

DELIVERING VALUE TO THE MINING INDUSTRY IN AFRICA

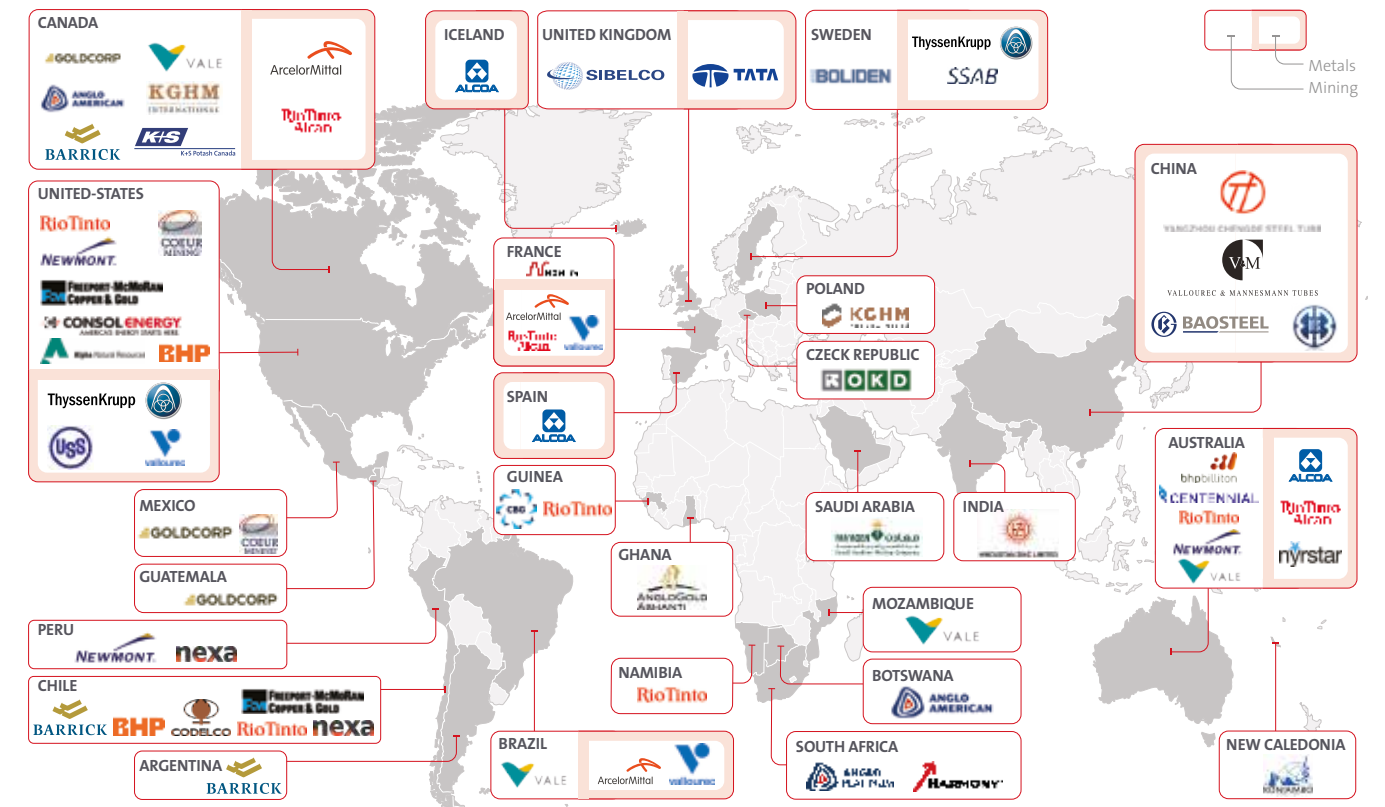


Resourcing the world





OUR GLOBAL EXPERIENCE ENABLES US TO DELIVER VALUE



Delivering value in multiple ways:

- Delivering cost efficiency
- Improving yield to support competitiveness
- Securing license to operate
- Responsibility planning for closure

Almost
1 billion dollars
Revenues in the mining & metals sector

Present in
all 6 continents
Veolia works with companies around the world

VEOLIA IS THE WATER CYCLE AND SALT MANAGEMENT PARTNER OF CHOICE FOR MINES

Our unique Water-Waste-Energy Perspective

Veolia services in mining

Our aim is to create an environmental circular economy, through our holistic approach to the water, waste and energy needs of our customers. This approach is the sum of a phased methodology with a turnkey result (outcome). We assess the customer's needs; break these down into smaller projects; and we align and allocate these projects with our in-house expertise, divisions and technologies to make available the best possible solutions and services.

