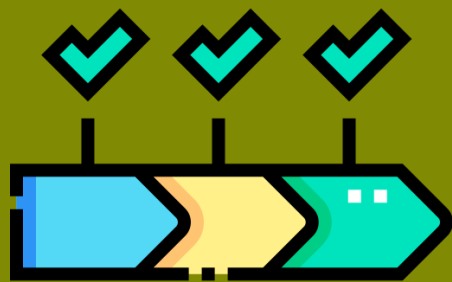


Kick-off Meeting
WP3 – Analysis of novel
value chains opportunities



Kick-off Meeting
Zaragoza, 22-23.11.2023
Alessandro Carmona
CIRCE – Technology Center
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NENUPHAR

*New governance models to enhance
nutrient pollution handling and nutrients
recycling*

GA n° 101082169

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NENUPHAR		Leader	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	M14	M15	M16	M17	M18	M19	M20	M21	M22	M23	M24	M25	M26	M27	M28	M29	M30
WP3 - Analysis of novel value chain opportunities		CIRCE															MS3															
3.1	Mapping of potential waste streams	CIRCE															D3.1													D3.4		
3.2	Benchmarking and techno-economic design for N/P waste recovery value chains	CIRCE																					D3.2									
3.3	Methodology to predict N/P emissions from recovered products	CIRCE																														D3.3
3.4	Technical design of N/P recovery pilot technologies	SUA																					D3.5									

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Involved partners: CAYS, ANOLTRI, UVIC-UCC, ZSA, LUKA, NRDA, SZE, SUA, BW, ARI, DRAXIS, LLU, VMU and GEST

Analyse of novel value chains opportunities



Specific objectives:

- Map the N/P pollution sources in each of the demsites
- Develop a GIS Platform to host the maps of each of the areas
- Perform a technoeconomic evaluation of different technologies and processes to recover N/P from targeted waste streams
- Develop a novel methodology to predict and monitor N/P emissions
- Design the technical solutions of the technologies and processes to be implemented in the demo sites

Task	Task name	Leader	Timing	Status
3.1	Mapping of potential waste streams	CIRCE	M1-M28	On-going
	3.1.1 Waste mapping of the regional clusters	CIRCE	M1-M28	On-going
	3.1.2 Development of the online Geospatial Intelligence Platform	DRAXIS	M12-M28	Not started
3.2	Benchmarking and techno-economic design for N/P waste recovery value chains	CIRCE	M7-M21	Not started
3.3	Methodology to predict N/P emissions from recovered products	CIRCE	M7-M30	Not started
3.4	Technical design of N/P recovery pilot technologies	SUA	M2-M21	Not started
	3.4.1 Redesign and adaptation of the ammonia stripping	GEST	M2-M15	Not started
	3.4.2 Design of the methodology for sludge compost processing and application	ZSA	M4-M21	Not started
	3.4.3 Design of the membrane and advanced pre-oxidation	SZE	M4-M21	Not started
	3.4.4 Design of the nature-based solution combined with biochemical and physical systems	SUA	M4-M21	Not started

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✓ WP3 deliverables



No.	Deliverable name	Type		Leader	Due date
D3.1	Database of the waste streams in each regional cluster	Report	Sensitive	CIRCE	M15
D3.2	Benchmarking and techno-economic analysis of the different valorisation solutions	Report	Public	CIRCE	M21
D3.3	Methodology to determine N and P emission in soil application	Report	Sensitive	CIRCE	M30
D3.4	Online GIS platform	Other	Public	DRAXIS	M28
D3.5	Compilation of technical solutions of NENUPHAR	Demonstrator	Sensitive	SUA	M21

✓ WP3 milestones



No.	Milestone name	Related WP	Due date	Means of verification
MS3	Regional clusters totally characterized	WP4, WP3	M15	Stakeholders characterized in D2.2 Waste characterization defined in D3.1 Regulatory characterization on D4.1 and D4.2
MS5	Successful commissioning and implementation on the pilots	WP3, WP5	M21	T3.4 and T5.1 already finished D3.5 validated All technologies are operating at full scale

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Mapping of potential waste streams

