



Low Emission Technologies

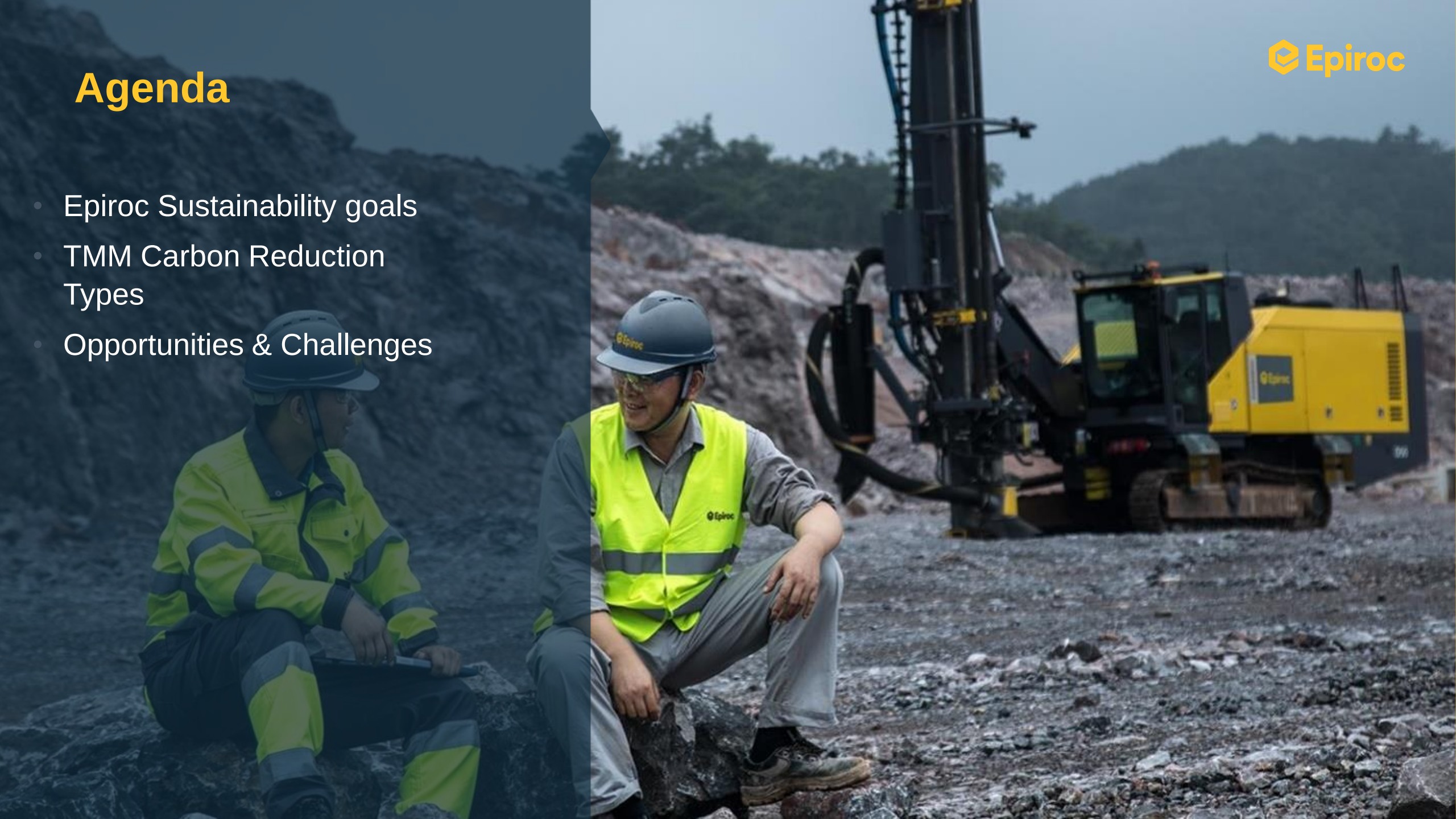
SAIMM, 16 October 2027

Kishore Jeebodh, Business Line Manager: Electrification



Agenda

- Epiroc Sustainability goals
- TMM Carbon Reduction Types
- Opportunities & Challenges



