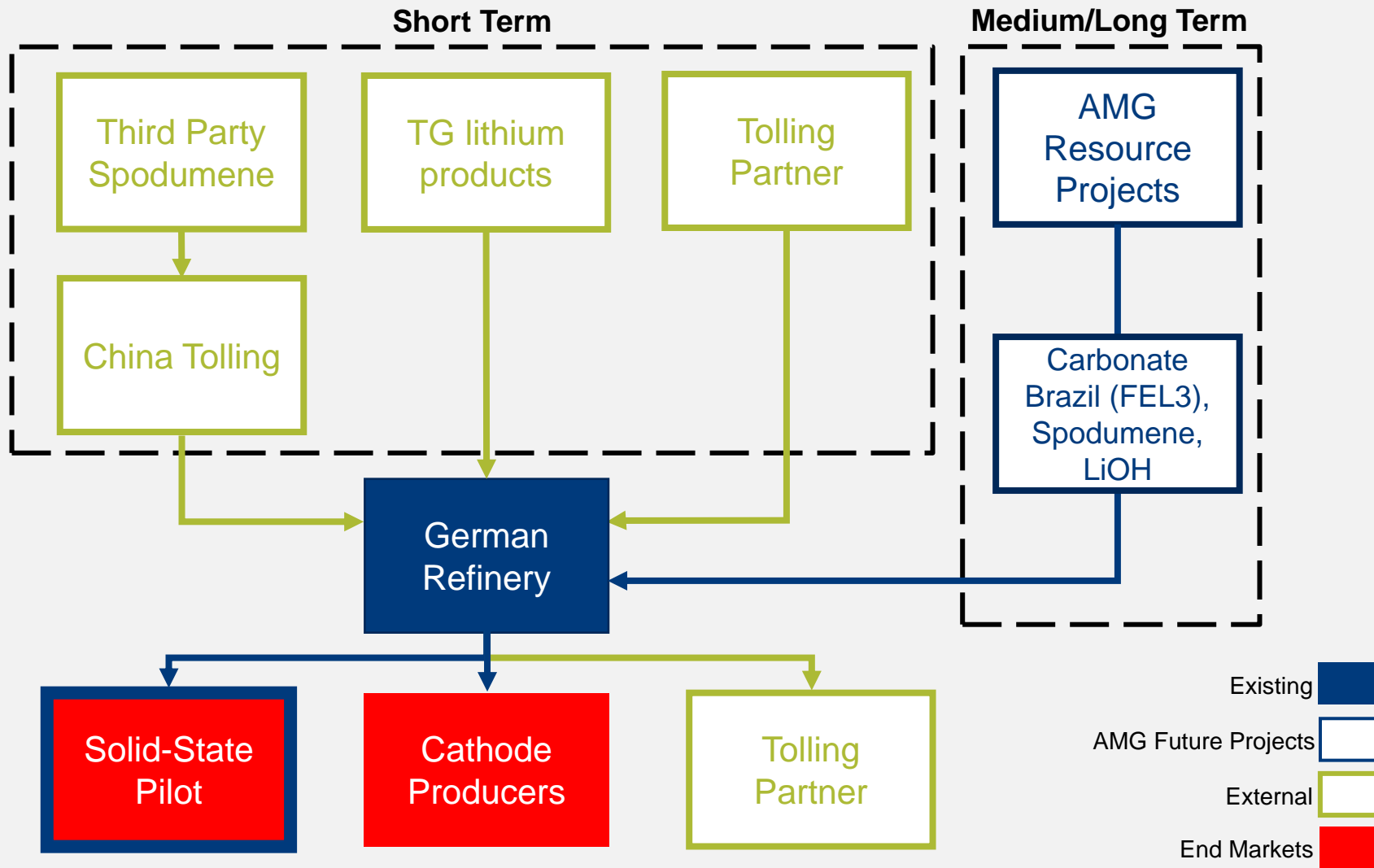




# LITHIUM HYDROXIDE BG REFINERY IN GERMANY – STATUS



# MODULE 2-5



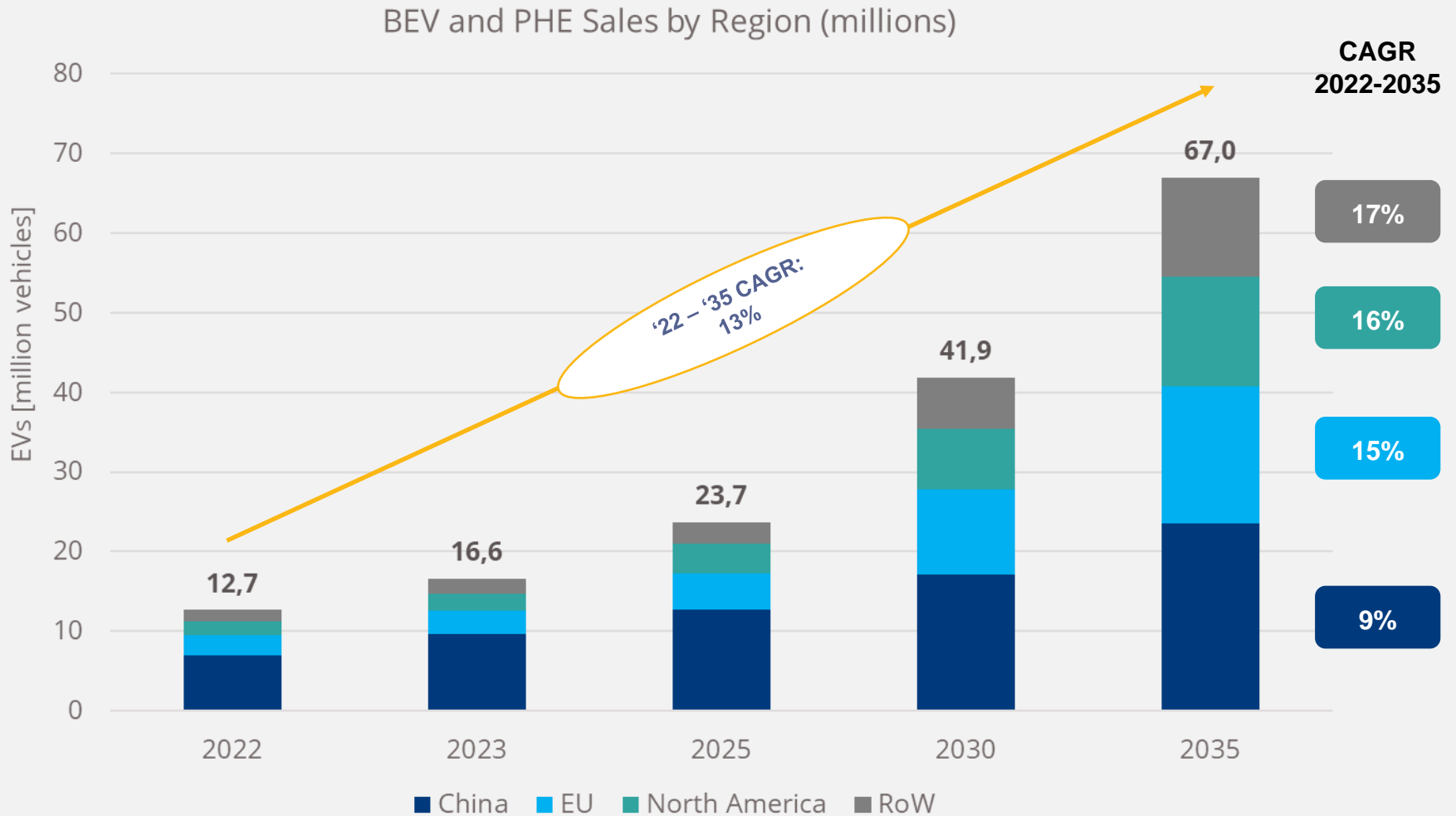


## DEVELOPING ADDITIONAL (AFFILIATED) RESOURCES

### **AMG Resource Development Support**

- Spodumene production know how
- Engineering / Project Management
- Offtake contracts (with or without KfW)
- Project Financing / Equity
- Equity participation

