Hydrogen Fuel Cells

From the (Under) Ground Up

Natural Resources Canada (NRCan) and Hydrogen Fuel Cell Technology in Underground Mining

When William Grove, a Welsh physicist and inventor, came up with the idea of the hydrogen fuel cell in 1838, no one, least of all him, could have imagined that it would have taken until now to find practical applications for the concept.

Today, Natural Resources Canada and its partners in the Fuelcell Propulsion Institute (FPI) are working on some seven projects aimed at bringing fuel cells to underground mining operations. They include: a mine locomotive; a test of underground environments on fuel-cell stacks; an underground loader; and other key initiatives aimed at demonstrating the safe and economic use of fuel-cell technology in underground mines.

The FPI is a North American-wide consortium of mining companies; mining equipment manufacturers, fuel cell technology developers, a variety of provincial government observers (health and safety inspectors, and trade unions), and other interested stakeholders (universities and agricultural cooperatives). NRCan and the U.S. Department of Energy are co-sponsors of FPI projects. NRCan is also a champion of innovation and advanced technology in the mining industry.

The more obvious benefits of the technology for underground operations, include:

- pollution-free exhaust (contributing to improved worker health and safety, and the elimination of greenhouse gas emissions, particularly CO_2);
- lower electrical costs (savings of both operating and installation costs for heating, cooling and ventilation);
- greatly reduced maintenance (both cost and time for vehicles and mechanical services);

- industry- and world-leading high-tech underground mine operations (with the increasing probability of "distance" or remote drilling, blasting, ore extraction and transportation, and the possibility of extended or reopened mine operations); and

- potentially improved investor returns (attracting investment back to underground mining, R&D investment, related consulting and support services, and equipment design and manufacture).

For Canada, these benefits only serve to reinforce our leadership in mining technology, establishing our claim on the fuel-cell technology niche market. They also guarantee that we will benefit first from the technology. These benefits will provide Canadian mining companies, laboratories (both public and private) and equipment manufacturers with the science and technology, the proven equipment, including the hydrogen production and delivery systems, and the skill and experience to remain leaders in mining technology. Altogether, this ensures Canada's capacity in knowledge and technology transfer internationally, while contributing to an improved public attitude to mining worldwide.

Dr. Marc Bétournay, a scientist and project leader with NRCan's CANMET-Mining and Mineral Sciences Laboratories, reported that the FPI estimates that parts of underground fleets (loaders, trucks and service vehicles) will have been successfully retrofitted with fuel-cell technology by 2005. "My personal dream for mining," he offers, "is to enable equipment to operate 24/7, without compressed air and costly and polluting equipment, with everything operated by expert people on the surface. That is the mine of the future."

For information regarding hydrogen fuel-cell applications in the mining industry, contact:

Dr. Marc Bétournay
C ANMET-Mining and Mineral Science Laboratories
Natural Resources Canada
Bells Corners Complex
Ottawa, Ontario
K1A 0G1

Telephone: (613) 995-1147
Email: mbetourn@NRCan.gc.ca