CONSIGLIO NAZIONALE
DEGLI INGEGNERI

CONVEGNO ON LINE
GIOVEDÌ 3 LUGLIO 2025, ORE 15.00 - 17.00
Ingegneria e gestione delle risorse idriche
Un approfondimento del n. 388
"Acqua" de L'Ingegnere Italiano

L'acqua come sfida multidisciplinare per l'ingegneria: prospettive europee.

Francesco Fatone

International Water Association Fellow, Water Europe Ambassador

Università Politecnica delle Marche - Italy

Funded by the European Union

Il contesto: **ACQUA sfide ed azioni**

- **IERI ED OGGI**: Urgenza di azioni e finanziamenti per uscire da infrazioni ed affrontare emergenze idriche legate ad (1) inquinamento; (2) scarsità/siccità e (3) inondazioni e dissesto
- **OGGI E DOMANI**: Importanti sfide delle nuove direttive UE, ed importanza di agire per tempo (ed evitare nuove infrazioni)
- **DOMANI (BREVE, MEDIO E LUNGO TERMINE)**: Strategia di resilienza idrica dell'Unione Europea

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I contenuti del numero 388

- Dal rischio alla prevenzione: un cambio di paradigma
- Il Nexus WEFE e le connessioni strategiche
- Risorse idriche e trasformazione industriale
- Il contesto italiano: tra investimenti e criticità
- La nuova strategia europea per la resilienza idrica
- Soluzioni integrate per territori più resilienti
- La transizione digitale nel ciclo idrico
- Il ruolo progetti di R&S&I europei
- L'ingegneria come leva strategica

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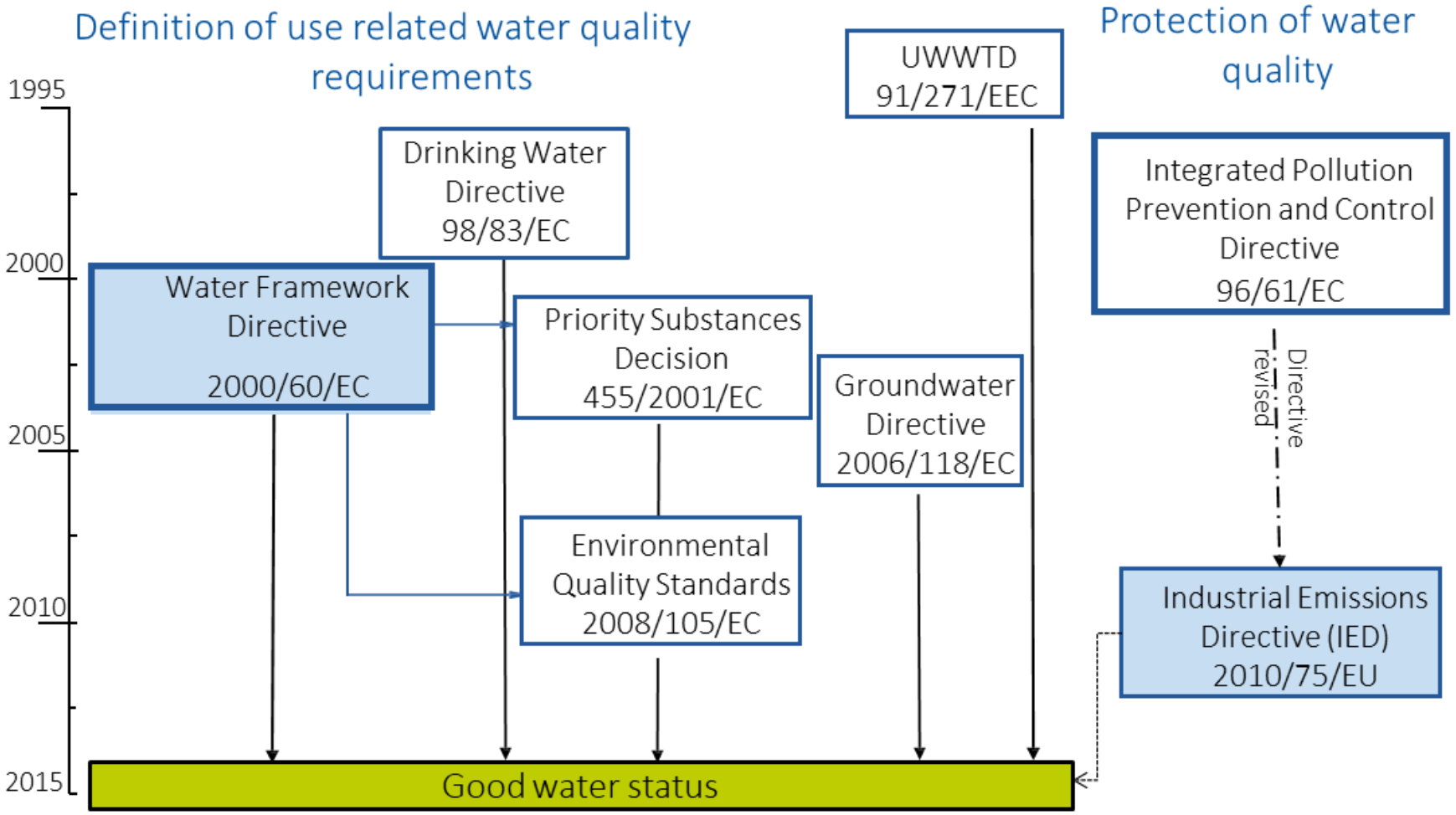
Overview – OLD EU water legislation



Source: Boymanns, 2001

Almost completely revised !

