ENERGY AND MINES WORLD CONGRESS

TORONTO, DEC 2-4 2019

Affordable, reliable, low-carbon power for mines

INCLUDING DECARBONIZING MATERIAL MOVEMENT TOWARDS ZERO EMISSIONS MINE FLEETS

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CEO
Gold Fields

Omar Thorpe
Senior Manager, Energy Systems
Rio Tinto IOC

Maarten Van Koppen
Manager, Energy & Sustainability
Newmont

Alexandre Belleau
General Manager, Projects & Innovation
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HEAR FROM 80+ SENIOR LEADERS FROM MINING, RENEWABLES, ENERGY AND FINANCE INCLUDING:

Patrick Marshall
Vice President of Product Management
MacLean Engineering

Mats Eriksson
President, Product Area Load & Haul
Sandvik

Sabrina Harbec
Sourcing Leader Procurement
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Guilherme Rodrigues
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Stephen Potter
Director of Metallics - Head of Power-Shift
Vale

Andrew Wilson
Energy Management Coordinator
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Ron Bose
Energy Lead – Onaping Area Mines
Glencore

Robin Manley
Vice President of Nuclear Regulatory Affairs and Stakeholder Relations
Ontario Power Generation (OPG)

Thomas Hillig
Managing Director
THEnergy

Geoffrey Ejzenberg
Chief Client Officer
ETF Mining Trucks

https://worldcongress.energyandmines.com
Why Mines Attend Energy and Mines:
“We are using already some renewable power and are considering installing more renewable power generation at some of our mine sites.”
Why Mines Attend Energy and Mines:
As Group Manager for Procurement, I’m responsible for the Electricity supply contracts for our operations. We are very keen to develop a mix of power supply options, including renewables either via offtake agreements or direct investment.”

PARTICIPATING MINES INCLUDE:
Why Mines Attend Energy and Mines:
“We are starting a greenfield mining project and require approximately 10MW of off-grid power for underground mining and ore processing.”

NEW FOR 2019

1. New, ground-breaking high-penetration renewables case studies from global mines
2. A 3-day agenda with increased meeting opportunities
3. Formalized mining and energy speed-networking
4. Towards 100% renewables and zero-carbon mining
5. New developments in hydrogen, LNG, and small modular reactors for mines
6. Variable mining - placing renewables at the centre of new mine design
7. Full-day on decarbonizing material movement – towards zero-emissions mine fleets
8. New technologies pavillion and pitch sessions
9. Mines and VIP networking dinner
10. Larger exhibition and networking spaces

https://worldcongress.energyandmines.com
Why Mines Attend Energy and Mines:
“...I am responsible for the transition of our mining operations from being fossil fuel reliant to low-emission technology.”

ATTENDEE BREAKDOWN 2018

- 30% Mining executives
- 34% Renewable energy developers
- 15% Infrastructure and engineering
- 9% Finance and legal
- 5% Government and NGOs
- 7% Other

SUPPORTING ORGANISATIONS

- Association minière du Québec
- AHK
- The Mining Association of Canada
- NWT & Nunavut Chamber of Mines
- INTERNATIONAL MINING
- MINING Magazine
- Resource World Magazine
- Sussex
- THEnergy
- CII
- Canada Mining Innovation Council
- ENERGY STORAGE CANADA
- Ontario Mining Association
- r4mining.com
- Renewables Now
- Centre for Excellence in Mining Innovation
- Ontario Energy Association
- Women in Mining CANADA
- MINING Review
- H2GO CANADA
We work collaboratively with our sponsors to create a marketing, lead generation and thought-leadership solution that meets their objectives in this growing market. Whether it is through one of our packages, or a bespoke solution, we will ensure you meet your company’s objectives. Our agenda is expertly created through hours of primary research with your key target audience to make sure the most timely and pressing issues are addressed at the event. We work with our sponsors to make sure their products and services are presented within the agenda and Summit in an engaging and informative way.

WHY SPONSOR THE SUMMIT?

For more information contact:
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Diesel consumption from heavy haulage vehicles contributes around 30-50% of the global mining sector’s total energy use, according to the Rocky Mountain Institute (RMI), representing a high portion of mining’s carbon footprint and operational costs. In order to meet carbon and energy targets, mines are looking to completely replace or retrofit diesel-powered fleets and equipment with low-carbon, cost-efficient options.

