EPRI | ELECTRIC POWER RESEARCH INSTITUTE

Electric Underground Mining Equipment

Electricity currently powers a significant share of the heavy equipment used in underground mining. Continuous miner and longwall systems that remove coal and other minerals, and roof bolters that secure the overhead rock are line-powered. Many types of moveable equipment and vehicles that still rely on diesel can also be line-powered or use batteries, and opportunities for further electrification abound.

"Electric technologies can contribute to increased efficiency and safety, and reduced operating costs for today's mining operations."
— Toby Steele, Founder, APEX Chargers, LLC

Underground mines use specialized heavy equipment and vehicles to move materials and people underground.

Shuttle cars, ram cars, haulers, and scoops move heavy loads—10 to 20 tons—of mined materials short distances underground. Vehicles may be electric-powered by reel-mounted cable or battery, or diesel-fueled. The operating voltage of battery ram cars and scoops is typically 128 VDC. New-generation 4-wheel drive vehicles, one with two 50–85 kW variable frequency drive AC traction motors and 240 V battery, promise greater torque, speed, regenerative braking, reduced maintenance, and twice the battery life of conventional DC-powered equipment.

Typical Input Demand: 130–230 kW
Typical Daily Energy Usage: 864–1,138 kWh

Some mines use dedicated vehicles called **mantrips** to transport up to 18 people to, from, and within the mine. Other mines use high ground-clearance pickup trucks and Humvee-like transporters. Vehicles must be able to traverse rough, muddy, sometimes slick terrain, and a grade as steep as 18%. Mantrips can be diesel- or battery-powered. Battery-powered vehicles typically operate at a range of 48 VDC for 2- to 4-person carriers to 128 VDC for 14- to 16-person carriers.

Typical Input Demand: 39 kW
Typical Daily Energy Usage: 366 kWh

Some operations use **locomotives** on rails to haul people, equipment, and materials at the mine. Electric locomotives can replace diesel locomotives in many applications. Electricity is delivered by trolley lines at 300 or 600 VDC or by batteries that operate at 120 VDC, or in combination. Typical electric locomotives are powered by one or two electric motors. Battery size ranges from 660 Ah for locomotives that move people to 1,750 Ah for those that move materials.

Typical Input Demand: 90–170 kW
Typical Daily Energy Usage: 306–1,080 kWh

Electric equipment enhances worker safety in underground mines. Its zero-emissions operation improves air quality. It runs quietly, aiding workers' ability to hear and speak—a necessity in the darkness where visual cues may be impossible. Industrial fans, also powered by electricity, circulate air and remove noxious or poisonous gases from underground mines.

Electric Underground Mining Equipment Manufacturers

Brand Name	Supplier	Contact Information
CAT	Caterpillar	www.mining.cat.com
GE Fairchild	GE Transportation/ Fairchild Intl.	www.getransportation.com
Joy	Joy Global	www.joymining.com
A.L. Lee	A.L. Lee Corp.	www.alleecorp.com
Phillips	Phillips Machine	www.phillipsmachine.com

Additional EPRI Resources

Available for download at www.epri.com/ET

Mining Electrification Potential and Benefits, 2009, ID# 1020278

This report describes the wide range of mining equipment used today and discusses potential for further electrification.

Commercial and Industrial Guide to Electric Transportation, 2015, ID# 3002004898

This 16-page color brochure introduces the electric vehicles and equipment that are currently in use or being demonstrated, and the opportunities for further electrification in commercial and industrial applications.

Contact Information

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