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DIRECTIVE (EU) 2020/2184 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 16 December 2020 on the quality of water intended for human consumption

PFAS Total	0,50	µg/l	'PFAS Total' means t polyfluoroalkyl subs This parametric va once technical guid this parameter are dance with Article may then decide to of the parameters 'P PFAS'.
Sum of PFAS	0,10	µg/l	'Sum of PFAS' mean polyfluoroalkyl subs concern as regards v human consumptio Part B of Annex III. T Total' substances tha oalkyl moiety with t (i.e. –CnF2n–, n ≥ 3) lether moiety with t e. –CnF2nOCmF2m

Article 13
Monitoring

Article 8
Risk assessment and risk management of the catchment areas for abstraction points of water intended for human consumption

Article 9
Risk assessment and risk management of the supply system

Article 10
Risk assessment of domestic distribution systems

Fonte: Luca Lucentini

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Storm waters, small cities and individual systems

Integrated water management plans (Art. 5/ Annex 5)

- Indicative non-binding target of 2%
- Hierarchy of measures

2030: Cities >100 000 p.e. **2035 :** Cities > 10 000 p.e.

Small agglomerations and secondary treatment (Art. 3, 6)

- Scope starting at 1 000 p.e.
- Time-limited derogations

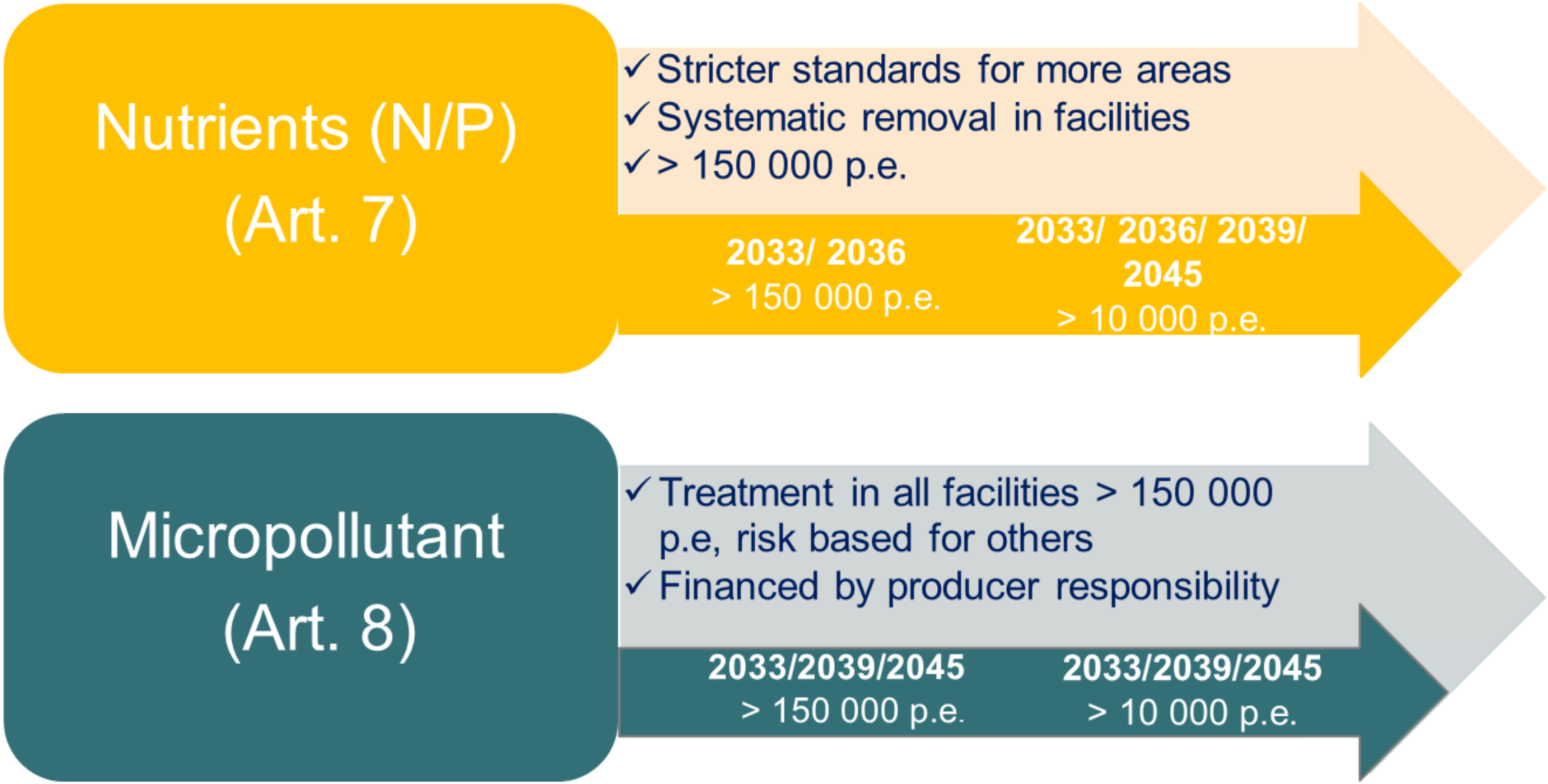
2035: Secondary > 1000 p.e. **+12 years** sensitive & coastal **+ 20 years** for specific cases

