ESNI Conference workshop

September 18st, 2024

Hands-on nutrient management: barriers and opportunities in EU & regional legislation and economic strategies

Interactive session organised by the NENUPHAR project.

Co-funded by the European Union

The project is supported by the European Union under grant agreement № 101082169. Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union. Neither the European Union nor the granting authority can be held responsible for them.

Contents

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NENUPHAR project description

New governance solutions and value chains addressing the recovery of **nitrogen (N) and phosphorus (P)** from three key waste streams with a high nutrient load and widely present in the EU: manure, sewage sludge, and dairy wastewater.

Four main innovations will be addressed:

- Methodology to estimate N/P emissions from fertilizer application.
- **New governance models.**
- Innovative economic and financial incentives for public and private entities.
- A set of technologies to treat manure, sludge, and dairy wastewater and recover nutrients.

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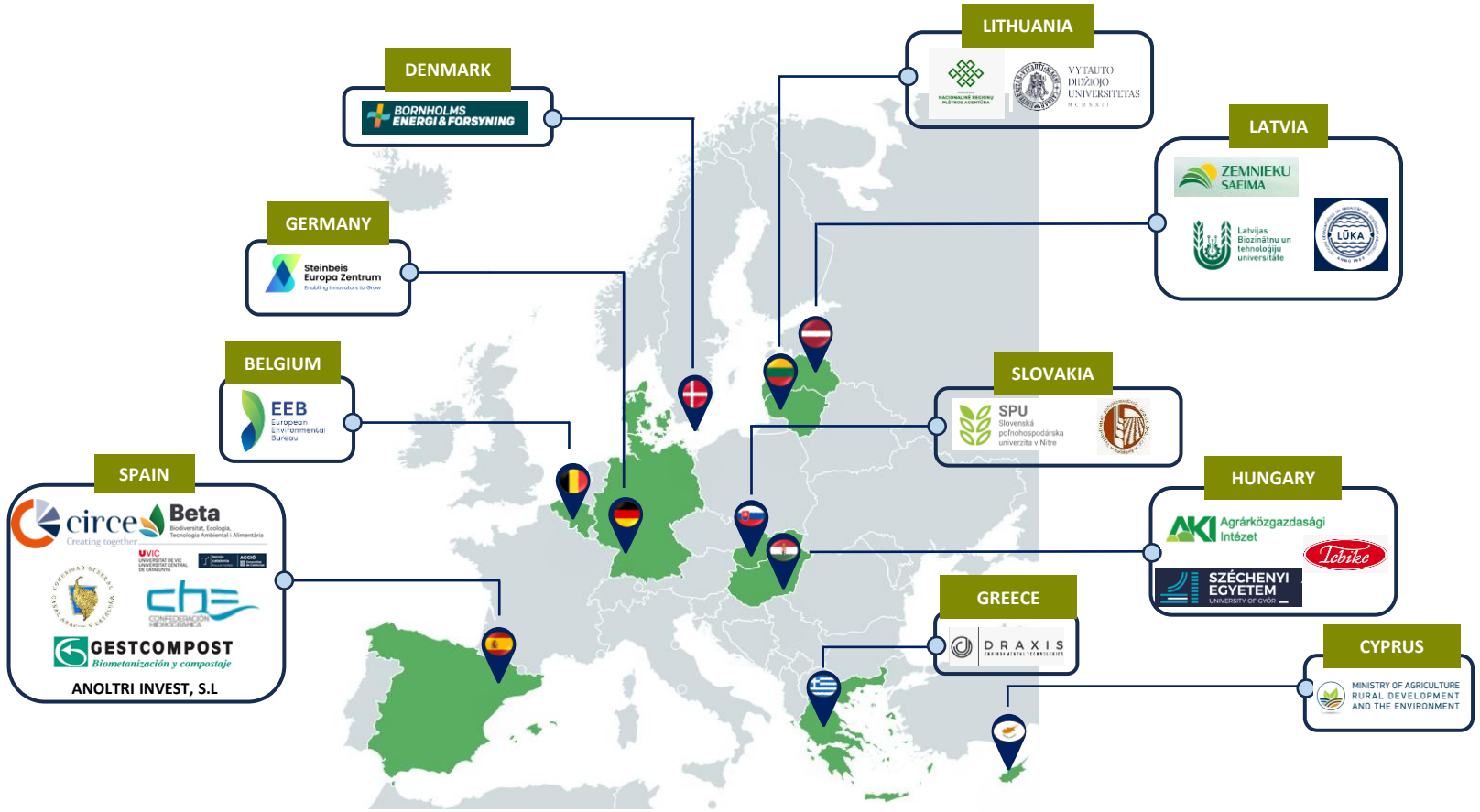
NENUPHAR project description

