



EU GREEN DEAL

**MAKE IT
REAL**

PARTNER EVENT
#EUGREENWEEK
30 MAY - 5 JUNE 2022



Water, Energy and Carbon Nexus management within circular territories and industries

3 JUNE 2022

**NEXT
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EU**



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Event co-organized by Water Europe "Circular Water VLT",

IWA Resource Recovery from Water Cluster

- 10:00 **The Circular Water within the Water Europe vision: current evidence and workplan**
Francesco Fatone, Chair Water Europe Circular Water VLT and Secretary IWA RRfW Cluster, Università Politecnica delle Marche, Italy
- 10:20 **Success and failure factors of 100+ innovation projects for valorisation of residual from wastewater**
Olaf van der Kolk, Co-chair IWA RRfW Cluster, Aquaminerals BV, Netherlands
- 10:40 **Energy and materials recovery from Water: principles and application within the IWA cluster**
Iffe Pikoar, Co-chair IWA RRfW Cluster, University of Queensland, Australia
- 11:00 **Circular water within the water-smart urban-industrial symbiosis; the ULTIMATE project**
Gerard van der Berg, Water Europe Circular Water VLT, KWR, Netherlands
- 11:20 **Circularity and sustainability measurement and assessment (towards standardized approaches)**
Evina Katsou, Co-chair Circular Water VLT, Brunel University of London, United Kingdom
- 11:40 **Risk-based approach for water-smart circular economy: the ZeroPM and PROMISCES projects**
Josef Klingner, Circular Water VLT, TZW, Germany and Julie Lions, BRGM, France
- 12:00 **Digitalization and marketplace to boost solutions uptake for water-smart circular economy**
Christos Makropoulos, National Technical University of Athens, Greece
- 12:20 **Questions and Answers**



**Water, Energy and Carbon Nexus management
within circular territories and industries**

The Circular Water within the Water Europe vision: current evidence and workplan

Francesco FATONE, IWA Fellow, Polytechnic University of Marche, Italy

Leader Circular Water VLT, Secretary IWA Resource Recovery from Water Cluster

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WWE LAB
Water and Waste Environmental Engineering

<https://wweelab.simau.univpm.it/>



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Contents

- EU-funded eco-innovations to deliver Circular Water
- WEFEC nexus
- EU policy context
- Water Europe and Circular Water



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H2020 projects related to water in the CE

ACRONYM	COORD.	DEMOS	MATERIALS RECOVERED
SMART-Plant	IT	NL, UK, IL, IT(2), EL, ES	cellulose sludge/ refined, PHAs, VFAS, Nutrients (phosphates, Struvite), P-rich sludge
INCOVER	ES	ES, ES(2), DE	PHAs(bioplastics), citric acid, biofertilizer, nutrient
RUN4LIFE	ES	BE, ES, NL, SE	Struvite, Ammonium Sulfate and Nitrate, phosphoric acid, solid and liquid NPK,
Water2REturn	ES	ES (2) + test in SI, RO, LT	Organic source fertilizers; biostimulant products, micro-algal biomass; soluble N and P from slaughter house waste water
Project O	IT	IT, IL, ES, HR	recovery nutrients, saltwater reuse, fit-for purpose water
HYDROUSA	EL	6 demosites in 3 EL-islands	clean water via evaporation and condensation, edible salt; nutrient rich water (as fertilizer)
NextGen	NL	DE, ES, NL(2), CH, UK, SE, EL, UK, RO	spiruline; struvite; ammonia sulphate; NPK fertilizer; protein
SYSTEMIC	NL	UK, DE, NL, BE, IT + test-plant in FI	mineral nutrients, ammonium sulphate, calcium carbonate; biogas; organic soil improver, P-poor soil improver, N+K-concentrates, NPK fertilizers;
ZEROBRINE	NL	NL, PL, TRK, ES Replication: NL(2), PL, EL, ES	minerals (e.g. sodium chloride, sodium sulphate), regenerated acids, caustics, magnesium
SALTGAE	ES	SI, IT, IL	algae biomass;



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H2020 new projects

“Building a water-smart economy and society”

ACRONYM	COORD.	DEMOS	MATERIALS RECOVERED
ULTIMATE	NL	ES, NL, IT, EL, UK, FR, DK, CZ, IL	Nutrients (ammonia); sulphur for sodium bisulfide; polyphenols, antioxidants; metals; copper-rich fertiliser
B-WaterSmart	DE		Brines/salts, energy/ biogas, nutrients (ammonia), minerals
Wider Uptake	NO	IT, NO, Cz, NL, Ghana,	Biocomposite materials, organic and inorganic fertilizers
WATER-MINING	NL	NL, ES, CY, PT, IT	Chemicals, minerals, nutrients (phosphates), fit-for-purpose water
REWAISE	ES	Living Labs: SE, SE, PL, ES(6), UK	Nutrients(primarily phosphorous), metals, minerals, CRM-Mg, Li; biogas; biopolymers; NPK fertilizers; struvite, vivianite