Individual systems (Art. 4)

- Minimum requirements for design, maintenance, inspection (IA, DL=36 months)

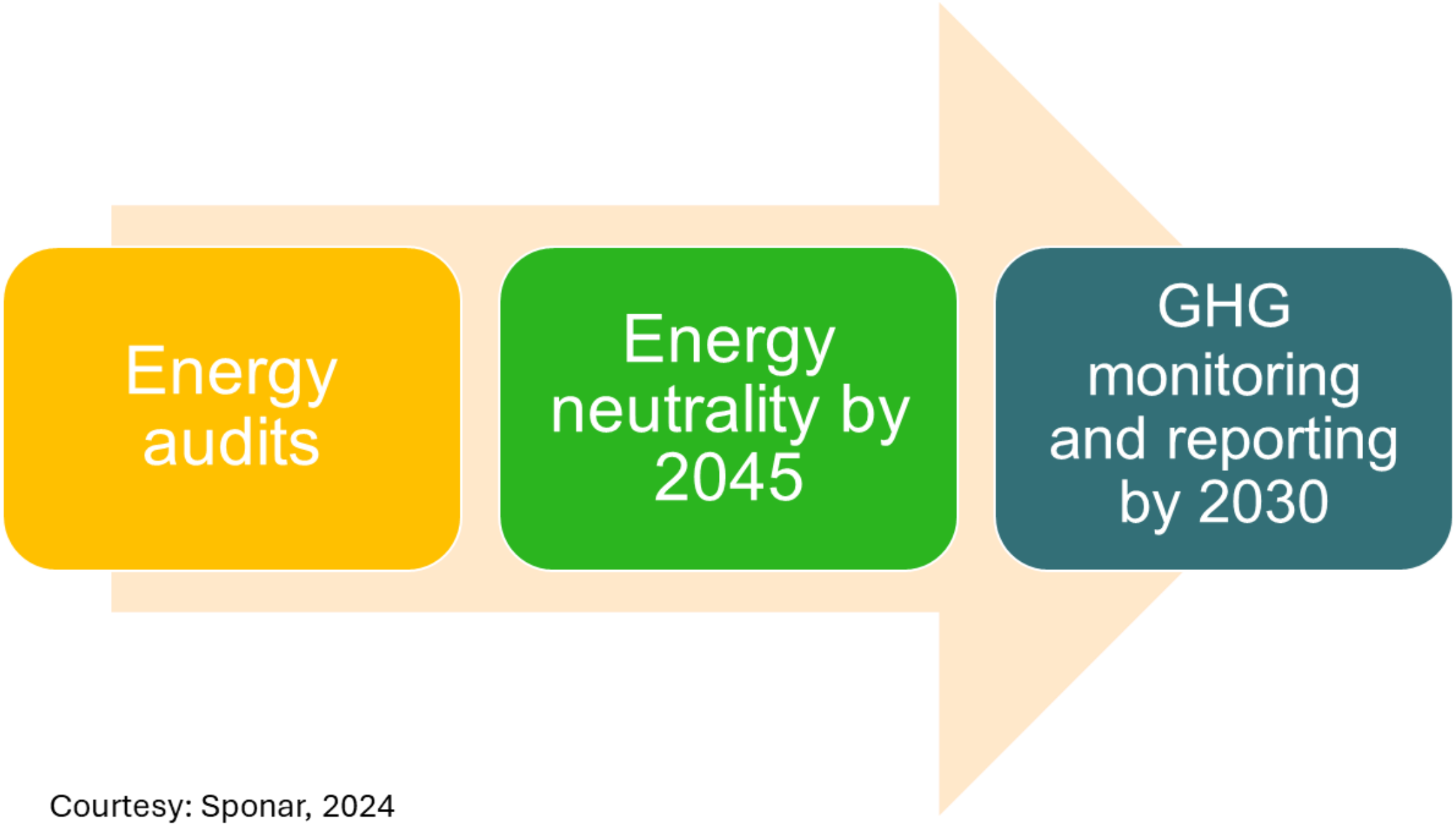
Adapted and integrated from Sponar, 2024

