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Report on innovative technological solutions in CSUD in EU Member States and third countries associated to the Programme

Curricula innovation in climate-smart urban development based on green and energy efficiency with the non-academic sector

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Executive Summary

This document represents D4.1 “Report on innovative technological solutions in CSUD in EU Member States and third countries associated to the Programme” of the SmartWB project funded by the European Commission's Erasmus+ Programme ERASMUS-EDU-2022-CBHE under grant agreement No 101081724. In this activity, by conducting a comprehensive questionnaire, innovative technological solutions in eight fields of CSUD at the EU level and the national level are collected by partners from EU Member States and third countries associated to the Programme. Furthermore, for each of the eight CSUD aspects, ambitions and legislation, implementation strategies and general practices are discussed, as well as the emerging trends in CSUD.

List of abbreviations

AEVERSU	Technical Association for Waste Management, Urban Waste Management and the Environment Business Association Valorization
AI	Artificial intelligence
ANFIS	Adaptive neuro fuzzy inference system
ATM	Metropolitan Transport Authorities
C&SUD	Circular and Sustainable Urban Development
CAP	Common Agricultural Policy
CEAP	Circular Economy Action Plan
CEF	Connecting Europe Facility
CSUD	Climate Smart Urban Development
DGT	Directorate-General for Traffic
EIP-Agri	The European Innovation Partnership on agricultural productivity and sustainability
EIP-SCC	European Innovation Partnership on Smart Cities and Communities
EPS	Elektroprivreda Srbije – Power Industry of Serbia
EU	European Union
FER	Federation of Recovery and Recycling
GHG	Greenhouse gas emissions
IoT	Internet of Things
ITS	Intelligent transport solutions
MITMA	Ministry of Transport, Mobility and Urban Agenda
NAP	The national access point
NFC	Near Field Communication
NGO	Non-governmental organization
NNTT	New Technologies
PIMA Adapta	The Environmental Incentive Plan for Adaptation to Climate Change in Spain
PNACC	National Plan for Adaptation to Climate Change
PNIEC	National Energy and Climate Plan
QR	Quick Response Code
R&D	Research and development
RES Serbia	The Association Renewable Energy Sources of Serbia
RNF	River nature reserve
SDGs	Sustainable Development Goals
SET Plan	The Strategic energy technology plan
TESC	Spanish Contactless Card
UNECE	United Nations Economic Commission for Europe
WFD	Water Framework Directive
WWTP	Waste water treatment plant

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1. Introduction

Climate Smart Urban Development (CSUD) has emerged as a crucial approach to promoting sustainable urbanization and addressing critical development challenges such as energy, water consumption and production, biodiversity, disaster preparedness, and climate change adaptation. By prioritizing sustainability in urban development, CSUD serves as a key lever for overall development around the world.

Three quarters of the population of Europe live in urban areas (Figures 1 and 2), and the European cities are the driving force behind the economy. In recent years, various factors exert significant stress on these settings, with climate change being a primary driver of these pressures [1]. The convergence of climate change with the ongoing socio-economic changes poses significant consequences on European resources and future. The EU's urban areas are important contributors to the EU's energy consumption and greenhouse gas emissions [2].

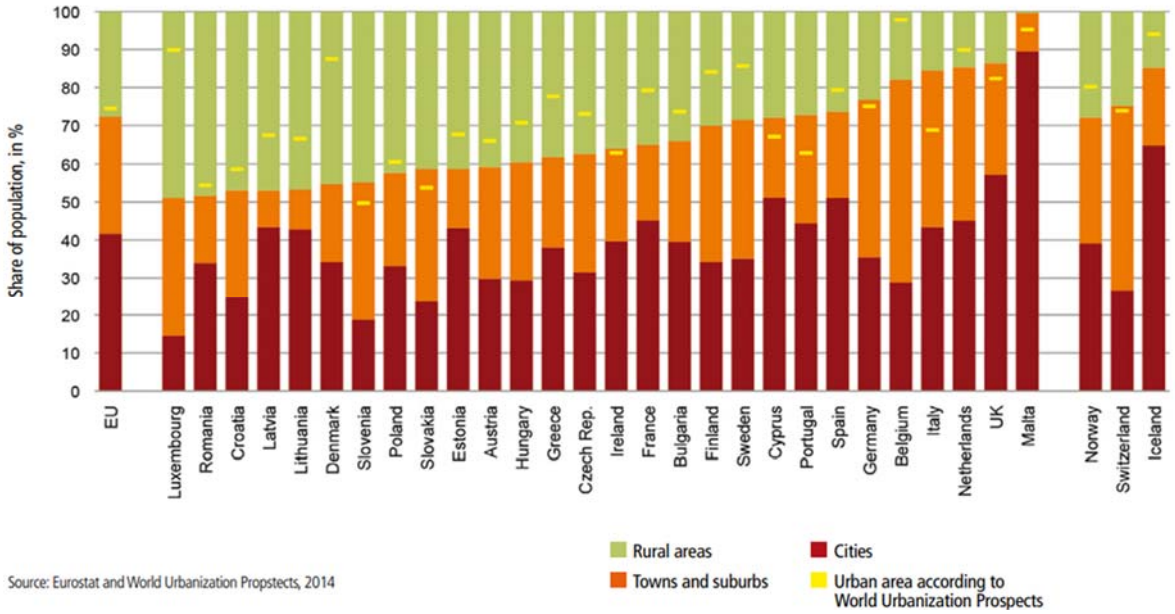

Figure 1 The State of the European Cities [3]

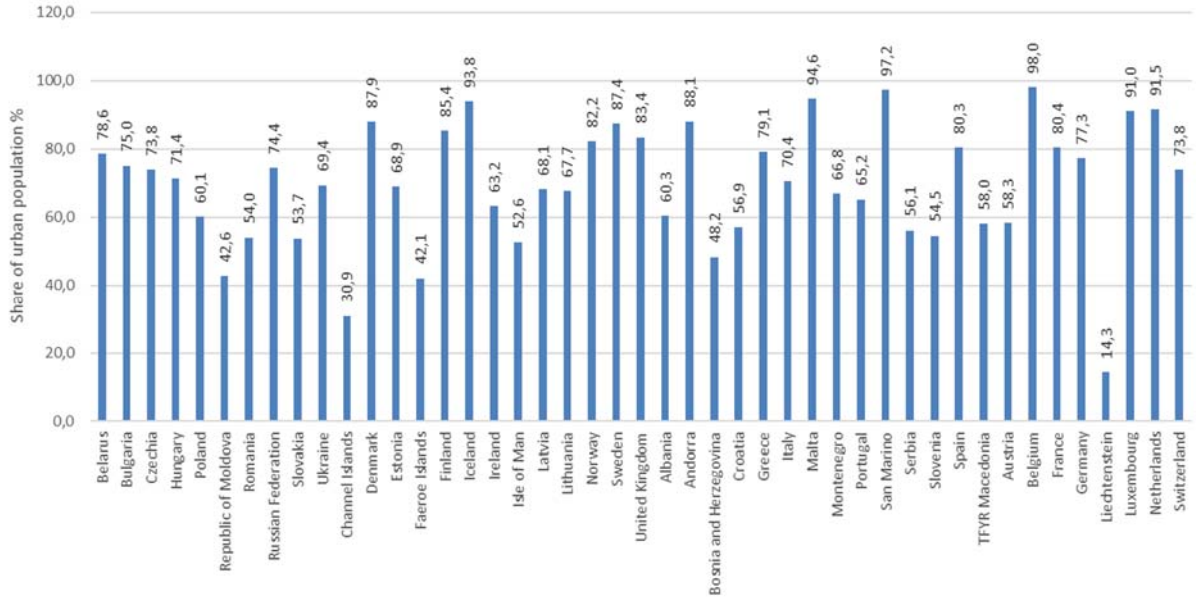

Figure 2 The state of urbanisation in Europe in 2018 [4]

Additionally, poor air quality remains a problem: in 2021, 10% of EU citizens were exposed to ozone and particulate matter PM10 levels above EU standards (Figure 3). This context demands a joint and comprehensive approach combining dialogue and partnerships which crosses sectors and governmental levels. CSUD presents a key opportunity for strengthening the resilience of these urban settings and avoiding a long-term negative impact on economic growth.

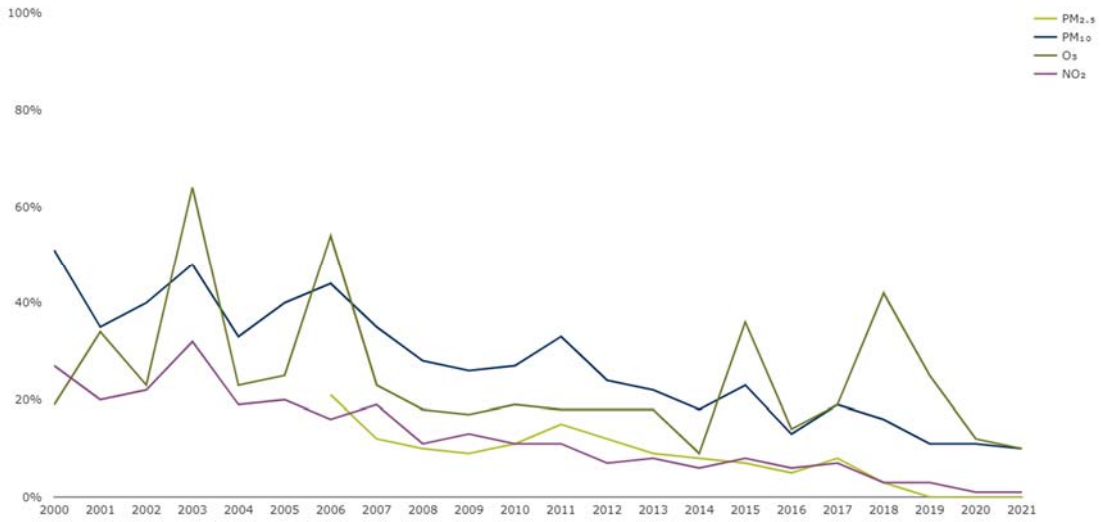

Figure 3 Urban population exposed to air pollutant concentrations above selected EU air quality standards, EU-27 [5]

This report explores the various innovative technological solutions that have been adopted in CSUD initiatives in these regions, highlighting legislative frameworks, best practices, and emerging trends. Through a comprehensive review of relevant legislations and a questionnaire (Annex 1), this report provides valuable insights into the role of innovative technological solutions in promoting CSUD and creating more sustainable, livable, and resilient urban environments throughout Europe.

1.1 The Status quo of CSUD Implementation in Europe: Opportunities and Challenges

A major challenge that Europe will be facing is the escalating level of urbanization to approximately 83.7% in 2050 [6]. Built-up areas are likely to expand by more than 3% between 2015 and 2030, reaching 7% of the EU territory by 2030 [7]. Additionally, the urban landscape of Europe is characterized with heterogeneity and its varying urban structure is a product of many underlying factors, including the historical development of settlements, their location and geographical characteristics, and their function and various political, demographic, and economic developments [8]. Other challenges faced by growing urban areas in Europe, including housing prices, traffic congestion, and urban flooding, as well as threats to sustainability due to urban sprawl, over-urbanization, and uncontrolled development, have become critical issues [9]. European and national policies and funding initiatives have been introduced to tackle these challenges, and cities are leading the way in their implementation. To further promote the uptake of smart city solutions, cities are investing in citizen skills and increasing awareness. Technological advancements in artificial intelligence (AI) and Internet of Things (IoT) are making smart city projects more efficient and appealing to European cities (European Comission, 2023). Furthermore, the EU recognizes the importance of accurate energy demand response, and technology-driven innovations can help achieve this goal.

All in all, the complex and interrelated challenges facing urban areas require a comprehensive and coordinated approach to sustainability, which is where the concept of Circular and Sustainable Urban Development (C&SUD) comes in. It aims to create more livable and resilient cities through the integration of economic, social, and environmental considerations into urban planning and development. Adopting a circular economy model, C&SUD can help cities reduce waste and pollution, promote resource efficiency, and create economic opportunities. Moreover, smart city solutions and technological innovations can enable more accurate monitoring and response to urban challenges, while also engaging citizens in the process (Elefteriu, 2023). Therefore, C&SUD has a crucial role to play in shaping the future of European cities and promoting sustainable development.

1.2 Ambitions and legislation at the European level for advancing CSUD

The European Union (EU) has set ambitious targets for mitigating the impacts of climate change and promoting sustainable development. As part of these efforts, the EU has set out different legislations and policies related to CSUD to promote more sustainable, healthier, and competitive urban areas, while also tackling climate challenges, Table 1.

EU has the 2050 long-term strategy where it aims to be climate-neutral by 2050 – an economy with net-zero greenhouse gas emissions. As part of the European Green Deal, the Commission proposed on 4 March 2020 the first European Climate Law to enshrine the 2050 climate-neutrality target into law.

Table 1 An overview of the European legislations and policies related to CSUD

EU legislation and policies	Objectives
The European Green Deal	It aims to make European cities sustainable and climate-neutral by 2030.
The Covenant of Mayors for Climate and Energy	It aims to support local and regional authorities to meet and exceed the EU's 2020 climate and energy targets.

Smart Cities Marketplace Formerly: European Innovation Partnership on Smart Cities and Communities (EIP-SCC)	It aims to serve as a hub for pivotal practical knowledge, capacity building support and facilitation of finance across areas such as sustainable urban mobility, districts and built environment, citizen focus and integrated infrastructures and processes in energy, information and communication technologies and transport.
The Urban Agenda for the EU	It aims to stimulate growth and innovation in EU cities and to tackle social challenges.
The EU's Urban Mobility Package	It aims at reducing greenhouse gas emissions from transport in urban areas and promoting sustainable modes of transport.
The EU's Circular Economy Action Plan (CEAP)	It aims to promote a circular economy in cities by reducing waste and increasing the use of renewable resources.
Energy performance of buildings directive	It promotes the integration of smart technologies in buildings to increase their energy performance and efficiency.
The Strategic energy technology plane (SET Plan)	It supports the most impactful technologies in the EU's transformation to a low-carbon energy system and fosters cooperation among EU countries, companies, and research institutions.
The energy union strategy (COM/2015/080)	It aims at setting out targets and actions to help provide secure, affordable, and clean energy for EU citizens and businesses.
Horizon Europe Mission on Climate-Neutral and Smart Cities: "100 climate-neutral cities by 2030"	It aims to promote system innovation across the value chain of city investment, targeting multiple sectors such as governance, transport, energy, construction, and recycling.
The EU Farm to Fork Strategy	It aims to make food systems fair, healthy, and environmentally friendly.
The proposal for a legislative framework for sustainable food systems (FSFS)	Its goal is to accelerate and make the transition to sustainable food systems easier. It will also have as its core objective the promotion of policy coherence at EU level and national level, mainstream sustainability in all food-related policies and strengthen the resilience of food systems.
The sustainability labelling framework	It will cover the provision of consumer information relating to the nutritional, climate, environmental and social aspects of food products.
Proposal for a revised Urban Wastewater Treatment Directive	The revision aims to: - Reduce pollution, energy use and greenhouse gas emissions, - Improve water quality by addressing remaining urban wastewater pollution, - Improve access to sanitation especially for the most vulnerable and marginalised, - Make industry pay to treat micro-pollutants, - Require EU countries to monitor pathogens in wastewater, - Lead to a more circular sector.
Water Framework Directive (WFD)	It aims at ensuring good qualitative and quantitative health.