Decarbonizing Material Movement - Towards Zero Emissions Mine Fleets will showcase the mines, OEMS, and technology experts at the forefront of the transition to zero-carbon trucks and underground mining equipment. Through cutting edge case studies and panel discussions, this event will provide critical insight on the timelines, economics, technology options and next steps for realizing zero-emissions mine fleets. Key topics to be covered include:

- Pathways and solutions to drive down emissions from mine trucks and equipment
- Insight from OEMS on the challenges and next steps for decarbonizing mine fleets
- In-depth case studies on all-electric mining, trolley assist, hydrogen and automation
- Key developments in hydrogen for heavy-duty fleets
- Powering 100% electrified mine sites with renewables
- Challenges and next steps for autonomous, electrified vehicles
This workshop provides energy professionals with a comprehensive understanding of the mining industry. Participants will learn about the fundamentals of the operational practices pivotal to the mining industry. Participants will be taught essential terminology and be provided with a clear understanding of the key concepts involved. Mining professionals will also benefit from having a broader understanding of the mine energy issues and how these relate to larger changes across the energy landscape.

WORKSHOP OUTCOMES

This course is essential for energy professionals currently involved, or who would like to be involved, in energy for mining projects. The workshop has been enjoyed by a cross-section of professionals involved in energy and mining. At the completion of this course participants will be able to:

- Appreciate the significance of energy in the mining industry (grid-tied & off grid)
- Understand frequently used terminology
- Describe the use of energy for open pit and underground mining methods
- Understand the principles of mine design, planning, operation and closure
- Understand the impact of energy on social (CSR) and environmental considerations
- Understand the production chain of mining from processing to extractive metallurgy, from pit to port
- International network development with other professionals and former attendees of the 8 previous workshops
## Agenda at a Glance

### December 1
- **The Mining Lifecycle**
  - Keynote: Nick Holland, CEO, Gold Fields
  - Developing a Roadmap for Low-Carbon Mining
  - New Technologies Pitch Session

- **Minerals Processing**
  - International Case Studies: New Milestones in Renewables for Mine
  - Energy Challenges and Options for New and Existing Operations

- **Energy Uses in Mining**
  - Zero-Carbon Mining - Drivers, Milestones and Challenges
  - Mining and Energy Speed-Networking

- **Mining CSR and Renewables**
  - Variable Mining - Placing Energy at the Center of Mine Design
  - Networking Drinks

### December 2
- **The Mining Lifecycle**
  - Keynote: Nick Holland, CEO, Gold Fields
  - Mining Corporate Power Purchase Agreements (PPAs)
  - New Technologies Pitch Session

- **Minerals Processing**
  - Alternative Fuels, Displacing Diesel for Remote Mines
  - Hydro Power for Mines

- **Energy Uses in Mining**
  - Renewables for African Mining Operations
  - Small Modular Reactors for Remote Mines

- **Mining CSR and Renewables**
  - Decarbonizing Mining with Green Hydrogen
  - Networking Drinks

### December 3
- **The Mining Lifecycle**
  - Keynote: Nick Holland, CEO, Gold Fields
  - Decarbonizing Mine Fleets - Key Drivers and Next Steps
  - How do we get to Zero-Carbon Fleets?
  - Powering 100% Electrified Mine Sites with Renewables

- **Minerals Processing**
  - Alternative Fuels, Displacing Diesel for Remote Mines
  - Addressing Mining’s Demand for Decarbonized Fleets
  - Decarbonizing Material Movement - International Case Studies

- **Energy Uses in Mining**
  - Renewables for African Mining Operations
  - Developments in Renewable Hydrogen for Heavy-Duty Fleets
  - Economics and Business Fundamentals of Zero-Carbon Mine Fleets

- **Mining CSR and Renewables**
  - Decarbonizing Mining with Green Hydrogen
  - Autonomous, All-Electric Fleets - Challenges and Next Steps

### December 4
- **The Mining Lifecycle**
  - Keynote: Nick Holland, CEO, Gold Fields
  - Decarbonizing Mine Fleets - Key Drivers and Next Steps
  - How do we get to Zero-Carbon Fleets?
  - Powering 100% Electrified Mine Sites with Renewables

