



Digital Tools for Operations in Water & Wastewater Systems

Michael MARTIN - VEOLIA Near & Middle East - 05/05/2025





"At Veolia, we are convinced that ecological transformation goes hand in hand with digital transition. Our business and our responsibility as a leader in ecological solutions commit us to providing our customers with the tools they need for the trajectories of decarbonation, depollution, resource saving and regeneration. Hubgrade brings together our capacity for innovation and our digital know-how at the crossroads of our three core businesses - water, waste and energy -, enabling us to support our customers in managing their resources more intelligently, safely and sustainably," a commenté commented **Estelle Brachlianoff, Veolia's Chief Executive Officer.**

**Based on a STRONG EXPERTISE on each business
and EXTENSIVE KNOW-HOW bundling solutions**

#1 Worldwide **Water services**

#1 Worldwide **Water technologies**

#1 in Europe **Circular economy**

#1 Worldwide **Hazardous waste**

#2 in Europe in **District heating**

#2 in Europe in **Energy efficiency services**

**Veolia is accelerating the necessary ecological transformation of cities
and industries by developing a digital platform including AI and ML:
Hubgrade**

Hubgrade

Powered by  **VEOLIA**

A platform developed by an operator for an operator

10,000+

sites connected
for municipalities,
industry and
commercial
institutions

3000+

completed GHG
emission studies

60+

Hubgrade Centers
in 20 countries

More than

450

experts and data
scientists

In Middle East, via ENOVA Hubgrade has been first deployed in 2019 for energy efficiency of 15 malls across 5 countries: UAE, Oman, Bahrain, Lebanon and Egypt.

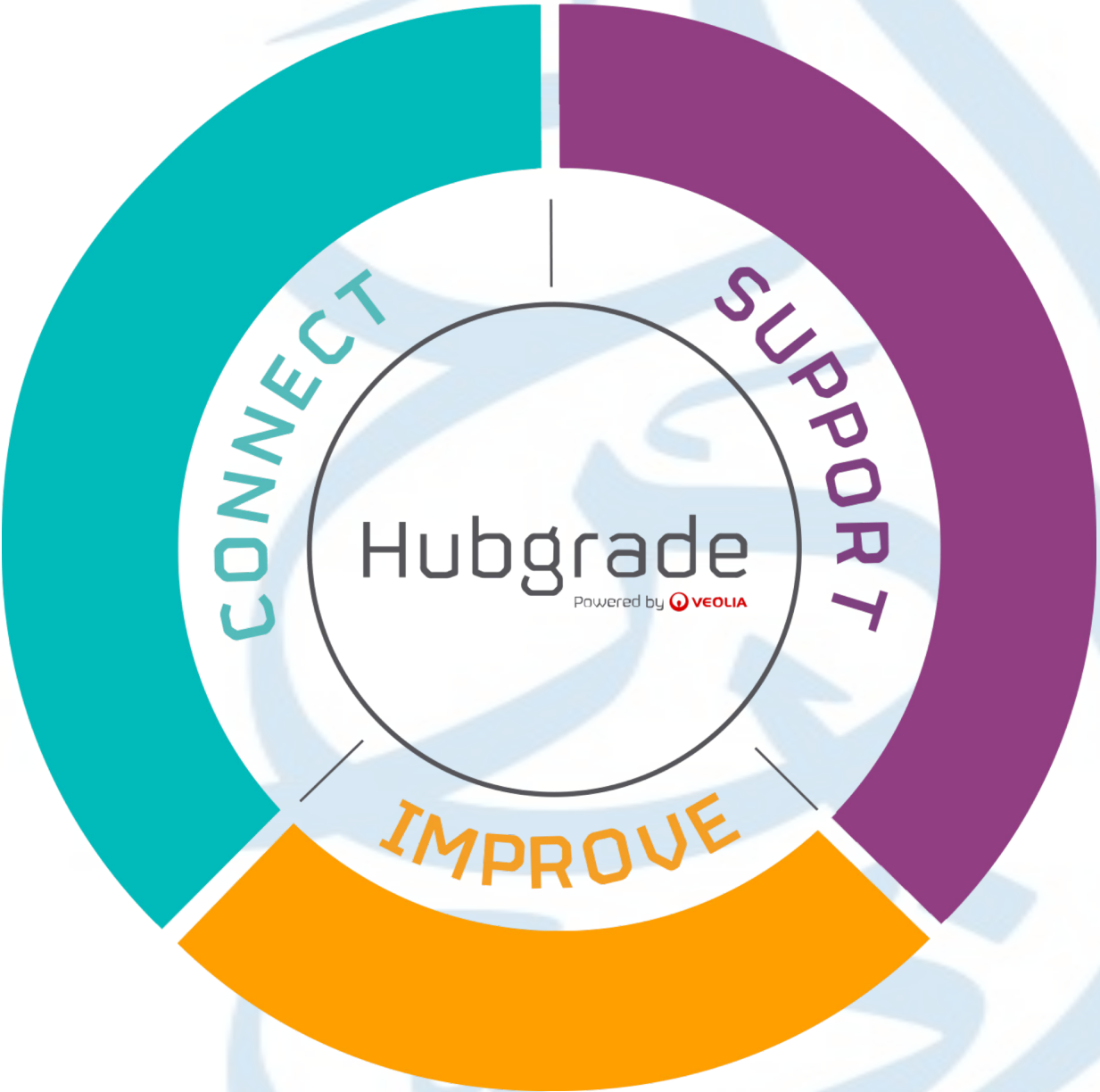
أسبوع المياه العربي السابع

Digital Tools - From visualisation to enhanced O&M



CONNECT
SUPPORT
IMPROVE

An approach that combines
human expertise
and the **power of digital tools** to enhance operational and environmental efficiency.



CONNECT

To **create a continuous link**,
and give an access to
information and expertise and
quality check.
One single source of truth.

SUPPORT

To **accompany** and **advise** on
operational and strategic
issues.

IMPROVE

To **improve** operational and
environmental **performance**
of the PWA's equipment and
infrastructure.

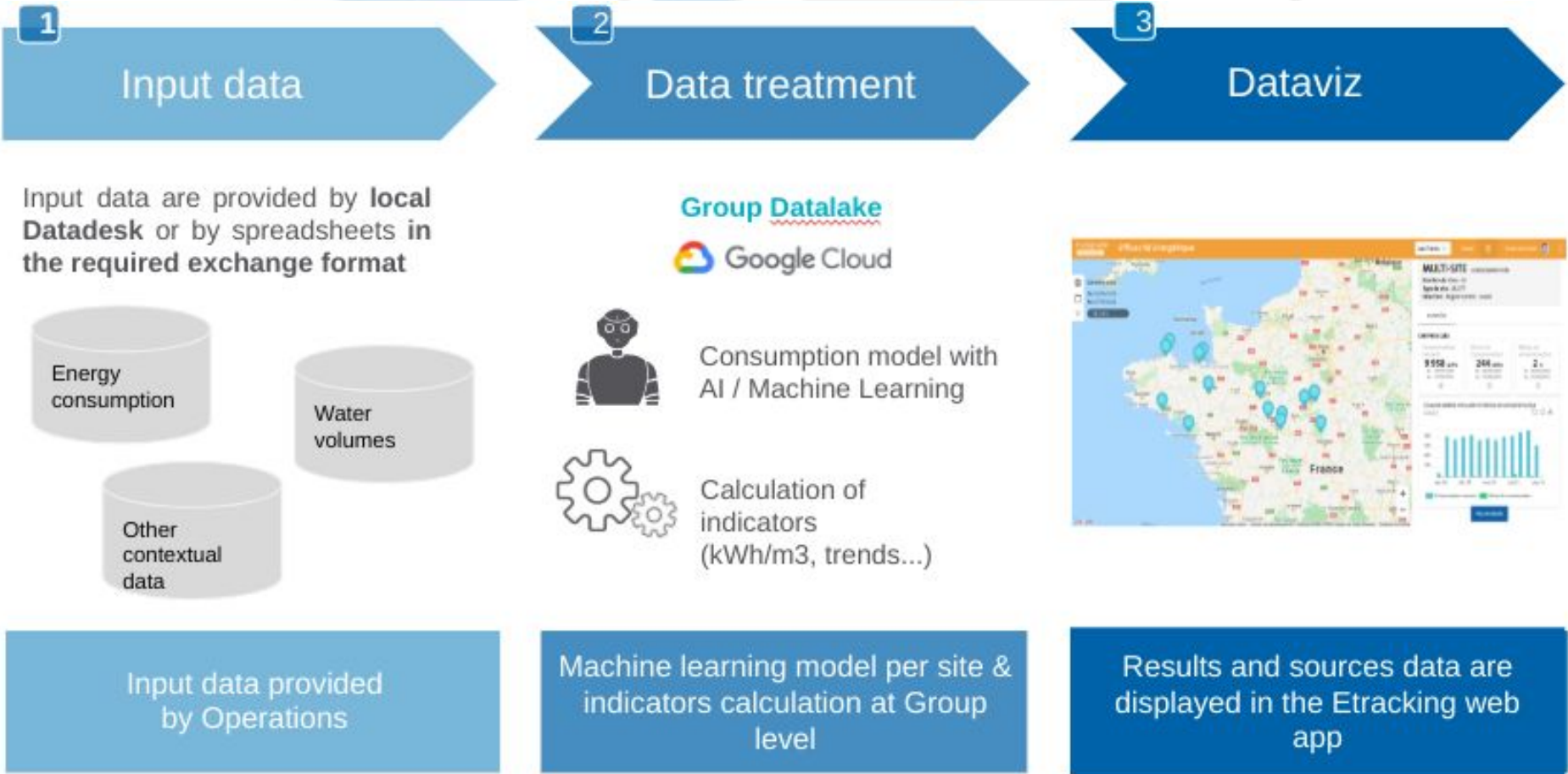
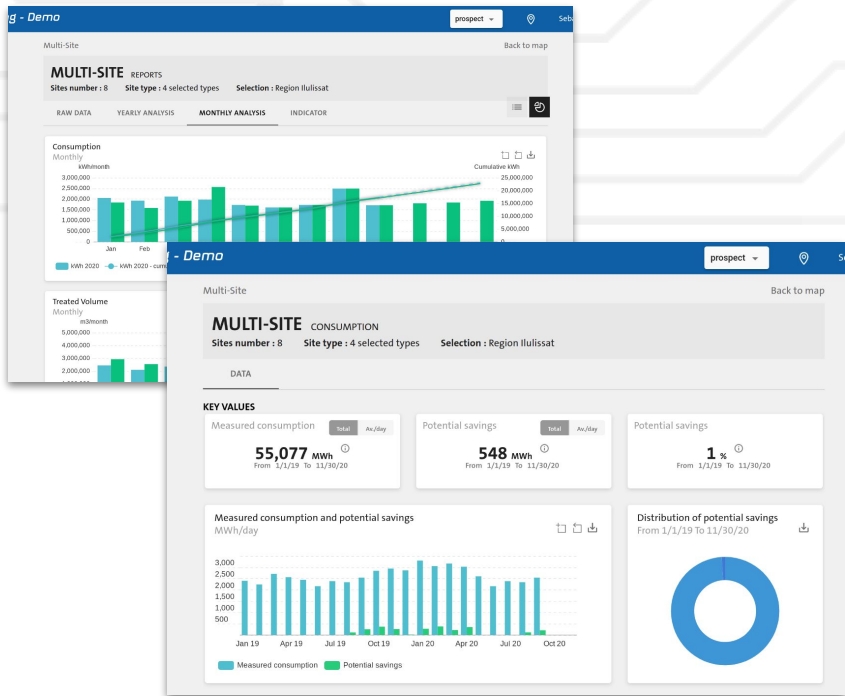
Digital Tools - Game Changer in Modern Water Systems



