

aeciworld.com



ENGINEERED SOLUTIONS



WE ARE ONE AECI, FOR A BETTER WORLD



INTRODUCTION

Our AECI WATER engineering experts deliver a comprehensive range of data and experience-driven services to increase transparency, consistency, and availability across our customer operations. AECI WATER offers competitive and innovative engineered solution aimed at satisfying our clients' needs. We have a vast skills and knowledge base to ensure our designed solutions are sustainable.

WE ARE HERE TO HELP YOU #MAKEADIFFERENCE

AECI WATER leverages industry-leading processes, wide-ranging services and a broad technology portfolio to help you address critical process, water and wastewater needs, while reaching your operational, environmental and sustainability goals. We help customers optimise resources, conserve usage, enhance profitability and ensure stakeholder satisfaction – while positively impacting the bottom line.

AECI WATER works with you to engineer a solution for your water management needs.

DESIGN TECHNOLOGIES

SPECIALISED DESIGN CAPABILITIES

We have the capability and software for design modeling and simulation for the following:

- Precipitation calculations
- Solids /liquid separations
- Hydraulic design
- Ion exchange and desalination modeling
- Scale prediction
- Water remineralisation and sanitisation
- Computational fluid dynamic (CFD) modeling

DIFFERENTIATION

- Integration of renewable energies into process designs
- Incorporation of waste to energy/ value technologies as part of technology offerings
- Alliance with global technology partners and suppliers
- Incorporation of various degrees of digital technology and monitoring solutions
- Our footprint extends throughout Africa and the Indian Ocean islands
- Local enterprise and supplier development offers technology-agnostic solutions
- Designs are approved by dedicated experts

ON-SITE SERVICES

- Water balance and plant performance audits
- CIP's on RO and UF using specialised chemistry
- Plant maintenance and repairs
- Plant operation and control
- On-the-job skills development
- Technical training
- Pilot-plant studies

ENGINEERED SOLUTIONS

PACKAGE PLANTS & STANDARD EQUIPMENT



Modular Package Plants | Clarifiers | Dissolved Air Flotation Units | Multimedia Filters | Water Softeners | Demineralisation Plants | Disinfection Systems | Membrane Filtration Systems (MF, UF, NF, RO & MBR) | Chemical Dosing & Control Systems | Maintenance Spares & Membrane Filter Replacements



Dosing and control system



Containerised drinking water plant
(Filtration, oxidation)



Clarifiers

CUSTOM-ENGINEERED SOLUTIONS



Integrated Water Treatment Plant Design and Project Management | Industrial Water, Potable Water and Wastewater Treatment Plants | Front-end Design Packages | Water and Salt Balance Studies to achieve optimum water reuse and recycle objectives | Pilot Plant Studies | Turnkey Projects (Build-for-sale and Build, Own & Operate) | Project Management (Document control and project coordination, EPC)



Demin water (45 m³/h), side stream filtration condensate polishing, potable water



Designed and built water treatment plant to upgrade surplus fissure water to process, potable and service water quality



Treating surplus mine water to meet river discharge standards
5,2 million litres/day



Typical side stream filtration plant ranging from 10 m³/hr to 400 m³/hr



Side stream filtration designed and built for a plant in Peru, 8 vessels capable of filtering 800 m³/hr

WE ARE COMMITTED TO A SUSTAINABLE FUTURE AND A BETTER WORLD FOR ALL THROUGH ALIGNMENT TO SEVERAL OF THE UN SUSTAINABILITY DEVELOPMENT GOALS.

PILOT TESTING

Proof of concept capabilities – conduct various pilot operations before and during the design phase.



Mobile chlorine dioxide unit



Biological digestion pilot study



Pilot-plant evaporative crystallisation



UF pilot skid

Multi-membrane technology capabilities
– UF Membrane IN/Out PES
– MF/UF Membrane Out/in - PVDF



Wastewater treatment pilot plants

Modular units which can be configured according to process design as 'proof of concept'