- **Minerals Processing**
  - Alternative Fuels, Displacing Diesel for Remote Mines
  - Addressing Mining’s Demand for Decarbonized Fleets
  - Decarbonizing Material Movement - International Case Studies

- **Energy Uses in Mining**
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  - Autonomous, All-Electric Fleets - Challenges and Next Steps

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## AGENDA DAY 1: DECEMBER 2, 2019

### 7:30 Coffee & Registration

### 7:55 Chair’s Opening Remarks

### 8:00 Keynote: How can We Energize the Mine of the Future?
- **Re-Energizing and Decarbonizing Our Mines**
  - **Nick Holland**, CEO, **Gold Fields**

### 8:20 Keynote Panel: Developing a Roadmap for Low-Carbon Mining

**Session Leader:**

| What are the key drivers behind current energy and climate change goals? |
| What areas of the business represent the greatest challenge in terms of realizing energy and climate plans? |
| What pathways and solutions are being considered at strategic and operational levels to realize affordable, reliable and low-carbon energy for operations? |
| What targets are mines setting for existing operations and greenfield sites in terms of the ideal percentage of renewable energy? |
| What technologies and strategies need to be in place to support the business case for high-penetration renewables? |
| Which energy milestone will be realized first - fully-electric mines, decarbonized fleets or 100% renewable energy-powered operations? |
| What would mines like to see from mining and energy suppliers to support the transition to sustainable power solutions? |

**Chair:** **Tyson Dyck**, Partner, **Torys**  
**Benjamin Little**, Senior Vice President, Corporate Affairs, **IAMGOLD**  
**Johnny Key**, Director, Energy & Power Solutions, **Freeport-McMoRan**  
**Maarten Van Koppen**, Manager, Energy & Sustainability, **Newmont Goldcorp**  
**Dennis Stansbury**, Senior Vice President of Engineering and Project Evaluations, **B2Gold**

### 9:00 Interactive Q&A with Audience

### 9:10 Networking Break & New Technologies Pitch Session

Taking place in the New Technologies Pavilion, attendees will have the opportunity to hear brief 3-minute elevator pitches from exhibitors on how their solution meets the carbon and energy goals of the global mining sector.

**Barista Services Sponsored By:**

### 9:50 Case Study: Reaching New Milestones with Off-Grid Solar and Storage

**B2Gold** is implementing one of the largest off-grid solar hybrid plants to power its mine in Mali.

- Details on this landmark off-grid hybrid which includes 30 MW of solar and battery storage
- Next steps for the Fekola Solar Plant and current expectations for fuel and operating cost savings
- Understanding how this hybrid plant fits with broader energy and climate goals

**Dennis Stansbury**, Senior Vice President of Engineering and Project Evaluations, **B2Gold**

### 10:10 Exploring New Options for Low-Carbon Energy and Technologies Across Sites

- Updates on Newmont Goldcorp’s climate and energy goals across North American operations
- Key considerations for investing in further renewables integration for remote and grid-tied sites

**Maarten Van Koppen**, Manager, Energy & Sustainability, **Newmont Goldcorp**

[https://worldcongress.energyandmines.com](https://worldcongress.energyandmines.com)
10:30 Mine-Site Integration Case Study: Enabling Technologies and Operational Lessons
Key updates on enabling technologies facilitating the integration of renewables for mine sites
- Lessons learned from operational projects and next steps for optimizing mine energy systems
- High-penetration renewables and zero-carbon mine sites; powering fleet electrification
Amiram Roth-Deblon, Head of Global Business Initiatives, juwi Renewable Energies

10:50 Powering a Major Underground Expansion with Wind: Next Steps’ for Voisey’s Bay
- Details on the lengthy analysis for integrating wind to offset diesel for this underground expansion which significantly increases operational load requirements
- Insight on the key factors influencing the project cost-curve and determining the lowest cost per MW/hour solution
- Timeline and next steps for wind at Voisey’s Bay
Guilherme Rodrigues, Energy Analyst, Vale

11:10 Interactive Q&A with Audience

11:20 Energy Challenges and Options for New and Existing Operations
- Insight on the current energy mix and challenges for mining operators
- What types of solutions are mines currently considering to reduce fuel consumption - or control electricity costs?
- What role do carbon reduction goals play in analyzing energy solutions?
- What are the main factors supporting the economics for renewables and/or storage integration?

