



# Bring greater efficiency to your mining operations

EcoEtruxure™ for Mining

Life Is On | Schneider  
Electric



## Schneider Electric in Mining

Schneider Electric has been a trusted partner to mining companies for over 40 years, starting back in the early 1970s with the installation of a Modicon 084 PLC at a mine site in Brazil.

And since then we have invested deeply in time and effort to know and understand your business and your challenges so that when we come to you with solutions, you can be confident they are fit for the job at hand.

With proven products and solutions that make you more efficient from mine to market, we help miners get the most out of the valuable human, mechanical, electrical, and natural resources that you work with every day.



## Schneider Electric Resources & Expertise in Mining: the experts behind our solutions

- Dedicated project, sales and services organization of over 100 people to support customers and their projects all around the world
- Consulting capabilities covering digital technologies & software, supply chain optimization, integrated operations, operational excellence, process optimization and energy efficiency
- Mining and mineral processing expertise

# The state of the mining industry today: Major trends and challenges driving change

## The only thing that is constant is change

Miners know it's difficult to embrace change when it involves so many different aspects of their business, and especially when it seems things are changing so fast.

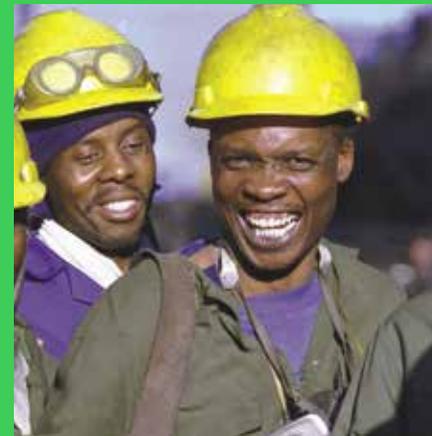
But in fact there is no choice. You either change or fall behind those who are intelligently adapting as the world changes around them. So knowing the trends and challenges fueling change is an important first step in becoming agile and taking advantage of the opportunities that are before you.

And Schneider Electric has used these market trends as a focal point when developing solutions for the mining industry: from innovative ways to optimize electrical distribution that reduce costs, to leveraging digital technologies that will attract and enable the next generation of workers to be more efficient than any that came before them.



## Demand

- Population growth
- Increasing urbanization
- Fluctuating geopolitical climates
- Chinese “new normal”
- Shifting energy mix



## Workforce

- Aging workforce
- Industry skills gap
- Change in demographics
- Stricter safety standards



## Industry

- Declining ore grades
- Scarcity of resources
- Access to capital
- Extreme mining (remote/deeper)



## Government

Stricter regulations  
Resource protectionism



## Social & Environment

Social license to operate  
Activism/hacktivism  
Climate change  
Sustainable water and land use



## Digitization

Real-time monitoring and visibility  
Information transparency  
Cooperation between systems  
and with humans  
Decentralized/empowered  
decision-making

## Key components of Digitization

Of all the trends impacting mining, none will be as critical as digitization. It will impact every aspect of your operation and provide the greatest potential for improving business and operational efficiency.



## Enabling technologies of digitization

- Cloud
- Mobility
- Analytics
- Big Data
- IoT

# The digital transformation: The promise of new technology

## Digital technologies and the IoT

The digital transformation is taking place all around us and mining companies are looking for ways to leverage it and the IoT to improve performance and attract the best and brightest workers to the next generation workforce. It's also a key contributor in maintaining and improving sustainability.

## From data to wisdom

Smart devices and sensors are generating lots of data from processes, from both fixed and mobile equipment, and with unprecedented granularity. They even allow data to be collected from things such as fire extinguishers and personal protective equipment that are not typically connected to a network.

But massive amounts of data alone is not an answer. Companies need to derive real business value from this ocean of data and turn it into meaningful, insightful information – and that is achieved thanks to intelligent software and technology that can transform data into information, information into knowledge, and ultimately knowledge into wisdom.

The integrated mine, rail and port operations of a mine can generate  
**2.5 Terabytes**  
of data per minute





Mining supply chain simulation can cover a planning horizon of up to

**30 years** or more

A single haul truck can have more than

**300 sensors**

collecting and pushing data on its location, condition, and performance



# The digital transformation: 3 key areas of added value

In the next five years, leaders in the mining industry will achieve their biggest improvements by embracing digital technologies like the Internet of Things and advanced analytics that can harness the power of big data.

And in respect to the added value that digitization will deliver, we at Schneider Electric see three main areas where you can leverage these new technologies:

- Operational Excellence
- Next Generation Workforce
- Digital Supply Chain

# 1

## Operational Excellence

Solutions that optimize and stabilize process performance and reduce energy usage, thereby achieving the highest level of performance and reliability from critical assets



# 2

## Next Generation Workforce

Technologies that attract and empower the next generation of workers and facilitate knowledge transfer, collaboration, situational awareness and safety, mobility and remote operations



# 3

## Digital Supply Chain

Solutions that integrate activities from resource to market, including inventory management and operations and planning



# Schneider's answer: EcoStruxure™ for Mining

## What is EcoStruxure for Mining?

EcoStruxure is our IoT-enabled architecture designed to leverage the digital transformation. Simply put, it connects a multitude of existing sensors linked to your fixed operations and mobile equipment, collects data, and analyzes and presents the data in a way that lets you take real-time corrective action in the short term so as to optimize your whole ecosystem over the long term.

## How are we different?

1. We have an unmatched portfolio of software and hardware
2. Interoperability of our solutions
3. We give you the choice to access data both on premise or via the cloud
4. Our use of open standards allows seamless integration of third party systems and devices

# Innovation™ at Every Level

We have leveraged advanced technology in the IoT, mobility, sensing, cloud, analytics, and cybersecurity for solutions that deliver “Innovation at Every Level.”

## Connected products

Field devices with embedded intelligence such as sensors, circuit breakers, meters, variable speed drives and process instrumentation provide the link to real-time data that is essential to higher-level control and decision-making.

devices at the edge of the IoT network is a must. This essential capability provides real-time solutions that enable local control at the edge, increasing safety and uptime.

## Applications, analytics, and services

Sophisticated problem solving and analysis at the enterprise level optimizes business operations and maximizes results.

## Edge control

Most mining processes are mission-critical, so control of



# EcoStruxure™ for Mining: Making safety a priority

Safety transcends every aspect of mining, and the integrated, digital solutions that are enabled through EcoStruxure for Mining can help improve the overall safety of both your people and operation.

- Automated inspection scheduling and procedural guidelines reduce the risk of overlooking a potential failure and ensure that important findings won't get lost in paperwork
- Data gathered remotely and reported via the IoT reduces the need to expose personnel to hazardous areas
- Simulation lets workers learn how to react properly when faced with unsafe or dangerous situations in a safe, risk-free learning environment
- Better understanding of the causes of downtime provide greater insights into safety issues
- Integrated environmental monitoring provides better information on KPIs and can trigger alerts to avoid potential problems
- Predictive technologies help anticipate potential equipment failures in critical assets before they can lead to unsafe operations
- Remote services provide expert support in real-time to augment local workers on-site
- Integrated surveillance and access control can prevent unauthorized access and avoid accidents
- Remote monitoring of electrical assets can predict and avoid potential arc flash incidents

There have been on average  
**1.9 major breaches**  
of tailings dams per year over  
the past 10 years

Reference: Casey Research

An arc flash can generate temperatures of up to  
**19,000°C**  
**/35,000°F**

Reference: US National Institute for Occupational Safety and Health

DO NOT INSTALL ON CIRCUITS WITH AVAILABLE SHORT-CIRCUIT CURRENTS GREATER THAN THE LOWEST SHORT-CIRCUIT RATING OF ANY INSTALLED UNIT 30225-190-01

**DANGER**  
**DO NOT REMOVE THIS TAG**  
IT IS A VIOLATION OF PLANT RULES TO DO SO WITHOUT AUTHORITY WILL MEAN DISCIPLINARY ACTION  
IT IS HERE FOR A PURPOSE  
**SEE OTHER SIDE**  
PLASTICLIP

UNIT HEATER  
MACHINE HALL

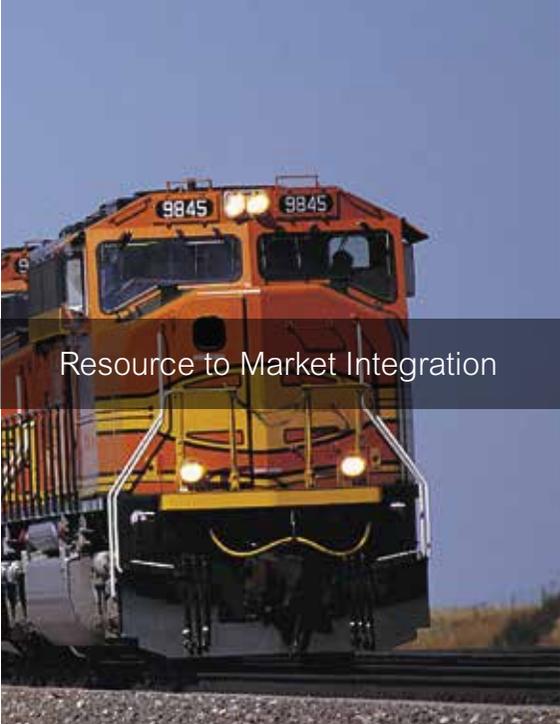
LVMCC-40

OFF



Simulated operator training can provide a  
**9% higher retention rate**  
than traditional learning processes