Veolia's mine water cycle management solutions

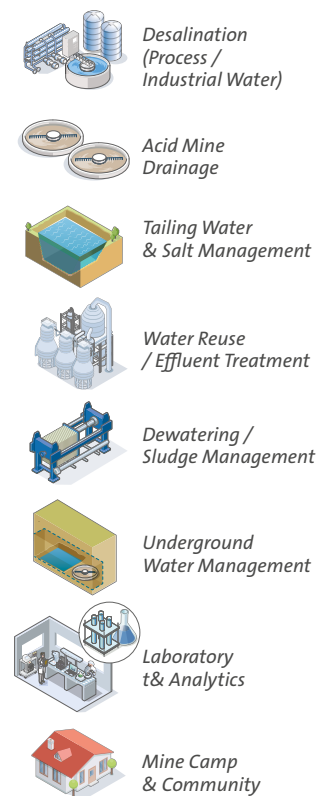
As a global specialist, we deliver the complete management of the entire water cycle. We help our customers reduce their water needs and enhance their productivity gains by establishing a circular economy. Our customised effluent treatment programmes ensure customers achieve full compliance with strict regulations and ESG mandates. Our holistic approach to operation and maintenance services enables us to deliver a complete range of on-site services, technologies and implementation solutions for all our customers' water management needs.

Veolia's mine water cycle management solutions are proven to help mining companies achieve improved environmental sustainability and enhance business profitability throughout the mining life cycle, from exploration to closure. Our customised solutions meet customers' environmental and financial objectives.

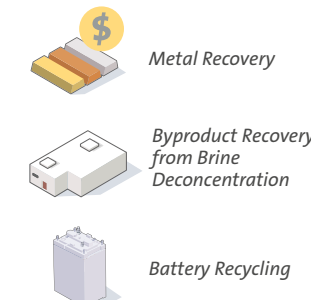
Our solutions:

- Increase cost savings, maintained through consistent process audits
- Improve water recovery & overall yield, to deliver consistent water supply & enable by-product recovery
- Ensure measurement of environmental impact & compliance with regulations
- Enable flexibility & performance stability, enabling resilience in a volatile market.

Water Management



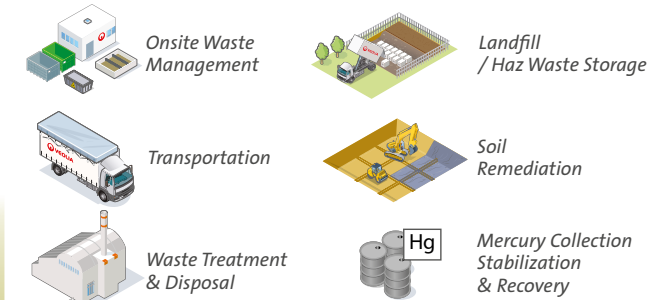
Byproduct Recovery & Recycling



Industrial Cleaning



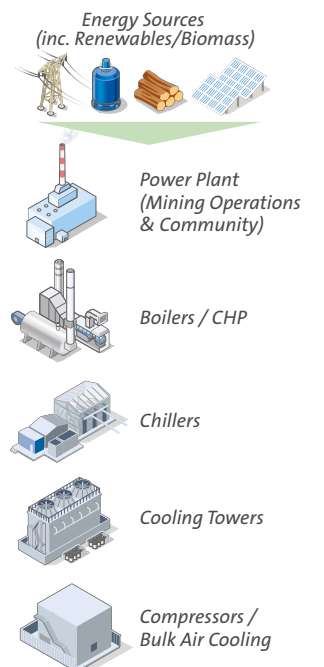
Total Waste Management



Smart Monitoring

Operational Data Monitoring & Online Dashboard Reporting

Energy



Sulfuric Acid Plant



€28,508

billion revenue in 2021

Our extensive geographical footprint gives us a unique perspective and an unrivalled pool of expertise