The Basque Declaration is another example of European frameworks to promote sustainable cities and CSUD [10]. It provides a vision for sustainable, resilient, and low-carbon cities in Europe adopted in 2016. It emphasizes the importance of Climate Smart Urban Development (CSUD) for achieving sustainable urban development goals. CSUD aligns with the Basque Declaration's goals of reducing

greenhouse gas emissions, promoting resource efficiency, and fostering social inclusion. By implementing CSUD principles, European cities can make progress towards the vision set out in the Basque Declaration and create more sustainable and resilient urban environments for their citizens.

1.3 An overview of the best practices on CSUD in Europe

The smart transition is a reality across cities and communities of all sizes and latitudes and has been for decades [11]. In response to the current efforts and grand challenges, many European cities and regions are adopting new strategies and technologies to create more resilient, livable, and climate-smart urban environments [9]. The following provides an overview of some of the best practices on CSUD in Europe:

- Helsinki's climate change adaptation policies 2019–2025: Helsinki has developed a comprehensive Climate Change Adaptation Strategy that focuses on CSUD measures such as green roofs and walls, sustainable transport systems, and energy-efficient buildings. The strategy is implemented through the city's Master Plan and is supported by innovative financing mechanisms such as the Helsinki Energy Challenge.
- Copenhagen's 2025 Climate Plan: The city has a comprehensive Climate Adaptation Plan that includes initiatives to enhance green spaces, manage water resources, and promote energy-efficient buildings. Copenhagen is also a leader in sustainable urban mobility with its extensive network of bike lanes and the introduction of the first citywide bike-sharing system.
- Amsterdam Circular 2020-2025 Strategy: It aims to create a sustainable and circular economy by 2050. The strategy includes measures such as reducing waste and emissions, promoting sustainable production and consumption, and transitioning to renewable energy sources. The city also has ambitious targets for reducing CO2 emissions and increasing the share of renewable energy in its energy mix.
- Barcelona green infrastructure and biodiversity plan: A series of initiatives to enhance the city's resilience to climate change, including the development of a comprehensive Climate Plan and the creation of a network of green spaces and parks. The city has also launched an ambitious program to retrofit existing buildings with energy-efficient technologies and promote the use of renewable energy sources.
- Malmö's Energy strategy 2021-2030: Malmö has developed an ambitious Climate Strategy that focuses on sustainable urban development, energy efficiency, and the promotion of renewable energy sources. The city has implemented a range of innovative initiatives such as the construction of energy-efficient buildings, the development of a district heating system, and the promotion of sustainable transport systems.
- More success stories across EU here.

1.4 An overview of the trends in Europe related to CSUD

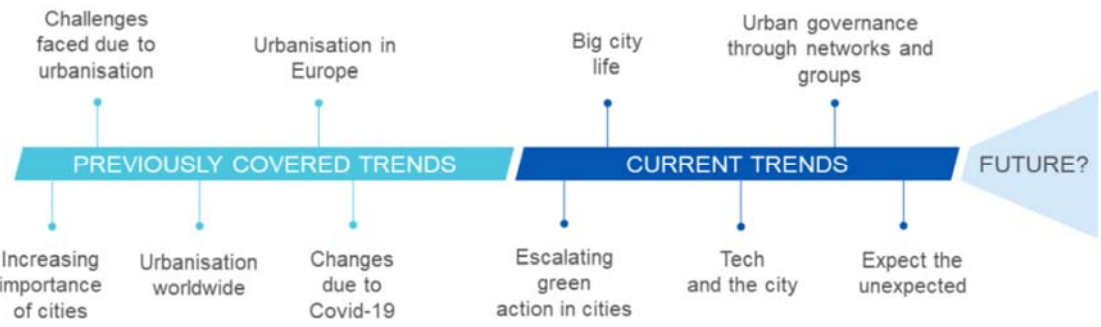

Figure 1. Fig 4. The timeline of trends in Europe related to CSUD [12]

Under the current urban paradigm, cities consume more resources than they produce. Changing this trend by optimizing 'urban metabolism' means actively involving citizens, completely redesigning products, relocating production and rethinking urban spaces. Therefore, the following emerging trends related to CSUD are seen:

- Urban resilience as a new normal

European cities are no exception to the need for increased resilience as they recover from the COVID-19 crisis. With the added challenges of the Russian invasion of Ukraine and climate change, it is more important than ever for cities in Europe to address long-standing inequalities in access to essential services. The pandemic has exposed vulnerabilities in healthcare, transport, affordable housing, energy, and income, which need to be addressed through long-term planning and preparedness for possible emergencies and unexpected events. To achieve this, European cities must improve crisis management and resilience plans and prioritize citizen training to handle emergency situations. By doing so, cities can better respond to future crises and ensure the well-being of their citizens.

- Techno-oriented urbanization

As European urban areas strive to improve their services and interact better with citizens, new and emerging technologies are becoming increasingly important. Digitalization, in particular, is seen as a critical tool in improving the efficiency and responsiveness of cities in relation to mobility, health, sustainability, citizen engagement, and city management. With a shift towards more citizen-centered, participatory approaches, there is a greater focus on the needs and empowerment of local populations. However, the implementation of these technologies raises important issues such as data privacy, ownership, sharing and standards, cybersecurity, and system redundancy and resilience. Therefore, collaboration between relevant stakeholders such as business, academia, citizens, NGOs, and local and national governments is critical for creating inclusive, safe, resilient, and sustainable cities that leave no one behind. Without appropriate accessibility and upskilling, the increasing use of digital technology could widen the digital divide and lead to further exclusion and social discontent. Therefore, it is essential to ensure that advanced technologies such as artificial intelligence, blockchain, and the Internet of Things (IoT) are optimized for urban systems and processes in a responsible and equitable manner. Moreover, the majority of European local governments will have transformed all their public services into digital formats by 2030, with a focus on user-friendly design principles such as clear and straightforward websites [9].

- Green infrastructure and actions

European urban areas are actively prioritizing the development of green infrastructure to address the growing threat of climate change. Urban activities contribute significantly to greenhouse gas emissions, and cities are taking the lead to counteract this by developing green roofs and walls, urban forests, and parks. The aim is to enhance biodiversity, reduce urban heat island effects, and mitigate flood risks [13]. To achieve this, many cities are working towards the United Nations' Sustainable Development Goals (SDGs), and local communities are actively involved in co-designing public spaces and regenerating biodiversity and ecosystem services [14]. However, the move towards carbon-neutral cities also poses a risk of 'greenwashing', with private investors focusing on richer areas of cities. To ensure equitable access to green urban spaces, city governments are increasingly called upon to justify the effectiveness of public actions and reflect on the value of urban spaces for collective interests. Creating green jobs is also gaining momentum in the labor market as a key infrastructure for CSUD [15].

- The Citizen's city

The promotion of citizen participation and co-creation in urban planning is becoming an increasingly important trend in European cities. The goal is to involve citizens in the decision-making processes related to urban planning and to give them a voice in the shaping of their cities. Citizen participation and co-creation not only improve the quality of urban planning by bringing diverse perspectives to the table, but also help to build trust between citizens and their local governments. This can lead to more sustainable and inclusive urban development that reflects the needs and aspirations of the local population.

Digital citizen participation is also a trend that can be recognized within the key trend that contributes/creates a deliberative and participatory democratic space, in the development of the smart city [16]. An example of this trend is digital consultation to guide the municipal practitioners into comprehensive plans.

- A circular future

The transition to a circular economy is a growing trend in the field of CSUD as it largely depends on the actions taken by cities [17]. Urban areas possess crucial competencies that can drive resource efficiency and circularity, such as waste management and recycling, urban transport, water supply and sanitation, and land use planning. These services are typically managed by local authorities, and it is important to align subnational and national initiatives to promote resource efficiency and advance towards a circular economy.

Additionally, sewage treatment can also play a vital role in the circular economy [18]. Through the recovery of nutrients and organic matter from wastewater, sewage treatment can support the production of new products such as biofuels, bioplastics, and fertilizers, contributing to the development of a more circular and sustainable economy. The use of treated sewage sludge as a soil amendment can also help to improve soil health and fertility, reducing the need for synthetic fertilizers and closing the nutrient loop. Overall, sewage treatment is not only essential for providing clean water but also offers opportunities for resource recovery and a more circular economy.

- The 'renovation wave'

The renovation of existing EU buildings to increase energy efficiency is crucial in achieving a climate-neutral EU by 2050. Integrating circular economy principles in building renovation can further reduce the use of materials and emissions embedded in building materials. Adopting circular economy-based approaches can also help reduce greenhouse gas emissions by avoiding or delaying the use of new materials in buildings. Extending the lifespan of existing buildings and increasing their intensity of use are effective ways to reduce the demand for new construction, which has a larger carbon footprint than renovating existing buildings. Circular renovation strategies can significantly reduce greenhouse gas emissions between 2022 and 2050 and make a substantial contribution to achieving climate neutrality.

- Smart energy

The urgency to transition to a more sustainable future has put cities under pressure to invest in clean energy and become more resilient. To meet these demands, European urban areas are embracing sustainable and ethical materials, environment-friendly designs, and renewable-powered systems, all while utilizing digital technologies to optimize resource usage [9]. This shift towards clean energy and sustainable practices not only promotes resilience but also drives the adoption of circular economy principles, where resources are used efficiently, and waste is minimized. By embracing these innovations, cities are setting the stage for more livable, resilient, and circular urban environments.

2. An overview of the questionnaire findings

2.1 Intelligent transport solutions for freight and passenger transport

2.1.1 Ambitions and legislation

The EU is committed to promoting the deployment of intelligent transport solutions for both freight and passenger transport, in order to improve efficiency, safety, and sustainability. Therefore, The European Union has implemented several legislative and policy initiatives to promote intelligent transport solutions (ITS) for both freight and passenger transport. Table 2 presents an overview of the European legislative frameworks in this area.

Table 2 An overview of the European legislations

EU legislation and policies	Objectives
Intelligent Transport Systems Directive (2010/40/EU)	This directive provides a framework for the deployment of ITS in road transport and other modes of transport, including freight and passenger transport. It establishes a European Electronic Toll Service, which allows for the collection of tolls electronically, and also sets out requirements for the provision of real-time traffic information and the use of intelligent transport systems to improve transport efficiency and safety.
Connecting Europe Facility (CEF)	The CEF is a funding program that supports the deployment of ITS in transport, among other areas. It has provided funding for projects such as the development of a European Multi-Modal Journey Planner and the deployment of intelligent transport systems for truck platooning.
Clean Vehicle Directive (2019/1161)	This directive sets out CO2 emission targets for new vehicles, including freight and passenger transport, and encourages the use of low-emission and zero-emission vehicles. It also includes provisions for the deployment of intelligent transport systems to improve vehicle efficiency and reduce emissions.
The European Green Deal	The European Green Deal sets out the EU's vision for a climate-neutral economy by 2050. It includes a focus on sustainable and intelligent transport, with initiatives such as the revision of the Alternative Fuels Infrastructure Directive to support the deployment of alternative fuels and the promotion of smart mobility solutions.
European Truck Platooning Challenge	The European Truck Platooning Challenge was a demonstration project that showcased the potential of truck platooning, which involves a convoy of trucks driving in close formation and communicating with each other through ITS. The project involved collaboration between the EU, Member States, and the private sector, and helped to promote the deployment of this technology on European roads.

In addition to the efforts at the European level, each member state of the EU has its own national legislative frameworks in place to address the issues in this area. These frameworks may complement or build upon the EU-level initiatives and can be tailored to the specific needs and circumstances of each member state.

For example, in Croatia there is Transport Development Strategy of the Republic of Croatia (2017–2030).

In Spain, there is a public consultation, prior to the Sustainable Mobility and Transport Financing Act. The deadline for contributions is 15th November, 2023. Also the following legislative documents:

- Directive 2010/40/EU
- The Royal Decree 662/2012
- The "Safe, Sustainable and Connected Mobility Strategy 2030"

2.1.2 Implementation strategies and general practices

The National Road Traffic Safety Program in Croatia is recognized as a state organization and authority responsible in coordination/implementation of the legislations. Additionally, the Faculty of Transport and Traffic Engineering at University of Zagreb is an example of public institutions that support General public based initiatives to monitor implementation of the laws in Croatia.

In relation to practices in Croatia, Zvonimir Nevisti provided the following: A management model based on the ANFIS methodology and real time measurement of the values of the selected parameters of the traffic flow would be developed. In addition, some external factors (time of day, weather conditions, etc.) affecting traffic safety would also be included. This approach is important for improving existing algorithms for managing variable traffic signs on highways.

In Spain, the competences in the field of Intelligent Transport Systems (ITS) and New Technologies (NNTT) applicable to transport are shared, between the following agencies of the Ministry of Transport, Mobility and Urban Agenda: The General Directorate of Land Transport (Sub-Directorate-General for Management, Analysis and Innovation), the Directorate-General for Roads (Sub-Directorate-General for Network Operation and Management), the Transport Studies and Technology Division, and the Deputy Directorate-General for Information Technology and e-Government. All of the foregoing without prejudice to the competence of the Ministry of the Interior (Directorate-General for Traffic-DGT) in this area, reason why both Ministries have been maintaining the relevant contacts.

As for the non-governmental/general public based initiatives to monitor implementation in Spain, there are:

- The Digital governance and government interoperability
- The Strategic subsidies plan 2022-2024
- Spain 2050: Fundamentals and proposals for a long-term national strategy

Regarding the general practices in Spain, there are:

- SIRDE: Shipment Data Recording Information System, system for the improvement of the management of road passenger transport concessions within the competence of the General State Administration.
- Secure parking for trucks: The http://www.eu-parking.eu website has been created, which already contains several truck-safe car parks listed with the new European standard. On this website the instructions for registering new truck safe car parks can be found.

The following products are still under development in Spain:

Within intermodal passenger management and services, the national access point (NAP) is a service required by the European Commission for the provision of multimodal travel information services in the European Union (EU). MITMA collects transport data and then makes it available to any interested party, encouraging the creation of new applications, platforms, and services for the user. All information on routes and regular passenger transport schedules for medium and long distances will be available for all modes of transport within their competence, including rail and regular road transport routes.

Initiatives are being supported for the creation of the "Multimodal integrated tickets", Systems based on account and impulse the implementation of the "Spanish card without contact" for the subscription of public transport with technologies such as Quick Response Code (QR) and Near Field Communication (NFC). In addition, the so-called "Last Mile" will be incorporated into the integrated ticket sales. Metropolitan areas have already introduced integrated transport titles through consortia. The formalization of agreements between the main interurban transport operators and the Consortia or Metropolitan Transport Authorities (ATM) will be promoted, for the incorporation in the purchase of the long-distance ticket of a metropolitan transport title. Here is the access to datasets: https://nap.mitma.es/

Spanish Contactless Card (TESC): The TESC Project (Spanish Contactless Card) is a tool for Interoperability in Mobility and especially in Public Transport. The term 'card' refers to the hardware, although it does not have to be a card itself. The communication standard is shared between several devices, such as mobile phones, smartwatches, wearables (devices capable of supporting application computing) and of course cards and terminals. In particular, for payment with the mobile phone there are several alternatives via App (computer application), using the NFC, by generating a QR code, with EMV card or with computer applications developed. The technical specifications can be found here.

Alternative energy sources for transport: Information has been collected on zero- or low-emission vehicles (alternative fuels and propulsion systems with batteries or hydrogen), specifying buses, as well as a brief reference to emissions regulations. In the case of Spain, the objective is to reduce its GHG emissions from diffuse sectors, such as transport, by 26% from 2020 to 2030. The Euro6 regulation was launched on 1 November 2015 with the aim of making all new vehicles sold in Europe reduce emissions of pollutants and particulates in suspension, that is, to be cleaner. With regard to Euro5, it reduces nitrogen oxide emissions from diesel engines from 180 mg/km to 80 mg/km. Two methodologies, ECOTRAM and LIFE GySTRA, have been included on the measurement and recording of bus emissions. Report on alternative energy sources for transport can be found here.