Reference: University of Colorado



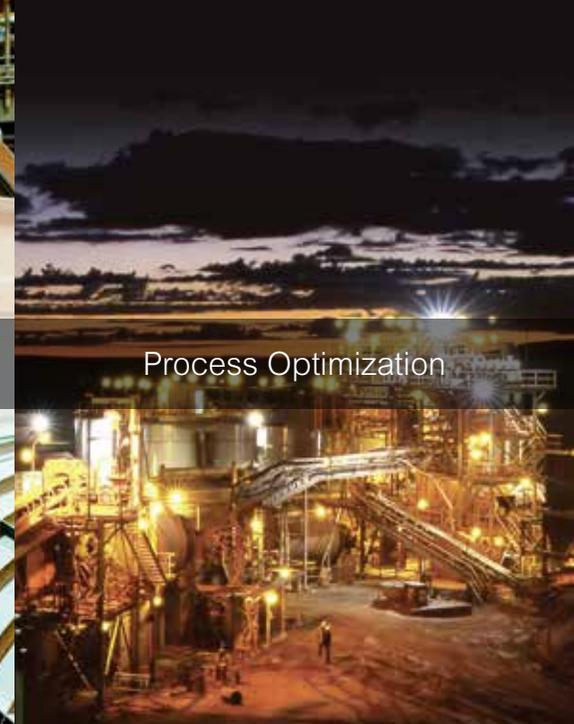
Resource to Market Integration



Mine Electrification



Process Automation & Control



Process Optimization

# Solution portfolio



Process Simulation



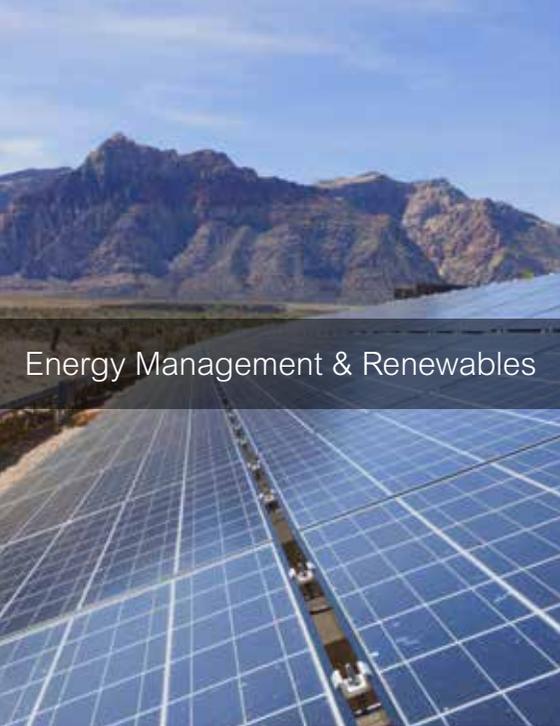
Material Handling Automation



Asset & Maintenance Management



Connected Worker



Energy Management & Renewables



Water & Environmental Management



Security & Facility Management



Life is On | Schneider Electric

Fuel Management & Truck Maintenance

# Solution portfolio



IT Infrastructure



Services



Projects & Consulting



Integrated Operations Center

# Resource to Market Integration

## Production Performance Management

It is difficult to make real-time decisions based on information that is spread across various databases, applications and spreadsheets.

Our production management solution consolidates and manages data from multiple mine, plant and business systems, enabling miners to identify production issues, manage inventory and quality, track production and asset performance, understand costs, and analyze business KPIs

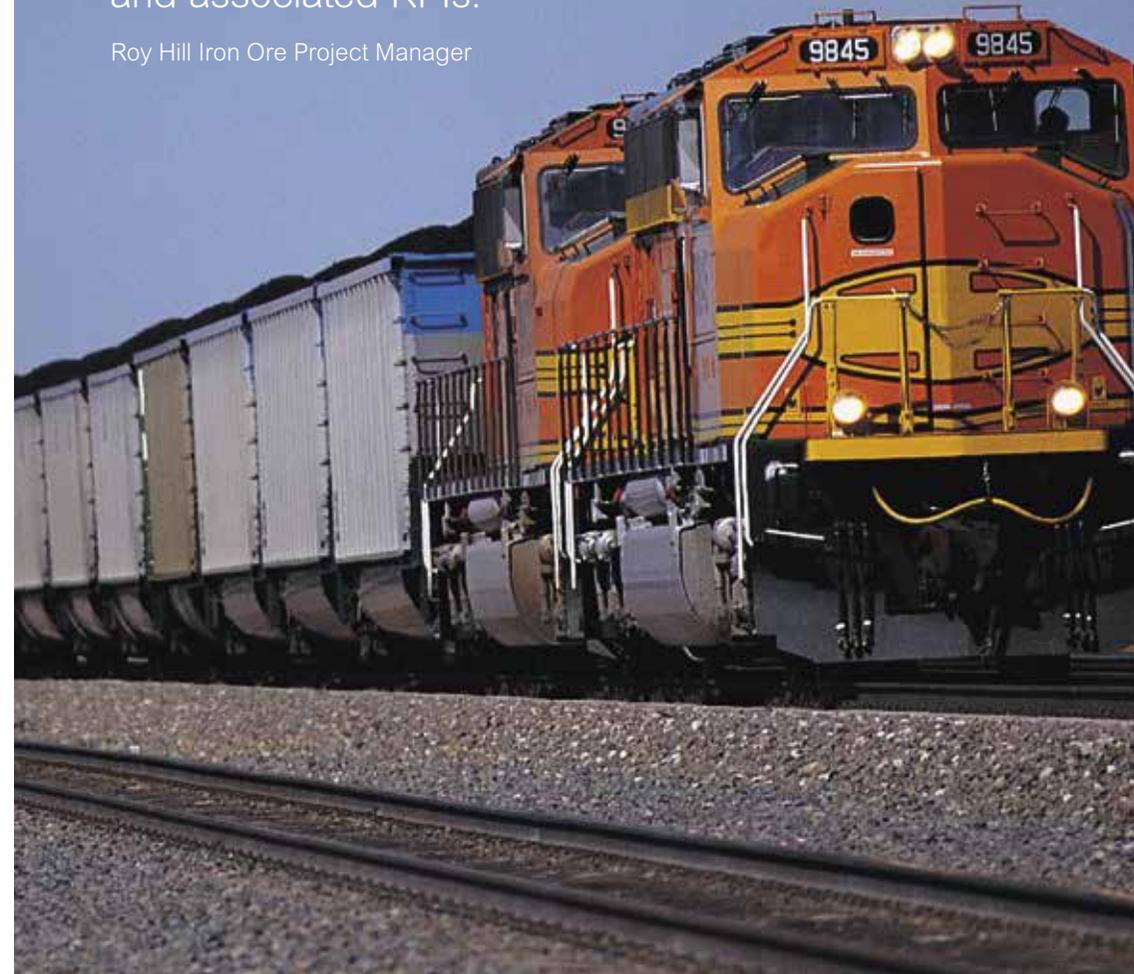
## Supply Chain Management

Our pit-to-port unified solution for planning and scheduling takes into account the mined materials, processing, supply chain capabilities and costs to deliver an optimal plan that maximizes profit. The optimized plan sets targets for detailed scheduling, focusing on long-term efficiency instead of short-term gains.

The scheduler allows miners to quickly see how closely the schedule is being followed, and to adapt if necessary to meet the plan.

“We utilize Schneider Electric’s sophisticated Advanced Planning & Scheduling (APS) modeling approach to help predict how each entity in the supply chain will operate - mine, plant, rail and port - not as discrete components, but as a single system that operates with unified objectives and associated KPIs.”