Nutrients and micropollutants



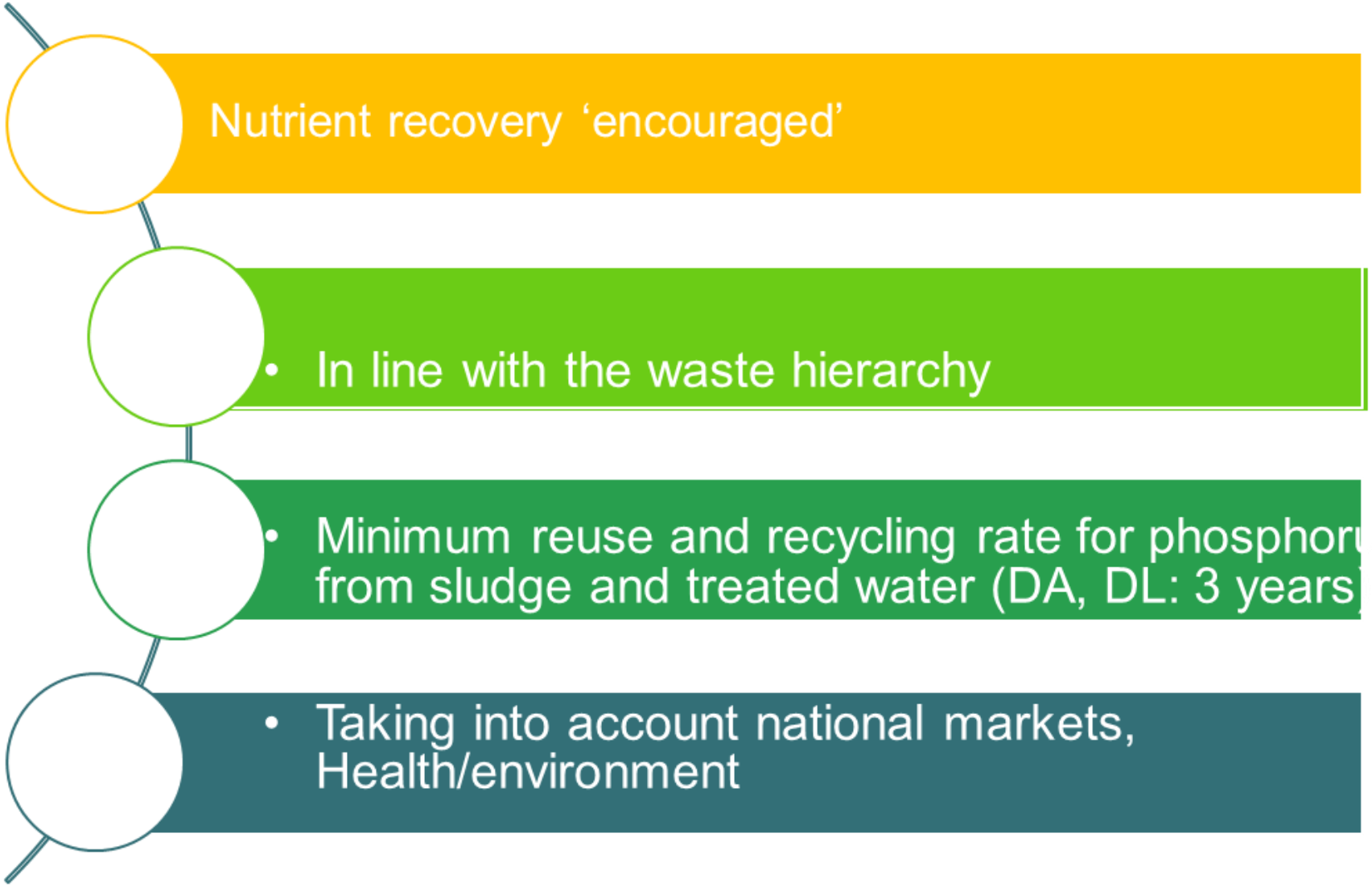
Courtesy: Sponar, 2024

Energy and GHG emissions (Article 11 and 21)