ETracking Module

An **operational tool** which enables the analysts and the operators to monitor the **energy consumption** of plants and pumping stations & identify the **potential energy savings** by using Machine Learning model

- Monitor the global energy consumption
- Identify quickly drift energy consumption
- Identify a potential saving in energy consumption
- Compare the energy consumption



Digital Tools - Water Resource Application

Water Resource Advisor Module (new)



Localize resources and assets on a basemap with dynamic status



Explore each resource and asset with associated dashboards based on operational data coupled with context data (weather forecasting, public hydrological data, etc.)



Analyze trends and evolution of indicators on chosen parameters based on past data



Permanent diagnosis of asset performance



Documents database



Centralized Log Book to log and easy share events



Alert Management system



Boreholes & Wells synoptic tool

Use-case examples

Drought management:

- Water resources status: piezometric levels, river flows, water levels in boreholes & reservoirs
- Rainfall

Regulatory compliance:

- Abstraction volumes vs. authorisation
- Water quality parameters vs quality standards

Asset performance optimisation:

- Borehole performance: specific capacity
- Pump performance: daily average flow vs. nominal flow

Operational strategy optimisation

- Energy consumption (kWh/m3)
- Water resources status

References in France & Spain (+400 assets)

Ongoing pilot in Oman (+25 boreholes)
Discussions ongoing in Jordan (DAOM)







Water Loss Management Module

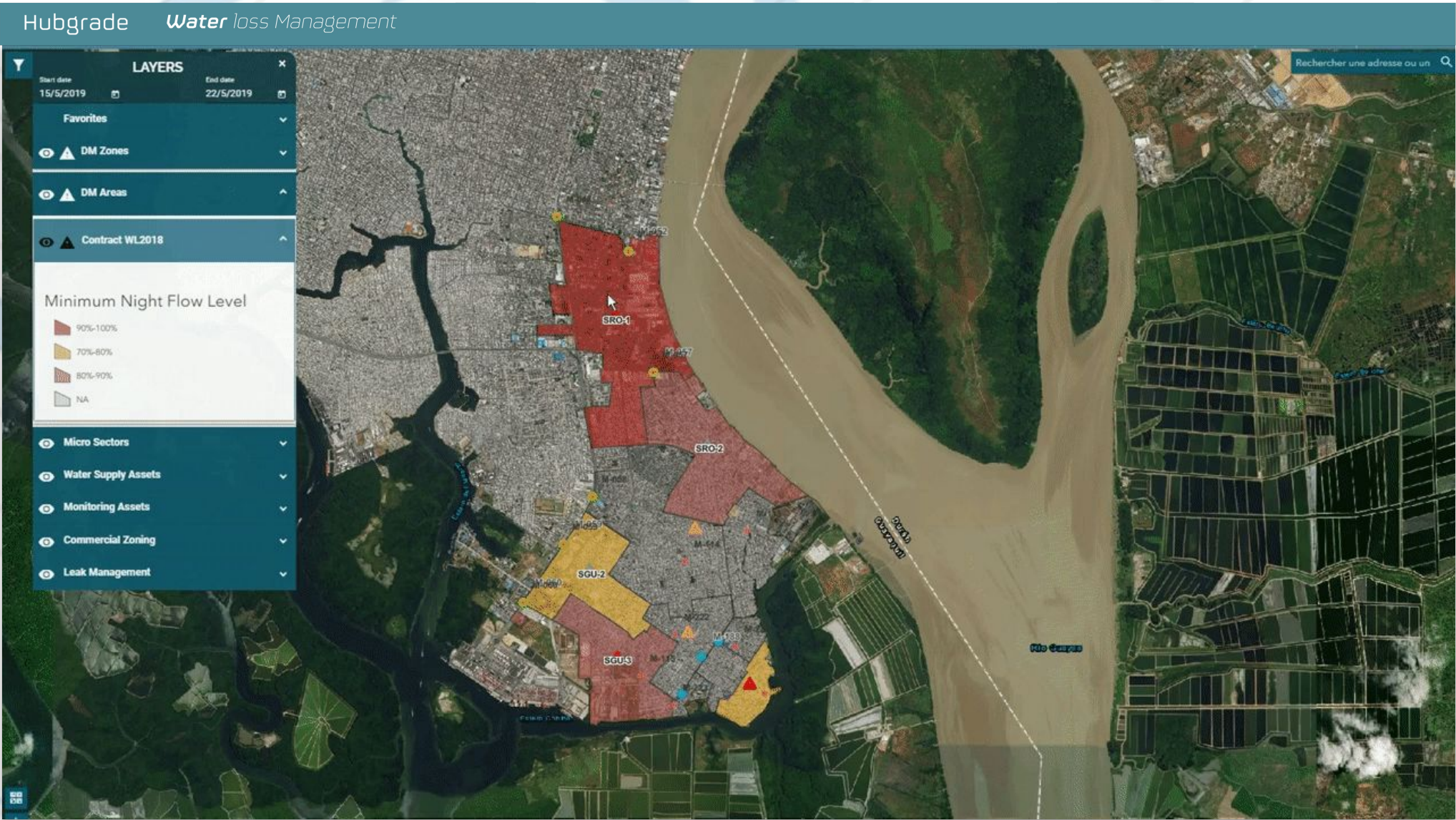
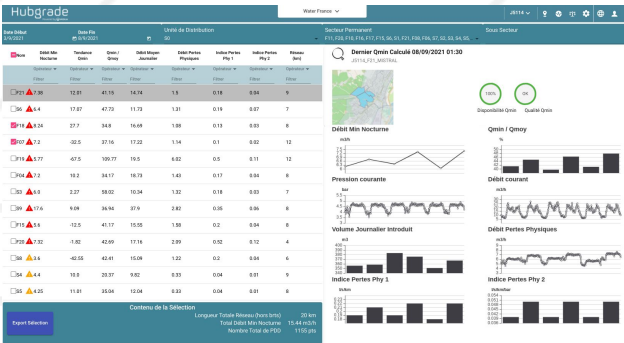


NON REVENUE WATER

A performance-oriented product Water loss calculates indicators facilitating the decision making, in particular by distinguishing physical losses and commercial losses

-  Prioritize leak research
-  Localize the origin of water losses
-  Increase network efficiency
-  Enable reporting

- **Preprocessing** of flow and pressure measurements with Time Series Engine
- **Cartographic visualization** of sectors, flow and pressure sensors, network assets, consumption and leak repair works
- **Calculation of network performance indicators** associated with sectors
- **Continuous modeling** of physical losses
- **Visualization of the monthly water balance** per sector



Smart Membranes Module



| The challenges

- Better **plan cleaning and replacement** of membranes to prevent **unplanned shutdowns**.
- Optimize **maintenance schedules** and maximize operational efficiency.
- Reduce the **total cost** of membranes and **energy consumption**.

