AQUADVANCED® Water Networks

Monitor network efficiency and water quality in your distribution network in real-time

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Challenges undertaken

REDUCING WATER LOSSES

ENSURING ACCESS TO SAFE DRINKING WATER 24/7 TO ALL CONSUMERS
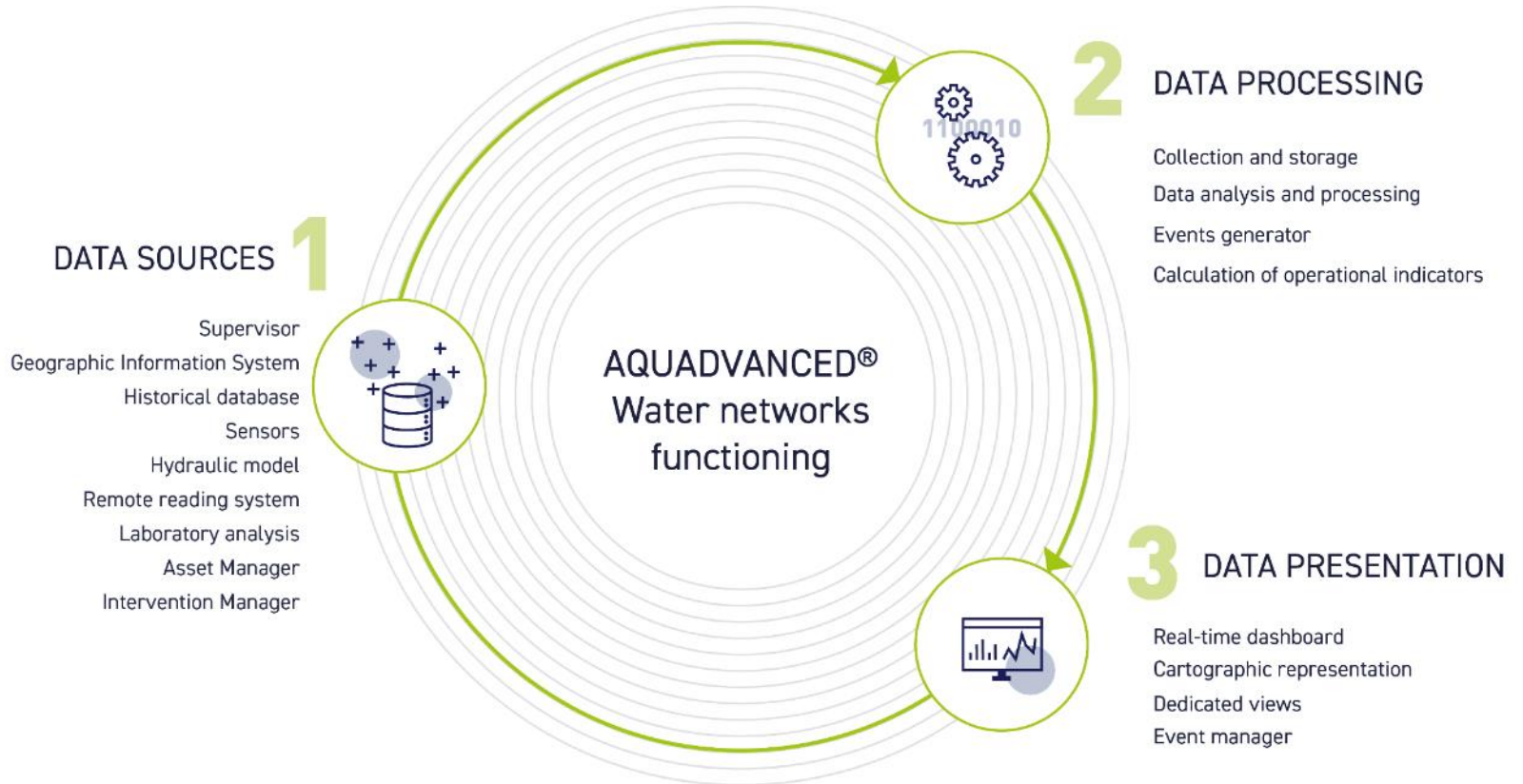
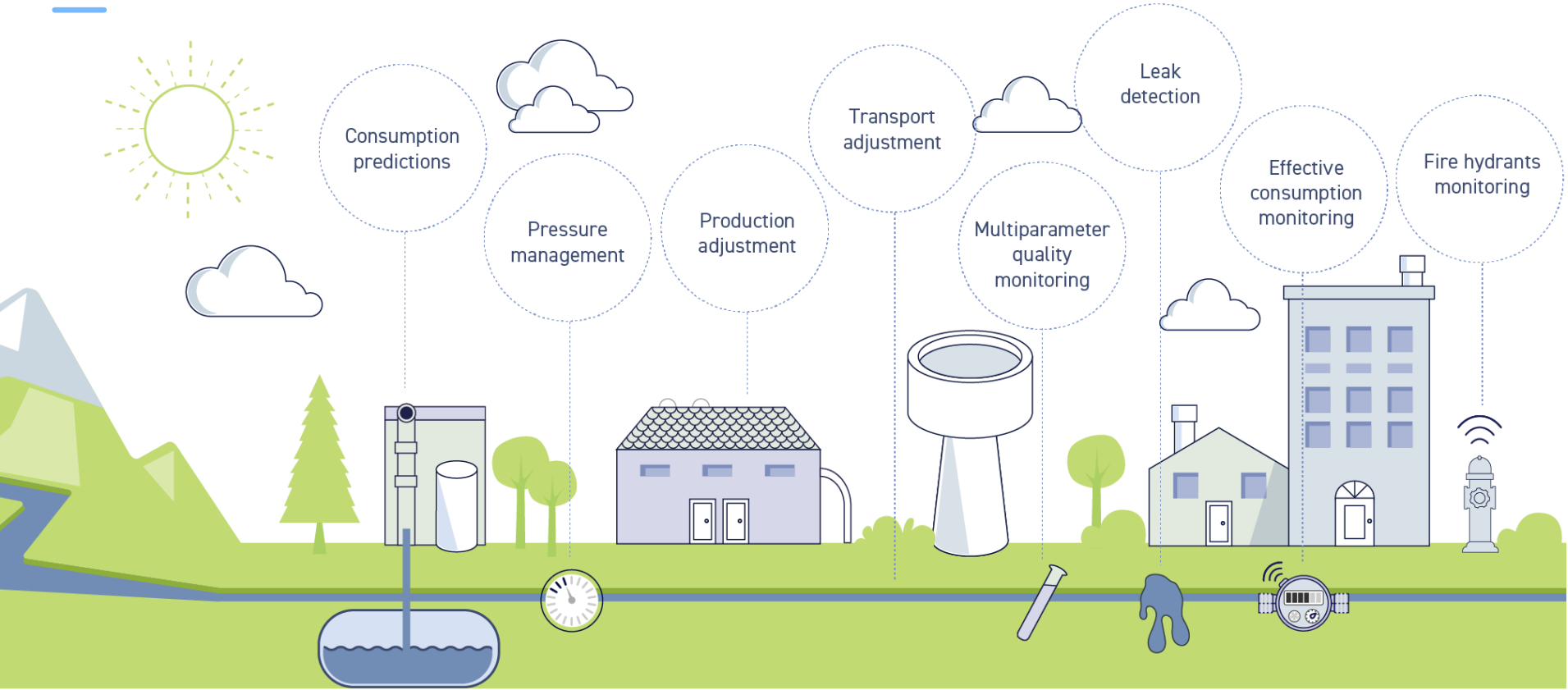**IMPROVING OPERATIONAL AND ECONOMIC PERFORMANCE**