November 2023

April 2027



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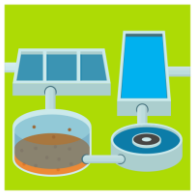
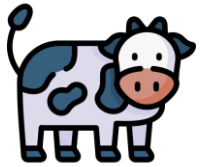
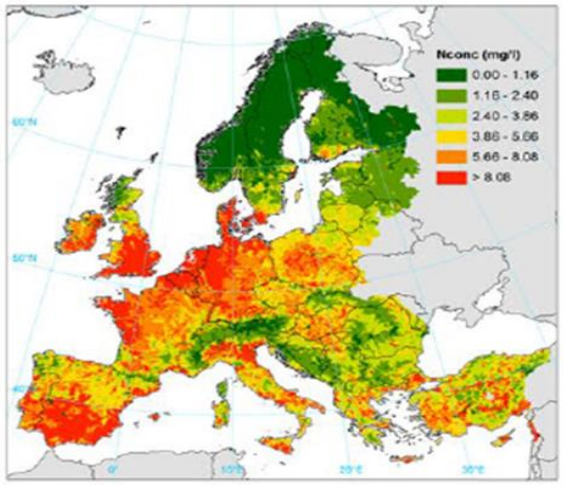
NENUPHAR project description

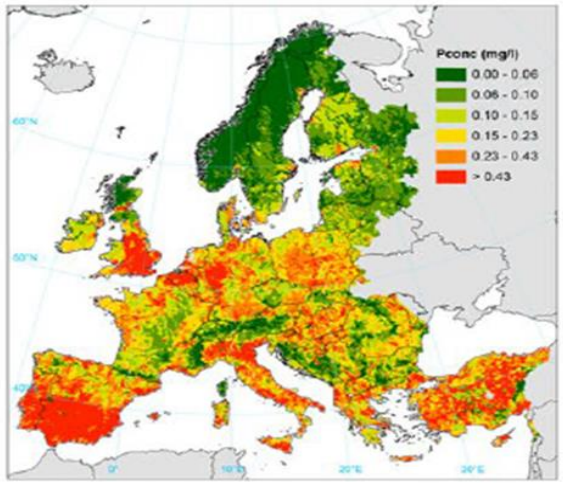
Wastes

- animal manures  → **1,400 million tons per year in EU**
- sewage waste (sludges)  → **9 millions tons (dry matter) per year in EU**
- food chain waste (dairy wastewaters)  → **926 million m^3 per year in EU**

2-5 Mt of N

0.6 Mt of P →





Grizzetti, B., Pistocchi, A., Liquete, C. *et al.* (2017) Human pressures and ecological status of European rivers. *Sci Rep* 7, 205.

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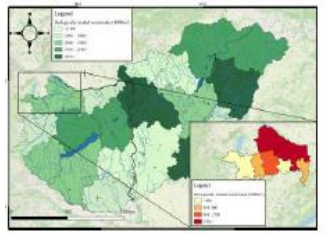
NENUPHAR project description

Main demosites

- **animal manures** → **SPAIN**
  - River basin ➔ Ebro
  - Drainage sea ➔ Mediterranean Sea
  - Tech ➔ Ammonia stripping

- **sewage waste (sludges)** → **LATVIA, LITHUANIA**
  - River basin ➔ Lielupe
  - Drainage sea ➔ Baltic Sea
  - Tech ➔ Composting

- **food chain waste (dairy wastewaters)** → **HUNGARY, SLOVAKIA**
  - River basin ➔ Danube
  - Drainage sea ➔ Black Sea
  - Tech ➔ 1. Membrane with pre-oxidation
    2. Nature-based solution



Followers

- **DENMARK**
  - Drainage sea ➔ Baltic Sea
  - Waste ➔ Sludge, manure and wastewater

- **CYPRUS**
  - Drainage sea ➔ Mediterranean Sea
  - Waste ➔ Sludge and wastewater