Regarding the R&D and innovative projects in Spain in this category:

- Digiziti project: Among the objectives of this innovative project is the implementation of a zero-emissions city model, give a boost to sustainable mobility and encourage public transport versus private as the best solution for the care of our cities and the environment. Video about the project: https://youtu.be/vPaGnJsC4RU
- ChainGo: It aims to revolutionize logistics through blockchain technology, especially focused on maritime freight transport. This intelligent transport system allows the CRTM to make real-time decisions, adjust supply to existing demand and be more efficient, which translates into more efficient, less-emitting and more sustainable transport. More info: https://chaingotech.com/

2.1.3 Emerging trends

In case of Spain, the national trends are included in the Integrated National Energy and Climate Plan (PNIEC) 2021- 2030, dealing with:

- Cleaner and more sustainable transport
- Greater efficiency in last mile deliveries
- Artificial intelligence as a safety tool
- Millions of vehicles
- New Vehicle-to-Infrastructure (V2I) solutions

2.2 Innovative surveillance concepts for air and water quality surveillance

2.2.1 Ambitions and legislation

The EU is committed to promoting the use of innovative monitoring technologies and data analysis methods to improve air and water quality surveillance. These initiatives aim to provide more comprehensive and accurate data on environmental conditions, which can be used to inform policy decisions and support efforts to protect the environment and public health. Table 3 presents an overview of the European legislative frameworks in this area.

Table 3 An overview of the European legislations

EU legislation and policies	Objectives
Directive on ambient air quality and cleaner air for Europe (2008/50/EC)	This directive sets out the EU's air quality standards and establishes requirements for monitoring and reporting on air quality. It also promotes the use of innovative monitoring technologies, such as low-cost sensors and mobile monitoring units, to supplement traditional monitoring methods.
Water Framework Directive (WFD) (2000/60/EC)	The Water Framework Directive establishes a framework for the protection of water resources, including the monitoring of water quality. It encourages the use of innovative monitoring technologies, such as remote sensing and unmanned aerial vehicles (UAVs), to supplement traditional monitoring methods.
Copernicus programme	The Copernicus programme is a European Earth Observation Programme that provides data on the environment, including air and water quality, through a network of satellites and ground-based sensors. The programme promotes the use of innovative monitoring technologies and data analysis methods to improve environmental monitoring.
Horizon 2020	Horizon 2020 is the EU's research and innovation funding programme, which includes funding for projects related to air and water quality surveillance. It supports research on innovative monitoring technologies, such as low-cost sensors and autonomous monitoring systems, and encourages the development of new data analysis methods.
LIFE programme	The LIFE programme is the EU's funding programme for environmental and climate action projects, which includes funding for projects related to air and water quality surveillance. It supports the development and implementation of innovative monitoring technologies and promotes the use of data-driven approaches to environmental management.

In addition to the efforts at the European level, each member state of the EU has its own national legislative frameworks in place to address the issues in this area. These frameworks may complement or build upon the EU-level initiatives and can be tailored to the specific needs and circumstances of each member state.

As examples at a national level, there are relevant documents in Spain, Law 34/2007 on air quality and protection of the atmosphere and Royal Decree 102/2011 on the improvement of air quality, and in Croatia - Air quality in the Republic of Croatia.

2.2.2 Implementation strategies and general practices

In Spain, the implementation in this area is shared among the following State organizations and authorities: Regional and local air quality networks, and the Autonomous communities and Local authorities. At present, the ambient air quality monitoring networks in Spain have more than 600 fixed measuring stations, distributed throughout Spain. The number of analyzers exceeds 4,000. Also, the Ministry manages, through the State Meteorological Agency, the EMEP/VAG/CAMP network.

Examples of the non-governmental/general public based initiatives to monitor implementation are AEMET, CIEMAT, Ecologistas en acción, Greenpeace and Aquae Foundation.

Regarding the general practices in Spain, there are:

Cartometrics: Firm oriented to water and wastewater infrastructure management, which can be applied in public and private facilities, municipalities or large industries. It has developed a platform based on satellite and machine learning. The platform also uses statistical data on consumption patterns, detecting possible fraud in the use of water, among others.

Aquaradar: Water quality monitoring technologies that can be applied in public and private infrastructures, municipalities, industries and water agencies or authorities. In this area, it is an early warning system for sustainable water management, which generates data through sensors and external sources, collects all the information in your cloud and transforms it into useful information for decision making.

In Croatia, the Ministry of Economy and Sustainable Development is responsible for the implementation in this area.

2.2.3 Emerging trends

In Spain there is The Environmental Incentive Plan for Adaptation to Climate Change in Spain (PIMA Adapta) - an initiative launched by MAPAMA in March 2015 with the aim of launching, on a pioneering basis and with a vocation for continuity over time, specific projects for adaptation to climate change. PIMA Adapta is part of the National Plan for Adaptation to Climate Change (PNACC) and includes actions in the areas of coasts, the public water domain, and National Parks.

River nature reserve (RNF) management and adaptation measures are also implementing.

2.3 Innovative/intelligent water supply – treatment and distribution

2.3.1 Ambitions and legislation

The European initiatives aim to improve the quality and sustainability of water resources and support efforts to address the challenges of water scarcity and climate change. Therefore, The European Union has implemented several legislative and policy initiatives to promote innovative and intelligent water supply, treatment, and distribution. Table 4 presents an overview of the European legislative frameworks in this area.

Table 4 An overview of the European legislations

EU legislation and policies	Objectives
Drinking Water Directive (2020/2184/EU)	This directive updates and strengthens the EU's drinking water quality standards and promotes the use of innovative treatment technologies to ensure the safety and quality of drinking water. It also encourages the use of intelligent water supply systems to optimize water use and reduce waste
Urban Wastewater Treatment Directive (91/271/EEC)	This directive establishes minimum standards for the treatment of urban wastewater and encourages the use of innovative treatment technologies to improve water quality. It also promotes the use of water reuse systems to support sustainable water management.
Horizon 2020	Horizon 2020 is the EU's research and innovation funding programme, which includes funding for projects related to this area
European Innovation Partnership on Water	The European Innovation Partnership on Water is a platform that brings together stakeholders from across the water sector to promote innovation and collaboration. It supports the development and deployment of innovative water technologies and encourages the adoption of smart water management practices.
Water Framework Directive (WFD) (2000/60/EC)	The Water Framework Directive establishes a framework for the protection of water resources, including the management of water supply, treatment, and distribution. It encourages the use of innovative technologies and practices to support sustainable water management and promote the efficient use of water resources.

In addition to the efforts at the European level, each member state of the EU has its own national legislative frameworks in place to address the issues in this area. In case of Norway, there are following legislation documents:

- National goals for water and health under UNECE
- Sector goals set forth by Norsk Vann
- "Drikkevannsforskriften" with guidelines

2.3.2 Implementation strategies and general practices

In Norway, the implementation in this area is shared among the following State organizations and authorities: Matillsynet, Folkehelseinstituttet, Helse og omsorgsdepartementet:, Landbruks-og matdepartementet, while Norsk Vann (advocacy organisation for water sector) is an example of non-governmental/general public based initiatives to monitor implementation.

2.3.3 Emerging trends

As an emerging trend, focusing on online monitoring of the distribution system (hydraulics and water quality) is present in Norway.

2.4 Innovative/intelligent wastewater collection and treatment, including resource recovery and reuse.

2.4.1 Ambitions and legislation

The European Union has implemented several legislative and policy initiatives to promote innovative and intelligent wastewater collection and treatment, including resource recovery and reuse. Table 5 presents an overview of the European legislative frameworks in this area.

Table 5 An overview of the European legislations.

EU legislation and policies	Objectives
Urban Wastewater Treatment Directive (91/271/EEC)	This directive establishes minimum standards for the treatment of urban wastewater and encourages the use of innovative treatment technologies to improve water quality. It also promotes the recovery of resources, such as energy and nutrients, from wastewater and encourages the reuse of treated wastewater for irrigation and other non-potable uses.
The EU's Circular Economy Action Plan (CEAP)	The Circular Economy Action Plan is a comprehensive strategy for promoting a circular economy in the EU, including in the water sector. It supports the recovery and reuse of resources from wastewater, such as phosphorus and nitrogen, and encourages the development and deployment of innovative treatment technologies.

Germany, as well as each other member state of the EU, has its own national legislative frameworks in place to address the issues in this area, such are:

- The National Water Strategy for Germany 2023;
- The Federal law is the Federal Water Act (Wasserhaushaltsgesetz - WHG, in German);
- The Wastewater ordinance that regulates pollutants in the use of sewage sludge for fertilising agricultural soils;
- State water acts.

2.4.2 Implementation strategies and general practices

In Germany, the Federal environmental agency is recognized as the state authority responsible in coordination/implementation of the legislations, while the German Association for Water, Wastewater and Waste (DWA) is non-governmental body to monitor implementation.

The following practices are followed in Germany in this regard:

- 97 % of the population is connected to central WWTPS via sewer system, the rest has decentralized (on-plot) small scale treatment units;
- removal of nutrients (nitrogen, phosphorus), mostly by biological treatment;
- energy efficiency of WWTPs.

The following solutions are still under development:

- Flood control and management,
- Removal of micro-pollutants,
- German action plan,
- P-removal from wastewater and reuse,
- Reuse of treated wastewater,
- Greywater treatment with reuse purposes,
- Heat transfer from wastewater for use,
- New treatment technologies (e.g. Nereda, Anamox),
- AI in wastewater treatment,
- Forecast of pandemics by monitoring of wastewater (e.g. Covid-19).

However, there are some emerging trends in EU member states, such are the following (in Germany):

- Ban of agricultural use of sludge from WWTP (from 2029),
- P-recycling for WWTP > 50.000 p.e. (from 2029/32),
- Strategies for wastewater reuse.

2.5 Storm-water and flash floods management – Blue Green solutions

2.5.1 Ambitions and legislation

The European Union has implemented several legislative and policy initiatives to promote innovative storm-water and flash floods management, including the use of blue-green solutions. Table 6 presents an overview of the European legislative frameworks in this area.

Table 6 An overview of the European legislations.

EU legislation and policies	Objectives
Floods Directive (2007/60/EC)	The Floods Directive establishes a framework for the assessment and management of flood risks, including from flash floods. It promotes the use of nature-based solutions, such as blue-green infrastructure, to manage flood risks and improve water quality.
Urban Water Agenda 2030	The Urban Water Agenda 2030 is a framework for promoting sustainable and resilient urban water management in the EU. It supports the use of blue-green solutions, such as green roofs and permeable pavements, to manage stormwater and reduce flood risks.
Green Infrastructure Strategy	The EU's Green Infrastructure Strategy promotes the use of nature-based solutions, such as green roofs, rain gardens, and wetlands, to address a range of environmental challenges, including stormwater and flood management. It encourages the development of blue-green infrastructure networks to improve ecological connectivity and support ecosystem services.
Urban Agenda for the EU	The Urban Agenda for the EU is a partnership between the EU, member states, and cities to promote sustainable urban development. It supports the use of blue-green solutions, such as urban forests and green corridors, to manage stormwater and enhance urban resilience.

In addition to the efforts at the European level, each member state of the EU has its own national legislative frameworks in place to address the issues in this area. Table 7 presents an overview of the national legislations from the findings of the questionnaire.

Table 7 Examples of the national legislations.

Country	Legislation and national framework
Spain	- Water Law: Royal Legislative Decree 1/2001 - Coastal Law: RD 876/2014 - Regulation of the Public Hydraulic Domain: RD 849/1986 - Flood risk assessment and management: RD 903/2010 - National Hydrological Plan: Law 10/2001 - Discharges: Royal Legislative Decree 1/2001 - Civil Protection: Law 17/2015 - Protection Plan against the risk of flooding and Resolution of January 31, 1995 - Land Law: Royal Legislative Decree 7/2015 - Hydrological plans and flood risk management plans of the demarcations: RD 701/2015
Austria	- Booklet on Flood Risk Management in Austria - Implementation of EU Floods Directive in Austrian Federal Water Rights Act - Preliminary flood risk assessment & Definition of areas with potential significant flood risks.

2.5.2 Implementation Strategies and general practices

In Spain, the following are recognized as the state organizations and authorities responsible in coordination/implementation of the legislations: The National Water Council (Consejo Nacional del Agua, CNA). As for the non-governmental/general public based initiatives to monitor implementation in Spain, there are: Green blue urban and WWF.

Regarding the practices, the following solutions are already taking place: Arlita, Nefusa, Nofloods, while the following are under development, considering urban resilience to flood risk:

- Fraga (Huesca),
- Hospital-residence in Cuenca,
- Cebolla City Council (Toledo),
- Los Alcázares City Hall (Murcia),
- Antonio Menárguez Costa Secondary School (Los Alcázares, Murcia),
- Typologies of single-family housing (Los Alcázares, Murcia),
- Multipurpose Building of the Polytechnic School of Engineering of Gijón (Gijón, Spain),
- Monastery of Santa María de Huerta (Soria, Spain),
- Marrón Industrial Park (Ampuero, Cantabria),
- Adarraga Sports Complex (Logroño, Logroño).

New, emerging trends in Spain are represented by the following initiatives:

- The implementation of sustainable drainage systems.
- Green Blue Urban's storm water management solutions.

2.6 Intelligent (household) solid waste management

2.6.1 Ambitions and legislation

The European Union has implemented several legislative and policy initiatives to promote intelligent household solid waste management to improve the sustainability and resource efficiency of waste management and support efforts to address the challenges of resource depletion and climate change. Table 8 presents an overview of the European legislative frameworks in this area.

Table 8 An overview of the European legislations.

EU legislation and policies	Objectives
Water Framework Directive (WFD) (2000/60/EC)	The Waste Framework Directive establishes a framework for waste management in the EU, including for household solid waste. It encourages the use of intelligent waste management practices, such as waste prevention, reuse, and recycling, and supports the development of innovative waste management technologies.
A zero-waste hierarchy for Europe	The European Waste Hierarchy is a prioritization framework for waste management, with a focus on waste prevention and resource efficiency. It encourages the use of intelligent waste management practices, such as waste prevention, reuse, and recycling, and supports the development of innovative waste management technologies.

At a national level, there are also relevant examples of legislations. In Spain, such is: Law 7/2022 of 8 April on contaminated waste and soils for a circular economy.

2.6.2 Implementation strategies and n practices

In Spain, the following are recognized as the state organizations and authorities responsible in coordination/implementation of the legislations:

- National Institute of Statistics Waste Spanish Composting Network Foundation for the Circular Economy,
- Technical Association for Waste Management, Urban Waste Management and the Environment Business Association Valorization R.S. U (AEVERSU),
- Association of Waste and Special Resources Management Companies,
- National Association of Pulp Manufacturers,
- Spanish Association of Paper and Cardboard Recyclers,
- National Association of Glass Container Manufacturers,
- Spanish Federation of Plastic Transformers and Handlers,
- Spanish Association of Plastic Industrialists,
- Spanish Institute of Plastic Technology,
- Entity for the Recycling of Plastic Waste in Spain,
- Spanish Confederation of Metal Business Organizations,
- Spanish Association of Aluminum Recycling,
- Spanish Association of Battery Collectors,
- Spanish Federation of Recovery and Recycling (FER),
- Spanish Association of Social and Solidarity.

As for the non-governmental/general public based initiatives to monitor implementation in Spain, there are:

- Ecoembes,
- ACA Ambientales,
- APIA,
- Ecovidrio,
- Sogama,
- Fundación Economía circular.

