No More Guesswork: Nutrient Monitoring That Meets Tomorrow's Demands

How the UWWTD Revision Will Affect Nutrient Limits: Prepare Your Plant Today

Thursday, November 6th
10 AM

STARTING IN 15 MINUTES

Juliane THAMM

Stuart AINSWORTH

Marie INIZAN

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JOIN US NOW

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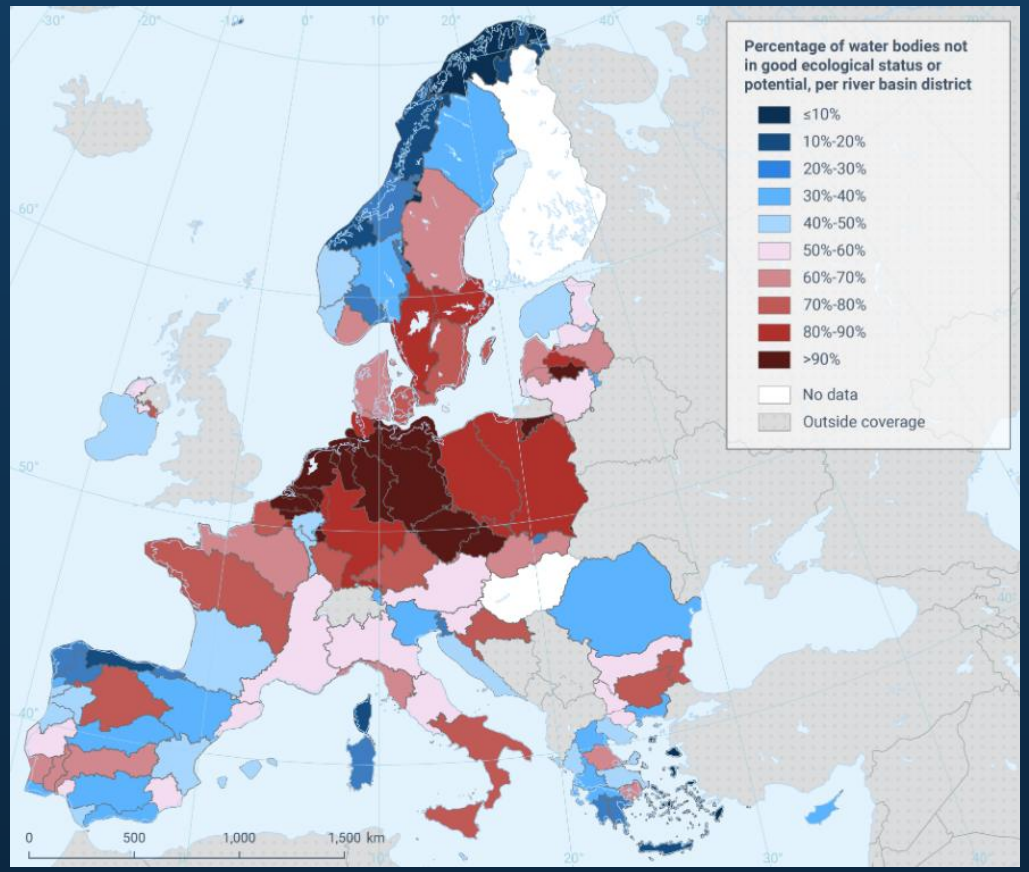
Agenda

1. Understanding the new UWWTD
2. Focus on nitrogen removal
3. Focus on phosphorus removal
4. UWWTD and micropollutants
5. Unlocking the full potential of your WWTP
6. Q&A

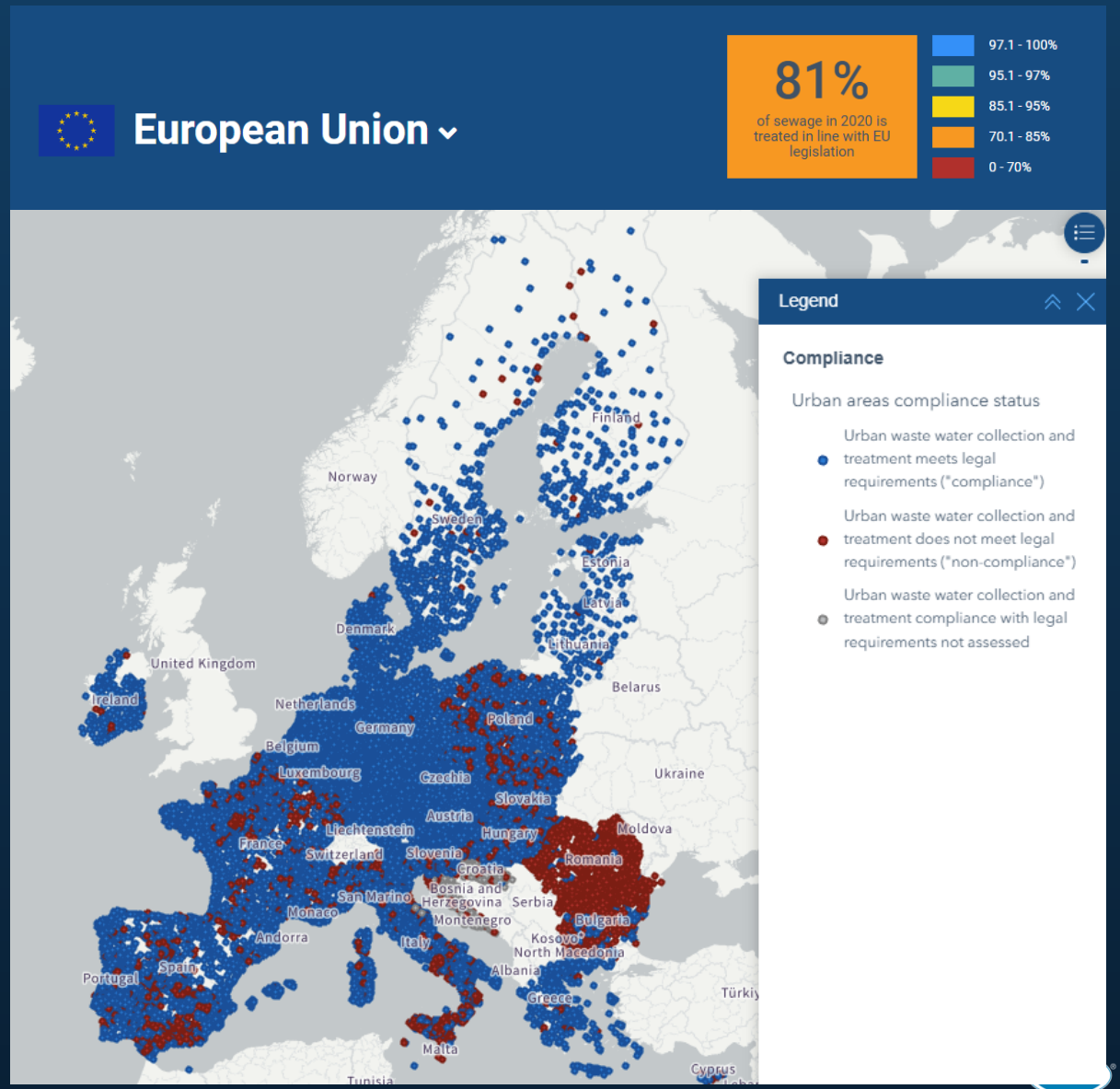
Two EU Directives Guiding Wastewater Treatment

- **The Water Framework Directive (WFD)**



Source : https://www.eea.europa.eu/en/analysis/indicators/ecological-status-of-surface-waters

- **The Urban WasteWater Treatment Directive (UWWTD)**



Source:
https://water.europa.eu/freshwater/freshwater/countries/uwwt/european-union

Understanding the new UWWTD

Why a revision of the UWWTD

Modernisation

1991 original directive: obsolete in light of today's challenges (circularity & emerging pollutants)

Environmental ambition

WFD objectives

Alignment with the European Green Deal / "Zero Pollution" action plan

Circularity : water reuse and energy recovery

Micropollutants & PFAS

Introduction of quaternary treatment
Extended producer responsibility (cosmetics, pharmaceuticals)