12:00 Interactive Q&A with Audience

12:10 Supporting Cleantech Opportunities with Global Mines
Stephanie Berlet, Director, Cleantech, Infrastructure & Climate Finance, Canadian Trade Commissioner Service

12:15 Networking Lunch

1:10 The World’s First Carbon Neutral Open-Pit Mine
- Current technologies under consideration and potential challenges in reaching carbon neutrality
- Initiating a task force to turn conventional mining into all-electric applications
- Next steps in realizing a carbon-neutral footprint for Matawinie
David Francis Lyon, Director of Electrification and Automation, Nouveau Monde Graphite (NMG)
CLIMATE AND ENERGY CASE STUDY

1:30 Case Study: The Implications of a Decarbonization Roadmap on Power Generation
- Exploring technological and strategic options to decarbonizing a surface mine
- The role of fleet electrification in meeting carbon targets
- Electrification transforming power generation: the role of renewables in meeting new load requirements

Chris Adachi, Manager of Sustainability and Climate Change, Teck Resources

1:50 Panel: Zero-Carbon Mining - Drivers, Milestones and Challenges
- What are the main drivers behind ambitious carbon reduction goals?
- How do mining leaders define “carbon-neutral mining”?
- What areas of the business represent the biggest carbon risk and the greatest challenge in terms of realizing reductions?
- What percentage of emissions come from electricity and diesel-use and how is this driving energy strategy?
- What technologies and strategies are expected to play key roles in driving down emissions for mines?
- How is the increased focus on decarbonisation changing the business case for renewable energy?

Chair: Catharine Farrow, Director, Franco-Nevada
Donald Bubar, President and CEO, Avalon Advanced Materials
Chris Angeconeb, President and CEO, Aurcrest Gold
Chris Adachi, Manager of Sustainability and Climate Change, Teck Resources
Andrew Wilson, Energy Management Coordinator, Detour Gold
Eric Strom, Head of Strategic Studies, Newcrest Mining

2:30 Interactive Q&A with Audience

2:40 Networking Break and Mining and Energy Speed-Networking

This extended break will include a formalized, one-hour speed-networking session allowing mining and energy participants the opportunity to connect in a series of brief one-on-one information exchanges. Participation is limited to mining attendees, premium delegates and event sponsors.

Barista Services Sponsored By:

4:00 Reshaping Power to Meet Mining’s Goals - Towards 100% Renewable Energy Mining
- Critical insight on deployable, modular power solutions for remote mining operations
- Understanding the expandability, remote operation, and renewables integration options
- Moving to 100% renewable energy-powered mine sites - insights from global case studies

Risto Paldanius, Business Development Director, Energy Storage and Integration, Wärtsilä
4:20 Variable Mining - Placing Energy at the Center of Mine Design
- How is the adoption of renewables changing the way mines plan new operations?
- How is the concept of variable mining - i.e. mining when the renewables resource is available - gaining traction for greenfield sites?
- What are the challenges and benefits of designing a mine to be powered largely by renewables?
- How does moving to high penetration renewables change capex requirements and opex savings over the life of mine - do the economics make sense?
- What changes to mine design processes are being considered for new operations to follow a renewable energy load profile?
- What new technologies and strategies are expected to play a role in realizing variable mining energy systems?
- Can mines achieve the same production rate when moving to variable mining?

