

Workshop on Sludge management in the Danube Region for a greener EU

10 June 2021

LIFE NEWEST

EU GREEN WEEK 2021 PARTNER EVENT



LIFE16 ENV/ES/000156



ZERO #EUGreenWeek
POLLUTION
for healthier people and planet



About SERVYECO

SERVYECO was founded in 1998

ACTIVITY



- Innovative management of the integral water cycle in the industry.
- Manufacture of “customized” chemical products for water treatment , improving the cost-benefit ratio of our customers.
- Friendly and flexible service with a multidisciplinary team of experts.

About SERVYECO

MORE THAN **20** YEARS OF EXPERIENCE

MORE THAN **30** PEOPLE

A PRODUCTION AREA OF MORE THAN **7.000** m²

MANUFACTURE AND DISTRIBUTION OF MORE THAN **5.000** TM/YEAR OF
CHEMICAL PRODUCTS

HIGHLY **QUALIFIED** HUMAN TEAM, ENGINEERS, CHEMISTS,
BIOLOGISTS, PHARMACEUTICS

COMMITMENT TO THE **INNOVATION** AND DEVELOPMENT OF NEW
LINES OF ENVIRONMENTALLY FRIENDLY CHEMICALS



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About LIFE NEWEST

PROJECT LOCATION: Spain

BUDGET INFO:

Total amount: 2.260.073€

% EC Co-funding: 1.347.627€ (59,63%)

DURATION: Start: 01/09/17 - End: 31/08/21

PROJECT'S IMPLEMENTORS:

Coordinating Beneficiary: SERVYECO S.L.

Associated Beneficiaries: EGEVASA, GOMSL



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About LIFE NEWEST

Main objective.

Industrial demonstration of a new innovative and environmentally friendly technology for the phosphorous removal in the wastewater for urban and industrial treatment plants and the valorization of the agriculture generated sludge.

Solution proposed.

The technology is based on a **new natural based organic polymer** able to improve the coagulant efficiency and replace the currently used dangerous chemical products.

Key actions.

Synthesis and industrial scale production of a novel natural based coagulant focused on elimination of phosphorus in the secondary treatment of wastewater. SERVYECO will manufacture **30 tons** of this polymer during **35 months**. This production will be able to **feed 4 wastewater plants**, managed by EGEVASA and GOMSL, during the implementation phase.



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About LIFE NEWEST

- Coagulants efficiency improvement in the wastewater treatment, **reducing parameters** like the **phosphorous content (35 - 45%)**, **suspended solids (55 - 65%)** and **turbidity (45 - 55%)**.
- **Total removal of toxic and corrosive products** in urban and industrial wastewater treatment plants. It is estimated a removal of **350 tons/year** of corrosive products **during the Project** and **40.000 – 60.000 tons** during the **3 subsequent years**.
- **Technology replication and transferability: Real scale implementation** in wastewater treatment facilities of 3 countries members (Spain, Germany and The Netherlands).
- **Estimated sales forecast** of 80.000 - 120.000 € during the Project and 12,5M €, 3 years later.



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B2. Industrial validation of the efficiency of coagulants of natural origin in URBAN wastewater treatment plants.

B2.1 Industrial demonstration at the urban wastewater treatment plant (Lloc Nou d'Ontinyent).

B2.2 Industrial demonstration at the urban wastewater treatment plant (Beniganim).

2017				2018				2019				2020				2021			
I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV





B2. Industrial validation of the efficiency of coagulants of natural origin in URBAN wastewater treatment plants.

Total P values

- BEWAT dose adjustment in Lloc nou d'en Fenollet WWTP
- BEWAT dose adjustment in Beniganim WWTP

Analysis of other points of the WWTP

- Water line: conductivity, SS, COD, chlorides and iron.
- Sludge line: volumetric index of sludge (VIS) and % of dry matter.

