INText PLATFORM

Innovative hybrid INTensive – EXTensive technologies for wastewater treatment in small communities.

WETPOL 2023

LIFE INTEXT is a project co-funded by the European Union under the LIFE Programme Grant Agreement no. LIFE18 ENV/ES/000233

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INTEXT Project

INText

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Innovative hybrid INTensive – EXTensive technologies for wastewater treatment in small communities

Partners:

- ✓ Water management, engineering and construction (Coordinator) → **Aqualia**
- ✓ 3 x I&T centres → CENTA (AMAYA), AIMEN & Aarhus University
- ✓ 4 x Technology companies → Syntea, Projar, Autarcon & FIN

Budget:

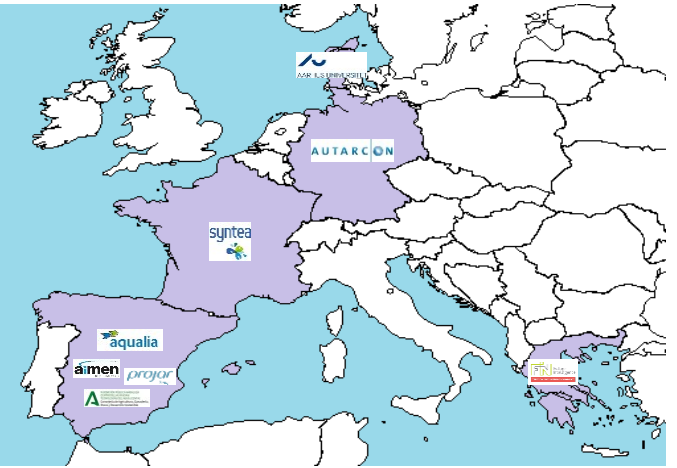
- ✓ Total: 2.926.547 €
- ✓ UE contribution: 1.596.470 €

Sites:

- ✓ Talavera de la Reina WWTP (Toledo) → Aqualia
- ✓ Carrión de los Céspedes WWTP (Sevilla) → CENTA (AMAYA)

Duration:

- ✓ 4 years
- ✓ 01/07/2019 – 30/06/2023 → 1-year extension (30/06/2024)



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INTEXT Platform

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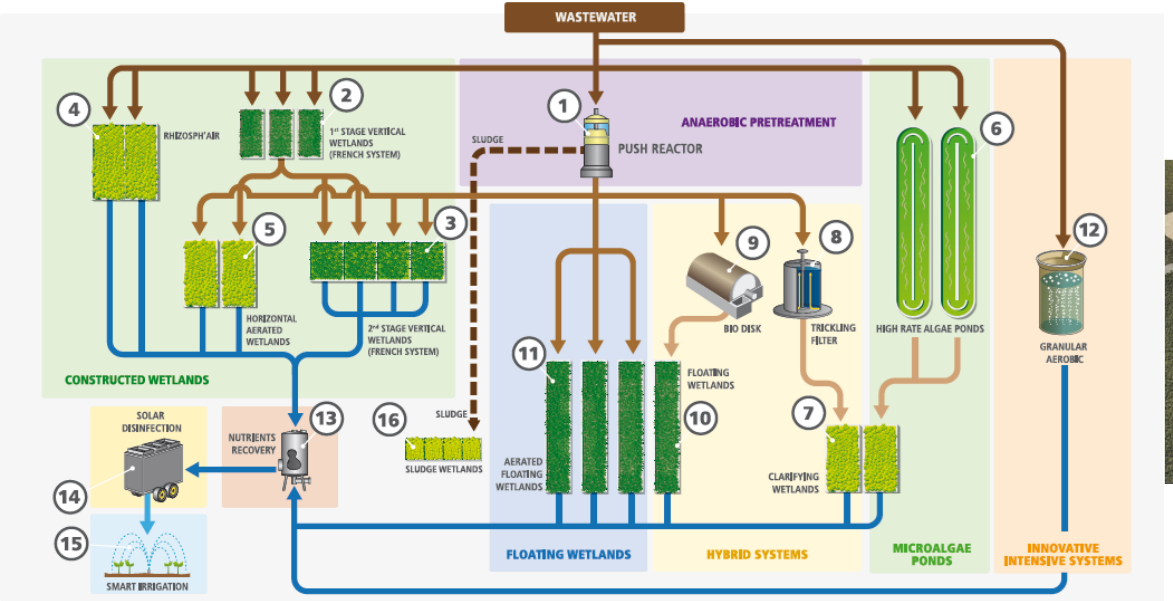
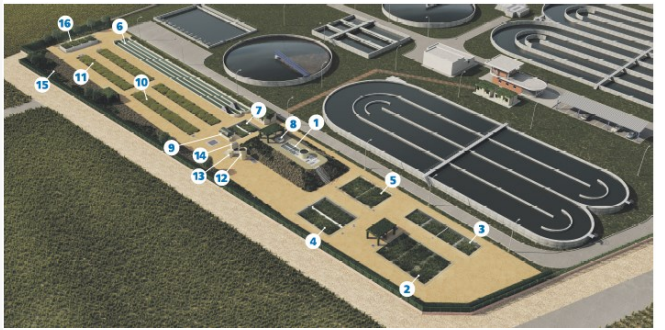
INTEXT Platform