PREDICTIVE ALGORITHMS



1

TRAINING

Machine Learning model trained on plant historical data to detect patterns and trends on key operational parameters

2

INFERENCE

Machine Learning model predicts the evolution of key operational parameters

3

ANALYSIS

The predictions are checked against the operator adjustable settings

4

PREDICTION

If a threshold is exceeded, a maintenance event is recommended



| The solution

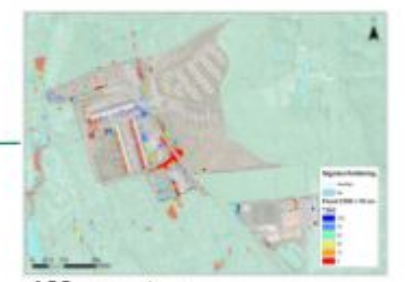
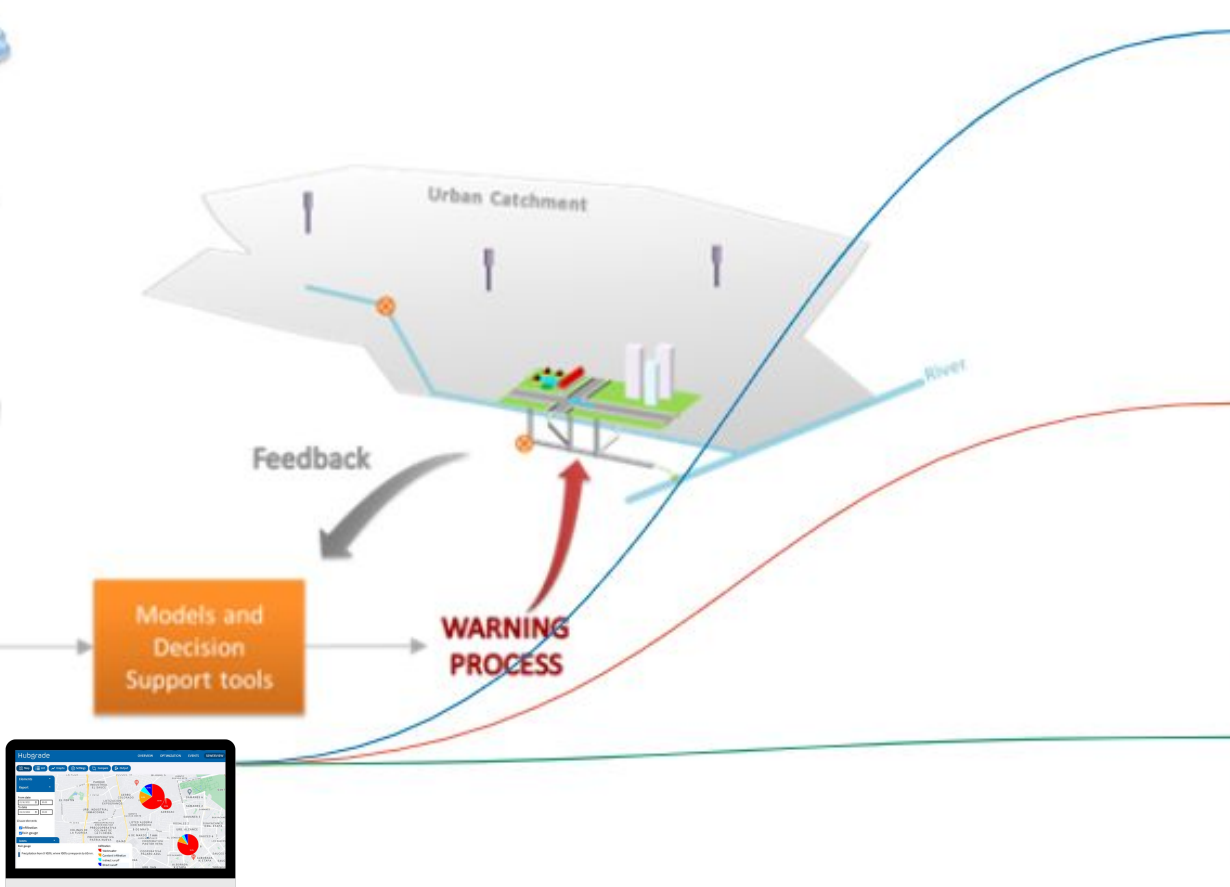
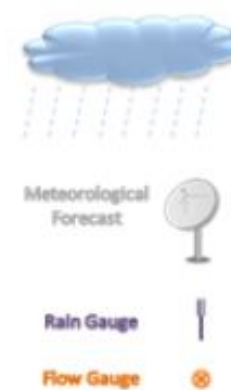
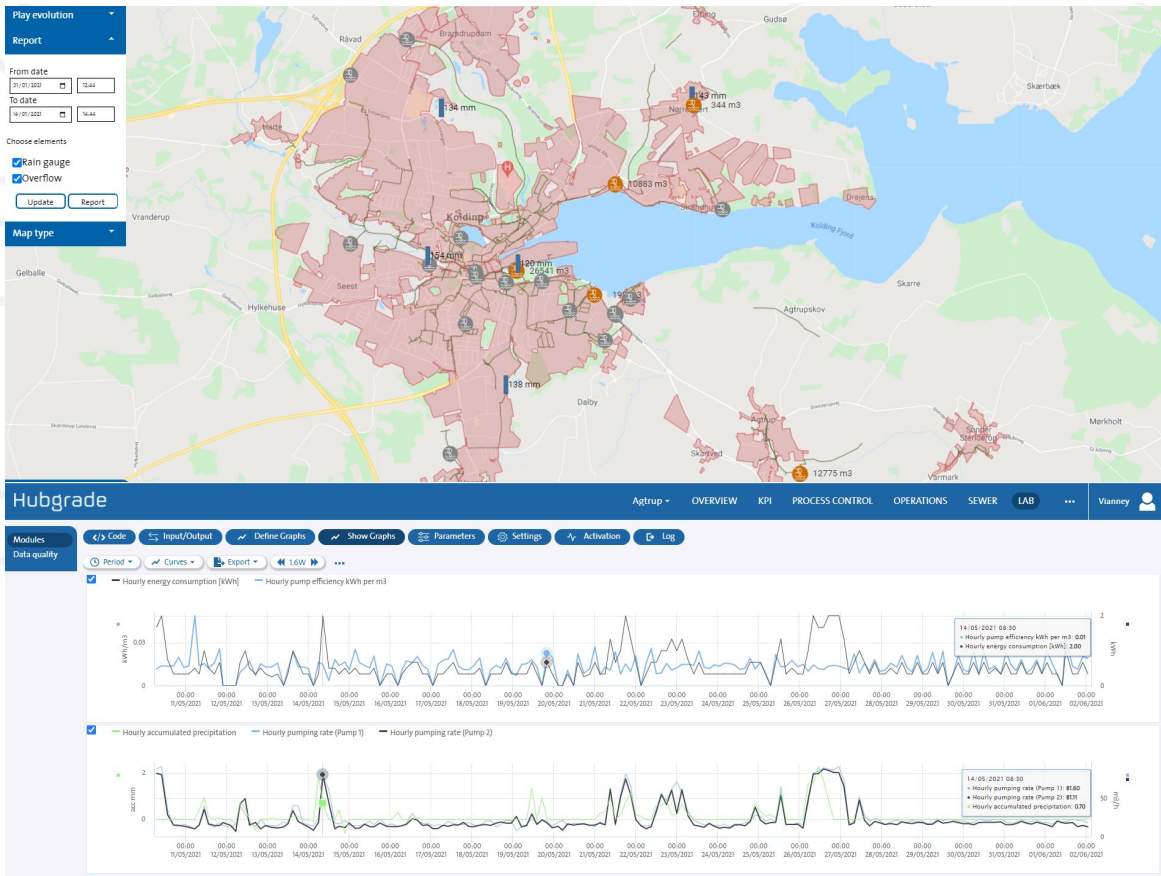
- **Real-time overview** of **membranes fouling state** and proactive monitoring through **alerts**.
- **Machine Learning & Artificial Intelligence** normalize and predicts the evolution of key operational parameters.
- Advanced analytics **predicts fouling** and optimize **cleaning cycles schedule**.
- **Predicts optimal timing for membrane maintenance** reducing costs and downtime.
- **Anticipates deviations** to prevent **membrane damage**, maximizes asset **lifetime** and enhancing long-term efficiency.