Consumption related to BEWAT NW3

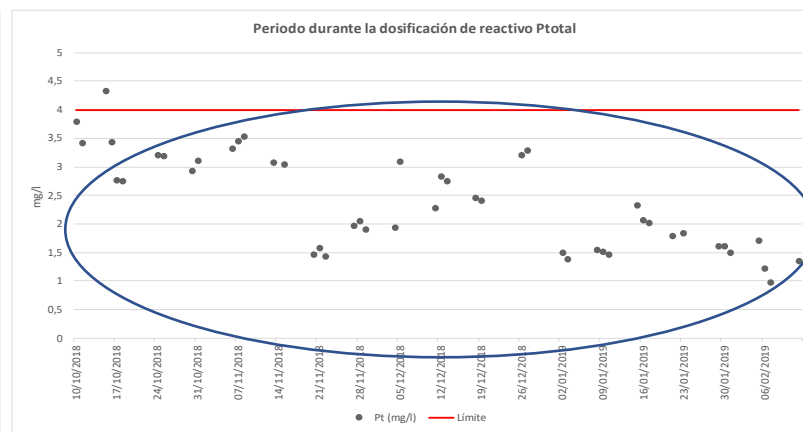
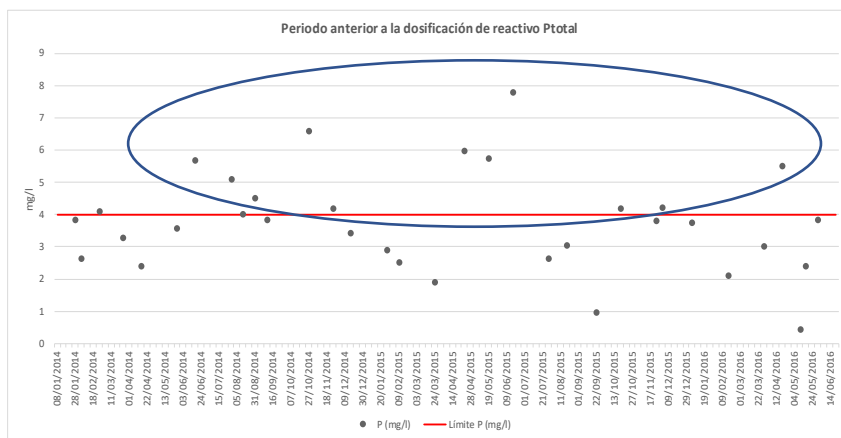
- BEWAT NW3 cost ratio.
- Reduction in the consumption of polyelectrolyte and increase in the percentage of dry matter.



B2. Industrial validation of the efficiency of coagulants of natural origin in URBAN wastewater treatment plants.

Lloc nou d'en Fenollet

- Reagent dosing starts on October 10, 2018.
- Reagent dosage at 44 ppm concentration based on preliminary JAR TEST.
- Analytical determinations.





B2. Industrial validation of the efficiency of coagulants of natural origin in URBAN wastewater treatment plants.

CONCLUSIONS

- Reagent dosing does not cause problems in mechanical equipment.
- The dosing equipment has not suffered stops during the implementation period.
- There are **no significant differences in conductivity and COD** values.
- **Reduction in the concentration of SS** in the effluent ($\approx 35\%$).
- **Reduction in VIS** values ($\approx 30\%$).
- **Reduction of P_{tot} values** in the effluent with compliance with the values of the Discharge Authorization ($\approx 65\%$).



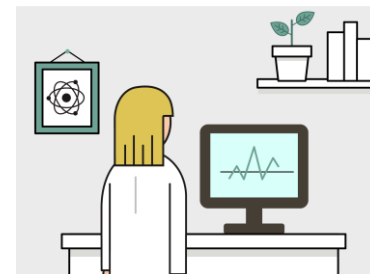
B3. Industrial validation of the efficiency of coagulants of natural origin in INDUSTRIAL wastewater treatment plants.

B3.1 Industrial demonstration at the industrial wastewater treatment plant (Ontinyent).

B3.2 Industrial demonstration at the industrial wastewater treatment plant. Phosphorous removal (Canals).

B3.2 Industrial demonstration at the industrial wastewater treatment plant. Chromium removal (Canals).

2017				2018				2019				2020				2021			
I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV





B3. Industrial validation of the efficiency of coagulants of natural origin in INDUSTRIAL wastewater treatment plants.

Total P values

- BEWAT dose adjustment in Ontinyent-Agullent WWTP.
- BEWAT dose adjustment in Canals-L'Alcudia WWTP.