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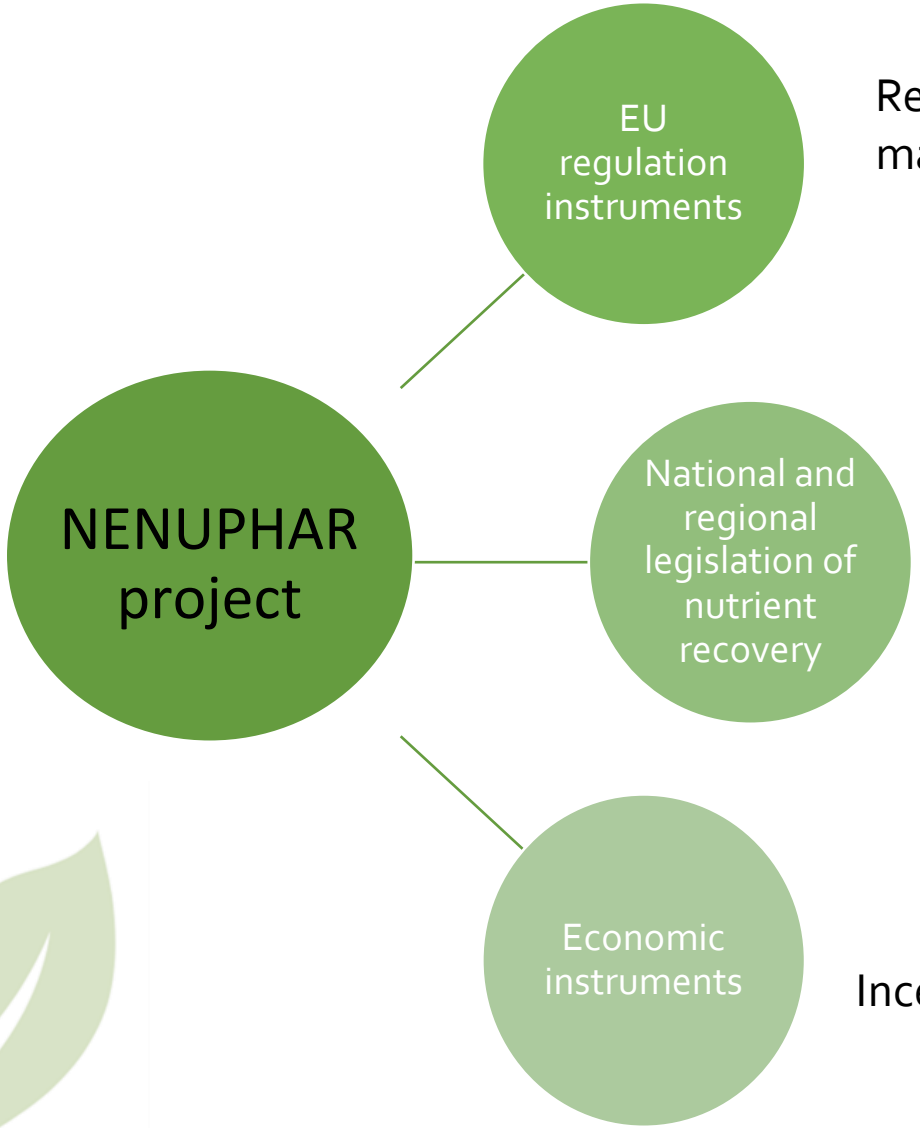
NENUPHAR activities on regulation analysis



Regulation framework for nutrients management in EU

Regulation framework for nutrients management in State Members

Incentives and economic strategies

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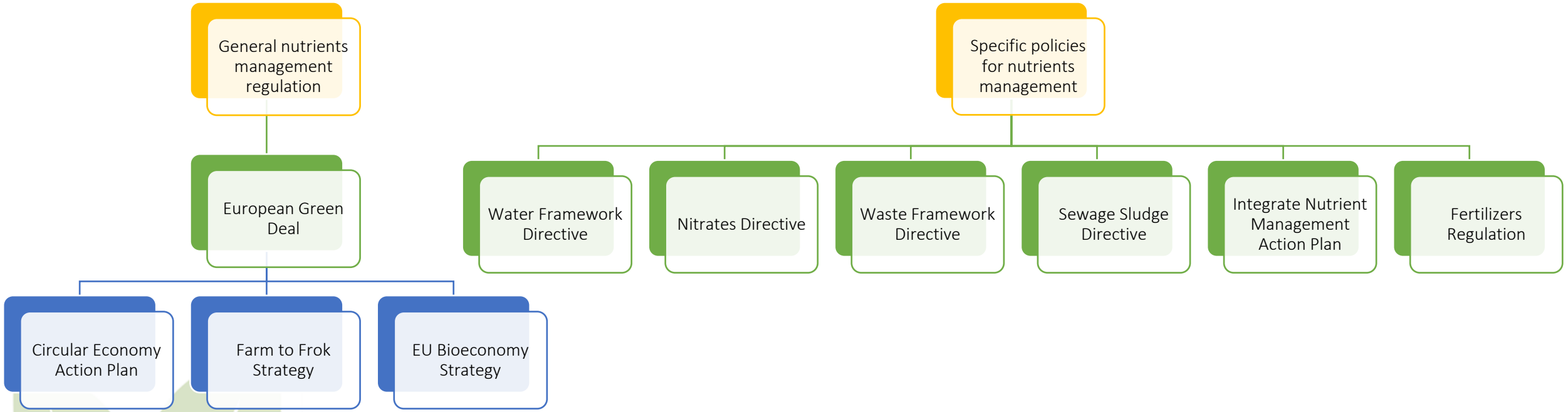
Regulation framework: Identify EU policies and regulations related to nutrients management