Chair: Michel Carreau, Director Hybrid Power and Microgrid, Hatch

5:00 Interactive Q&A with Audience

5:10-6:10 Networking Drinks

7:00-9:00 Mines and VIPs Dinner
The VIP Dinner provides key sponsors, premium delegates and mining operators more quality time to connect during a relaxed and informal evening.
AGENDA DAY 2: DECEMBER 3, 2019

9:25 Chair’s Remarks

9:30 Decarbonization in Mining and Opportunities for Non-Competitive Collaboration
   Stephen Potter, Director of Metallics - Head of PowerShift, Vale

9:50 Mining Corporate Power Purchase Agreements (PPAs)
   Session Leader:
   Total en

- What are the key drivers behind mining corporate power PPAs for renewable energy - and which key mining centres hold the best opportunities for these deals?
- From a mining operator’s perspective, what are the financial criteria that need to support a PPA agreement with a third party for renewable energy?
- From an independent power producer viewpoint, what needs to be in place to de-risk a PPA for a mining client?
- How do lenders view the risks of these deals vs. other types of industrial PPAs and offtake agreements?
- How do mining operators and IPPs view the life-of-mine challenge when structuring a PPA?
- Mining and finance experts views on the ideal length of a PPA in order to create value for both mine operators and developers
- What are some examples of recent mining corporate PPAs that have adapted to fit with the business models of mining customers?
- Behind the meter vs. through the grid: What are the pros and cons for mines and developers?
   Clément Faure, Head of Business Development - Mining & Hybrids, Total Eren
   Greg McNab, Partner, Baker McKenzie

10:30 Interactive Q&A with Audience

10:40 Networking Break & New Technologies Pitch Session
   Taking place in the New Technologies Pavilion, attendees will have the opportunity to hear brief 3-minute elevator pitches from exhibitors on how their solution meets the carbon and energy goals of the global mining sector.

Barista Services Sponsored By:

11:20 The Role of Alternative Fuels in Displacing Diesel for Remote Mines
   Session Leader:
   energir

- What are the current and short-term energy economics for remote mines?
- What strategies and solutions are mines considering for fuel displacement?
- What types of alternative fuels are being assessed to reduce diesel reliance?
- What are the main considerations in analyzing alternative fuel options - supply chain challenges, transport, safety etc.?
- How do the economics of alternative fuels compare to diesel pricing and logistical costs?
- What are the potential challenges and costs associated with fuel switching?
- How can fuel-switching fit with renewables integration to achieve further emissions savings?
   Chair: Guillaume Brossard, Director, Development & LNG, Énergir
   Martin Boucher, Vice President, Environment, Health, Safety and Sustainable Development, Stornoway Diamond Corporation
   Sabrina Harbec, Sourcing Leader Procurement, ArcelorMittal
   Alexandre Belleau, General Manager Projects & Innovation, Quebec Iron Ore
12:00 Interactive Q&A with Audience

12:10 Hydro Power for Mines - A New Initiative with South American Mining Operators
- Details on SmartH2OEnergy - a German Government-led initiative to support hydro for mines
- Analyzing the diesel-savings of small-scale hydro in combination with other renewables
- Next steps for the initial pilot project with a Peruvian mine
  Thomas Hillig, Managing Director, THEnergy

12:30 Networking Lunch

NEW TECHNOLOGY: SMALL MODULAR REACTORS

1:30 Small Modular Reactors for Remote Mines: Strategic Developments and Challenges
- What are the latest developments in SMRs for mines - design options, test sites, safety standards etc.?
- What are the key benefits this technology can offer mining operators as a diesel replacement?
- What are the main challenges that need to be overcome before the technology can be commercialized and how are these being addressed?
- What is the most likely business model for SMRs for mines and how does the compare to other remote energy options?
- What are some of the key considerations for individual mine sites when trying to determine the applicability of this SMRs?
- Can SMRs work as a back-up system for renewable energy hybrids for mines - what are the key technical and commercial considerations for integrating the technologies?
- What test sites or projects are most relevant to mining operators in terms of demonstrating the viability and operating results of small nuclear reactors?

2:00 Interactive Q&A with Audience

2:20 Hydrogen for Mines: Strategic and Technological Innovations
- Insight on the latest developments in hydrogen applications in mining energy
- Key benefits and challenges in integrating hydrogen into mine power systems
- Next steps in deploying hydrogen technologies in mining

2:40 Implementing Hydrogen for Mines and Building a Regulatory Framework
- Next steps for implementing a hydrogen roadmap and the implications for mining operators
- Key considerations around (the economics) safety and performance of hydrogen for mines
- Details on general integration of hydrogen-powered haulage trucks
  Marc Bétournay, Principal Research Scientist, Natural Resources Canada

