



Sustainability in Mining

Increase energy efficiency and productivity while minimising environmental impact

Incentives to drive sustainability in mining



Energy efficiency, environmental care and carbon footprint disclosure are surfacing to the top of the agenda in the mining and minerals industry. Carbon emissions, effluent and waste, as well as water conservation are key concerns for mining companies against a backdrop of increased reporting requirements.

Climate change, energy security, water scarcity, land degradation and declining biodiversity continue to stress communities leading to new methods of environmental awareness and resource conscious business practices. Both mining and industrial operations are adopting environmental strategies as a commitment to these very real challenges.

Mining companies are taking active steps to examine their investment, capital expenditure and operational strategies to ensure sustainable, environmentally friendly operations. Investments in sustainable practices and capital equipment need to provide tangible savings to the bottom line.

In previous years sustainable investments were not seen to provide significant returns on investment (ROI) but with the rapidly changing regulatory and economic environment, returns are becoming increasingly attractive. When all the benefits of new technology and business practices are accounted for, including direct savings through greater efficiency and associated incentives such as carbon tax credits, investments become a lot more attractive. These same investments in energy savings, for example, also become exceedingly desirable when viewed over a longer time horizon.

ABB is at the forefront of technologies in energy efficiency, plant optimisation, environmental systems to reduce carbon emissions and minimise waste water.

Pushing sustainability boundaries

The mining and minerals industry is a large consumer of energy and resources, placing it in a position of potential conflict with governments and communities. The cost of energy, especially electricity has risen sharply, and reliability of supply has been a worrisome issue that mining operations have taken steps to address. Many large well-established mining and minerals operations are doing brilliant work to reduce energy consumption in their operations, minimise use of precious water resources and lower their carbon footprint.

All these measures just makes good business sense – using less electricity means that every kilowatt hour saved goes straight to the bottom line and increases the payback period of investments in savings programs and energy efficient capital equipment. In fact, increasingly all businesses are moving towards business models that provide continuous improvement in energy use, security of supply and long-lasting contributions to the environment.

ABB, which has been supplying solutions to the mining industry throughout the world for more than 120 years, offers a comprehensive package of solutions, products and services from mining to market. The company solutions include those for cement, open-pit mining, underground mining, minerals, service and environmental consulting.

Cement industry: ABB's solutions increase the efficiency for the complete primary production chain optimising its major electrical installations and processes. This leads to enormous savings in cash and significant enhancement in a plant's economy over its life-cycle.

Open-pit mining: ABB is an experienced and reliable partner for the electrical equipment and automation of systems for open-pit mining and materials handling. The machines equipped by ABB cover the entire production process from extraction through transport to shipping with an integrated control concept from a single source.



Underground mining: In mine hoist solutions, ABB has introduced a number of technological breakthroughs such as state-of-the-art drive and control systems, hydraulic disc brakes, controlled braking and Rope Oscillation Control. It has delivered more than 600 new hoists and undertaken the modernization of hundreds of existing plants. ABB supplies electrical systems for underground mine trucks that maintain a higher speed than diesel trucks, resulting in greater productivity as well as lower operating and maintenance costs while substantially improving the underground environment. In mine automation, to meet the increased demand for higher productivity, enhanced safety and a better environment underground, ABB can provide Mine Automation Solutions based on Industrial IT System 800xA, including haulage systems, crushers, conveyor belts, hoisting and ventilation fans.

Minerals: ABB has a track record of supplying complete electrification for more than 60 plants worldwide. Our expert engineering, supply, construction and management services, and our in-depth experience of the production process ensure results. Our approach treats the plant and its requirements as single fully integrated entity.

Service: ABB's vast experience and extensive reference list has provided a base to develop and deliver Support and Service solutions specifically designed for the cement, minerals and mining industry - solutions that provide a profitable investment. The central focus of Service and Support is to reduce direct maintenance cost, improve operational reliability and increase revenues. Our portfolio covers services such as spare parts, upgrades, repair and refurbishment and life cycle support contracts.



