

A dynamic black and white photograph of water splashing, with numerous bubbles and droplets captured in motion, creating a sense of freshness and energy. This image occupies the left side of the page.

INNOVATING FOR A GREENER FUTURE:

European water service
priorities



EurEau

Innovating for a greener future: European water service priorities

Our world is changing rapidly and so are water services. Innovation is key to guaranteeing the affordability of safe, sustainable and resilient water services for the decades to come. Water service providers are well aware of the challenges and have identified a number of technological and non-technological areas requiring particular innovation efforts with a view to meeting the goals of the European Green Deal.

The research needs are compiled in this document and should help policy makers in designing research and innovation programmes in a way that responds to the real needs of drinking water and waste water operators.

Innovation has multiple facets

Over the past decades, water services have improved significantly in terms of quality and accessibility. Today, 95% of European citizens have access to high quality drinking water while 86% of them are connected to waste water services. Our sector has substantially increased the levels of health and environmental protection while reducing energy demand and embracing circular economy principles. Innovation has been a key enabling factor in this process.

Innovation is therefore a crucial tool to help the water sector meet the challenges of the United Nation's Sustainable Development Goals, adapt to climate change, become more efficient and comply with legislation at all levels.

For the water sector, innovation must not be limited to technological developments. In reality, innovation comprises other aspects including governance, communication, public policy and partnerships. Although EurEau had approached the topic from a more

Innovation means "exploiting new ideas leading to the creation of a new product, process or service". It is not only the invention of something new, but actually it is "bringing it to market", or putting it into practice and exploiting it in a manner that leads to new products, services or systems that add value or improve quality for customers, operators and the environment. Innovation includes all areas such as technology, business models, new management methods, social science projects, communication and governance.

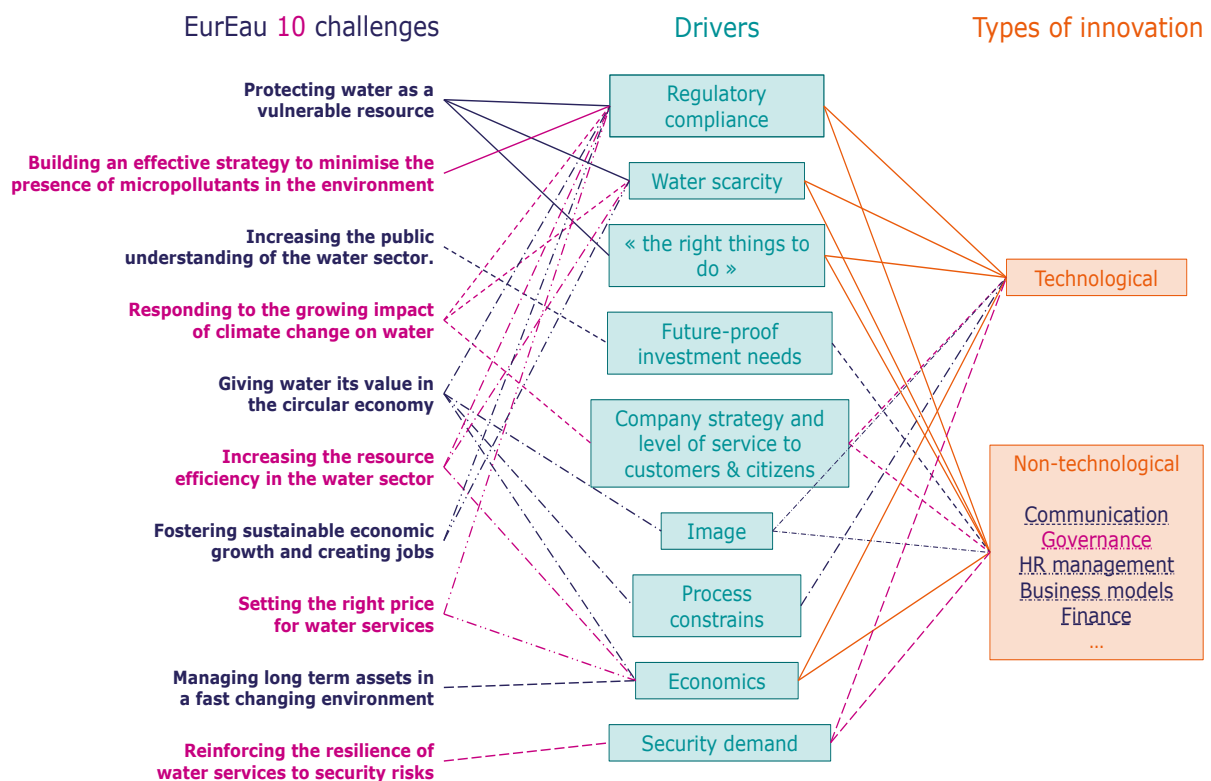
An innovation-friendly landscape for the water sector requires a legislative frame-work that stimulates and enables innovation, provides flexible policy and financing instruments to cover all stages of the innovation cycle, addresses all areas - be they technological or non-technological, stimulates cooperation between R&I actors and water operators, and addresses the needs of all types of water operators.