3:00 Networking Break

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Panel: Decarbonizing Mining with Green Hydrogen
- Understanding key hydrogen market developments and the likely impacts for the resource sector
- What are the latest regulatory and safety standards developments for hydrogen applications?
- How do the current economics for hydrogen applications for mines compare to other decarbonization options?
- What types of collaboration opportunities exist for mines to partner on hydrogen projects?
- What are the best near-term opportunities for mines to integrate this technology?
- What are the key barriers to integrating this technology into mining’s power systems and fleets?
- What are the advantages and disadvantages for mines of being first-to-market with hydrogen?
- Which test sites and initiatives provide the most insight for mines on the technology’s potential?
- When is hydrogen for mining power systems and fleets expected to be viable for large-scale deployment?

Ryan Sookhoo, Director, Business Development, Hydrogenics
Daljit Bawa, Business Development Manager, Ballard Power Systems
Michel Epiney, Business Development Specialist M&E, Air Liquide
Marc Bétournay, Principal Research Scientist, Natural Resources Canada

Interactive Q&A with Audience
Networking Drinks Reception
**AGENDA DAY 3: DECEMBER 4, 2019**

8:55  Chair’s Opening Remarks

9:00  Keynote: Decarbonizing Mine Fleets - Key Drivers and Next Steps

Tony Makuch, President and CEO, Kirkland Lake Gold

**MINING OPERATORS ROUNDTABLE**

9:20  Mining Leaders Roundtable - How do we get to Zero-Carbon Fleets?

- What are the key drivers for considering alternatives to diesel-powered trucks and equipment?
- What solutions are currently being explored - or deployed - to reduce or replace diesel-use?
- How do the capex requirements of different solutions compare to diesel-powered trucks and equipment - and are they economic today?
- Where does existing technology have the most impact in terms of carbon and cost savings?
- Retrofitting vs all-electric replacements - what are the key considerations for mining operators?
- Which disruptive technologies will likely be the most effective in terms of completely replacing diesel - and when are they expected to reach commercialization?
- What are the benefits and drawbacks of being an early mover in transitioning to low-carbon surface and underground vehicles?
- When do the big investments in decarbonized trucks and equipment need to be made in order to reach current carbon and energy targets?

Chair: Trang Tran-Valade, Founding President, SHYFTinc
David Francis Lyon, Director of Electrification and Automation, Nouveau Monde Graphite (NMG)
Ron Bose, Energy Lead – Onaping Area Mines, Glencore
Fred Stanford, President and CEO, Torex Gold
Tony Makuch, President and CEO, Kirkland Lake Gold

10:00  Interactive Q&A with Audience

10:10  Networking Break

Barista Services Sponsored By:

**ALL-ELECTRIC MINE CASE STUDY**

10:40  All-Electric Case Study: Operating a Battery-Powered Fleet

Maarten Van Koppen, Manager, Energy & Sustainability, Newmont Goldcorp

11:00  Collaborating on Decarbonizing Material Movement

- Updates on the International Council of Mining and Metals (ICMM)’s Innovation for Cleaner Safer Vehicles programme involving mining leaders and suppliers
- The pathway to greenhouse gas emissions-free surface mining vehicles by 2040: current challenges and next steps
11:20	Addressing Mining’s Demand for Decarbonized Fleets

- What pathways and technologies are OEMs assessing to get to zero GHG-emitting vehicles?
- What are the main technical and commercial challenges with moving to zero-emissions fleets?
- What feedback have suppliers had from mining customers on different low-carbon solutions?
- What are some of the considerations for individual mine sites when trying to determine the right decarbonization pathway - i.e. location, mining method, operational design, power infrastructure, timing of developments, fleet management etc.?
- What signals are suppliers looking for from mining customers that will enable further R&D and investment in zero-carbon trucks?

- What are some of the best options for mines looking for flexible solutions to drive down their emissions but not go fully electric?
- How can autonomous technology enable zero-mining fleets - what are the advantages and potential hurdles for adding automation?