Digital Tools - Wastewater Operations

Main references in Canada, Ecuador & Europe

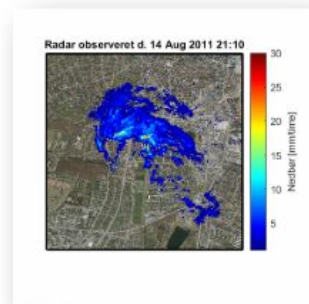
Performance Sewer Module

This module is an **online digital twin** of the sewer network. It enables network operating teams to **make informed decisions** related to their facilities & **optimizes** the operation of the sewer network thanks to **real-time data** and **predictive analytics**

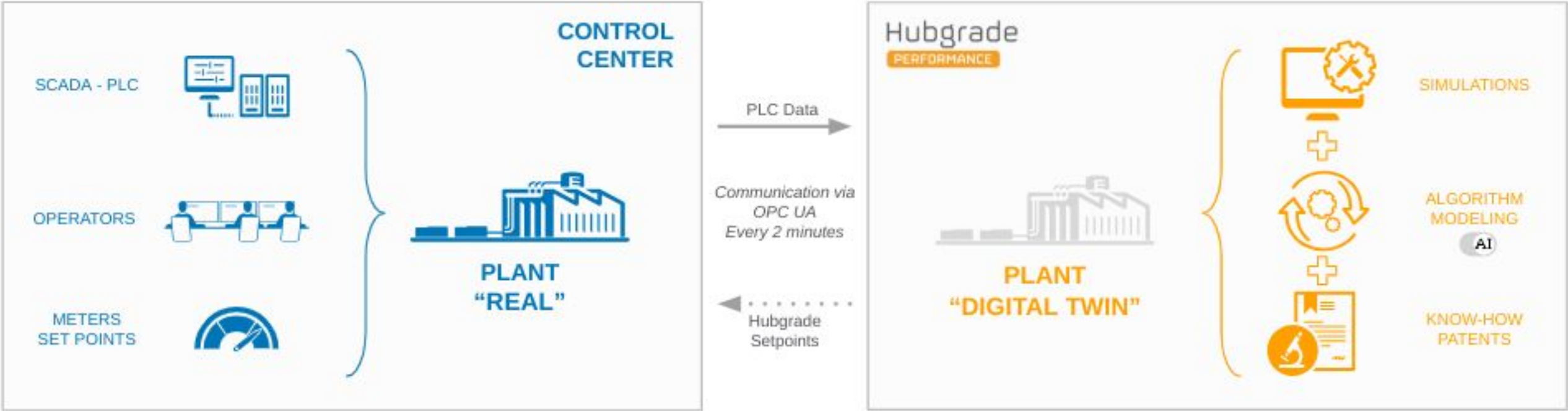


Informed real time flood management

1. Mapping of flooding - before it happens, i.e. a informed emergency response
2. Training emergency staff in handling of floods – before they happen
3. Real flood forecasts and warnings to public and radio
4. Real time information (e.g. on the mobile), during the flood



Performance Plant Module

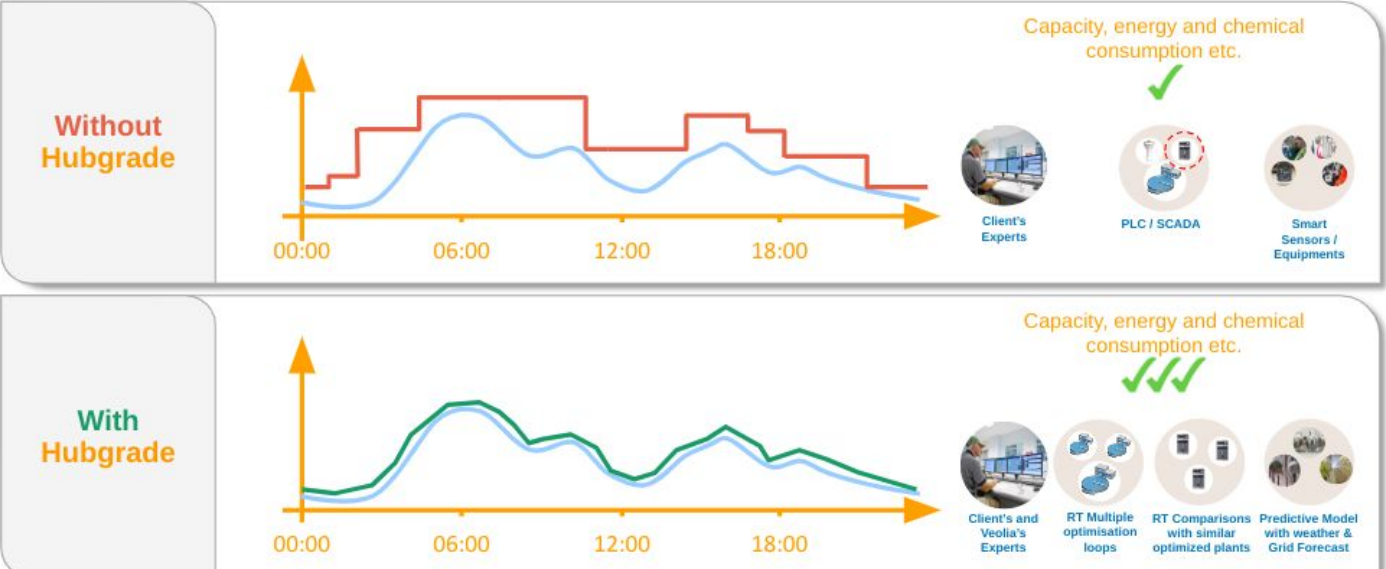


The operator remains in control and decide what instruction to use
Allowing Hubgrade to optimize **OR** using existing PLC set points

You also decides which part of the plant will be optimized
All the Hubgrade features can be turned on/off on demand

The digital twin of the Plant provides predictive analysis
It is in constant dialogue with its physical counterpart