Rainfall Events

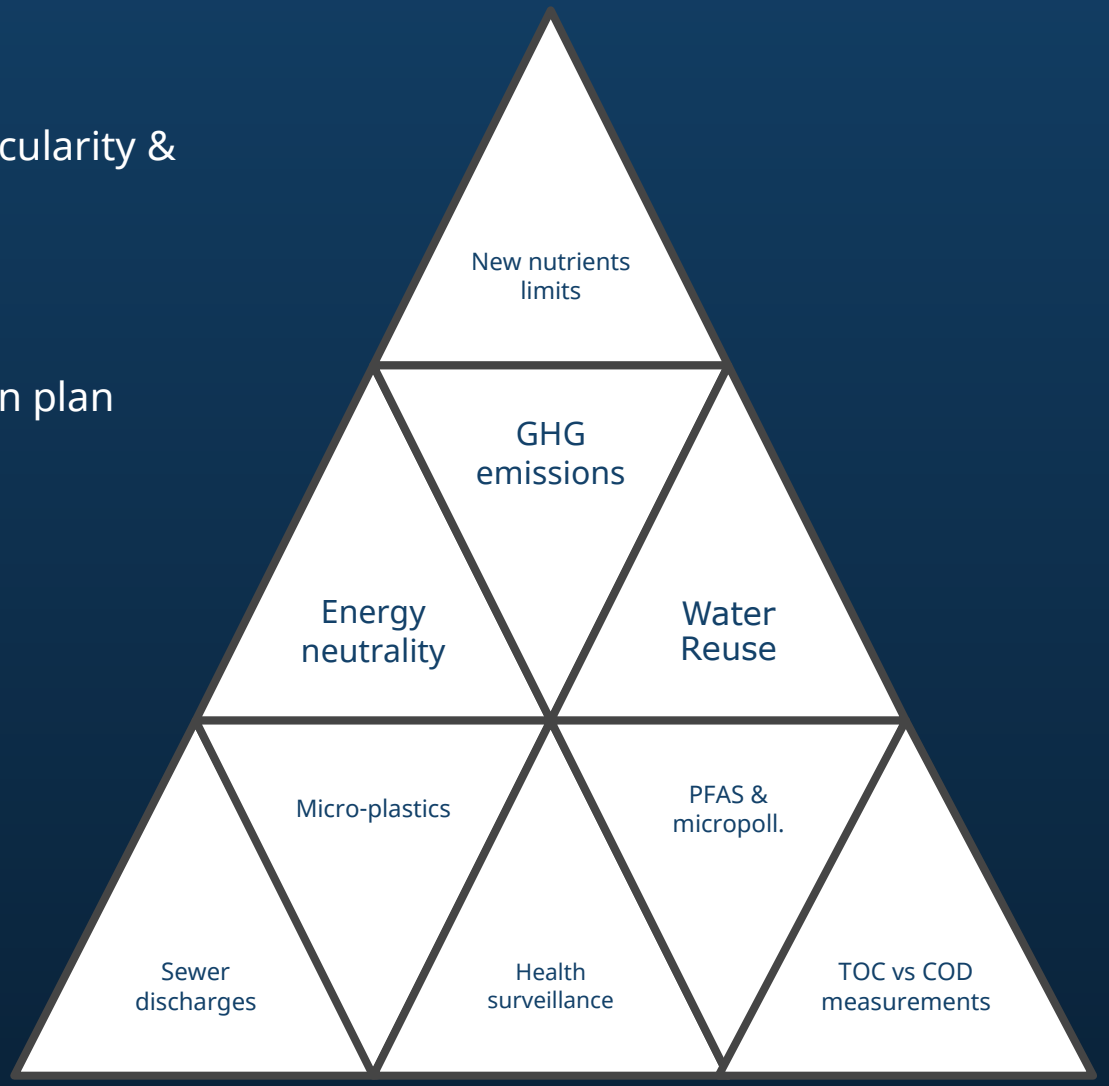
Limiting discharges of untreated wastewater

Energy Neutrality

Goal: energy self-sufficiency of treatment plants by 2045

Scope Extension

Threshold lowered to 1,000 PE → more agglomerations affected



📌 Stronger UWWTD Requirements: Is your plant ready to tackle it?

🧪 Nutrients under control

New limits for phosphorus and total nitrogen

Applies to WWTPs >150,000 PE and >10,000 PE in sensitive areas

Gradual implementation until 2045

⚡ Towards energy neutrality

National-level target by 2045

Mandatory energy audits for WWTPs >10,000 PE (by 2032)

GHG emissions must be quantified and monitored (by 2030)

💊 Micropolluants

Introduction of quaternary treatment

Goal: 80% reduction of micropollutants

Partially required by end of 2033, mandatory for all WWTPs by end of 2045

Poll

What is your current level of awareness regarding the 2024 revision of the UWWTD?

A. I have never heard of it

B. I’ve heard about it, but I’m not yet aware of the concrete impacts for my plant(s)

C. I’m already familiar with the main points and the consequences for my plant(s)

📌 UWWTD : what’s new with nutrients?

Parameters	1991 (UWWTD)	2024 (UWWTD revision)
Nitrogen (TN)	For sensitive areas only: WWTP 10 000–100 000 PE : **15 mg/L** WWTP ≥100 000 PE : **10 mg/L**	WWTP 10 000–150 000 PE : **10 mg/L** ⬇️ - Sensitive areas only WWTP ≥150 000 PE : **8 mg/L** ⬇️ - All areas
Phosphorus (TP)	For sensitive areas only: WWTP 10 000–100 000 PE : **2 mg/L** WWTP ≥100 000 PE : **1 mg/L**	WWTP 10 000–150 000 PE : **0,7 mg/L** ⬇️ - Sensitive areas only WWTP ≥150 000 PE : **0,5 mg/L** ⬇️ - All areas

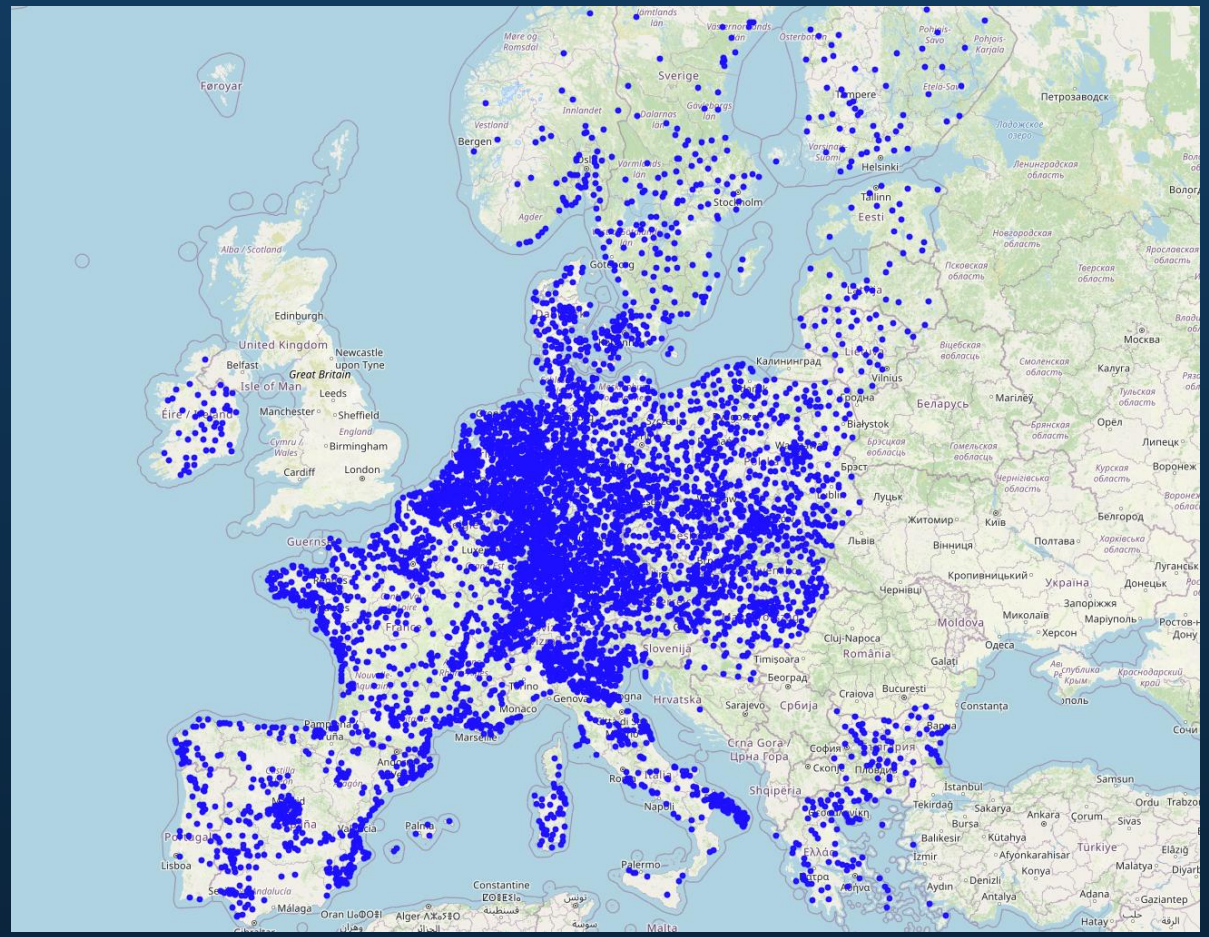
Implementation Deadlines for WWTPs ≥150,000 PE:

- 2033 : 30% of WWTP must comply
- 2036 : 70% of WWTP must comply
- 2039 : All WWTP must comply

Implementation Deadlines for WWTPs between 10000-150000PE in sensitive aeras

- 2033 : 20% of WWTP must comply
- 2036 : 40% of WWTP must comply
- 2039 : 60% of WWTP must comply
- 2045 : All WWTP must comply

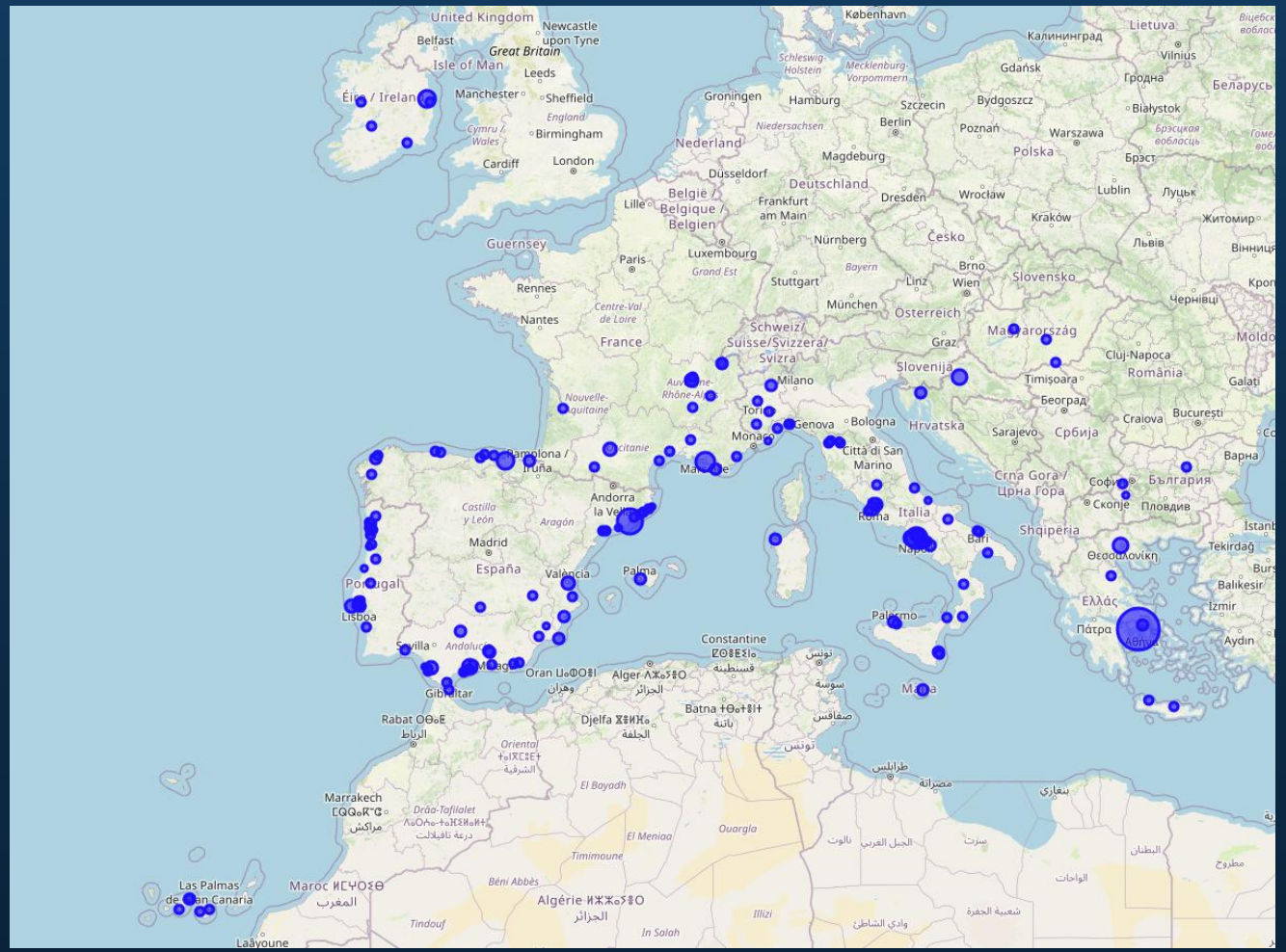
📌 UWWTD:
example of impact for phosphorus on plants between 10,000 and 99,999PE



6332 WWTP between 10 000 et 99 999 PE in sensitive area

- ⬇️ Total phosphorus: 2 mgTP/L → 0.7 mgTP/L

📌 UWWTD : example of impact for phosphorus on plants > 150 000 PE



Estimated number of WWTP with no P treatment today and which will need to treat at 0,5mgTP/L between 2033 and 2039 = 155 WWTPs

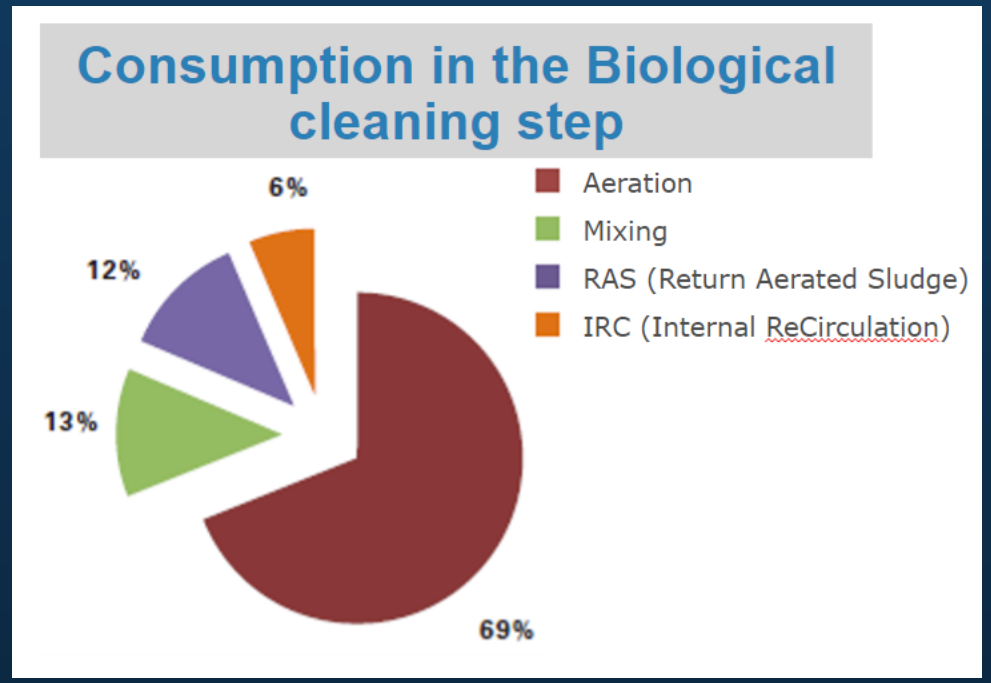
⬇️ From no TP consent → 0.5 mgTP/L

UWWTD and nutrients: a complex challenge – both technical and economic

- ⚠️ Rising pressure on WWTPs
  - Possible redesign of treatment plant needed
  - Increased complexity in daily operations
  - Higher operating costs for energy & chemicals
- 🎯 The operator’s challenge
  - Meet new targets without overinvesting
  - Control costs in a tougher regulatory context
  - Secure compliance with automation & continuous data
- 🛠️ What if we could adapt today?
  - Proven solutions exist to turn constraints into circular opportunities
  - Prepare for tomorrow with smarter, resource-focused operations

Focus on nitrogen

Optimising Nitrogen Treatment & Achieving Energy Neutrality: A Winning Combination!