Roy Hill Iron Ore Project Manager



# Mine Electrification

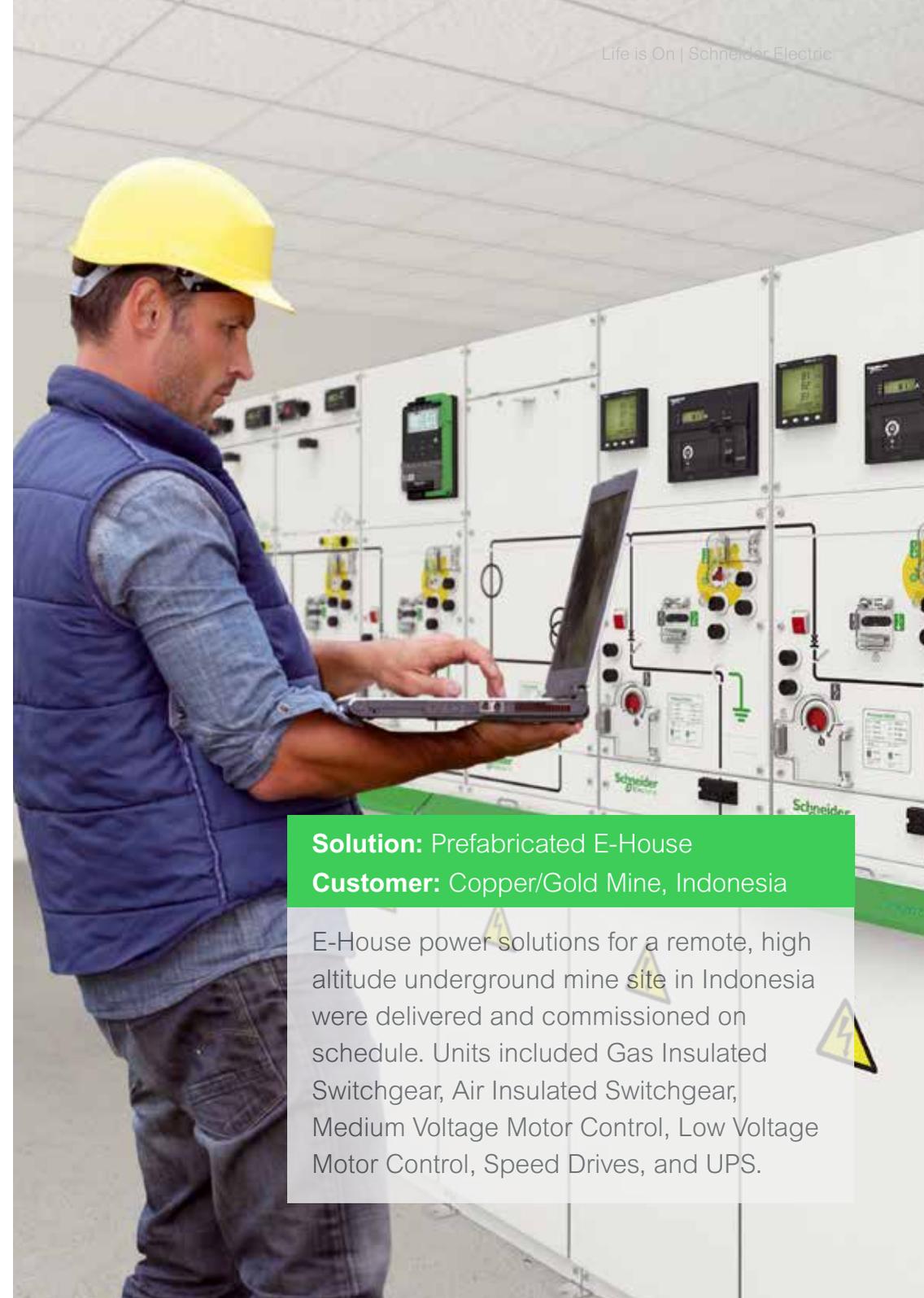
## Integrated Power Solutions

Integrated electrical architectures from a single supplier provide reliable performance at an optimized cost for mining applications. Significant cost-reductions can be achieved in your electrical power system through optimized voltage levels, transformer size, cable and busbar ratings, short circuit currents, and proper motor and generator parameters.

As a global partner with an extensive presence in over 100 countries around the world, Schneider Electric can deliver complete, integrated solutions that meet both local and international standards. Regardless of where in the world a project is located, we can help you comply with all applicable electrical standards.

## Prefabricated E-House

E-House is a complete power distribution substation that integrates medium and low-voltage switchgear, motor control centers, transformers, HVAC, UPS, and building management and control systems in a single, modular enclosure. It is designed, engineered, assembled and tested in the factory prior to delivery at the mine site and significantly reduces installation and commissioning, especially in remote and harsh environments.



**Solution:** Prefabricated E-House

**Customer:** Copper/Gold Mine, Indonesia

E-House power solutions for a remote, high altitude underground mine site in Indonesia were delivered and commissioned on schedule. Units included Gas Insulated Switchgear, Air Insulated Switchgear, Medium Voltage Motor Control, Low Voltage Motor Control, Speed Drives, and UPS.

# Process Automation & Control

## Process Automation & Control

Mining control applications can be highly distributed and heavily instrumented, requiring an integrated and flexible automation and control platform that can address their complexity. Our process control portfolio provides solutions suitable for small operations to advanced Ethernet distributed architectures able to manage complex instrumentation networks and motor driven applications.

Users get a single software environment that delivers flexible engineering, operation and maintenance capabilities that are necessary to address these challenges, and which is also both process and object-oriented: The application is modeled according to the actual mining operation and process (digital twin), making it intuitive to configure and easy to use.

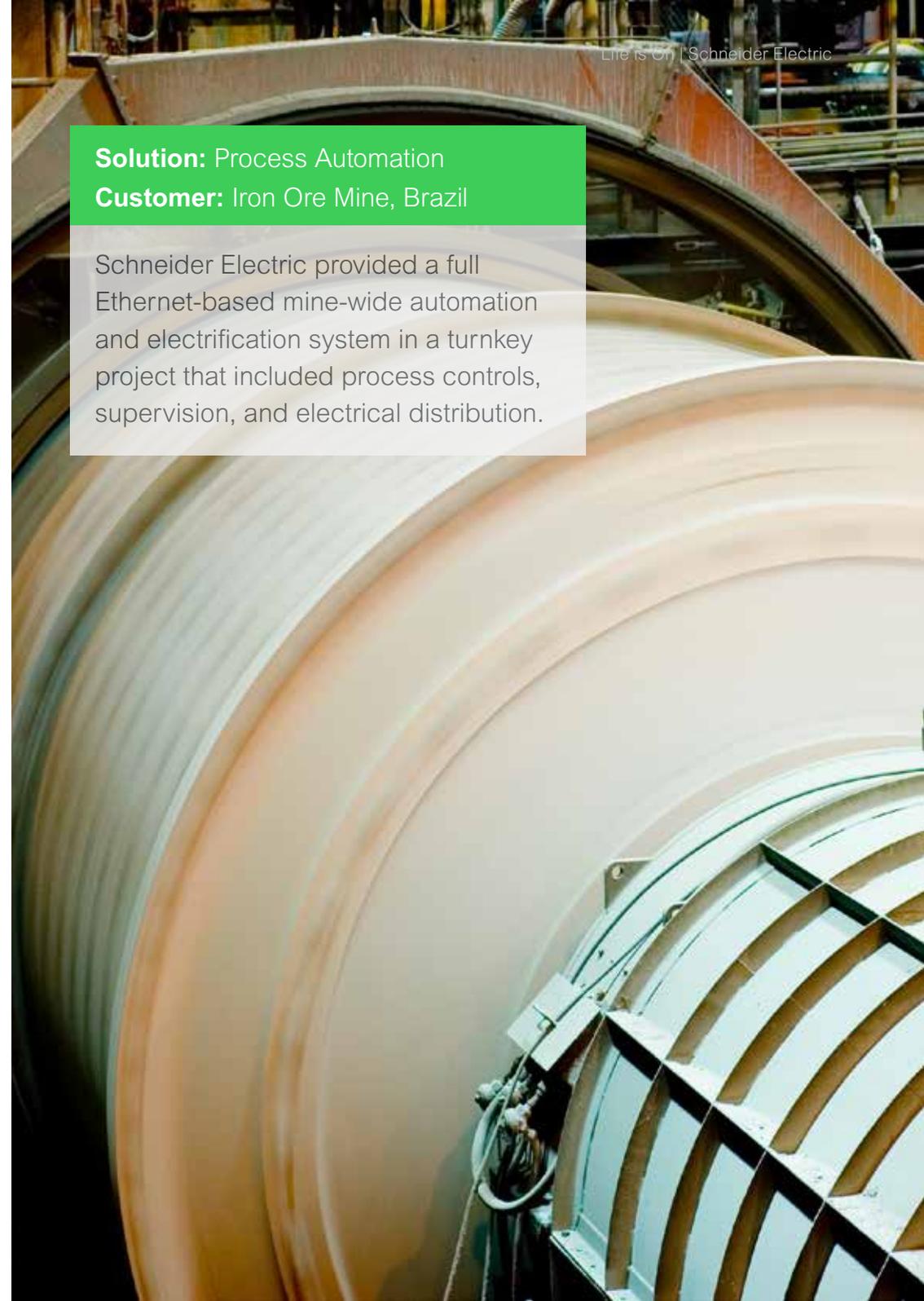
## Mining and Mineral Processing Object Library

We offer comprehensive mining and minerals object-oriented libraries that provide both control and graphical objects. The libraries help to reduce engineering time and project risk through standardization and reusability of the objects, all with the reassurance that they have been fully Tested and Validated.

**Solution:** Process Automation

**Customer:** Iron Ore Mine, Brazil

Schneider Electric provided a full Ethernet-based mine-wide automation and electrification system in a turnkey project that included process controls, supervision, and electrical distribution.



# Process Optimization

## Process Optimization

Process Optimization uses real-time process and economic data to determine set points that guarantee maximum operating profit while satisfying all regulatory requirements, providing sustainable plant performance and increased return on investment.