Epiroc 2030 goals for people and planet



Activities and roadmaps are in place, and we are making good progress



Low Emissions Options

TMM & Supporting Infrastructure



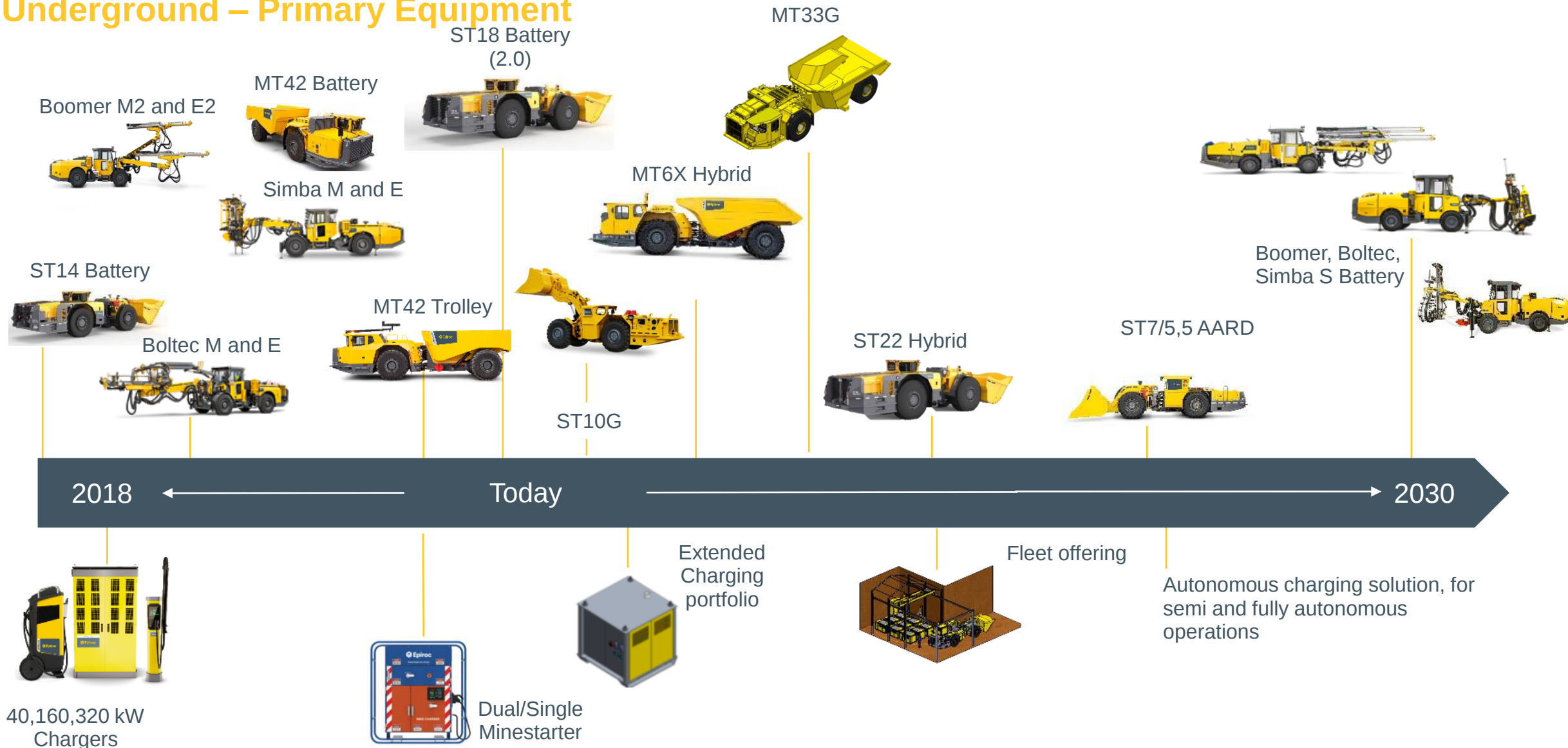
Electrification Roadmap



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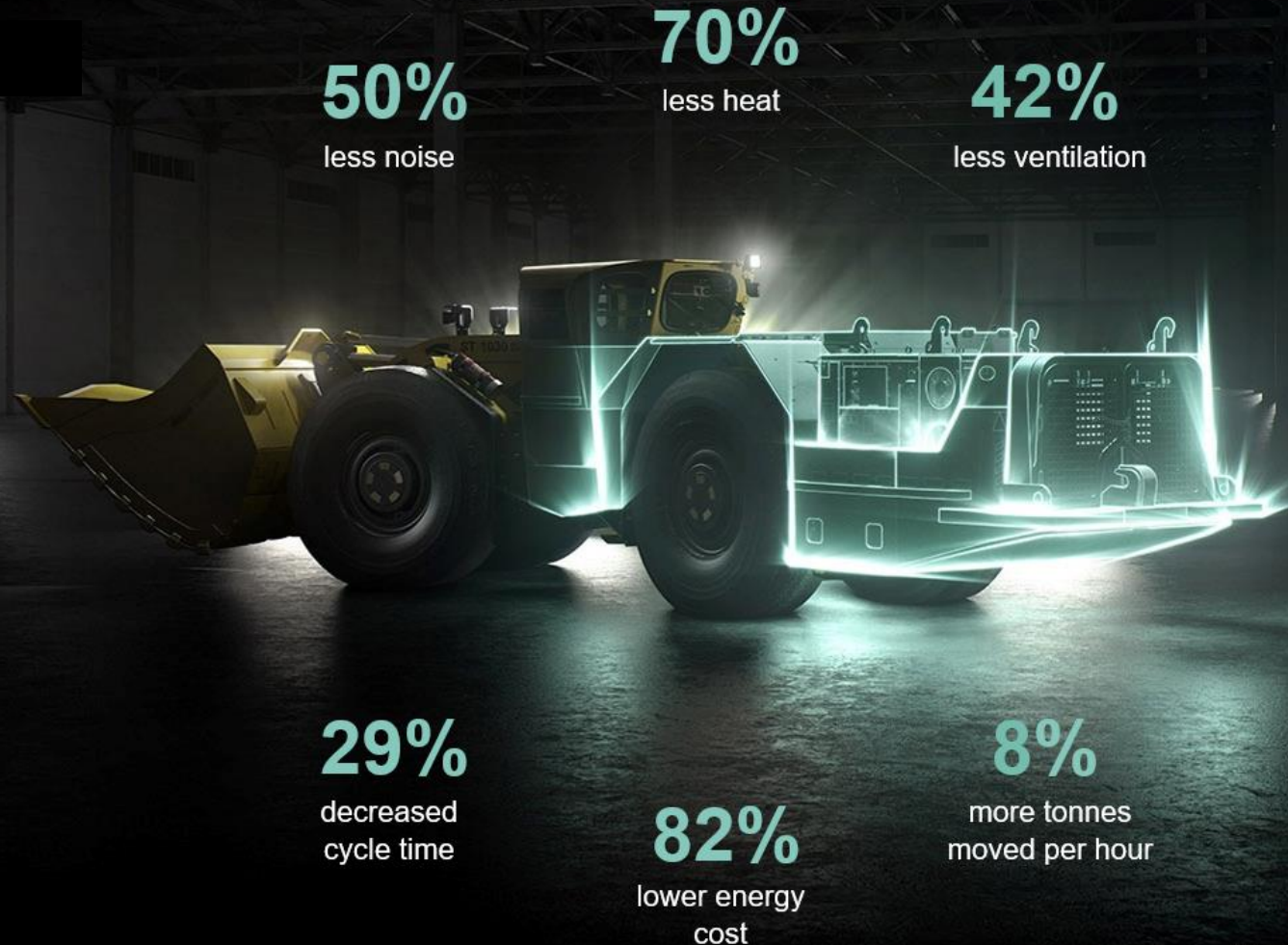


Underground – Primary Equipment



Battery Electric Vehicles (BEV)

- Protecting people from toxic gases, noise and heat
- **Higher productivity**
- Eliminating or reducing CO₂e emissions
- Reducing energy consumption (ventilation is a large part of operational expenses)
- Avoiding costly capex investments in ventilation
- Lower maintenance cost
- Adhering to new legislation, rules and standards





- All the benefits of BEV
- Solution for brown fields operation with aging fleets
- Reuse and/or modification of major components
- Some common components with ICE e.g. Axles, Cabin, Load Frame etc.