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Solution

CONTINUOUSLY MONITOR AND CONTROL YOUR WATER NETWORK PERFORMANCE

⇛ **AQUADVANCED® Water Networks** is a real-time software solution dedicated to the performance of drinking water networks and **preservation of water resources.**

⇛ It provides operators of drinking water production, transport and distribution networks a **day-to-day management tool** for continuous monitoring of operations and easy management of incidents for reducing water losses and real-time water quality control.

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How it works

DATA SOURCES **1**

Supervisor
Geographic Information System
Historical database
Sensors
Hydraulic model
Remote reading system
Laboratory analysis
Asset Manager
Intervention Manager

2 ## DATA PROCESSING

Collection and storage
Data analysis and processing
Events generator
Calculation of operational indicators

3 ## DATA PRESENTATION

Real-time dashboard
Cartographic representation
Dedicated views
Event manager

AQUADVANCED®
Water networks
functioning

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Benefits

CONTINUOUS MONITORING OF WATER QUALITY
Thousands of physicochemical and bacteriological parameters analyzed in real time

TRACKING AND SECURING THE DRINKING WATER NETWORK
90% of detected events are confirmed

IMPROVED NETWORK EFFICIENCY
Gains of 2% to 5% on network efficiency

OPTIMIZATION OF WATER PRODUCTION AND TRANSPORT COSTS
5% savings on water production energy costs

Monitoring

⇛ REDUCING WATER LOSSES

- Network performance dashboard
- Monitoring of major customers' consumption
- Acoustic leak detection
- Data from smart water meters

⇛ WATER QUALITY MONITORING

- Quality dashboard
- Water quality maps
- Virtual sensors
- Sampling points & lab analyses
- Monitoring of the fire hydrant
- Monitoring of sampling compliance
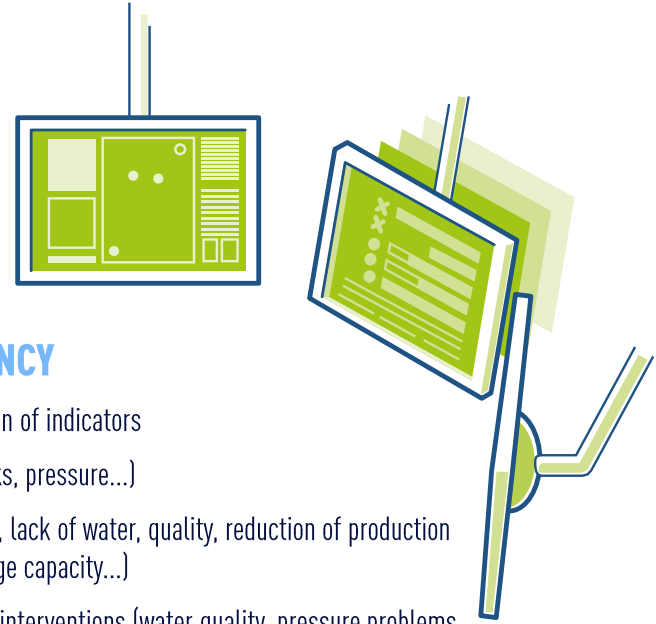
⇛ OPERATIONAL EFFICIENCY

- Real-time dashboard and calculation of indicators
- Automatic detection of events (leaks, pressure...)
- Real-time alerts (sensor anomalies, lack of water, quality, reduction of production and transport capacities, low storage capacity...)
- Geo-referencing of complaints and interventions (water quality, pressure problems, leaks, maintenance, etc.)
- Monitoring compliance with contractual commitments on volumes (declaration of public utility, water purchases/sales, etc.)

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Anticipation


WATER CONSUMPTION FORECASTS

- Real-time calculation of forecast water consumption profiles for all supply areas based on influential data (calendar information, weather, etc.)

RISK ANTICIPATION

- Centralization of information on future operations limiting the supply capacity of the network

- Predictive detection of risks to the security of supply (water shortages, low storage, etc.) caused by the accumulation of constraints on the production and transport network
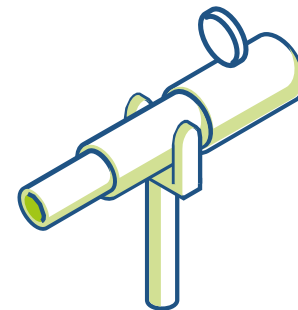
SIMULATIONS AND PREDICTIVE SCENARIOS

- Definition of fictitious or previously encountered operating scenarios

- Simulation of variable constraints (capacity, consumption, structural changes in the network) on supply

- Identification of the best alternative supply solutions (use of back-up facilities, interconnections, manual facilities, etc.)