## Advanced Process Control

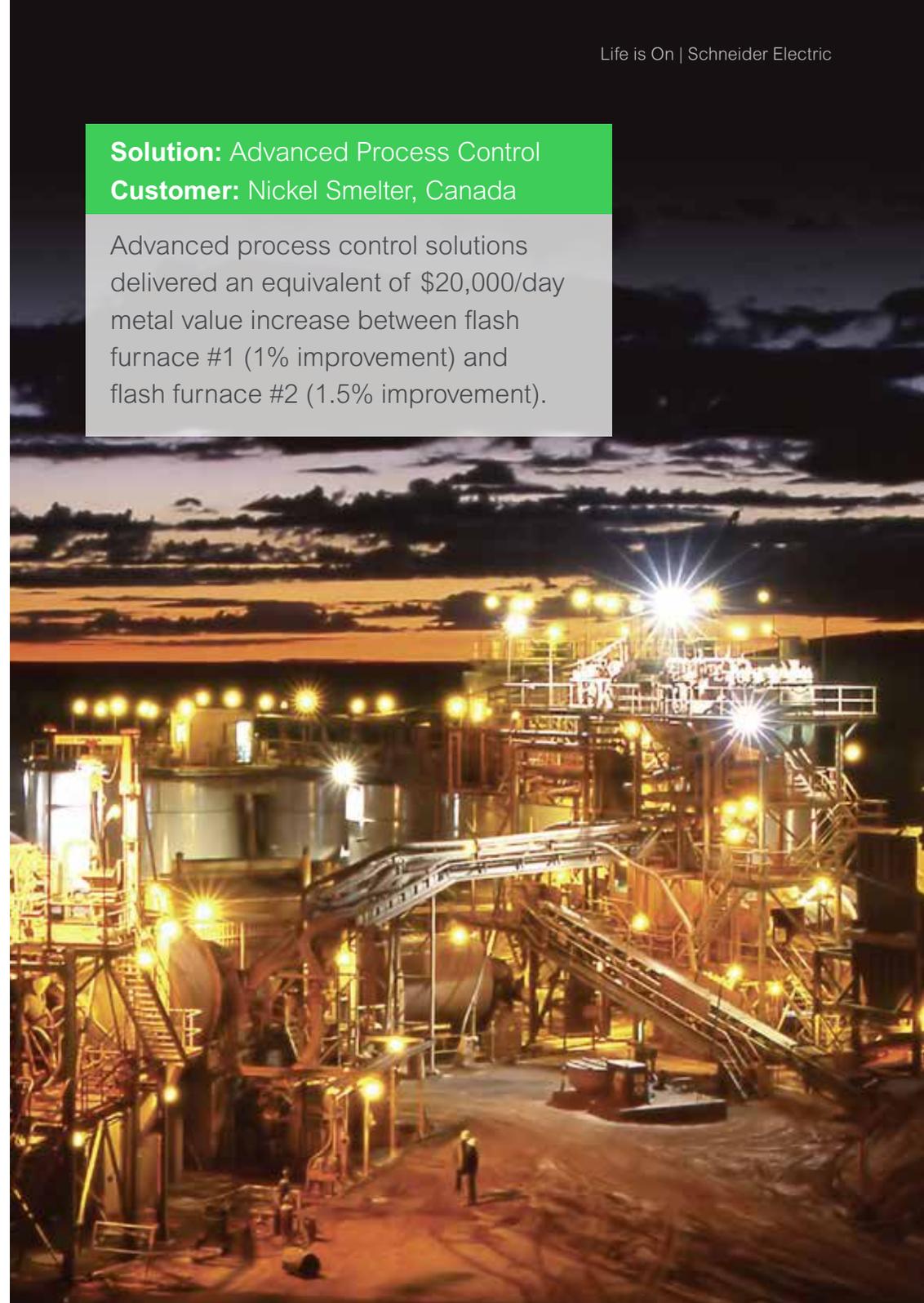
Advanced Process Control systems stabilize and optimize processes above and beyond that which is possible from normal process control, resulting in improved mineral recovery, higher grades, faster throughput, and better energy efficiency.

Comminution typically accounts for approximately 50% of a mine's electrical load, making Advanced Process Control a perfect fit for complex applications like grinding circuits and flotation, as well as metal processing facilities such as furnaces and smelters.

**Solution:** Advanced Process Control

**Customer:** Nickel Smelter, Canada

Advanced process control solutions delivered an equivalent of \$20,000/day metal value increase between flash furnace #1 (1% improvement) and flash furnace #2 (1.5% improvement).



# Process Simulation

## Dynamic Simulation

Process simulators enable companies to meet plant lifecycle requirements, from steady state simulation for plant and process design to dynamic simulation for process control engineering, control check out, operation, process scalability studies, process benchmarking and optimization.

## Virtual Reality and Immersive Operator Training & Simulation

Our Virtual Reality and OTS (Operator Training and Simulation) solutions provide operators and plant personnel with a high-fidelity 3D virtual process and plant environment in which to learn operating procedures and to train for emergency situations. It also enables the capture and knowledge-transfer of best-practices, increasing efficiency and reducing costly errors and maintenance procedures.

**Solution:** Operator Training & Simulation (OTS)

**Customer:** Zinc-lead smelting and refining operations, Canada

Schneider's Operator Training and Simulation solution was deployed at a groundwater treatment plant that had to meet critical environmental requirements and was used to train new operators on how to prevent above-limit groundwater from being dumped into their outflow.



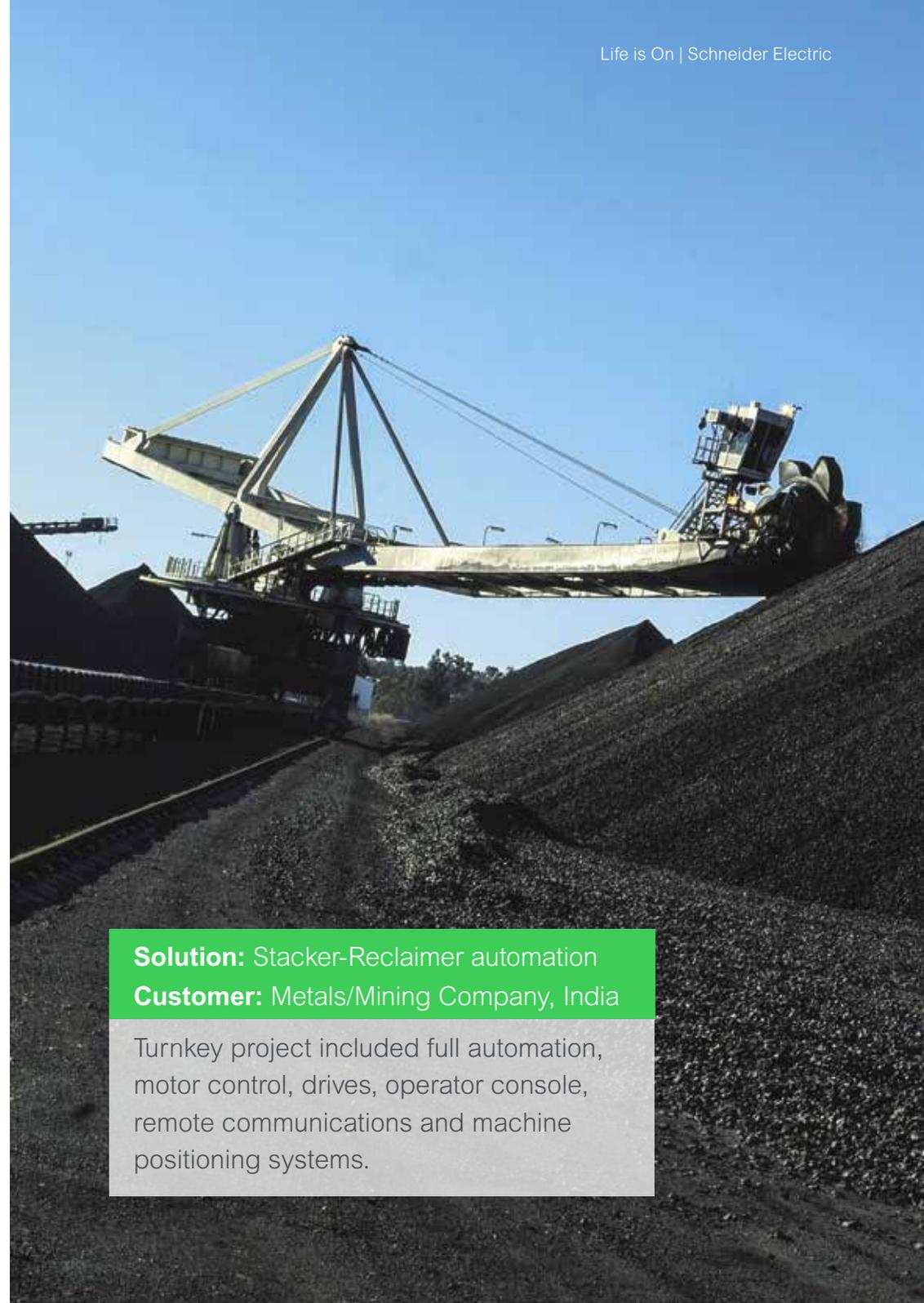
# Material Handling Automation

## Conveyor Systems

Schneider Electric provides integrated systems for mining conveyors through integrated architectures that seamlessly connect all the key components in a system, including power, controls, drive systems, surveillance cameras, sensors and other field devices.

## Stacker-Reclaimers

We also provide full solutions for the automation, power and motor management of stacker-reclaimers, including integration with specialty sensors and systems such as collision avoidance, positioning and stockpile management.



**Solution:** Stacker-Reclaimer automation

**Customer:** Metals/Mining Company, India

Turnkey project included full automation, motor control, drives, operator console, remote communications and machine positioning systems.

# Asset and Maintenance Management

## Condition Monitoring and Predictive Analytics

Millions of dollars are lost each year due to preventable unplanned downtime and equipment failures.

From condition monitoring to advanced machine learning and modeling solutions that identify subtle changes in system behavior, our solutions identify the early warning signs that can lead to diminished equipment performance and unplanned failures. Solutions are available for both on-premise or the cloud.