Hybrid Vehicles



-15%

Fuel Consumption

+11%

Speed

- Mechanical Drivetrain replaced with wheel motors
- Reduced maintenance on drivetrain
- No additional infrastructure or range anxiety
- Increased installed power
- Better control of engine power delivery
- Steer & Brake by wire

Trolley BEV

- Based on existing MT42 SG Platform
- Trolley easily retrofittable to battery pack
- Reduce battery for 0 gradient haulage, ie. Reduce OPEX
- Charging on trolley
- Regeneration capabilities
- Overall CO2 reduction, Scope 1 (100%), Scope 2 dependant on source

+ 126
Tonnes / shift

+ 50%
Speed up ramp

+ 23%
Productivity

-90%
Drivetrain
Maintenance

-25%
LCC compared to
diesel

-80%
Heat

-100%
DPM



Low Emission Fleet Comparison



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	Hybrid	BEV/Conversion	BEV-Trolley
CAPEX	Higher than ICE	Higher than ICE Battery CAPEX	Higher than ICE Battery CAPEX
OPEX	-15% Fuel Consumption	Battery OPEX	Battery OPEX
LCC	Reduced drivetrain maintenance	- 25 to 30%	- 20 to 25%
Infrastructure Requirements	None	Electrical, Swopping	Electrical, Trolley
Range Anxiety	None	5 Hours	None
Performance	+11%	+11%	+11%
*Emission Reduction	-15% Reduction	100% Reduction	100% Reduction

*Scope 1 CO2 Reduction

Challenges & Opportunities

Technology Maturity, Infrastructure, Change Management, Technical Support



Electrification Challenges & Opportunities



Electrification Challenges & Opportunities



Generations/Source
effects on scope 2
emissions
Supply/Grid
constraints
Companies investing
in alternative sources

Electrification Challenges & Opportunities



Reticulation constraints within brownfields operations

Offset ventilations demands with charging demands

Electrification Challenges & Opportunities



Technology Maturity
Range Anxiety
Charging Delays & Rates
Insufficient volumes for 2nd life BESS

Electrification Challenges & Opportunities



Higher CAPEX
Lower OPEX
Lower hydrocarbon
consumption
Improved
productivity &
efficiency

Electrification Challenges & Opportunities



Deficiency in skills to support Low Emissions equipment
Different skills profile to current UG Mechanised Mining workforce

Electrification Challenges & Opportunities



Opportunities for
addressing/optimising
energy usage
2nd/3rd life opportunities
within circular
economy
Recycling capabilities
in region

What does the future hold?

Expectations in the upcoming years



Future Expectations

Mobile Mining Equipment

- Higher Energy density Batteries
- Reduction in battery costs
- Longer Battery Autonomy, Faster Charging Times (MCS)
- Increased Battery Life
- Battery Chemistry Safety
- Elimination of Battery Swopping and Infrastructure
- Autonomous Charging



Future Expectations

Infrastructure

- Higher demand for green energy to aid reduction of Scope 2 Emissions
- More focus on Energy Management and Optimisation, through load balancing, BESS etc.
- Reduces ventilation requirements
- Increased focus on infrastructure planning to support TMM Electrification