Analysis of other points of the WWTP

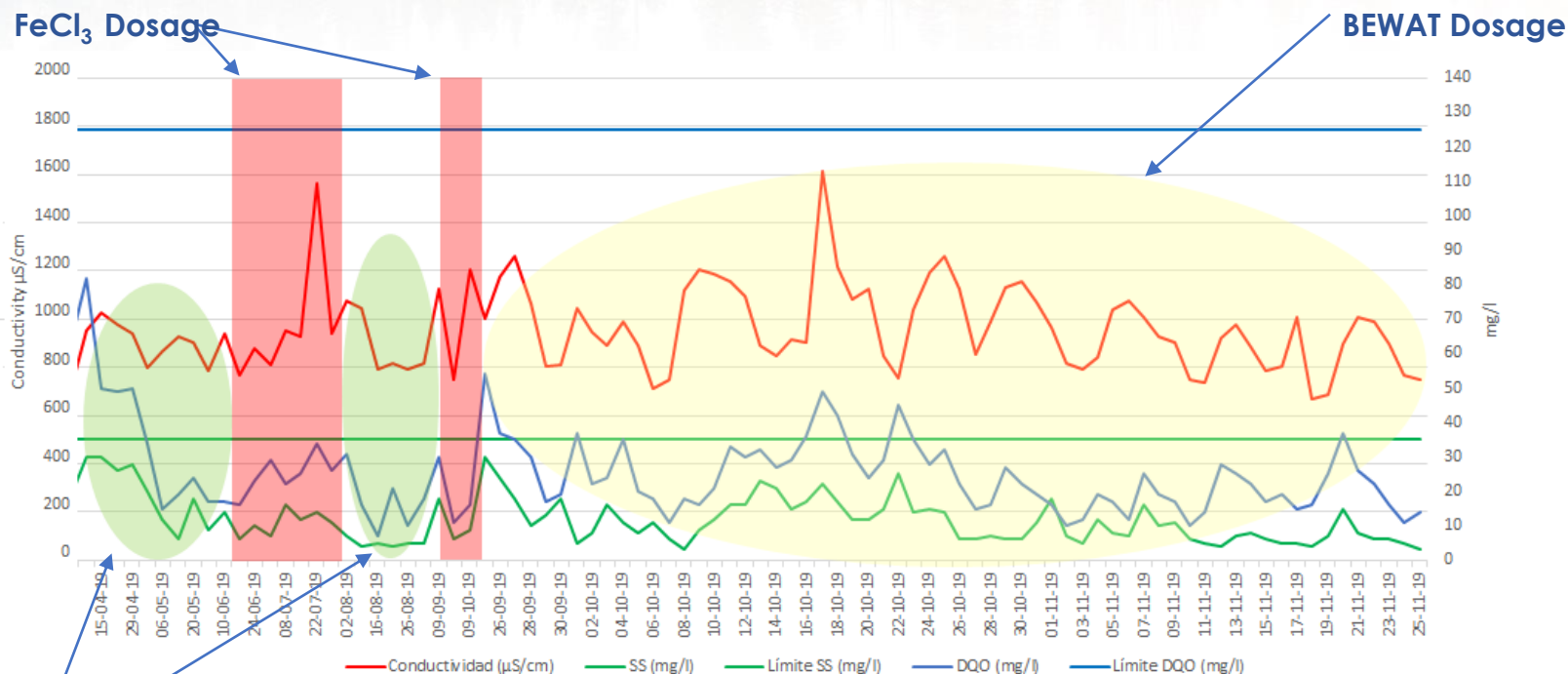
- Water line: conductivity, SS, COD, chlorides and iron.
- Sludge line: Volumetric index of sludge (VIS) and % of dry matter.

Consumption related to BEWAT

- BEWAT cost ratio.
- Reduction in the consumption of polyelectrolyte and increase in the percentage of dry matter.



B3. Industrial validation of the efficiency of coagulants of natural origin in INDUSTRIAL wastewater treatment plants.



FeCl₃-
BEWAT
Dosage

9% of reduction in
conductivity values.

15% of reduction in
SS values.

31% of reduction in
COD values.



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B3. Industrial validation of the efficiency of coagulants of natural origin in INDUSTRIAL wastewater treatment plants.

CONCLUSIONS

- There is no type of interaction between FeCl_3 and BEWAT products.
- BEWAT dosing does not cause problems in mechanical equipment.
- The dosing equipment has not suffered stops during the implementation period.
- **Reduction** in the **concentration of chlorides** in the effluent (**$\approx 50\%$**).
- There are **no significant differences in VIS values**.
- **Reduction of P_{tot} values** in the effluent with compliance with the values of the Discharge Authorization (**$\approx 70\%$**).