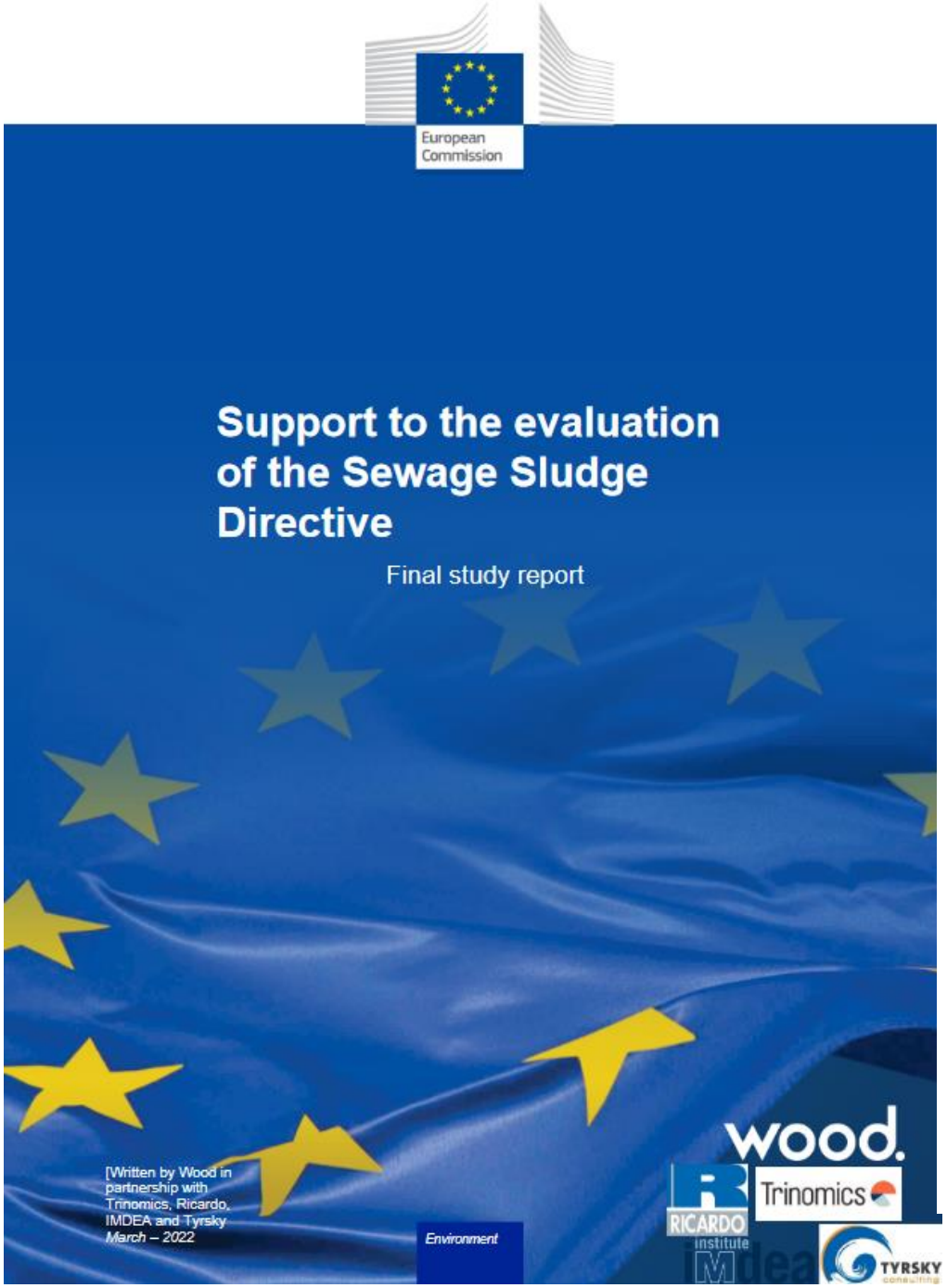


Courtesy: Sponar, 2024

Prevention and Circular economy (Art. 14/20)



Courtesy: Sponar, 2024



EUROPEAN
COMMISSION

Brussels, 22.5.2023
SWD(2023) 158 final

COMMISSION STAFF WORKING DOCUMENT

EXECUTIVE SUMMARY OF THE EVALUATION

Council Directive 86/278/EEC of 12 June 1986 on the protection of the environment, and in particular of the soil, when sewage sludge is used in agriculture

{SWD(2023) 157 final}

EUROPEAN
COMMISSION

Brussels, 4.6.2025
COM(2025) 280 final

COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS

European Water Resilience Strategy

https://circabc.europa.eu/ui/group/1c566741-ee2f-41e7-a915-7bd88bae7c03/library/b560bc22-6a61-4b63-b62b-a7fe890ea177/details

	ACTIONS	Timeline
	RESTORING AND PROTECTING THE WATER CYCLE	
	Establish, including through Structured Dialogues with Member States, implementation priorities of the Water Framework and the Floods Directives, focusing on water quality and quantity.	**2025-2026**
	Revise the Marine Strategy Framework Directive.	**2027**
	Develop water scarcity indicators and a Technical Guidance on Drought Management Plans.	**2026-2027**
	To address main sources of pollution: • **Public-private initiative to achieve a technological breakthrough in feasible and affordable methods for the detection and remediation of PFAS and other persistent chemicals, if the right partners are found.** • **Launch an Assistance Toolbox for Member States to support actions to reduce nutrients pollution, including through enhanced modelling, interactive maps and exchanges of best practices.**	**2027** **2026-2027**

BUILDING A WATER-SMART ECONOMY THAT LEAVES NO ONE BEHIND, SUPPORTS EU COMPETITIVENESS AND ATTRACTS INVESTORS		
	Recommendation on the Water Efficiency First principle, guidelines and EEA report on the untapped water efficiency potential.	**2025-2026**
	Support the uptake of water reuse practices also beyond agriculture and review the Water Reuse Regulation.	**2026-2028**
	Public water supply: • **Support leakage reduction and infrastructure modernisation and deep data assessment.**	**2025-2028**
	Agriculture: • **Maximise the use of CAP Strategic Plans for water resilience through knowledge sharing and innovative solutions promoted by the EU CAP network, the European Innovation Partnership (EIP-AGRI), as well as improved and independent farm advisory services.** • **In the next programming period, continue to incentivise farmers to improve the environmental and climate performance of their holdings, including towards better water management.**	**2025-2026**
	Industry and Energy: • **Launch a pilot project to promote water efficiency, including waterless and closed water cycle technologies, in selected industrial clusters.** • **Include water usage among the parameters of a common Union scheme to rate the sustainability of data centres and propose water consumption minimum performance standards.** • **Public-private initiative to achieve a technological breakthrough in feasible and affordable methods for dry cooling, if the right partners are found.**	**2025-2026**
	Promote an exchange of best practices on freshwater balances, accounting of water flows, water efficiency, and smart water metering across all economic sectors	As from 2025
	Assess the quality of the data available on water and, where appropriate, submit a legislative proposal for the introduction of new environmental economic account modules for water accounts.	By the end of 2026

SECURING CLEAN AND AFFORDABLE WATER FOR ALL, EMPOWERING CONSUMERS AND OTHER USERS		
	Address the water footprint of products when setting or updating requirements under the ESPR and the EU Ecolabel.	**2025-2027**
	Promote best practices on public awareness and the role of water pricing to promote water efficiency, cost recovery and the polluter pays principle, and related national water governance.	**2026-2027**
	Boost efforts towards water resilience across the built environment through the upcoming work programme 2026-2027 of the New European Bauhaus Facility and in the upcoming Affordable Housing Plan.	**2026**