technological perspective for a number of years, we see today that water utilities in nearly all Member States continue to face problems in accessing and implementing innovative solutions. It seems that this is not primarily caused by the lack of technological developments or solutions available but rather by the policy side which regulates the capacity of water utilities to invest (time and money) in innovation. The fact that utilities in a number of countries find it difficult to even maintain the infrastructure in place demonstrates how difficult it is for them to invest money and time in innovation. Additionally, implementing innovative solutions needs to be accompanied with human resource management to adapt to the chosen solutions.

A stronger focus is needed on innovative public policy (regulation, economics), governance and partnerships to avoid legislative rules that set detailed and definitive requirements, leaving little room for innovation to meet demands outside regulatory compliance.

Significant amounts of mainly European but also national public funds are invested in the early stages of the innovation cycle, i.e. into research. This opportunity can easily be lost if the research results do not reach the European water sector at an economically viable scale, or do not respond to their real-life needs. Innovation is therefore much more than an appendix to research. It is an integral part of the whole cycle and should be treated as such.

Graph 1: Drivers for innovation in the water sector



Barriers to innovation must be overcome

A number of barriers may slow down innovation in the water sector. They include

- ~ inflexible and prescriptive legislation;
- ~ missing LCA data showing that new solutions do not only address one particular issue, but provide wider sustainability benefits;
- ~ a lack of knowledge on innovative solutions;
- ~ a lack of innovative financing solutions;
- ~ Technological solutions not adapted to the needs of water service providers;
- ~ A lack of public support.