Pilot cooling tower

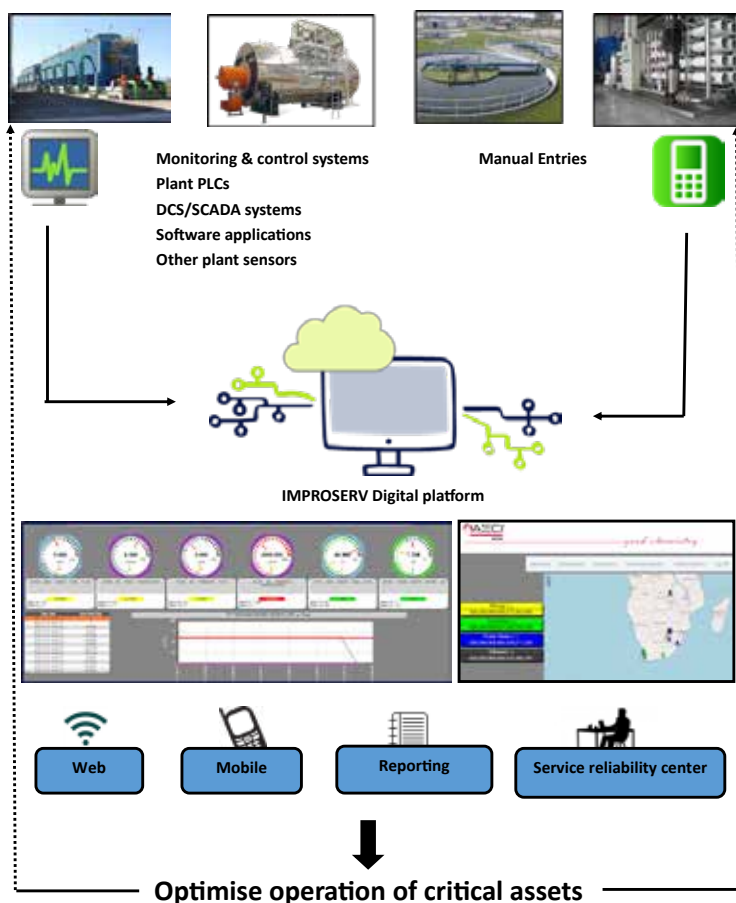
Testing treatment programs for alternative water sources

DIGITAL ASSET PERFORMANCE MANAGEMENT

AECI WATER applies best-in-class water and process chemicals, treatment services, subject matter expertise, and digital tools to optimise your resources, conserve usage and enhance profitability.

The Internet of Things, or IOT, is a rapidly evolving area that brings together people, machines and data to enable industrial assets to perform at elevated output, efficiency and reliability levels. In partnership with various technology partners, AECI WATER offers a unique suite of online monitoring and control systems, as well as digital asset performance management (APM) tools specifically designed to extend the life of critical assets and reduce operating costs.

DIGITAL ASSET PERFORMANCE MANAGEMENT



CASE STUDY 1

ALTERNATIVE WATER SOURCE TREATMENT - AECI MINING

THE CHALLENGE

AECI's goal is to reduce / replace 2 billion litres of potable water in the private industrial sector in five years. Availability of three water sources, namely: PSE water (process sewage effluent), effluent water from the site run-off, and cooling tower blow-down from two cooling towers on site.

THE SOLUTION

- Due to these streams having different chemistries, different technologies were utilised to ensure proper treatment and long-term sustainability.
- All streams are treated to the correct specification for re-use as feed to cooling towers and boiler systems.
- Technologies include DAF/ GAC, UF tolerating up to 5ppm oil; RO with our ZeeWeed 500D® ensuring a particulate -free effluent.

THE CONCLUSION

- AECI WATER designed, built, supplied and are operating a water-treatment plant that will produce 60 m³/hr of treated water which will be fed to the cooling towers and demin plant for operation of the boilers.

The RETURN ON INVESTMENT

- A R30-million state-of-the-art water- treatment plant designed to save the city 400 million litres of potable water per year, which is sufficient for 4600 people annually!



CASE STUDY 2

AECI WATER PROVIDES NOT JUST SUSTAINABLE WATER, BUT ALSO SOLUTIONS YIELDING BENEFITS ON AIR QUALITY COMPLIANCE AND IMPROVED ENERGY EFFICIENCY TO A KEY FOOD & BEVERAGE CUSTOMER.

THE CHALLENGE

AECI's goal is to reduce / replace 2 billion litres of potable water in the private industrial sector in five years.

THE SOLUTION

- Borehole water is upgraded to feed 3 x 20 ton and 2 x 8 ton boilers. The AECI WATER treatment plant produces on average 11 m³/hour of good quality water. The treated borehole water is then used directly into the boilers as feed water, eliminating the use of softener.

THE CONCLUSION

- Borehole water treatment for boilers, saving close to 100 million litres per annum
- Design 16 m³/hr
- Positive impact on boiler operation and carbon footprint by enabling a reduction in CO₂ emissions due to better feed-water quality.

The RETURN ON INVESTMENT

- Increased cycles of concentration in boiler, leading to a saving of water, fuel and reducing air emissions from the boiler stacks.
- Sustainable operation.