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Source: <https://impact-sc5.eu/>

Creating high quality new knowledge

Strengthening human capital in R&I

Fostering diffusion of knowledge and open data

Partnerships and international openness

Scientific

Addressing EU policy priorities

Strengthening the uptake of innovation in society

Societal and
environmental

Generating innovation based growth

Creating more and better jobs

Leveraging investment in R&I

Development and adoption of innovative technological solutions

Economic



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WATER in CEAP: still marginal

*“Furthermore, the Commission will develop an **Integrated Nutrient Management Plan**, with a view to ensuring more sustainable application of nutrients and stimulating the markets for recovered nutrients.*

*The Commission will also consider **reviewing directives on wastewater treatment and sewage sludge** and will assess **natural means of nutrient removal such as algae**”*



Circularity in production processes



- promoting the uptake of green technologies through a system of solid verification by registering the EU Environmental Technology Verification scheme as an EU certification mark



Supports the implementation of both the **Circular Economy Action Plan** and the **Waste Framework Directive** by **identifying a list of priority waste or by-product streams (scoping)** and **deriving the most suitable candidate streams for which to develop further EU-wide end-of-waste or by-product criteria**.



<https://publications.jrc.ec.europa.eu/repository/handle/JRC128647>



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Resource Recovery from Water and maturity level: where do we stand?



We have developed green Ferrari



But still circular pathways to pave!



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Technology Readiness revisited: A proposal for extending the scope of impact assessment of European public services

Ilenia Bruno(*), Alessandro Donarelli, Valeria Marchetti, Anna Schiavone Panni, Beatrice Valente

COVINO, {ibruno, adonarelli, valeriamarchetti, aschiavonepanni, bvalentecovino}@kpmg.it

Georges Lobo, European Commission, DIGIT D.2, georges.lobo@ec.europa.eu

Francesco Molinari(*), mail@francescomolinari.it

(*), corresponding authors

*from TRL and SRL to more structured, holistic, and impact aware, evaluation approach → including **Legal** and **Organizational RL***



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Circular Water



WATER



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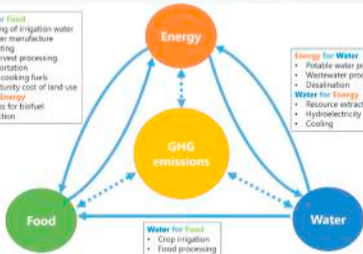
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Nexus globally, and generally



- Energy for Food**
- Pumping of irrigation water
 - Fertilizer manufacture
 - Harvesting
 - Postharvest processing
 - Transportation
 - Use of cooking fuels
 - Opportunity cost of land use
- Food for Energy**
- Biomass for biofuel production



- Energy for Water**
- Potable water production
 - Wastewater processing
 - Desalination
- Water for Energy**
- Resource extraction
 - Hydroelectricity
 - Cooling



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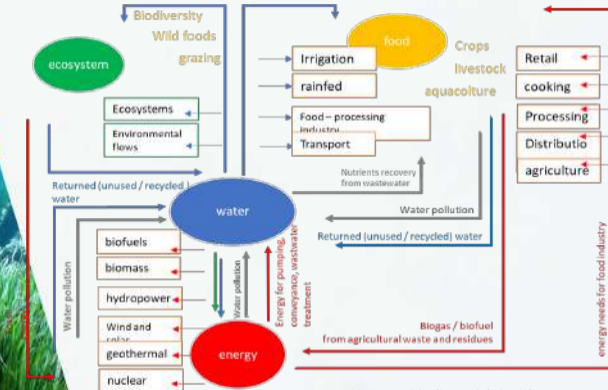
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WEFE NEXUS



Source: Bidoglio et al. (EC-JRC)

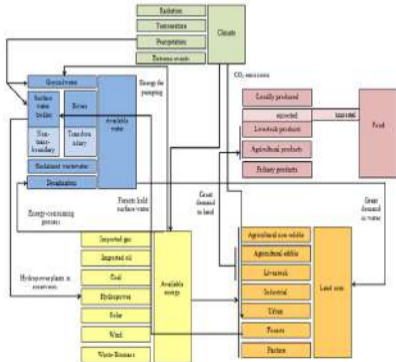


Source:
NEXUSNET
COST ACTION



NEXUS conceptual model...