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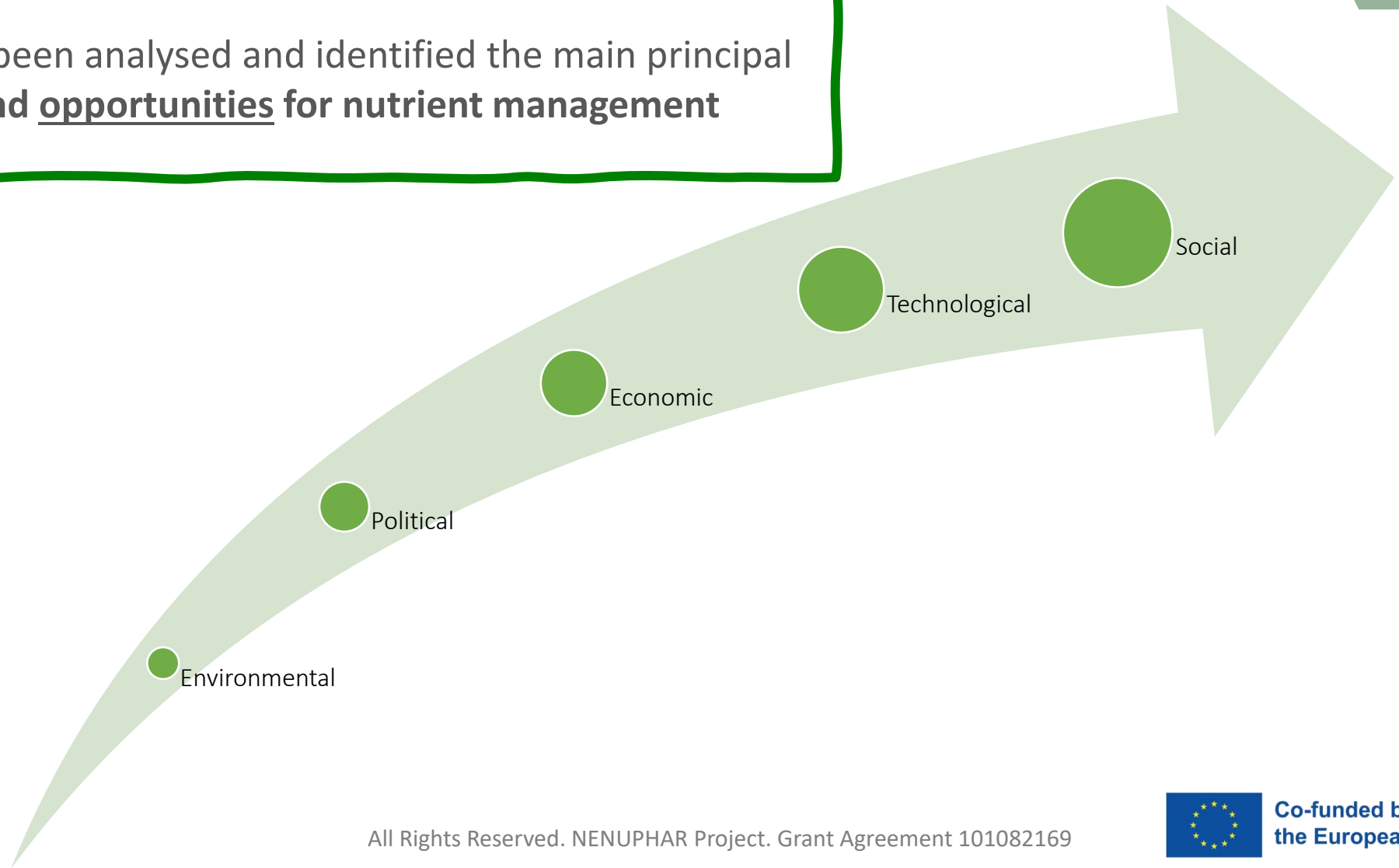
EU Regulation analysis

Each regulation has been analysed and identified the main principal **barriers, gaps and opportunities for nutrient management**



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EU Regulation: gaps and barriers