220,000

employees on 6 continents

We are uniquely able to maximise efficiency and mitigate environmental impact

UNDERGROUND WATER MANAGEMENT

Veolia's water cycle management solutions for underground mines deliver optimisation and control of the mine's water systems. This provides for effective cost saving, ensures consistent water supply and mine performance, as well as enabling management of environmental impact for more sustainable operations, without risking the plant or its operations. Veolia's underground mining operational strategy is very much united with its commitment to meet the needs of our customers' water requirements without compromising the plant or operations. Our approach and service offering includes:

- Water cycle assessment, design and management review
- Segment expertise and technical evaluation
- World class water chemistry assessment and supply
- Operational and maintenance services
- Complete on-site engineering and operational services
- Integrated "smart and intelligent" monitoring and feedback systems.

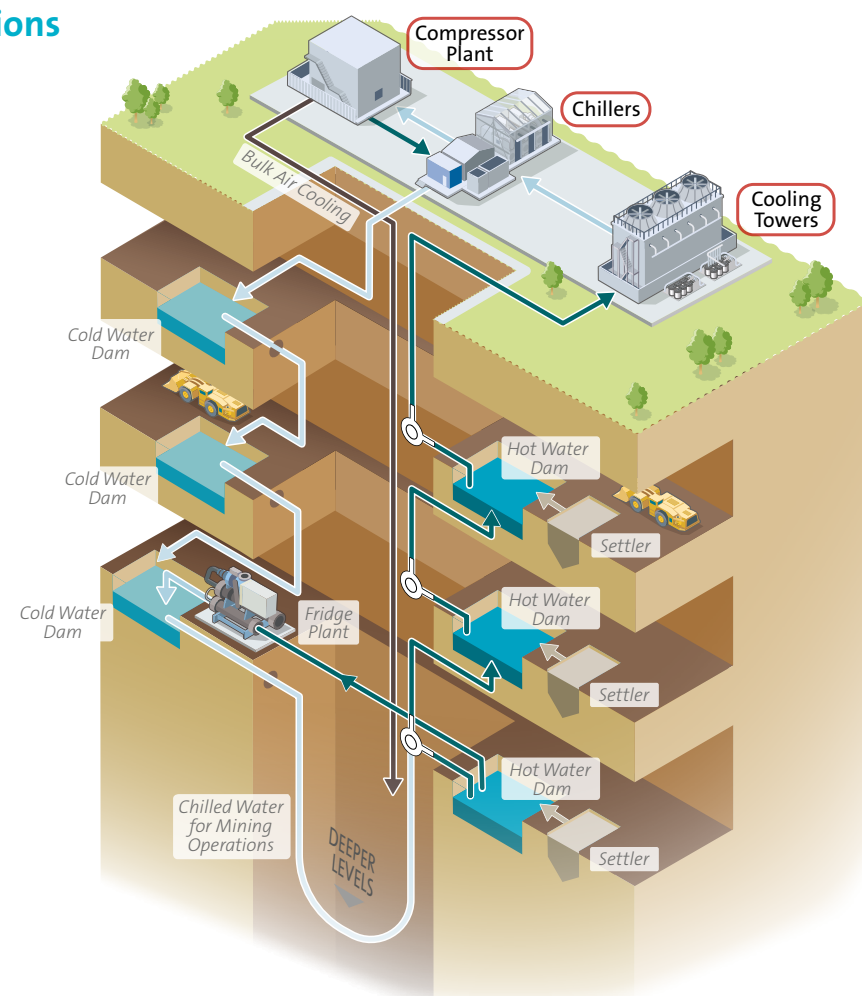
Our services

- Water cycle design
- Engineering
- Procurement
- Maintenance
- Water chemistry assessment
- Monitoring/reporting

Underground mining operations

As part of our approach paradigm in the mining industry, we strongly believe the better we can define and quantify our customers' needs, the better we can allocate resources, align our implementation strategy and deliver value. We create and sustain our value through an in-depth understanding and comprehension of the water balance, key performance indicators (KPIs), as well as mechanical, operational and chemical demand for underground mining.