Technology HUB

- ✓ Talavera de la Reina WWTP → **+ 5.800 m²**
- ✓ **+ 16 Technologies** and combinations → All sized for **125 PE**
- ✓ Possibility to simulate **uncontrolled discharges** and periods of **high hydraulic load**.



#hub INText



INTEXT Platform

Technology HUB

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INTEXT Technology benchmarking

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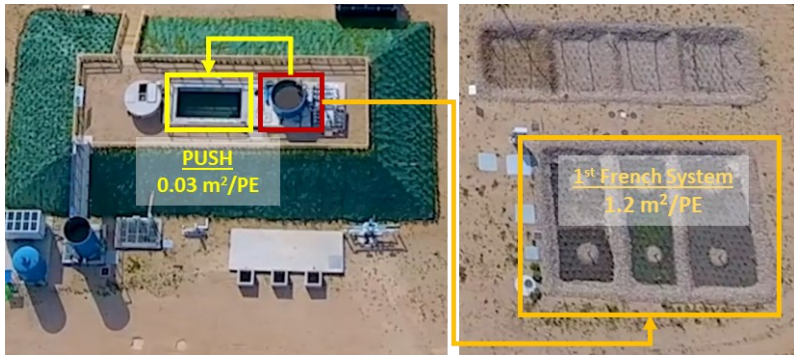
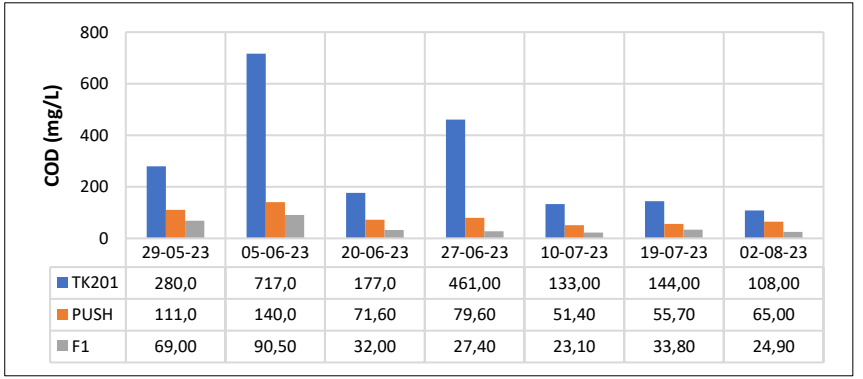
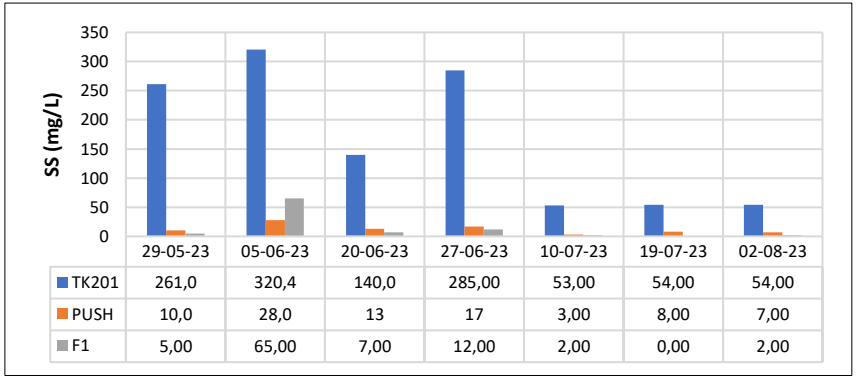
Anaerobic pre-treatment (PUSH) vs. 1st Stage French System