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Advanced control

⇛ **OPTIMIZED WATER PRODUCTION STRATEGIES**

- Calculation of water production strategies based on demand forecasts and constraints (quality, pressure, operation, etc.) and guaranteeing the security of supply

- Optimization of costs generated by the production, transport and purchase of water

⇛ **RESOURCE ALLOCATION SCENARIOS**

- Prioritized allocation of water according to different uses

⇛ **OPTIMIZED MONITORING**

- Transmission of commands and instructions to equipment (pumps and valves) and structures (production plant, pumping station, control valves) via supervision
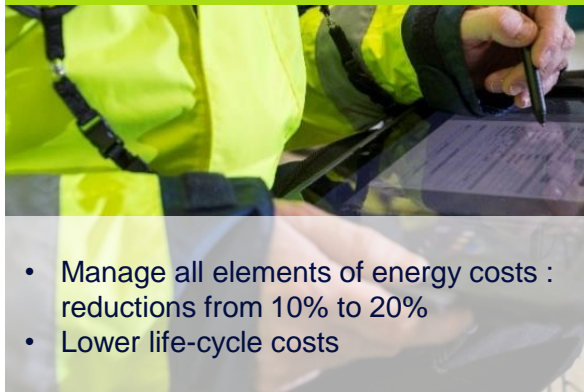
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AQUADVANCED® Energy

Real time energy management software for water utilities

DRIVERS FOR ENERGY OPTIMIZATION IN DRINKING WATER SYSTEMS

Reduce Operating Costs

- Manage all elements of energy costs : reductions from 10% to 20%
- Lower life-cycle costs

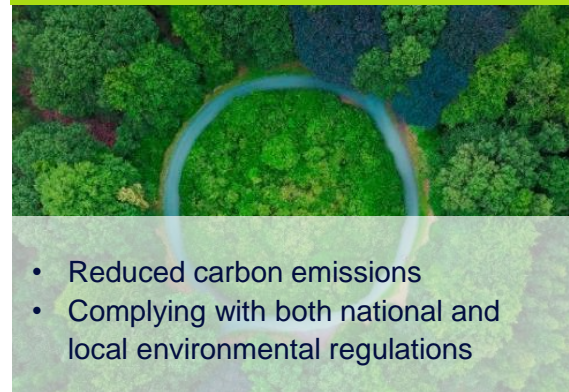## NUMEROUS BENEFITS FOR USERS

Optimize Management of drinking water production

- Supporting uninterrupted supply night and day
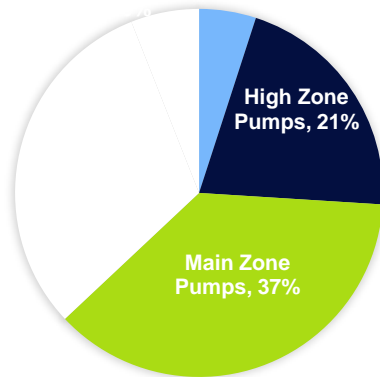- Helping system operators and engineers

Lower environmental footprint

- Reduced carbon emissions
- Complying with both national and local environmental regulations

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WATER UTILITY ENERGY CONSUMPTION – KEY ISSUES

Energy is typically the second highest operating cost (behind labor) for most water utilities.
That's $10 billion per year in USA alone! Worldwide some 3-5% of all electricity is used for water pumping.

Pump capital and maintenance costs can be dwarfed by operating costs

Pumping is the dominant energy expenditure in a drinking water system

High Zone Pumps, 21%

Main Zone Pumps, 37%

Electricity, 95%

Maintenance, 4%

Purchase Price, 1%

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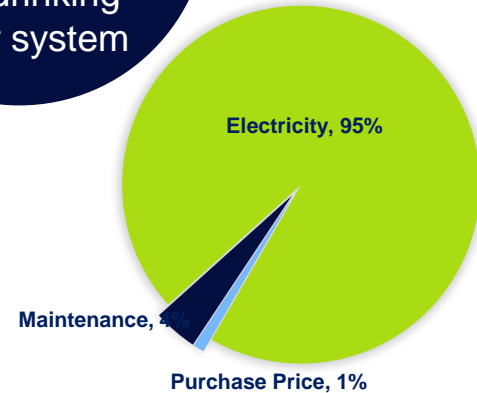
HOW DOES IT WORK ?

1 | ***DATA ACQUISITION, ANALYSIS AND FUTURE PREDICTION***

2 | ***REAL-TIME MODELLING AND OPTIMISATION EVERY 30 MIN***

3 | ***AUTOMATED PUMP AND VALVE CONTROL***

- Water Demand prediction
- Real-time telemetry measurements

- Calculation of optimised control strategies
- Confirm safe operation with a real-time hydraulic model
- Seek better solution if required

- Send commands and set-points via SCADA to pumps and valves

FEATURES OVERVIEW

Theme	Detailed features
MONITORING & MANAGEMENT	• Global map-integrated view of the water production and distribution system with hydraulic data in real-time • Computed data and key performance indicators • Alerts management
FORECASTS	• Water demand forecasts updated every 30 minutes • Live updating of energy tariffs through connection to local energy market trading system
SIMULATIONS	• Simulation module to assess the benefits of alternative operating strategies, impact of planned maintenance or planned network changes
OPTIMIZATION & CONTROL	• Calculation of optimization schedules from actual operational data, current set-points/constraints and available equipment (updated every 10 minutes) together with water demand forecasts (updated every 30 minutes) and mathematical calculation techniques. • Fully automatic operations with optimized set-points, pump controls and production plans sent directly to the SCADA control system