# PROJECTED GLOBAL ELECTRIC VEHICLE GROWTH





# THE LIVA ORIGIN



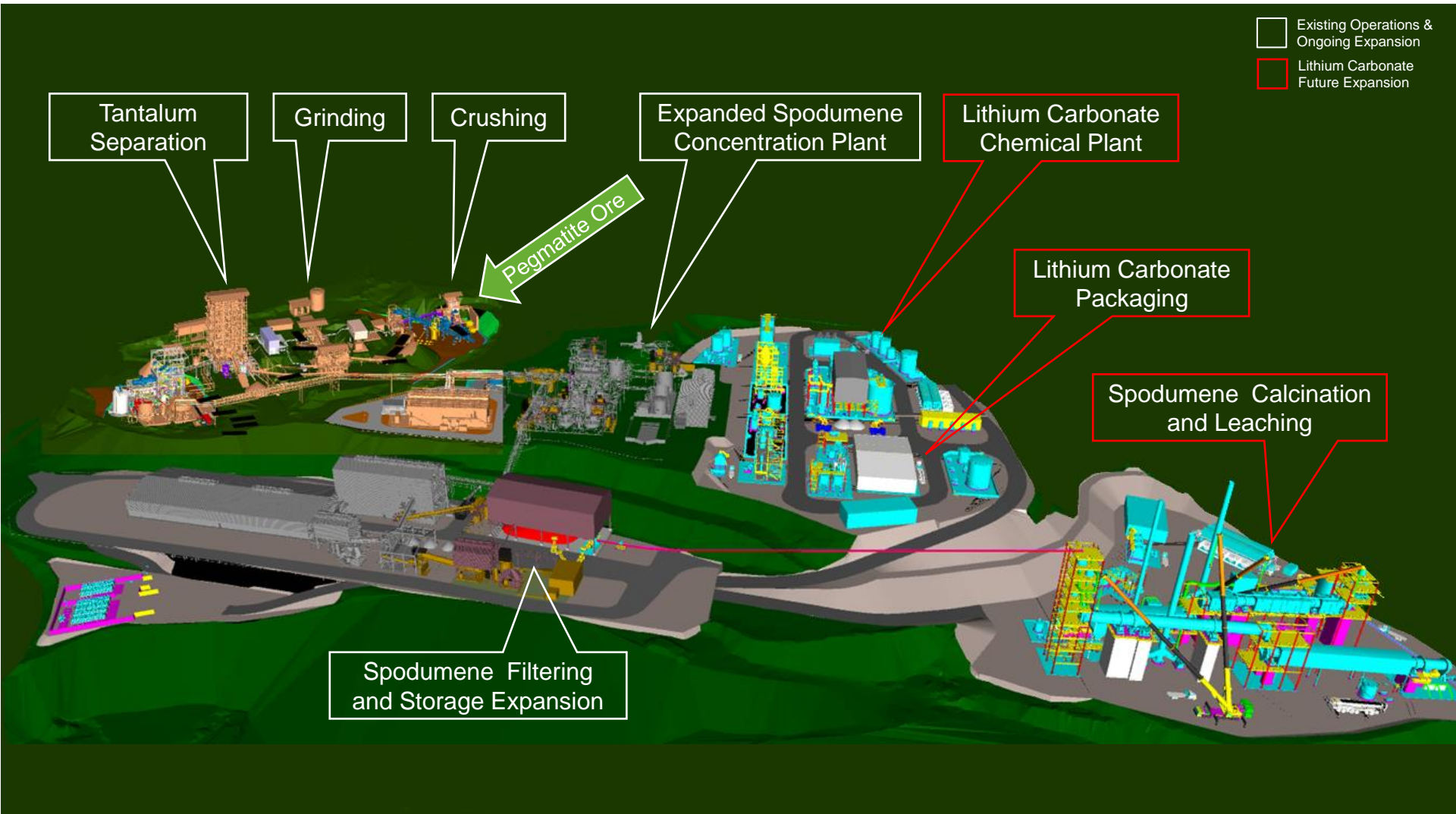


# LITHIUM: UPSTREAM GROWTH STRATEGY



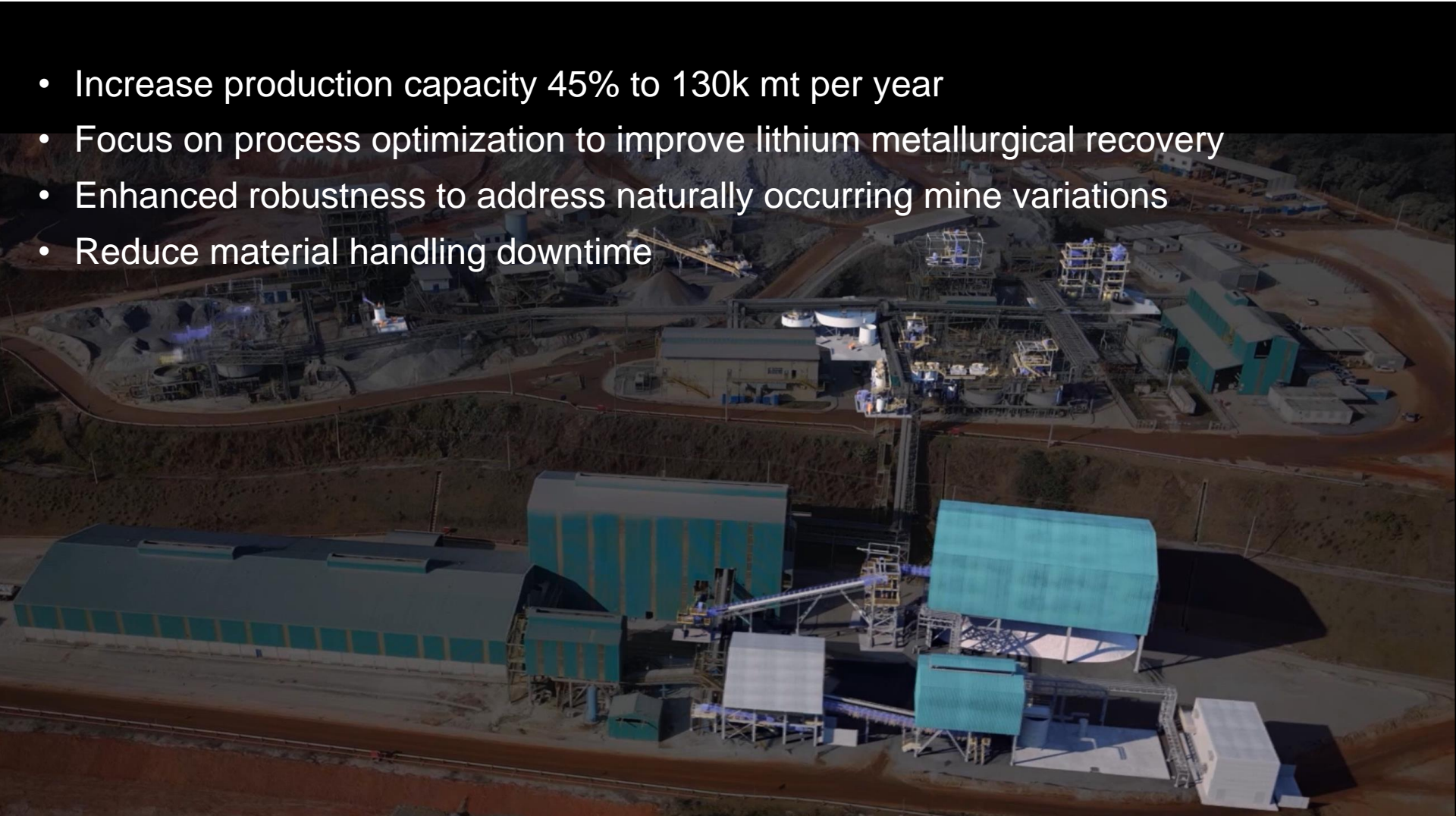


# BRAZIL OPERATIONS



# SPODUMENE EXPANSION

- Increase production capacity 45% to 130k mt per year
- Focus on process optimization to improve lithium metallurgical recovery
- Enhanced robustness to address naturally occurring mine variations
- Reduce material handling downtime





## AMG IS A LOW-COST SPODUMENE PRODUCER

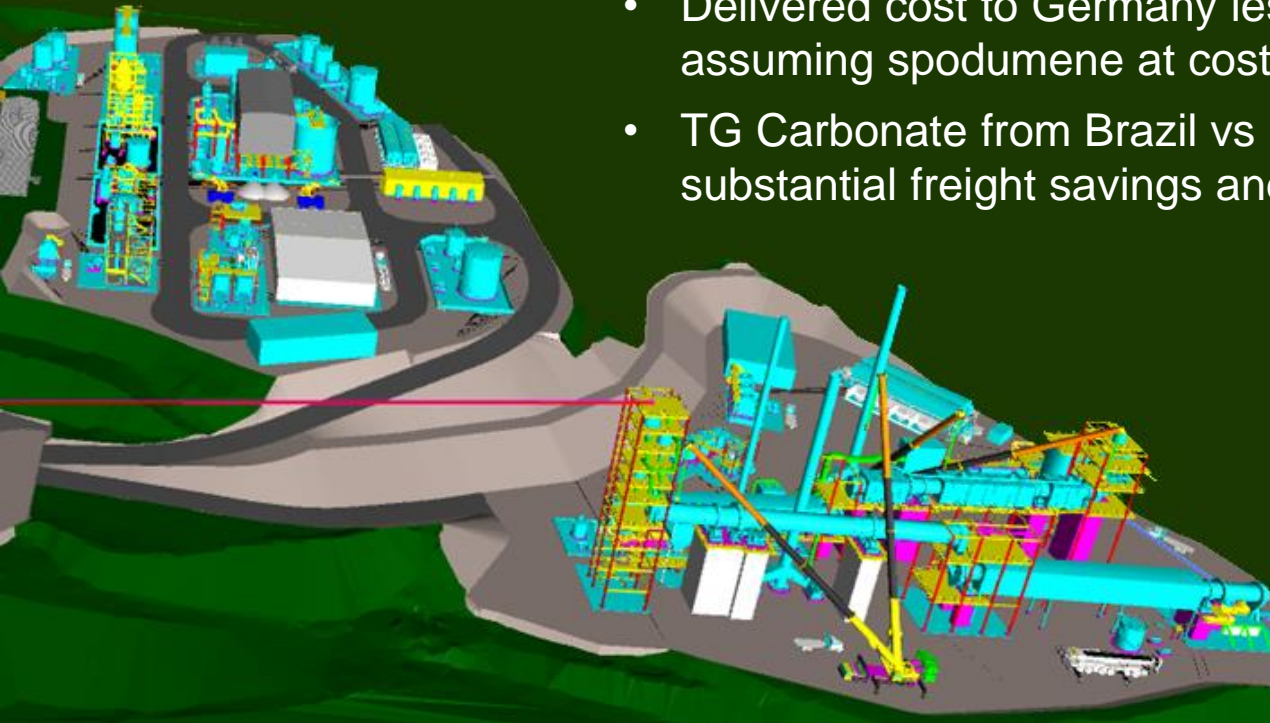
***\$461/mt cost per ton delivered to China, net of tantalum, feldspar and tin by-product credits***

- The Mibra mine is a long-term tantalum concentrate producer and is the largest conflict-free producer of tantalum in the world
- Mibra's tantalum production is the key reason for the mine's low-cost spodumene position
- Mibra's tantalum production will expand to 370K pounds per year. This expansion will occur in combination with the spodumene expansion
- AMG Brazil entered into a life-of-mine strategic partnership with JX Nippon Mining & Metals Corporation that sells 100% of Mibra's tantalum concentrate production to their subsidiary, Taniobis
- This life of mine strategic partnership ensures long-term stability in tantalum sales and corresponding by-product credits to lithium production costs

# TECHNICAL GRADE LITHIUM CHEMICAL PLANT

## Preliminary Estimates:

- Investment: \$250M
- Commissioning: End of 2025
- Capacity: 16.5 mt Technical Grade Lithium per annum
- Delivered cost to Germany less than \$10,000 /mt; assuming spodumene at cost for conversion in Brazil
- TG Carbonate from Brazil vs Upgrading in China results in substantial freight savings and ~90k mt reduction in CO<sub>2</sub>e





# SUSTAINABILITY

- Across all Brazil sites, Lost Time Rate of 0.14 and Recordable Rate of 0.42 compare favorably to Bureau of Labor Statistics Industry Benchmarks: 1.2 Lost Time Rate and 4.1 Recordable Rate (88% and 90% better, respectively).
- In 2021, AMG Brazil was awarded a Recognition on Good Suppliers Practices Prize from Novelis, which recognizes initiatives from partners of Novelis contributing to a more sustainable world.
- In 2022, AMG's owned hydroelectricity plant produced electricity to cover 48% of our total power needs (produced 65.67 TJ and consumed 135.96 TJ across all of our Brazil operations).
- Above all, preserving the environment is part of the essence of AMG Brazil which, with its production, contributes globally to the reduction of CO<sub>2</sub> emissions.