INTEXT Technology benchmarking







- PUSH® → Aqualia's Patented UASB anaerobic pre-treatment

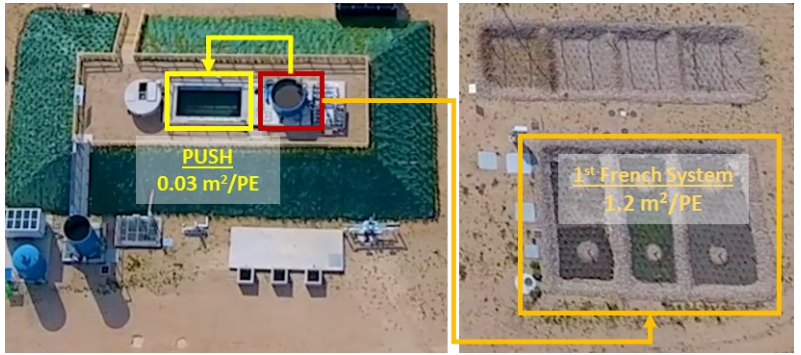
- Innovative pulse feeding system

- 1st stage French system → Vertical Flow Constructed Wetland

	PUSH®	1st French System (F1)
Feed	Raw water	Raw water
Flow	72 m³/day	19 m³/day
Footprint	0.03 m²/PE	1.2 m²/PE
Removal	COD & SS	COD & SS
Process	Anaerobic (Biogas)	Aerobic (No odour)
Sludge	External management	On-site management
Nutrients	Non-denitrification	Non-denitrification

Anaerobic pre-treatment (PUSH) vs. 1st Stage French System

INTEXT Technology benchmarking



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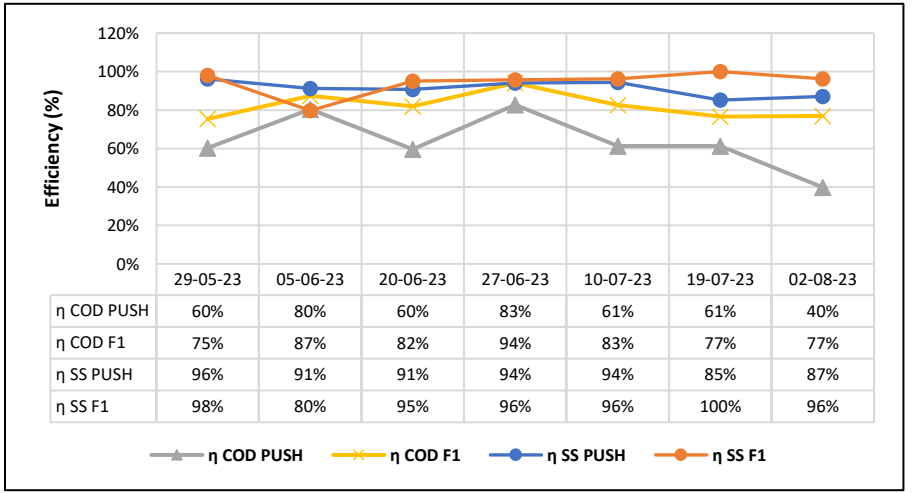
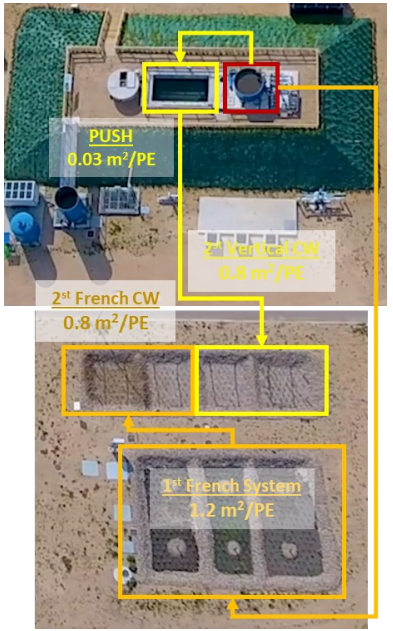


