CANMETMINING -TRANSFORMATIVE TECHNOLOGIES AND SPECIALIZED SERVICES DIVISION

CanmetMINING 5 year Research Plan (2016-2021) Where are we now that we've reached the mid-point? What is needed to reach our goals? What is planned for the future?

Kristie Tarr December 2018

Enhancing Productivity



Replacing Diesel





Improving Energy Efficiency



Where are we now that we've reached the mid-point?



- 1. Successful demonstration of high performance synthetic cables for mine hoisting (including NDT method)
- 2. Evaluation of innovative mining equipment (MINRAIL/ SAMS)
- 3. Developing tool for optimizing production schedules based on ventilation constraints



What is needed to reach our goals?



Transformative technologies for improving productivity in mining

• Development of tools for optimizing production schedules

Enhancing

- Application of transformative technologies for mine automation
- Application of AI techniques for enhanced mineral resource extraction productivity



What is planned for the future?

Enhancing Productivity





- Demonstration of optimized production schedule tools
- Organize and deliver (jointly with GMG) a workshop at CIM 2019 "Automation in mining – one element of the digital mine of the future"
- Collaboration with SOSCIP and PEB on a proposal to assess opportunities to improve efficiency of the regulatory and permitting process for mining by using emerging technologies, such as AI techniques

Enhancing Productivity



Replacing Diesel





Improving Energy Efficiency



Where are we now that we've reached the mid-point?

REPLACING DIESEL POWER IN UNDERGROUND MINES



- Chairing CSA mining standards review committee
- Showcasing alternative energy technology
- Identifying opportunities for enhancing H&S and GHG abatement
- Chairing HMII steering committee
- Analyzing technologies for battery/electric powered mining vehicles
- Developing tools for analyzing the impacts of the introduction of alternative energy technologies



What is needed to reach our goals?

REPLACING DIESEL POWER IN UNDERGROUND MINES



Trolley-Electric Power Distribution

Battery-Electric Technologies

- Impacts of the introduction of alternative energy technologies
- Taking a hard look at the electrification of mining

Fuel Cell-Electric Technologies

• Hydrogen fuel cell-electric power as an alternative energy solution



What is planned for the future?





- Status report on readiness and implementation trends
- Engage through seminars, continue collaboration with CMIC, GMG

ENERGY AND MINES CONGRESS DECEMBER 1, 2018 Today we publish issue 6 of the Energy and Mines Magazine. Our main feature focuses on ...

1. Hydrogen in Mines: the missing piece of the power puzzle

Today we publish issue 6 of the Energy and Mines Magazine. Our main feature focuses on the uses and potential of Hydrogen in the mining industry.

As solar panels and wind turbines become more commonplace on mines, hydrogen is poised to become the most talked about clean energy solution of the next decade.

The article features interviews and insight from mines and hydrogen experts from North America, South Africa and Australia.

Download the magazine now.

Newsletter of the International Energy Agency Click here to view in your browser



CO2 emissions keep rising

The stark news that we're bringing with us to the global climate conference this week is that **carbon emissions from advanced economies are set to rise in 2018** for first time in five years. This is particularly worrisome for global efforts to meet the Paris Agreement.

"Our data shows that despite the strong growth in solar PV and wind, emissions have started to rise again in advanced economies, highlighting the need for deploying all technologies and energy efficiency," said Dr Fatih Birol, the IEA's Executive Director. "This turnaround should be another warning to governments as they meet in Katowice this week. Increasing efforts are needed to encourage even more renewables, greater energy efficiency, more nuclear, and more innovation for technologies such as carbon capture, utilisation and storage and hydrogen, for instance."

Enhancing Productivity



Replacing Diesel





Improving Energy Efficiency



Where are we now that we've reached the mid-point?

- Developed a method for testing inflatable bolts in shear
- In collaboration with NRC, assisted with technical feasibility studies of the NRC RBS (Rock Bolt Sensor) technology in the laboratory
- In collaboration with NRC, completed underground demonstration trials of the NRC RBS (Rock Bolt Sensor)
- Development of a new sensor for measuring borehole closure in soft rock mines



Safer Access to Deep Underground Mines



What is needed to reach our goals?

- Standard methods available for shear testing of bolts and for mesh testing
- Assessment of the NRC RBS technology completed sensor validated in laboratory, and then field demonstrations
- New CMIN Borehole Closure Sensor proven and available for use





What is planned for the future?



- Continued development of improved ground support assessment methods
 - Standardized mesh testing method
 - Development of shear and dynamic testing of tensioned bolts
- Collaborative development of future ground sensors (with NRC)





Enhancing Productivity



Replacing Diesel





Improving Energy Efficiency



Where are we now that we've reached the mid-point?

- Energy benchmarking program launched
- Waste heat recovery study underway
- Development of projects in Big data and AI to improve energy efficiency

















Natural Resources Ressources naturelles Canada Canada

Welcome

This mining energy benchmarking program is made possible through a partnership between <u>MiTRAQ</u> and <u>Natural Resources Canada</u>.

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Efficiency

CanmetMINING 5 year Research Plan (2016-2021)

What is needed to reach our goals?

DATA-DRIVEN TECHNOLOGIES FOR IMPROVING ENERGY EFFICIENCY IN MINING

- Recruit participants for the Energy Benchmarking Tool
 - Platform promotion
- Determine meaningful KPI's for energy benchmarking – IESO Steering Committee
- Development of projects to utilize Big data and AI techniques to improve energy efficiency in mining

What is planned for the future?

- NSERC application in collaboration with MIRARCO and Laurentian University to the Pan-Canadian Framework on Clean Growth and Climate Change – to assess the risks and benefits of low-carbon heating and cooling technologies for the Canadian mining sector
- Development of collaborative projects to integrate emerging technologies in energy management practices for real-time decision making
 - Visualization
 - Predictive analytics
 - IoT







QUESTIONS?