🧪 Stricter Total Nitrogen Standards

- ➡️ Require optimization of the treatment process

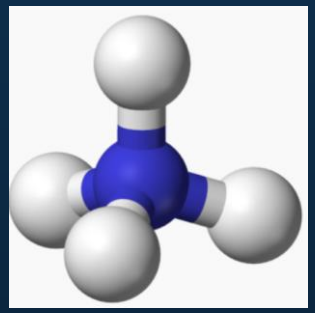
⚡ Energy Neutrality

- ➡️ Also means reducing and optimizing energy consumption
- ➡️ Aeration accounts for up to 60% of a WWTP's total electricity use
- ➡️ No energy neutrality without aeration optimization

🎯 Solutions for improving nitrogen removal have a dual benefits:

- ➡️ Secure nitrogen compliance
- ➡️ Reduced energy consumption

Nitrogen removal challenges



- Lack of visibility on key parameters
- Compliance
- Sludge age
- Lack of carbon source for denitrifcation
- Adequat air supply
- Power consumption optimisation

Poll

In light of the new nitrogen requirements and energy neutrality goals, what is your current position?

A. No nitrogen treatment optimization project: the future nitrogen standard seems achievable without changes, and energy neutrality will not be pursued through aeration

B. Energy neutrality is a goal, but there is still time to consider it

C. Aeration optimization is under consideration: energy neutrality is a goal, and it makes sense to start saving energy now

D. Discussions are already underway, as significant investments will likely be needed to ensure nitrogen treatment performance

Basic monitoring solutions to address these challenges

LDO

- No membranes to replace
- No calibration required
- No drift and highly accurate measurements

pHd-ORP

- Differential electrode measurement technology
- Ensures measurement accuracy
- Reduces downtime and maintenance

Advanced monitoring solutions to address these challenges

NH6000 (Amtax replacement)

- Easy installation at the measurement point
- Gas-selective electrode method with 5-minute response time
- Integrated sample preparationInstallation facile au point de mesure

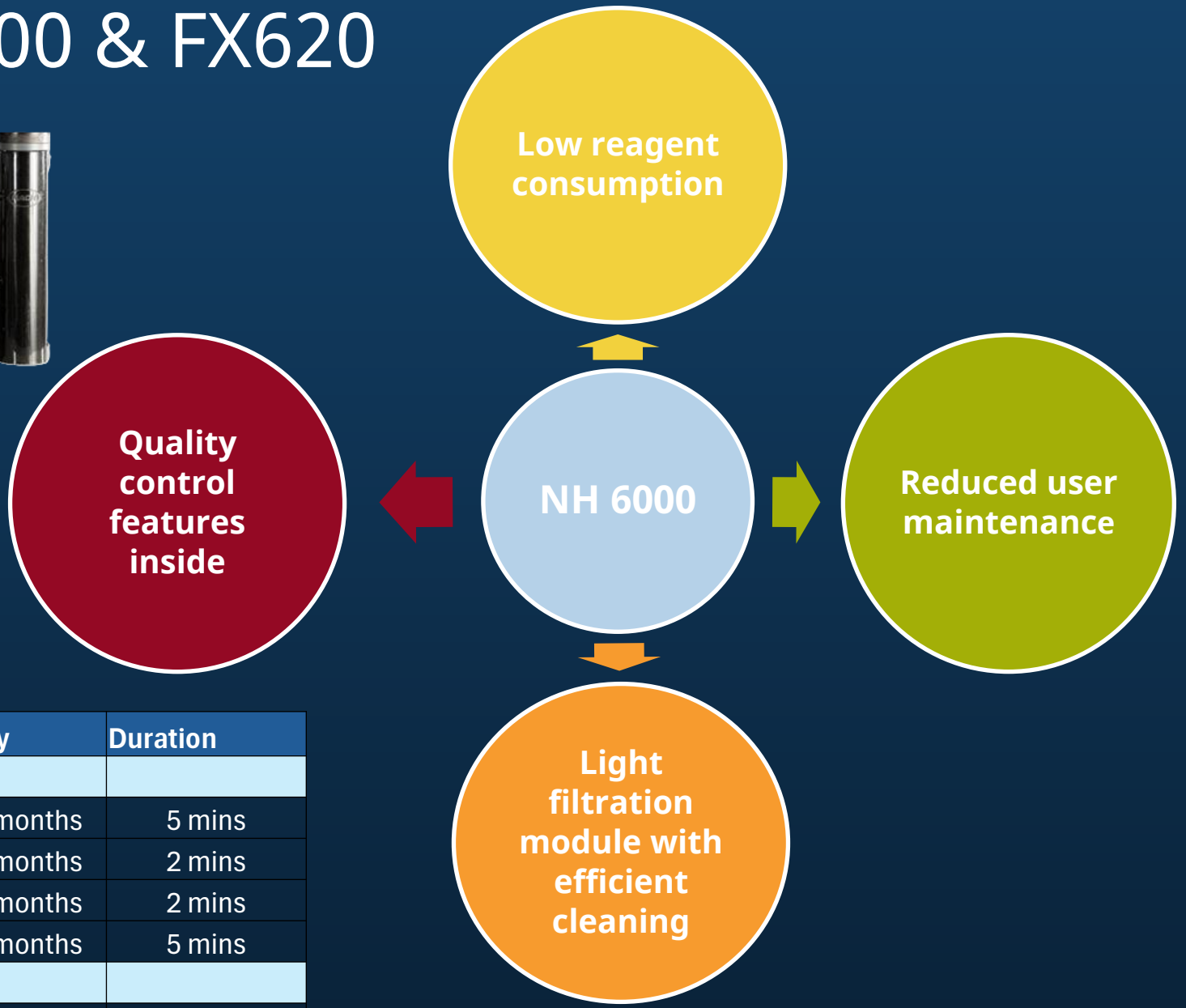
NT3100

- UV absorption method
- Self-cleaning and sludge compensation

AN-ISE

- ISE probe for combined NO_3^- / NH_4^+ measurements

Focus on the new NH6000 & FX620



Main maintenance steps	Frequency	Duration
NH6000 analyser		
Replace electrolyte and membrane cap	Every 6 months	5 mins
Replace air filters pads	Every 6 months	2 mins
Replace sample pump tubing	Every 6 months	2 mins
Replace reagents *	Every 6 months	5 mins
Filtration module		
Clean the filter membrane **	Every 3 months	10 mins
Clean the air bubble cleaning module (FX620)	Every 6 months	10 mins

* Compared to Hach previous AMTAX analyzer

Focus on the new NH6000

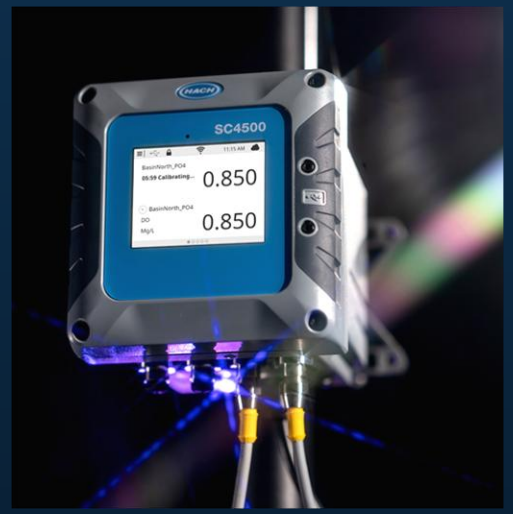
- Muni WWTP
- Influent of BAFF for nitrifcation
- NH6000 measurement range of 1-100mg/L, expected accuracy of 3% + 1mg/L
- FX620 instaled in by-pass

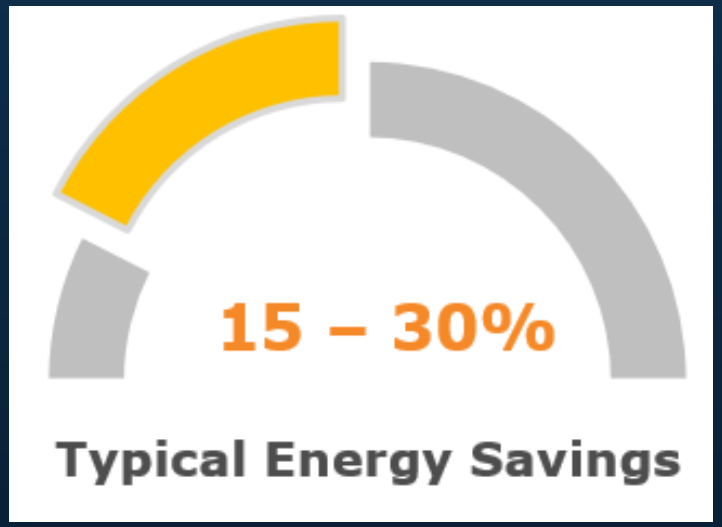
- Muni WWTP
- On AST
- NH6000 measurement range of 0,05 - 20mg/L