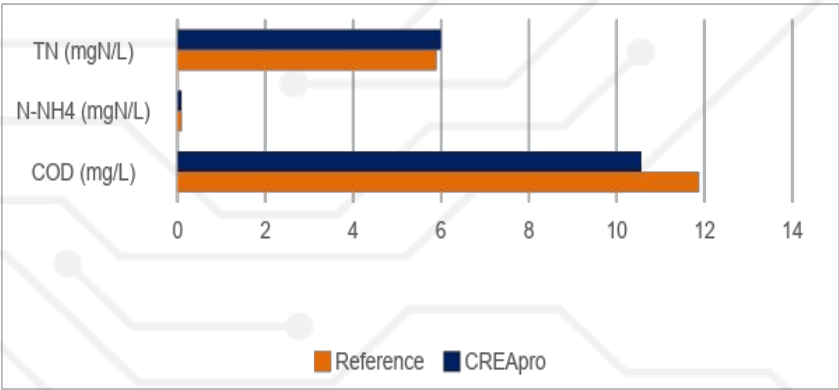
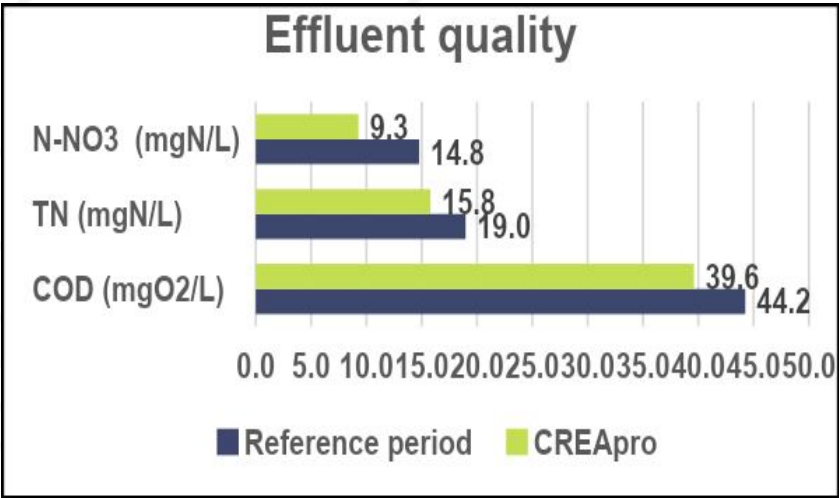
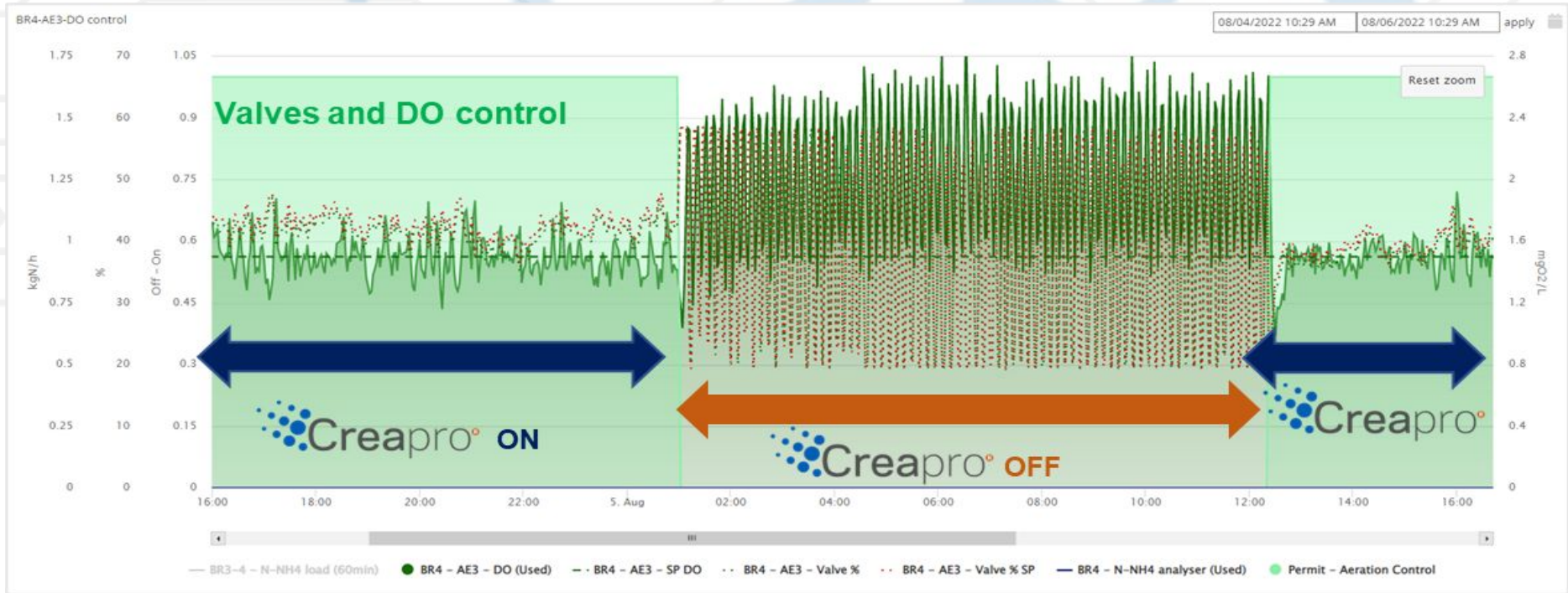
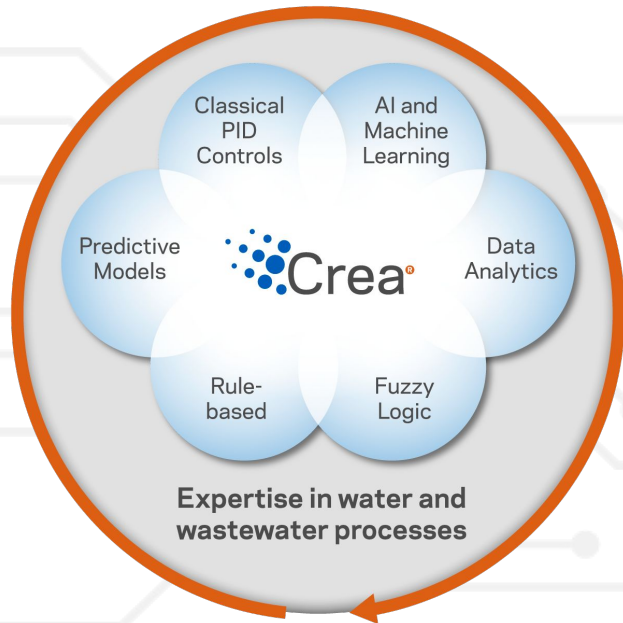
Our patented algorithms and AI autonomously simulates scenarios
before proposing the best possible outcome in the real world



Digital Tools - Wastewater Operations

2 references in Middle East:
As Samra WWTP (Jordan)
Doha North WWTP (Qatar)

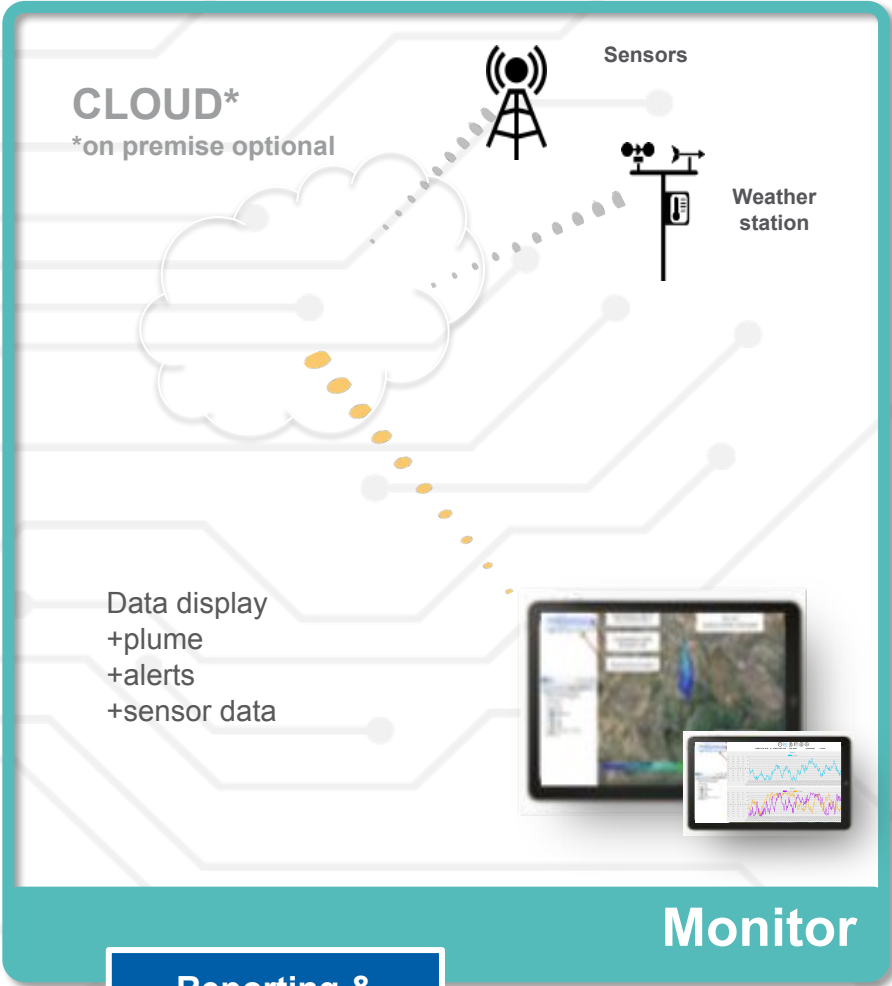
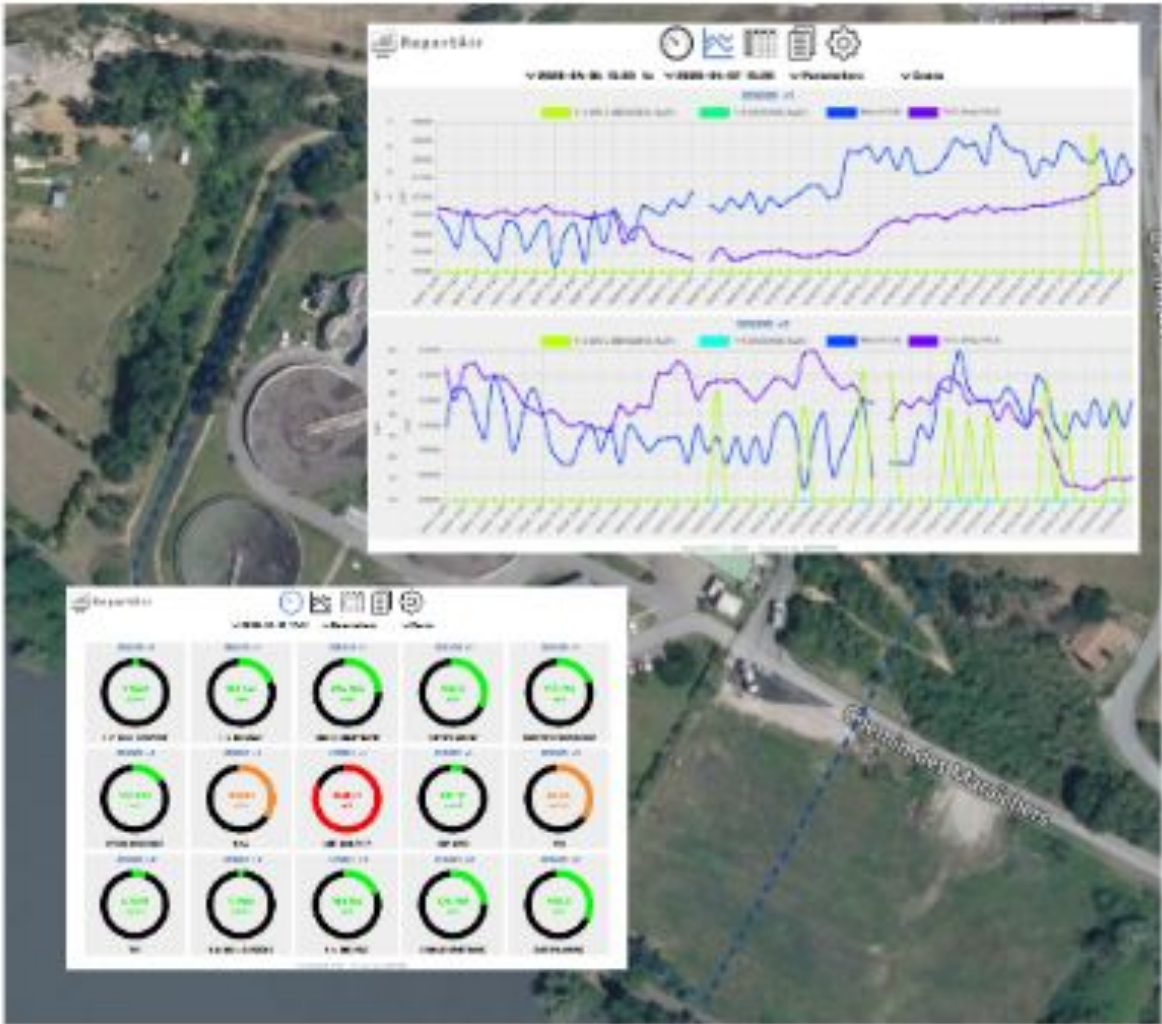
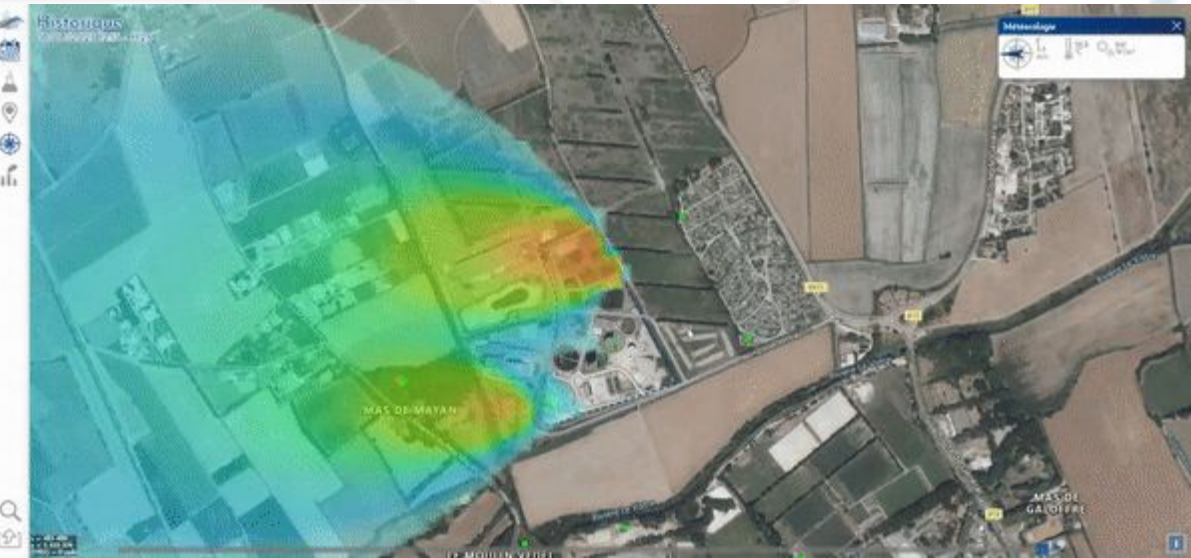
CreaPro Module for Advanced Aeration Control