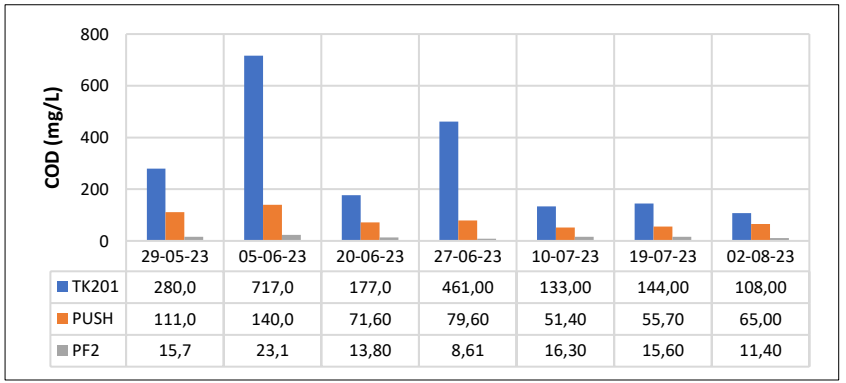
PUSH + Vertical CW vs. French CW System

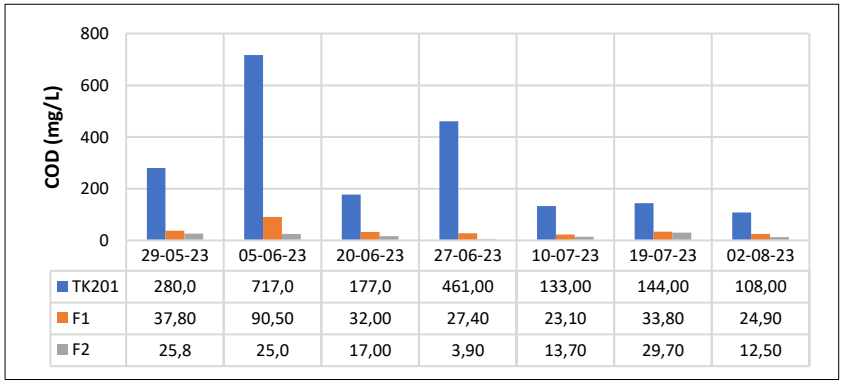
INTEXT Technology benchmarking



- 2st stage French system → Vertical Flow Constructed Wetland
- 2 Beds
- Sand layer 0-4
- "Polishing" stage

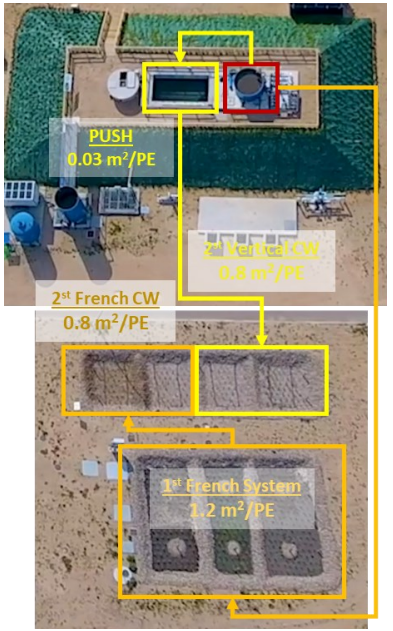
	2nd Vertical CW (PF2)	2nd French System (F2)
Feed	PUSH effluent	1st stage effluent
Flow	9 m³/day	9 m³/day
Footprint	0.03 + 0.8 m²/PE	1.2 + 0.8 m²/PE
Removal	COD & SS	COD & SS
Nutrients	Non-denitrification	Non-denitrification
Aeration	Passive	Passive