Regarding the practices, still the following solutions are under development:

- Novobin,
- Marmosl,
- Pire2030,
- T-tres-en-R,
- Circularlab,
- URBANREC,
- Ecolec.

There are also new emerging trends in Spain regarding textile industry - one of the most polluting branches of industry. The use of organic waste to produce agricultural fertilizer or compost became another trend that marked recycling in 2022. Besides that, recycling is a new trend in decoration.

2.7 Sustainable food supply

2.7.1 Ambitions and legislation

The European Union has implemented several legislative and policy initiatives to promote a sustainable food supply. Table 9 presents an overview of the European legislative frameworks in this area.

Table 9 An overview of the European legislations.

EU legislation and policies	Objectives
Common Agricultural Policy (CAP) CAP 2023-27	The Common Agricultural Policy 2023 is the EU's main policy for supporting agriculture and rural development. It includes measures to promote sustainable agriculture practices, such as crop diversification, agroforestry, and integrated pest management, and supports the development of sustainable food supply chains.
The EU Farm to Fork Strategy	The Farm to Fork Strategy is a comprehensive strategy for promoting a sustainable food system in the EU. It includes measures to reduce the environmental impact of food production and consumption, improve the health and nutrition of EU citizens, and ensure the resilience of food supply chains.
Organic Farming Regulation (EU) 2018/848	The Organic Farming Regulation establishes rules for organic farming in the EU. It promotes sustainable agriculture practices, such as soil management, crop rotation, and the use of organic fertilizers, and supports the development of sustainable food supply chains.

Sustainable Consumption and Production Action Plan	The Sustainable Consumption and Production Action Plan is a strategy for promoting sustainable consumption and production in the EU. It includes measures to reduce food waste, promote sustainable food choices, and improve the sustainability of food supply chains.
Horizon 2020	It supports research on sustainable agriculture practices, sustainable food processing technologies, and sustainable food supply chains.

In Spain, there is the Law 16/2021 on measures to improve the functioning of the food chain.

2.7.2 Implementation strategies and general practices

The State organizations and authorities responsible in coordination/implementation of the legislations in Spain are:

- The European Innovation Partnership on agricultural productivity and sustainability (EIP-Agri)
- National rural development Programs
- AESAN

As for the non-governmental/general public based initiatives to monitor implementation in Spain, they are: Anthesis, Engie, CESFAC, ASEDAS.

Still the following solutions are under development: Helpfood, and Prosciutto di Parma, while the new trends are emerging regarding the following topics:

- Sustainability and certified surface,
- Regenerative agriculture,
- Recycled foods,
- Foods of vegetable origin,
- Climate neutral foods,
- Plastic footprint,
- Approach to biodiversity,
- Commercial developments.

2.8 Natural disaster risk management

2.8.1 Ambitions and legislation

The European Union has implemented several legislative and policy initiatives to manage natural disaster risks. Table 10 presents an overview of the European legislative frameworks in this area.

Table 10 An overview of the European legislations.

EU legislation and policies	Objectives
Civil Protection Mechanism	The EU Civil Protection Mechanism is a system for coordinating assistance in the event of natural disasters, both within the EU and with other countries. It facilitates the exchange of information, resources, and expertise, and supports the deployment of emergency response teams.

Floods Directive (2007/60/EC)	The Floods Directive establishes a framework for managing flood risks in the EU. It requires member states to identify flood-prone areas, develop flood risk management plans, and take measures to reduce flood risks.
Forest Fire Prevention and Management	The EU has developed a comprehensive strategy for preventing and managing forest fires, which includes measures to reduce the risk of fires through forest management practices, increase awareness of fire risks, and improve the coordination of emergency response.
European Disaster Risk Management	The EU Disaster Risk Reduction Strategy is a comprehensive strategy for managing disaster risks in the EU. It includes measures to strengthen disaster risk assessment and early warning systems, improve disaster preparedness and response, and promote disaster risk reduction in the EU and globally.
Copernicus Emergency Management Service	The Copernicus Emergency Management Service is a tool for providing real-time information and support during natural disasters. It includes satellite imagery, mapping, and other data sources to support emergency response and recovery efforts.

In addition to the efforts at the European level, each member state of the EU has its own national legislative frameworks in place to address the issues in this area. For example, Spain has its Law 17/2015 of 9 July on the National Civil Protection System.

Serbia, as a third country associated to the Programme, also has its national framework:

- Action plan for the implementation of the national disaster risk management programme (2016-2020),
- National action plan for the mitigation of the consequences of drought and land degradation,
- National disaster risk management program,
- National strategy for protection and rescue in emergency situations,
- Law on waters,
- The law on meteorological and hydrological activity,
- Law on reconstruction following natural and other hazards,
- Law on disasters risk reduction and management in emergency situations,
- Law on emergency situations.

2.8.2 Implementation Strategies and general practices

The State organizations and authorities responsible in coordination/implementation of the legislations in Spain are: UME, Civil Protection, National Emergency Protection, while Acción contra el hambre and Risk Management Organization are examples of non-governmental/general public based initiatives to monitor implementation of this area.

As emerging trends in Spain, the following are present:

- Barometer for national disasters,
- Early alert systems.

In Serbia, the State organizations and authorities responsible in coordination/implementation of the legislations are:

- The Ministry of Agriculture, Forestry and Water Management,
- The Ministry of Environmental Protection,

- The Ministry of Interior,
- The Republic Hydrometeorological Service of Serbia,
- Serbian Waters,
- Environmental Protection Agency.

Examples of non-governmental /general public based initiatives to monitor implementation of this area in Serbia are:

- Serbia Green Building Council, and
- Civilna zaštita.

The following are emerging trends in Serbia:

- Sustainable development,
- Constant development and update of early warning system, plans and strategies for natural disasters protection,
- Development of proactive risk-based approaches for preparedness on natural disasters,
- Adaptation on climate changes,
- Ensuring and protecting water resources,
- Reduction of air and water quality, and
- Improving the quality of the environment.

2.9 Innovative energy production and user management

2.9.1 Ambitions and legislation

The European initiatives aim to reduce the environmental impact of energy production and consumption, increase the security and reliability of the EU's energy supply, and support the transition to a low-carbon economy. Table 11 presents an overview of the European legislative frameworks in this area.

Table 11 An overview of the European legislations.

EU legislation and policies	Objectives
Renewable Energy Directive (EU) 2018/2001	The Renewable Energy Directive establishes targets for increasing the share of renewable energy in the EU's energy mix. It also includes measures to promote the deployment of innovative renewable energy technologies, such as offshore wind and advanced biofuels.
Energy Efficiency Directive (2012/27/EU)	The Energy Efficiency Directive establishes targets for improving energy efficiency in the EU. It includes measures to promote the deployment of innovative energy efficiency technologies, such as smart grids, energy storage, and energy-efficient buildings.
Clean Energy for All Europeans Package	The Clean Energy for All Europeans Package is a comprehensive package of legislative measures aimed at promoting the deployment of clean energy technologies in the EU. It includes measures to support the development of innovative renewable energy technologies, improve the energy efficiency of buildings, and promote the deployment of smart energy systems.
European Smart Grids Task Force	The European Smart Grids Task Force is a platform for promoting the deployment of smart grid technologies in the EU. It supports the development of standards and interoperability frameworks and

	promotes the exchange of best practices and knowledge-sharing among stakeholders.
European Energy Union	The European Energy Union is a strategy for ensuring a secure, sustainable, and affordable energy supply in the EU. It promotes the use of innovative technologies and approaches to energy production and management and supports the integration of renewable energy sources into the EU's energy system.

An example of Serbian legislation and national framework:

- Amendments to the Law on Energy,
- Law on Energy Efficiency and Rational Use of Energy,
- Law on the Use of Renewable Energy Sources,
- Amendments to the Law on Mining and Geological Research,
- The Law on energy.

2.9.2 Implementation strategies and general practices

In Serbia, the State organizations and authorities responsible in coordination/implementation of the legislations are:

- Ministry of Mining and Energy,
- The Department for Green Energy,
- The Section for Legal and Economic Activities in Oil and Gas Sector,
- The Division for Energy Efficiency Improvement, Sustainable Development and Climate Change in Energy Industry,
- The Directorate for Energy Reserves.

Examples of non-governmental /general public based initiatives to monitor implementation of this area in Serbia are:

- The electricity market in Serbia is dominated by the state-owned power utility EPS (Elektroprivreda Srbije – Power Industry of Serbia), which owns all large generation capacities and supplies most consumers.
- The Association Renewable Energy Sources of Serbia (RES Serbia) is a business association founded on February 24th, 2021 and aimed at improvement of the business environment in the field of renewable energy sources and environmentally motivated promotion of the generation and use of electric power from renewable energy sources,
- Green Energy of Serbia is the initiative aiming at stopping the building of the thermos-power plants.

The following are emerging trends in Serbia:

- The vision of the Ministry of Mining and Energy is energy-safe and climate-neutral economic development of the Republic of Serbia.

Also, Serbia offers grants and subsidies for renewable energy projects through various government programs and initiatives. These include the Green Fund, which provides funding for renewable energy and energy efficiency projects, and the Serbian Innovation Fund, which supports innovative projects in the energy sector.

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Appendix: Responses from SmartWB partners to a comprehensive questionnaire

Nettskjema

Climate Smart Urban Development (CSUD) status in your country

Submission: 27058233

Name

Zvonimir Nevisti

Email address

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Please choose the CSUD area you wish to response (Please use the link again to reply under a new area)

Intelligent transport solutions for freight and passenger transport (bus, ferry, trains, cars, bicycles etc),

(1) National ambitions and legislation (names & weblinks)

Intelligent transport system Croatia (https://www.its-croatia.hr/?page_id=327&lang=en)

(2) State organizations and authorities responsible in coordination/implementation of the legislations (names & weblinks)

National Road Traffic Safety Program (https://npscp.info/)

(3) Non-Governmental /General public based initiatives to monitor implementation (names + weblinks)

Faculty of Transport and Traffic Engineering (https://www.fpz.unizg.hr/web/naslovna/novosti)

(4) What solutions/products are already practiced? What, when, coverage, etc (text, links)

Not answered

(5) What solutions/products are under development, which are not yet in full scale? (text, links)

In this project, the goal is to explore the possibilities of developing an advanced decision support system model for safety management on a highway section. Based on this assessment, the system recommends active measures to reduce the probability of their actual occurrence.
In the continuation of the project, a management model based on the ANFIS methodology and real-time measurement of the values of the selected parameters of the traffic flow would be developed. In addition, some external factors (time of day, weather conditions, etc.) affecting traffic safety would also be included. This approach is important for improving existing algorithms for managing variable traffic signs on highways.

(6) What are the national trends

Not answered

(7) Are there any R&D or/and innovative projects completed/on going? (text, web

links)

Not answered

Any other comments/information

Not answered

Please upload any documents, photos etc here (if yiu have zip files, please use filemail.com or wetransfer.com to upload them. Pl send the link to harsha@nmbu.no)

Not answered

Nettskjema

Submission: 26822660

Name

Martin Oldenburg

Email address

martin.oldenburg@th-owl.de

Please choose the CSUD area you wish to response (Please use the link again to reply under a new area)

Innovative/intelligent wastewater collection and treatment, including resource recovery and reuse

(1) National ambitions and legislation (names & weblinks)

Federal water act

Wastewater ordinance

State water acts

National water strategy (2023)
https://www.bundesregierung.de/breg-en/search/national-water-strategy-2171262

(2) State organizations and authorities responsible in coordination/implementation of the legislations (names & weblinks)

Federal environmental agency
(see stormwater)

(3) Non-Governmental /General public based initiatives to monitor implementation (names + weblinks)

DWA (see stormwater)

(4) What solutions/products are already practiced? What, when, coverage, etc (text, links)

97 % of the population is connected to central wwtps via sewer system, the rest has decentralised (on-plot) small scale treatment units

removal of nutrients (nitrogen, phosphorus), mostly with biological treatment
energy efficiency of wwtp

(5) What solutions/products are under development, which are not yet in full scale? (text, links)

Flood control and management
removal of micropollutants
(German action plan
https://www.open-government-deutschland.de/opengov-en/open-government-partnership-germany)

P-removal from wastewater and reuse
reuse of treated wastewater
greywater treatment with reuse purposes
heat transfer from wastewater for use
new treatment technologies (e.g. Nereda, Anamox)
AI in wastewater treatment
Forecast of pandemics by monitoring of wastewater (e.g. Covid19)

(6) What are the national trends

ban of agricultural use of sludge from wwtp (from 2029)
P-recycling for wwtp > 50.000 p.e.(from 2029/32)
strategies for wastewater resuse

(7) Are there any R&D or/and innovative projects completed/on going? (text, web links)

yes, many.....

Any other comments/information

Most of the information are in German language

Please upload any documents, photos etc here (if yiu have zip files, please use filemail.com or wetransfer.com to upload them. Pl send the link to harsha@nmbu.no)

Not answered

Nettskjema

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Please choose the CSUD area you wish to response (Please use the link again to reply under a new area)

Intelligent transport solutions for freight and passenger transport (bus, ferry, trains, cars, bicycles etc),

(1) National ambitions and legislation (names & weblinks)

Directive 2010/40/EU of the European Parliament and of the Council of 7 July 2010 establishing the framework for the implementation of ITS in the road transport sector and for interfaces with other modes of transport: https://www.mitma.gob.es/recursos_mfom/pdf/9B69D3F3-120B-441D-B93F-0E3ABA0656D7/115339/directiva201040ueen.pdf

The following Royal Decree w transposes the directive into Spanish law:

Royal Decree 662/2012 establishing the framework for the implementation of Intelligent transport Systems (ITS) in the road transport sector and for interfaces with other modes of transport: https://www.mitma.gob.es/recursos_mfom/pdf/ED13C116-5D63-4CD8-97C9-0E7AB62C8677/115151/BOEA20125043.pdf.

To face new challenges, the Ministry of Transport, Mobility and Urban Agenda has designed the "Safe, Sustainable and Connected Mobility Strategy 2030", also known as "es.movilidad". The Strategy will guide MITMA’s mobility activity over the next 10 years: https://esmovilidad.mitma.es/

The Ministry of Transport, Mobility and Urban Agenda (MITMA), in accordance with the Sustainable Development Goals of the 2030 Agenda, and international and European experiences, designs the Safe, Sustainable and Connected Mobility Strategy, whose vision is "make mobility a right, an element of social cohesion and economic growth", with the horizon 2030. From this perspective, a normative provision with the rank of Law that responds to the economic, social and environmental challenges faced by transport and mobility, understood as a cross-cutting policy has been built.

The main areas to regulate by this Act will be: Transport taxation, transport financing, other transport subsidies and aid, planning and financing of transport infrastructure, regulation to promote sustainable mobility, regulation on awareness and training in sustainable mobility, research and innovation in transport and mobility, regulation of urban freight logistics and distribution, digitalization and automation of transport and open data, improving the competitiveness of transport and other sectoral measures, Instruments for governance and public participation.

There is a public consultation prior to the Sustainable Mobility and Transport Financing Act: https://www.mitma.es/el-ministerio/participacion-publica/formulario-de-consulta-publica-previa-la-ley-de-movilidad, here is the draft prepared for public consultation: https://www.mitma.es/recursos_mfom/paginabasica/recursos/20200828_doc_consulta_borrador_oficina2.pdf. The deadline for contributions is 15 November, 2023.