A typical process flow diagram for underground mining operations "water cycle" is shown here.



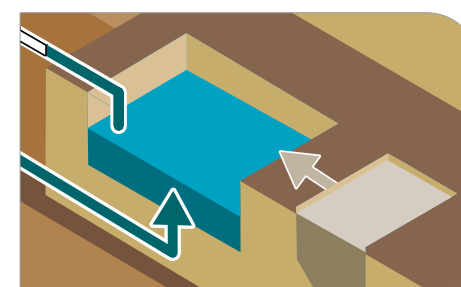
We perform an MOC Audit and work with customers to determine how we can provide guaranteed performance to best suit their needs.

MOC audit

- M** – Mechanical System Survey
- O** – Operational Assessment System Control & Capability
- C** – Chemical (modelled chemistry to resolve system variations)

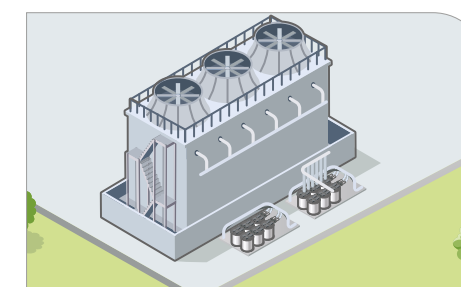
We give focus to the activity, productivity and effectivity of our implementation structure:

- **Activity:** we assess the On-site Staffing Strategy and Skills Development requirements of our personnel
- **Productivity:** we focus on Preventative & Maintenance Planning and a Feedback Report for Structures & Interfaces
- **Effectivity:** we evaluate, design and engineer our chemical programmes, consumption and equipment operation.



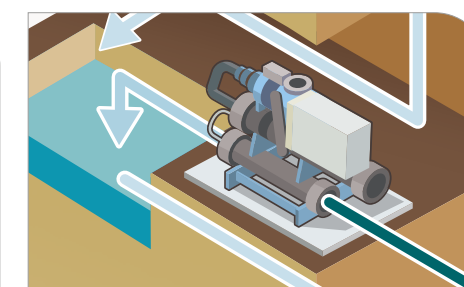
Underground settlers

- Lime & Soda Ash Optimisation
- Composition Holder for flocculants
- Operator/s Training
- pH / Alk Control
- Mud Level Control



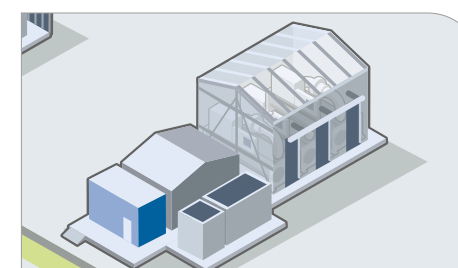
Surface fridge plants

- Multi Function Chemical Programs (High Conc)
- Biocide Optimisation
- Re-use of Mine Water as blended make-up



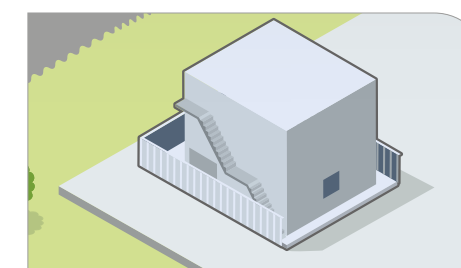
Underground fridge plants

- Multi Function Chemical Programs (High Conc)
- Satellite Dosing
- Biocide Optimisation
- Cond / TDS Control
- Corrosion Inhibitors
- Dosing on Surface
- Filter Plant Optimisation



Chiller dam

- Bacteria, Mold and Algae Control
- pH / Alk Control
- Mud Level Control (Over Carry)