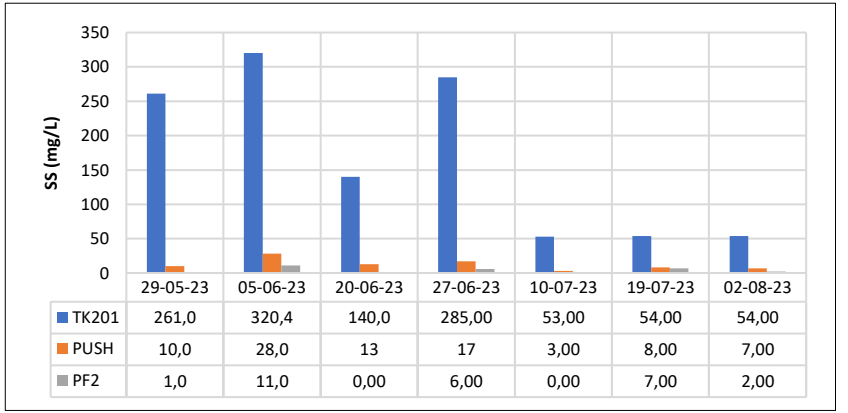
PUSH + Vertical CW vs. French CW System

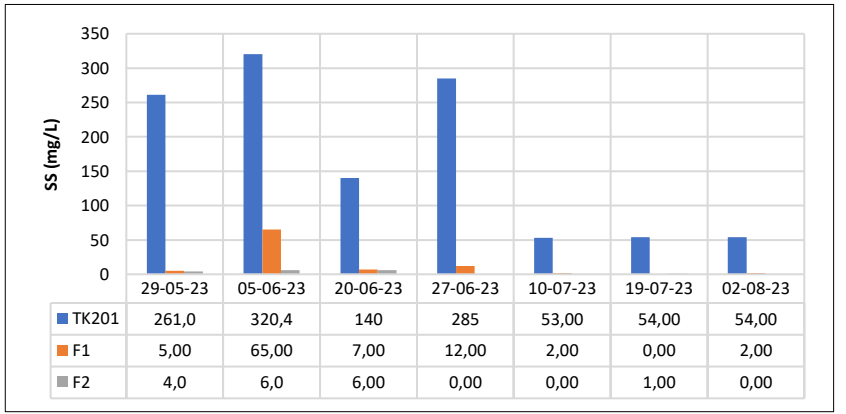
INTEXT Technology benchmarking



- 2st stage French system → Vertical Flow Constructed Wetland
- 2 Beds
- Sand layer 0-4
- "Polishing" stage

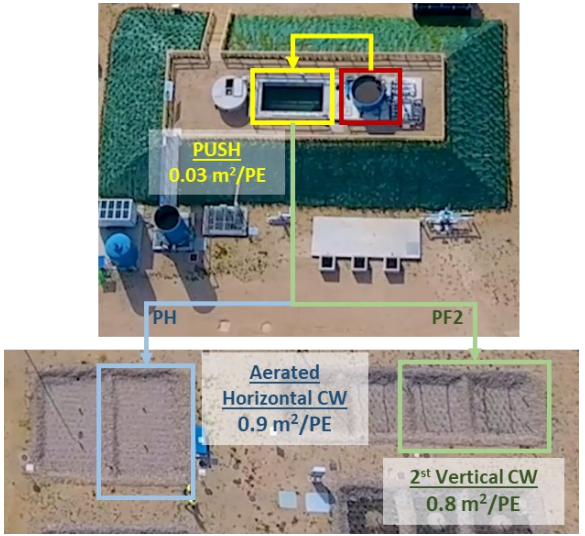
	2nd Vertical CW (PF2)	2nd French System (F2)
Feed	PUSH effluent	1st stage effluent
Flow	9 m³/day	9 m³/day
Footprint	0.03 + 0.8 m²/PE	1.2 + 0.8 m²/PE
Removal	COD & SS	COD & SS
Nutrients	Non-denitrification	Non-denitrification
Aeration	Passive	Passive