Chair: Jennifer Prospero, Manager, Sustainability Sherritt International Corporation
Mats Eriksson, President, Load and Haul Division, Sandvik
Ron Crawford, Director, Product Management, Komatsu America
Patrick Marshall, Vice President of Product Management, Maclean Engineering
Travis Battley, Business Line Manager - Underground Rock Excavation, Epiroc

1:10 The Economics and Business Fundamentals of Zero-Carbon Mine Fleets

- How do the economics of different fleet decarbonization options compare today?
- Which applications and technologies provide the highest value in terms of return on investment?
- What is required to get these technologies down to the cost level that it needs to be for mines?
- What types of applications and projects will enable commercialization?
- What are the current projections in terms of commercialization for different zero-carbon solutions?
- What role are different government finance bodies playing in enabling zero-carbon fleets?
- What are the most viable routes to financing zero-carbon mine fleets today?

Theo Yameogo, EY Canadian Mining & Metals Co-Leader, EY
Bappa Banerjee, General Manager, Mining Equipment, GE Transportation, a Wabtec Company
Norbert Becker, Vice President - Mining, Excavation & Transport, Siemens
Thomas Kirk, Manager, Rocky Mountain Institute

1:50 Interactive Q&A with Audience

2:00 Case Study: Operating Results from the World’s First “Emission-Free” Quarry

- Lessons learned from this landmark test site using fully electric, autonomous machines
- Integrating new machine and fleet control and real-time management systems
- Initial results in terms of carbon emissions, energy and operator cost savings

David Nus, Global Key Accounts Management, Volvo Construction Equipment
AGENDA DAY 3: DECEMBER 4, 2019

AUTONOMOUS ALL-ELECTRIC FLEETS

2:20  Autonomous, All-Electric Fleets: Challenges & Next Steps
- What additional benefits does automation bring to electric trucks in terms of energy and climate goals?
- What are some of the challenges of fully-electrified, autonomous mine fleets - and how are these being addressed by OEMs and technology experts?
- What are the emerging and current automation technologies for mining fleets - and what will their impact be as they’re integrated into the mining process?
- What lessons can be learned from mines and OEMs currently testing autonomous, all-electric trucks and equipment?
- What are the human capital implications of automation and how can mines build adaptive workforces?
- What is important to consider when looking to move to electrification and autonomation for a site and what are the risks of adoption and non-adoption?
- What is the current expectation for widespread adoption of autonomous, electric vehicles for mines?

Geoffrey Ejzenberg, Chief Client Officer, ETF Mining Trucks
David Nus, Global Key Accounts Management, Volvo Construction Equipment

3:00  Interactive Q&A with Audience

3:10  Chair’s Closing Remarks
ATTEND AS A DELEGATE

Premium Delegate Place

- Access to 3 days of the conference, December 2-4 including all the listed sessions lunches breaks and receptions. The ticket also includes access to all the presentations and videos after the event
- Speed Networking – Takes the traditional value of face-to-face networking and combines it with predictive matching software that allows attendees to pre-select the types of people they’re interested in meeting. The Speed Networking Session takes place on the first morning of the conference
- Mines and VIPs Dinner – Taking place on the evening of December 2nd this event will provide an informal opportunity to network and mingle with fellow delegates and speakers in a relaxed environment. All mines, sponsors and premium delegate ticket holders are invited to attend.

Basic Delegate Place

- Access to 3 days of the conference, December 2-4 including all the listed sessions lunches breaks and receptions. The ticket also includes access to all the presentations and videos after the event

Workshop - An essential introduction to mining for energy professionals

- To be held on Sunday, December 1st, this is a full-day workshop including lunch, breaks and a digital set of the materials. The workshop equips energy professionals with exactly the right information to enable them to effectively engage with the mining community.

Mine Pass

- We have a number of complimentary passes to mine energy decision-makers. To understand the terms and apply visit https://worldcongress.energyandmines.com/mine-pass/

Discounts, promotional codes, multiple bookings

We offer discounts for colleagues and customers of our speaking and supporting organisations. We also offer discounts to academic, government and non-profit organisations. Multiple bookings from the same organisation (3 or more) qualify for discounts too.

For details of these discounts and codes contact olivia.mendoza@energyandmines.com
Tel: +1 315 750 4278

DELEGATE FEE SCHEDULE

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<tr>
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<th>Early Bird Until Nov 1</th>
<th>Event After Nov 1</th>
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<td>Premium</td>
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