CASE STUDY 3

A 5 MILLION LITRES PER DAY WATER-TREATMENT PLANT BUILT AND COMMISSIONED ON THE BANKS OF THE CALEDON RIVER

THE CHALLENGE

To make water available to the community on the banks of the Caledon River in Lesotho

THE SOLUTION

- The plant consists of the following treatment sections:
- Pontoon for river water abstraction
- Pre-coagulation to destabilise the colloidal suspension for high turbidity waters
- Pre-clarification tank with 5-hour retention and desludging manifold for solid removal
- Second coagulation to destabilise the colloidal suspension of fine particles for low-turbidity waters
- Mixing chambers for rapid and slow mixing
- Solids/ liquid separation step utilising clarifiers
- Pressure sand filters for pin floc removal
- Sand filter backwashing facility to remove entrained suspended solids from sand filters
- Installation of a product water disinfection facility utilising chlorine gas

THE CONCLUSION

- AECI WATER designed, built and installed treatment plant will take close to 2 million litres of water from the Caledon (Mohokare) River. The water will be pumped to the water-treatment plant using a pontoon system where it will be treated to meet potable water standards as set out in the SANS 241-1:2015 and WHO Standards.

The RETURN ON INVESTMENT

- Water availability, opening up downstream business opportunities.



CASE STUDY 4

CIRCULAR MINING SOLUTIONS – WATER RE-USE PROJECT FOR KEY MINING CUSTOMER

THE CHALLENGE

Owing to municipal water supply challenges in the Welkom area, AECI WATER partnered with a key gold-mining customer to investigate repurposing alternative water sources to a quality deemed acceptable by the gold plant.

THE SOLUTION

- AECI Water designed, installed, commissioned and are operating and maintaining a 43 m³/hr water treatment plant. Each building block is uniquely designed according to the chemistry of the alternative water source.

THE CONCLUSION

- Cost-effective and sustainable solution to treat alternative water to a suitable chemical and microbiological standard to replace the potable water (Sedibeng) being used on the plant (plant design 43 m³/hr) 332 million litres of potable water replacement per annum.

The RETURN ON INVESTMENT

- Delivering improved water quality that will further optimise plant processes and realise further operational benefits
- Enhancing sustainability of operations by removing dependence on municipal water supply
- Unlocking potable water cost-savings
- Contributing to improved gold recoveries



CASE STUDY 5

CIRCULAR INDUSTRIAL SOLUTIONS – WATER RE-USE PROJECT FOR AECI FOOD & BEVERAGE

THE CHALLENGE

AECI's goal is to reduce / replace 2 billion litres of potable water in the private industrial sector in five years.

Alternative water solution: RO plant operational.

Managing high dissolved iron and salt content

THE SOLUTION

- STEP 1 – Iron removal with DAF
- STEP 2 – AFM filtration for suspended solids removal
- STEP 3 – GAC filtration for polishing
- STEP 4 – RO for desalination
- STEP 5 – Calcite filter for re-mineralisation

THE CONCLUSION

- Reducing potable water usage by 30% . Target to have 100% potable water replaced with RO water provided water can be used in production
- Plant capacity is 6 m³/h product water

The RETURN ON INVESTMENT

- A water-treatment plant designed to supply water from an onsite borehole, reducing potable water demand by almost 24 million litres per year.



CASE STUDY 6

CIRCULAR MINING SOLUTIONS – THE MINE BENEFITS FROM A SIGNIFICANT CONTRIBUTION TO THEIR CORPORATE WATER SAVINGS AND ENVIRONMENTAL IMPACT REDUCTION GOALS, AS WELL AS IMPROVED RECOVERIES (REDUCED FOULING)

THE CHALLENGE

Our goal is to reduce / replace 2 billion litres of potable water in the mining sector in five years. Reduction in potable water consumption

Treating and re-using excess underground fissure water

THE SOLUTION

- Desalination to potable water standard

THE CONCLUSION

- AECI WATER is managing this customer site where underground fissure water is upgraded to potable water standards. A true sustainability project.

The RETURN ON INVESTMENT

- Reduction in potable water consumption
- Treating and re-using excess underground fissure water
- Desalination to potable water standard
- Replaced 1 billion litres of potable water per year
- Sustainability of mining operation



CASE STUDY 7

DESALINATION TO POTABLE WATER STANDARDS

THE CHALLENGE

Our goal is to reduce / replace 2 billion liters of potable water in the industrial sector in five years. Reduction in potable water consumption through the use of alternative water sources.

THE SOLUTION

- Desalination to potable water standard
- Given the high energy cost of desalination, the incorporation of ERD devices significantly reduces the energy demand
- AECI WATER designed, built, installed, commissioned and are operating various desalination plants in the Western Cape. Desalination plants, if designed correctly, are sustainable and cost-effective. Taking into account the high costs of energy associated with desalination, an energy recovery device (ERD) is part of the design. This technology reduces power consumption in terms of kW/m³ by 30- 50%, depending on the feed source of the water.