	Policy restrictions and regulatory hurdles	Lack of targeted policies and fiscal and economic instruments	Economic constraints (e.g. cost of implementation)	Implementation and resource limitations (e.g. infrastructure,..)	Technical constraints (limited research and innovation)	Environmental constraints (e.g. climate-related, ...)	Monitoring and data limitations	Limited awareness and education	Limitations of current agricultural practices	Social acceptance	Regional variability
European Green Deal	X	X		X				X			
Circular Economy Action Plan		X		X	X			X			
EU Bioeconomy Strategy	X		X	X						X	
Farm to Fork Strategy	X		X						X		
Water Framework Directive (WFD)				X	X		X		X	X	X
Nitrates Directive	X	X		X	X	X	X	X			X
Integrated Nutrient Management Action Plan			X	X	X		X				
Waste Framework Directive	X	X					X				
Sewage Sludge Directive	X		X		X	X	X				
Fertilizers Regulation	X	X	X	X	X		X	X	X		

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EU Regulation: opportunities

	Policy support and regulatory updates	Financial instruments and market-based incentives	Research and innovation (technological improvements)	Increased Awareness and Training	Agricultural Practice Solutions and Healthier Soils Strategies	Nutrient Recycling	Waste Reduction and prevention	Environmental solutions	Holistic approach	Stakeholder Collaboration (producer responsability)
European Green Deal	X		X		X		X			
Circular Economy Action Plan		X	X			X	X	X		X
EU Bioeconomy Strategy	X	X	X					X		
Farm to Fork Strategy		X	X		X	X				
Water Framework Directive (WFD)	X		X			X			X	
Nitrates Directive	X		X		X				X	
Integrated Nutrient Management Action Plan	X		X	X						
Waste Framework Directive		X				X	X			X
Sewage Sludge Directive	X		X			X			X	
Fertilizers Regulation		X	X							

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EU Regulation

Gaps and Barriers

Environmental	Political	Economic	Technological	Social
• Climate change problems • Data limitation	• Policy restrictions and lack of target policies	• Lack of financial and market-based instruments	• Resources limitation and innovation	• Lack of knowledge and awareness

Opportunities

Environmental	Political	Economic	Technological	Social
• Sustainable agriculture practices • Healthier soils	• Policy support and regulatory updates	• Financial and market-based incentives	• Research and innovation improvements	• Promotion of awareness and trainnings

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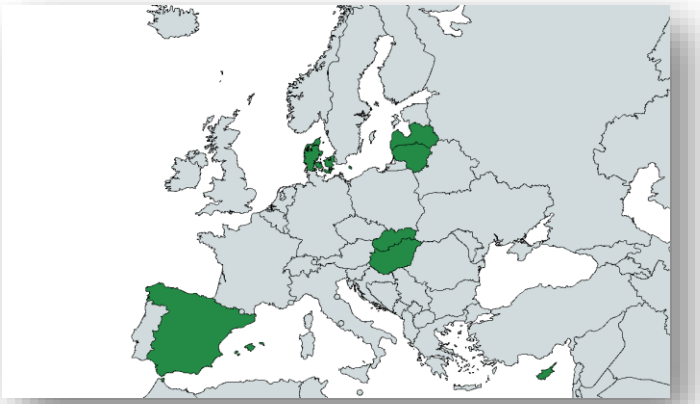
National and regional legislation

Objective of this task: *to establish an overview of the regulatory framework for the correct implementation of the Demos.*

Transposition

- Partners from NENUPHAR project have identified and assessed the national and regional legislation applicable on nutrient pollution and nutrient management.
- Legal requirements/limitations have been detected.

Spain (Aragon and Catalonia regions)
Latvia (Zemgale & Kurzeme region)
Lithuania (Šiauliai region)
Hungary (Győr region)
Slovakia (Nitra region)
Denmark (Bornholm)
Cyprus



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National and regional legislation

Main barriers detected: *Countries/regions and their most relevant issues related to the detected barriers.*

Country/ regions	Restrictions on the Application of fertilisers to soils	Restrictions on Manure application to soils	Requirements to manage Animal by-products	Requirements to Fertiliser market	Restrictions to Sewage sludge application to soils	River basin restrictions	Quality requirements for Water bodies	Technology barriers	Need for Education and awareness	Restrictions to Waste application to agricultural lands	Waste transport requirements	Requirements to Authorisations, monitoring activities
Spain	X	X	X	X	X	X		X	X			X
Slovakia					X	X	X			X		
Hungary					X	X	X					
Lithuania					X				X		X	
Latvia						X						X
Denmark	X	X							X	X		X
Cyprus						X						

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National and regional legislation

Main findings – Restrictions on the Application of organic fertilisers to soils

Denmark:

Annex 1 (BEK No 1001 of 27/06/2018 Decree) establishes **a waste list that can be used for agricultural purposes without prior permission** (includes some wastes such as sewage sludges, some animal by-products, sludge and wastewater from cheese dairies, etc.). However, all waste **must meet certain requirements:**

- **quality standards** and should not contain significant **amounts of harmful substances**.
- **producers must provide detailed declarations** about the waste.
- **waste storage and application** must follow **specific regulations**.
- **restrictions on the amount of waste** that can be applied **per hectare per year**.