(2) State organizations and authorities responsible in coordination/implementation of the legislations (names & weblinks)

The competences in the field of Intelligent Transport Systems (ITS), New Technologies (NNTT) applicable to transport, are shared, between the following agencies of the Ministry of Transport, Mobility and Urban Agenda (https://www.mitma.gob.es/): the General Directorate of Land Transport (Sub-Directorate-General for Management, Analysis and Innovation), the Directorate-General for Roads (Sub-Directorate-General for Network Operation and Management) (https://www.mitma.gob.es/contacte-con-el-mitma/carreteras/servicios-centrales/servicios-centrales-de-la-direccion-general-de-carreteras), the Transport Studies and Technology Division (https://www.mitma.gob.es/ministerio/organizacion-y-funciones/secretaria-general-de-transporte-y-movilidad), and the Deputy Directorate-General for Information Technology and eGovernment (https://www.mites.gob.es/es/organizacion/organigrama/subsecretaria/contenido/OM94.htm). All of the foregoing without prejudice to the competence of the Ministry of the Interior (Directorate-General for Traffic-DGT): https://www.dgt.es, in this area, reason why both Ministries have been maintaining the relevant contacts.

(3) Non-Governmental /General public based initiatives to monitor implementation (names + weblinks)

Digital governance and government interoperability:
https://repositorio.cepal.org/bitstream/handle/11362/47018/1/S2100258_es.pdf
Strategic subsidies plan 2022-2024:
https://cdn.mitma.gob.es/portal-web-drupal/planes_estartegicos/mitma_pes_2022_2024.pdf
Spain 2050: Fundamentals and proposals for a long term national strategy
https://www.lamoncloa.gob.es/presidente/actividades/Documents/2021/200521-Estrategia_Espana_2050.pdf

(4) What solutions/products are already practiced? What, when, coverage, etc (text, links)

SIRDE: Shipment Data Recording Information System, from 2016 (https://apps.fomento.gob.es/Sirde), a system for the improvement of the management of road passenger transport concessions within the competence of the General State Administration.
The way it operates can be found: (https://www.mitma.gob.es/recursos_mfom/pdf/025EB530-A909-403E-9D25-DC30653AE7BB/142654/OperativaSIRDE.pdf)
SIRDE Technical specifications: (https://www.mitma.gob.es/recursos_mfom/pdf/79265A02-4D8F-461C-9A60-4B2B1CDC159F/142653/AnexoEspecificacionesTecnicas.pdf).

Secure parking for trucks:

In compliance with Delegated Regulation 885/2013 of the European Commission as regards the provision of information services on safe and secure parking areas for trucks and commercial vehicles and on the other hand Law 37/2015, of 29 September, Roads, in articles 26 and 27.5, the General Director of Roads has resolved to develop the National Point of access to information, managed by the S.G. Network Operation and Management, on protected and safe parking areas in the State Road Network:
https://www.mitma.gob.es/carreteras/aparcamientos-seguros
Access to the application:
https://portalweb.mitma.es/aplicaciones/portalweb/VisorMapaDGC/AparcamientosSeguros

(5) What solutions/products are under development, which are not yet in full scale? (text, links)

Within intermodal passenger management and services, the national access point (NAP) is being created: https://esmovilidad.mitma.es/evento/punto-de-acceso-nacional-informacion-sobre-desplazamientos-multimodales.
The NAP is a service required by the European Commission for the provision of multimodal travel information services in the European Union (EU). MITMA collects transport data and then makes it available to any interested party, encouraging the creation of new applications, platforms and services for the user. All information on routes and regular passenger transport schedules for medium and long distances will be available for all modes of transport within their competence, including rail and regular road transport routes. In the near future there will be greater visibility of the supply of transport services at all levels, local, regional and national.
Initiatives are being supported for the creation of the "Multimodal integrated tickets", Systems based on account and impulse the implementation of the "Spanish card without contact" for the subscription of public transport with technologies such as QR and NFC. In addition, the so-called "Last Mile" will be incorporated into the integrated ticket sales. Metropolitan areas have already introduced integrated transport titles through consortia. The formalization of agreements between the main interurban transport operators and the Consortia or Metropolitan Transport Authorities (ATM) will be promoted, for the incorporation in the purchase of the long distance ticket of a metropolitan transport title. Access to datasets: https://nap.mitma.es/

Spanish Contactless Card (TESC): The TESC Project (Spanish Contactless Card) is a tool for Interoperability in Mobility and especially in Public Transport. The term 'card' refers to the hardware, although it does not have to be a card itself. The communication standard is shared between several devices, such as mobile phones, smartwatches, wearables (devices capable of supporting application computing) and of course cards and terminals. In particular, for payment with the mobile phone there are several alternatives via App (computer application), using the NFC (Near Field Communication), by generating a QR code (Quick Response code), with EMV card or with computer applications developed.
Complete information at ITS Spain (www.itsspain.com) at technical level of both the specifications and the pilots developed.

The technical specifications can be found at:
https://www.mitma.gob.es/recursos_mfom/paginabasica/recursos/especificaciontescv07.pdf

Alternative energy sources for transport: Information has been collected on zero- or low-emission vehicles (alternative fuels and propulsion systems with batteries or hydrogen), specifying buses, as well as a brief reference to emissions regulations. Today, vehicles powered by natural gas seems to be a good option in the short term to replace the most polluting fuels in transport fleets and public transport as a result of their performance and high mileage. On short routes, battery-powered electric buses are being introduced, using the start and end of line stops for recharging batteries. In the short and medium term the different modes of propulsion, combustion (diesel with AdBlue, gas and biofuels) will coexist.
The regulation distinguishes between the reduction of greenhouse gases (GHG), such as CO2 and the reduction of pollution, which is mainly caused by nitrous oxides (NOX) and suspended particles. In the case of Spain, the objective is to reduce its GHG emissions from diffuse sectors, such as transport, by 26% from 2020 to 2030 The Euro6 regulation was launched on 1 November 2015 with the aim of making all new vehicles sold on European soil reduce emissions of pollutants and particulates in suspension, that is, to be cleaner. With regard to Euro5, it reduces nitrogen oxide emissions from diesel engines from 180 mg/km to 80 mg/km. Two methodologies, ECOTRAM and LIFE GySTRA, have been included on the measurement and recording of bus emissions.
Report on alternative energy sources for transport:
https://www.mitma.gob.es/recursos_mfom/paginabasica/recursos/energias_alternativas_para_el_transporte.pdf

(6) What are the national trends

National trends are included in the Integrated National Energy and Climate Plan (PNIEC) 2021-2030, that cna be accessed: https://www.miteco.gob.es/images/es/pnieccompleto_tcm30-508410.pdf
The Spanish government approved it in 2021 and it forecasts that by 2030, the fleet should have five million electric vehicles, although currently only circulate approximately 150,000 units of zero emissions. Faced with the uncertainty of electrification for many companies, Geotab has solutions such as its Report for the Adoption of Electric Vehicles, which analyzes precisely which vehicles in the fleet can be effectively replaced by electric equivalents.

These are the trends:

Cleaner and more sustainable transport: According to the Ministry of Transport, Mobility and Urban Agenda, 27% of harmful emissions come from transport, making it mandatory to reduce this pollution by 30% by 2030. Telematics can be an ally in achieving this objective thanks to its ability to offer precise control over the performance of each vehicle and better optimization of the routes they carry out. Through the data collected, fleet managers can increase the efficiency of each vehicle according to its function, making possible greater fuel savings.

Greater efficiency in last mile deliveries: If 2021 was the year of the consolidation of online commerce, in 2022 the main protagonist will be the last mile deal. However, the adoption of the Law on Climate Change and Energy Transition, which implies the creation of new Low Emission Zones in large cities from 2023, can cause supply chain problems due to access restrictions to urban hubs for the most polluting vehicles. In this sense, telematics is particularly useful in the planning of routes and in choosing the most suitable vehicles for each operation. And in the case of companies that transport perishable goods, this technology will be key to ensure the maintenance of the chain of cold and optimal conditions in the warehousing process.

Artificial intelligence as a safety tool Millions of vehicles will be able to benefit from a predictive maintenance approach through regular analysis of their components thanks to artificial intelligence. This will make it easier for companies to anticipate possible mechanical failures in their vehicles and thus reduce the risk of accidents. Telematics will also enable fleet managers to detect if the driver is not wearing a seatbelt correctly or if he shows risky driving habits -sudden braking or sudden acceleration, for example, with the aim of designing personalized training plans to reduce accidents. This ties in with the new Traffic, Vehicle Traffic and Road Safety Act that has come into force in March 2023.

New Vehicle-to-Infrastructure (V2I) solutions as efficient and sustainable mobility models:

To calculate the price of insurance policies based on driving habits or the accident rate of drivers, facilitating keyless access in the case of shared vehicles or paying road tolls without stopping will become increasingly common during 2022. In addition, smart cities and the well-known Vehicle-to-Infrastructure (V2I), which allow the exchange of information between the vehicle and its environment (with traffic signals or traffic lights, for example), will also begin to become a reality this year. And in the field of transport, the gradual introduction of the digital tachograph before it becomes mandatory in 2026 will facilitate collecting information on driving and rest time remotely and in real time, saving companies time and resources.

(7) Are there any R&D or/and innovative projects completed/on going? (text, web links)

Digiziti project:
Among the objectives of this innovative project is the implementation of a zero emissions city model, give a boost to sustainable mobility and encourage public transport versus private as the best solution for the care of our cities and the environment. All this will be possible thanks to funding from the European Union, Recovery Plan Transformation and Resilience and the CDTI, and the teamwork of different partners that will bring research and innovation developments to this project led by Avanza. Video about the project: https://youtu.be/vPaGnJsC4RU

More info about the project: https://avanzagrupo.com/digizity-sostenibilidad-e-innovacion/

ChainGo: it aims to revolutionize logistics through blockchain technology, especially focused on maritime freight transport. Currently, inefficient industry systems, based mainly on the use of paper documentation, involve bureaucratic processes that result in delays and penalties.
https://chaingotech.com/

Project Big Data for improving public transport in Madrid:
The big data and business intelligence project uses advanced analytics to manage and plan, in real time, the Consortium's operational resources in a more efficient way. This solution takes advantage of the data generated by the more than 4 million daily journeys that occur in Madrid's public transport, by the 42 public and private operators, more than 7 thousand vehicles circulating every day in the region to establish profiles and meet demand in a more agile and sustainable way. This intelligent transport system allows the CRTM to make real-time decisions, adjust supply to existing demand and be more efficient, which translates into more efficient, less-emitting and more sustainable transport
https://www.idom.com/noticia/big-data-como-oportunidad-para-un-transporte-mas-eficiente-sostenible-y-orientado-al-ciudadano/

more info: https://www.eldebate.com/espana/20220921/madrileno-podra-llevar-pronto-abono-transporte-movil_61188.html

Any other comments/information

Not answered

Please upload any documents, photos etc here (if yiu have zip files, please use filemail.com or wetransfer.com to upload them. Pl send the link to harsha@nmbu.no)

ITS.jpg
(10019 bytes)

Nettskjema

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Please choose the CSUD area you wish to response (Please use the link again to reply under a new area)

Innovative/intelligent wastewater collection and treatment, including resource recovery and reuse

(1) National ambitions and legislation (names & weblinks)

Forurensningsloven: https://lovdata.no/dokument/NL/lov/1981-03-13-6

Forurensningsforskriften: https://lovdata.no/dokument/SF/forskrift/2004-06-01-931

Vannforskriften: https://lovdata.no/dokument/SF/forskrift/2006-12-15-1446

(2) State organizations and authorities responsible in coordination/implementation of the legislations (names & weblinks)

Miljødirektoratet: https://www.miljodirektoratet.no/

Statsforvalteren: https://www.statsforvalteren.no/

Vannområdene: https://www.vannportalen.no/

Municipalities

(3) Non-Governmental /General public based initiatives to monitor implementation (names + weblinks)

Norsk Vann (advocacy organisation for water sector): http://www.norskvann.no

Vannforeningen (prof. society): https://vannforeningen.no/

(4) What solutions/products are already practiced? What, when, coverage, etc (text, links)

Reuse of local soil for trench construction instead of CO2-intensive industrial rock material

Various no-dig inspection and rehabilitation methods (e.g. fiberoptic temperature sensor for identifying infiltration/inflow)

Microbial source tracking for identifying sewers as a source of pollution

(5) What solutions/products are under development, which are not yet in full scale? (text, links)

Not answered

(6) What are the national trends

I guess the role of sewers/stormwater networks as a source of pollution is receiving more attention

Infiltration and inflow to sewers is an important issue

Use of sustainable materials (pipe and sediments) for trench construction

Implementation of systematic IAM

(7) Are there any R&D or/and innovative projects completed/on going? (text, web links)

https://www.sintef.no/siste-nytt/2020/lager-verktoy-for-a-planlegge-fornyelse-av-va-ledningsnett/

Any other comments/information

Not answered

Please upload any documents, photos etc here (if yiu have zip files, please use filemail.com or wetransfer.com to upload them. Pl send the link to harsha@nmbu.no)

Not answered

Nettskjema

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Please choose the CSUD area you wish to response (Please use the link again to reply under a new area)

Sustainable food supply

(1) National ambitions and legislation (names & weblinks)

Law 16/2021 of 14 December amending Law 12/2013 of 2 August on measures to improve the functioning of the food chain: https://www.boe.es/eli/es/l/2021/12/14/16

(2) State organizations and authorities responsible in coordination/implementation of the legislations (names & weblinks)

The European Innovation Partnership on agricultural productivity and sustainability (EIP-Agri).
National rural development Programs: https://www.mapa.gob.es/es/desarrollo-rural/temas/programas-ue/periodo-2014-2020/programas-de-desarrollo-rural/
AESAN: https://www.aesan.gob.es/AECOSAN/web/home/aecosan_inicio.htm

(3) Non-Governmental /General public based initiatives to monitor implementation (names + weblinks)

Anthesis: https://www.anthesisgroup.com/es/negocios-agricolas-y-sistemas-alimentarios/
Engie: https://www.engie.es/estrategia-de-sostenibilidad-alimentacion-y-bebidas/#
CESFAC: https://cesfac.es/
ASEDAS: https://www.asedas.org/

(4) What solutions/products are already practiced? What, when, coverage, etc (text, links)

https://cordis.europa.eu/article/id/430509-smart-solutions-for-sustainable-food-supply-in-europe/es

(5) What solutions/products are under development, which are not yet in full scale? (text, links)

Helpfood: https://www.bioazul.com/proyectos/helpfood-4-0-sostenibilidad-y-circularidad-en-la-cadena-alimentaria/
Prosciutto di Parma: https://eurocarne.com/noticias/codigo/50384/kw/Prosciutto+di+Parma+lanza+un+proyecto+de+cadena+de+suministro+sostenible

(6) What are the national trends

1.- Sustainability and certified surface. It is expected that the rates of adoption of sustainability schemes (organic, fair trade, etc.) will continue to increase this year encouraged by a more

responsible consumption, which demands organic food, and by the promises of ethical supply by food companies. An increase in the amount of agricultural land certified in sustainability is thus foreseeable.

2.- Regenerative agriculture. It is expected that there will be more food operators committed to regenerative agriculture. General Mills, Nestlé and Unilever are some of the large companies in the sector that already invest in it.

3.- Recycled foods. Many new recycled foods and ingredients will be launched in 2023. This research shows that the number of companies with recycled products has increased from almost nothing to more than 200 in the last five years. Upcycled Foods Inc., Barnana, Toast Ale and Crust Group are pioneers in this area. And is that sustainability commitments and efficiency impulses are encouraging food companies to develop recycled products, More product innovations and new raw materials are expected to emerge as recycled food sources this year.

4.- Foods of vegetable origin. After many years of high growth, the sectors of dairy and meat-free alternatives are maturing. The largest growth is now projected in the plant-based seafood sector, indicating that new launches will come to market that will be based on fish, squid, shrimp, crab, etc. of vegetable origin.