## LOCAL COMMUNITY

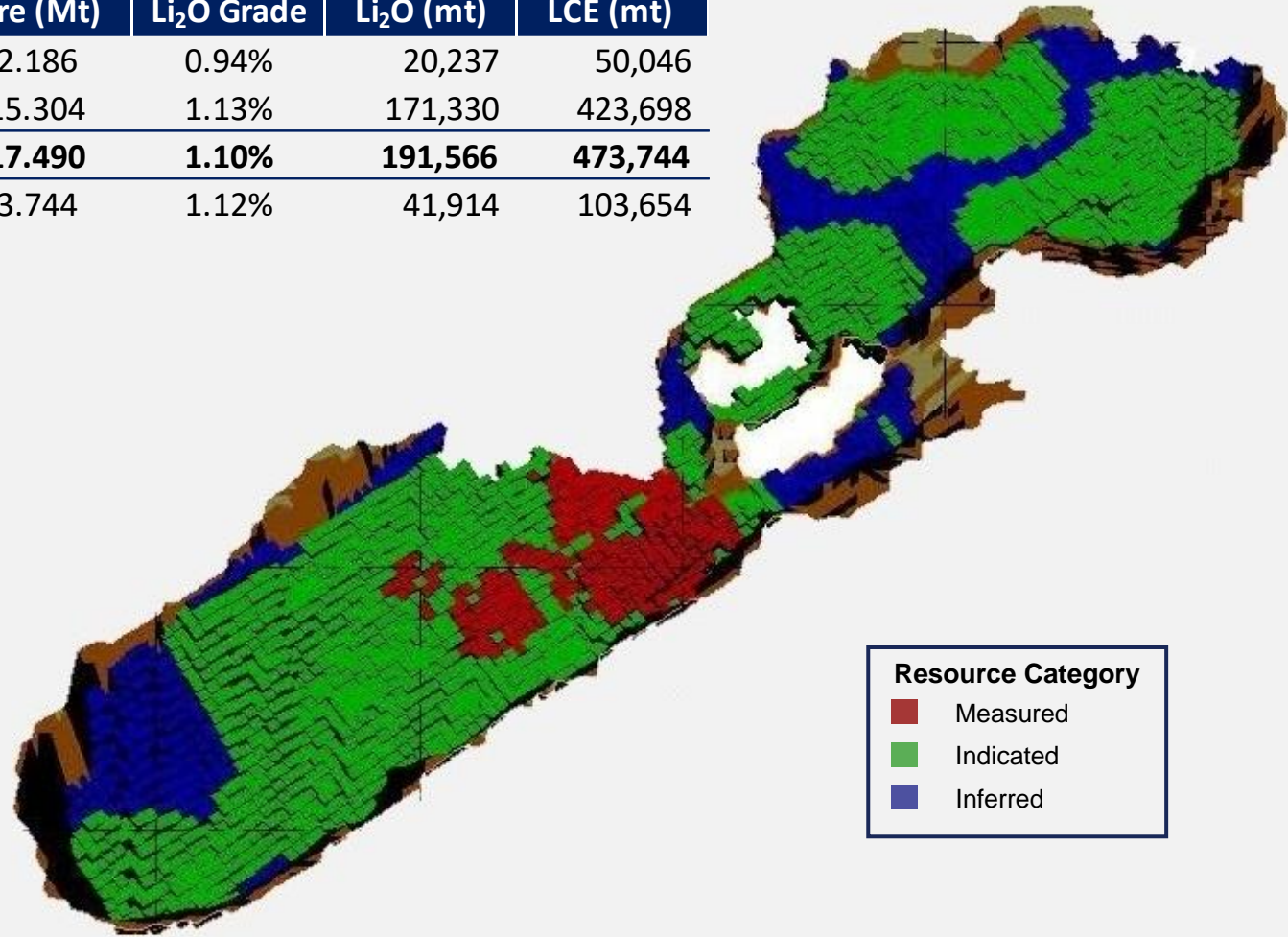
- The company prioritizes local culture and building a relationship of trust and mutual respect and prioritizes hiring locally.
  - More than 70% of employees are local hires
  - The Young Apprentice Program, a partnership with SENAI, Nacional Service of Industrial Learning, is an internship based on the commitment of local labor development and professional possibilities.
  - AMG Brazil partners with local universities focusing on personal and professional development of young people and adults entering the job market. Since 2015, AMG Brazil has prepared more than 70 individuals for the job market, directly hiring almost 40%.



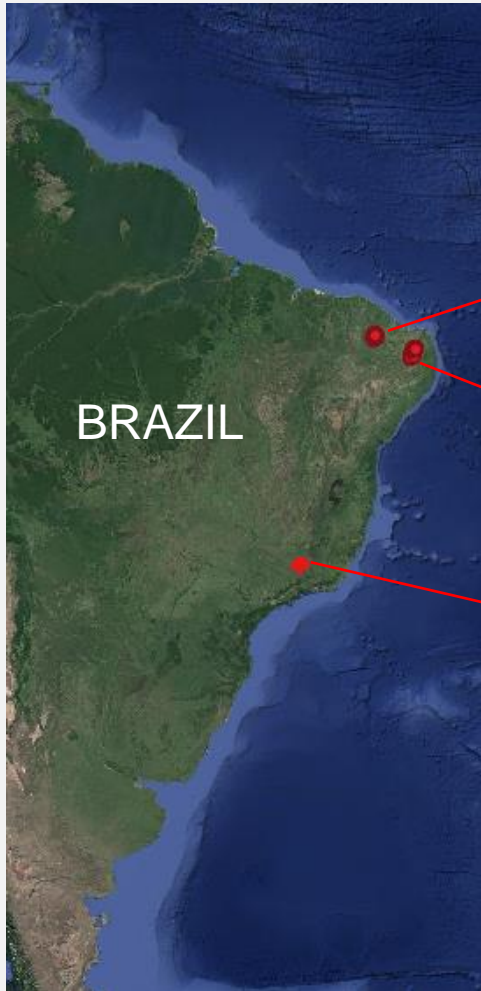


# MIBRA RESOURCE – 2021

Category	Ore (Mt)	Li <sub>2</sub> O Grade	Li <sub>2</sub> O (mt)	LCE (mt)
Measured	2.186	0.94%	20,237	50,046
Indicated	15.304	1.13%	171,330	423,698
<b>Measured &amp; Indicated</b>	<b>17.490</b>	<b>1.10%</b>	<b>191,566</b>	<b>473,744</b>
Inferred	3.744	1.12%	41,914	103,654



# STRATEGIC EXPLORATION PROJECTS



## **Ceará**

9 Mineral Rights. Geochemical results show presence of Lithium, Tantalum and Tin. Ongoing drilling campaign

## **Paraíba**

8 Mineral Rights. Geochemical results show presence of Lithium, Tantalum and Tin

## **Minas Gerais**

New exploration project to delineate subsurface pegmatite occurrences in areas near existing Mibra mine



# LITHIUM HYDROXIDE BG REFINERY IN GERMANY - STATUS





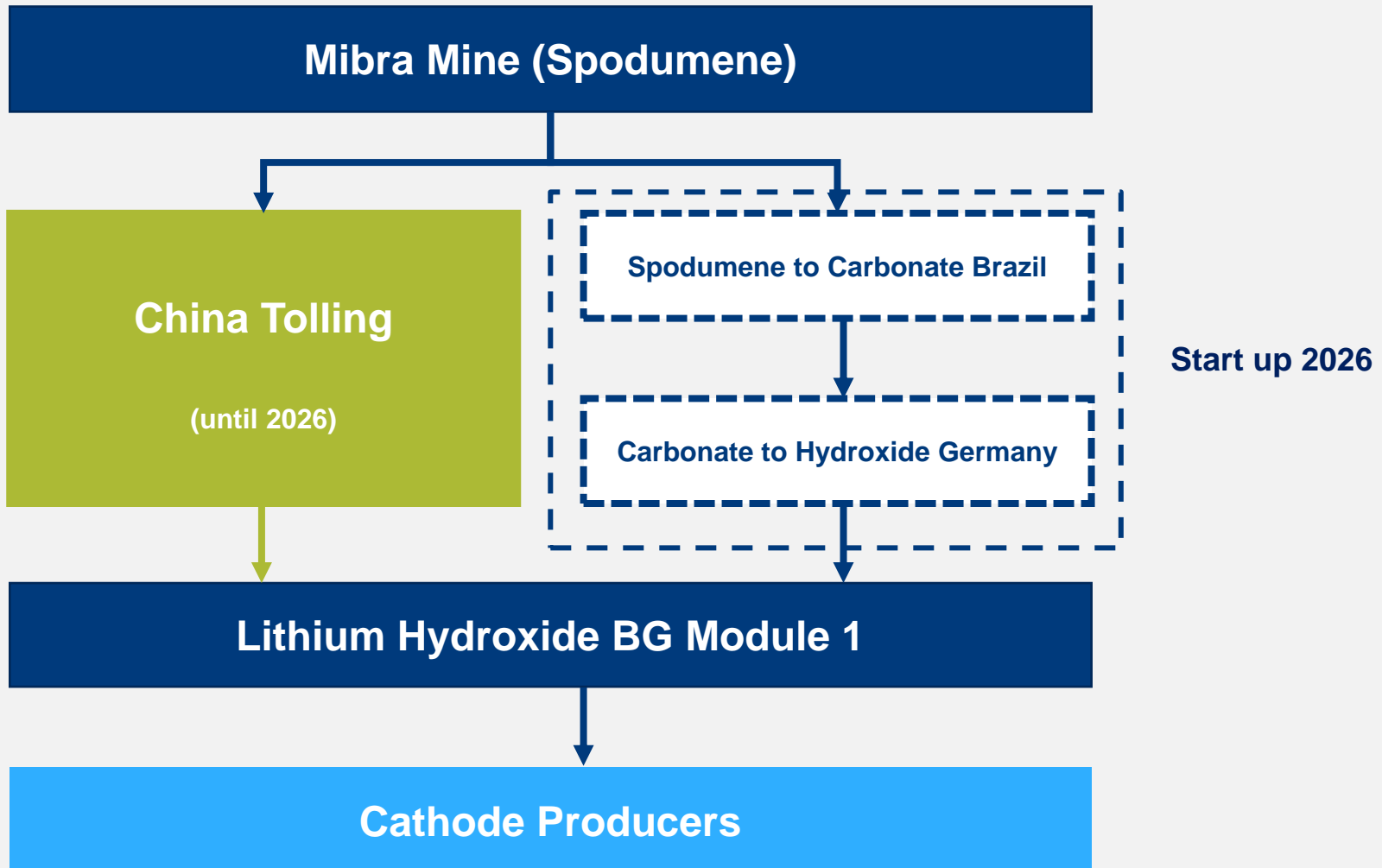




## LITHIUM HYDROXIDE BG REFINERY – TIMELINE

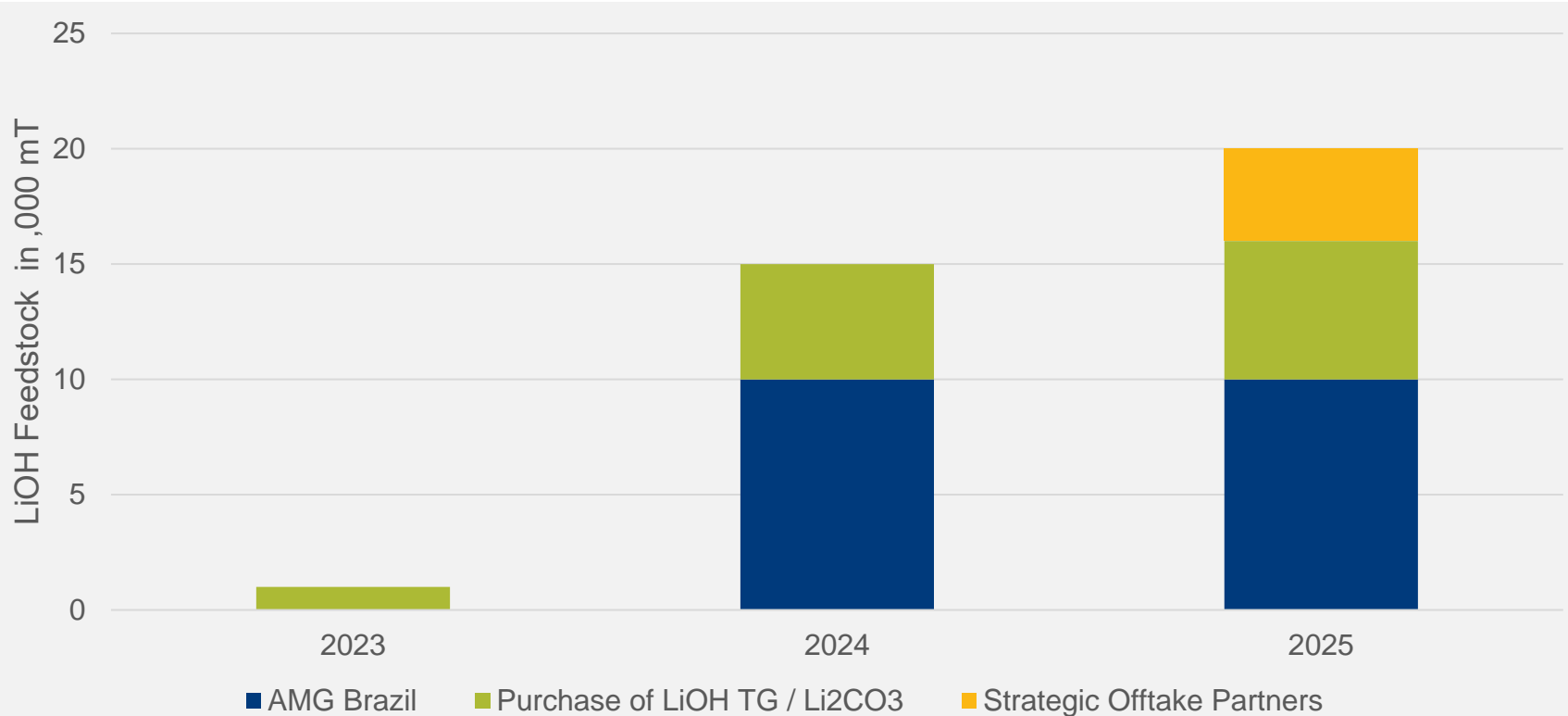
- Production of highly-refined, battery-grade Lithium hydroxide.
- Module 1 with 20,000 MT/yr capacity, further modules up to 100,000 MT/yr in total.
- Located in Bitterfeld/Germany: access to all required energies and infrastructure.
- Start up in Q4
- Expected Capex of \$140 million for module 1.