Environmental Consulting: ABB helps companies improve the environmental performance of their operations. We bring repeatable methodologies, leading edge technologies and the transfer of skills and knowledge to practically manage environmental issues. Our consultants have significant knowledge of process industry operations and the regulatory framework our customers operate within. We can also draw on the broad range of engineering and consultancy skills within ABB. We help to minimise water usage and waste production and in so doing reduces energy and utilities use and increases process efficiency.

Industrial Energy Efficiency: ABB is a leading provider of Industrial Energy Efficiency improvement services to process industries across the world. We help process industry companies to reduce their energy bills and carbon emissions. ABB identifies energy and utility savings and implements improvement programmes that deliver sustainable savings. Savings are typically 5-20% and arise throughout the energy system including reduced consumption, minimising distribution losses and improving generation efficiency. Our approach is in three phases: Opportunity Identification (where can improvements be made); Energy Management Master Plan (project implementation road-map); and Implementation (delivering the benefits). ABB can provide the technical skills, dedicated resources and experienced programme managers, with a proven track record, to ensure that beneficial projects are successfully implemented. Our approach includes change management and skills transfer to ensure that the energy savings are sustained.

Maintenance management systems consulting: ABB helps customers increase production and reduce maintenance costs by improving the effectiveness and use of Computerised Maintenance Management Systems (CMMS). The effective use of a CMMS leads to improvements in equipment reliability, availability and maintainability.

ABB solutions go much further -- we provide transmission systems, substations, renewable power generation and water treatment, and desalination plants for operations in remote locations. All our solutions reduce your environmental footprint.

Robust solutions for large scope projects

In 2009 Vale, the Brazilian mining company awarded ABB a contract for the electrification and automation of the Moatize coal mine in Mozambique's Tete Province. ABB collaborated internally with members of the Centre for Excellence for Mineral Processing in Switzerland, and formed an external consortium with B&W Electrical and Instrumentation.

The new mine is one of Vale's major investments in Africa. When completed, it will have a nominal capacity of 11 million tons per year: 8.5 million tons of metallurgical coal and 2.5 million of thermal coal.

The ABB scope of works at Moatize includes;

- Extending the existing substation at Matambo with a new 220/66 kV bay including a 40 MVA 220/66 kV transformer and extension to the existing double busbar system
- Installing a 44km, 66 kV overhead line from the Matambo substation to the Moatize site
- Building a new switchyard equipped with SCADA system at the proposed Moatize site with a 40 MVA 66/22 kV transformer
- 22 kV GIS switchgear and DC power supply units, plus 22 kV power factor and harmonic filter system
- Control system equipment, complete with workstations and furniture. DCS equipment and software packages
- Plant lighting and earthing protection system. Plant lighting and small power system within substation area

The order includes conceptual and detailed engineering, manufacturing, erection supervision, commissioning, training and design schedule. Various types of VVVF drives have been installed on the project. The Multi Drive solution in variable speed drives in the project has resulted in a more economic solution and reducing the costs of the project.

Compact and movable substations known as Minisubs have been designed for a part of the 22kV distribution in the plant. These are built on steel baseframes with a distribution transformer up to 1600 kVA and an LV distribution board. Ring main units (RMUs) used in the distribution system are SF6 insulated compact switchgear units with a short circuit current of 25 kA.



ABB's vast experience in mining and minerals, combined with comprehensive automation and power offerings and local expertise, provides customers with robust solutions for large scope projects.

ABB's comprehensive packages include competencies, products and services for the complete primary production chain in the mining and mineral processing industries. ABB delivers power distribution equipment, integrated process control, optimization and information systems, drive systems and world-leading technology such as gearless mill drives as well as service and support. ABB's superior technology and in-depth knowledge of the customers' processes provides long-term cost-effective solutions with reduction of total investment and of energy consumption. With its global network, ABB provides local support and engineering facilities that are never far from customers.

For more case studies, please go to:

www.abb.com/mining and www.abb.com/minerals

Giving water the treatment it deserves



Our planet is facing a real crisis in water resources. Climate change and population increases are changing the balance of supply and demand. According to predictions, by 2030 the world's population will be over 8.1 billion. Since 1950, the need for water has trebled and it will double again by 2050.