Beyond online nitrogen monitoring: RTC for smart process control

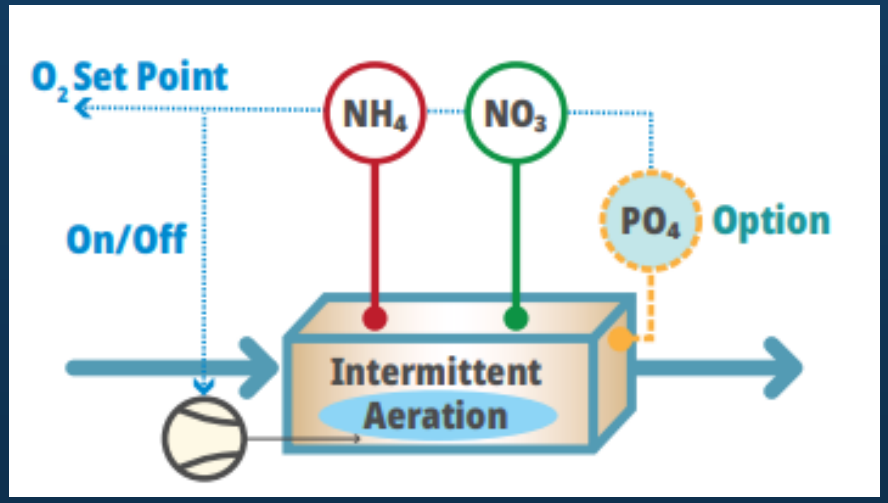
RTC Controller for Optimizing Activated Sludge Basins :

- Adaptable to any plant configuration
- Ensures compliance
- Optimizes operational costs
- Available on SC4500 platform (RTC-N/DN) and on standardized combined platform





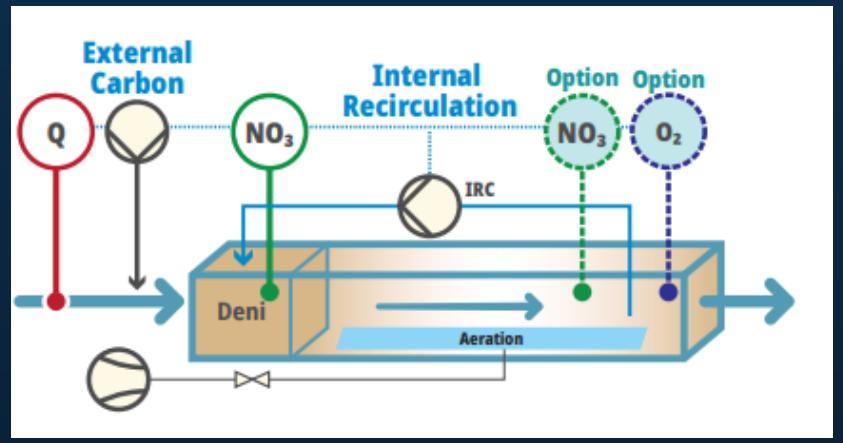
Beyond online nitrogen monitoring: RTC for smart process control



RTC-NDN : for controlling aeration on/off in intermittent operation.

RTC-N : for controlling the oxygen setpoint in continuous nitrification.

RTC-DN : for managing external carbon dosing and/or internal recirculation



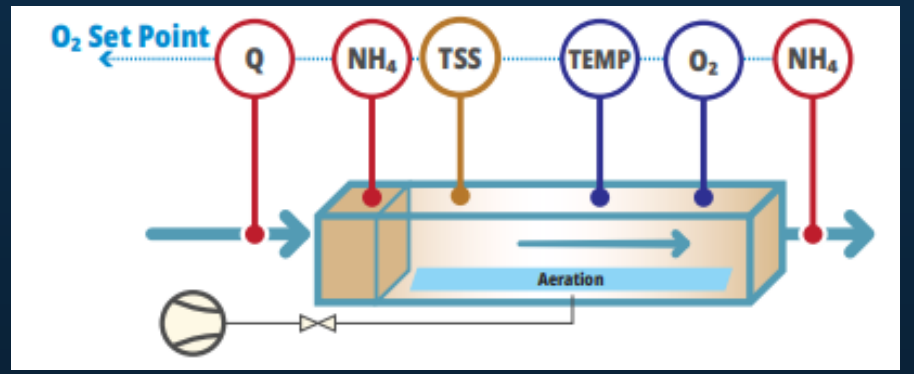


Illustration 1 of solutions for nitrogen optimisation

🏭 The WWTP:

- 170,000 PE operating with intermittent aeration
- Discharge consent for total nitrogen: 10 mgN/L

🎯 Objectives :

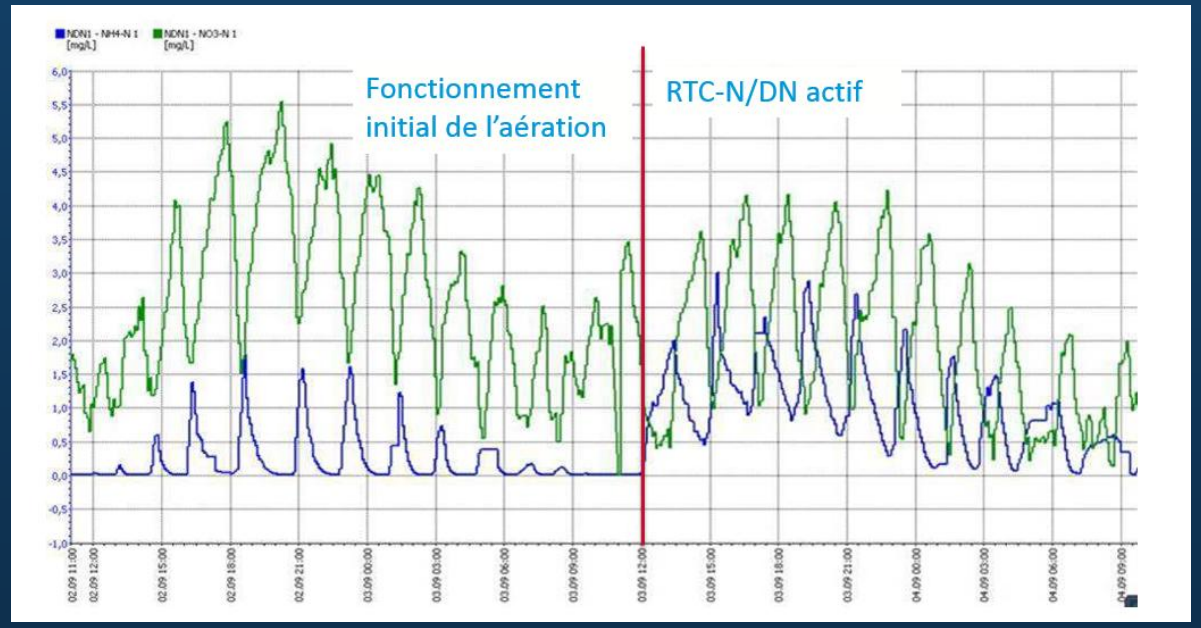
- Ensure stable nitrogen removal performance
- Reduce energy consumption

⚙️ Implementation:

- On-line ammonium and nitrate measurements (AMTAX and NT31)
- N/DN-RTC: dynamic control of aeration sequencing based on real-time NH4 and NO3 levels

📊 Results :

- Stable nitrogen discharge performance
- Energy savings: ~12% reduction in aerators operating time