B4. Sludge evaluation procedure for its biomethanization and reuse in agriculture

B4.1 Characterization of sludge samples from conventional treatment.

B4.2 Sludge composting analysis.

B4.3 Determination of the ecotoxicological effect of compost on the soil.

B4.4 Agronomic potential tests.

B4.5 Determination of biomethanization potential.

2017				2018				2019				2020				2021			
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B4.2 Sludge composting analysis.

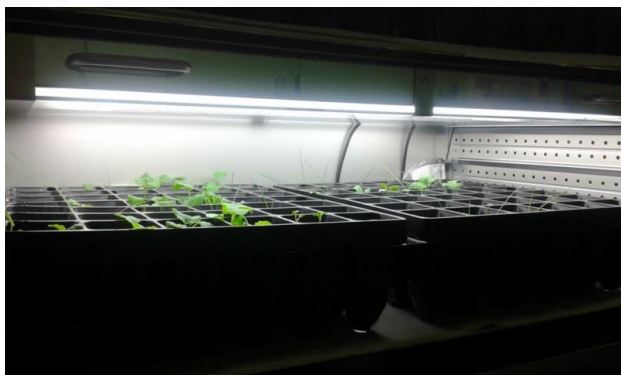
	H (%)	pH	EC (dS/m)	OMT (%)	OMoxid (%)	Org C (%)	C/N	Total N (%)	NH4 (%)	NO3 (%)	Org N (%)	P2O5 (%)	K (%)	Ca (%)	E. Coli
BEWAT	51,4	8,1	0,82	35,3	27,2	15,8	11,7	1,35	0,21	< 0,1	1,14	0,2	0,53	25	93
FeCl ₃	36,9	7,2	4,9	60,2	46,2	26,9	13,1	2,04	0,22	0,068	1,75	1,38	0,98	13,9	< 3,6
	Mg (%)	Na (%)	S (%)	Fe (ppm)	Mn (ppm)	Zn (ppm)	Cu (ppm)	B (ppm)	Mo (ppm)	Ni (ppm)	Pb (ppm)	Cd (ppm)	Cr (ppm)	Cr (VI) (ppm)	Hg (ppm)
BEWAT	0,79	0,1	0,19	2000	116	200	63	18,9	< 0,5	9,31	31,4	< 0,5	17,1	< 0,5	< 0,5
FeCl ₃	0,84	0,2	0,39	9300	113	320	75	62	1,01	9,56	14,6	< 0,5	30,1	< 1	< 0,5

All compost produced achieve the quality to be applied to the field according to RD 1310/1990. However, sludge generated with **BEWAT** could be considered for its characteristics as a class **A fertilizer product** in front of class **B fertilizer sludge**, generated with FeCl₃, according to RD999/2017.



B4.3 Ecotoxicological effect of compost on the soil.

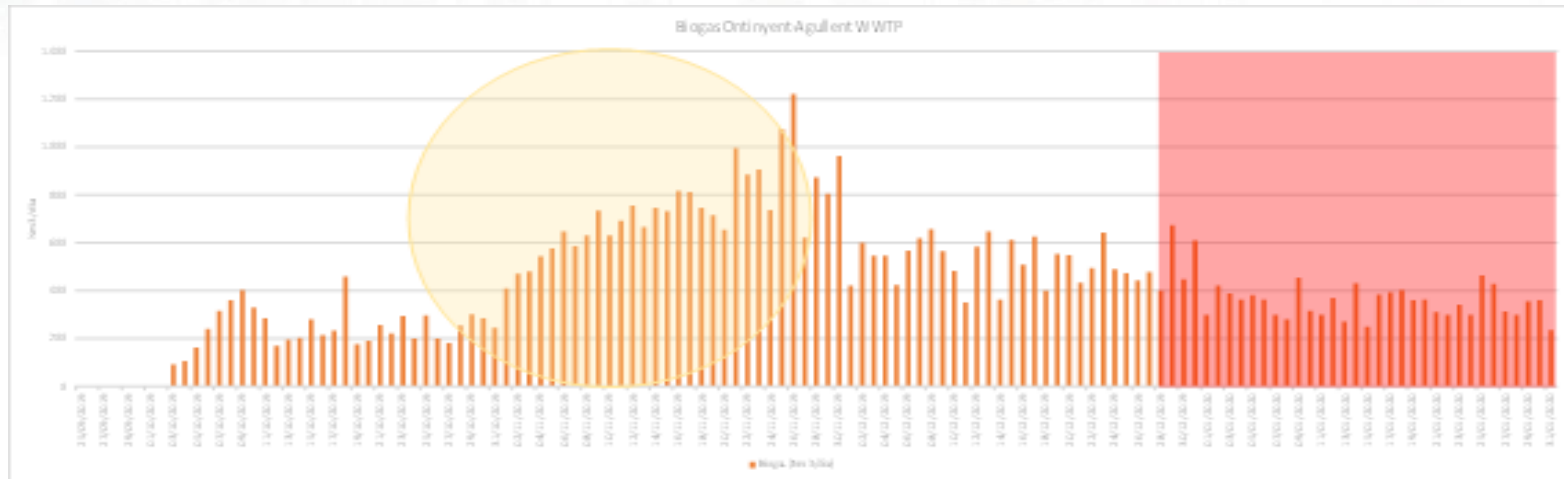
B4.4 Agronomic potential tests.



