

# GREEN technologies that are changing the way we do business

BY ELIZABETH HAMES



## THE MAGIC OF ZEOLITE

It sounds like folklore: a stone that can suck harmful metals and chemicals from the soil while returning beneficial nutrients back to the Earth. But the only magical thing about zeolite is its ability to remain virtually unheard of—until now. Zeolite has been used to clean up radioactive soils in Fukushima, Japan, dissolve smog in B.C.'s Fraser Valley, and produce sweeter wines in the Okanagan Valley.

And now, Ray Paquette, CEO of B.C.-based Canadian Mining Company Inc., is trying to convince mining companies to leverage zeolite's unique detoxifying powers to clean up their mine sites. "As far as curing the planet of its ails, it's something that will help in a lot of different areas," he says. Treating effluent at mine sites with zeolite filters, for example, can transform millions of litres of liquid into a few tons of easily-controlled solid waste. Mixed with tailings, the porous stone can also help mitigate the potentially damaging effects of contaminants.

It's just one of the innovative approaches mineral exploration and mining companies are utilizing to do right by the planet and also by their investors. Both public pressure and cost pressures have long pushed the industry to operate more sustainably, and many of the advances made so far have been "modest, but still good things," says John Thompson, President of the Canadian Mining Innovation Council (CMIC). "The last piece of the puzzle is looking at new technologies that are really going to make a difference to the environment."



## HAULING WITH HYBRID ENERGY

Consider the sheer amount of rock that must be moved to extract a valuable mineral. Goldcorp's Musselwhite mine in northwestern Ontario, for example, processed 1.3 million tonnes of ore in 2012 to produce 240,000 ounces of gold, according to the company's website. Historically, diesel-hungry vehicles have been the only option for companies looking to haul large loads. But CanmetMINING (CMIN), a division of Natural Resources Canada, has partnered with Sudbury-based Mining Technologies International to develop a hybrid diesel-electric loader that could fulfill mining companies' hauling needs while being gentler on the environment.

All of the loader's parts are powered by electricity. The only function of the diesel engine, which runs at a high-efficiency "sweet spot", is to recharge the battery, explained Michel Grenier, a Senior Scientific Adviser with the division. CMIN says the loaders will cut noxious emissions by as much as 70 per cent, which in turn can reduce the demand on a mine's ventilation system by up to 40 per cent. A significant number considering that ventilation can account for more than a third of a mine's total electricity costs. Hybrid vehicles are only the beginning for CMIN, whose long-term goal is to have fully-electric mobile equipment underground.





### **NO NEED FOR HELICOPTERS**

When it comes to minimizing energy consumption, however, moving rock is only part of the battle. Minerals are not known for being conveniently located next to existing roads, and the Canadian landscape is littered with obstacles that even all-terrain vehicles have difficulty surmounting. So exploration and mining companies have traditionally been reliant on expensive and relatively fuel-inefficient helicopters to get workers and supplies to and from their sites.

But one Quebec company has developed an all-terrain vehicle that can power through mud, snow, bush and water with ease. "The Kaskoo goes over it no problem," says Jean-Paul Allaire, spokesperson for ALL Technologie Inc. "In 10 years from now we are not going to hear the word muskeg anymore." IOS Services Géoscientifiques Inc., one of Quebec's largest exploration firms, has been operating the prototype successfully for a year and has already reduced its use of helicopters.

## WARMING UP TO WIND POWER

Remoteness has an additional impact on energy use, as many of Canada's mine sites lie beyond the reach of the electrical grid, making them dependent on generators.

A large mine can consume millions of litres of diesel fuel every year in heating, lighting and pumping water from shafts. In 2007, Diavik Diamond Mine in the Northwest Territories began investigating ways of diversifying its power supply. A small-scale wind farm, managers estimated, could reduce the mine's dependency on diesel by five million litres annually.

Unfortunately, there was no wind turbine on the market that could operate in the mine's harsh climate. So the company turned to German manufacturer ENERCON to build a blade de-icing system that could withstand temperatures of  $-40^{\circ}\text{C}$ . "A new benchmark for this particular product," says Diavik spokesperson Doug Ashbury.

Since it started generating power in September 2012, the wind farm has survived one of the coldest winters on record and has saved Diavik more than \$1 million in fuel costs in only a few months, adds Ashbury. The company estimates that the \$32 million project will pay for itself within eight years.

"There's a cost aspect, and of course there's an environmental aspect too," says Ashbury. "We want to do our part to reduce our carbon footprint."



## SENSOR STEWARDSHIP THAT REDUCES WASTE

Energy efficiency is not the only path to a smaller environmental footprint. In fact, according to CMIC President John Thompson, the best change that mining companies can make is to produce fewer tailings by mining less material. "That would be the end game," he says.

Fortunately for miners, a Vancouver-based company has developed technology to allow them to do just that. MineSense's high-frequency electromagnetic sensor (HFEMS) technology measures the grade of ore in the ground, allowing miners to be pickier about what and how much ore they process and throw away. By adopting HFEMS, the company says, miners can reduce their production of waste by as much as 60 per cent, and energy usage by as much as 16 per cent, for an overall cost savings of between 15 and 30 per cent.

These numbers have already proven popular with major mining companies. "Early adopters of MineSense technologies include BHP, Xstrata and Vale, as well as a number of junior mining companies including Canadian Arrow Mines and Anfield Nickel," says Dr. Andrew Bamber, CEO of MineSense.

Although the industry has made great inroads so far, Thompson says exploration and mining companies will never stop pushing to become more efficient. "You're just going to see year on year people are always going to be squeezing, squeezing, squeezing to get it better, to do it better," says Thompson. "Both because that's good for business, but also because it's good for sustainability." **c**

Elizabeth Hames is a Vancouver-based freelance journalist and a consulting writer with Hassard Fay.

A low-angle, upward-looking photograph of a wind turbine tower. The tower is painted a light yellow-green color and has a conical shape. At the top, the nacelle and parts of three white blades are visible against a clear blue sky. In the lower-left foreground, a worker wearing a yellow high-visibility safety vest, dark pants, and a hard hat with a headlamp is standing on a metal platform with a railing. The worker is looking towards the right side of the frame. The overall scene is brightly lit, suggesting a sunny day.

*A small-scale  
wind farm,  
managers  
estimated,  
could reduce  
the mine's  
dependency  
on diesel by*  
**5 MILLION**  
*litres annually*