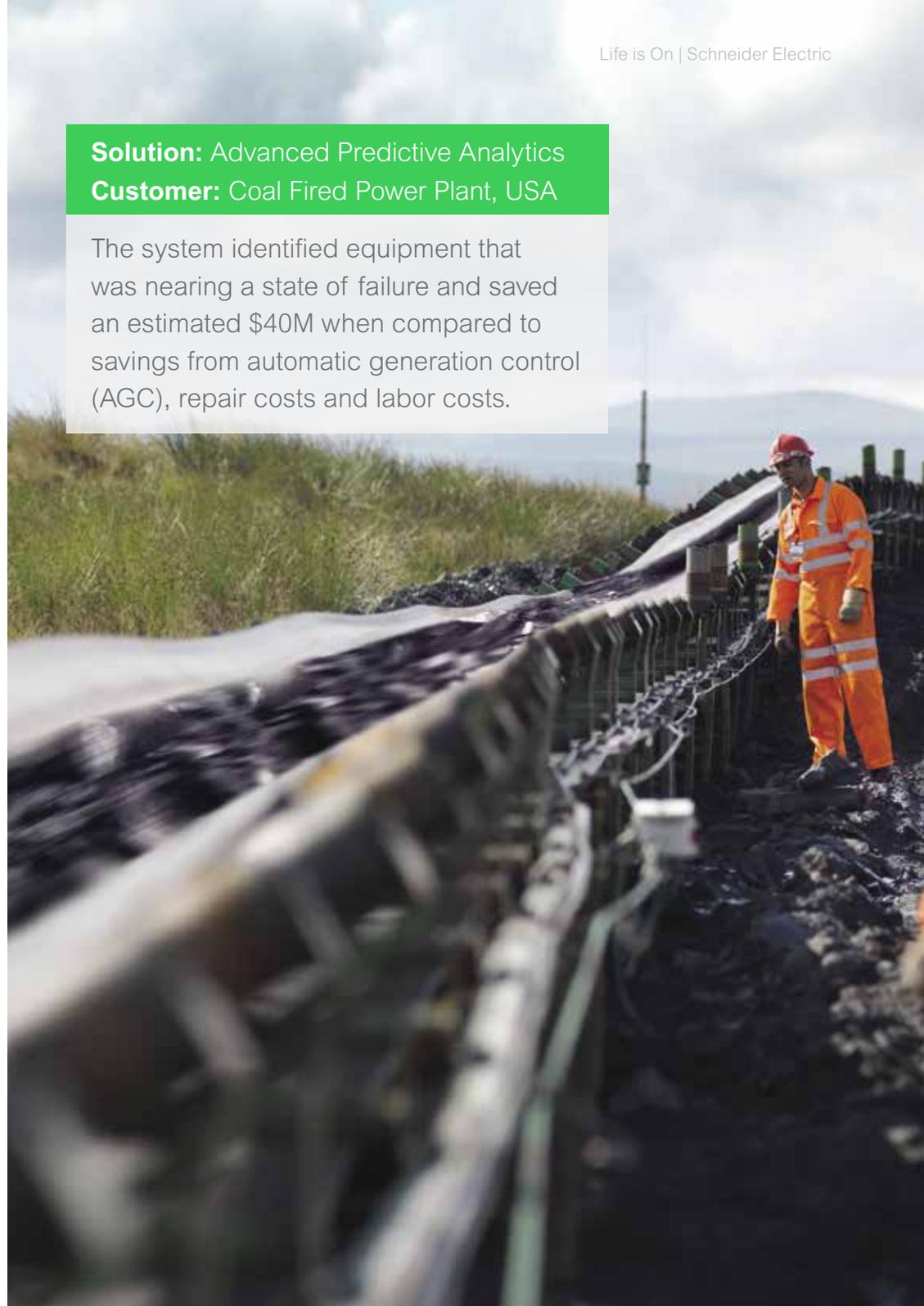
## Enterprise Asset Management

Maintenance costs in the mining industry can range from 30 to 50% of total operational budget. With our Enterprise Asset Management (EAM) software you can ensure you are getting the most out of your assets through proper maintenance scheduling and tracking, spares and inventory management, as well as procurement capabilities that ensure efficiency across the entire spectrum of your asset portfolio.

**Solution:** Advanced Predictive Analytics

**Customer:** Coal Fired Power Plant, USA

The system identified equipment that was nearing a state of failure and saved an estimated \$40M when compared to savings from automatic generation control (AGC), repair costs and labor costs.



# Connected Worker

## Real-time Data Acquisition and Reporting

Our mobility solutions allow users to view data and KPIs on mobile devices like smartphones and tablets and enable real-time decision making.

## Safety, Maintenance and Environmental Inspections

Mobility technology for workflow, data collection and general task management (safety, maintenance and environmental) helps achieve consistent and precise execution of procedures.

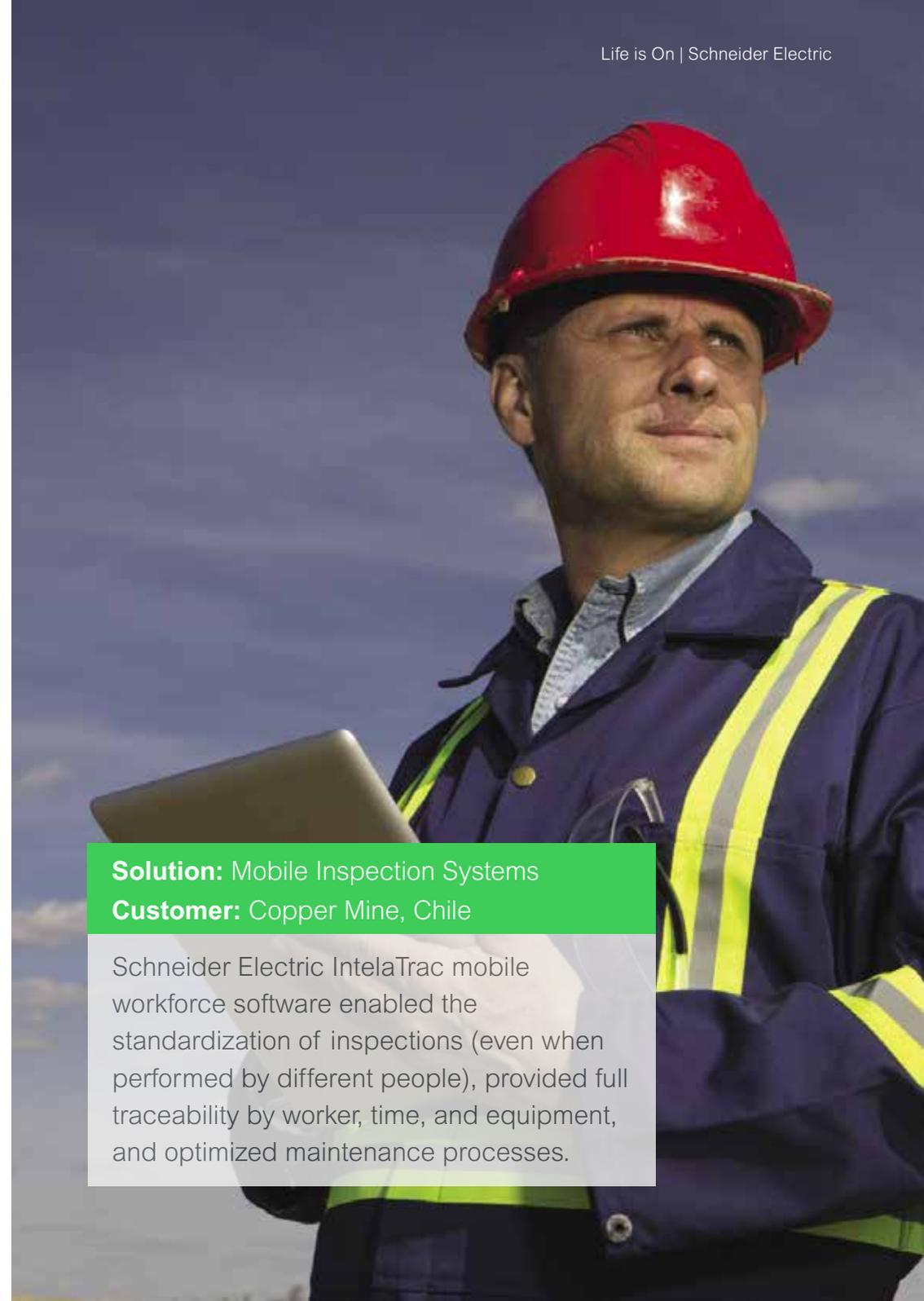
## Augmented Reality

Innovative augmented reality software for mobile devices uses the device's camera to recognize electrical panels, cabinets, machines and process areas and then superimpose real-time data and virtual objects onto them. This gives operators and technicians immediate access to relevant technical, performance and condition information and speeds up decision-making, troubleshooting, and performance efficiency.

**Solution:** Mobile Inspection Systems

**Customer:** Copper Mine, Chile

Schneider Electric IntelaTrac mobile workforce software enabled the standardization of inspections (even when performed by different people), provided full traceability by worker, time, and equipment, and optimized maintenance processes.



# Energy Management & Renewables

## Energy Management Systems

Schneider Electric offers a comprehensive set of services across all areas of an organization's energy and sustainability management program, including supply, demand, and sustainability.

Our Energy Management and Information solutions provide comprehensive, real-time reporting and visibility of the critical energy measures in a production context, enabling miners to make fully informed energy management decisions that maximize energy performance and deliver critical energy savings.