Spain:

According to Royal Decree 1051/2022, **manure,** whether solid or slurry, **may not be applied within five metres of the banks of rivers, lakes, standing water bodies, groundwater abstractions for human consumption, wells and springs**.

The **Regional governments** may establish **greater distances**, especially in water bodies that do not comply with environmental objectives.

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National and regional legislation

Main findings – Restrictions on Sewage sludge application to soils

Slovakia:

Sewage sludge or bottom sediments **may only be applied** on agricultural or forestry lands where the **concentration of dangerous substances** is below the **limit values specified in Annex nº 4 Act nº188/2003**. When applying sewage sludge, the total amount of nitrogen **must not exceed 75 % of the dose necessary to fertilise the agricultural crop**.

Hungary:

Sludge produced in wastewater treatment plants that **do not exceed 5,000 population** equivalents **and have a high pollutant load** is **deposited in landfills** (these sludges cannot be used on agricultural land).
Sewage sludge can be **used in on-site composting if the requirements set out in the Government Decree 559/2023**, and a **waste management permit is available**, emitted in accordance with the Government Decree on the Registration and Official Approval of Waste Management Activities.

Lithuania:

There are strict **regulations** regarding **the application of composted sludge** due to **potential contaminants or pathogens: Specialized equipment** may be required **for spreading composted sludge** effectively on agricultural fields, **mitigating odor issues** requires additional measures; **not all crops and soils may benefit** from the application of composted sludge.

Latvia:

Every time that a farmer wants to **use composted sewage sludge as a fertiliser**, **a document shall be drawn up and signed.** This situation might discourage farmers from using this resource (it is easier to use regular fertilisers).

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National and regional legislation

Main findings – River basin and water restrictions

Spain:

The requirement for **declaring a water as affected of NVZ** (Nitrates Vulnerable Zone) is increased: **NVZ = surface water where nitrates > 25 mg/l** (previously 50 mg/l); **NVZ = groundwater water where nitrates > 37,5 mg/l** (previously 50 mg/l).

Slovakia:

There are **requirements for the use of nitrogen fertilisers in NVZ:** periods listed in Annex 2 Act nº136/2000 are prohibited; obligatory to draw up a plan for the use of nitrogen fertiliser substances every year; nitrogen doses of agricultural fertilisers: do not exceed the nitrogen dose of 170 kg/ha per economic year; **restrictions on the use of fertilisers on certain slopes;** nitrogen fertilisers **may not be applied in the area within 10 m of the boundary of the protection zone** of the first level of the water resource at all levels of restriction.

Hungary:

A national regulation lays down general rules for the application of **limit values for emissions of water pollutants** and specific rules for the setting of emission limit values. The Regulation sets out **detailed rules** on the technological limit values for discharges of used and **wastewater from the processing of milk and milk products.**

Latvia:

The regulations **limit the time that the composted sewage sludge can be applied to the fields in NVZ** (Nitrates Vulnerable Zone). The application period is shorter than in non-NVZ.

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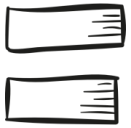
Policy tools and instruments

Policy tools  Instruments 

Devices used to help turn a broad policy aim into a specific action

Tool = key categories

- Highlight the relative political costs of action (e.g., persuading, sharing information rather than regulation or redistribution);
- Choice of tool = policy choice → patterns of policy tool → 'policy styles'

Instrument = wide range of measures

- Legislation, expenditure, economic incentives, penalties, education, various forms of service delivery;
- Incentives and obligations.

Source: Cairney (2020) based on Howlett & Tosun (2019); Greer & Jarman (2008); Birkland (2011)

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Economic instruments: Main policy types

Policy Type	Characteristics of the Policy	Characteristics of the Arena	Examples	Guiding Principles
Distributive	Collective public provision	Consensual No opposition/resistance	Research grants General tax reduction	Incentives
Redistributive	Relation between costs and benefits obvious	Conflictual Polarization between winners and losers Ideological framing	Progressive taxation Labor market policy Social assistance	Imposition by the state
Regulatory	(Legal) norms for behavior/interaction	Changing coalitions according to the distribution of costs and benefits	Consumer protection Safety at work Protection of environment	Imposition by the state Persuasion Guidance by exemplary models Self-regulation

Source: Heinelt (2007) based on Windhoff-Héritier (1987) & Lowi (1964)

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Considerable characteristics of policy instruments

Certainty	Timeliness	Less Cost	Efficiency	Effectiveness	Flexibility	Visibility	Accountability	Choice
Certainty of the administrative process and the compliance of targets.	Extent to which the tool works quickly.	Expense of the tool.	Extent to which the tool creates maximum outputs for a given input.	Extent to which the tool is likely to achieve its goals.	Ease with which the tool can be altered to changing needs and circumstances.	The extent to which the program is well known or less well known (sometimes invisibility is an important goal).	Extent to which implementers are accountable for their actions.	Degree of citizen choice afforded by the policy.