GOVERNANCE AND IMPLEMENTATION TO BOOST CHANGE		
	Step up enforcement and launch structured dialogues with all Member States to accelerate and scale up implementation of the EU water acquis, based on key enforcement priorities stemming from the latest assessment of the River Basin and Flood Risk Management Plans.	**2025-2026**
	Under Cohesion for Transitions Community of Practice, organize a regular exchange with regions, cities and water authorities, to promote exchange of best practices on "sponge landscapes" and transboundary water cooperation identified under Interreg.	**2025-2027**
	Launch a viewer integrating environmental data with data related to the water and energy grids to assist Member States in their spatial planning efforts to identify the best areas for win-win localisation of water-intensive business operations.	**2027**
	Create a Water Resilience Forum.	As from 2026

FINANCE, INVESTMENTS AND INFRASTRUCTURE TO ACHIEVE A STABLE SUPPLY		
	Launch of EIB Water Programme and Sustainable Water Advisory Facility in cooperation with the Commission to step up the assistance to potential loan-takers, increasing the pipeline of projects.	**2025**
	Support Member States and regions in reorienting Cohesion policy funds for water resilience within the mid-term review.	**2025**
	Establish a Water Resilience Investment Accelerator.	**2026-2027**
	Launch a Green and Blue Corridors initiative to support the restoration of ecological settings and infrastructure including rivers, wetlands, and coastal restoration to restore the water cycle with a source-to-sea approach.	**2027**
	Adopt a Roadmap for Nature Credits to tap the potential of these instruments and incentivise the scale-up of these markets.	**2025**
	Use the Technical Support Instrument to help Member States addressing water-related challenges, particularly those identified in the European Semester.	As from 2025

DIGITALISATION AND ARTIFICIAL INTELLIGENCE TO ACCELERATE AND SIMPLIFY SOUND WATER MANAGEMENT		
	Develop and implement Destination Earth and EU Digital Twin of the Ocean applications for water resilience, and by 2030, make the capabilities available to national and local administrations in the EU and beyond.	**2025-2030**
	Develop an EU-wide Action Plan on digitalisation in the water sector including an EU-wide initiative on Smart metering for all.	**2026**
	Launch a Copernicus Water Thematic Hub.	**2026**

RESEARCH AND INNOVATION, WATER INDUSTRY AND SKILLS TO STRENGTHEN COMPETITIVENESS		
	Science/policy interface to disseminate the results of EU-funded R&I projects e.g. through a one-stop shop platform.	**2026**
	Water Resilience R&I strategy.	**2026**
	Water Smart Industrial Alliance to stimulate competitiveness.	**2026**
	European Water Academy.	**2026-2027**
	Knowledge and Innovation Community (KIC) in Water, Marine and Maritime Sectors and Ecosystems under the European Institute of Innovation and Technology (EIT).	**2026**
	Promote further research and innovation to promote sustainable desalination.	2026
	Water Tech challenge, in cooperation with the EIC.	tbd

SECURITY AND PREPAREDNESS TO BOOST COLLECTIVE RESILIENCE		
	Enhance resilience of on- and offshore water infrastructure through the implementation of the Critical Entities Resilience Directive.	**2025**
	Enhance EU real-time early warning and monitoring systems by strengthening the European Drought Observatory and the European Flood Awareness System of the Copernicus Emergency Management Service.	**As from 2025**
	Adopt a European Climate Adaptation Plan.	**2026**
	Strengthen the prevention of water-borne infectious diseases through the implementation of Regulation (EU) 2022/2371 on Serious Cross-border Threats to Health.	As from 2022

ACTING GLOBALLY – LEADING BY EXAMPLE, COMMITMENT AND INITIATIVES		
	Promote water resilience through the Global Gateway by support for priority water-related initiatives and reinforced country and regional engagement.	**As from 2025**
	Strengthen global water governance by engaging in discussions on a future global water governance framework.	As from 2025
	Foster cross-border water cooperation through supporting accession to the UN Water Convention.	As from 2025
	Support the access to an improved drinking water source and/or sanitation facility for at least 70 million individuals, unlock larger investments and boost competitiveness of the EU water industry.	ongoing
	Significantly scale up investment in nature-based solutions in infrastructures or in conjunction with infrastructures.	As from 2026
	Mainstream water in international processes, including the three Rio Conventions on climate change, biodiversity and desertification.	As from 2025
	Enhance implementation of water-related goals and targets[80] of the Kunming Montreal Global Biodiversity Framework.	ongoing
	Enhance EU engagement in the Ramsar Convention.	As from 2025
	Strengthen engagement in inter-alia G7, G20, the Transboundary Water Cooperation Coalition, the Freshwater Challenge and the Baku Water Dialogue.	As from 2025
	Assess the investment needs for each candidate country to comply with the water acquis.	As from 2026
	Step up engagement in the Union for Mediterranean and the Blue Mediterranean Partnership.	As from 2025

Selezione di progetti per (NEAR) ZERO POLLUTED CIRCULAR ECONOMY

WATER REUSE RISK MANAGEMENT PLANs

- IRRIGATION
- RAILWAY CONSTRUCTION SITE
- NATURAL COASTAL PROTECTED AREAS

Energy efficiency in combination with renewable energy (biogas+SP) and NBS for nutrient management

Cultivated field A 2.0 ha (drains into the vegetative buffer strip) Cultivated field B 2.6 ha (drains water into a wetland)