5.- Climate neutral foods. Food production is a major contributor to and one of the most affected by climate change. The emergence of climate change is giving food companies a new impetus to measure, reduce and offset their carbon emissions. This year, more companies in the sector are expected to commit to climate neutrality.
6.- Plastic footprint. The environmental problem of plastic has a particularly special impact on retail and the food industry. Many brands and chains are committed to this and the rate of targeted action is expected to continue to rise in 2023. In Spain, since 1 January began to govern, pioneering throughout the European Union (EU), the tax on non-reusable plastic packaging, which will fall on the entire industry with a tax rate of 0,EUR 45 per kilogram of this material produced or purchased.
7.- Approach to biodiversity. At the recent UN Biodiversity Conference, 195 countries pledged to protect 30% of land and water by 2030. As the food industry is the largest contributor to biodiversity loss, more operators are expected to commit to avoiding deforestation and biodiversity.
8.- Commercial developments. The shift to the circular economy is encouraging sustainable food retailers to adjust their business models. More organic and natural food stores are expected to offer refillable options: selling unpackaged foods such as grains, cereals, nuts, seeds, lentils, rice, etc. Others are likely to follow the example of the Dutch chain EkoPlaza and develop plastic-free zones in their stores, says the consultant.

(7) Are there any R&D or/and innovative projects completed/on going? (text, web links)

1.- Chep, Henkel and Capsa Food, first companies to use the duo-trailer for their shared logistics.

2.- Smurfit Kappa Agropaper, the first paper coating for vegetable mulching. 3.- Pepsico, the first brand of carbonated drinks in the national market whose bottles do not contain virgin plastic and are 100% recycled. 4.- Mercadona and Martens. The beer supplier Martens has introduced the first bottles to replace the plastic film with an adhesive for its grouping. 5.- Alcampo Universal substrate zero residue. A substrate for plants made of compost made from organic waste from their own stores. 6.- Ecoembes, in collaboration with local authorities, has implemented a system of return and reward machines (SDR) of 'RECICLOS', which encourage the recycling of packaging rewarding the citizen with sustainable prizes.In 2021 La Llavor, a training centre in digital skills for students/schoolchildren, was opened by the RETA Operating Group (Agrarian Test Spaces Network), in collaboration with the municipality and educational institutions of Guissona. 8 is promoting incubators to accompany young people without agrarian notions in the start-up of farms and livestock. 9.- Plusfresc and Sunka. Together with Payflow, Supsa Supermercats Pujol has implemented 'wage on demand', being the first national distribution chain to offer this service to its staff. 10- Mercadona has introduced the five-day working day, being the first company in the sector to provide two days of weekly rest and eight long weekends a year to the whole employees. 11.- Too Good To Go. More than 20 manufacturers and To Good to Go have promoted 'Meaningful Dates', a joint initiative against food waste. 12.- Naturpod has launched the first ethylene absorption capsule aimed at the domestic (consumer) market completely compostable. 13.- Grupo Nueva Pescanova has launched to the market 'La Pasta del Mar', a range of textured fish similar to pasta. 14.- Grupo Calvo has launched Vuelca Fácil, a container that allows you to dump tuna without using a fork or other utensils. 15.- Kraft Heinz has launched Heinz Zero, the first ketchup with no salt or added sugars. 16.- Mercamadrid has launched the Fruit School, an educational space aimed at schoolchildren whose function is to promote knowledge about healthy diet. 17.- Lumensia, a spin-off of the Polytechnic University of Valencia, has developed Sapher 1.0, a photonic circuit system for microbiological control and allergen detection. 18.- Revoolt Revoolt, the sustainable logistics startup, has made available to its customers a digital signage solution that informs consumers in real time of the slots available to receive their order at home.19.- Consum has applied to all the handles of its shopping carts and baskets a coating that eliminates fungi, bacteria and viruses, avoiding the contagion derived from contact with pathogens such as Covid-19 20. - Bisari is the first company to offer an electrostatic pollination service in the national territory.

Any other comments/information

Not answered

Please upload any documents, photos etc here (if yiu have zip files, please use filemail.com or wetransfer.com to upload them. Pl send the link to harsha@nmbu.no)

food.png
(147088 bytes)

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Please choose the CSUD area you wish to response (Please use the link again to reply under a new area)

Intelligent (household) solid waste management

(1) National ambitions and legislation (names & weblinks)

Law 7/2022 of 8 April on contaminated waste and soils for a circular economy:
https://www.boe.es/eli/es/l/2022/04/08/7

(2) State organizations and authorities responsible in coordination/implementation of the legislations (names & weblinks)

Instituto Nacional de Estadística-Residuos
Red Española de Compostaje
Fundación para la Economía Circular
Asociación Técnica para la Gestión de Residuos, Aseo Urbano y Medio Ambiente
Asociación Empresarial Valorización R.S.U (AEVERSU)
Asociación de Empresas Gestoras de Residuos y Recursos Especiales
Asociación Nacional de Fabricantes de Pasta, Papel i Cartón
Asociación Española de Recuperadores de Papel i Cartón
Ecovidrio
Asociación Nacional de Fabricantes de Envases de Vidrio
Ecoembes
Federación Española de Transformadores y Manipuladores de Plásticos
Asociación Española de Industriales de Plástico
Instituto Tecnológico del Plástico
Entidad para el Reciclado de los Residuos Plásticos en España
Confederación Española de Organizaciones Empresariales del Metal
Asociación del Reciclado del Aluminio
Asociación Española de Recogedores de Pilas, Acumuladores y Móviles
Composta en Red
Federación Española de la Recuperación y el Reciclaje (FER)
Asociación Española de Recuperadores de Economía Social y Solidaria

You can access to all their webpages at:
https://www.miteco.gob.es/es/calidad-y-evaluacion-ambiental/temas/prevencion-y-gestion-residuos/enlaces/Enlaces_entidades_relacionadas_gestion_residuos.aspx

(3) Non-Governmental /General public based initiatives to monitor implementation (names + weblinks)

Ecoembes: https://www.ecoembes.com/es
ACA Ambientales: https://www.cienciasambientales.org.es/
APIA: https://www.apiaweb.org/
Ecovidrio: https://www.ecovidrio.es/
Sogama: https://www.sogama.gal/gl
Fundación Economía circular: https://economiacircular.org/

(4) What solutions/products are already practiced? What, when, coverage, etc (text, links)

best solutions already practiced in Spain can be consulted at: https://www.miteco.gob.es/es/calidad-y-evaluacion-ambiental/temas/prevencion-y-gestion-residuos/

(5) What solutions/products are under development, which are not yet in full scale? (text, links)

Novobin: https://wellnesstg.com/
Marmosl: https://mamosl.es/
Pire2030:
https://www.juntadeandalucia.es/medioambiente/portal/documents/20151/26992369/2021_10_19_PIRec_completo5.pdf/6c1a646a-c293-79ca-c201-a913386b86ce?t=1634807843024
T-tres-en-R: https://www.euskadi.eus/contenidos/documentacion/ppgr2030/es_def/adjuntos/PPGR-2030-DEFINITIVO.pdf

(6) What are the national trends

The UN has already warned that the textile industry is one of the most polluting. It is estimated that currently only 1% of this material is recycled. But what until recently was the bet of some SMEs to produce artisanal products with garments or accessories based on recycled material is widespread. In this 2022 it is easy to find in the most popular clothing chains collections complete with recycled material. They stand out those of technical clothing, bathing and sneakers made from plastics. The Spanish Inditex, for example, recovered almost 16,000 tons of clothing and accessories in 2019 and has set itself that by 2025 100% of the cotton, linen and polyester used in their garments is either organic, more sustainable or recycled.

Compost with organic waste The use of organic waste to produce agricultural fertilizer or compost is another trend that marks recycling in 2022. There are many municipalities that, since the new Waste Law already requires separate municipal collection, have advanced with the brown container or betting on door-to-door collection. There are autonomous communities, such as Asturias, that have been encouraging this production at the domestic level for years and provide citizens who are interested in material and training. The Cabildo of Tenerife has another pilot experience as communities of neighbors. The system has also become widespread in urban gardens.
Plastic recycled throughout, including in toys Next summer will be the first in Spain in which products made from single-use plastic, such as cutlery, glasses or straws, cannot be marketed due to the

entry into force of the new Waste Law, which requires a progressive increase in the percentage of recycled plastic in packaging such as water bottles and other beverages. This will increase the demand for recycled PET to around 45%. Companies are moving forward with research into chemical recycling as a complement to the mechanic, in which the composition of the product does not change. In addition, the use of recycled plastic in sectors such as toys is a trend.
Recycling is also a trend in decoration The interior decoration sector is not escaping the demand for increasingly sustainable and environmentally friendly products. There is already talk of the eco-friendly style as a trend in this 2022. Outstanding furniture made with reused wood and recycled glass, along with organic materials.

(7) Are there any R&D or/and innovative projects completed/on going? (text, web links)

Circularlab: https://www.thecircularlab.com/
URBANREC: https://www.ecofragmentation.com/proyecto-urbanrec/
ecolec: https://ecolec.es/

Any other comments/information

Not answered

Please upload any documents, photos etc here (if yiu have zip files, please use filemail.com or wetransfer.com to upload them. Pl send the link to harsha@nmbu.no)

compostaje.jpg
(11179 bytes)

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Please choose the CSUD area you wish to response (Please use the link again to reply under a new area)

Stormwater and flash floods management – Blue Green solutions

(1) National ambitions and legislation (names & weblinks)

At the state level:
- Water Law: Royal Legislative Decree 1/2001, of July 20, 2001, approving the Consolidated Text of the Water Law.
of the Water Law.
- Coastal Law: RD 876/2014, of October 10, which approves the General Regulations of the Coastal Law and Law 2/2013, of May 29, 2013.
Law and Law 2/2013, of May 29, 2013, on the protection and sustainable use of the coast and modification of Law 22/1988, on Coasts.
22/1988, on Coasts.
- Regulation of the Public Hydraulic Domain: RD 849/1986, of April 11, 1986, approving the Regulation of the Public Hydraulic Domain, which develops the preliminary, I, IV, V, VI and VII titles of Law 29/1985, of August 2, 1985, of the Law on the Public Hydraulic Domain.
29/1985, of August 2, 1985, on Water and its amendments: RD 606/2003, of May 23; RD 9/2008, of January 11; RD 1290/2012, of January 11.
January; RD 1290/2012, of September 7 and RD 638/2016, of December 9.
- Flood risk assessment and management: RD 903/2010, of July 9, 2010, on flood risk assessment and management.
flood risks.
- National Hydrological Plan: Law 10/2001, of July 5, of the National Hydrological Plan and its amendments:
RD-Law 2/2004, of June 18 and Law 11/2005, of June 22.
- Discharges: Royal Legislative Decree 1/2001, of July 20, which approves the Revised Text of the Water Law and Order AAA/2056, of June 20, 2005.
Water Law and Order AAA/2056/2014, of October 27, which approves the official models for the of authorization request and declaration of discharge.
- Civil Protection: Law 17/2015, of July 9, of the National Civil Protection System, in addition to the corresponding resolutions: Resolution of August 2, 2011, approving the State Plan for Civil Protection against the risk of floods.
Protection Plan against the risk of flooding and Resolution of January 31, 1995, of the Secretary of

State for the Interior
of the Secretary of State for the Interior, approving the Basic Guidelines for Civil Protection Planning in the face of flood risk.
risk of flooding.
Figure 8. Designs with SUDS. France (Ronchamp), Austria (Hallstatt).
16
- Land Law: Royal Legislative Decree 7/2015, of October 30, approving the Law on Land and Urban Rehabilitation and Royal Decree 7/2015, of October 30, approving the Law on Land and Urban Rehabilitation.
and Urban Rehabilitation Law and Royal Decree 2159/1978, of June 23, 1978, which approves the Planning Regulations for the
for the development and application of the Law on the Regime of Land and Urban Planning.
At the autonomous or regional level:
- Hydrological plans and flood risk management plans of the demarcations: RD 701/2015,
of July 17 and RD 1/2016 and RD 11/2016, of January 8, approving the different hydrological plans of the demarcations of the
RD 18/2016, RD 19/2016, RD 20/2016, RD 20/2016, RD 21/2016, of January 15,
and RD 159/2016 of 15 April, approving the flood risk management plans of the demarcations.
demarcations.
- Civil protection: The special civil protection plans for the risk of floods prepared by the autonomous the autonomous communities and approved by the National Commission for Civil Protection can be consulted on the civil protection website: http://www.proteccioncivil.es/riesgos/inundaciones/planes.
- Plans of Territorial Planning of supramunicipal scope.
- General Plans:

https://www.boe.es/eli/es/rd/2010/07/09/903

(2) State organizations and authorities responsible in coordination/implementation of the legislations (names & weblinks)

National Water Board: The National Water Council (Consejo Nacional del Agua, CNA) is a consultation and participation body for water planning at the state level under the Ministry of Ecological Transition: https://www.miteco.gob.es/es/

(3) Non-Governmental /General public based initiatives to monitor implementation (names + weblinks)

Green blue urban: https://greenblue.com/es/soluciones/gestion-de-agua-de-lluvias/
WWF:
https://wwflac.awsassets.panda.org/downloads/flood_green_guide_espanol_revisado_armado.pdf

(4) What solutions/products are already practiced? What, when, coverage, etc (text, links)

Arlita: https://www.arlita.es/soluciones/gestion-de-agua
Nefusa: https://www.neefusa.org/nature/water/consejos-para-reducir-el-impacto-de-la-escorrent-de-

aguas-pluviales
Nofloods: https://nofloods.com/es/

(5) What solutions/products are under development, which are not yet in full scale? (text, links)

Urban resilience to flood risk: Fraga (Huesca)
Hospital-Residence in Cuenca
Cebolla City Council (Toledo)
Los Alcázares City Hall (Murcia)
Antonio Menárguez Costa Secondary School (Los Alcázares, Murcia)
Typologies of single-family housing (Los Alcázares, Murcia)
Multipurpose Building of the Polytechnic School of Engineering of Gijón (Gijón, Spain)
Monastery of Santa María de Huerta (Soria, Spain)
Marrón Industrial Park (Ampuero, Cantabria)
Adarraga Sports Complex (Logroño, Logroño)

All this pilot solutions can be consulted at: https://www.miteco.gob.es/es/agua/temas/gestion-de-los-riesgos-de-inundacion/usos-del-suelo-en-zonas-inundables/Programas-piloto-adaptacion-riesgo-inundacion.aspx

(6) What are the national trends

One of the solutions in this area is to increase permeability in urban areas.

The implementation of sustainable drainage systems is increasingly demanded by municipal authorities as a prerequisite for their urban plans. These measures must be specified early in the process, considering site analysis, masterplan design and environmental impact assessments.

GreenBlue Urban's stormwater management solutions are designed to replace conventional drainage designs through green infrastructure, rain gardens, rain gardens, tree wells, and the like.