Sub Task No.	Title	Leader	Duration
sT3.1.1	Waste mapping of the regional clusters	CIRCE	M1-M28
sT3.1.2	Development of the online Geospatial Intelligence Platform	DRAXIS	M12-M28

NENUPHAR Sub Task 3.1.1 / Sub task leader: CIRCE / Duration: M1-M28

Mapping of potential waste-streams (1/2): Regional clusters

 Create detailed maps of waste production and management and propose new valorisation schemes that could be applied to other regions



Results of this subtask will be included in D3.1 Database of the waste streams in each regional cluster



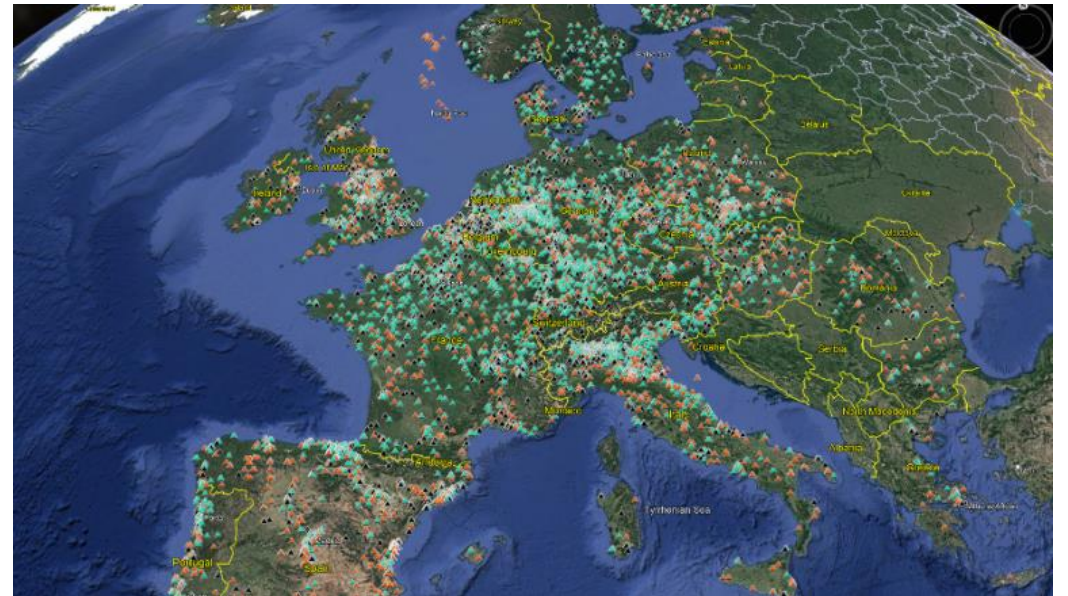
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Mapping of potential waste-streams (2/2) / 3.1.2 GIS platform



Develop an online Geospatial Intelligence Platform that will allow users to access and analyze geospatial data

- This sub-task involves processing, analysis and geospatial visualization of the maps produced in T3.1.1
- The data will be transformed into web maps or services depicted through different layers, making them ready to use
- The task aims to support the identification of synergies between the generation of waste and areas with need of N/P input, facilitating the exploitation and/or disposal pathways of these wastes



Results of this subtask will be included in D3.4 Online GIS platform



Benchmarking and techno-economic design for N/P recovery value chains

Perform a benchmarking and techno-economic design for N/P waste recovery value chains, considering the environmental and economic aspects of different feedstocks and technologies

Task description

- Collection of relevant inputs for the techno-economic analysis from the experiences of the value chain actors, by interviews and visits when possible
- Analyze the costs, benefits, and trade-offs of different alternative feedstocks, taking into account their location, availability, properties, and pre-treatment needs
- Assess the market technologies for N/P recovery and their potential to be implemented in the project value chains
- Establish the CAPEX and OPEX of the whole value chains, considering the most cost-effective business models

Pig manure:

- CIRCE
- ANOLTRI
- UVIC-UCC



WW sludge:

- ZSA
- LLU
- LUKA
- NRDA
- VMU



Dairy industry:

- SZE
- SUA



Results of this task will be included in D3.2 Benchmarking and techno-economic analysis of the different valorisation solutions



Methodology to predict N/P emissions from recovered products

Create a lab scale methodology to measure N and P emissions from recovered products when applied to the soil, and compare them with inorganic fertilisers

Task description

- Dataset of experiments using columns with different types of soils, conditions, and cultures
- These will be designed, considering columns created with different types of soils and using different conditions and cultures
- Validation the methodology using the experimental columns and real data from the three demonstration sites
- Analysis of emission values for the tested product and comparison with urea and P2O5 as references
- Validation of environmental safety, social acceptance, and the regulatory framework of the recovered products in the different value chains

Spain:

- CIRCE
- UVIC-UCC

Latvia:

- ZSA
- LLU

Slovakia:

- SUA



Technical design on N/P recovery pilot technologies



This task addresses the preliminary trials, design and engineering of the pilot processes and technologies that will be installed and operated in WP5, and will be divided in four sub-tasks:

Sub Task No.	Title	Leader	Duration
sT3.4.1	Redesign and adaptation of the ammonia stripping	GEST	M2-M15
sT3.4.2	Design of the methodology for sludge compost processing and application	ZSA	M4-M21
sT3.4.3	Design of the membrane and advanced pre-oxidation	SZE	M4-M21
sT3.4.4	Design of the nature-based solution combined with biochemical and physical systems	SUA	M4-M21

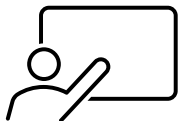
The results of this task will be included in D3.5 Compilation of technical solutions of NENUPHAR

Redesign and adaptation of the ammonia stripping

- Study on the complete redesign and planning of the project engineering, based on the low performance of early tests of the stripping already installed
- Detailed analysis of the implemented equipment, plans, and current conditions of process as well as the problems detected
- Sizing and evaluation of the potential equipment, its requirements and operating conditions, considering technical, environmental and energy efficiency criteria
- Integration of the selected equipment with the current operating process and auxiliary equipment

Design of the methodology for sludge compost processing and application

- Develop the methodology for processing, preparation and application of composted sewage sludge
- Different types of composted sludge will be analysed in order to develop the guidelines for their preparation and application that will be implemented in WP5



Design of the membrane and advanced pre-oxidation

- Assess the technology currently available (membrane separation) and its operation at lab scale
- Composition of the wastewater treated and the effluents obtained will be measured to have an overarching knowledge of the process performance
- Design and building of technology for industrial dairy conditions, considering the results from the lab tests
- Acquisition and production of the requirement equipment will be carried out, considering also specific features

T3.4.4 Design of the nature-based solution combined with biochemical and physical systems