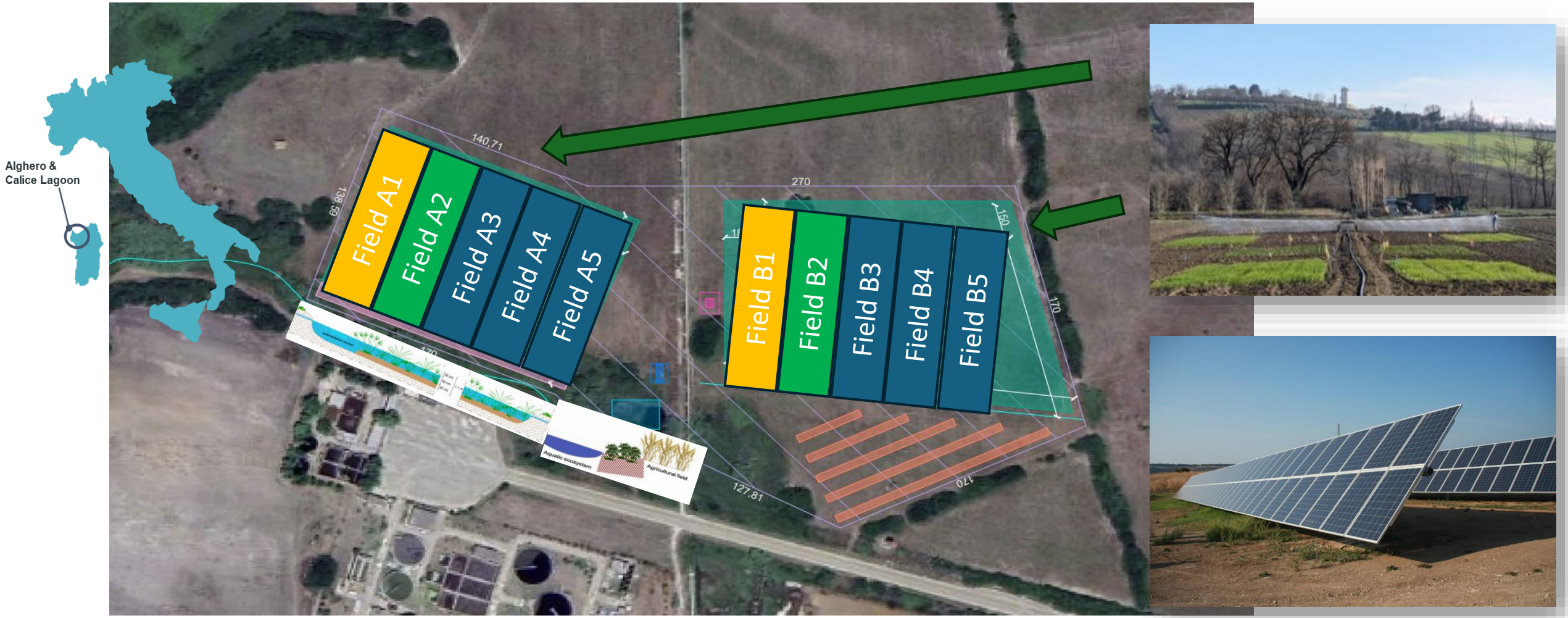


fig 9 – Cultivated fields layout

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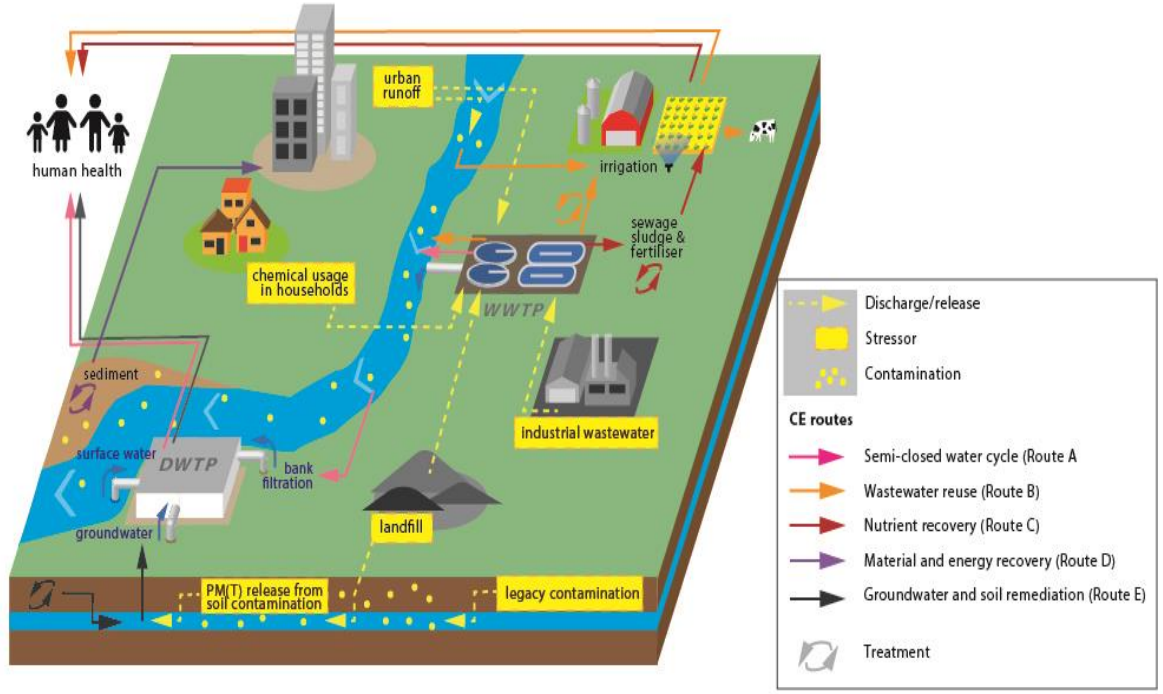
(NEAR) ZERO POLLUTED CIRCULAR ECONOMY: REASEARCH NEEDED!