Source:
NEXUSNET
COST ACTION

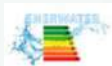


H2020 and HEU projects

Source:
NEXUSNET
COST ACTION



SIM4NEXUS



NEXUS-NESS

ARSINOE
CLIMATE RESILIENT - INNOVATIVE THROUGH SYSTEMIC SOLUTIONS AND KNOWLEDGE



NEXOGENESIS
STREAMLINING WATER RELATED POLICIES



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Crucial years for water (and energy) EU policies



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*Virtual workshop on the 20-21st of April 2021, organised by the **European Commission** in the context of the impact assessment of the Urban Waste Water Treatment Directive (UWWTD) and the evaluation of the Sewage Sludge Directive (SSD).*



Waste water and sludge: how to integrate in the circular economy and support new energy and climate ambitions?



Integrate wastewater and sludge management in the circular economy and support new energy and climate ambitions

1. *Addressing micropollutants in sludge and impact on soil where it is applied*
2. *Recovery of raw materials from wastewater and sewage sludge*
3. *Energy efficiency and production in UWWTPs and process chain*
4. *GHG emissions from urban wastewater and sludge*



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Water Europe Water Vision

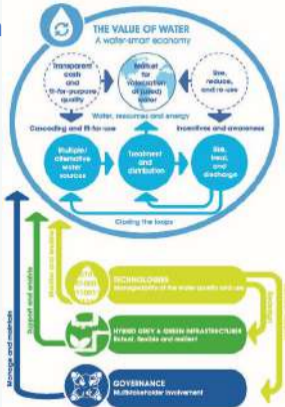
Update in progress!

Challenges:

- Water scarcity
- Pollution of the environment
- Adaptation to climate change and extreme events

Water-Smart Society:

- a society in which the **true value of water** is recognised and realised;
- all available water sources are managed in such a way that **water scarcity and pollution of water resources** are avoided;
- Water and resource loops are largely closed to foster a **circular economy** and optimal resource efficiency,
- the water system is **resilient** against the impact of climate change events.
- A society in which **all relevant stakeholders** are involved in the governance of our water system.



WE Water Vision Leadership Teams



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Value of Water	Digital Water	Circular Water	Grey-Green Infra	WS Industries	WS Cities	WS Rural Areas
<p>Jacob Bossaer (BOSAQ)</p> 	<p>Dragan Jovic (IWR)</p> 	<p>Francesco Fatone (UNNPM)</p> 	<p>Frans van de Ven (DELTAES)</p> 	<p>Geoff Townsend (ECOLAB)</p> 	<p>Jens Friis (CALL Copenhagen)</p> 	<p>Jochen Freybrich (Royal Zoonkamp)</p> 
<p>Phoebe Koumoudou (Alfred KC)</p> 	<p>Elia Ugarelli (INTEF)</p> 	<p>Evina Khatou (Brunel University)</p> 	<p>Tristan Debuigne (ISANE)</p> 	<p>Niels Groot (DOW)</p> 	<p>David Schwesig (RW Zentrum We)</p> 	<p>Bruno Moße (INRAE)</p> 
<p>Dominique Damendral (BRM)</p> 	<p>Bert De Winter (De Watergroep)</p> 	<p>Josef Köfinger (ICW)</p> 	<p>Victor Beumer (BESMER Consultancy)</p> 	<p>Miguel Savina (Eurocal)</p> 	<p>Armando Quazzo (UNIBRA)</p> 	<p>Antonio Lo Porto (ISA-CNR)</p> 
<p>Richard Belman (Surwacat)</p> 	<p>Peter Kűbig (GVE Europe)</p> 	<p>Gerard van den Berg (KWR)</p> 	<p>Alessandro Biancardi (PLANET SRL)</p> 	<p>Maria Cristina Pasi (IAR)</p> 	<p>Arnout Ruelens (City of Mechelen)</p> 	
<p>Arthur Volkamer (Hydroscop Systems)</p> 	<p>Lydia Vainavakidou (University of Easton)</p> 	<p>Tom Arnel (University of Bath)</p> 		<p>Nathalie Swinnen (Solvay)</p> 		



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The Circular Water VLT develops strategic recommendations for structuring new strategies to **underpin circular models that enhance the ability of our society to recover, refine, reuse, repurpose, capture value from, and extend the use-life of, an ever-increasing range of resources and products, thereby projecting the European water and water-connected sectors as global circular economy forerunners.**



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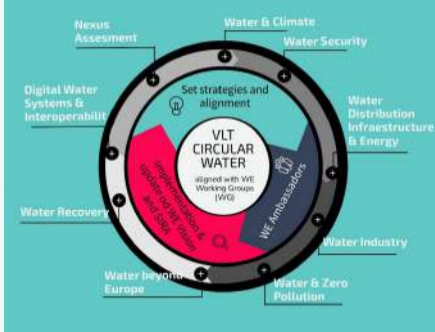
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Europe



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THANK YOU!

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