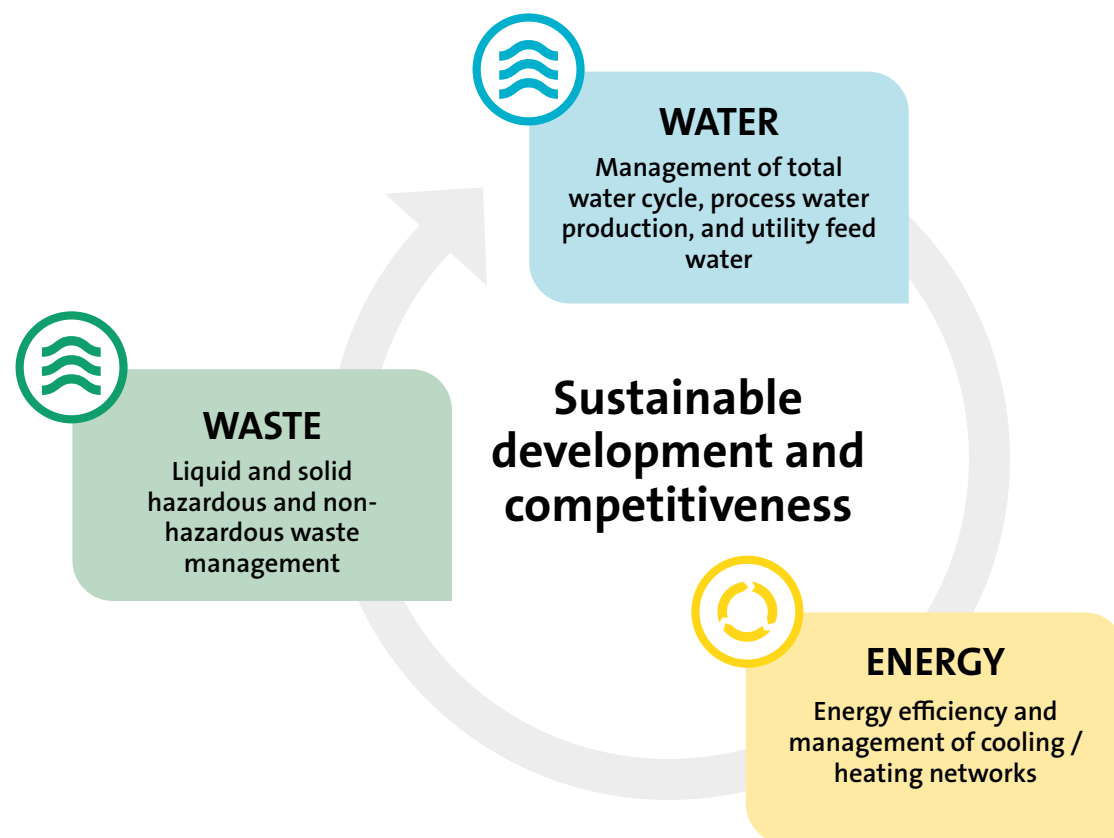


Compressor plant

- Multi Function Chemical Programs (High Conc)
- Algae Control
- Seasonal Optimisation

TAILING WATER AND SALT MANAGEMENT

Veolia's water cycle management solutions address the water challenges of the mining industry globally. They do not focus on one specific water stream as every polluted circuit is ultimately interconnected, and finishes in the mine water system.



Optimising your water cycle operations

Creating optimal solutions and long term operations for process water, tailings and effluent treatment systems.

- Guaranteed performance e.g. water quantity, quality & availability
- Reduce environmental impact through water reuse & byproduct recovery
- Guarantee environmental compliance

Unlocking value from your waste streams

We recover valuable by-product and make it available for beneficial reuse onsite or with 3rd parties. This increases value and can reduce your waste treatment and disposal costs. For example:

- Gypsum valorised in nearby cement plant
- Magnesium Hydroxide valorised as neutralising agent in Biox/CIL process
- Recovery Soluble metals from tailings drainage

CASE STUDY: ANGLOGOLD ASHANTI – OBUASI MINE, GHANA

The challenge: The Obuasi Mine had been in the maintenance phase since 2016 and in 2019, AngloGold Ashanti sought to re-develop the mine. In order to obtain the operating licence, the mine was required to meet the requirements of the Ghana Environmental Protection Agency. AngloGold Ashanti therefore issued a tender for the water management of the mine, including both water for operations and drinking water for employees.