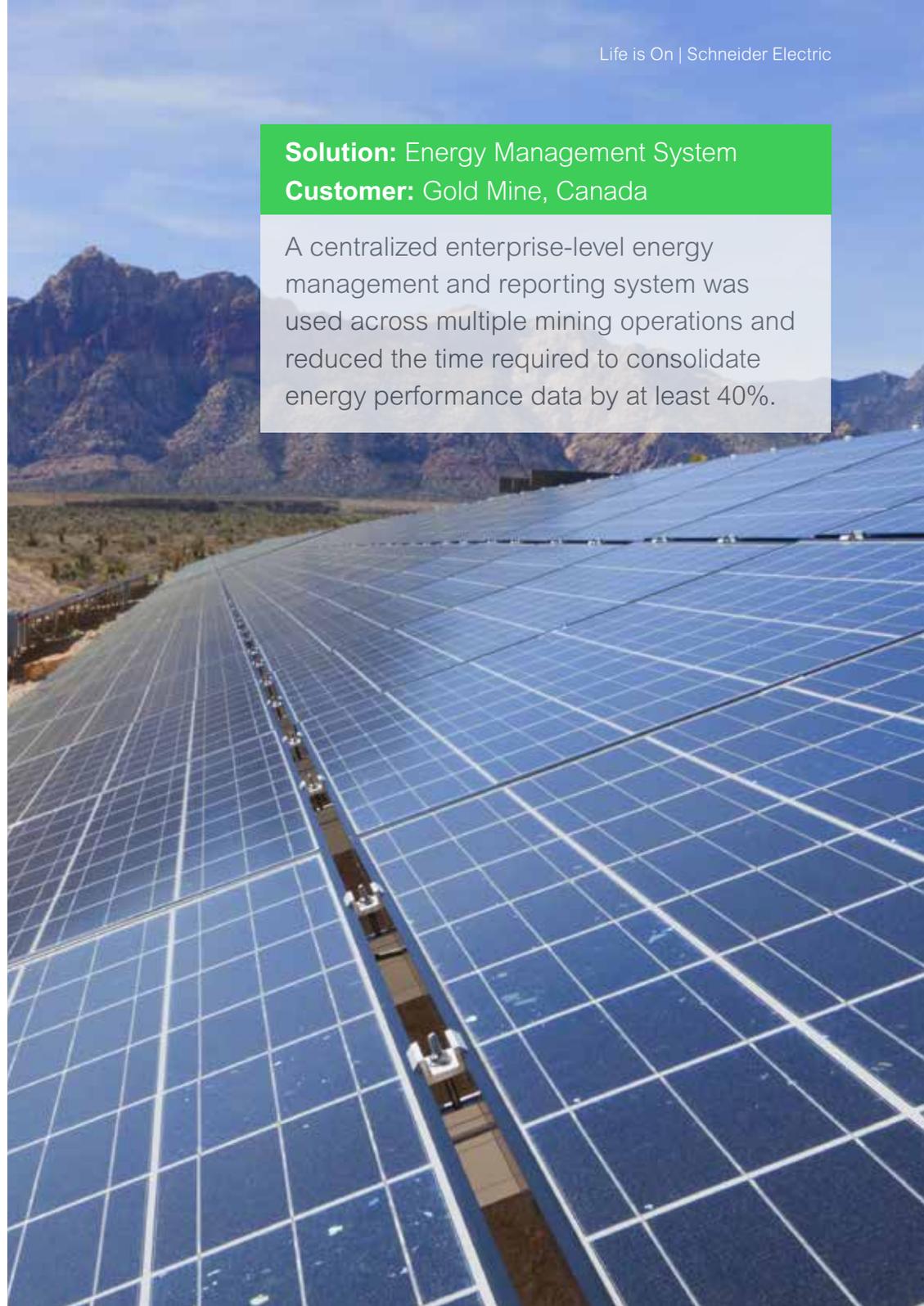
## Hybrid Energy Generation

Schneider Electric's combined expertise in solar and micro-grid technologies allows us to deliver effective renewable-based solutions for mining operations.

**Solution:** Energy Management System

**Customer:** Gold Mine, Canada

A centralized enterprise-level energy management and reporting system was used across multiple mining operations and reduced the time required to consolidate energy performance data by at least 40%.



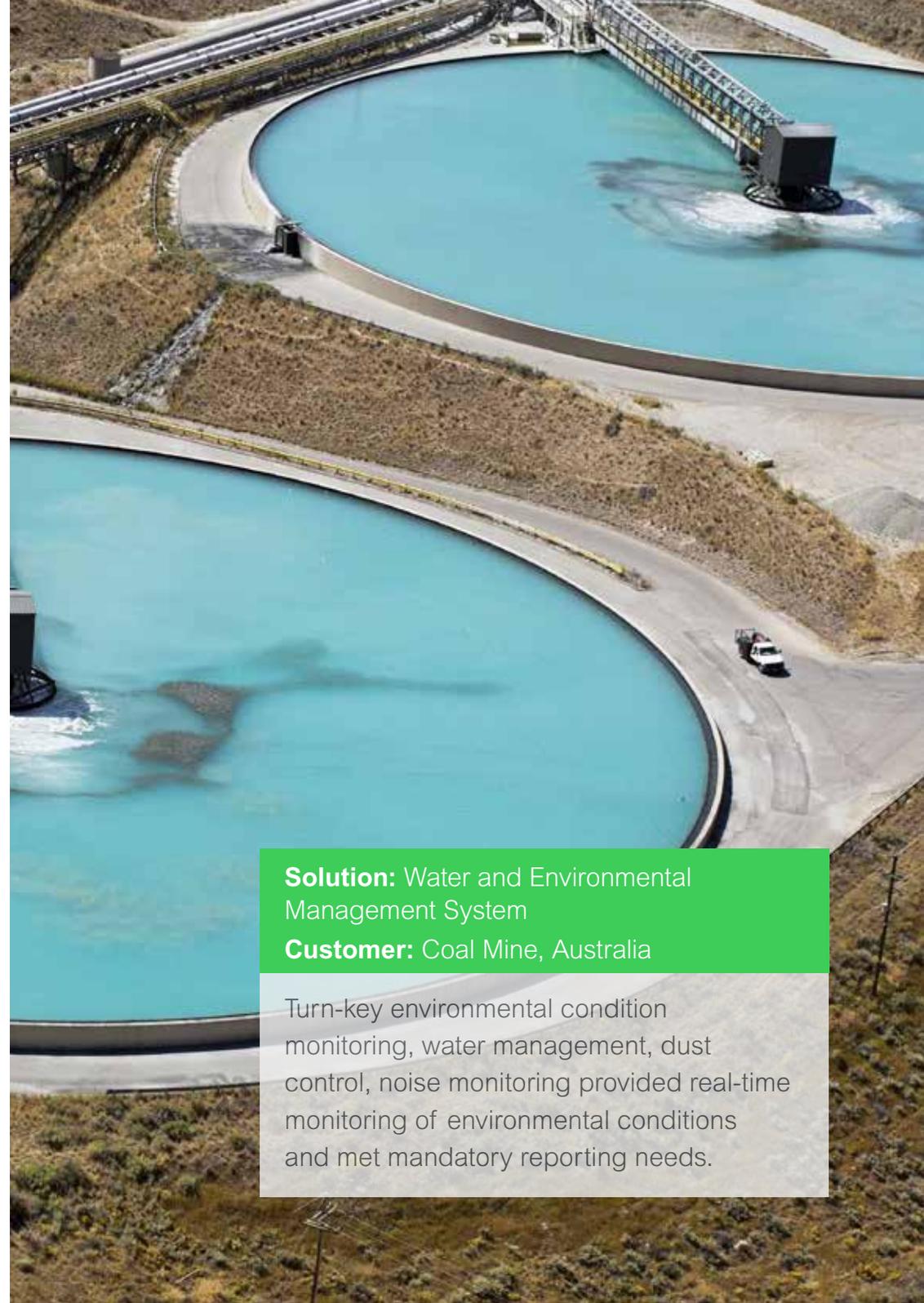
# Water and Environmental Management

## Water and Environmental Management

The use of water in mining has the potential to affect both surface water and groundwater sources. In response to environmental concerns and regulations, miners are looking to implement effective strategies to monitor water consumption, quality and discharges.

Schneider delivers telemetry, sensing and mobility technologies for collecting water data from different sources as well as software analytics solutions to aggregate and display process and water information under a production context (water balances, KPIs).

By integrating additional data from other sensing technologies for such variables as dust and noise, a mining operation can achieve a comprehensive environmental monitoring system covering alerts and reporting.



**Solution:** Water and Environmental Management System

**Customer:** Coal Mine, Australia

Turn-key environmental condition monitoring, water management, dust control, noise monitoring provided real-time monitoring of environmental conditions and met mandatory reporting needs.

# Security and Facility Management

## Building Management

Schneider Electric offers a fully integrated architecture for building management that provides interoperability and openness for full visualization and control of all building systems, including: access controls, surveillance, HVAC, lighting control and energy management.