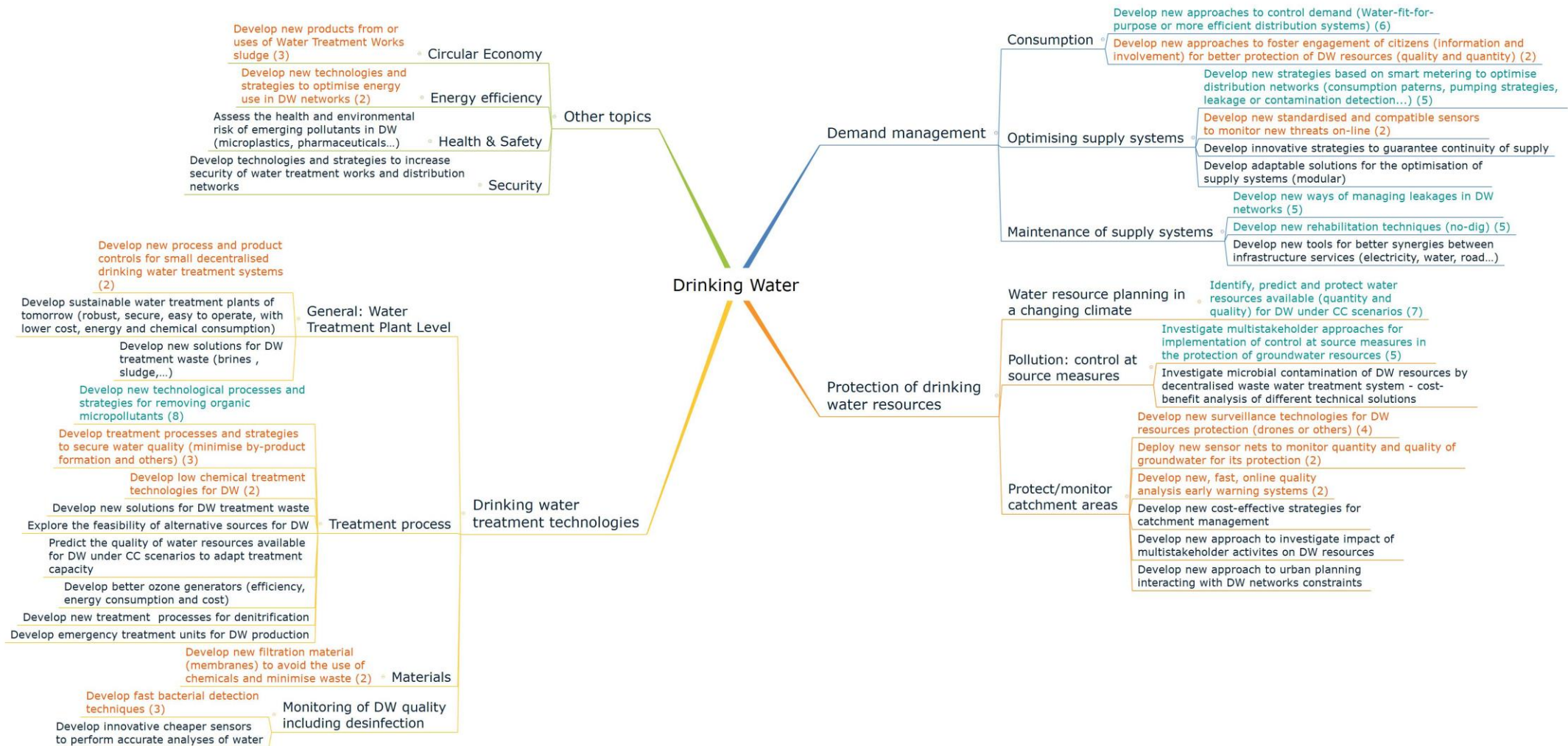
Through its 32 national member associations, EurEau boosts a unique network of water operators from across Europe. We are willing and able to ensure a better information flow between regulators, public support providers and water operators. This document forms an important part of the effort. Moreover, we can also use our network to better inform water operators of promising innovation cases.