Features:

100% recycled materials
Nestable modules
Optional overflow drainage point
Stackable design for efficient transport
Possibility of locking, to prevent frost in winter
Durable and resistant finish
Available in corten and galvanized steel
Custom construction
Top grid available in a variety of finishes
Compatible with any hard surface

Recycled plastic
92% of available volume
High load bearing capacity

(7) Are there any R&D or/and innovative projects completed/on going? (text, web links)

Life green adapt: To achieve climate goals, industries must accelerate the transition to a climate-resilient, resource-efficient, low-carbon and circular economy. From July 2021, the 42-month LIFE GREEN ADAPT project will increase the resilience of EU waste infrastructure to climate change by implementing green and nature-based solutions. The project will focus on landfills as a potential source of serious pollution episodes when they are affected by extreme weather events, demonstrating the potential of blue-green infrastructures (BGI) and ecosystem approaches. LIFE GREEN ADAPT will demonstrate BGI's ability to manage floods:

https://www.iagua.es/noticias/isle-utilities/cambio-sector-residuos-life-green-adapt

The AQUAVAL project aims at the efficient management of rainwater in urban areas, providing innovative solutions to problems related to the quantity and quality of urban runoff, caused by the increasing waterproofing of soils in municipalities. To this end, it proposes the use of Sustainable Urban Drainage Systems (SUDS), integrating water infrastructures into the landscape and urban morphology of such municipalities, thereby reducing the impacts of its urban development and bringing social and environmental values to the programmed actions. In its development, AQUAVAL has carried out different pilot experiences of demonstration and management of rainwater through SUDS, as a complement to the existing water infrastructure, in some local places in Valencia Region: https://hidravlc.webs.upv.es/w_aquavalx.html

Any other comments/information

Not answered

Please upload any documents, photos etc here (if yiu have zip files, please use filemail.com or wetransfer.com to upload them. Pl send the link to harsha@nmbu.no)

waterfloods.jpg
(159987 bytes)

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Please choose the CSUD area you wish to response (Please use the link again to reply under a new area)

Innovative energy production and user management (Biogas, solar, wind, etc)

(1) National ambitions and legislation (names & weblinks)

Spain has designed the National Integrated Energy and Climate Plan 2021-2030 (PNIEC). It aims to reflect that commitment and Spain's contribution to the international and European effort. Spain's PNIEC identifies challenges and opportunities across the five dimensions of the Energy Union: decarbonisation, including renewable energy; energy efficiency; energy security; the internal energy market and research; innovation and competitiveness. The PNIEC sends the necessary signals to provide certainty and a sense of direction to all actors, also providing flexibility and manageability to the energy transition and decarbonisation of the economy. In this way, it is hoped to capture maximum opportunities for economic development and employment generation:
https://www.miteco.gob.es/es/ministerio/planes-estrategias/plan-nacional-integrado-energia-clima/plannacionalintegradodeenergiayclima2021-2030_tcm30-546623.pdf
In this link, the different main legislation can be accessed:
https://energia.gob.es/renovables/Paginas/normativa.aspx
Order ITC/1522/2007 of 24 May (BOE 01/06/2007) establishing the regulation of the guarantee of the origin of electricity from renewable energy sources and high efficiency cogeneration.
Law 24/2013, of 26 December, of the Electricity Sector (BOE 27/12/2013)
Royal Decree 413/2014, of 6 June (BOE 10/06/2014) regulating the activity of electricity production from renewable energy sources, cogeneration and waste.
Order TEC/1302/2018 of 4 December (BOE 06/12/2018) laying down the provisions necessary to implement a system of aid for investment in installations producing electricity from renewable sources in non-peninsular territories and determining the transfer of EUR 60 million from the electricity surplus to the budget of the Energy Diversification and Saving Institute with effect from 2017.
Order TEC/1314/2018, of 7 December (BOE 12/12/2018) laying down the provisions necessary to implement a system of investment aid for installations producing electricity from renewable sources and determining the transfer of EUR 60 million from the electricity surplus to budget of the Institute for Energy Diversification and Savings with effect for the 2018 budget year.
Royal Decree-Law 15/2018, of 5 October (BOE 06/10/2018) of urgent measures for the energy transition and the protection of consumers Royal Decree-Law 20/2018, of 7 December (BOE 08/12/2018) of urgent measures to boost economic competitiveness in the industry and trade sector

in Spain.
Royal Decree-Law 17/2021, of 14 September (BOE 15/09/2021) of urgent measures to mitigate the impact of the escalation of natural gas prices in the retail gas and electricity markets.
Royal Decree-Law 29/2021 of 21 December (22/12/2021) adopting urgent measures in the field of energy to promote electric mobility, self-consumption and the deployment of renewable energies.
Royal Decree-Law 6/2022 of 29 March (BOE 30/03/2022) adopting urgent measures within the framework of the National Plan of Response to the Economic and Social Consequences of the War in Ukraine.
Royal Decree-Law 10/2022 of 13 May (BOE 14/05/2022) temporarily establishing a mechanism for adjusting production costs to reduce the price of electricity in the wholesale market.
Royal Decree-Law 17/2022 of 20 September (BOE 21/09/2022) adopting urgent measures in the field of energy, in the application of the remuneration scheme to cogeneration installations and the VAT rate applicable to intra-Community deliveries, imports and acquisitions of certain fuels is temporarily reduced.
Royal Decree-Law 23/2020 of 23 June (BOE 24/06/2020) approving measures in the field of energy and in other areas for economic recovery.

(2) State organizations and authorities responsible in coordination/implementation of the legislations (names & weblinks)

Committee on Industry, Energy and Tourism.
Ministry of Energy, Tourism and Digital Agenda (MINETAD).
National Markets and Competition Commission (CNMC).
Iberian Energy Market Operator (OMEL).
Electrical System Operator (REE).
Gas System Operator (ENAGAS).
The Ministry of Economy and Competitiveness (MINECO), State Secretariat for Research, Development and Innovation (SEIDI), to which the Centre for Energy, Environmental and Technological Research (CIEMAT).
The Ministry of Agriculture and Fisheries, Food and Environment (MAPAMA).
The Nuclear Safety Council (CSN).
Institute for Energy Diversification and Saving (IDAE).

They all can be accessed at: https://www.energiaysociedad.es/manual-de-la-energia/1-3-instituciones-energeticas-comunitarias-y-espanolas/

(3) Non-Governmental /General public based initiatives to monitor implementation (names + weblinks)

Renewables Foundation: https://fundacionrenovables.org/
Energies with no frontiers: https://energiasinfronteras.org/
Green Fund: https://www.fondoverde.org/
The Association of Renewable Energy Companies (APPA): https://www.appa.es/
The National Association of Energy Producers (ANPIER): https://anpier.org/

The Spanish Photovoltaic Union (UNEF): https://www.unef.es/
Friends of the Earth: https://www.amigosdelplaneta.com/
Protermosolar: https://www.protermosolar.com/
Greenpeace: https://www.protermosolar.com/
WWF: https://www.wwf.es/
SEO Birdlife: https://seo.org/
Ecologists in Action: https://www.ecologistasenaccion.org/
The New Energy Model platform: https://nuevomodeloenergetico.org/

(4) What solutions/products are already practiced? What, when, coverage, etc (text, links)

Orsted: https://orsted.es/
My Energy Map: https://www.myenergymap.es/
Gen0: https://wearegen0.com/servicios/sistemas-de-gestion-energetica/
Repsol: https://www.repsol.com/
Engie: https://www.engie.es/actividades/energia-renovable/
Iberdrola: https://www.iberdrola.com/conocenos/nuestra-actividad
Energiber: https://www.energiber.com/
Bester: https://bester.energy/soluciones-renovables/
Acciona: https://www.acciona.com/es/soluciones/energia/

(5) What solutions/products are under development, which are not yet in full scale? (text, links)

Indel: https://indel.energy/es/
SolarProfit: https://solarprofit.es/es/
Crusol: https://www.crusol.com/
Ceder: http://www.ceder.es/

(6) What are the national trends

Fight against climate change: In this energy transition, Spain has had a very remarkable growth, and is that when in 2012 the production of clean energy generated was around 30% of the total, in 2021 it was already 47% and in 2022 it was also over 40%.

The evolution of renewable energy: Spain has in its possession two bulwarks that place it at the head of future renewable energy production, wind and sun. In 2021, Spain became the second country in the European Union to generate more electricity from solar and wind energy. Such is the case that wind and solar energy are the renewable energies most in demand in Spain, with wind use at 22.1% of total electricity and solar representing 10.8% of photovoltaic type and 1.7% thermal. Renewable energy is effective in two respects, on the one hand it contributes to reducing emissions to the atmosphere, and on the other it reduces energy dependence by seeking a safe and indigenous supply. With these objectives, Spain is among the 15 largest consumers of clean energy in the world, and is that the consumption of renewable energy in our country is 20.7% of the final

gross consumption. Wind energy is the first clean energy source in Spain, after surpassing hydro in 2009. 53% of the green energy generated in Spain since 2022 comes from wind turbines installed by the Spanish geography. Meanwhile, solar energy reached historical data in 2022.
Making Spain electricity grids sustainable and reducing our carbon emissions to the atmosphere, but also gaining access to new renewable facilities by approving access to new renewable parks, promoting digitisation and the integration of all energies.
Self-consumption is one of the elements on the table that need to be defined. This two-way system will allow Spanish homes and businesses to have access to energy, its management and control of its surpluses. Renewable energy must become the lifeline of our economy, and the means to do so are not lacking. In this sense, Spain and especially Andalusia, is the sun of Europe, so it has the necessary instruments to make renewable energy the source of drinking and put itself at the head in energy production.
The National Integrated Energy and Climate Plan (PNIEC) maintains that renewable energies will increase progressively, reaching 74% in 2030 and 100% by 2050.

(7) Are there any R&D or/and innovative projects completed/on going? (text, web links)

there are 544 innovative projects on going from 2022:

https://www.miteco.gob.es/es/prensa/220120_npmitecodestina177millonesparaimpulsar544proyectosdeenergiasrenovablesinnovadoras_tcm30-535392.pdf

Any other comments/information

Not answered

Please upload any documents, photos etc here (if yiu have zip files, please use filemail.com or wetransfer.com to upload them. Pl send the link to harsha@nmbu.no)

renewable energy Spain.jpg
(122603 bytes)

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Please choose the CSUD area you wish to response (Please use the link again to reply under a new area)

Innovative/intelligent wastewater collection and treatment, including resource recovery and reuse

(1) National ambitions and legislation (names & weblinks)

Urban Waste Water
- Council Directive 91/271/EEC of May 21, 1991, on urban wastewater treatment: https://www.boe.es/buscar/doc.php?id=DOUE-L-1991-80646

- Royal Decree-Law 11/1995, of December 28, 1995, establishing the standards applicable to urban wastewater treatment: https://www.boe.es/eli/es/rdl/1995/12/28/11

- Royal Decree 509/1996, of March 15, 1996, implementing Royal Decree-Law 11/1995, of December 28, establishing the rules applicable to the treatment of urban wastewater: https://www.boe.es/eli/es/rd/1996/03/15/509

- Resolution of June 30, 2011, of the Secretary of State for Rural Affairs and Water, declaring the sensitive areas in the intercommunity basins: https://www.boe.es/eli/es/res/2011/06/30/(2)

- Resolution of April 28, 1995, of the Secretary of State for the Environment and Housing, which provides for the publication of the Agreement of the Council of Ministers of February 17, 1995, approving the National Plan of Sanitation and Wastewater Treatment: https://www.boe.es/eli/es/res/1995/04/28/(2)

- Agreement of the Council of Ministers of July 8, 2007, approving the National Water Quality Plan: sanitation and purification 2007-2015: https://www.miteco.gob.es/images/es/PlanNacionalCalidadAguas_tcm30-279844.pdf

Reuse of wastewater
Royal Decree 1620/2007, of December 7, establishing the legal regime for the reuse of treated water: https://www.boe.es/eli/es/rd/2007/12/07/1620/con

Sewage sludge
Royal Decree 1310/1990, October 29, regulating the use of sewage sludge in the agricultural sector:

https://www.boe.es/eli/es/rd/1990/10/29/1310

Order AAA/1072/2013, of June 7, on the use of sewage sludge in the agricultural sector: https://www.boe.es/eli/es/o/2013/06/07/aaa1072

Monitoring and evaluation of the state of wastewater

Royal Decree 817/2015, of September 11, establishing the criteria for monitoring and evaluation of surface water status and environmental quality standards: https://www.boe.es/eli/es/rd/2015/09/11/817

Groundwater
Royal Decree 2618/1986, of December 24, 1986, approving measures concerning subway aquifers under Article 56 of the Water Law: https://www.boe.es/eli/es/rd/1986/12/24/2618
Royal Decree 1514/2009, of October 2, 2009, regulating the protection of groundwater against pollution and deterioration: https://www.boe.es/eli/es/rd/2009/10/02/1514/con

(2) State organizations and authorities responsible in coordination/implementation of the legislations (names & weblinks)

The Hydrographic Confederations (in inter-community basins) and the water administrations of the Autonomous Regions (in intra-community basins) are responsible for the system of authorizations and
concessions for reused water in their territorial area.
The sanitary authority of the Autonomous Community in the issuance of the prior binding report, in all cases of water reuse
or Holder of the concession or authorization, who must bear the costs necessary to adapt the reuse of water to the
reuse of water to the quality requirements in force at any given time . This holder could be:
- The concessionaire of the first use.
- The holder of the discharge authorization.
- A third party.
In this link, you can find the access to the web pages of the Hydrographic Confederations in Spain: https://www.miteco.gob.es/es/ministerio/funciones-estructura/organismos-publicos/confederaciones-hidrograficas/default.aspx

(3) Non-Governmental /General public based initiatives to monitor implementation (names + weblinks)

Professional associations, federations and specialized user entities:
- AEAS, Asociación Española de Abastecimientos de Agua y Saneamiento (Spanish Association of Water Supply and Sanitation): non-profit professional association for the promotion and development of the scientific, technical, technical, economic, environmental and social non-profit association for the promotion and development of scientific, technical, administrative and legal

aspects of urban water supply and sanitation services.Its
Its origin goes back to 1971, when the members of the Spanish Committee of the International Water Supply Association (IWSA)
Water Supply Association (IWSA) decided to set up a national association that, in the image of the international association, would deal with all facets of the urban water cycle: https://www.aeas.es/
- AGA, Asociación Española de Empresas Gestoras de los Servicios de Agua Urbana (Spanish Association of Urban Water Utilities): an association for the promotion and defense of the common interests of service companies related to the integral water cycle: https://www.iagua.es/aga

- AEOPAS, Asociación Española de Operadores Públicos de Abastecimiento y Saneamiento (Spanish Association of Public Water Supply and Sanitation Operators).It is an entity whose fundamental objectives are the defense of water as a common good, its management from the and international solidarity and cooperation: https://www.aeopas.org/

- FENACORE, Federación Nacional de Comunidades de Regantes de España (National Federation of Irrigation Communities of Spain), politically independent non-profit association that brings together entities (irrigation communities, irrigation syndicates, irrigation syndicates, etc.) dedicated to the administration of water for irrigation, both surface and underground, defending the rights of irrigators: https://fenacore.org/

- SEOPAN, Asociación de Empresas Constructoras y Concesionarias de Infraestructuras (Association of Construction Companies and Infrastructure Concessionaires): association for the promotion of investment in infrastructures, and the promotion of public-private collaboration projects as decisive public-private collaboration projects as decisive elements for competitiveness and economic growth or Other associations, foundations and NGOs related to the dissemination, knowledge and protection of the environment: https://fenacore.org/

- ADECAGUA, Asociación para la defensa de la calidad de las aguas: Spanish association, member of the WATER ENVIRONMENT FEDERATION (WEF) and the EUROPEAN WATER ASSOCIATION (EWA),
non-profit organization, with the aim of contributing to disseminate the latest knowledge on how to improve the quality of the environment: https://adecagua.es/

- AQUAE Foundation, with the aim of promoting education and the dissemination of knowledge, in order to move towards a sustainable and respectful model for the environment.
towards a sustainable model that respects the environment, biodiversity and the dignified and equitable development of the
and equitable development of people, optimizing natural resources and, especially, the use of water: https://www.fundacionaquae.org/

- The Botín Foundation's Water Observatory is an interdisciplinary think-tank that aims to contribute

to current and future debates on water issues: https://fundacionbotin.org/en/programmes/water-observatory/