Water is an essential resource for our ecosystems and the key factor supporting development activities from agriculture and industry to energy.

For nearly 50 years, ABB has been equipping thousands of water plants and networks, providing products, systems and services in over 100 countries worldwide. ABB provides expertise and solutions for all activities related to the water lifecycle, from water intake to re-introduction into the environment.

ABB products and solutions are designed to improve the performance of water plants and networks. Our high efficiency motors and variable speed drives improve energy efficiency by up to 60%. ABB Water Leakage Management solutions help utilities to monitor and reduce losses from distribution networks.

Thanks to its various business units, ABB is ready to meet any demand coming from the main water management fields, including water transfer systems, distribution networks, irrigation networks, pumping stations, desalination plants, urban treatment plants and industrial treatment plants.

In mining and minerals processing ABB is able to serve as partner in the complete water cycle. From collection, through purification and transportation to distribution and re-use, ABB provides enhanced, efficient and reliable product and solutions. PABB goal is to optimize the employment of water and energy resources and to manage the integrated water cycle with efficiency and effectiveness.

ABB provides complete solutions for the electrical and automation processes: drives and motors; instrumentation; control products and PLCs (programmable logic controllers); low-voltage, medium-voltage and high-voltage switchgears and components; transformers; SCADA systems (Supervisory Control and Data Acquisitions); DCS (Distributed Control Systems); communication networks; optimization and Asset Management solutions. The products and solutions portfolio is completed by a wide range of services in engineering, consulting, construction and maintenance. ABB is the ideal partner for ICE (Instrumentation, Control and Electrification).

Consulting solutions for improved performance and profitability

ABB Global Consulting understands industry's challenges, and is uniquely positioned to help mining and minerals-processing customers achieve their targets of improved productivity and cost efficiency. We have the expertise and experience to deliver solutions that drive better performance to improve profitability and competitiveness. As part of the global ABB group, we can draw on business and technical experience working with customers worldwide in the mining sector to meet particular production or asset management challenges.

We are a consultancy organization with a delivery culture; our job is not to just advise our customers, but to ensure that this advice produces the required results. Our approach is highly practical and 'hands-on', harnessing our people's expertise across the wide range of process and technology disciplines in mining and minerals processing.

Energy efficiency

The ABB Industrial Energy Efficiency program offering involves the application of a rigorous methodology and high-level functional expertise to help customers realize significant and sustainable energy savings. We use a wholistic approach that considers all the major plant processes and systems, and treats all these elements as part of one interlinked system that needs to function optimally. Savings are realized by reducing wastage through the entire system; including reducing consumption of utilities by users, minimising distribution losses and improving efficiency of generation. Energy savings are also identified through process optimization of different plant systems such as fired equipment, gas compression, complete steam systems, cooling water, refrigeration and heating, ventilation and air conditioning, as well as electrical systems.

The ABB Industrial Energy Efficiency program involves careful evaluation of:

- Quantified energy savings
- Expected capital expenditure
- Return-on-investment
- Payback periods
- Technical and commercial risks
- Development of energy management lifecycle programmes

In the face of increasing energy costs, we deliver an improved energy cost per unit of product, and drive the transfer of skills and knowledge for ongoing energy efficient operations.

Operations Improvement

Our operations improvement team can help you maintain 'best in class' performance. ABB's operations improvement service is tailored to suit your needs. We can set and meet precise targets, develop effective strategies and monitor progress every step of the way for all types and scales of project.



What we do includes:

- Defining and agreeing on targets
- Setting strategy with manageable measurable steps
- Improving business and production process performance
- Delivering supply chain performance
- Improving variable cost performance
- Increasing operational competitiveness
- Optimising your asset base
- Transforming business culture
- Making safety an integral part of your culture
- Developing people skills

Our broader capabilities include:

- Industrial Energy Efficiency
- Operational improvement
- Process Safety
- Environmental services
- Integrated engineering
- Integrity management
- Project services
- Technical training
- Validation and compliance

ABB Global Consulting provides technical services to improve performance in the areas of compliance, operations and engineering to customers in the mining and minerals processing industry worldwide.

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