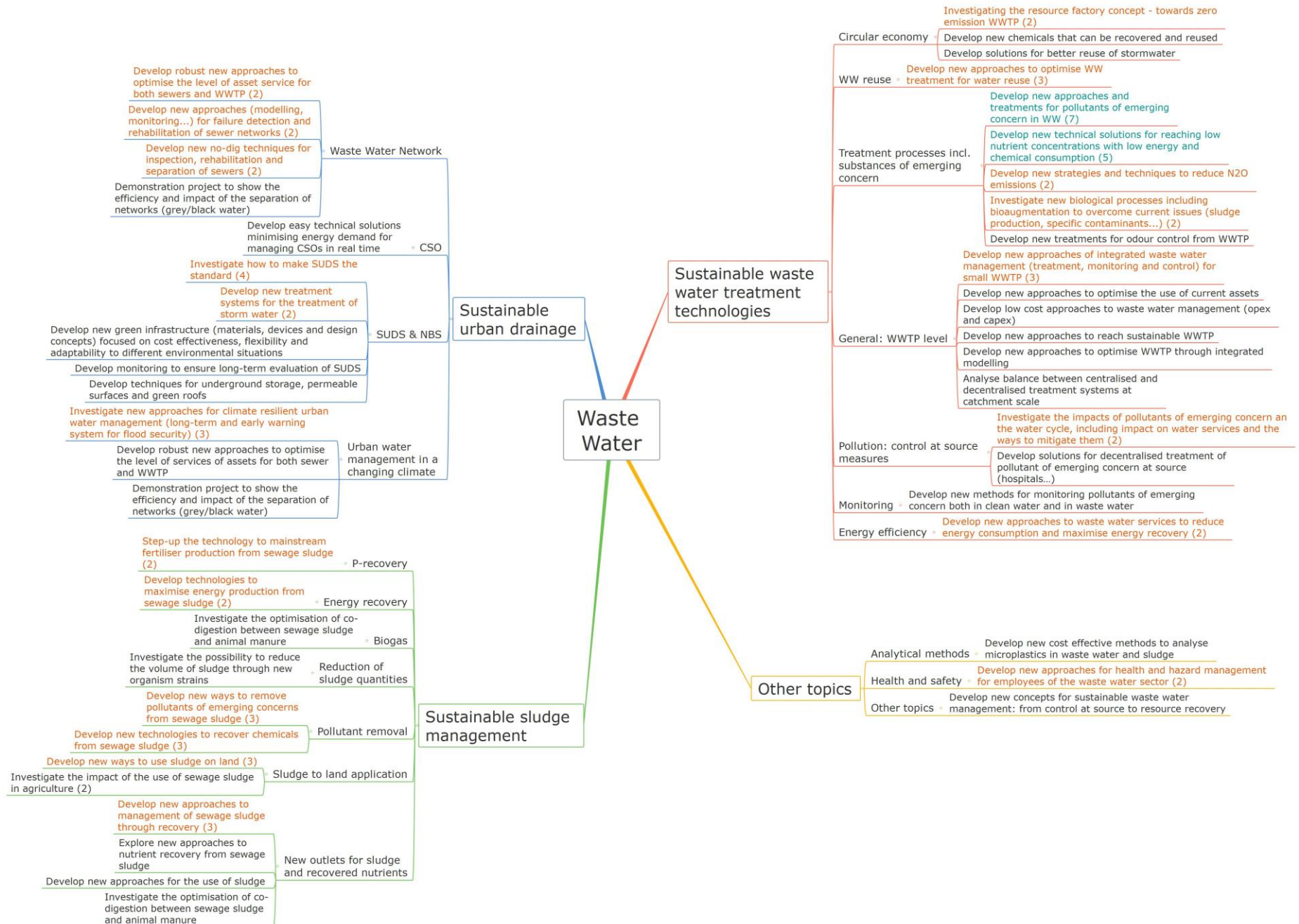
Innovation priorities for EurEau members

EurEau members reported over 350 proposals for innovation. In order to present them all, we regroup them by topics and group the one tackling the same ideas. However we obtain a quite substantial number of needs. With the figures below we hope to visualise and help the reader to jump on the topics of interest for him. These figures represent either the research needs for drinking water, waste water or horizontal matters. Within a figure, we highlighted the most cited topics as follows:

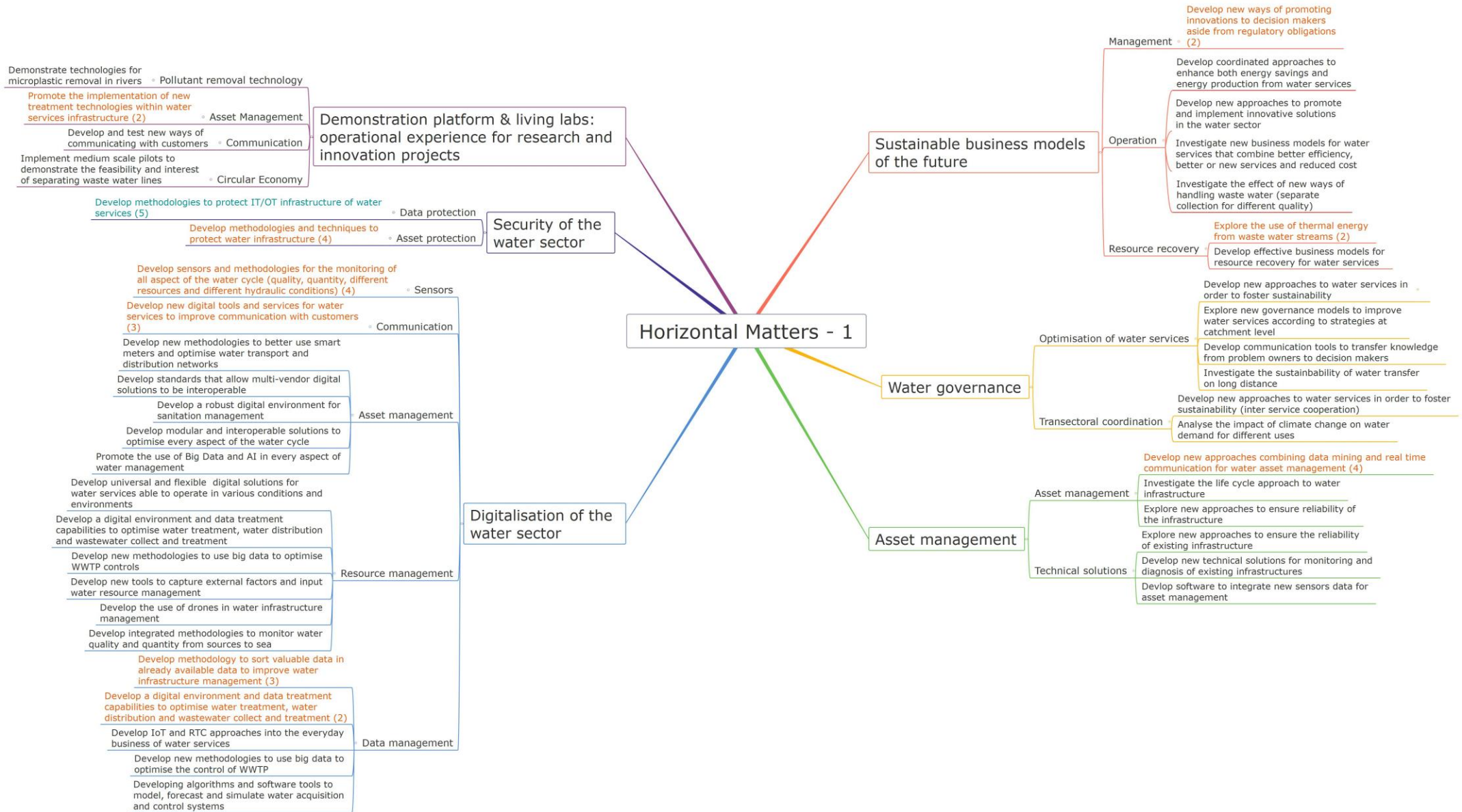
- ~ 5 times and more in green
- ~ between 2 and 4 times in orange
- ~ single proposals in black.

The figures are displayed in a list version for a more detailed analyses of the proposals.