Source: Levine, Peters & Thompson (1990)

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General types of policy tools/instruments

TOOLS, INSTRUMENTS	DESCRIPTION
Law, regulation, authority tools, directive power	Pronouncements of policy that carry the force of law; compel particular behaviors and compliance.
Provision of goods and services	Services provided directly by the government to users.
Transfer payments, benefits	"Transfer" of money from government to various interests.
Contracts	Contracts with private firms to provide goods or services.
General Expenditures	General spending done by the government every day on the people, goods, and services it needs to function.
Market and proprietary operations	Government activities that have private counterparts, and that have economic and policy consequences.
Tax system	Policies intended to alter behavior by making some activities more or less economically desirable.
Loans and loan guarantees	Loans to induce economic activity or other desirable activity.
Subsidies	Payments to ensure the economic viability of an activity, particularly when that activity addresses some broader goals.
Insurance	Provision of insurance where it is not generally available in the private insurance market.
Suasion, Hortatory tools	Attempts to persuade people to engage in desirable behaviors or to avoid engaging in undesirable behaviors.
Inducements and sanctions	Tools that induce "'quasi-voluntary or quasicoerced' actions based on tangible payoffs"
Capacity-building tools	"Training, technical assistance, education, and information needed to take policy relevant actions" and empower other agencies.
Learning tools	Tools to help understand the relevant aspects of policy problems.
Inspection, Licensing	Government authority to engage in an activity that is prohibited without such a license.
Informal procedures	Procedures not specified in law or regulation to resolve problems.

Source: Peters (1999); Levine et al. (1990); Schneider & Ingram (1997); Anderson (2000)

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NENUPHAR: Economic instrument types identified (so far)

Credit institutions
- Cooperative bank loans
- Commercial bank loans
- Credit guarantee bank loans
- Credit union loans
- Agricultural cooperative loans

Type of loans
- Microcredits
- Long term loans >5 years
- Medium term loans 1.5-5 years
- Short term loans up to 18 months
- Credit lines/overdrafts

Funds and support programs
- EU EAFRD, CAP support (European funds)
- Climate funds
- Voluntary carbon markets
- Compensation funds
- FAO fertilisation programmes

Taxes and incentive systems
- Environmental taxes
- Tax reliefs
- Deposit refund system

Cost-reducing services
- Agriculture input suppliers
- Cost reducing services

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Are there existing economic instruments to promote nutrient flows using dairy wastewater/sewage sludge/manure systems? What are the specialities of these instruments?

Are there financing gaps in agri-food sector for shift to a nutrient cycling business model? Dairy wastewater/sewage sludge/manure systems require additional operative or investment related financing?

Which are the main barriers or failures of using the right economic tools in nutrient management?

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Interactive activity

Methodology

According to NENUPHAR project scope, a debate time will be carried out in order to **identify potential barriers related to regulatory/economic instruments,** and also **measures to overcome those barriers.**

Groups formation

- **Groups** of 5-10 people, according to different waste and your background (**manure, sewage sludge, wastewater**)
- **Time to debate** (35-40 min): a moderator will guide the discussions in each group.
  - What do we need from you? **Only your participation!** your knowledge of the matter, your opinion, your experience in other projects, information from your country...
  - There will be **moderators from NENUPHAR project in each group**.
- **Round of conclusions** (15 min): the moderator will present the relevant information.

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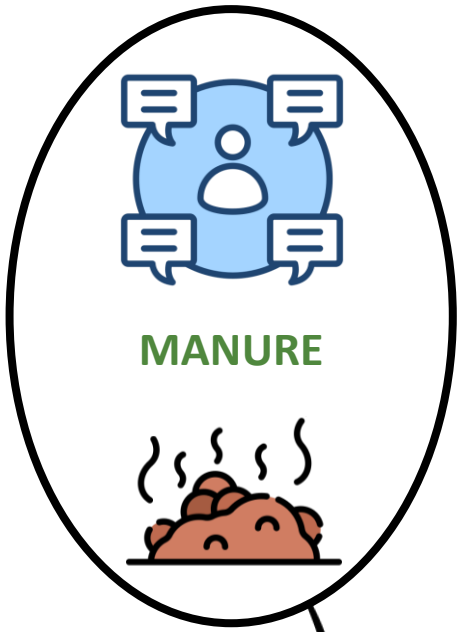
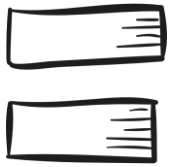
Interactive activity



Issues to address…
EU, National and Regional legislation
Economic instruments
Waste treatment, application to soils, stakeholders, etc.
Barriers/Opportunities



Round of conclusions

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Time for debate and discussion

Is there any regulatory/economic instrument in your country or region that promote nutrient recovery?