AQUADVANCED® Energy - Operator Interface
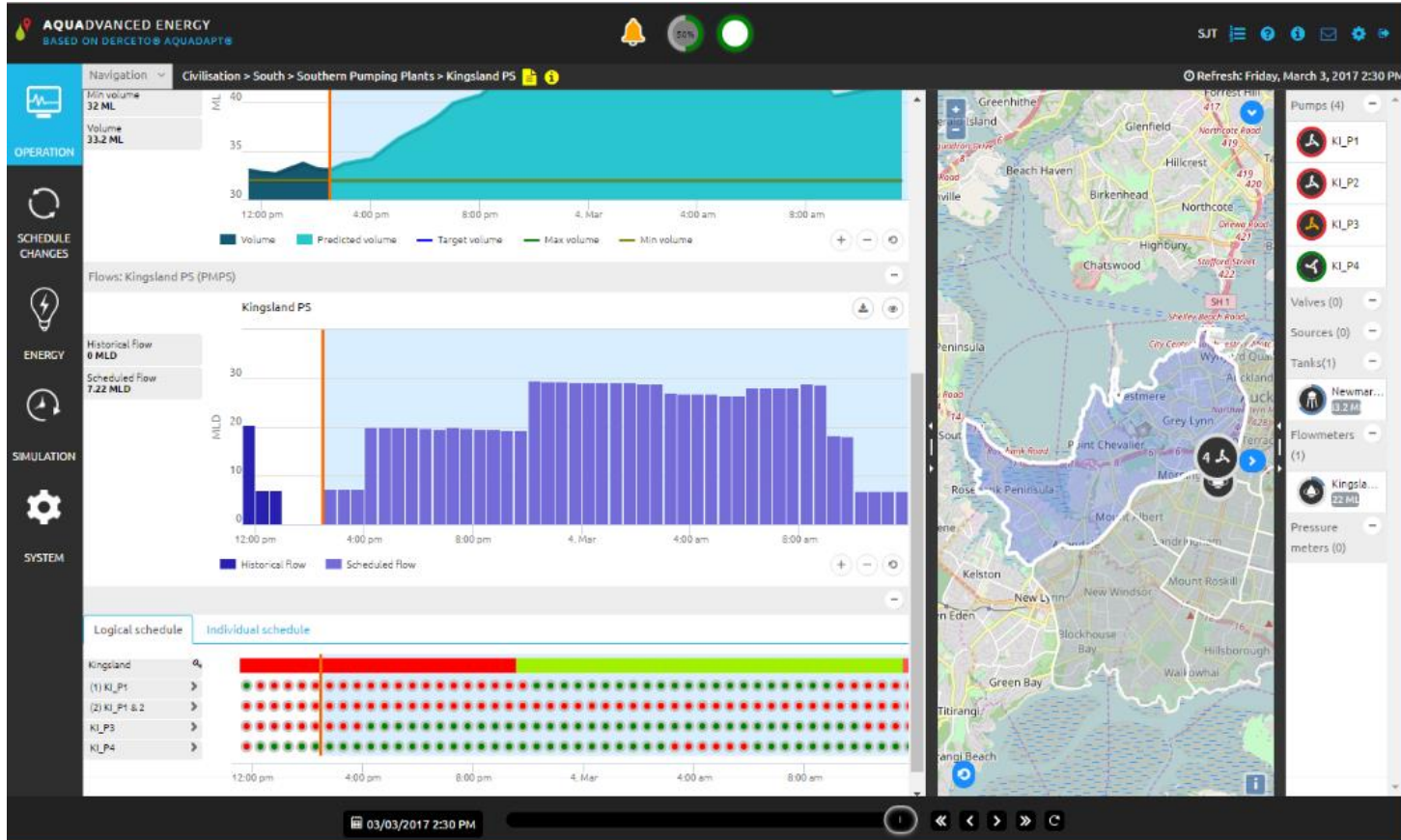
AQUADVANCED® Energy references worldwide

CANADA
1,3M inhabitants
10% cost savings
$1,6M annual cost savings

Region of Peel
working with you

UNITED STATES OF AMERICA

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SUEZ Water Idaho
SUEZ Water New Jersey

WSSC
Where Water Matters

WaterOne

EAST BAY
MUNICIPAL UTILITY DISTRICT

Gwinnett

watershed
management

el paso WATER
780,000 inhabitants
10% cost savings
$620,000 annual cost savings

emwd
700,000 inhabitants
15% cost savings
$400,000 annual cost savings

UNITED KINGDOM
NORTHUMBRIAN WATER living water
4,5M inhabitants
15% cost savings

FRANCE suez
SUEZ Water France
Paris south

SPAIN
Consorci d'Aigües de T...
660,000 inhabitants
21% cost savings
$885,000 annual cost savings

ITALY MM
Metropolita Milanese

CHINA
MACAO WATER

AUSTRALIA
Unity water
2.9M inhabitants

LinkWater

NEW ZEALAND
Wellington Water
400,000 inhabitants
10% cost savings

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USE CASE, NORTHUMBRIAN WATER, UK

Key figures

- Serving 4.5 million people
- Producing 1100 Ml/d (280 MGD)
- Employing 2950 people
- Turnover £700M / year
- Spend £31 million per year on electricity
- Virtually all for pumping of water and sewage
- 60% for water, 40% for wastewater
- Complex electricity tariffs provided

NORTHUMBRIAN WATER

Northumbrian Water

Essex & Suffolk Water

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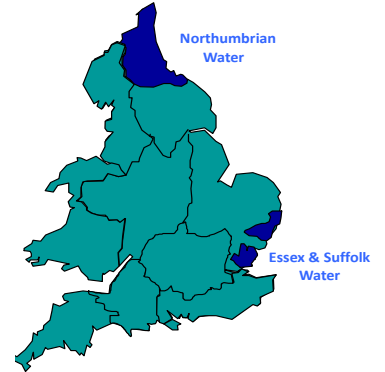
AQUADVANCED® ENERGY – OVERALL COST SAVINGS
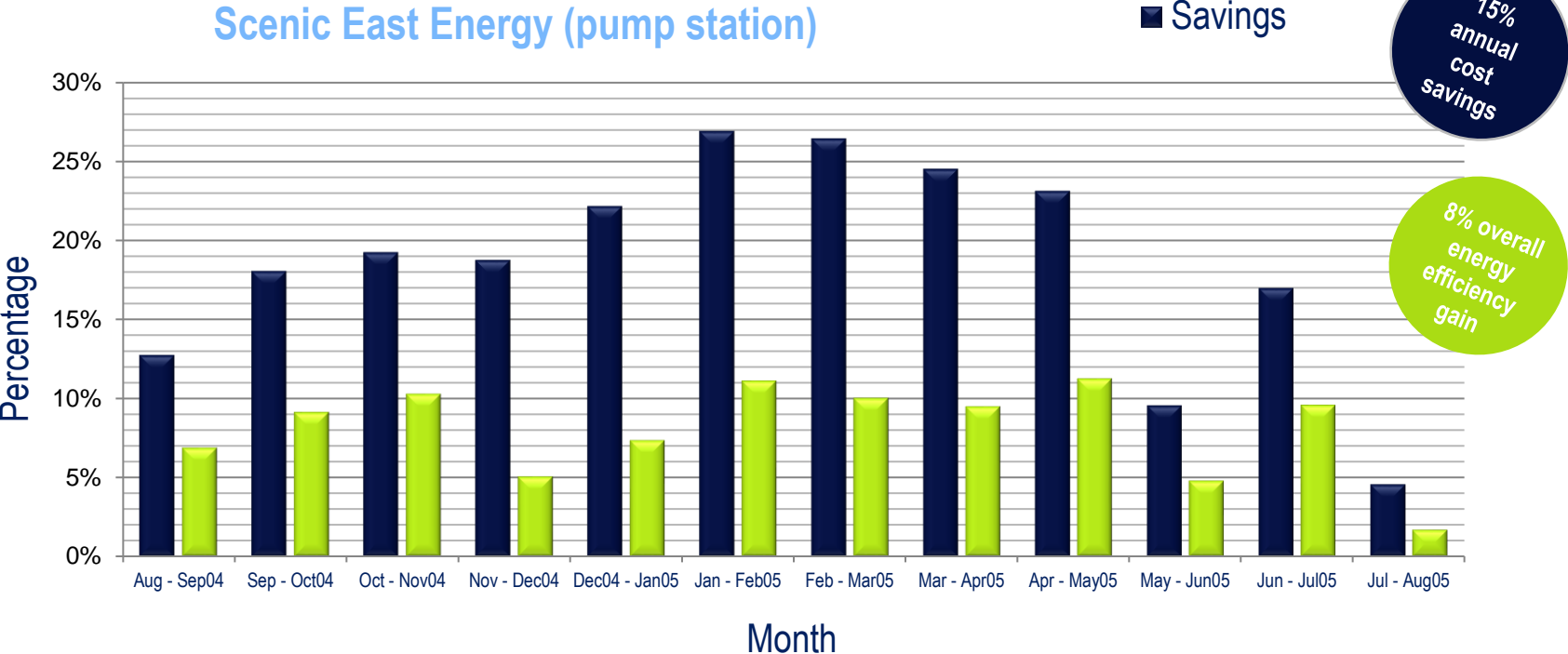
Challenges