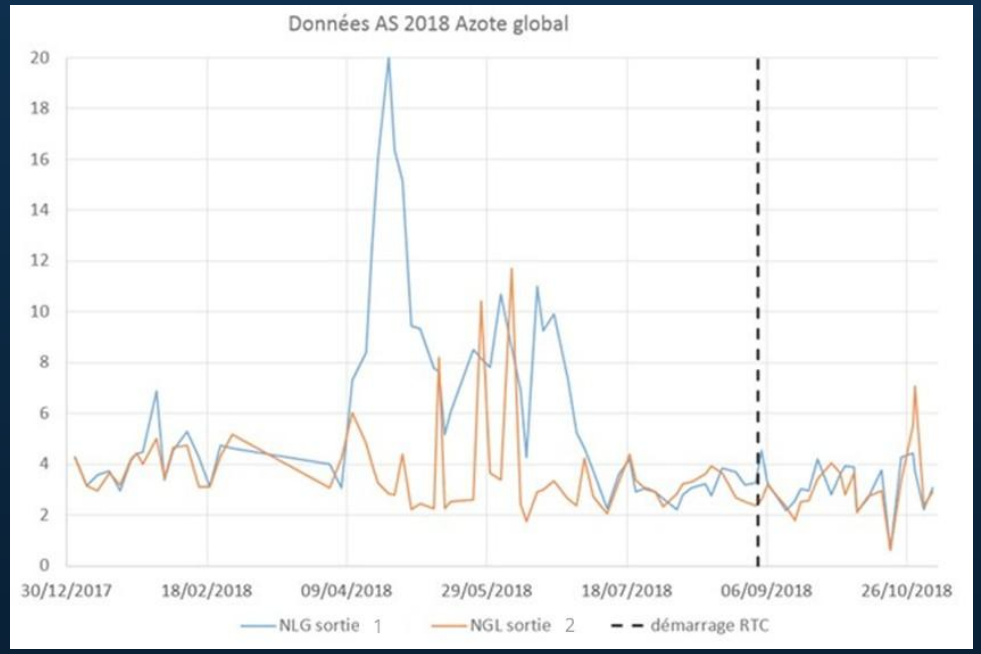


Illustration 2 of solutions for nitrogen optimisation

🏭 The WWTP:

- 45,000 PE, located in southern England with pre-denitrification
- Discharge permit for total nitrogen reduced from 13.8 to 9.8 mgN/L

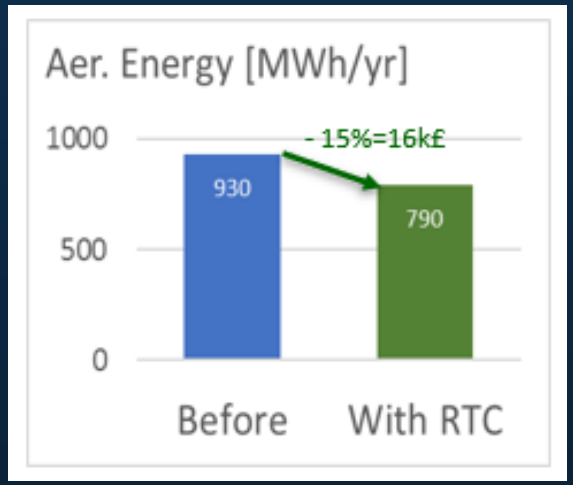
🎯 Objectives :

- Compliance with the new permit without external carbon source
- Reduce aeration costs

⚙️ Implementation:

- On-line measurements ammonium and nitrate
- N-RTC: to prevent excessive oxygen levels
- IRC-RTC: control of mixed liquor recirculation to the anoxic zone
- SRT-RTC: adjustment of sludge age

💰 Investissement : ~145 000 €



📊 Results :

- £6M investment avoided (no need to switch to Bardenpho process with methanol)
- New TN limit achieved
- Energy savings: ~15% or £14,000/year

Focus on phosphorus removal

UWWTD major changes – P removal Recap

(EU 2024/3019)

>150K Pop equiv (104 reg samples)

1.0 mg/l → 0.5 mg/l

or 90% Removal

~100+ % more treatment chemicals

Mandatory **tertiary treatment**

>10K - <100K Pop equiv (<50K = 24 RS, >50=52 RS)

2.0 mg/l → 0.7 mg/l

or 87.5% Removal

~200++ % more chemicals

Mandatory **tertiary treatment** if into sensitive water

>100K - <150K Pop equiv (52 reg samples)

1.0 mg/l → 0.7 mg/l

>1K - <10K Pop equiv

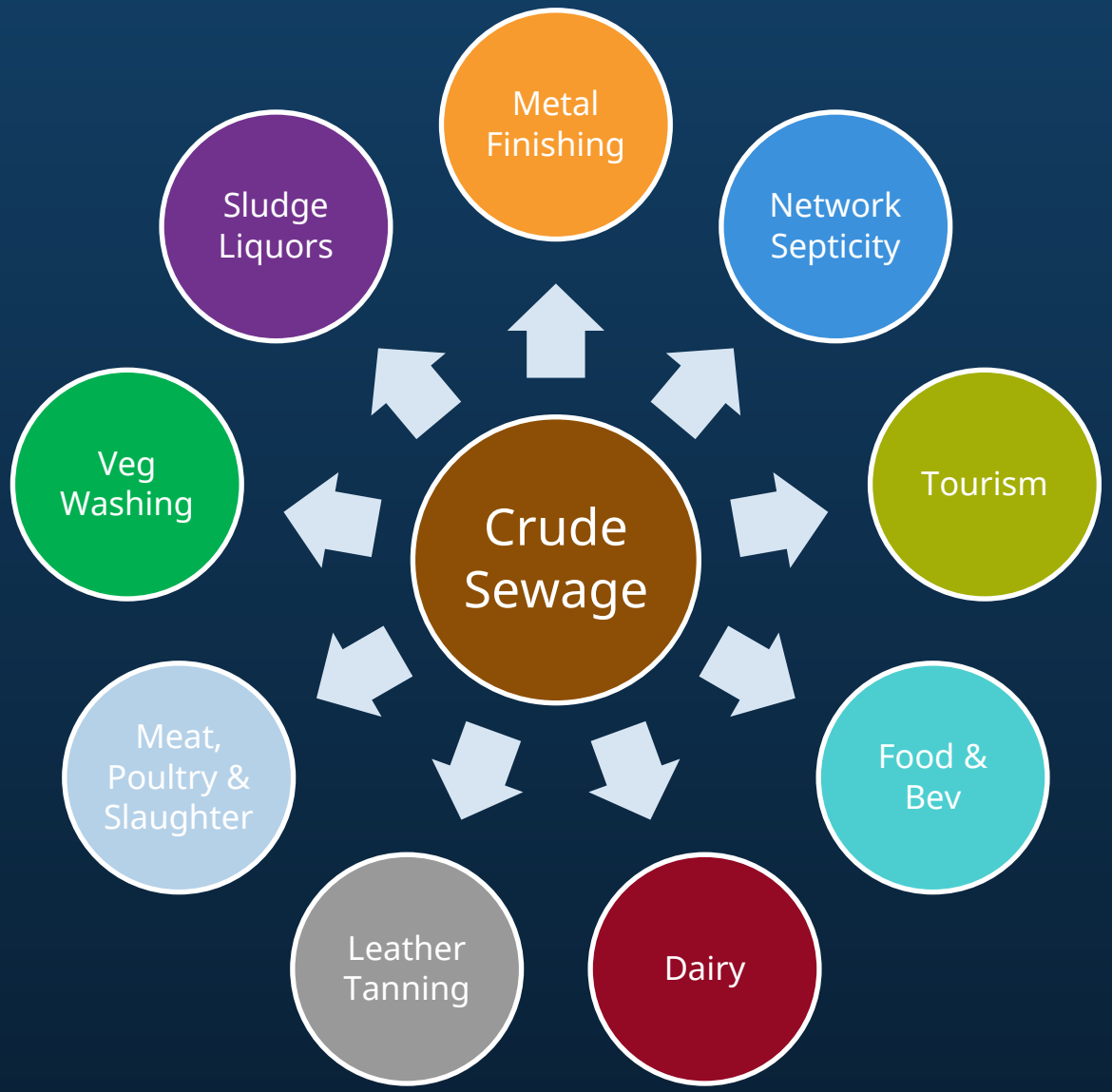
Subject to national discretion

Very large number of plants

Newly Designated Sensitive Water

Steep learning curve for 155 WwTW's

Phosphorus removal challenges



Component	Phosphorus Content
Human Waste	Urine 1300 mg/l, faeces 3000 mg/l Ortho P = 1.2–1.8 g PO_4-P/PE/day Total P = 1.8–2.5 g P/PE/day
Milk	~950 mg/l
Meat processing	200 mg/l
Industrial Detergents	1,000–5,000+ mg/L
Metal finishing waste	50 – 2000+ mg/l
Sludge liquors	5-80 mg/l
Veg washing	10 -80 mg/l (Spinach, carrots, potatoes all high)
Food grade phosphoric acid	**750,000 mg/l**

POLL

Do you think you will require instrumentation to meet the UWwTD phosphorus removal revisions?