The overall treatment system includes 4 industrial wastewater treatment plants and 2 drinking water treatment plants.

Client needs: Design & build a wastewater treatment plant for the gold mine.

Veolia solutions:

- Capacity: 7.4 MLD x 3
- Aeration (Pre-oxidation)
- Chemical Oxidation
- Clarification – Actiflo™ (Packaged Solution)
- Application: Mining Effluent Reuse
- Removal of Arsenic, Heavy Metals, COD & other Contaminants

The project: Veolia, through its subsidiary Veolia Ghana Limited, has operated the water management system for AngloGold Ashanti's Iduapriem gold mine (in Ghana) since 2014. Building on this experience and this partnership, Veolia proposed a solution that includes the overall management and treatment of water from ore processing and runoff linked to precipitation on the mine perimeter. For the execution of the project, 3 deployment phases were planned:

- Phase 1: Operate & maintain the 6 developed water treatment plants, improving their efficiency;
- Phase 2: Review the complete mine water management system, including the different water sources & propose an effective optimisation of the water treatment system; and
- Phase 3: Propose a solution, a schedule & a cost estimate for the management of brines dissolved in water, including by-products.

The treatment process: The 4 industrial wastewater treatment plants are interconnected by a network of basins:

- A pre-treatment plant removes cyanide by biological treatment methods to obtain pre-treated water
- This water is then conveyed to two plants where a second pre-treatment (settler & cartridges filters) reduces the suspended matter and the turbidity to a sufficiently low level in order to feed the reverse osmosis which will finalise the treatment, to obtain treated water that complies with regulations
- Finally, the third plant treats the effluents that do not contain cyanides.

The 4 industrial wastewater treatment plants have a total hydraulic capacity of 1,850 m³ / h. The 2 drinking water production plants, with a total hydraulic capacity of 360 m³ / h, make it possible to break down suspended matter and disinfect the water before distribution.

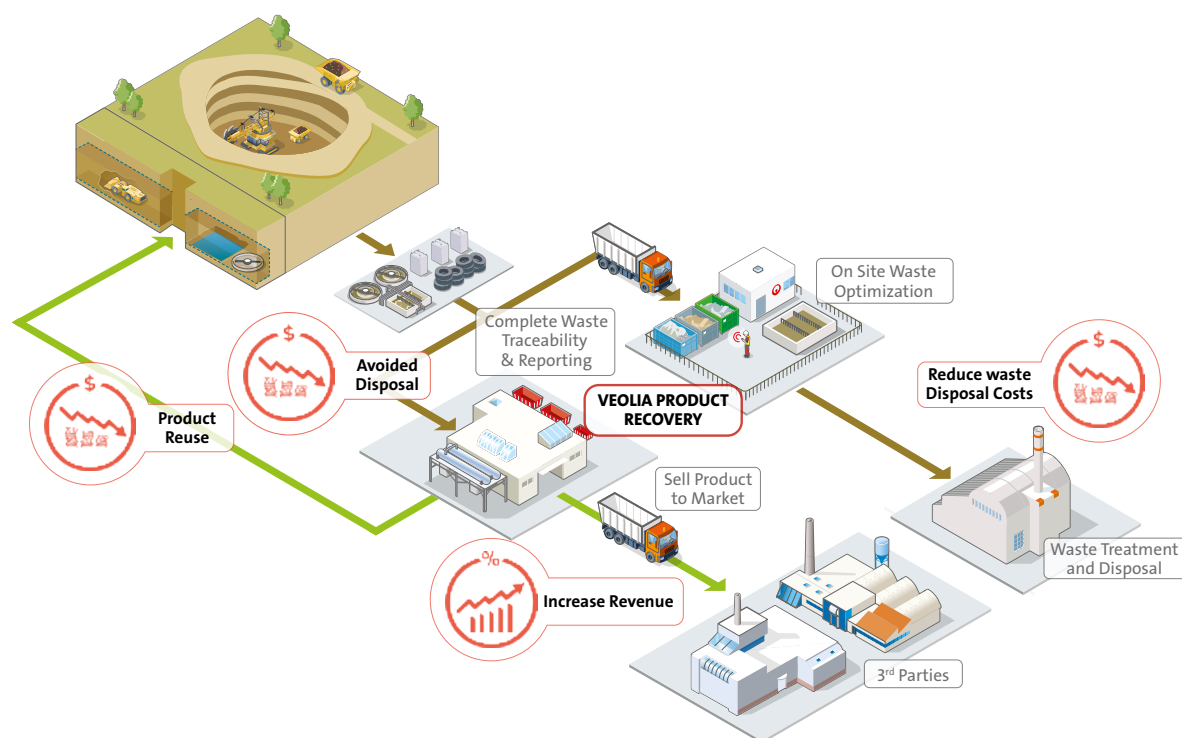
The benefits for the customer: By ensuring that discharges comply with the requirements of the Ghana Environmental Protection Agency, Veolia enables its client to retain its operating license and carry out its core activities. In addition, the deployment in 3 phases makes it possible to control the water treatment system and identify the optimisations necessary to better meet the customer's needs.