Highly energy-consuming, plants have to evolve to benefit from predictive maintenance solutions, secure operations and optimize their processing processes, which are particularly costly in terms of reagents.

Plant operators main issues :

- optimal security

- control of the conformity of treated water

- efficient, reliable and resource-efficient treatment processes (energy, reagents)

- effective asset management and interventions

- transparency towards stakeholders

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Solution

REAL-TIME CONTROL OF THE PERFORMANCE OF WATER AND WASTE WATER PLANTS

⇛ **AQUADVANCED® Plant** is an advanced system that allows operators to comply with water quality regulations optimizing operating costs (energy, chemicals) thanks to a detailed monitoring of the assets and their interactions.

⇛ Designed with incremental layers of decision support tools, **from monitoring and analysis of the performance to the detection of anomalies**, it also includes performance forecast through process modelling and full automated control features.

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Benefits

In real time, AQUADVANCED® Plant allows to :

- Optimize operating costs related to resource consumption, interventions and maintenance operations.

- To rationalize patrimonial investments

- To ensure the safety of the agents and the security of the infrastructures

- Ensure regulatory compliance

- To offer a multi-plant hypervision that can be customized and accessible at any time

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Hypervision

OPEX OPTIMIZATION
- energy
- chemicals
- sludge disposal
- maintenance

⇛ **RISK REDUCTION**
- early detection of derives on compliance or costs
- compliance and effectiveness of the treatment processes, availability of assets and operating time, energy and chemicals consumption, interventions, safety, operating costs…

⇛ **TIME SAVINGS**
- data management
- reporting
- advanced analytics
- customizable dashboards
- real-time and multi-plant dashboard for local authorities

⇛ **BETTER MANAGEMENT**
- real-time and daily
- continuous improvement of plant performance is enabled
- early detection of malfunctions and alerts: compliance, treatment procedures, equipment, OPEX
- smart management of alarms (prioritization, screening, grouping)
- customization of indicators by the operator

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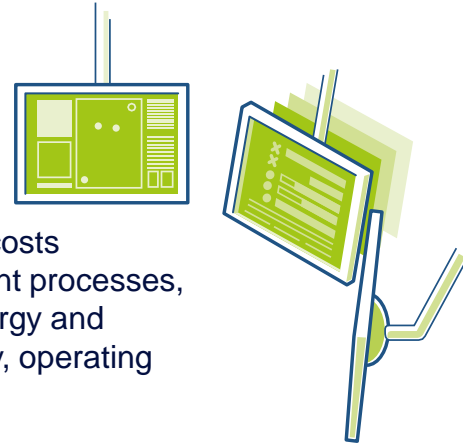
Multi-plant cartography

Cartographic
visualization
(GIS)

Synthetic vision
of the plants and
their operation by
themes
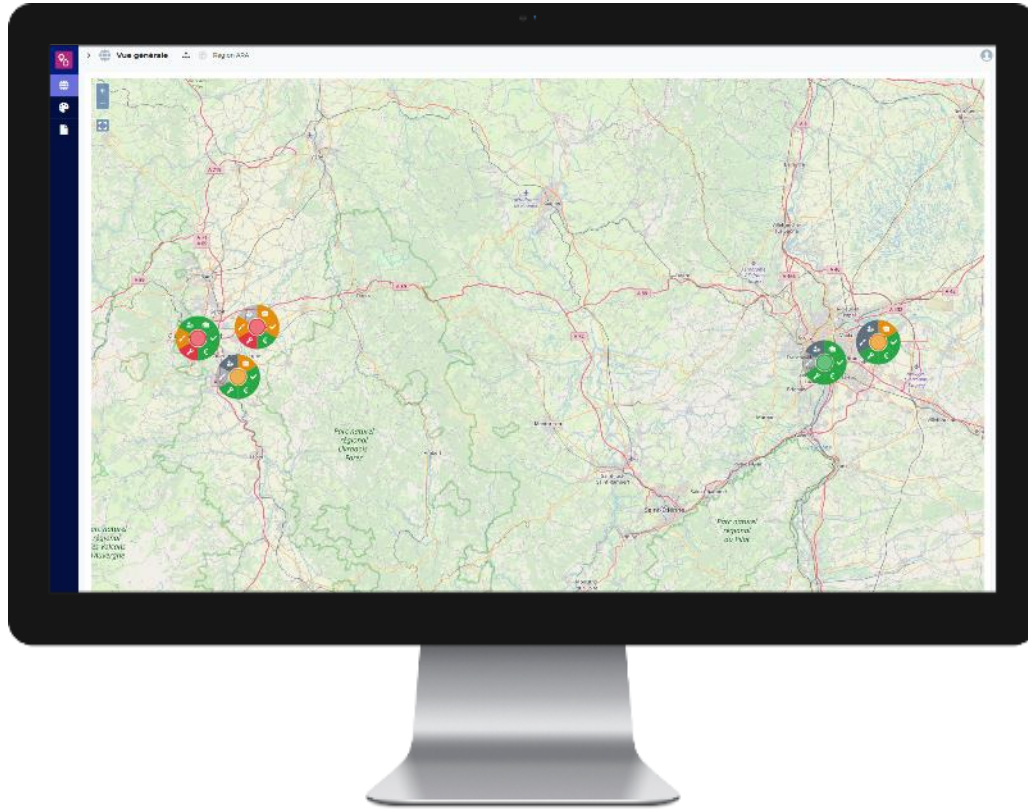
Dashboard

