ICA’s members are developing innovative solutions to reduce carbon emissions and promote responsible practices.

**Freeport -McMoRan**
Increased ore recovery by optimizing mill controls to accommodate seven different identifiable ore types at their Bagdad, Ariz, site, increasing copper production by at least 15 percent.

**Boliden in Sweden**
Has implemented automation technology, such as advanced position technology and monitoring systems, to locate workers and equipment quickly, improving productivity. It has also installed on-demand ventilation systems, which can achieve up to 25 percent energy savings.

**BHP Billiton**
Is using blockchain technology to ensure a more efficient and effective supply chain. In partnership with copper fabricator Southwire, BHP delivered its first carbon neutral copper cathode in 2021.

**Rio Tinto**
Is using robotics for worker protection. A 3D-printed, remotely operated robot, Mark, checks retired mine shafts for safety and can carry out complex tasks by maneuvering into spaces too small, high or dangerous for humans.

**Aurubis**
Introduced new technology in Hamburg, Boosting Emission Reduction (BER). The technology can capture particulate matter smaller than 10 µm, the size of a human red blood cell. The system works on demand and refines air from the smelter operations through 6,300 filter elements.

**Boliden**
In Sweden has implemented automation technology and monitoring systems to locate workers and equipment quickly, improving productivity. It has also installed on-demand ventilation systems, which can achieve up to 25 percent energy savings.

**BHP, Rio Tinto and Vale**
Launched the Charge On Innovation Challenge to develop effective solutions for mine electrification and decarbonization. The Challenge seeks new solutions that safely deliver electricity to large battery-electric off-road haul trucks in a way that maintains or improves current productivity levels.