- TSE quality improved
- As Samra blowers = -18%
- Doha North blowers = -8% (with only MOV Control)

CLEAR (Cloud Live Emission for AiR) Module

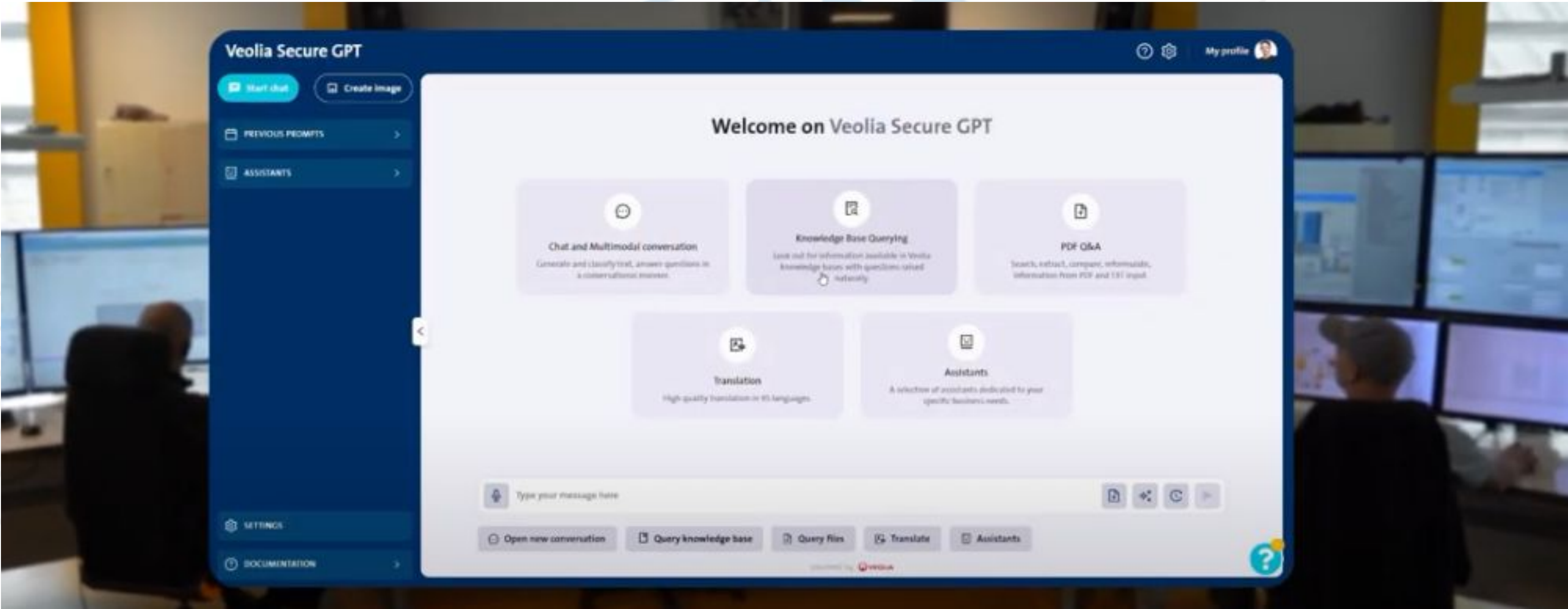
CLEAR Monitors and Evaluate in real time Air Quality and odours around hot spots in networks and/or plants. The solution gives actionable insights through data capture from air quality monitoring devices, visualisation, analytics and reporting.



Reporting & modeling

Digital Tools - GenAI

Veolia Secure GPT



In 2023, Veolia has launched a secured GenAI environment for internal use, enhanced with technical databases and numerous other information available for +200,000 staff

Digital Tools - Next steps

05/02/2025

For the first time, Veolia, a global leader in ecological transformation, and Mistral AI, a key player in generative artificial intelligence, announce a strategic partnership aimed at transforming the management and monitoring of industrial sites for water management, waste recycling and local energy production. By combining Mistral AI's cutting-edge technology with Veolia's data and expertise, the two companies are paving the way for a new era of innovation and efficiency, actively contributing to the ecological transformation.