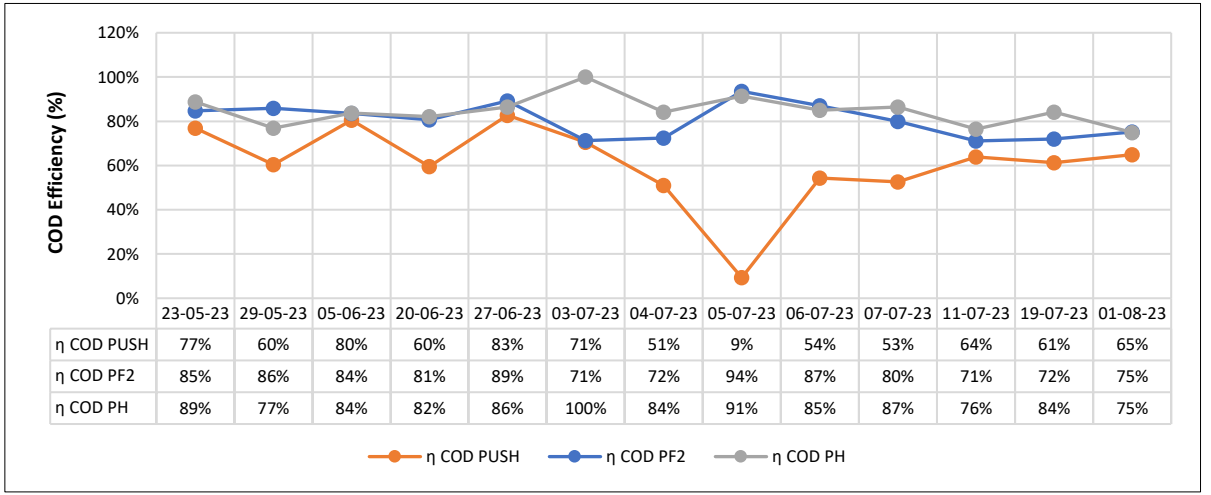




Anaerobic pre-treatment (PUSH) + Vertical / Horizontal Constructed Wetland

INTEXT Technology benchmarking

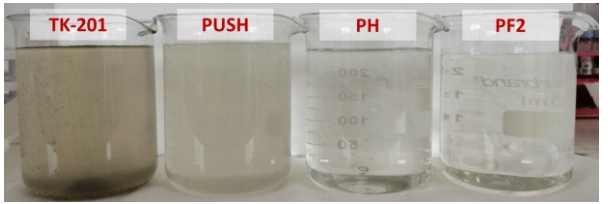




	23-05-23	29-05-23	05-06-23	20-06-23	27-06-23	03-07-23	04-07-23	05-07-23	06-07-23	07-07-23	11-07-23	19-07-23	01-08-23
η COD PUSH	77%	60%	80%	60%	83%	71%	51%	9%	54%	53%	64%	61%	65%
η COD PF2	85%	86%	84%	81%	89%	71%	72%	94%	87%	80%	71%	72%	75%
η COD PH	89%	77%	84%	82%	86%	100%	84%	91%	85%	87%	76%	84%	75%

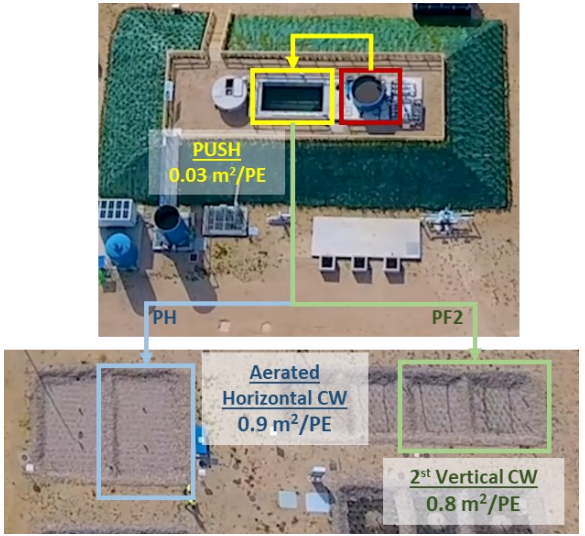
- Horizontal Flow Constructed Wetland:
- 2 Beds
- Gravel layer 0-4
- Possible to feed continuously

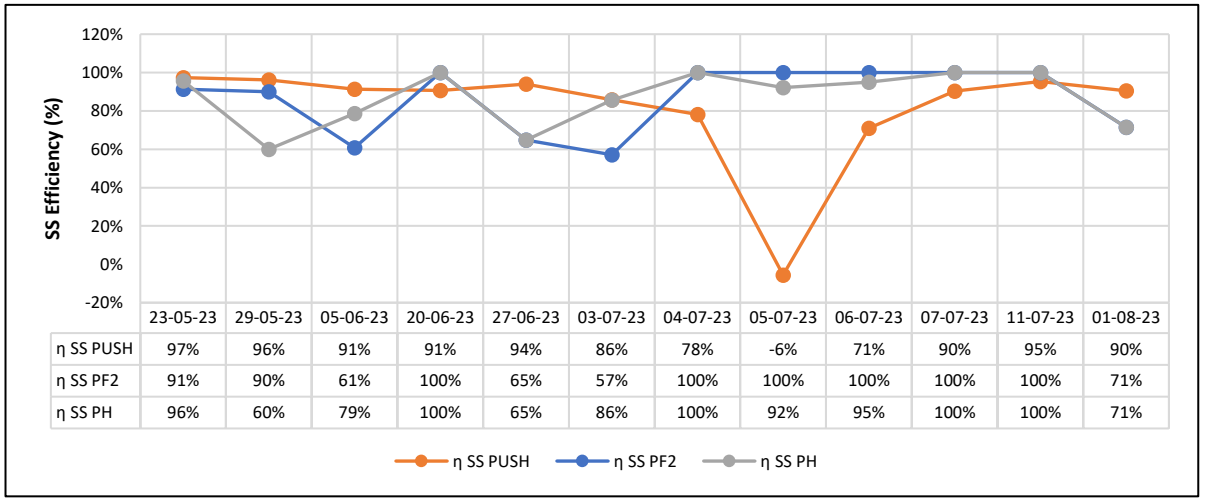
	Horizontal CW (PH)	2nd Vertical CW (PF2)
Feed	PUSH effluent	1st stage effluent
Flow	12 m³/day	9 m³/day
Footprint	0.03 + 0.9 m²/PE	0.03 + 0.8 m²/PE
Removal	COD & SS	COD & SS
Nutrients	Denitrification	Non-denitrification
Aeration	Forced	Passive