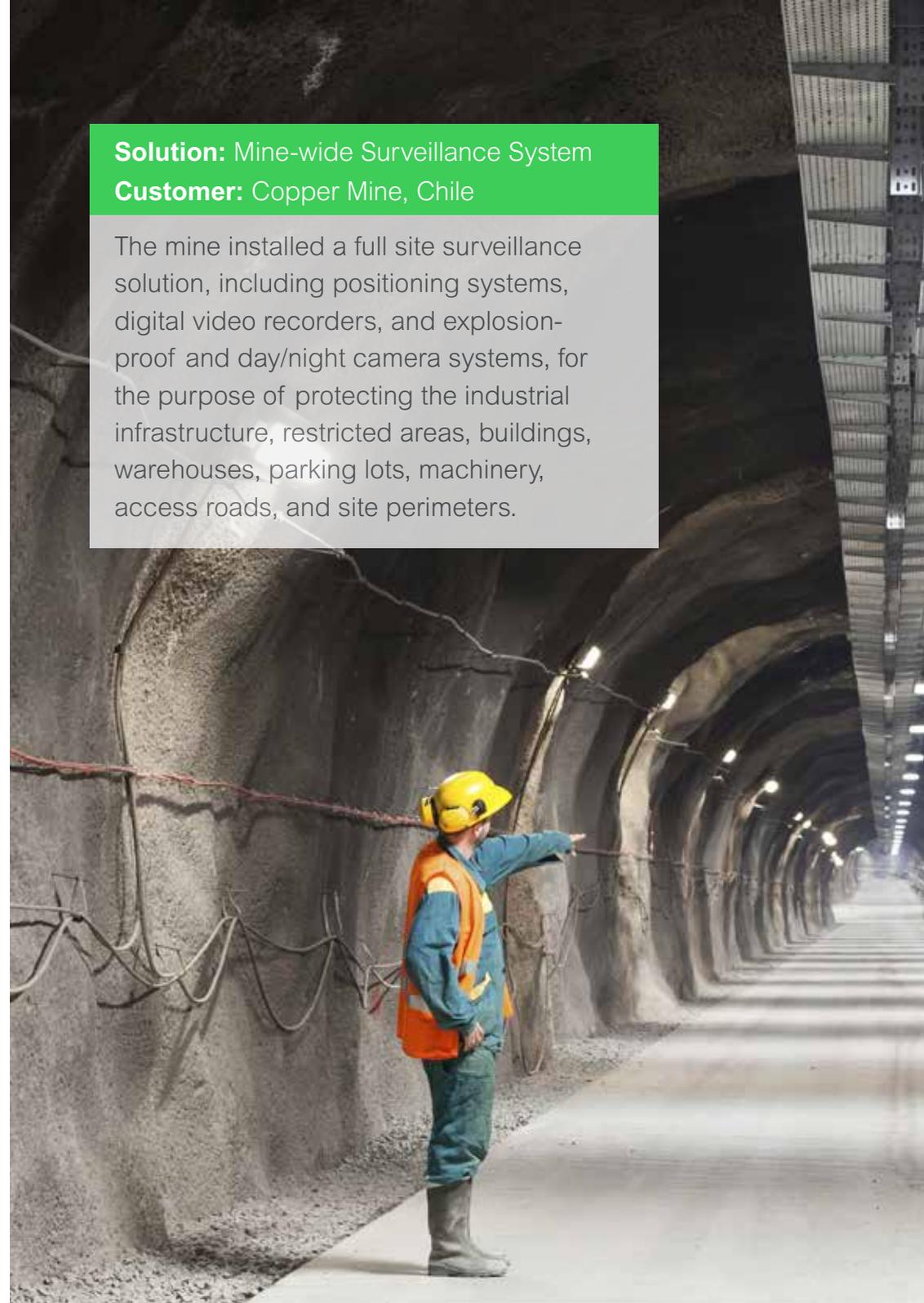
## Integrated Site Security

Pelco by Schneider Electric offers the industry's best security cameras and video surveillance systems. They are designed for exceptional performance indoors or out, with specialty solutions created for industrial needs such as thermal recognition, explosion-proof housings, low lighting conditions, and advanced video analytics.

**Solution:** Mine-wide Surveillance System

**Customer:** Copper Mine, Chile

The mine installed a full site surveillance solution, including positioning systems, digital video recorders, and explosion-proof and day/night camera systems, for the purpose of protecting the industrial infrastructure, restricted areas, buildings, warehouses, parking lots, machinery, access roads, and site perimeters.



# Fuel Management and Truck Maintenance

## Fuel Management

An integrated fuel management system enables miners to get a complete picture of fuel usage at the mine site, including fuel levels in each area, fuel dispensed to each asset, and alarms and reports. Also, unlike other fuel systems, our system is based on industrial grade telemetry that keeps data safe and secure even through a power outage. It is also an open solution enabling integration with other systems

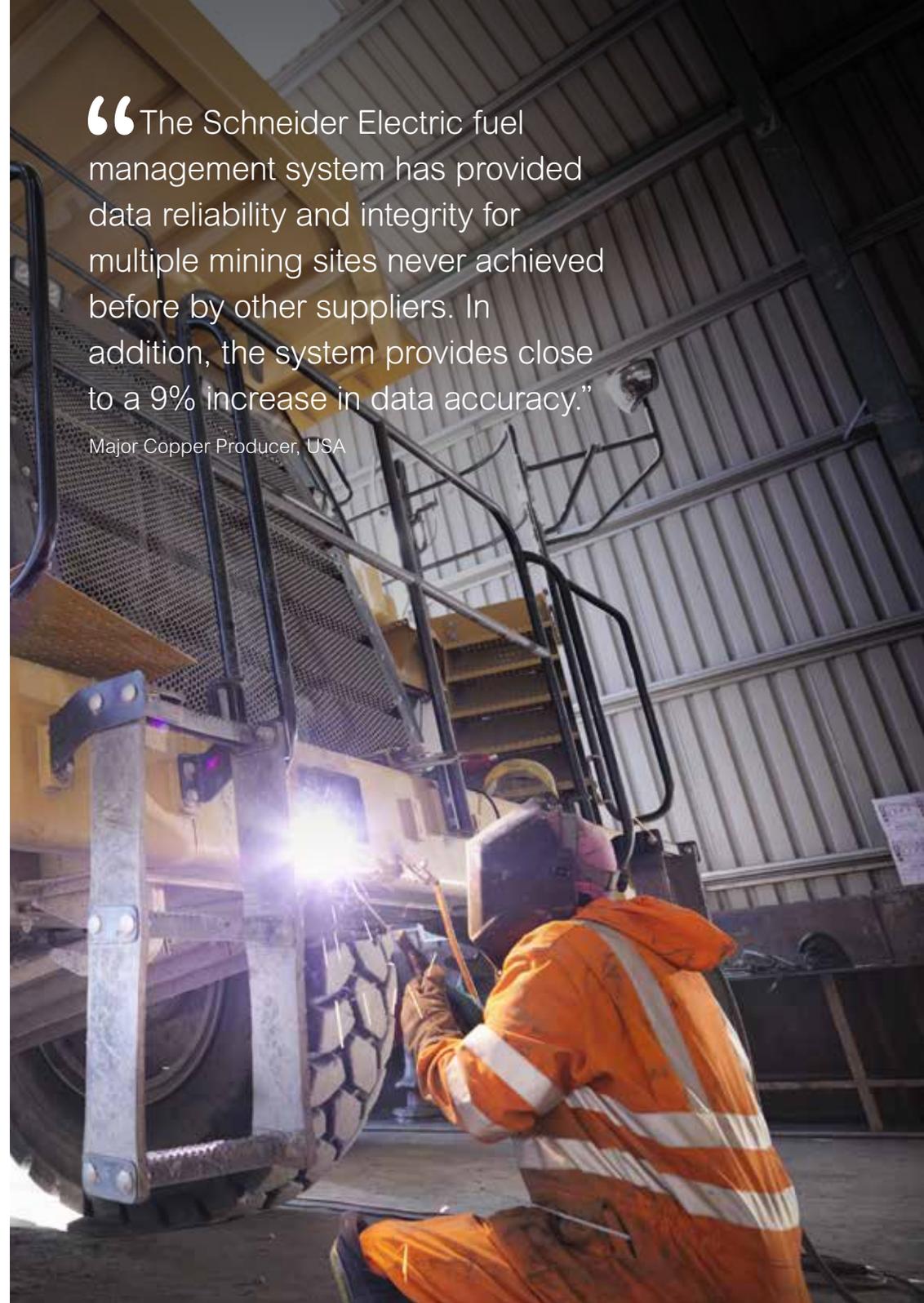
## Integrated Truck Workshop and Warehouse

For the truck maintenance workshop we offer an integrated solution covering two applications:

1. facility infrastructure and process systems, including access control, communications, fire systems, surveillance, water, lubricants and compressed air, and
2. asset management and maintenance management, such as check-in, check-out, parts management, and maintenance activity management.

“The Schneider Electric fuel management system has provided data reliability and integrity for multiple mining sites never achieved before by other suppliers. In addition, the system provides close to a 9% increase in data accuracy.”