# MODULE 1: LITHIUM SUPPLY CHAIN





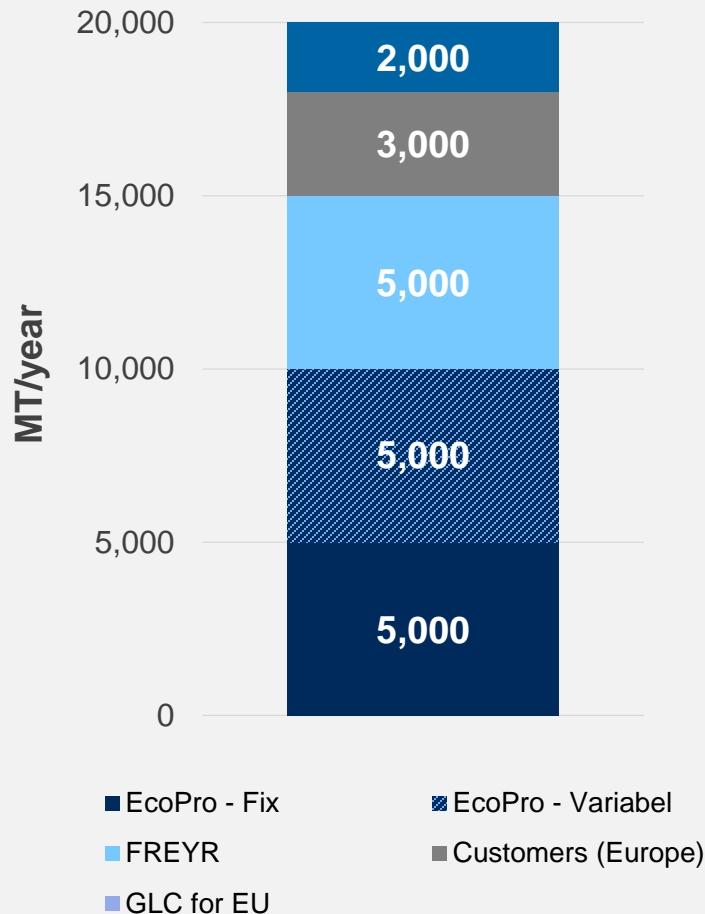
# LITHIUM FEEDSTOCK SOURCES MODULE 1



- AMG Brazil: only volumes not covered by Spodumene contracts.
- LiOH BG qualification during 1st half of 2024.

# MODULE 1: LITHIUM HYDROXIDE OFFTAKE

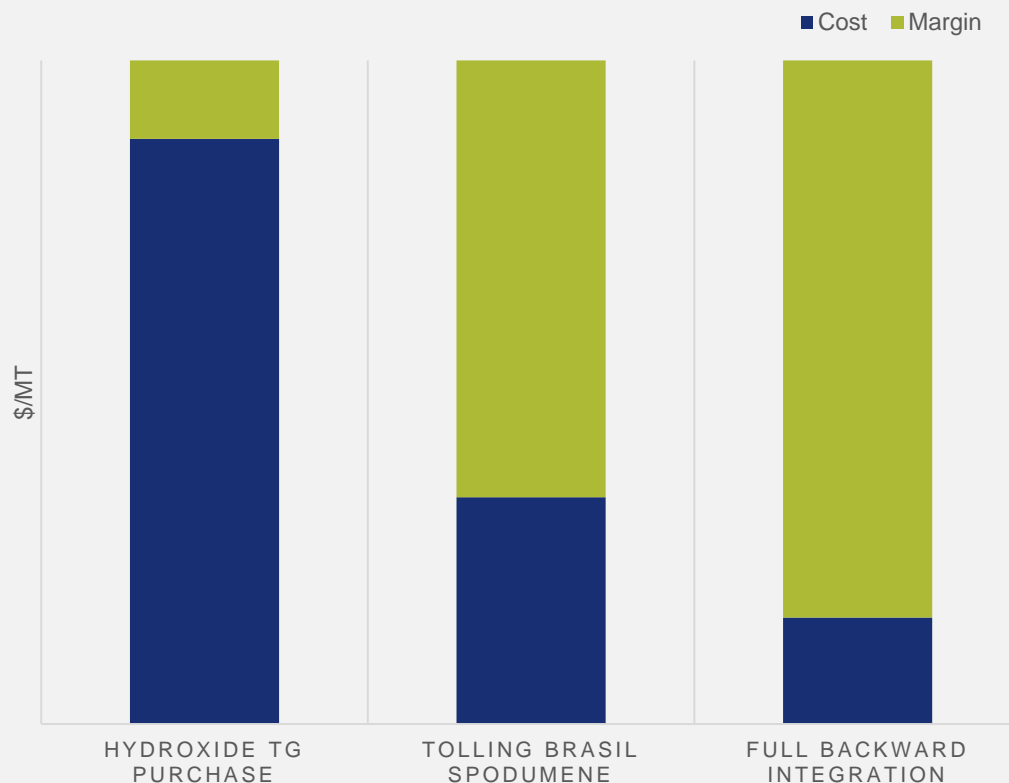
## Existing offtakes at runrate 2025



- AMG has signed a binding supply agreement with Korean **EcoPro** for an initial three-year term to deliver a binding 5,000 MT/yr plus an optional 5,000 MT/yr to EcoPro BM's CAM-facility in Debrecen-Hungary.
- AMG executed a MoU with **FREYR** for an off-take of up to 5,000 MT/yr.
- AMG executed further MoUs with different customers.
- AMG has an agreement in place with General Lithium for an offtake of up to 2,000 MT/yr for their EU needs.



# INDICATIVE MARGIN DEVELOPMENT TO A FULLY BACKWARD INTEGRATED LITHIUM COMPANY



## Technical Grade Purchase:

Represents the margin of the Bitterfeld plant assuming the open market purchase of technical grade hydroxide.

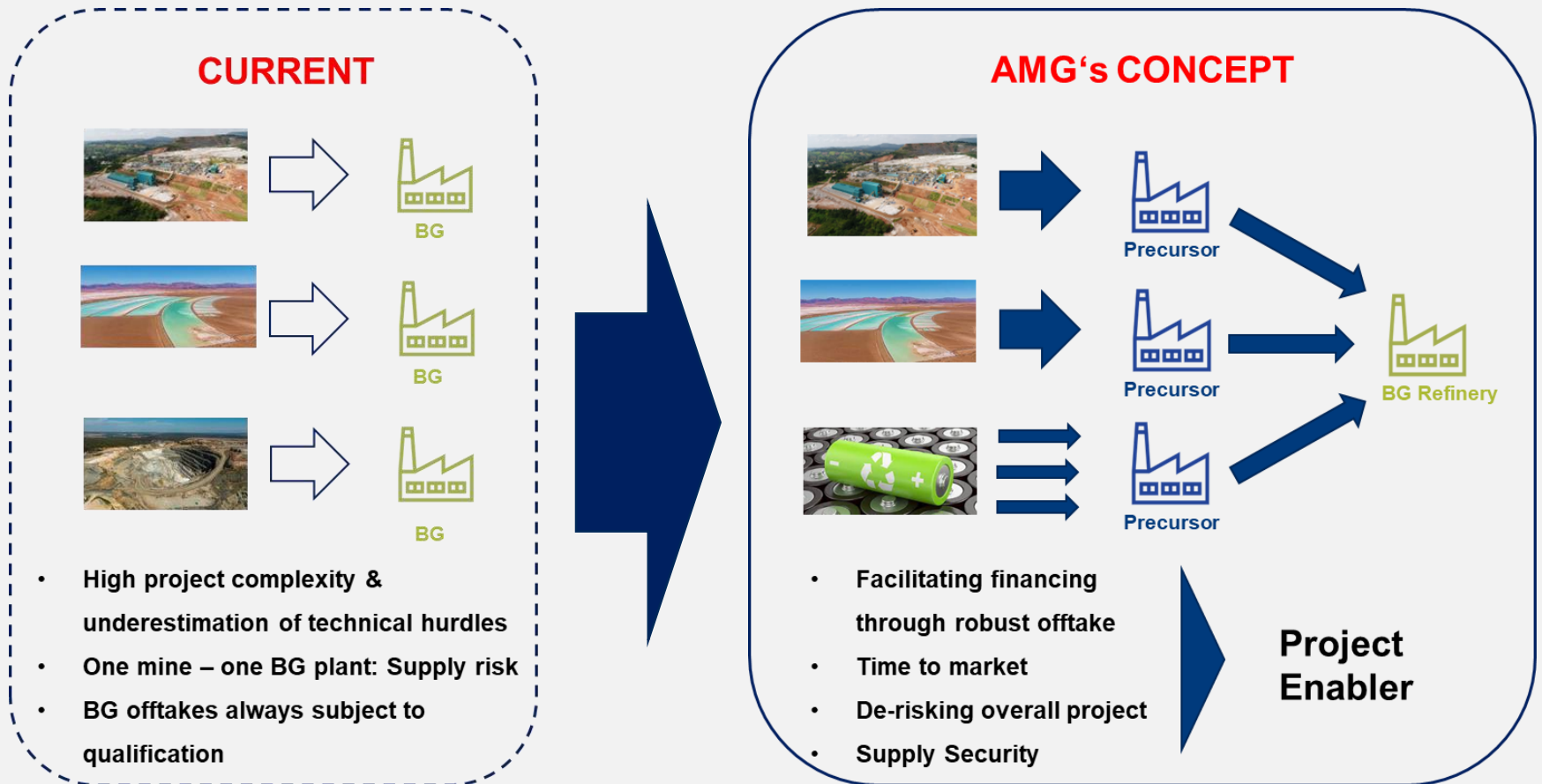
## Tolling Brazil Spodumene:

Represents the margin available to Bitterfeld via tolling Brazil spodumene in China and delivering technical grade hydroxide to Germany.

## Full Integration:

Represents the delivery of technical grade carbonate to Germany direct from the Brazilian Technical Grade plant.