Anaerobic pre-treatment (PUSH) + Vertical / Horizontal Constructed Wetland

INTEXT Technology benchmarking





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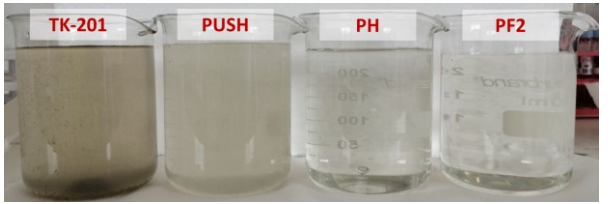
η SS PUSH	97%	96%	91%	91%	94%	86%	78%	-6%	71%	90%	95%	90%
η SS PF2	91%	90%	61%	100%	65%	57%	100%	100%	100%	100%	100%	71%
η SS PH	96%	60%	79%	100%	65%	86%	100%	92%	95%	100%	100%	71%

- Horizontal Flow Constructed Wetland:
- 2 Beds
- Gravel layer 0-4
- Possible to feed continuously

	Horizontal CW (PH)	2nd Vertical CW (PF2)
Feed	PUSH effluent	1st stage effluent
Flow	12 m³/day	9 m³/day
Footprint	0.03 + 0.9 m²/PE	0.03 + 0.8 m²/PE
Removal	COD & SS	COD & SS
Nutrients	Denitrification	Non-denitrification
Aeration	Forced	Passive



PUSH + Biofilm Systems (Biodisk / Trickling filter) + Clarifier / Floating Wetland

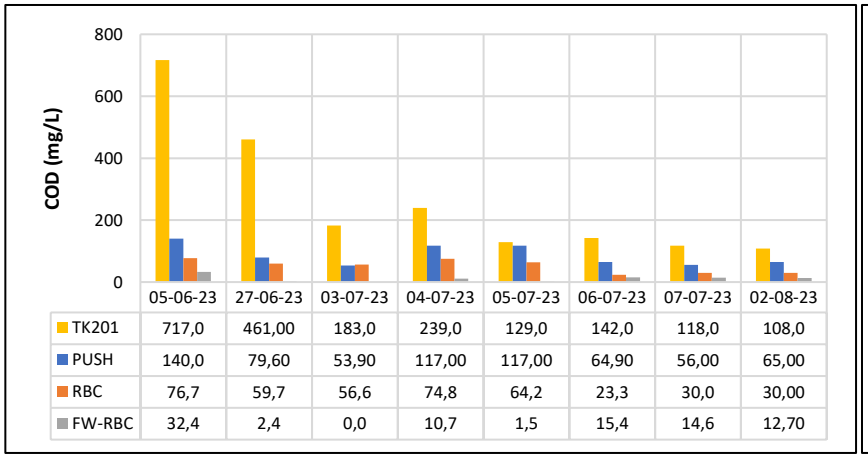
INTEXT Technology benchmarking

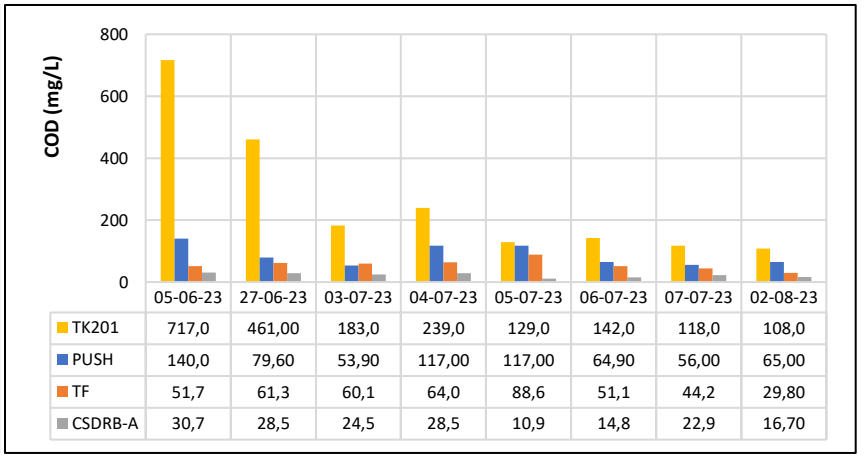
- Biofilm Systems:

- Rotating Biological Contactor (RBC) → Internal recirculation

- Trickling Filter (TF) → Natural or forced aeration

	RBC	TF
Feed	PUSH effluent	PUSH effluent
Flow	19 m³/day	19 m³/day
Footprint	0. 3 m²/PE	0.3 m²/PE
Removal	COD & SS	COD & SS
Biofilm	Rotative high specific surface disk	High specific surface plastic material
Nutrients	Non-denitrification	Non-denitrification