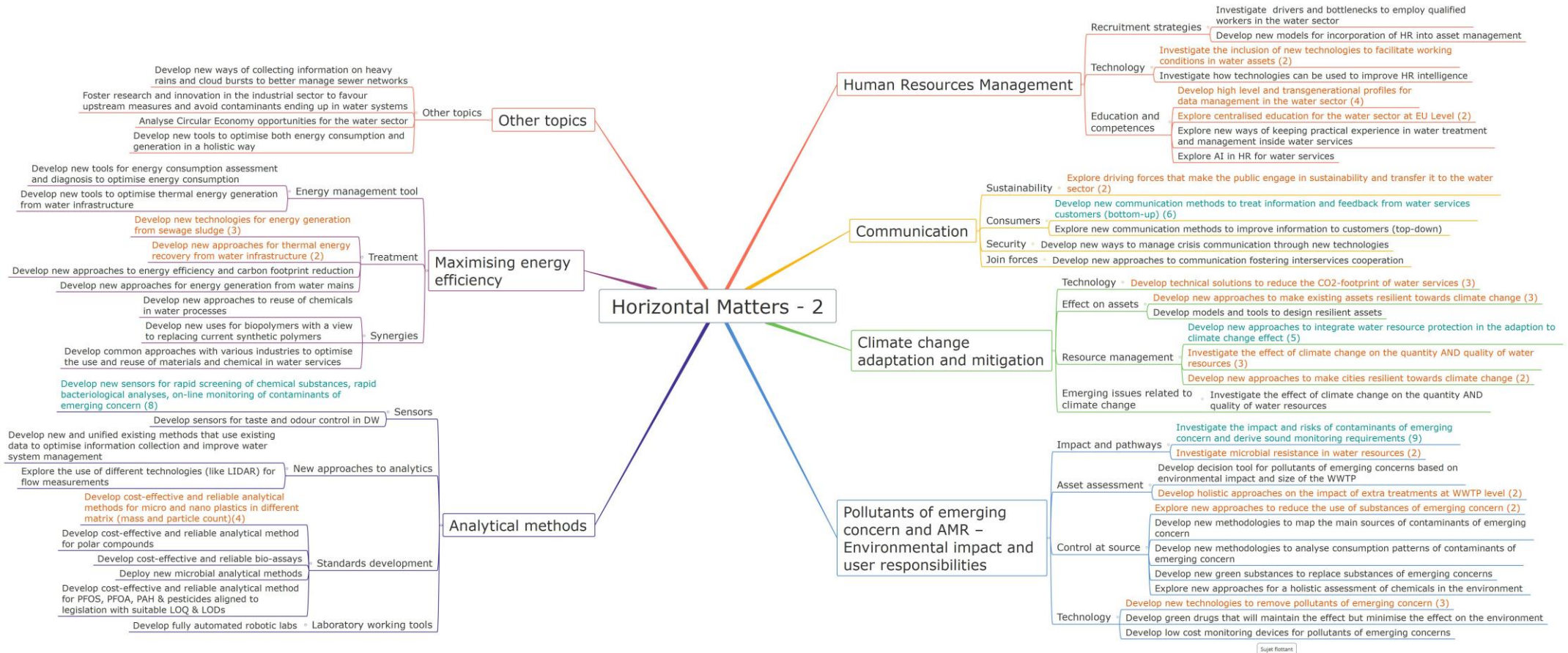




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Summary Table of the most frequently proposed ideas

In the following table we regrouped the topics proposed more than once (green and orange) and associated them first with the EurEau challenges they answer and second, the European Commission Green Deal objective they contribute to. Both of these are presented according to the numbered list below. The entire list of proposed topics can be obtained upon request from EurEau.

List of EurEau's 10 challenges:

1. Protecting water as a vulnerable resource
2. Building an effective strategy to minimise the presence of micropollutants in the environment
3. Increasing the public understanding of the water sector
4. Responding to the growing impact of climate change on water
5. Giving water its value in the circular economy
6. Increasing the resource efficiency in the water sector
7. Fostering sustainable economic growth and creating jobs
8. Setting the right price for water services
9. Managing long term assets in a fast changing environment
10. Reinforcing the resilience of water services to security risks

Major themes of the Green Deal related to EurEau challenges

1. Increasing the EU's climate ambition for 2030 and 2050
2. Supplying clean affordable and secure energy
3. Mobilising industry for clean and circular economy
4. Preserving and restoring ecosystems and biodiversity
5. A zero pollution ambition for a toxic-free environment.