# GAME CHANGER: NEW AMG SUPPLY CHAIN CONCEPT

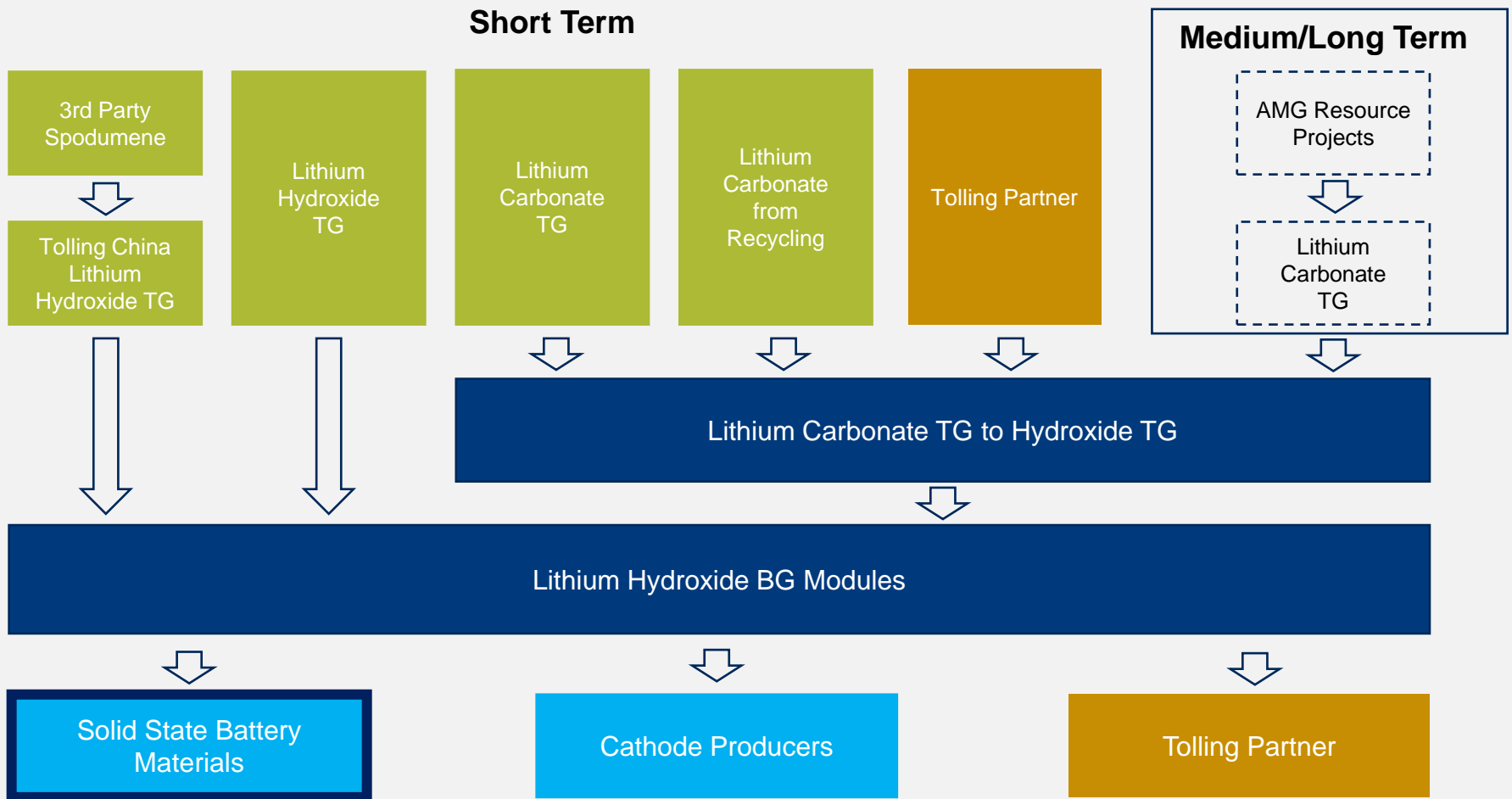




# GROWTH: AMG LITHIUM SOURCING STRATEGY



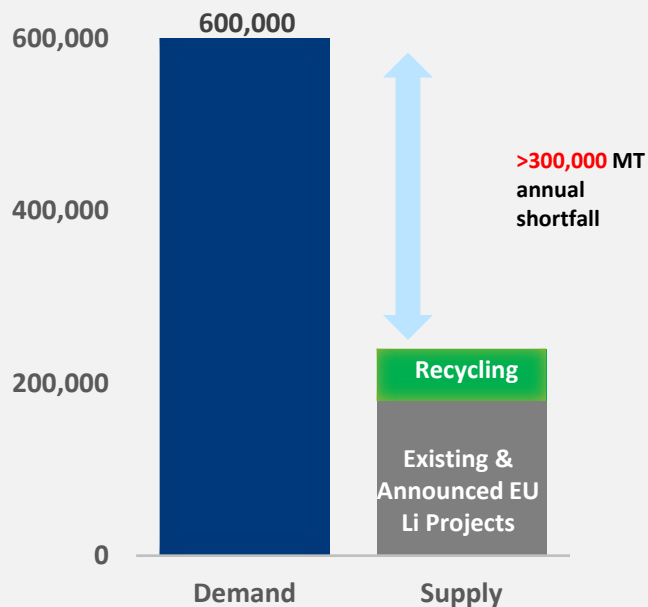
# LITHIUM SUPPLY CHAIN – MODULE 2-5



AMG 2026 ■ AMG Future Projects □ External ■ End Markets ■ Tolling ■

# WHY EUROPE ? – EU REQUIRES LARGE VOLUMES LITHIUM HYDROXIDE BG

**Estimated 2030 EU  
Lithium Market  
Balance (kMT LCE)**

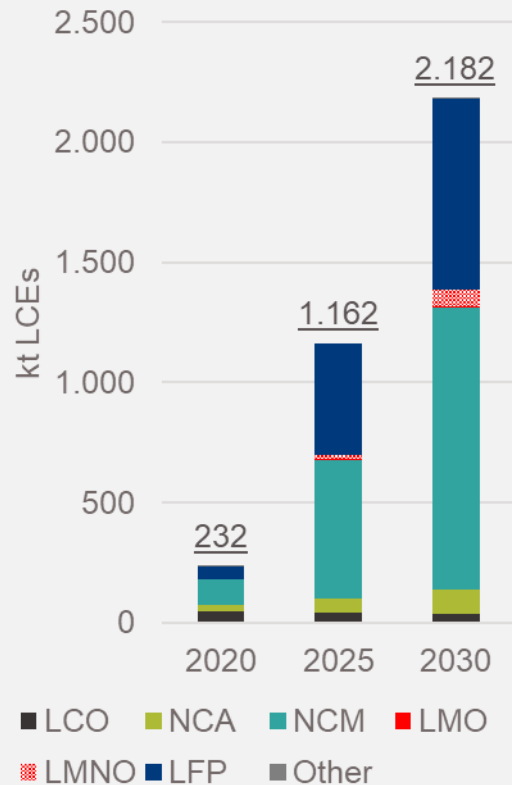


**2025: already announced European demand  
of ~300 ktpa LCEs for Cathodes**

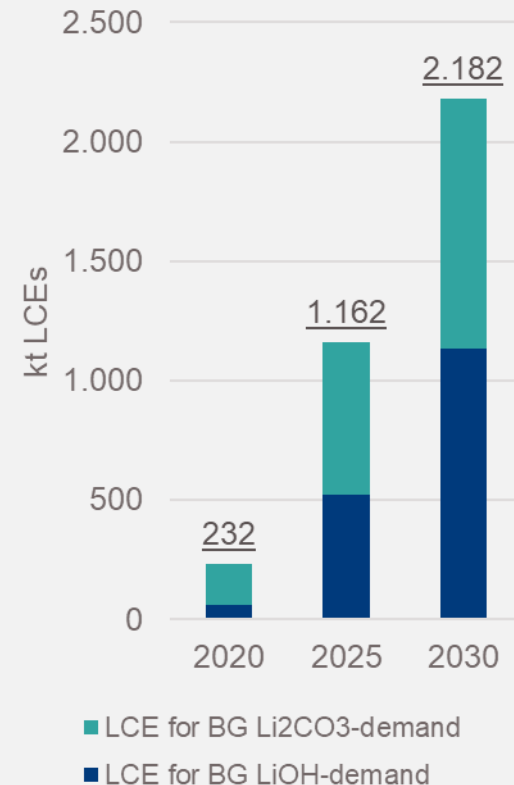


# WHY LIOH ? - GROWING DEMAND FOR LITHIUM HYDROXIDE BG DRIVEN BY HIGH NICKEL BATTERY CATHODES

Lithium Demand in Rechargeable Batteries



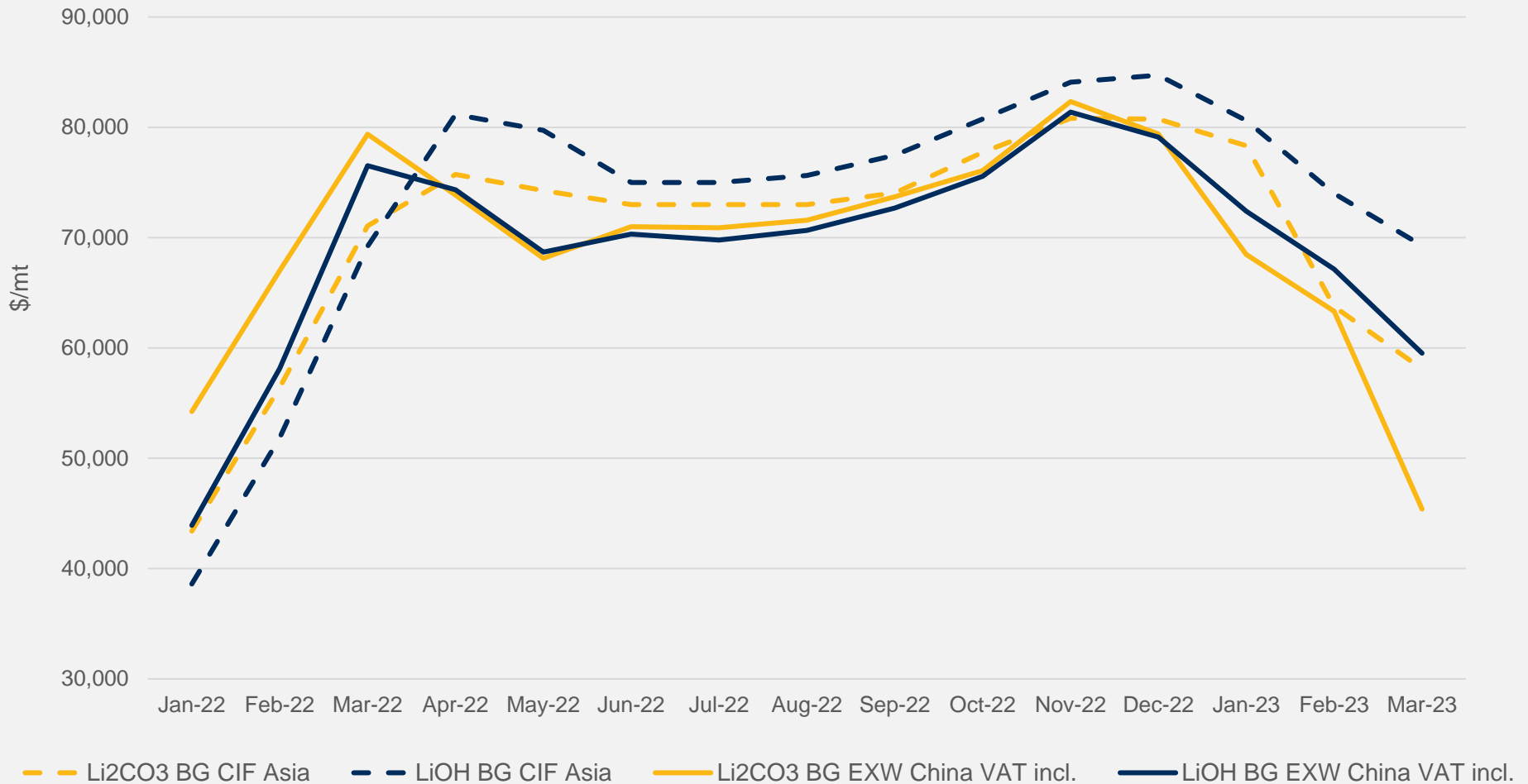
EV Demand for Lithium by Type



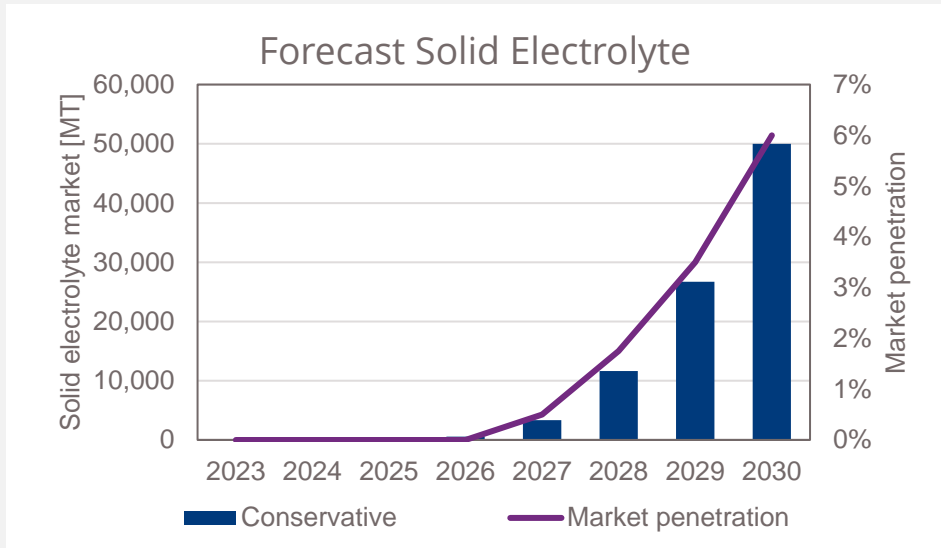
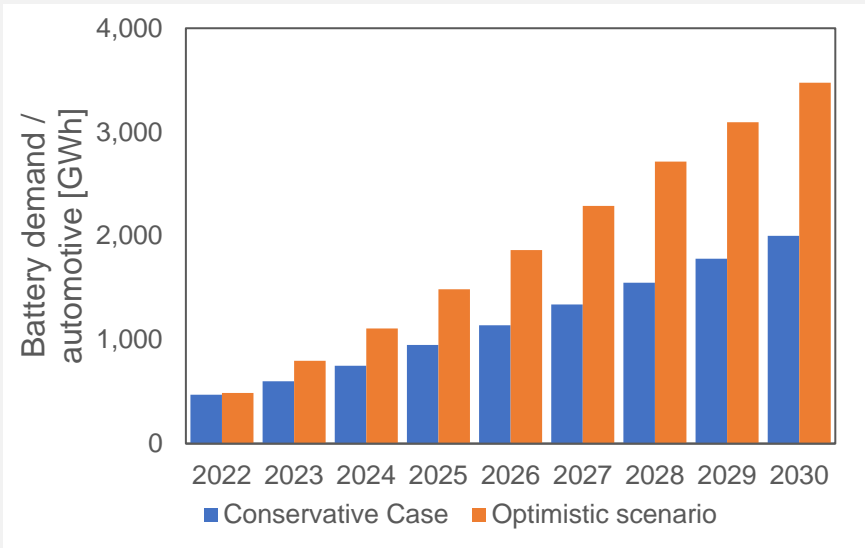
Source: Lithium-Forecast-Benchmark-Mineral-Intelligence Q4-2022. Note: High Nickel includes NCM712, NCM811, NMX, NCA, NCMA, LNMO and other nickel chemistries.

# CURRENT LITHIUM SALT PRICE TREND IN CHINA

Fastmarkets LiOH / Li<sub>2</sub>CO<sub>3</sub> BG spot prices



