



**Today most people believe
that battery powered
equipment will replace
diesel equipment at some
point in the future**



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How did we get here?

**A Brief History
of Battery Powered
Mining Equipment**



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Five Years Ago

- **There were a few prototypes in hard rock mines that were not successful**
- **No hard rock production systems were available**
- **No evidence that battery power was viable**

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Today

- **Over four years of experience in real world production environments**
- **Over 100,000 real production hours**
- **Over four years of enhancements that have created a mature and stable system**
- **Customers that have used the equipment for years and are investing in more.**
- **New tenders from major mining companies now include a request for battery powered alternatives.**

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What is currently being proven?

Battery power...

- is reliable
- reduces capital expenditures
- reduces operational expenses
- is more productive
- better for worker health and satisfaction



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Five Years from Now

The Year 2020


- All tenders will request only zero emission equipment
- Diesel will no longer be an option in new equipment
- A few diesel engines will remain underground, but will be phased out
- Cost per ounce will be lower industry wide, mine company financial health will have improved




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The Tipping Point



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**So how do you begin your
company's transformation?**



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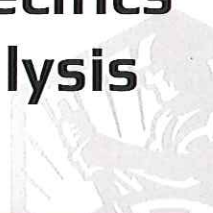
**So how do you begin your
company's transformation?
Get Informed.**



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**Get Informed...
Start a discussion that
includes your mine specifics
and create a cost analysis**



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Proving the Savings

- **We have models that can help your development team and partners quantify the benefits based on the specifics of each project**
- **We will help you produce reports and presentations for internal review and for public market analysts**
- **We have operational and financial models for each type of deployment**
 - **New development**
 - **Mine expansion**
 - **Fleet conversion**

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Transforming the Mine Plan

- **Reduction in capital costs**
 - **Less ventilation**
 - **Less cooling**
 - **Less electricity generation for off-grid sites**
- **Operational cost savings related to reduced electricity, less diesel, and lower maintenance**
- **Less ventilation infrastructure means faster development of adjacent ore bodies**
- **Lower operational cost translates to lower cost per ounce**

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Recommendations

- **Focus on high CFM equipment first
(LHDs and trucks change ventilation use dramatically)**
- **Rent battery packs
(treat them like fuel)**
- **Carry loads down hill wherever possible
(results in less charging and longer duty cycles)**
- **High electricity costs translate to higher savings with
battery equipment**
- **Include both new equipment and re-manufactured
equipment in your fleet conversion plan**


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Operational Readiness

- **Staff training for operators, technicians,
and management**
- **Service facility plans, electrical grid
design, data acquisition and reporting**
- **Service equipment, Maintenance
procedures**
- **Spare parts inventory and management**

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The Human Factor



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Thank You



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