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**Bradshaw Research Initiative for Minerals and Mining**

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## **UBC Research Initiative to Support Low Carbon Mining for the Green Economic Recovery**

The Bradshaw Research Initiative for Minerals and Mining (BRIMM) at the University of British Columbia has begun developing a new research program titled *Sustainable Mine Energy Systems*. This theme will be led by Dr. Ali Madiseh, Assistant Professor in the Norman B. Keevil Institute of Mining Engineering and Canada Research Chair in Advanced Mine Energy Systems at the University of British Columbia.

As climate change action puts pressure on global CO<sub>2</sub> emissions, the mining industry faces the urgent need to reduce its carbon footprint to remain industrially competitive and socially acceptable. The vast quantity of metals needed for cleantech industries that will lead Canada's economic recovery will require a massive expansion of mining operations. To sustain the electrification of the global economy, we will need as much copper over the next 30 years as has been produced in the entirety of human history. Currently, many mine sites rely heavily on fossil fuels for haulage, heating and operations, which impose a significant carbon footprint on their operation. Without decarbonization of the industry, the CO<sub>2</sub> footprint of mining will expand in line with industry growth

Decarbonization attempts have so far been based on renewable energy (i.e. wind or solar) sources. However, the uptake of renewables is constrained by the high cost and operational logistics of battery solutions. In most cases where renewables have been implemented, their contributions have stayed below 10% of the mine's total energy requirements. This theme will focus on the development, implementation, and integration of renewable energy at mine sites to increase the share of renewables and the ultimate goal of achieving full-decarbonization.

Four program objectives have been identified:

- 1) Evaluating the costs and CO<sub>2</sub> mitigation benefits of implementing renewables, hydrogen and carbon capture systems for future mines.
- 2) Understanding how renewable energy within an integrated energy system can be employed to best serve the specific energy needs of various mining operations by studying multi-stream energy solutions
- 3) Evaluating possibilities for hybridization and optimization of various energy solutions to achieve the most cost-effective and environmental scenarios.

- 4) Developing sensors and transparent carbon accounting systems (including those based on blockchain) to track the carbon footprints of operating mines so that stakeholders and consumers can make choices and exert influence on the transition to zero net carbon mining products.

Eventually, this research initiative will use UBC's decades of collective experience in clean energy, mining and systems engineering to reduce the carbon footprint of mines in collaboration with the mining industry.

BRIMM Director, Dr. John Steen, emphasized the importance of bringing UBC's clean energy expertise to the mining sector. "Unless the mining industry can decarbonize, the efforts to address climate change through EVs and batteries will be for nothing. We must figure out how to mine the metals for the 21<sup>st</sup>-century electric economy without producing more greenhouse gasses."

BRIMM is currently looking for collaboration partners and opportunities for the theme. Please contact the Program leader Dr. Ali Madiseh and BRIMM director, Dr. John Steen for further information at [info@brimm.ubc.ca](mailto:info@brimm.ubc.ca)