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Theme	Sub-theme	Major research topic (green and orange)	Corresponding EurEau Challenge	Corresponding Green Deal objective
DW - Demand Management	Consumption	Develop new approaches to control demand (Water-fit-for-purpose or more efficient distribution systems)	6	4
		Develop new approaches to foster engagement of citizens (information and involvement) for better protection of DW resources (quality and quantity)	3,	4, 5
	Optimising supply systems	Develop new strategies based on smart metering to optimise distribution networks (consumption patterns, pumping strategies, leakage or contamination detection...)	7, 9, 10	3, 5
		Develop new standardised and compatible sensors to monitor new threats on-line	7, 9, 10	3, 5
	Maintenance of supply systems	Develop new ways of managing leakages in DW networks	6, 7, 9	3
		Develop new rehabilitation techniques (no-dig)	6, 7, 9	1, 3
DW – Protection of DW resources	Water resource planning in a changing climate	Identify, predict and protect water resources available (quantity and quality) for DW under CC scenarios	1, 4,	1, 3, 4
	Pollution: Control at source measures	Investigate multistakeholder approaches for implementation of control at source measures in the protection of groundwater resources	1, 2,	4, 5
	Protect/Monitor catchment areas	Develop new surveillance technologies for DW resources protection (drones or others)	1, 7	4, 5
		Deploy new sensor nets to monitor quantity and quality of groundwater for its protection	1, 7	4, 5

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		Develop new, fast, online quality analysis early warning systems	1, 7, 9, 10	5
DW – DW treatment technologies	General: Water Treatment Plant Level	Develop new process and product controls for small decentralised drinking water treatment systems	7, 9, 10	4, 5
	Treatment Processes	Develop new technological processes and strategies for removing organic micropollutants	2, 7	5
		Develop treatment processes and strategies to secure water quality (minimise by-product formation and others)	7, 9, 10	4, 5
		Develop low chemical treatment technologies for DW	6, 9, 10	5
	Materials	Develop new filtration material (membranes) to avoid the use of chemicals and minimise waste	7, 9, 10	5
DW – Other topics	Circular Economy	Develop new products from or uses of Water Treatment Works sludge	5, 7	3
		Develop new technologies and strategies to optimise energy use in DW networks	5, 6, 7	3
WW – Sustainable WWT technologies	Circular Economy	Investigating the resource factory concept - towards zero emission WWTP	4, 5, 6, 7, 9	1, 2, 3
	WW Reuse	Develop new approaches to optimise WW treatment for water reuse	1, 2, 5, 6, 7	3, 5
	Treatment processes incl. substances of emerging concern	Develop new approaches and treatments for pollutants of emerging concern in WW	1, 2,	5
		Develop new technical solutions for reaching low nutrient concentrations with low energy and chemical consumption	4, 6, 7, 9	1, 5
		Develop new strategies and techniques to reduce N2O emissions	4, 7, 9	1, 5

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		Investigate new biological processes including bioaugmentation to overcome current issues (sludge production, specific contaminants...)	7, 9	5
	General: WWTP level	Develop new approaches of integrated waste water management (treatment, monitoring and control) for small WWTP	1, 3, 7, 9, 10	4, 5
	Pollution: control at source measures	Investigate the impacts of pollutants of emerging concern on the water cycle, including impact on water services and the ways to mitigate them	1, 2, 5, 9	5
	Energy efficiency	Develop new approaches to waste water services to reduce energy consumption and maximise energy recovery	5, 6, 7, 8	1, 2, 3
WW – Sustainable sludge management	P-recovery	Step-up the technology to mainstream fertiliser production from sewage sludge	5, 7	3
	Energy recovery	Develop technologies to maximise energy production from sewage sludge	5, 7, 9	2, 3
	Pollutant removal	Develop new ways to remove pollutants of emerging concerns from sewage sludge	1, 2, 5	3, 5
		Develop new technologies to recover chemicals from sewage sludge	5, 7	3, 5
	Sludge to land application	Develop new ways to use sludge on land	5	1, 3,
		Investigate the impact of the use of sewage sludge in agriculture	4, 5	1, 3, 5
	New outlets for sludge and recovered nutrients	Develop new approaches to management of sewage sludge through recovery	5	1, 3, 5