Thematics

Synthesis of the performance of the main treatment processes

Treatment lines
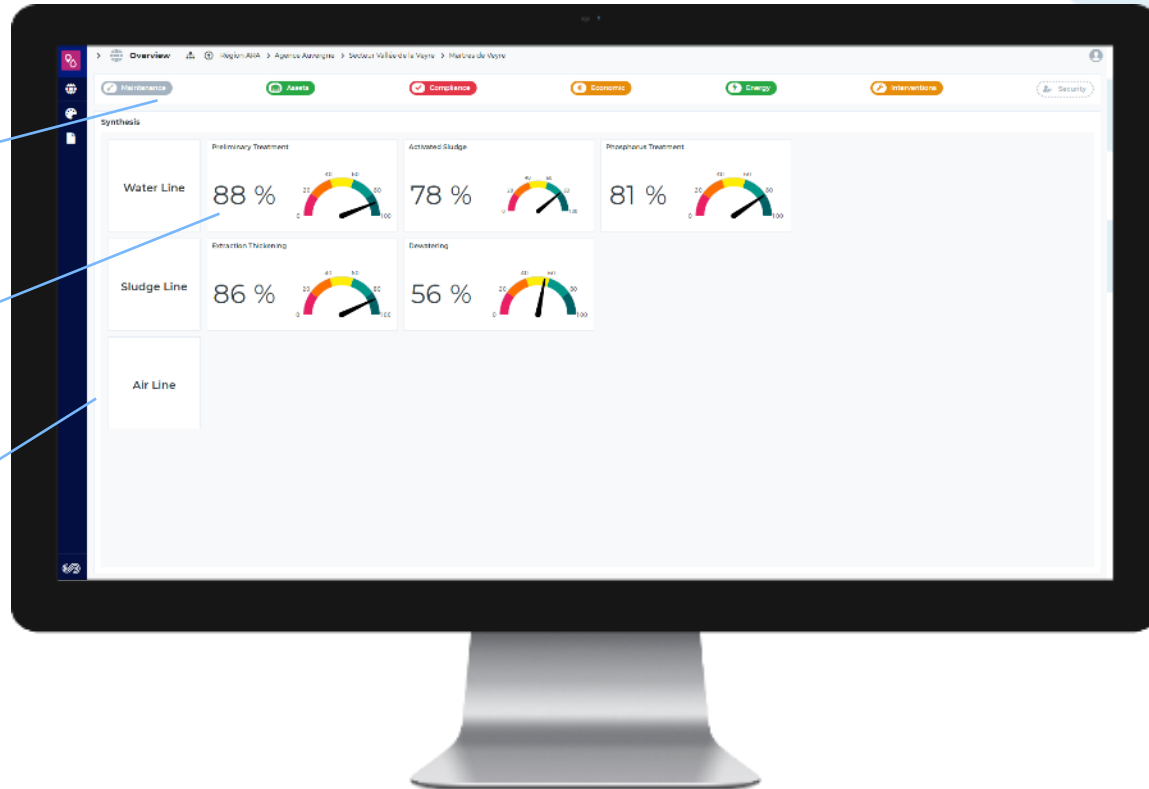
Main features
Predictions and simulations

⇛ **GENERAL FEATURES**

- Real time modelling and prediction : process, quality, odors, chemicals, water consumptions, energy, assets, hydraulic (roadmap)

- Predictive maintenance for critical equipment (roadmap 2020)

- Predictive models forecasting the consumption of resources (chemical in drinking water)

- Aging models of equipment and renewal strategies (roadmap)

- Predictive alerts (roadmap 2020)

⇛ **OLFACTORY NUISANCE MANAGEMENT**

- Comprehensive decision-making support tool identifying real-time the odours (H2S, RSH, NH3) and their source

- 3D modelling of odour dissemination

- Diminish the odour nuisance and its treatment costs

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Main features
Real time control modules

DRINKING WATER

⇛ **SETTLING & FILTRATION OPTIMIZATION**

- Model based optimization of chemical dosage to reduce the costs of products used in settling (coagulant/polymer/CAP)

- Off line simulation of dosing scenarios

- Advanced management of sand filter washing cycles to reduce wash water losses

- Smart early warning system

WASTE WATER

⇛ **AERATION AND BIOLOGICAL TREATMENT CONTROL**

- Advanced control of the biological system aeration by controlling the generation and distribution of air according to the plant's objectives

- Operating cost savings through energy price optimization strategies and optimal chemical dosage

- Smart management of pumps for external and internal recirculation

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Decision support modules

DRINKING WATER

⇛ **MEMBRANES MAINTENANCE**

- Optimized management of the maintenance plan for membrane modules to extend the life of the equipment

- Optimization of renewal costs with a targeted strategy

- Document and report operations & maintenance activities

WASTE WATER

⇛ **ANAEROBIC DIGESTION & CO-GENERATION**

- Monitoring of digesters and securing operations to ensure the availability of assets

- Decision-making support tool for the recommendation of feeding ratios depending on available substrates

- Increasing biogas production (co-digestion)

- Increasing energy generation (cogeneration)