Major Copper Producer, USA



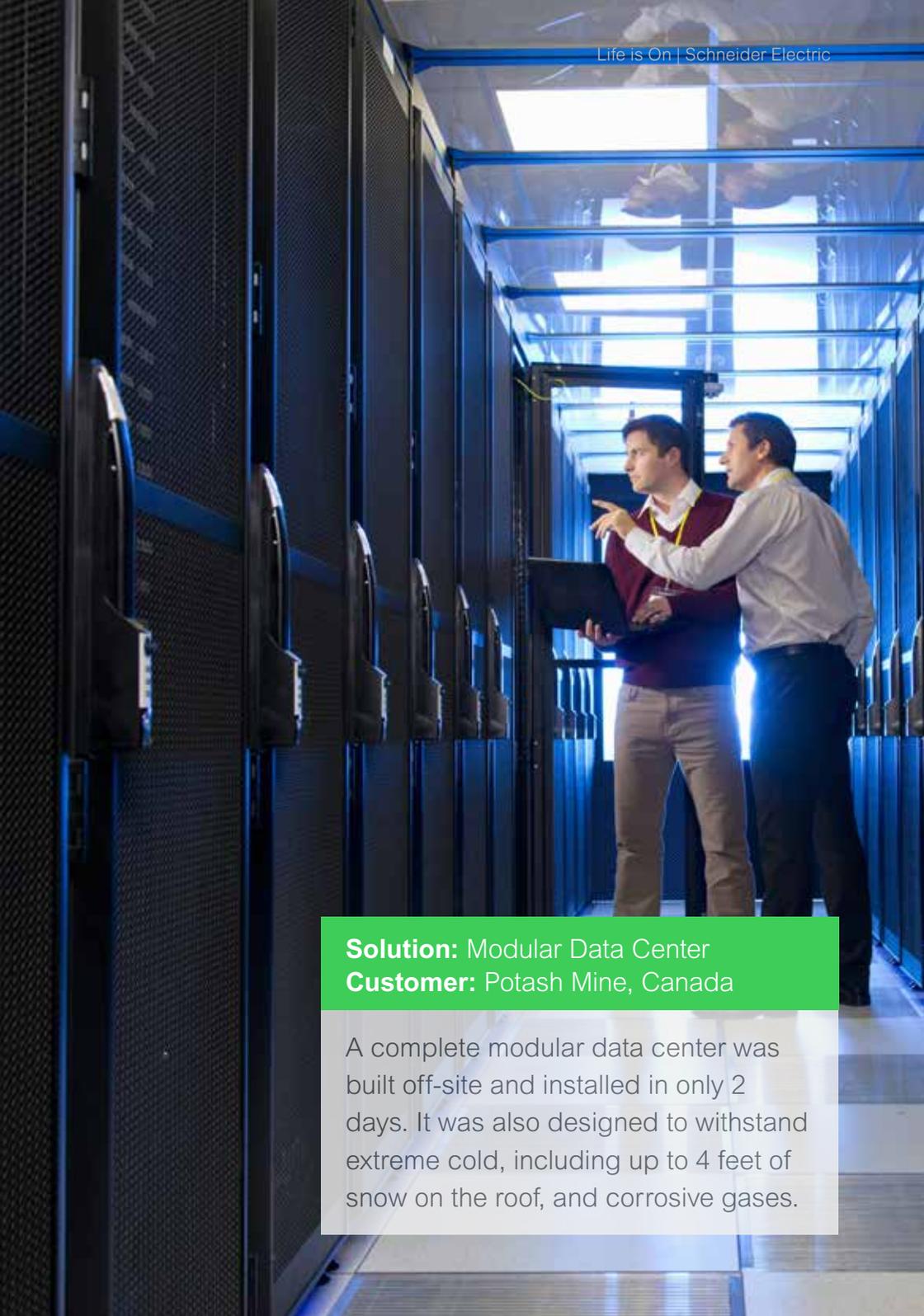
# IT Infrastructure

## Data Center Solutions

Schneider Electric's solutions for data centers include the capability to deliver full enterprise data centers and prefabricated customized systems. Our prefabricated data centers are especially useful in remote mining applications because they are designed to withstand harsh environmental conditions, can be deployed quickly at a mine site, they offer highly predictable performance, and they can be scaled as needed.

## Ruggedized UPS (Uninterruptible Power Supply)

Schneider's Uninterruptible Power Supplies are designed to withstand the harsh environments of mining applications, including seismic activity and extreme temperatures.



**Solution:** Modular Data Center  
**Customer:** Potash Mine, Canada

A complete modular data center was built off-site and installed in only 2 days. It was also designed to withstand extreme cold, including up to 4 feet of snow on the roof, and corrosive gases.

# Services

## Field Services

For over 30 years Schneider Electric Field Services has been modernizing and extending the useful life of equipment for electrical distribution, automation, critical power and building management systems around the world, keeping employees and assets safer and increasing the efficiency and reliability of the overall technical infrastructure at thousands of industrial installations.

## Remote Access Management

Our Monitoring & Diagnostics Services Center can remotely monitor your industrial assets as a service, in which our engineers use predictive analytics technology to monitor all covered assets and provide early warnings and diagnostic guidance. This service enables organizations to improve equipment reliability and performance, and reduce maintenance costs, capital expenditures and total cost of ownership.

## Energy and Sustainability Services

Schneider Electric offers a full scope of energy and sustainability services as well, including demand side, supply side, sustainability strategy (reporting, compliance management) and technology implementation (software, reporting).



**Solution:** Carbon Management and Reporting

**Customer:** Iron Ore Mine, USA

Schneider Electric Sustainability Services delivered analysis and guidance covering sustainability metrics reporting, including consumption of fossil fuels and greenhouse gas emissions. Our support significantly decreased the administrative burden on facility and corporate stakeholders and helped the user to meet EPA compliance deadlines for reporting.

# Projects & Consulting

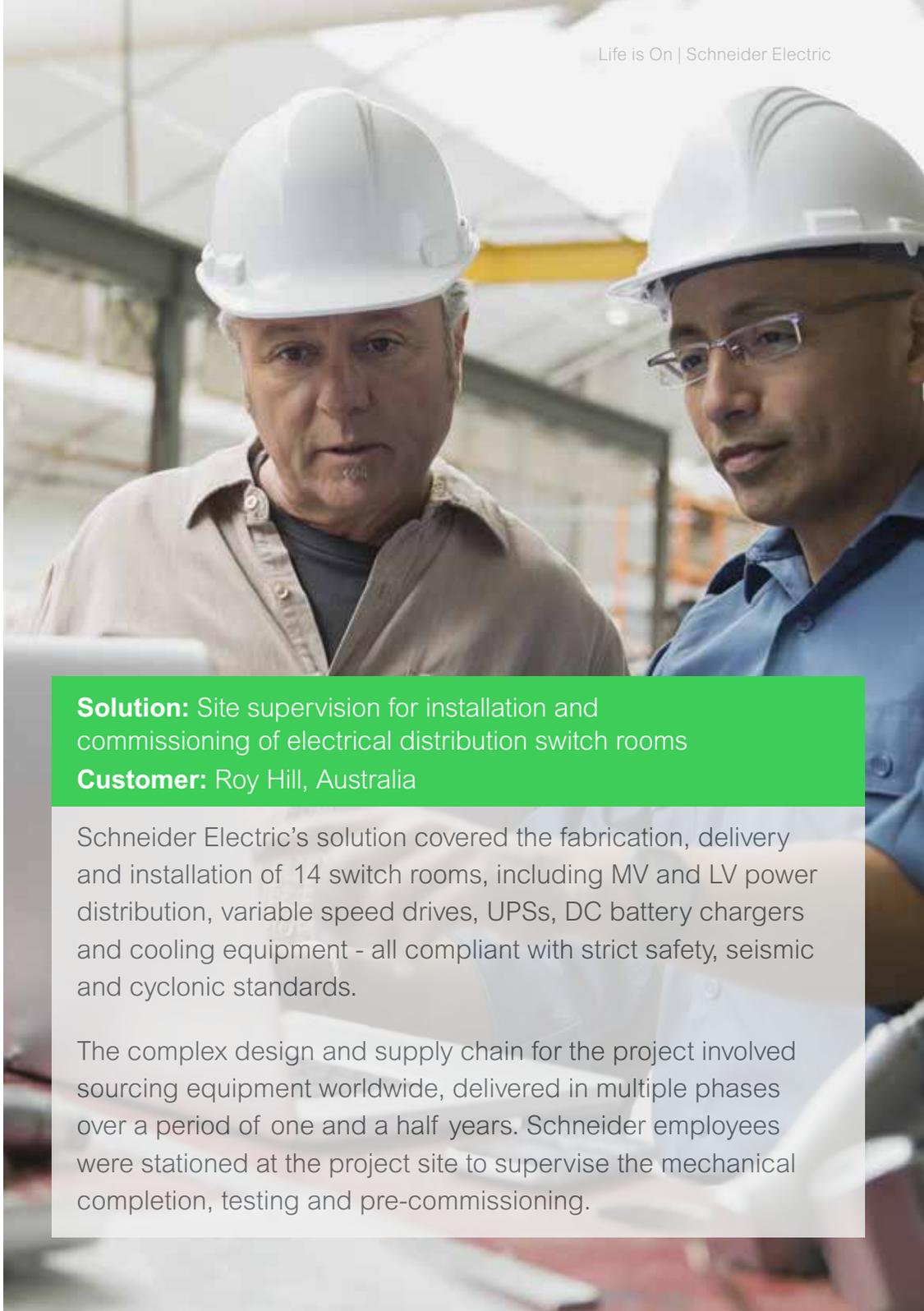
## Projects

Schneider Electric's project delivery organization offers the advantage of being a single, highly qualified source for the definition, design, implementation, testing, installation, commissioning and hand-over of automation, electrical distribution and associated systems for your project.

We employ a robust and proven project delivery methodology that is utilized by project teams around the world, ensuring a standard, consistent approach throughout the project lifecycle, even when multiple teams are involved.

## Consulting

Schneider specialists can help miners get the most of their operations, with proven, experienced consulting for resource to market integration, supply chain management, data management and integration, analytics, asset optimization, process optimization, mineral processing, and energy optimization.

A photograph of two men wearing white hard hats and safety glasses, looking at a document on a construction site. The man on the left is older with grey hair, wearing a tan shirt. The man on the right is younger, wearing a blue shirt and glasses. They are in an industrial setting with scaffolding and equipment in the background.

**Solution:** Site supervision for installation and commissioning of electrical distribution switch rooms

**Customer:** Roy Hill, Australia

Schneider Electric's solution covered the fabrication, delivery and installation of 14 switch rooms, including MV and LV power distribution, variable speed drives, UPSs, DC battery chargers and cooling equipment - all compliant with strict safety, seismic and cyclonic standards.

The complex design and supply chain for the project involved sourcing equipment worldwide, delivered in multiple phases over a period of one and a half years. Schneider employees were stationed at the project site to supervise the mechanical completion, testing and pre-commissioning.

# Integrated Operations Center

## Bringing it all together

Digitization, the IoT, and the Schneider Electric solutions that are enabled by them, allow you to centralize many of the monitoring and control functions for multiple remote operations in a single physical location: the Integrated Operations Center.

And this centralized operations hub gives you the ability to locate certain key front-line workers all under one roof where you can more easily replicate best-practices across all mine sites, optimize the supply chain, foster more efficient problem solving, and deliver savings to the bottom line for a greater competitive edge.



Life Is On

**Schneider**  
Electric™

[schneider-electric.com](https://www.schneider-electric.com)

**Schneider Electric**

35 rue Joseph Monier  
92500 Rueil-Malmaison, France  
Tel : +33 (0)1 41 29 70 00

© 2017 Schneider Electric. All Rights Reserved. Life Is On Schneider Electric is a trademark and the property of Schneider Electric SE, its subsidiaries and affiliated companies  
• 998-20106320\_GMA-US.