Ecotoxicological assays using *Brassica rapa*, *Lolium perenne* y *Trifolium repens* (OECD Guideline 208) and edaphic microorganism like *Folsomia candida* (ISO 11267) and *Enchytraeus crypticus* (ISO 16378) are being studied. These results will obtain risk quotient about environmental application using BEWAT in front of ferric chloride.



B4.5 Determination of biomethanization potential.

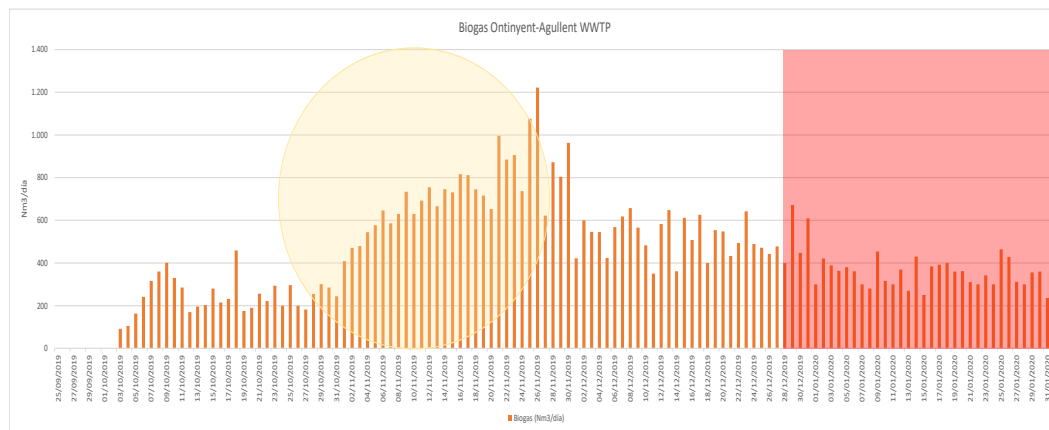


The dosing of BEWAT increases biogas production based on two characteristics that make it different from ferric chloride:

- BEWAT has bigger density (1.09 g/ml) than FeCl_3 (1.44 g/ml), so improvements in the mixing process and increased biogas production were expected.
- BEWAT comes from a biodegradable polymer and therefore increases the organic load to the anaerobic digestion process, thus increasing biogas production.



B4.5 Determination of biomethanization potential.



The periods studied were:

- 26/10/2019-26/11/2019: During this period, one month had elapsed dosing only **BEWAT NW3** and the average biogas production was **625 Nm³/day**.
- 26/12/2019-26/01/2020: During this period, one month had elapsed dosing only **FeCl₃** and average biogas production was **374 Nm³/day**.

The dosing with **ECOTAN NW3** was found to increase biogas production by 251 Nm³/day.



B4.5 Determination of biomethanization potential.

%DM floated sludge with ferric chloride	%DM floated sludge with BEWAT	%DM dewatered sludge with ferric chloride	%DM dewatered sludge with BEWAT
3.03	3.49	24.46	25.63

BEWAT significantly improves the dry matter values of the floated sludge and dewatered sludge. These values are in line with the improvement observed in the concentration of recirculated sludge, because increasing this concentration reduces the water pockets that can affect the sludge flotation and dewatering processes.



THANKS FOR YOUR ATTENTION!

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