- Simulation of impact of new loads on the biological state of digesters

References
Main rollouts

USA
USA
Los Angeles West Basin

CHINA
CHINA
Yuelai

AUSTRALIA
AUSTRALIA
Boneo

SPAIN
Benidorm

QATAR
QATAR
Doha

LILLE

HAUTS DE FRANCE

ELANCOURT • VERSAILLES
• MORSANG
SUR SEINE

GRAND OUEST

EST

• DIJON

NOUVELLE AQUITAINE

RIOM •
• LA FEYSSINE
MARTRES •
DE VEYRE
• RHONE SUD

AUVERGNE RHONE ALPES

BIARRITZ
ST-JEAN DE LUZ

OCCITANIE

TOULOUSE •

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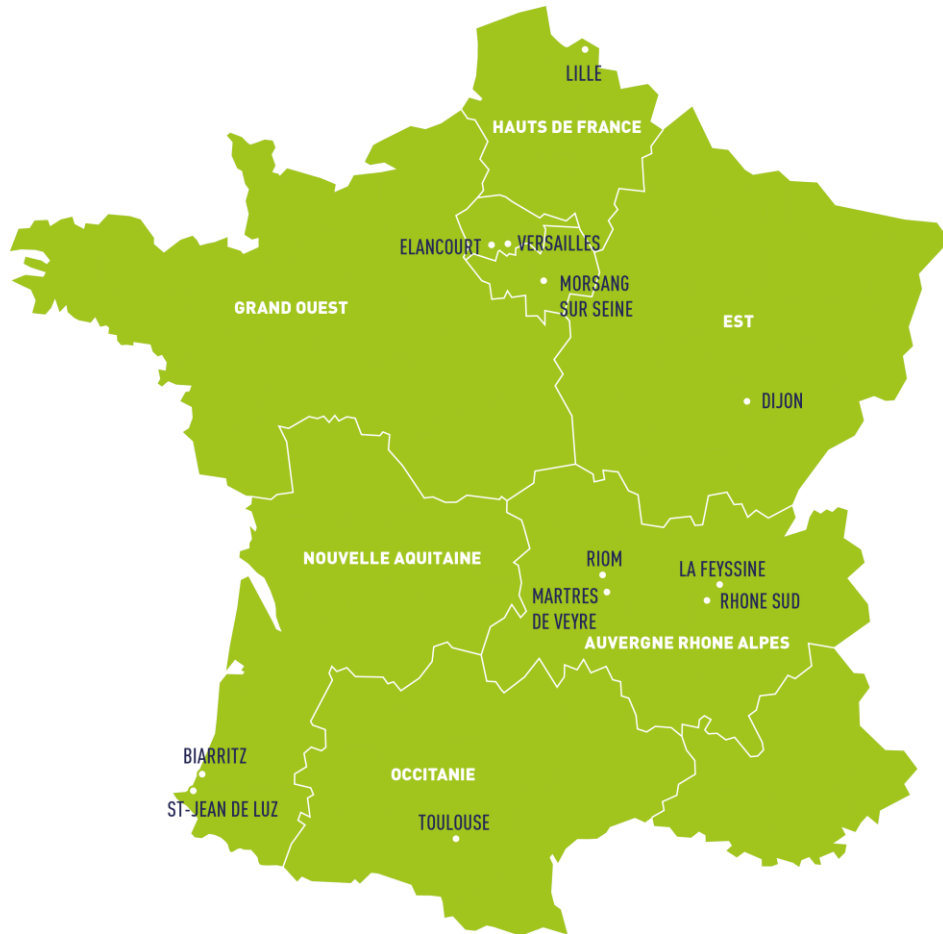
References
Drinking water plants

Chongqing, China

Optimising coagulant dosage in settling process
Reduction of coagulant OPEX -20%

Optimising water losses in filtering process
Reduction of water losses -40%

Morsang-sur-Seine, France

150 000 m3/day water production

Optimising coagulant and PAC dosages
Reactives savings > 50 k€ / an

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References
Wastewater treatment plants

Saint-Jean de Luz, France

Optimising aeration energy
Optimal adjustment between the activated sludge
concentration, the aeration energy and the sludge quality
Energy consumption of blowers - 9%

Optimising dryness of sludge
Monitoring, analszing and optimising sludge dryness
weekly
Sludge disposal costs - 5%

Biarritz, France

Optimising the Biofors' energy
Daily optimal adjustments between the average speed of
blowers and effluent water quality
Energy consumption of blowers - 6%

Correction of ventilator drift
Daily monitoring of the submeter of ventilation process
Electrical consumption of ventilation process - 14%

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AQUADVANCED® Urban drainage

Empower your decision-making for optimized and real-time wastewater management, flood prevention and environmental protection

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Challenges undertaken

FLOOD CONTROL

Limit network overflows and anticipate rain events, improve crisis management and protect citizens and properties.
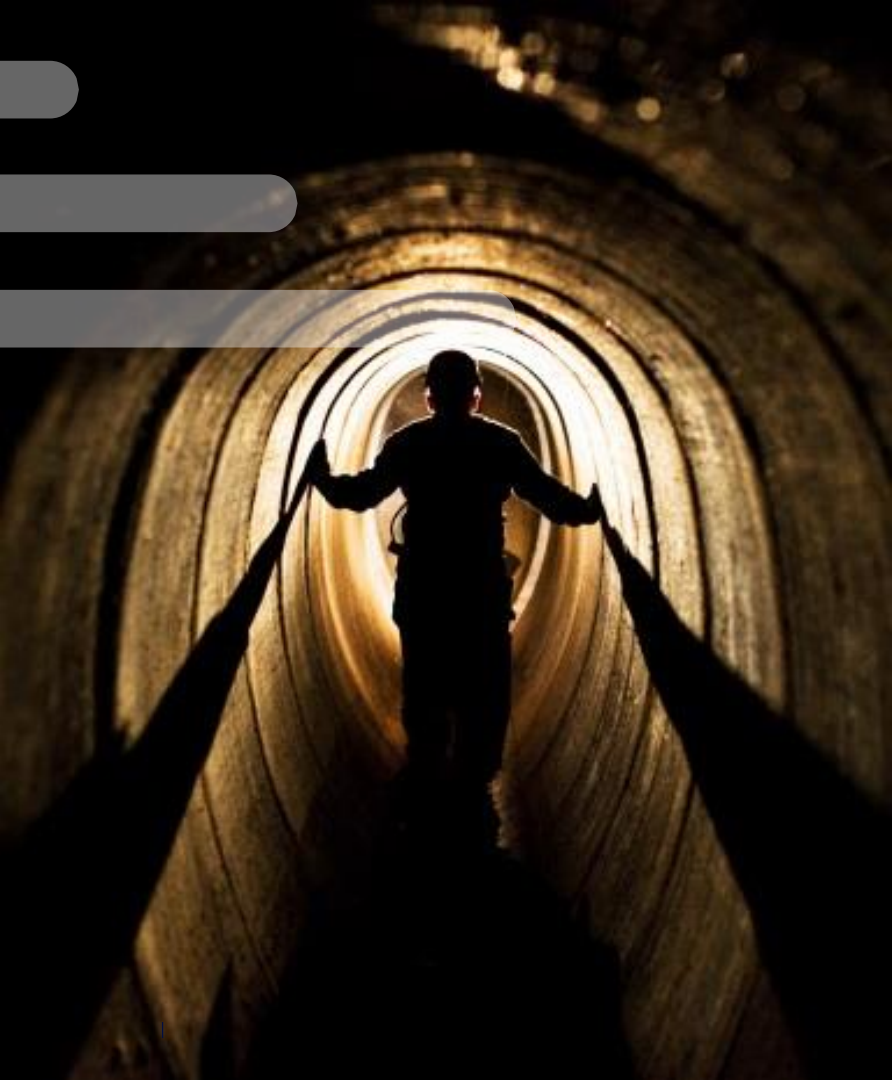
HEALTH, SAFETY AND RESPECT OF THE ENVIRONMENT