In your opinion, which are the main barriers that prevent or hinder nutrient recovery? (authorizations/licenses, waste-treatment, etc.)

Is there a friendly framework for marketing and application of nutrients recovered from waste?

How can we encourage regulatory/economic instruments nutrient recovery? Do you know of any cases/experiences that recover nutrients from waste?

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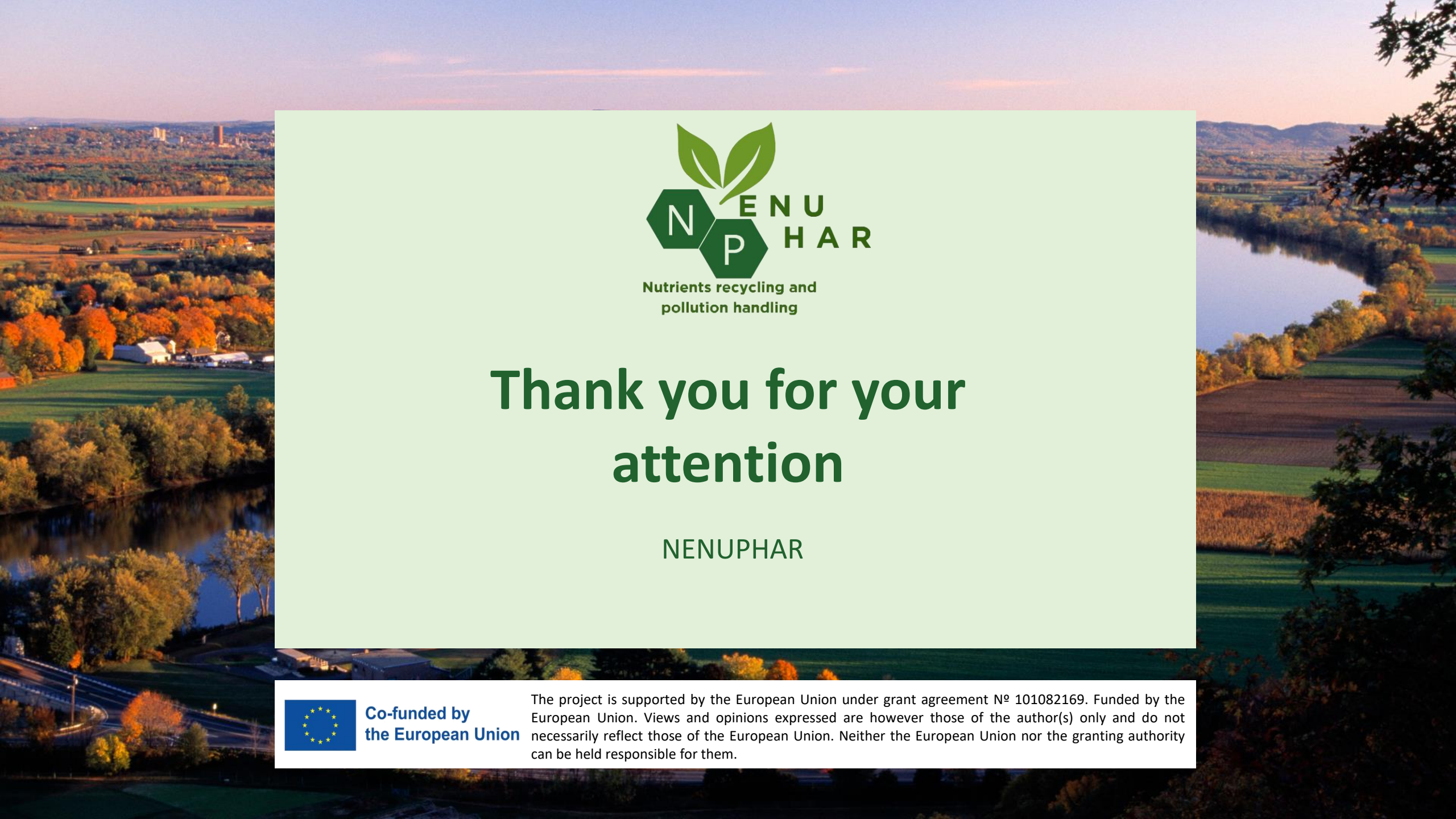

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Nutrients recycling and pollution handling

Thank you for your attention

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