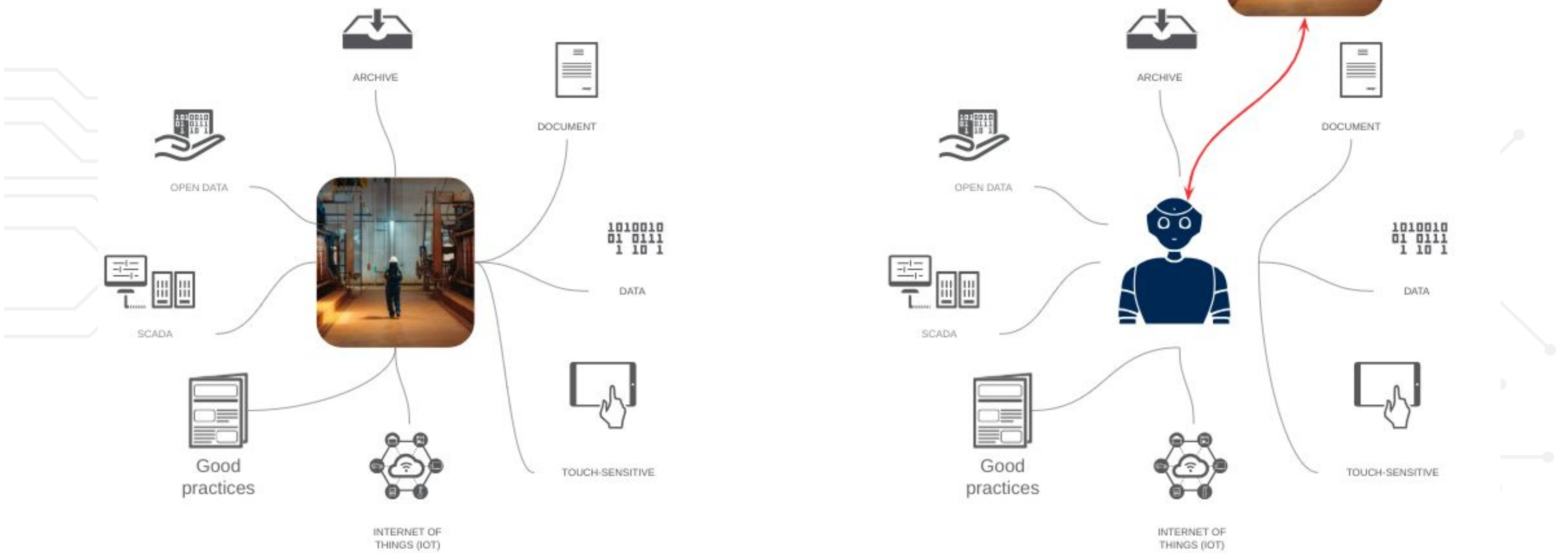
This partnership marks a major step forward in industrial management. Thanks to the integration of Mistral LLM (Large Language Model) with Veolia's data and knowledge base, it will now be possible to have a conversation with the plant, a world first. This innovation will bring unprecedented transparency and modernize plant monitoring, particularly in crucial areas such as personal safety and water consumption management.

By integrating the power of generative artificial intelligence, Veolia and Mistral AI are implementing a unique solution enabling employees and stakeholders to co-pilot water, waste and energy plants through interactive discussions. This represents a further step towards the realization of Industry 5.0 and the emergence of augmented employees, where technology directly supports human expertise.

Digital Tools - Next steps

Talk to My Plant - New Generation Assistants

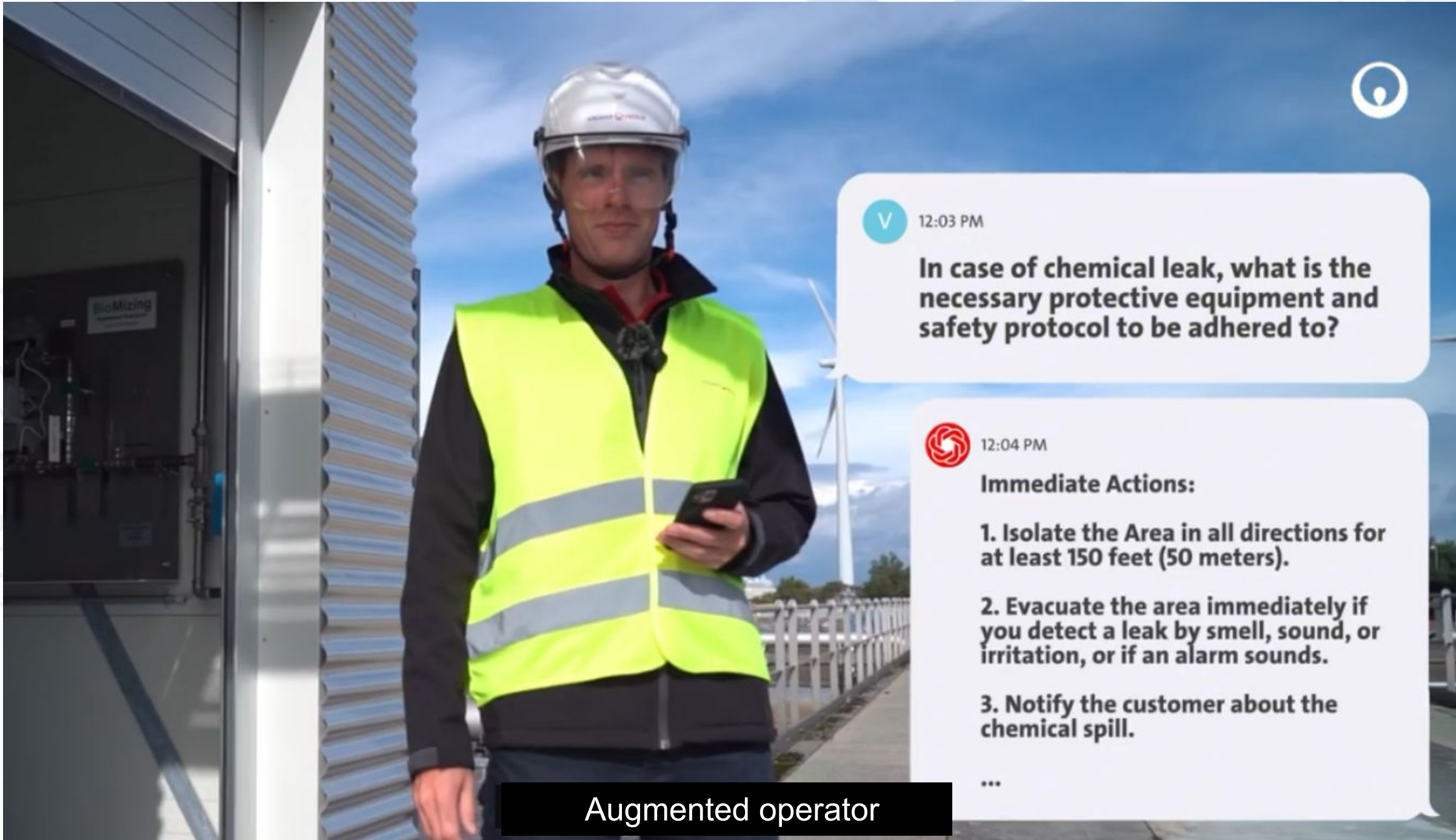
On top of the data available for the opertaor, a GenAI layer



Digital Tools - Next steps

2 ongoing pilots in Middle East:
Sur Desal Plant (Oman)
Bahrain Bay Utilities WWTP (Bahrain)

Talk to My Plant - New Generation Assistants



Digital Tools - Next steps

Talk to My Plant - New Generation Assistants

Advanced Plant Data Insight and Recommendation Assistant

- pH: Ranged from 7.117 to 7.815 (within acceptable range of 6.5 to 8.5)
- Inlet Flow: Ranged from 84.852 to 108.564 m³/h (well below the threshold of 5000 m³/h)
- Temperature: Ranged from 35.999 to 36.000 °C (slightly above the high threshold of 35 °C)
- Turbidity: Ranged from 1.097 to 2.377 NTU (within acceptable range of 5 NTU)
- SS Concentration: Ranged from 8.744 to 23.761 mg/L (well below the threshold of 30 mg/L)

• Tank 4:

- pH: Ranged from 8.499 to 8.500 (at the high threshold of 8.5)
- Inlet Flow: Ranged from 86.223 to 138.527 m³/h (well below the threshold of 5000 m³/h)
- Temperature: Ranged from 15.656 to 26.460 °C (within acceptable range of 15 to 35 °C)
- Turbidity: Ranged from 0.764 to 2.720 NTU (within acceptable range of 5 NTU)
- SS Concentration: Ranged from 4.590 to 23.482 mg/L (well below the threshold of 30 mg/L)

Overall, the operations on the 5th of September 2024 were mostly within acceptable ranges, except for the turbidity in Tank 1, which exceeded the thresholds.