# NEXT GENERATION AUTOMOTIVE BATTERY TECHNOLOGY: ALL-SOLID-STATE-BATTERIES (ASSB)



## Application & Market:

- All-Solid-State Batteries are next step in automotive battery technology
- Forecasts estimate 5-7 % market penetration in 2030 (total market of ~2.000 GWh)
- EV market forecast indicates large growth potential on long-term view 2030+

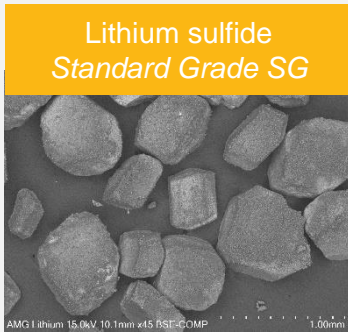
## Technology:

- Solid electrolytes are critical performance components to reach energy density and safety targets.
- Solid electrolytes and precursors are key compounds regarding quality and product availability of ASSBs.



# MARKET TREND: ALL-SOLID-STATE-BATTERIES (ASSB) OUR PORTFOLIO: SOLID ELECTROLYTES AND LITHIUM SULFIDE

## Precursors (Lithium Sulfide)

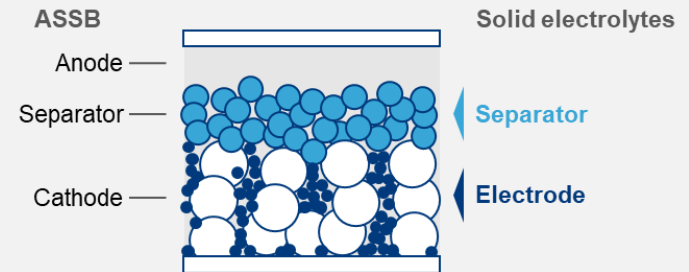


Standard product for solid electrolyte production

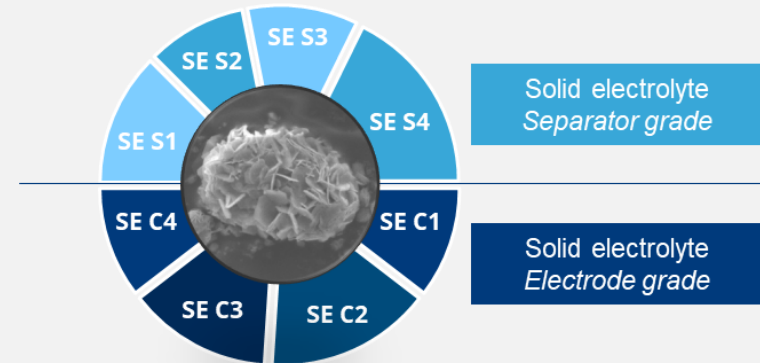


Premium product for **electrode** production

## Sulfidic Solid Electrolytes



### Solid electrolyte portfolio



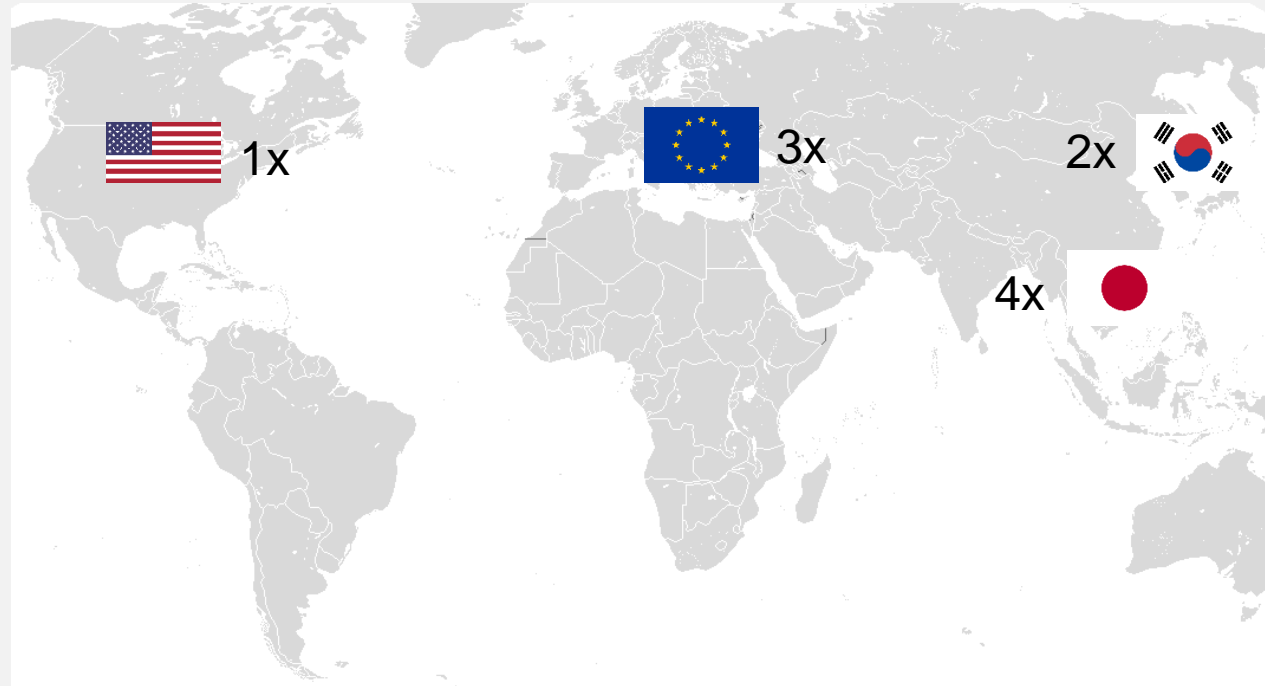
- Broad portfolio of sulfide-based solid electrolytes
- Scalable production process
- Proprietary process filed for patent

# GLOBAL CUSTOMER ACTIVITIES

## Current status:

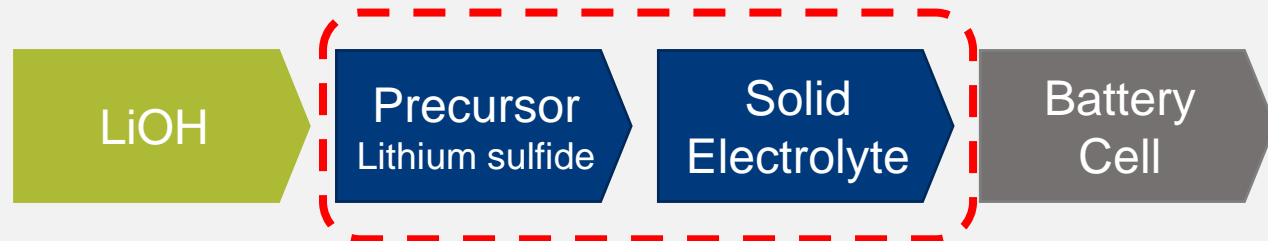
Projects with customers in:

- Europe (3x): development projects & evaluation
- USA (1x): qualification
- Japan (4x): qualification & evaluation projects
- Korea (2x): sampling & evaluation
- **Addressable AMG customer potential: 6.000+ MT/a in 2028**



## Our position:

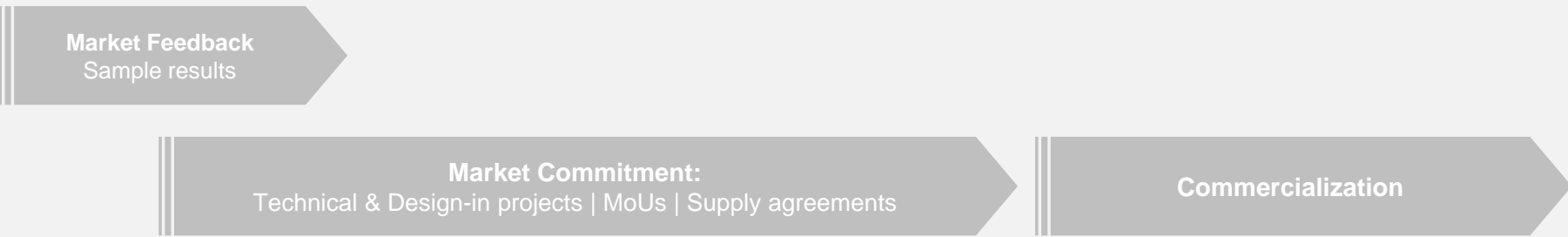
- Development partner and prospective material supplier
- Backward integrated technology leader for solid electrolyte production



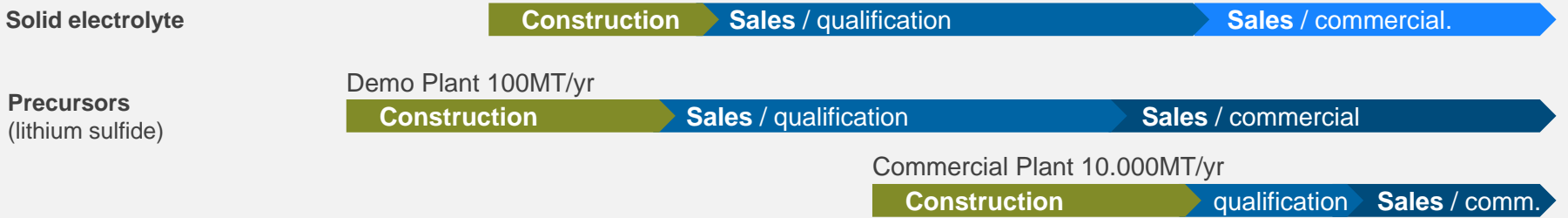
# LITHIUM SULFIDE & SOLID ELECTROLYTE ROADMAP



Market



Products





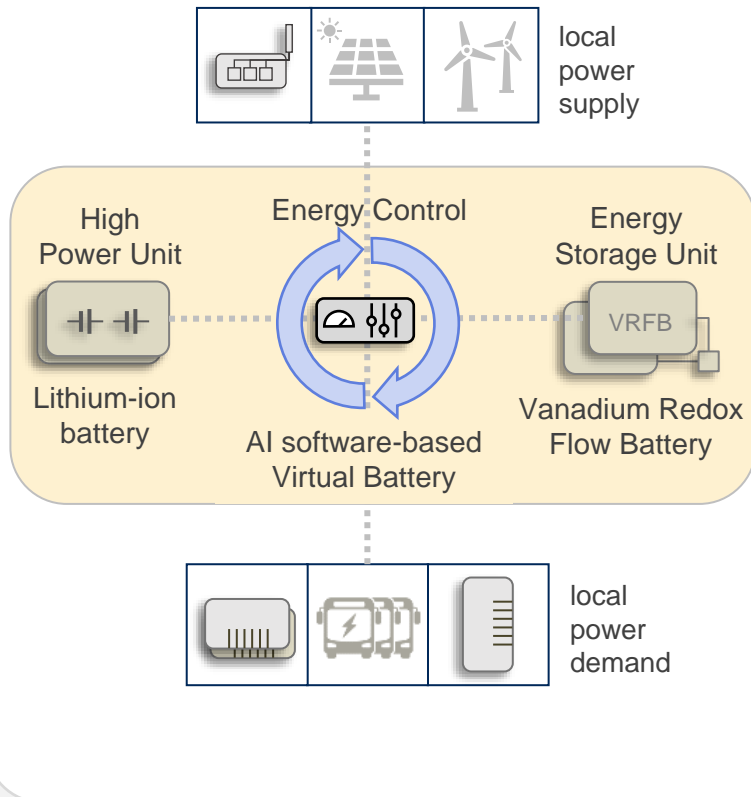
# LIVA Power Management Systems



Project IPS7000,  
location: AMG Graphite,  
Hauzenberg, Germany

# LIVA APPROACH: CONCEPT OF A HYBRID BATTERY

## LIVA Hybrid Energy Storage System



### Large scale energy storage systems:

Managing the fluctuating power demand and power supply, integrating and shifting unsteady renewable energies (solar & wind)

### Technical approach:

- ▶ High power unit (Li-ion battery)
- ▶ Energy storage unit (Vanadium Redox Flow battery)
- ▶ Software solution with artificial intelligence (AI)
- ▶ Control system for multiple energy assets including power production, hydrogen, and process heat and cooling

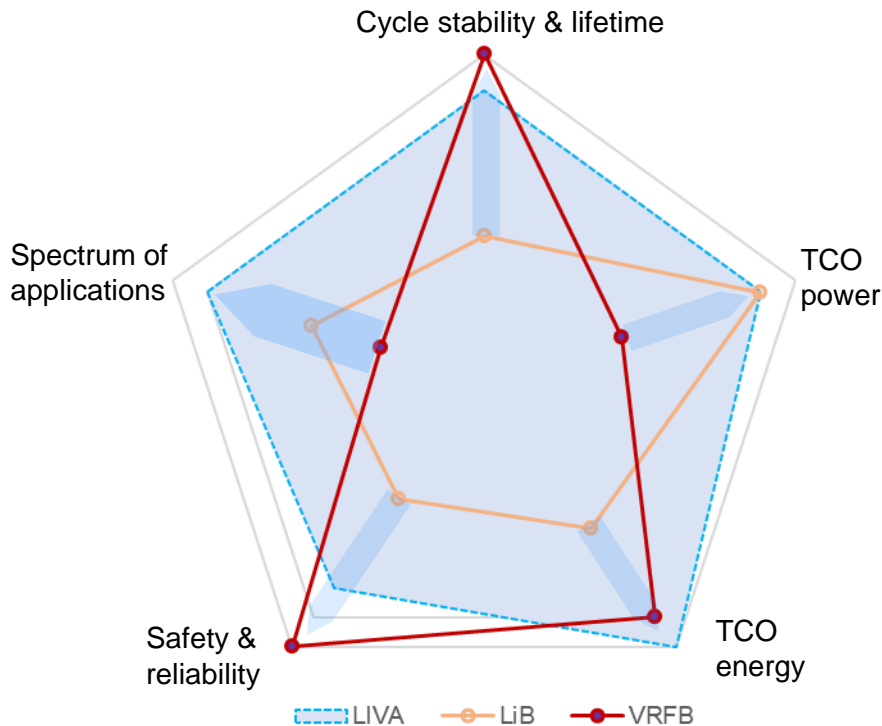
### Environmentally friendly battery:

- ▶ Low CO<sub>2</sub> footprint of the energy storage system
- ▶ Green mining strategy
- ▶ No problematic raw materials
- ▶ Fully closed recycling

# TECHNICAL ADVANTAGE & BENEFITS OF A HYBRID ENERGY STORAGE SYSTEM ('HESS')

LIVA's battery technology approach: use respective KPI advantages (key performance indicators)

## Performance profile virtual HESS

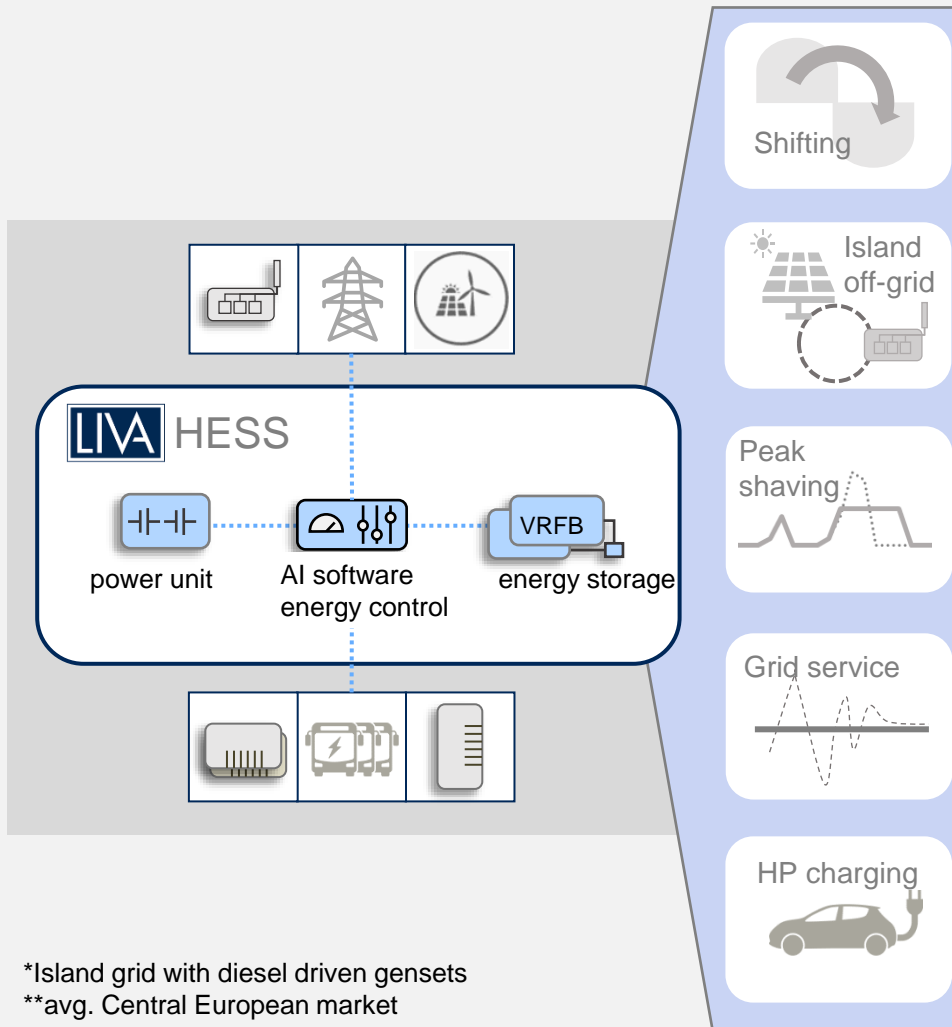


## Advantage & Benefits

- ▶ Broad Range of industrial and grid scale applications
- ▶ Optimal use of the KPI's
- ▶ Increased overall system efficiency to power supply and energy storage
- ▶ Improved safety & increased reliability (availability >99,9%)
- ▶ Long lifetime of the batteries: 15-20 years, +20,000 cycles
- ▶ Lowest Total Cost of Ownership/ Levelized Cost of Storage (LCOS)
- ▶ Custom tailored system with flexible up-grade capabilities for power and energy
- ▶ Low CO<sub>2</sub> footprint at life-cycle