A. Yes

B. No

C. Not sure

Advanced Monitoring Solutions To Address These Challenges

Phosphax Sc
Ortho P

3 working ranges
0.05 – 15 mg/l, 1 – 50 mg/l,
0.015 – 2 mg/l lowest detection limit commercially available
5-minute measurement interval
1 or 2 sample streams

Filtration
Filtrax

Proven in post PST applications
Highly robust
Fast sample delivery
Supports dual channel applications maximizing analyser value

EZ – TP
Total P

Sample is digested for accurate TP results
Aimed at final effluent applications
0.01 – 2 mg/l range
30 min cycle time

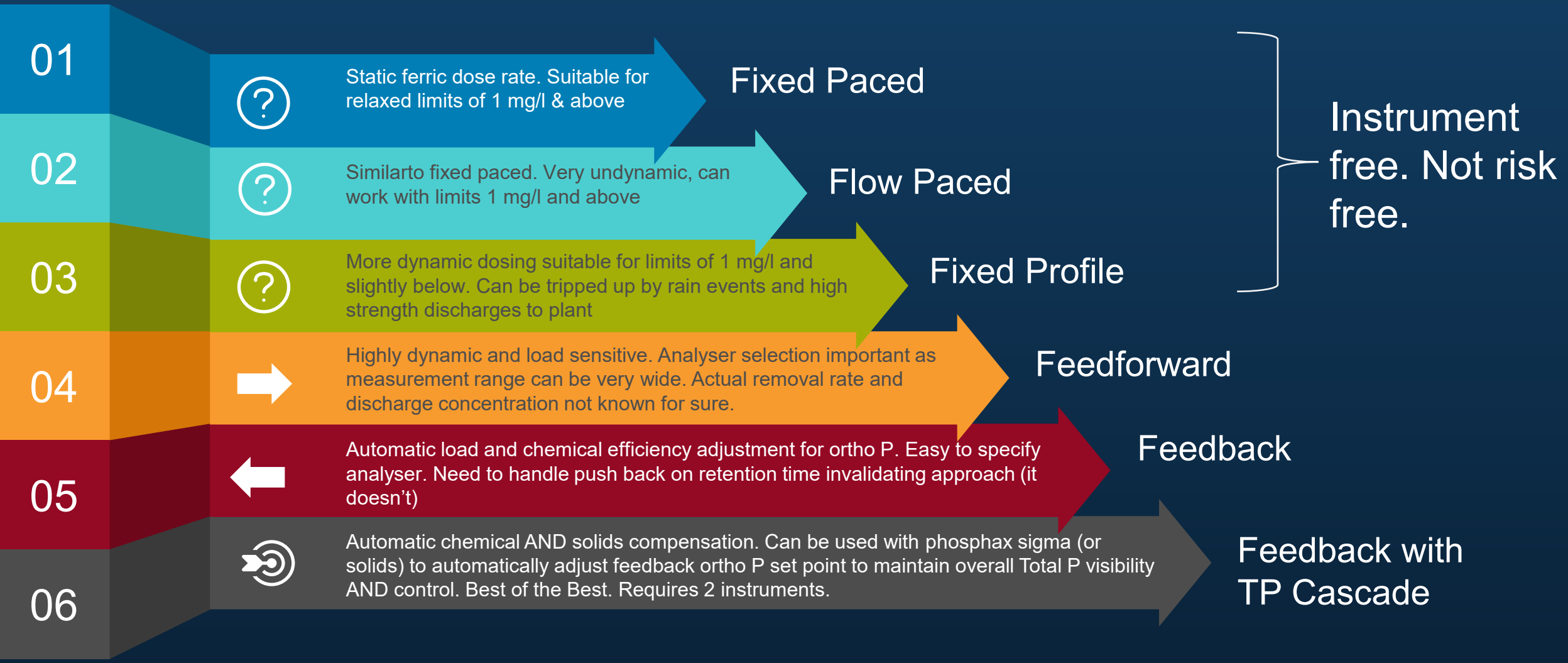
Phosphax Sigma + Sigmatax
Total P

Sample has ultrasonic & pressurized digested step for rapid & accurate TP results
Aimed at final effluent applications with control
0.01 – 5 mg/l range
10 min cycle time

Solitax
Solids

High performance solids measurement
Can support cascade functionality
Helps understand overall TP performance & risk

Control Technique Evolution



Selected Application Options

Revised UWwTD Ready!

Feedback

Control to a known discharge ortho P concentration

\+ FF

Maintain enough P for biological stage then go very low

\+ Dynamic ortho P target

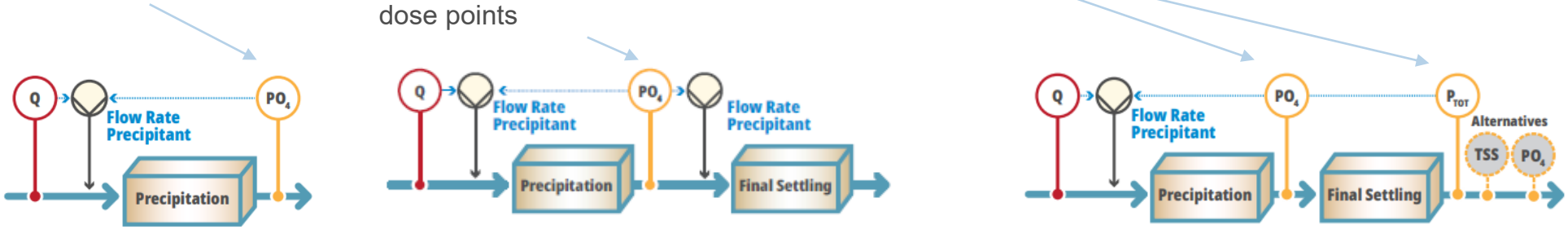
Enhanced Total P compliance with solids auto compensation

Advanced Feedback (allows set point close to zero – conventional feedback struggles to achieve this asymmetric set point)

Feedback (across biological stage) + feedforward (informing final tank or tertiary filtration dose) 1 analyzer informing 2 dose points

Feedback with secondary cascade control (additional TP or solids measurement)

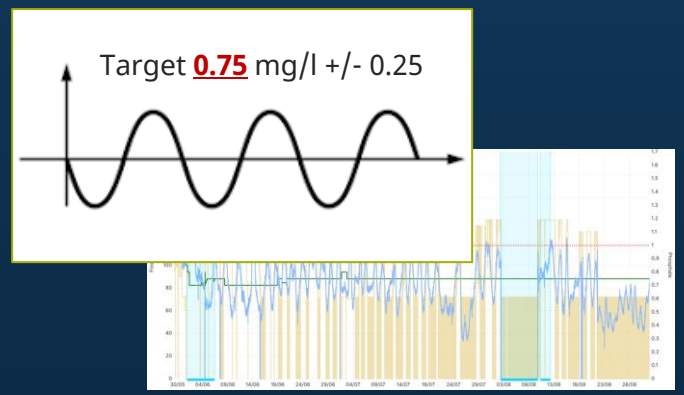
Compliance Security



What Is The General Indicative Performance?

Feedback Across 2 process stages (dose PST eff measure post final tank

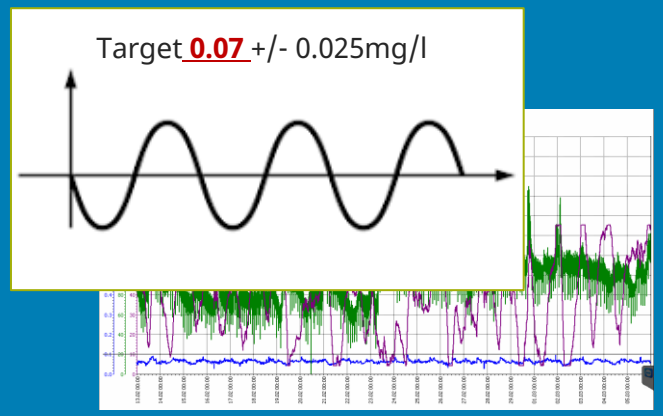
NOT RECOMMENDED!
(Still worked better than incumbent method)



Ireland Site: Design 150K Pop equiv

Customer had existing final eff phosphax and dosed into PST effluent. Simply added SC4500 to final effluent analyser to upgrade dose strategy

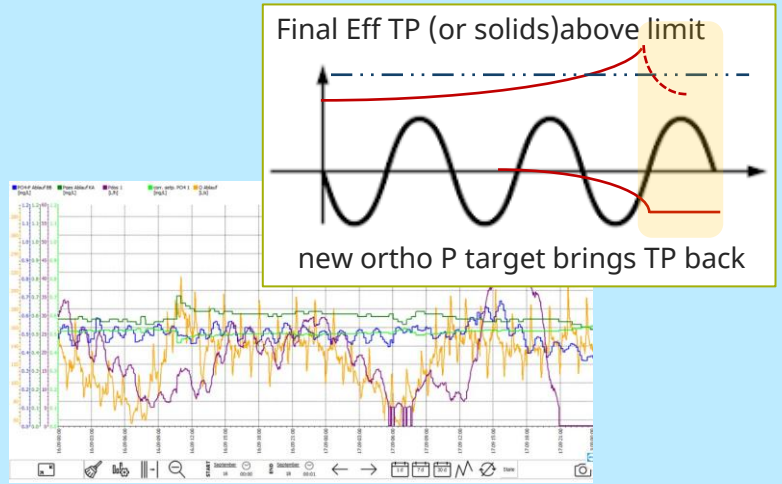
Feedback Across 1 process stage (eg final tank, ASP, tertiary filtration etc). Strictest Regulatory limits can be managed in conjunction with solids management.