Responsible water management and securing zero impact on local and regional water resources is essential in the mining industry.

PRODUCT RECOVERY & METAL RECOVERY

Veolia provides the technology and expertise required for several mining production processes, including by-product waste recovery. We have the capability to transform the by-products from wastewater treatment (sludge, grit and grease) into raw materials that can provide an additional source of revenue for mines.

CASE STUDY: COPPER RECOVERY IN RANCAGUA, CHILE



The challenge: One of the world's largest copper producers is facing an increasingly challenging market, affected by both copper price volatility and increasing production costs, in particular at its copper mine located 120 km South of Santiago de Chile.

In 2013, Veolia established a joint venture (VWP) with Vapor Procesos, a Chilean provider of copper recovery solutions for mining operations, approached the client and secured a 5-year contract to recover copper from tailing ponds, which could boost copper production at the site.

Client needs: Copper recovery from tailing pond acid drainage.

Veolia's solutions: As part of the contract, VWP had to design, build and begin operations of a new mining effluent processing facility. This new facility has an installed capacity to treat 3 million m³ of water per year and can recover a total of approximately 1,680 tonnes of copper by combining various technologies.

The solution has been developed to process tailing drainage with a concentration of soluble copper that is too low to be directly recovered through the traditional Solvent Extraction and Electrowinning process (SX-EW) of the client. A multiple-step recovery process has been implemented so as to concentrate the soluble copper and make it suitable for the client's SX-EW unit.

The benefits for the customer:

This solution operated by Veolia Chile allows to –

- Optimise production cost (the extra copper is recovered from tailings at a cost lower than extraction)
- Boost the total mine production with cost-efficient copper recovery
- Lower the environmental impact by removing copper elements from tailings drainage
- Improve the environmental image of the mine as a more sustainable mine site.

CASE STUDY: KUSASALETHU MINE OPERATIONS, SOUTH AFRICA



The challenge: Kusasalethu Mine Operations required complete maintenance management, operational services and performance solutions for its water related systems and process-units within these systems.

Client needs: Total water management, including the supply of chemicals and equipment, and deployment of on-site personnel.

Veolia solutions:

- Chemical selection, dosage optimisation & supply
- Consumables – 4" RO membranes, cartridge filter elements
- Site laboratory
- Installation of new equipment – 17 off MiniRO, dosing equipment & instruments
- Regular maintenance

The treatment process:

The treated circuits included –

- Settler circuits (between 73 & 113 level settlers)
- Refrigeration plants, including 71 level fridge plants
- Surface cooling circuits, including a condenser cooling circuit & compressor cooling circuit

Quick Facts:

4.42MI water intensity/ ton of ore treated
26 staff on site

OUR PURPOSE: MULTIFACETED PERFORMANCE

Our purpose framework is at the heart of our operations. It serves as the strategic compass for the company, balancing our economic and financial, commercial, environmental, human resources and social performance. This framework also identifies 18 priority goals; to achieve these we must leverage Veolia innovations, our regional partnerships and stakeholder skills.