Limit polluting discharges to the water body, identify the presence of clear parasitic water and comply with water pollution regulations.

OPERATIONAL AND ECONOMIC PERFORMANCE

Secure operations, reduce operating costs and limit investments by valuing existing assets.

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Solution

FOR CONTROLLED, COMPLIANT AND EFFICIENT WASTEWATER SYSTEMS

⇒ **AQUADVANCED® urban drainage** is a real-time platform for the monitoring and management of wastewater and rainwater networks.

⇒ By processing meteorological data, information from in-field sensors and advanced algorithms, the solution anticipates and support flood prevention, manages quality of discharges into the natural environment, while optimizing existing regulation and treatment infrastructures.

⇒ **AQUADVANCED® urban drainage** provides operators with optimized management strategies allowing to remotely control the network, with or without automated control.

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How it works

DATA SOURCES **1**

Business references (GIS, assets)

Manual import or editing

Field measurements (rain gauges, flow meters...)

Equipments (pumping stations, valves...)

Databases (supervision, FTP)

Client IS

Weather forecasts

Radar water frames

AQUADVANCED® URBAN DRAINAGE FUNCTIONING

2 **DATA PROCESSING**

Collection and storage

Data analysis and processing (contextualization of dry/rainy weather data)

Automatic and/or manual validation

Modeling

Calculation of operational indicators (daily volume, rainfall, parasitic clear water, equipment operation, etc.)

3 **DATA PRESENTATION**

Dashboard : indicators (graphs, data series, summary tables), synoptic and cartographic visualizations

Events (dry weather spill, too long operating time...)

Forecasts: historical, real time, forecasts on D+x

Management Management scenarios / instructions

Reporting: exports, auto or on-demand reports, regulatory format

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Benefits

CONTINUOUS MONITORING OF THE WASTEWATER SYSTEM

Up to 45 % reduction in the total volume discharged per year

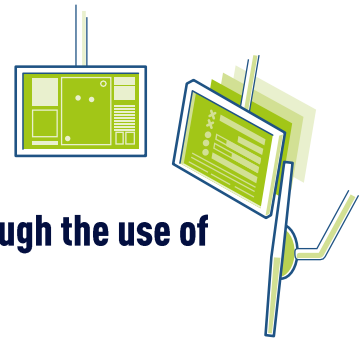**ANTICIPATION OF FLOOD AND POLLUTION RISKS**

Flood risk alerts **up to 24h in advance**

OPTIMIZATION OF OPERATIONAL COSTS AND INVESTMENTS

Potential investments reduction of 50% for additional storage capacities

©SUEZ / William DANIELS

Monitoring module

Real-time geographic dashboard of the storm or sewer network and automatic event detection through the use of advanced data processing

WEATHER MONITORING

- Weather KPIs

- Rainfall monitoring and alarms

MONITORING OF DAILY NETWORK OPERATIONS

- Real-time dashboard with data series and KPIs computation

- Automatic event detection

- Hydraulic and quality analytics: overflows monitoring, pumping stations, retention basins, WWTP entrances, parasitic clear water....

- Follow-up of operations: cleaning, maintenance, in field interventions, localisation of odor complaints and black spots...

REPORTING AND REGULATORY DATA EXPORTS

- Report and balance sheet generation

- Data export (CSV format, specific local data format,...)

- Data exposure with APIs

DATA COLLECTION AND STORAGE

- Generic connector for data acquisition

- Long-term data storage and management

- Critic and validation session

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Anticipation module

Forecasting the risk of overflowing the natural environment or the network and/or the risk of pollution on the water bodies

⇛ **DATA COLLECTION AND STORAGE**

- Consolidation and mapping of multi-source data
- Triggering alerts on thresholds

⇛ **WEATHER FORECASTING**

- Radar view
- Meteorological modelling
- Rainfall monitoring and alarms

⇛ **FLOOD AND SPILL FORECASTING**

- Real-time prediction of the flooding or overflowing risk of the unitary or separative sewerage network

⇛ **POLLUTION RISK PREDICTION**

- Hydraulic, marine, river modelling,...
- Prediction of the bacteriological pollution risk

Advanced control module

Optimized steering with or without automatic control of the entire sewerage system

⇛ **ASSET OPTIMIZATION**

- Definition of dynamic management strategies
- Iterative module for evaluating and defining flexibility

⇛ **CONTINUOUS PERFORMANCE EVALUATION**

- Indicator tracking
- Post-event report
- System monitoring (infrastructure and business-specific)

⇛ **DECISION SUPPORT TOOL**

- Proposal for a management scenario
- Management scenario test

⇛ **OPTIMAL AND PREDICTIVE GLOBAL CONTROL SYSTEM**

- Calculation of optimized management strategies
- Automatic and continuous application of equipment regulation instructions

For further enquiries, you can email to puranut.w@suez.com