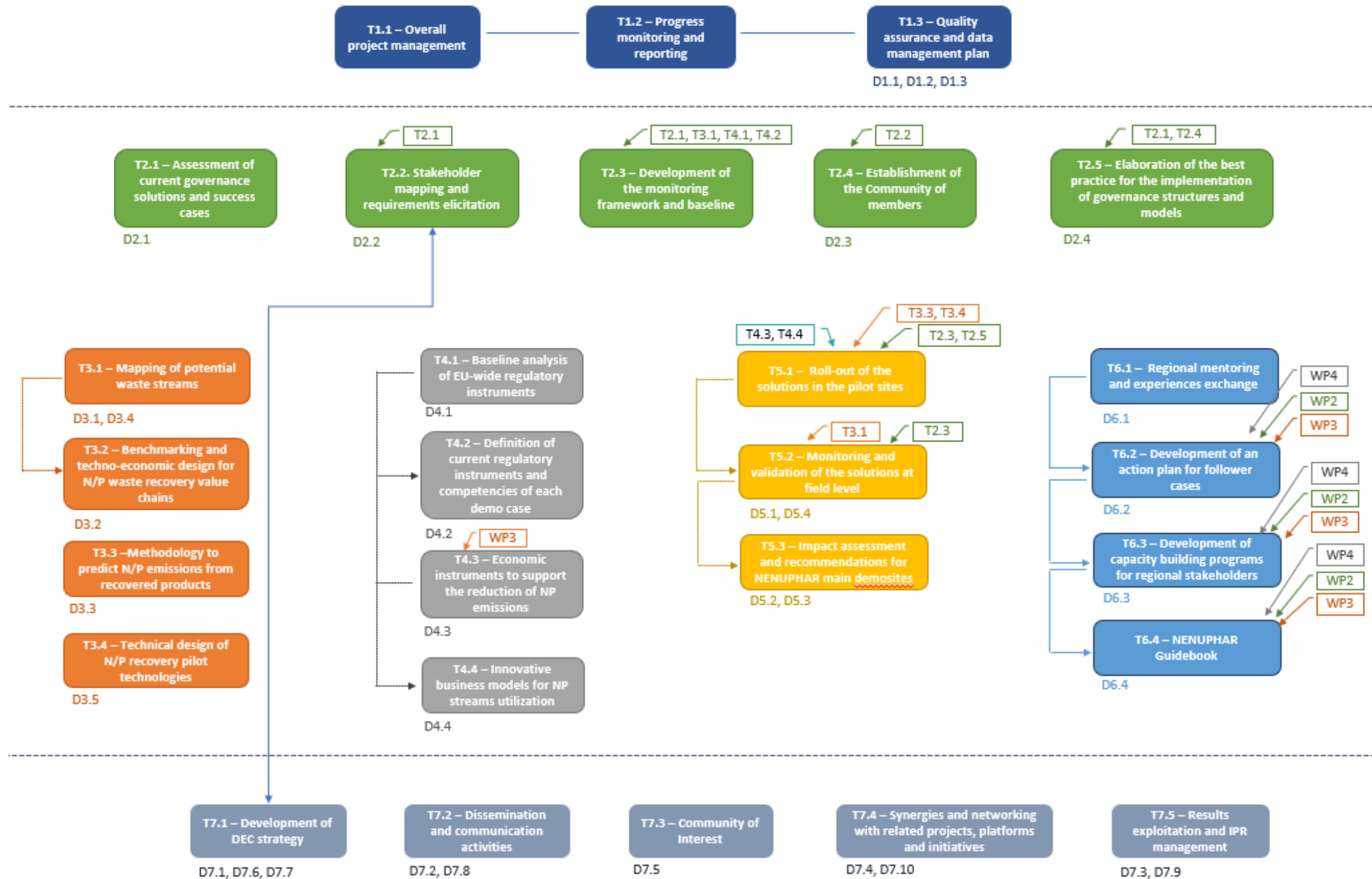
- Laboratory test of the nature-based solution in SUA facilities
- Different types of biomass will be tested to treat dairy wastewater
- Growth biomass will be then dried and treated by ultrasounds, measuring the following parameters in both the wastewater and the biomass generated: N (in form of nitrate and ammonia) and P content, heavy metals, microorganisms, alkaline content (K, Ca and Mg)
- Biomass with the better performance in terms of N/P recovery, while maintaining health requirements, will be used for the pilot demonstration in SUA-UF

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Interactions with other WPs



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Activity	Related task	Leader	Date	Input required
Waste mapping of the regional clusters	T3.1.1	CIRCE	Dec.2023	Data collection on existing producers, type of waste available, specific characteristics (seasonality, format, etc.) and possible blends produced
Redesign and adaptation of the ammonia stripping	T3.4.1	GEST	Dec.2023	Presentation of the redesign and planning of the project engineering, based on the low performance of early tests of the stripping already installed Analysis of the implemented equipment, plans, and current conditions of process as well as the problems detected
Design of the methodology for sludge compost processing and application	T3.4.2	ZSA	Jan.2024	Presentation of the methodology for processing, preparation and application of composted sewage sludge
Design of the membrane and advanced pre-oxidation	T3.4.3	SZE	Jan.2024	Assessment of currently technology available (membrane separation) and its operation at lab scale
Design of nature-based solution combined with biochemical and physical systems	T3.4.4	SUA	Jan.2024	Propossal of laboratory test of the nature-based solution



THANK YOU!

Questions?

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