# APPLICATIONS LIVA HYBRID ENERGY STORAGE SYSTEMS



## Energy applications

- *Prosumer*. Optimized self consumption and self-sufficiency with solar & wind
- Efficient off-grid & island solutions
- Reducing CO<sub>2</sub> emission up to -80% vs. Diesel gensets. Reduce electricity costs up to -55%\*

## Power applications

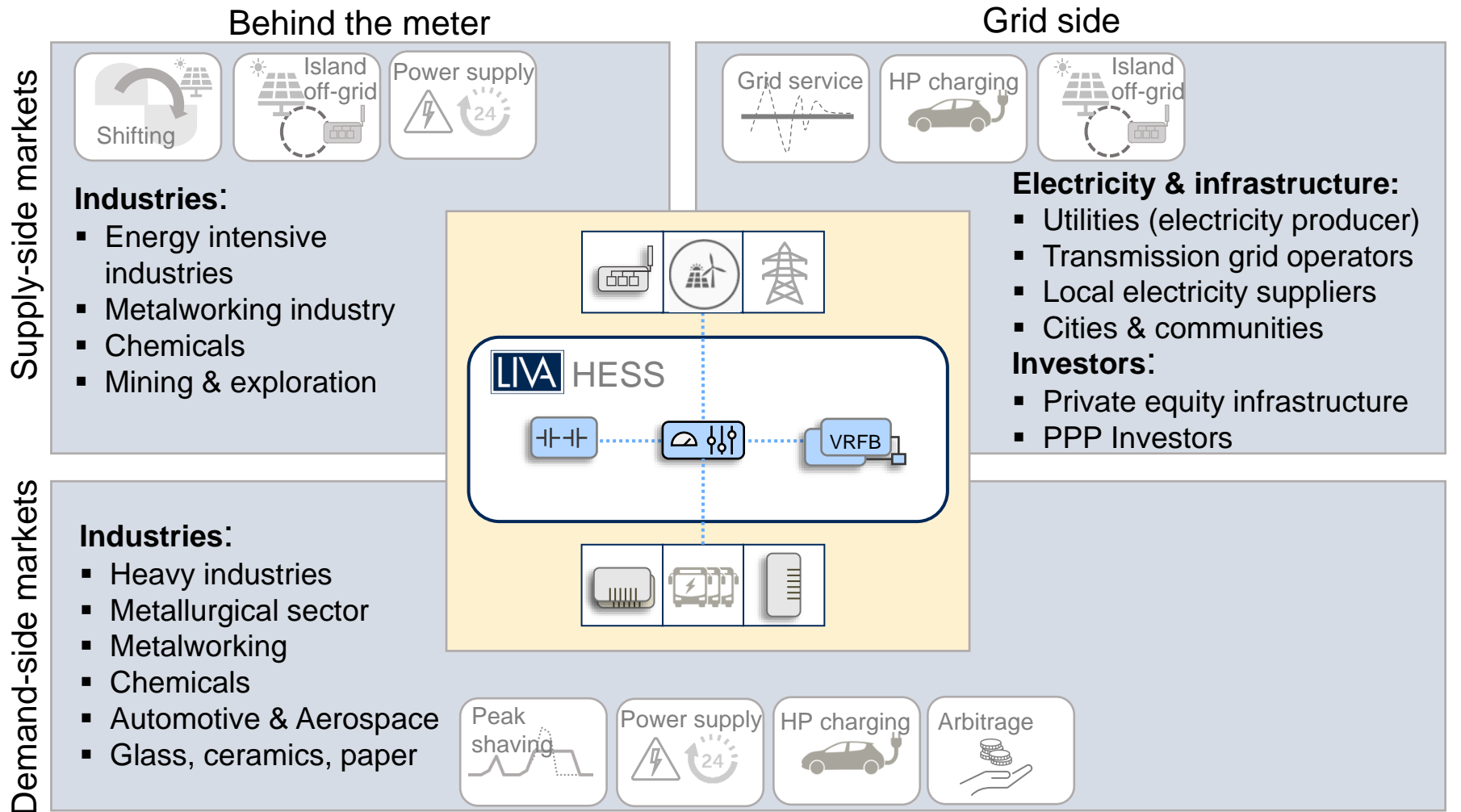
- Reduce power peaks (peak shaving) and power grid cost up to -80%\*\*
- Grid stabilization & power quality improvement: frequency containment reserve, grid peak load management
- Emergency/uninterrupted power supply with black starting capabilities

## New applications

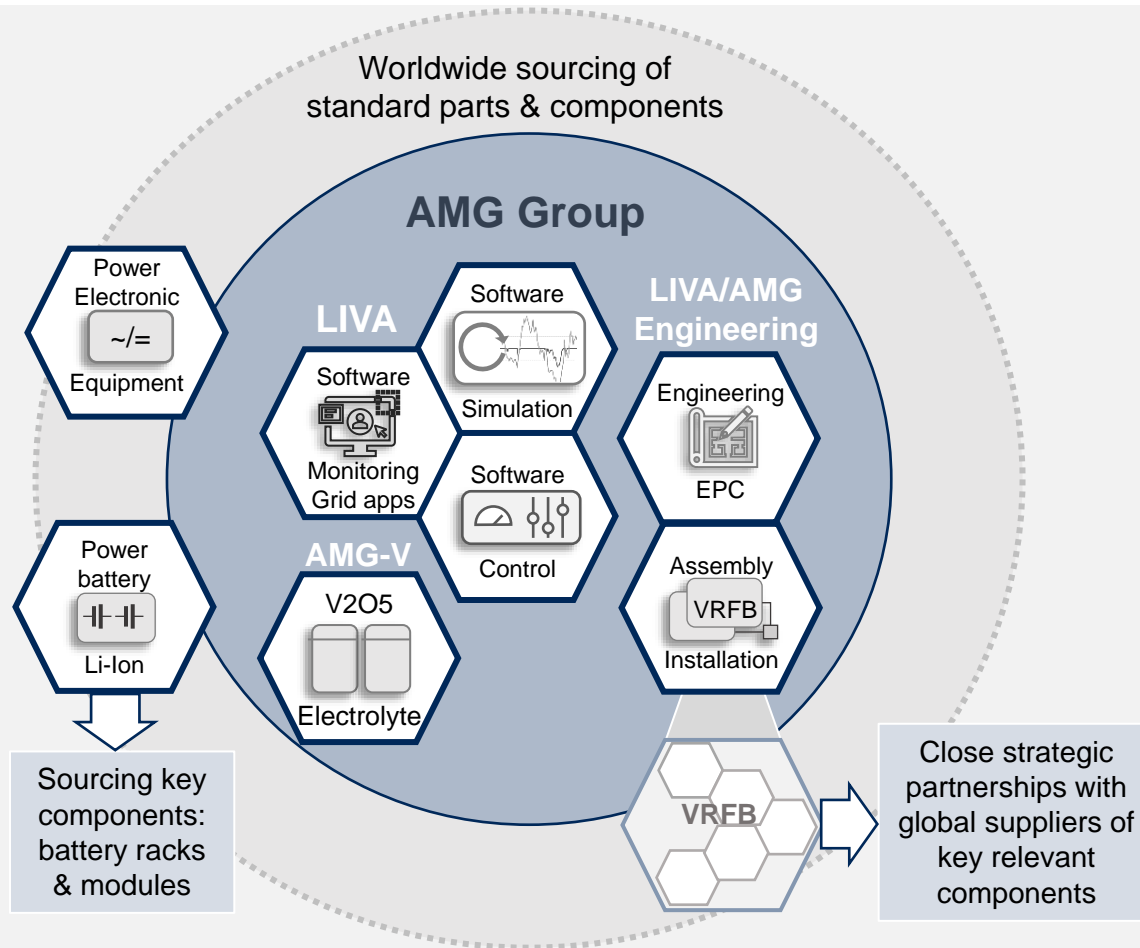
- Electric vehicle infrastructure: Integrate renewable energies & high-power charging
- Opportunity charging & discharging: Arbitrage spot market of electricity

\*Island grid with diesel driven gensets  
 \*\*avg. Central European market

# MARKET OF THE APPLICATIONS



# VALUE CHAIN: INTEGRATION WITH AMG ACCELERATES LIVA'S GROWTH



## LIVA delivers a customized, turnkey facility

- Full-service engineering, procurement and construction (“EPC”) of a Hybrid Energy Storage System (“HESS”)
- Automated operations and energy balancing with self-learning algorithms
- Remote monitoring with analytics and monthly reporting
- Utilizing AMG Engineering to accelerate our EPC offering
- Backward integrated to vanadium electrolyte production in Nuremberg

*Power Management as a Service*



# LIVA IS PLANNING A RAPID EXPANSION OF HYBRID ENERGY STORAGE SYSTEMS (“HESS”)

## 1. AMG Graphite Hauzenberg, Germany

### Current Use:

- Peak Shaving
- Emergency Power

### Future Expansion:

- Solar Energy Integration
- Grid Service

Size 3,5 MWh

## 2. Wipotec Kaiserslautern, Germany

### Planned Uses

- Renewable Integration:

- Solar
- Wind
- Geothermal

- Energy Shifting
- Peak Shaving
- Grid Service

Size: 4 MWh

## 3. AMG Titanium Nuremberg, Germany

## 4. AMG Chrome Rotherham, UK

## 5. AMG Vanadium Cambridge, Ohio

### Planned Uses

- Peak Shaving
- Solar Integration / Energy shifting
- Grid Services
- Emergency Power

Total size: 15 MWh

## 6. Large Scale Industrial Customer (Electro Steel)

### Planned Uses

- Integrated Energy Management
- Replace diesel generators
- Peak Shaving
- Grid Service
- Renewable Integration

Lithium-ion Battery:  
28 MWh

Vanadium Redox Flow  
Battery: 80 MWh

# THANK YOU!

Li-ion High power  
battery racks

Power electronics  
DC-DC converters  
DC-AC inverters

Vanadium  
Catholyte & Anolyte

Modular 16-stack  
cabinet units

## Hybrid Energy Storage System (HESS)

- 1.5-Level design, underground tank system with passive & active thermal management
- VRFB energy storage: 3.75 MWh (385 kW power)
- Li-ion-battery (BESS): 0,35 MWh (1.0 MW power)





LITHIUM LAB



LITHIUM HYDROXIDE – BITTERFELD, GERMANY



LIVA BATTERY



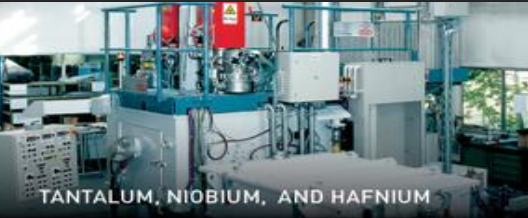
LI PROCESSING, AMG BRAZIL



TITANIUM



PLUTONIUM



TANTALUM, NIOBIUM, AND HAFNIUM



VANADIUM, MOLYBDENUM AND NICKEL – CAMBRIDGE, OHIO



VANADIUM, MOLYBDENUM AND NICKEL – ZANESVILLE, OHIO



LITHIUM TAILINGS



ENGINEERING – HANAU, GERMANY



MELTSHOP – ZANESVILLE, OHIO



V<sub>2</sub>O<sub>5</sub>

This announcement appears as a matter of record.



AMG's LAW:

“Everything that can be recycled will be recycled.”

AMG ADVANCED METALLURGICAL GROUP N.V.  
amg-nv.com