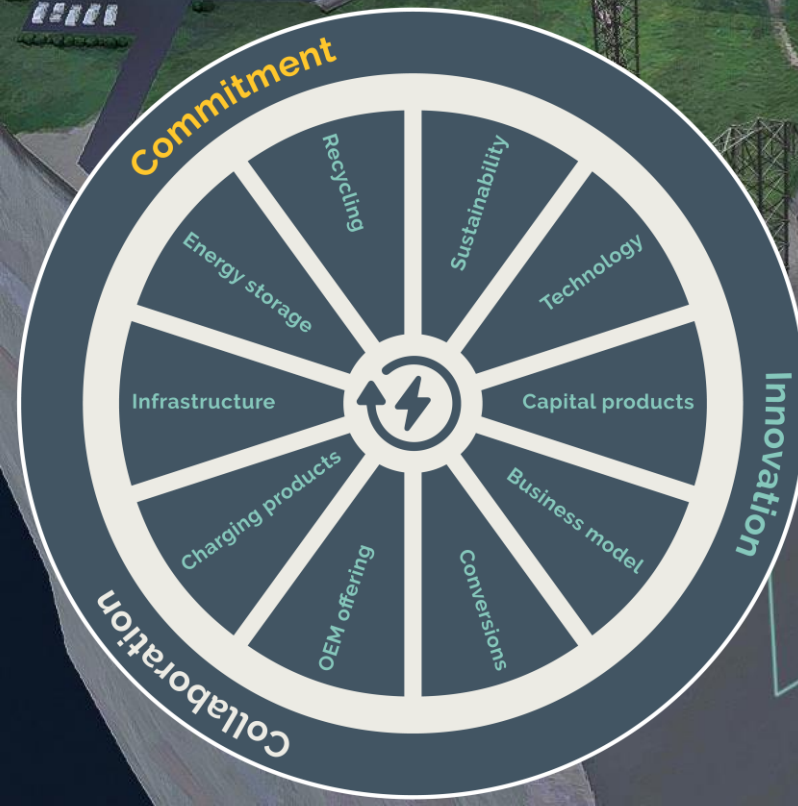
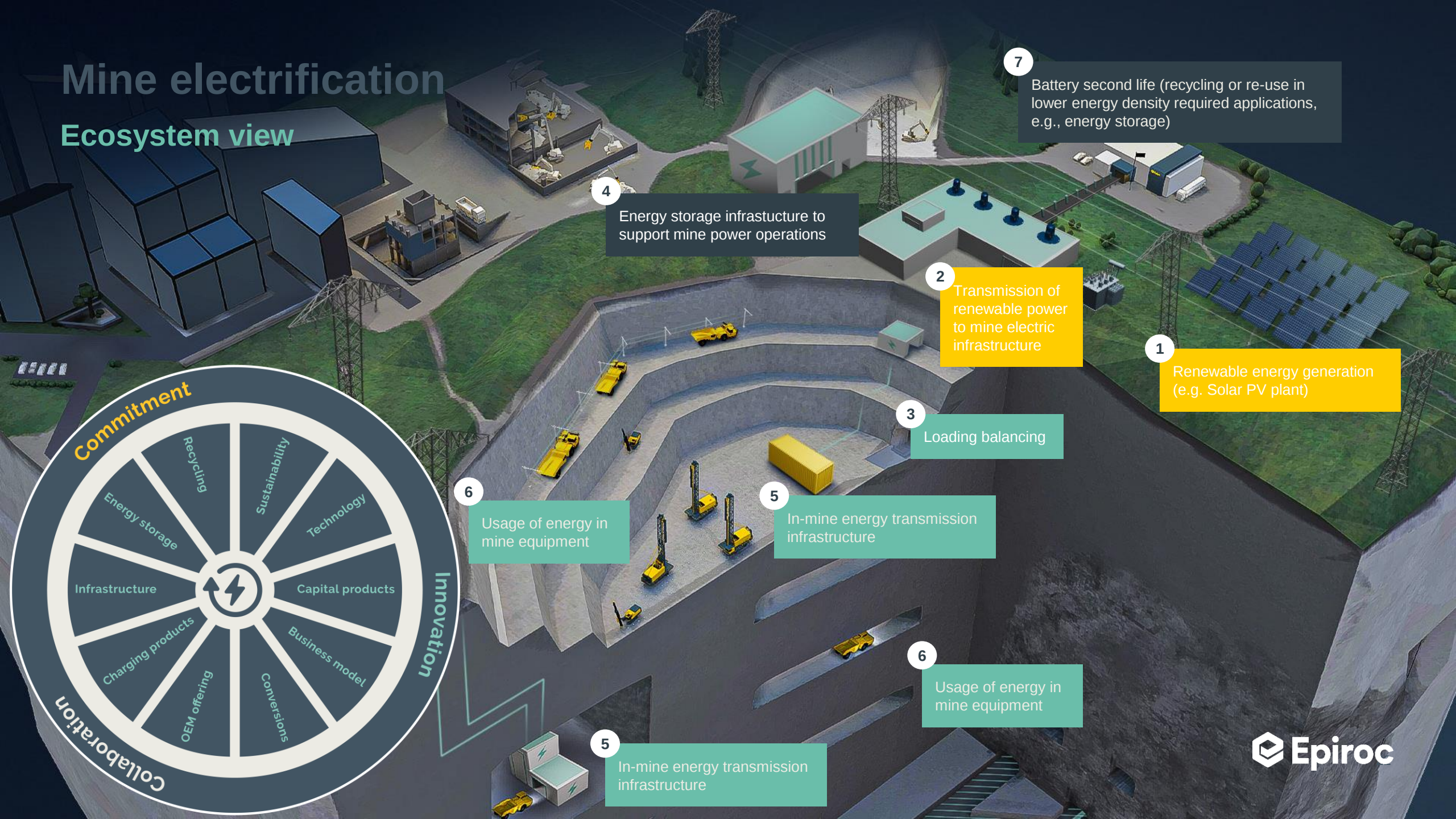


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Mine electrification

Ecosystem view



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