Contribute to safe and sustainable Circular Economy

5 circular economy routes and chemical emissions pathways from the soil-sediment-water systems :

- (i) semi-closed water cycles for drinking water supply at urban and catchment scale;
- (ii) wastewater reuse for irrigation in agriculture;
- (iii) nutrient recovery from sewage sludge;
- (iv) material recovery from dredged sediment;
- (v) groundwater and land remediation for safe reuse in urban areas.



www.promisces.eu

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Diffuse pollution in urban areas – Which pollutants?

Monitoring protocols
Sensors

Pathogens

Emerging pollutants

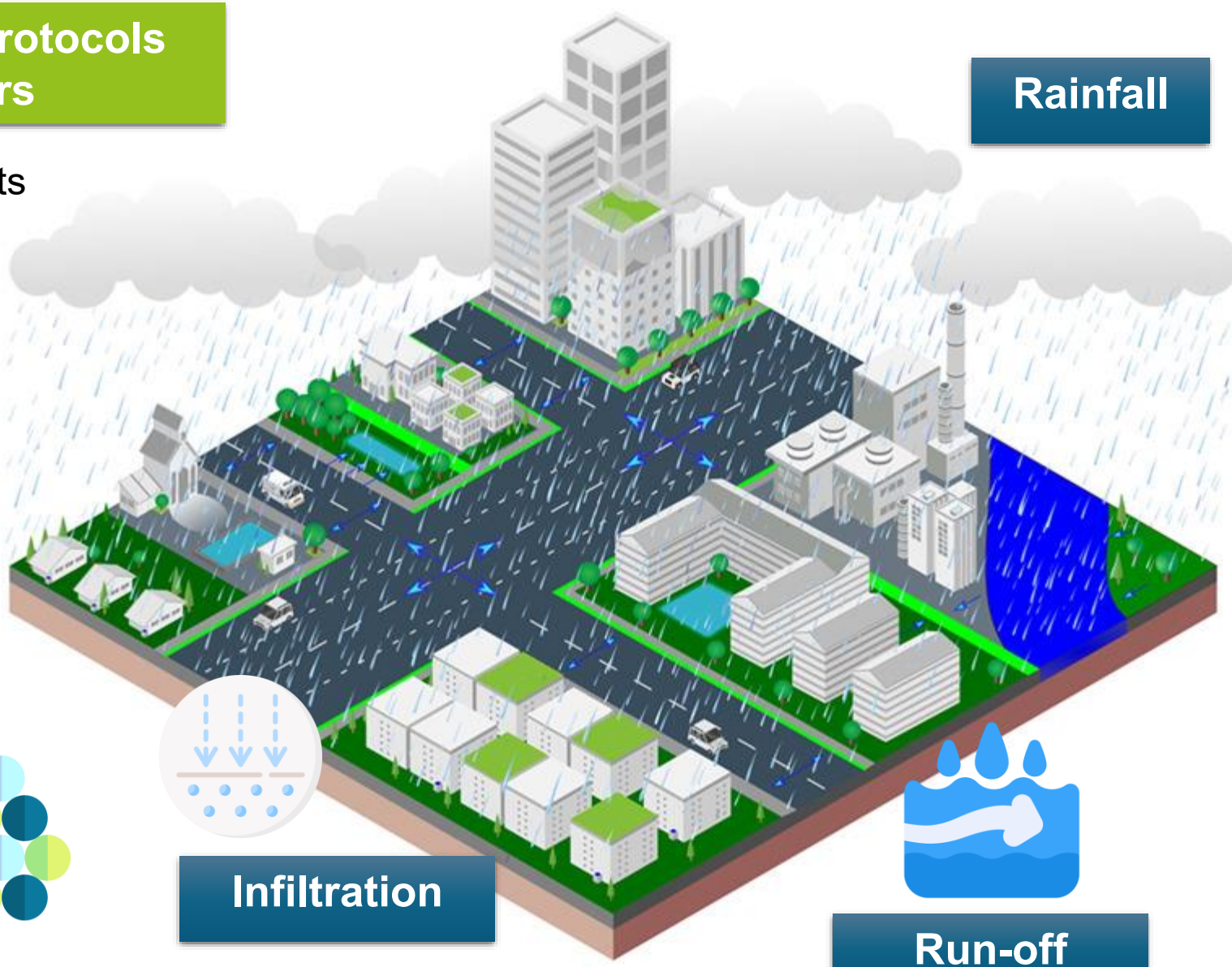
Rainfall

PAHs

Nutrients (N, P)

Heavy metals

Solids



Infiltration

Run-off

Microplastics

https://doi.org/10.1002/wat2.1525

waterun

SMARTechs integrated in existing WWTPs (revamped/upgraded to WRRFs)

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