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WW – Sustainable urban drainage	Waste Water Network	Develop robust new approaches to optimise the level of asset service for both sewers and WWTP	3, 4, 6, 9	1
		Develop new approaches (modelling, monitoring...) for failure detection and rehabilitation of sewer networks	4, 7, 9	1, 4, 5
		Develop new no-dig techniques for inspection, rehabilitation and separation of sewers	4, 6, 7, 9	1, 5
	SUDS & NBS	Investigate how to make SUDS the standard	4, 6, 9	1, 4, 5
		Develop new treatment systems for the treatment of storm water	4, 9	1, 4, 5
	Urban water management in a changing climate	Investigate new approaches for climate resilient urban water management (long-term and early warning system for flood security)	4, 6, 9	1
WW – Other topics	Health and safety	Develop new approaches for health and hazard management for employees of the waste water sector	7	5
HM1 – Sustainable business models of the future	Management	Develop new ways of promoting innovations to decision makers aside from regulatory obligations	3, 5, 7	3
	Resource recovery	Explore the use of thermal energy from waste water streams	5, 6, 9	2, 3
HM1 – Asset management	Asset management	Develop new approaches combining data mining and real time communication for water asset management	9	5
HM1 – Digitalisation of the water sector	Sensors	Develop new approaches combining data mining and real time communication for water asset management	9	5
	Communication	Develop new digital tools and services for water services to improve communication with customers	3, 8	
	Data management	Develop methodology to sort valuable data in already available data to improve water infrastructure	9, 10	5

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		management		
		Develop a digital environment and data treatment capabilities to optimise water treatment, water distribution and wastewater collect and treatment	7, 8, 9, 10	5
HM1 – Security of the water sector	Data protection	Develop methodologies to protect IT/OT infrastructure of water services	7, 9, 10	5
	Asset protection	Develop methodologies and techniques to protect water infrastructure	4, 7, 9, 10	1, 5
HM1 – Demonstration platform & living labs	Asset management	Promote the implementation of new treatment technologies within water services infrastructure	9	5
HM2 – Human Resources Management	Technology	Investigate the inclusion of new technologies to facilitate working conditions in water assets	7, 9	5
	Education and competences	Develop high level and transgenerational profiles for data management in the water sector	7	
		Explore centralised education for the water sector at EU Level	7	
HM2 – Communication	Sustainability	Explore driving forces that make the public engage in sustainability and transfer it to the water sector	4, 7, 9	1, 5
	Consumers	Develop new communication methods to treat information and feedback from water services customers (bottom-up)	3, 8	
HM2 – Climate change adaptation and mitigation	Technology	Develop technical solutions to reduce the CO2-footprint of water services	4, 7, 9	1, 5
	Effect on assets	Develop new approaches to make existing assets resilient towards climate change	4, 7, 8, 9	1, 5
	Resource	Develop new approaches to integrate water resource protection in the adaption to climate change effect	1, 4	1, 5

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	management	Investigate the effect of climate change on the quantity AND quality of water resources	1, 4	1, 5
		Develop new approaches to make cities resilient towards climate change	4	1
HM2 – Pollutants of emerging concern and AMR	Impact and pathways	Investigate the impact and risks of contaminants of emerging concern and derive sound monitoring requirements	1	5
		Investigate microbial resistance in water resources	1	5
	Asset assessment	Develop holistic approaches on the impact of extra treatments at WWTP level	9	1, 5
	Control at source	Explore new approaches to reduce the use of substances of emerging concern	1, 2	5
	Technology	Develop new technologies to remove pollutants of emerging concern	1, 2, 7	5
HM2 – Analytical methods	Sensors	Develop new sensors for rapid screening of chemical substances, rapid bacteriological analyses, on-line monitoring of contaminants of emerging concern	2, 10	5
	Standards development	Develop cost-effective and reliable analytical methods for micro and nano plastics in different matrix (mass and particle count)	1, 2, 7, 8	5
HM2 – Maximising energy efficiency	Treatment	Develop new technologies for energy generation from sewage sludge	4, 5, 7, 8	1, 2
		Develop new approaches for thermal energy recovery from water infrastructure	5	1, 2

About EurEau

EurEau is the voice of Europe's water sector. We represent 34 national associations of drinking water and waste water operators from 29 countries across both the private and the public sectors.

We bring national water professionals together to agree European water sector positions regarding the management of water quality, resource efficiency and access to water for Europe's citizens and businesses.

With a direct employment of around 476,000 people, our sector makes a significant contribution to the European economy.