THE CONCLUSION

- The addition of the desalination plants enhanced the sustainability of fishmeal supply.
- The first 36 m³/h containerised desalination plant at St Helena Bay, comprising 10 reverse osmosis vessels and 70 membranes, can produce 864 000 l/d of water. The 26 m³/h Amawandle pelagic plant has seven reverse osmosis vessels and 49 membranes. The plant has the capacity to produce 624 000 l/d of water. Both AECI WATER plants source sea water from beach wells.

The RETURN ON INVESTMENT

- Sustainable water supply
- Production security
- Designed to save almost 500 million litres of potable water per annum.



NEW TECHNOLOGY AND INNOVATION



Zero Liquid Effluent Discharge

- Circular disc membranes – For challenging waste water and brine solutions. Can handle much higher feed SDI's than conventional RO membranes. Can also operate up to 140 bar to help recover as much water from brine streams as possible
- Vibrating shear enhanced processing – for highly challenging waste waters, containing high amounts of BOD, COD & FOG. Can also tolerate much higher SDI and suspended solids loading than conventional membranes and circular disc membranes
- Ceramic membranes – can be used for water with higher FOG/ COD concentrations as opposed to normal UF membranes
- Sea water high pressure membranes
- Gas scrubbing membranes
- LP evaporator & crystalizer units. Using a vacuum to reduce boiling points to reduce overall energy requirement for ZLD solutions of highly concentrated waste streams



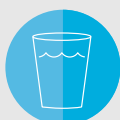
Disinfection

- Chlorine dioxide in-situ generation in liquid phase
- Electro-oxidation
- Ultra-violet disinfection technologies
- Oxonia – potential opportunities in F&B and pharmaceutical industries



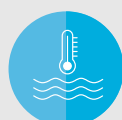
Other Engineered Solutions

- High suspended solids clarification technology (sectional panel clarifier)
- Ion exchange (moving bed reactor)
- Electro-coagulation – non-chemical pre-treatment solution that can also help reduce COD, phosphates and dissolved metals



Mechanical Filtration

- Membrane use for clarification, desalination and protein recovery
- Multi-media filtration
- Fibre disk Filter (FDF)[™] – focus on 5 µm filtration. Can be used to replace non-back-washable cartridge filters, for replacement of conventional sand filtration, pre-treatment for UF or can act as a final polishing unit for potable water applications
- Glass media with unique phosphate-removing product that aids in oil removal. Cut rate is 15 µm as compared to conventional media with 35-50 µm cut rate. Can provide much clearer water product with lower backwash water consumption
- Oil removal systems
- Course aggregate filters



Biological / Organic

- Organic waste digestion to energy for reduction in external energy dependency
- MBR (membrane bio-reactor) & MABR (membrane aerated biofilm reactor) technology for organic waste digestion (no energy) in an effort to achieve Green Drop status
- MBBR technology for organic waste (no energy)
- Biological assisted technology for nitrite and ammonia removal.



Vibrating membranes



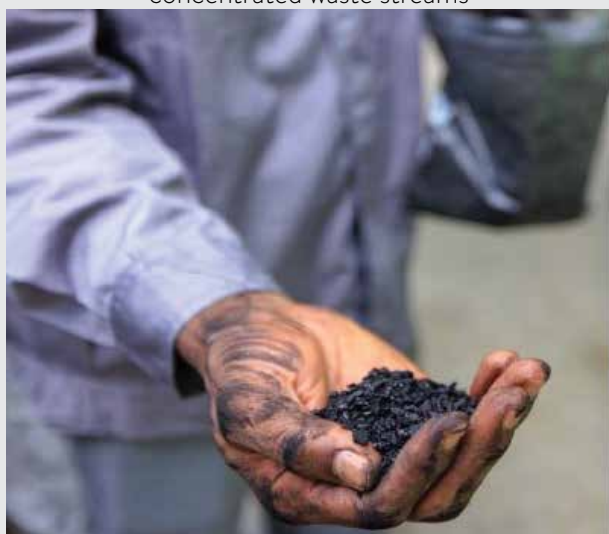
FDF™ for sustainable filtration (< 5 Micron nominal)



LP evaporator & crystalliser units. Using vacuum to reduce boiling points to reduce overall energy requirement for ZLD solutions of highly concentrated waste streams



CD membrane modules



Granular Coconut Shell Based Activated Carbon



ZeeWeed 700B Fibre

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