OUR COMMITMENT TO STAKEHOLDERS

- **5 stakeholders:** Employees, Society, Planet, Clients, Shareholders.
- **5 commitments:** Linked to the UN's Sustainable Development Goals (SDGs), these serve as assessment criteria, against which we evaluate our performance.
- **18 performance objectives:** These are our action priorities. They unify the various business units with a common approach, in the pursuit of our purpose.

Our commitments	Our priority objectives
Environmental performance	<ul style="list-style-type: none"> • Reducing greenhouse gas emissions to combat climate change • Circular economy: recycling • Protection of environments & biodiversity by improving the environmental & biodiversity footprint of sensitive sites • Sustainable management of water resources, to deliver clean drinking water through our networks
Commercial performance	<ul style="list-style-type: none"> • Consolidate the turnover for the hazardous waste treatment & recovery segment • Deployment of new innovative solutions • Enhance customer & consumer satisfaction
Economic & financial performance	<ul style="list-style-type: none"> • Revenue growth • Enhanced business profitability • Boost return on capital investment • Improve investment capacity
Human resources performance	<ul style="list-style-type: none"> • Prioritising safety at work to reduce the rate of occupational injuries • Investment in addition employee training, to enhance employability
Social performance	<ul style="list-style-type: none"> • Increase access to essential services (water & sanitation) • Creation of jobs & wealth in the regions in which we operate

Proven experience & expertise:

With 160 years of experience in the operation of environmental infrastructures, we design & deliver solutions with an effective Total Cost of Ownership, maximise capital & operational expenses.

Unique business model:

We take complete accountability for our daily performance, tracking our progress against measurable KPIs. With project structuring & infrastructure financing experience, we deliver a seamless & synergised solution.

Access to both specialised & bundled service capabilities:

We can create solutions which bundle our specialised capabilities across water, waste, industrial & energy services; delivering economies of scale & a truly robust environmental competence.

Community consultation & stakeholder engagement:

Our experience in the management of municipal & industrial infrastructure enables us to deliver meaningful community education related to your water, waste & energy projects.

Innovation:

Veolia consistently develops research programmes & technologies, and explores new business partnerships dedicated to the mining industry.

Global company with a local footprint:

Working with us means tapping into our worldwide networks wherever you are, while we deliver quality services & workforce development locally.

VEOLIA'S PRESENCE IN AFRICA



Veolia Services Southern Africa and Veolia Ghana Limited are subsidiaries of the global Veolia Group – the leader in optimised resource management – with expertise in the design of water, waste and energy management solutions. Veolia develops access to resources, preserves available resources, and replenishes them.

Drawing on the group's expertise, developed over the last 160 years, as well as its extensive research and its development capabilities, Veolia Services Southern Africa and Veolia West Africa solutions enable the sustainable development of communities and industries. With business operations in 23 African countries, Veolia offers customers and partners access to a network of experts across the African continent, which we have served for over 20 years. From water supply to the provision of energy services, we deliver solutions tailored to local needs.

Veolia Services Southern Africa

With headquarters in Johannesburg, Veolia Services Southern Africa boasts a large regional footprint, with offices in Durban and Paarl, and international offices and operations in neighbouring Botswana and Namibia. Our manufacturing hub, which offers dedicated technical support, is also situated in Johannesburg, serving clients across our global network. Veolia Services Southern Africa has a comprehensive B-BBEE programme in place.

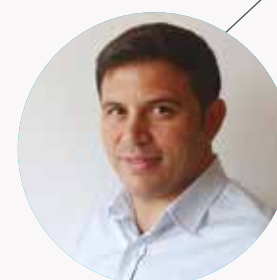
Veolia Ghana Limited

Headquartered in Accra, Veolia Ghana boasts a large footprint in the mining industry, where it offers wastewater treatment services. In addition, the company provides, operates and maintains water and wastewater facilities, solid and liquid waste treatment plants, and energy services.

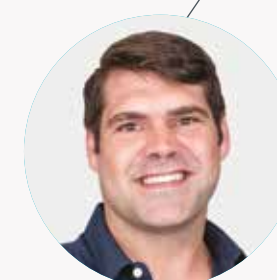


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