Germany Site: Design 50K Pop equiv
Feedback across ASP

Utra low ortho P allowed Tot P of 0.25 mg/l to be met WITHOUT tertiary filtration

Dynamic Ortho P target in action. Total P cascade function from additional TP final effluent measurement



Leverages additional ortho P removal performance to auto compensate for solids impact on TP compliance risk

Beyond online phosphorus monitoring: RTC for smart process control

Sc4500
Instrument
Controller

Converts Analyser to chemical dose tool
Low Price Point solution
Highly Scalable
Proven Algorithms & Fallback Position
Advanced Feed Forward **or** Feed Back

Software /
Hardware

Industrial
PC

- Supports **6** different control options for P removal
- Choice of over 60 optimisation tools for whole plant
- Required for Cascade and combination approaches for P removal

UWWTD and micropollutants

🧪 UWWTD : what’s new with micropollutants?

Objectives :

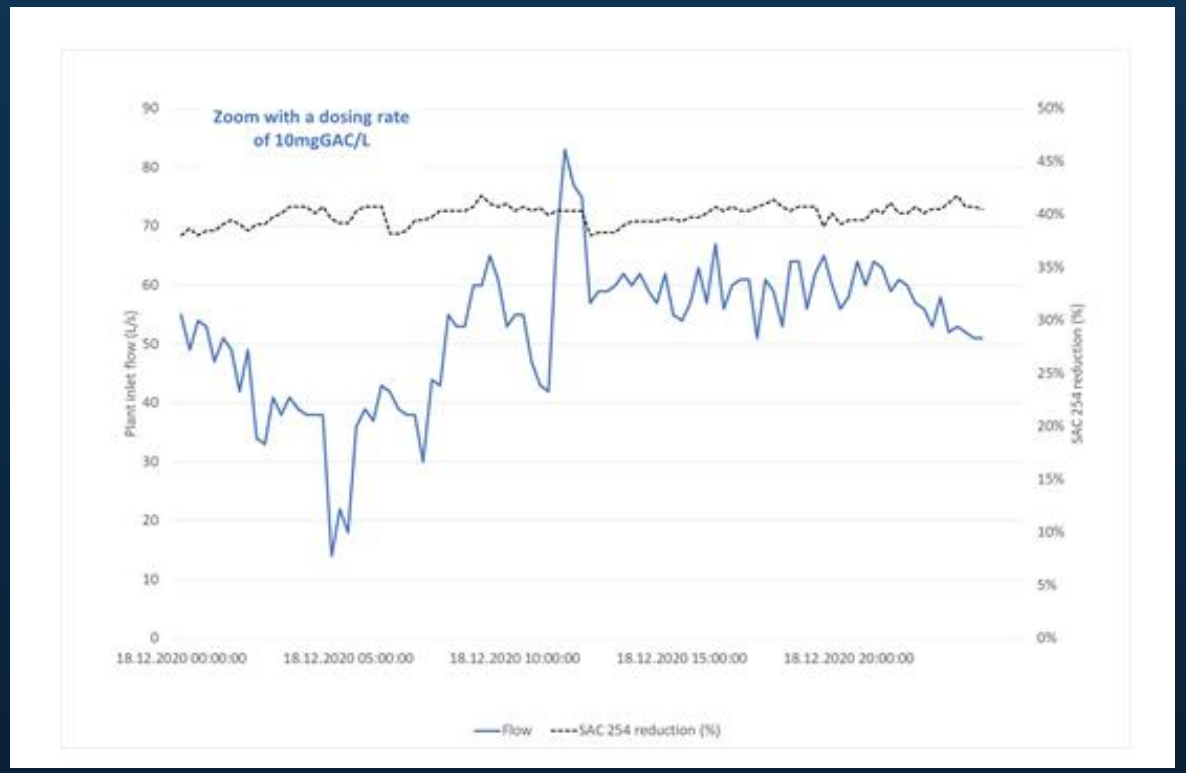
- Remvoal rate ≥ 80 %
- Mandatory for WWTP>150,000 PE & >10,000 PE in sensitive areas
- Sensitive areas must be identified by 31/12/2030

Agglomerations of more than 150,000 PE	Deadline	Agglomerations of more than 10,000 PE in sensitive areas*	Deadline
20% of agglomerations	Dec 31, 2033	10% of agglomerations	Dec 31, 2033
		30% of agglomerations	Dec 31, 2036
60% of agglomerations	Dec 31, 2039	60% of agglomerations	Dec 31, 2039
100% of agglomerations	Dec 31, 2045	100% of agglomerations	Dec 31, 2045

Illustration of solutions for micro-pollutants removal

Online monitoring of SAC_{254} with UVAS SC:

- ✓ Direct UV absorbance measurement at 254nm across a 50mm pathlength
- ✓ Clear correlation between the decrease of absorbance (ΔAbs) and the relative removal efficiency of more than 184 micropollutants



Other parameters of interest for micropollutants removal:

- ✓ Turbidity (SOLTIAX or ULTRATURB)
- ✓ Nitrite (EZ serie)
- ✓ ORP
- ✓ Ozone (Orbisphere C1100)
- ✓ Sludge level (granualted activated carbon)

Unlock the full potential of your WWTP

HACH®

🎯 Achieving UWWTD revision targets for nitrogen & phosphorus: measure, control, optimize

📊 Measure what matters – directly at the point of treatment

ex : NH_4^+, NO_3^-, PO_4-P, TP: robust online sensors for real-time insight

Reliable data = foundation for compliance & process understanding

🧠 Go beyond monitoring – control the key levers

Aeration: optimize oxygen supply (RTC-NRC+, RTC-NDN+)

Recirculation: manage internal flows for denitrification (RTC-DN+)

Sludge age: stabilize biological performance

Reagent dosing: adjust carbon source or metal salts based on actual needs

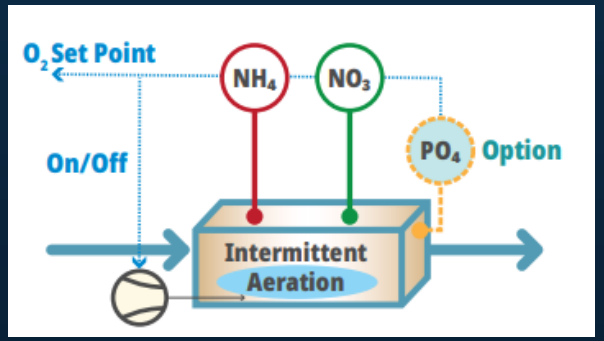
🔁 Circular mindset

Reduce chemical use

Lower energy demand

Improve effluent quality

Secure compliance with minimal overinvestment



Challenges ahead and solutions are already available

📉 **UWWTD revision= stricter new standards**

➤ Nitrogen, phosphorus, micropollutants, energy,...

⚙️ **Online measurement and real-time control = optimization driver**

➤ Accuracy, responsiveness, automation, compliance

💡 **Act now to anticipate**

➤ Prepare WWTPs for the 2033–2045 deadlines

➤ Ensure compliance without overinvesting

If you now think…

I should really try to enhance my precipitant dosing strategy.

I'm already tight with my effluent limits now – it will cost so much to build a new aeration tank.

I'm not sure about the optimal instrumentation for my micropollutant removal stage.

My nitri/deni control could also use a makeover.

Let's explore **tailored solutions** for your needs.

Click the box to share your details and connect with our experts.

HACH®

Q&A session

Let's explore **tailored solutions** for your needs.

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