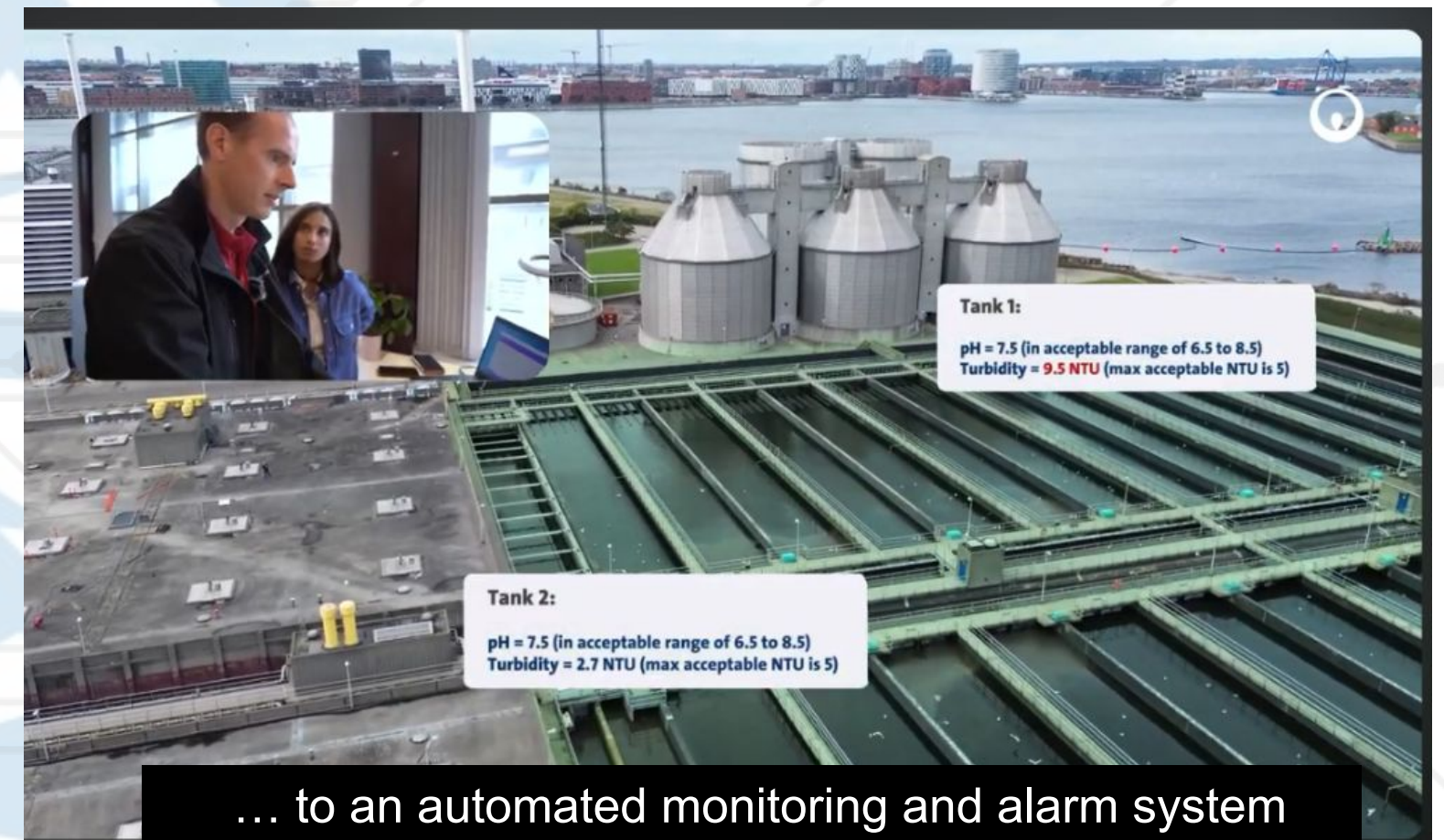
The acceptable ranges for key process parameters in the AquaRenew wastewater treatment plant are as follows:

- pH: 6.5-8.5
- Flow: Up to 5000 cubic meters per day
- Temperature: 15-35°C
- Turbidity: Less than 5 NTU
- Suspended Solids (SS): Less than 30 mg/L

Regular monitoring of these parameters is essential to ensure the plant operates effectively. If any parameter falls outside its acceptable range, corrective actions should be taken promptly.

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Digital Tools - One step further

Next Level of Digital Twin

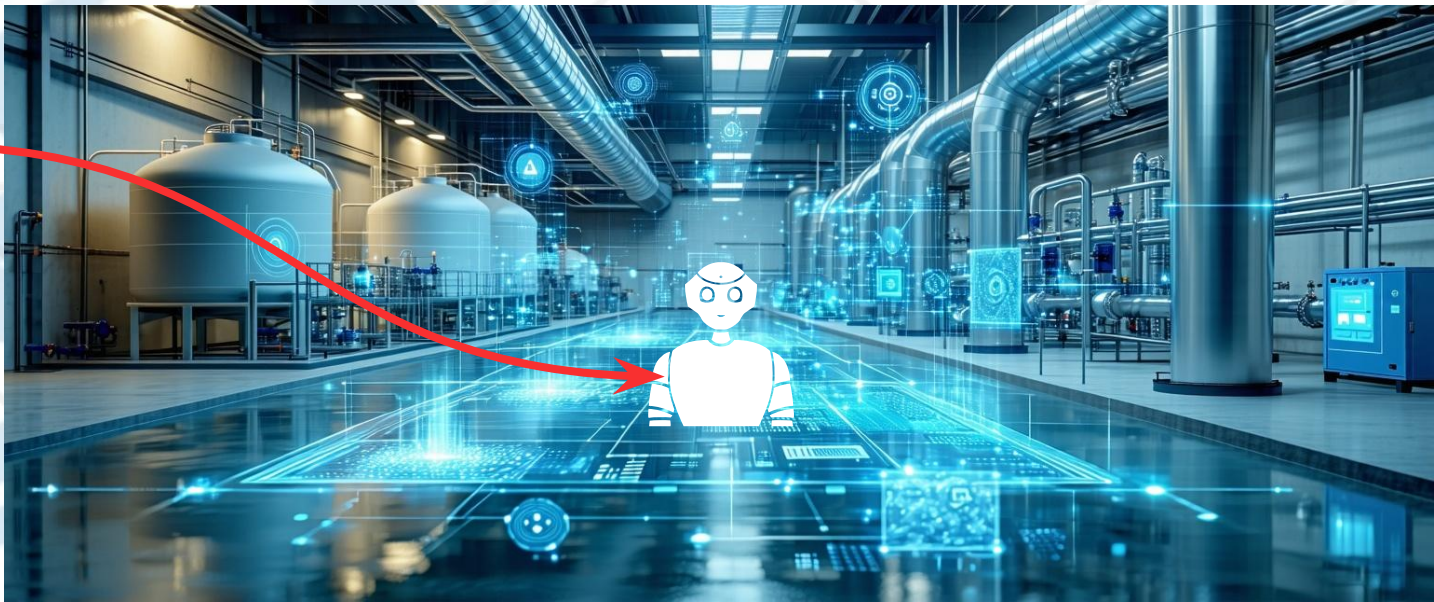
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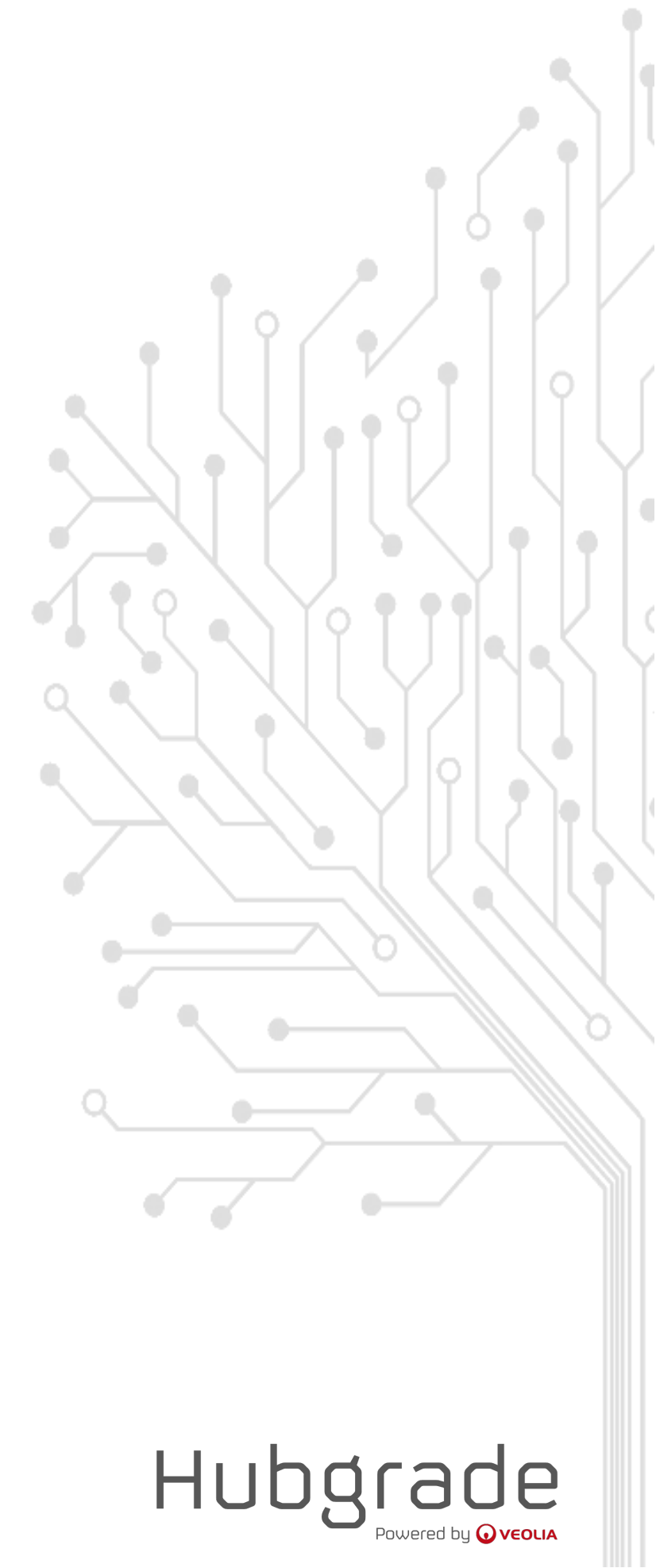


The operator takes information and recommendations thanks to AI solutions

CLOSE FUTURE

Next level of digital twin is able to take some decisions autonomously under the control & supervision of the operator





THANK YOU

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