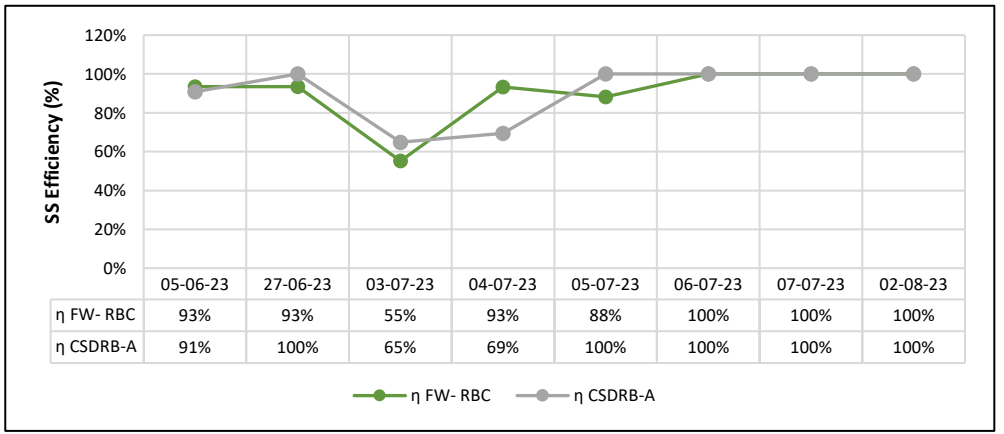


PUSH + Biofilm Systems (Biodisk / Trickling filter) + Clarifier / Floating Wetland

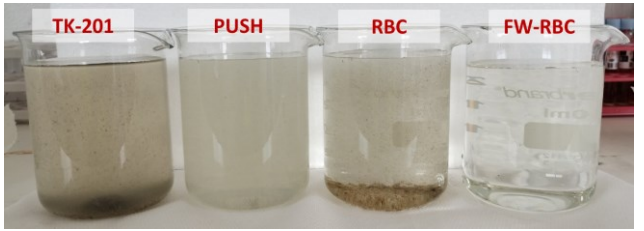
INTEXT Technology benchmarking

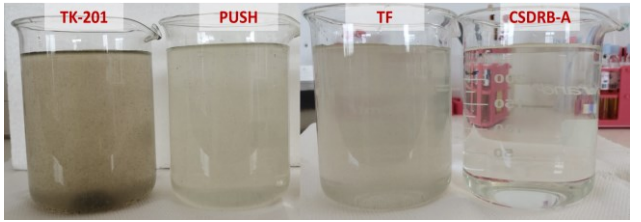
	Floating wetland (FW)	Clarifier CW (CSDRB)
Feed	RBC effluent	TF effluent
Flow	19 m^3/day	6 m^3/day
Footprint	1 m^2/PE	0.5 m^2/PE
Removal	SS	SS
Sludge	On-site management	On-site management
Nutrients	Nitrification	Nitrification

- Post-treatment of biofilm systems:
- Floating Wetland (FW)
- Clarifier Constructed Wetland (CSDRB) → Secondary clarifier



	05-06-23	27-06-23	03-07-23	04-07-23	05-07-23	06-07-23	07-07-23	02-08-23
η FW- RBC	93%	93%	55%	93%	88%	100%	100%	100%
η CSDRB-A	91%	100%	65%	69%	100%	100%	100%	100%





4

Conclusions

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Take-home message

Conclusions

✓ **INTEXT** Platform:

+ 16 Technologies sized for 125PE → Results under **real conditions**.

+ **Multiple combinations** and possibility to perform different organic and hydraulic tests.

+ Continuous sensors (Ox, Redox, pH), weekly sampling and special sampling campaigns for emerging pollutants.

✓ **INTEXT** Technologies data:

+ **Preliminary results**, expected to collect data for a full year.

+ With low organic load wastewater, the anaerobic system (**PUSH**) alone is able to achieve an effluent suitable for discharge.

+ **1st French stage** wetland has high COD and SS removal efficiencies. It can also manage the sludge on site, which makes it a very interesting system.

+ **2nd French stage** is very interesting as a polishing stage to remove COD and SS. The quality of the effluent after this system is excellent.

+ An **Aerated Horizontal wetland** as a 2nd stage is very interesting compared to a Vertical 2nd stage, as these systems can be fed continuously, and aeration reduces clogging and denitrification is achieved.

+ **Clarification systems** such as FW and CSDRB are very interesting in addition to biofilm systems because they are able to retain the released biomass with very high efficiency.

THANK YOU!
QUESTIONS?

www.life-intext.eu

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Rubén Hervás - **WETPOL 2023**

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