- FNCA, Fundación Nueva Cultura del Agua, a foundation that promotes a change in water management policy in order to achieve more rational management policy to achieve more rational and sustainable actions: https://fnca.eu/

- PTEA: http://www.plataformaagua.org/index.php/ptea

CONAMA, an independent, non-profit Spanish foundation that promotes an open dialogue to foster sustainable development in Spain and Latin America: https://www.fundacionconama.org/
- WWF Spain: https://www.wwf.es/
- Ecologists in Action: https://www.cleanenergywire.org/experts/ecologists-action-ecologistas-en-accion
- Greenpeace: https://es.greenpeace.org/es/
o Clusters specialized in reuse:
- AEDyR, Asociación Española de Desalación y Reutilización (Spanish Association of Desalination and Reuse): Non-profit association with the purpose to promote the adequate use of seawater and brackish water desalination and water reuse, contributing to the
reuse of water, contributing to the sustainable management of water resources. The association aims to bring together all the people, companies and groups related to desalination and water reuse in Spain: https://aedyr.com/
- ASERSA: Asociación Española de Reutilización Sostenible del Agua (Spanish Association for the Sustainable Reuse of Water) is a non-profit organization of an associative nature related to water reuse: https://www.asersagua.es/
o International groups specialized in reuse:
- WRE, Water Reuse Europe: non-profit association (United Kingdom) with the objective of creating a collective identity for the water reuse sector in Europe and share best practices, knowledge, techniques, research and knowledge, know-how, techniques, research and experience on reuse, promoting the safe and effective use of recycled water. It develops the following objectives:
To facilitate the exchange of knowledge between public and private entities involved in the reuse of water; to promote European expertise and services in water reuse to a global audience; to support the to a global audience; to support European companies in their efforts to commercialize water reuse solutions; to raise awareness of the reuse solutions; raise public awareness and understanding of water reuse practices; and promote the reuse practices; and promote research and innovation in water reuse: https://www.wearewater.org/es
- IWSA, Water Supply Association: is an open platform for dissemination and collaboration between the innovative sector and users of new technologies specialized in water management
ALADYR, Asociación Latinoamericana de Desalación y Reúso del Agua A.G. (Latin American Association of Desalination and Water Reuse): association with the purpose to promote, protect and develop technologies and projects aimed at desalination and water treatment for reuse and and

consumption under standards of sustainability and environmental respect. The Association has the formal support of the Spanish Association of Desalination and Reuse (AEDYR), the International Desalination Association (IDA) and the Caribbean Desalination Association (CARIBDA): https://aladyr.net/

(4) What solutions/products are already practiced? What, when, coverage, etc (text, links)

SigmaDaf: https://sigmadafclarifiers.com/sistema-mbr-aguas-residuales-compacto/
Cmbe: https://www.cmbe.es/
Veolia Green Path: www.veolia.es
Cetaqua: https://www.cetaqua.com/investigacion/biofactoria-y-recuperacion-de-recursos/
Aguasb: https://aguassb.com/aguas-residuales/

(5) What solutions/products are under development, which are not yet in full scale? (text, links)

Retema: https://www.retema.es/
Laboragua: https://www.laboragua.es/
Navagua: https://navagua.com/
Lewa: https://www.lewa.es/

(6) What are the national trends

At the national level, increased reuse can provide substantial improvements not only in water planning and water management, but its promotion can also result in not only in the field of water planning and water management, but its promotion can also be beneficial for the fulfillment of other environmental policies.
beneficial for the fulfillment of other environmental policies, among which the following should be highlighted: the Spanish Circular Economy Strategy20 and the EU Action Plan for the Circular Economy (very directly related to this strategy, which is developed in chapter 3.1.4).
One of the five main lines of action on which the policies and instruments of this Spanish strategy are focused and articulated is precisely the reuse of waste: "a valuable tool for reducing pressure on natural water resources, natural water resources", by developing an action plan to eliminate existing regulatory barriers, disseminate the existing regulatory barriers, the dissemination of the benefits of water reuse, as well as its promotion through and its promotion through lines of research and financing.
Both the EU's Circular Economy Action Plan and the new Circular Economy Strategy (in which the reuse of wastewater can be included) also includes among its objectives the following
contribute to mitigating greenhouse gases and preventing pollution (by incorporating nutrients from wastewater treatment back into the water nutrients from wastewater treatment back into the water cycle for irrigation).
o National Plan for Adaptation to Climate Change
21 (hereinafter PNACC), improving the integration of climate change adaptation and water resource management measures to contribute to sustainable development, sustainable development. The

PNACC, prepared by the Spanish Climate Change Office (OECC), constitutes a reference framework for coordination among public administrations in impact, vulnerability and vulnerability activities to assess impacts, vulnerability and adaptation to climate change in Spain.
Its main objective is to achieve the integration of climate change adaptation measures based on the best available knowledge in all public administrations.
knowledge available in all sectoral and natural resource management policies that are vulnerable to climate change, and to the
vulnerable to climate change, in order to contribute to sustainable development. As water resources being one of the sectors most vulnerable to climate change, the PNACC assesses this vulnerability, given that the corresponding vulnerability, given that the corresponding increase in temperature and, in Spain, the general decrease in precipitation, cause precipitation in general, will cause a reduction in water supplies and a change in water demand in the
water demand in irrigation systems. The PNACC defines a series of measures, activities and lines of work22 in relation to water resources for water assessments.
Reuse can contribute to this proper management by reducing water stress and nutrient discharges, alleviating scarcity and thus strengthening the adaptive capacity to cope with the effects of climate change and reducing nutrient runoff, mitigating scarcity and thus enhancing resilience to the effects of climate change, particularly in situations of prolonged drought, of climate change, particularly in situations of prolonged drought. In general, especially when treatment treatment standards are high, discharges of treated water are a positive contribution to receiving water bodies, since they
to the receiving water bodies, as they make it possible to maintain a quality compatible with good status and an adequate flow regime, particularly in situations of prolonged drought.
and an adequate flow regime, even compensating for other possible previous alterations.
For its part, reuse can help to reduce abstractions in bodies at risk of non-compliance and/or facilitate the transport of nutrients to the receiving water bodies, and/or facilitate that the nutrients transported by the wastewater be removed by the crops instead of ending up in the crops instead of ending up in the water environment.
Finally, the PNACC raises among the challenges for its updated version aspects related to improving participation and governance, strengthening inter-administrative coordination, so that efforts can be integrated at all levels, coordination, so that efforts at the European, state, regional and local levels can be integrated, synergies can be generated and mechanisms can be synergies and establish stable and effective mechanisms for cooperation, joint reflection and exchange of information and experiences, exchange of information and experiences.

(7) Are there any R&D or/and innovative projects completed/on going? (text, web links)

Imwater: https://www.imwater.es/
Retema: https://www.retema.es/
Aiju: https://www.aiju.es/
Life-Phoenix: https://life-phoenix.eu/

Any other comments/information

Not answered

Please upload any documents, photos etc here (if yiu have zip files, please use filemail.com or wetransfer.com to upload them. Pl send the link to harsha@nmbu.no)

aguas residuales.jpg

(98645 bytes)

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Please choose the CSUD area you wish to response (Please use the link again to reply under a new area)

Stormwater and flash floods management – Blue Green solutions

(1) National ambitions and legislation (names & weblinks)

NVE guidelines: https://publikasjoner.nve.no/veileder/2022/veileder2022_04.pdf
State planning guidelines for climate and energy planning and climate adaptation: https://lovdata.no/dokument/SF/forskrift/2018-09-28-1469
Climate adapeted stormwater management guidelines: https://www.nb.no/items/80200efa602d5a6855f622af3cc4a31f?page=0
The building code: https://dibk.no/regelverk/byggteknisk-forskrift-tek17
The pollution regulations: https://lovdata.no/dokument/SF/forskrift/2004-06-01-931
Plannin and Building Act: https://lovdata.no/dokument/NL/lov/2008-06-27-71
Norsk Standard: https://www.standard.no/fagomrader/bygg-anlegg-og-eiendom/parker-og-grontanlegg/blagronn-faktor/
NOU overvann: https://www.regjeringen.no/no/dokumenter/nou-2015-16/id2465332/

(2) State organizations and authorities responsible in coordination/implementation of the legislations (names & weblinks)

Direktoratet for byggkvalitet: https://dibk.no/
Norges vassdrags- og energidirektorat: https://www.nve.no/
Norsk Vann: https://norskvann.no/

(3) Non-Governmental /General public based initiatives to monitor implementation (names + weblinks)

Oslo kommune: https://www.nordrefollo.kommune.no/globalassets/nordre-follo/tjenester/plan-bygg-og-eiendom/byutvikling-og-arealplaner/dokumenter-og-veiledere/blagronn-faktor---brukerveiledning-for-blagronn-faktor-1.pdf

(4) What solutions/products are already practiced? What, when, coverage, etc (text, links)

In 2020, a survey was published by Norsk Vann. Municipalities were asked whether specific types of measures had been established in their own municipalities. The answers were as follows: 0 - 10% (blue and blue-green roofs), approx. 30% (controlled flood areas, permanent waters, green roofs), approx. 50% (raingardens, infiltration basins). Source: https://va-kompetanse.no/butikk/b-26-kunnskapsbehov-innen-overvann-og-klimatilpasning-kun-digital/

(5) What solutions/products are under development, which are not yet in full scale? (text, links)

The state and municipalities today require that storm water be handled according to nature-based principles. Measures to meet the requirement normally use natural processes such as collection, infiltration and evaporation to improve water quality and deal with extreme rainfall. There are generally many design variants, and also examples of suppliers who have tried to standardize nature-based solutions. For example:

* https://www.milford-global.com/articles/oasis-the-complete-blue-green-solution
* https://www.skjeveland.no/va/overvannsh%C3%A5ndtering/alma-regnbed-200

(6) What are the national trends

National trends:

* Increased socio-economic awareness of climate adaptation measures (in fact, the requirements for recurrence intervals for rainfall have been reduced in recent years)
* More conscious handling of uncertainty in calculations/design
* Constantly increasing focus on choosing blue-green solutions over traditional systems.
* Increased awareness related to the risk aspect for flood damage
* Increased awareness of the added value of blue-green solutions

(7) Are there any R&D or/and innovative projects completed/on going? (text, web links)

* https://www.klima2050.no/
* https://www.nmbu.no/prosjekter/node/43212
* https://www.baerum.kommune.no/tjenester/vann-og-avlop/miljo-overvann-og-klimatilpasning/fremtidsfremtidsrettet-overvannshandtering/beskrivelse-av-behov/
* https://www.niva.no/en/projectweb/newwaterways
* https://www.spare-project.com/

Any other comments/information

Not answered

Please upload any documents, photos etc here (if yiu have zip files, please use filemail.com or wetransfer.com to upload them. Pl send the link to harsha@nmbu.no)

Not answered

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Innovative/intelligent water supply – treatment and distribution

(1) National ambitions and legislation (names & weblinks)

National goals for water and health under UNECE:
https://www.mattilsynet.no/mat_og_vann/drikkevann/nasjonale_maal_vann_og_helse/

Sector goals set forth by Norsk Vann: https://norskvann.no/wp-content/uploads/Norsk_Vanns_strategiplan_-2023_2026.pdf

"Drikkevannsforskriften" with guidelines:
https://lovdata.no/dokument/SF/forskrift/2016-12-22-1868
https://www.mattilsynet.no/om_mattilsynet/gjeldende_regelverk/veiledere/veiledning_til_drikkevannsforskriften.25091

(2) State organizations and authorities responsible in coordination/implementation of the legislations (names & weblinks)

Matillsynet: http://www.mattilsynet.no/
Folkehelseinstituttet: http://www.fhi.no/
Helse og omsorgsdepartementet: https://www.regjeringen.no/dep/hod/
Landbruks- og matdepartementet: http://lmd.regjeringen.no/

(3) Non-Governmental /General public based initiatives to monitor implementation (names + weblinks)

Norsk Vann (advocacy organisation for water sector): http://www.norskvann.no

(4) What solutions/products are already practiced? What, when, coverage, etc (text, links)

Some examples of dynamic pressure reduction valves to optimize pressure with demand variation (e.g. Bergen, Oslo)

Some examples of using turbines to extract hydropower instead of PRVs where energy is lost to heat (Glitrevannverket)

No-dig methods for pipe rehabilitation

(5) What solutions/products are under development, which are not yet in full scale? (text, links)

There are some efforts to develop no-dig methods for connecting service lines to mains (e.g. no-dig challenge for Oslo municipality)

(6) What are the national trends

Focus on online monitoring of the distribution system (hydraulics and water quality), which historically has been low

(7) Are there any R&D or/and innovative projects completed/on going? (text, web links)

RENVANN and LEAKNOR: https://blogg.hallingplast.no/tre-prosjekter-bedre-vannforsyning

PhD projects at NTNU and NMBU focusing on pressure management, leakage management

Any other comments/information

Not answered

Please upload any documents, photos etc here (if yiu have zip files, please use filemail.com or wetransfer.com to upload them. Pl send the link to harsha@nmbu.no)

Not answered

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Please choose the CSUD area you wish to response (Please use the link again to reply under a new area)

Innovative surveillance concepts for air and water quality surveillance

(1) National ambitions and legislation (names & weblinks)

Spanish legislation on air quality currently in force is represented by the following regulations:

Law 34/2007, of November 15, 2007, on air quality and protection of the atmosphere.
This law updates the legal basis for developments related to the evaluation and management of air quality in Spain, and its ultimate aim is to achieve optimum levels of air quality in order to avoid, prevent or reduce risks or negative effects on human health, the environment and other assets of any nature. It empowers the government to define and establish air quality objectives and minimum requirements for air quality assessment systems, and serves as a regulatory framework for the development of national, regional and local plans for the improvement of air quality.

Royal Decree 102/2011, of January 28, on the improvement of air quality.
This regulation transposes to the Spanish legal system the contents of Directive 2008/50/EC of May 21, 2008 and Directive 2004/107/EC of December 15, 2004.

It is approved with the purpose of avoiding, preventing and reducing the harmful effects of the mentioned substances on human health, the environment as a whole and other goods of any nature.

This royal decree was amended by Royal Decree 678/2014 to modify the carbon sulfide quality objectives established in the single transitory provision, and by Royal Decree 39/2017, to transpose into our legal system Directive 2015/1480, which establishes rules regarding reference methods, data validation and location of measurement points for the assessment of ambient air quality, and to incorporate the new information exchange requirements established in Decision 2011/850/EU. In addition, this last royal decree provides for the approval of a National Air Quality Index to inform citizens, in a clear and homogeneous manner throughout the country, about the quality of the air they are breathing at any given moment.

In January 2023, Royal Decree 34/2023 was approved, amending Royal Decree 102/2011, together with other environmental regulations, to incorporate the provisions of the Framework Plan of Action in the short term in the event of high pollution episodes.

Legislation related to water quality surveillance: https://www.miteco.gob.es/es/agua/legislacion/

(2) State organizations and authorities responsible in coordination/implementation of the legislations (names & weblinks)

Regional and local air quality networks.

The Autonomous Communities and Local Authorities in Spain, according to their competences established in the current legislation, are responsible for managing air quality data measurement networks. At present, the ambient air quality monitoring networks in Spain have more than 600 fixed measuring stations, distributed throughout Spain. The number of analyzers exceeds 4,000. Here are the links to the Spanish air quality assessment networks:

Andalucia: https://www.juntadeandalucia.es/temas/medio-ambiente/emisiones/calidad.html.

Aragón: https://aragonaire.aragon.es/es/inicio.

Zaragoza Town Hall: https://www.zaragoza.es/sede/portal/medioambiente/calidad-aire/

Asturias: https://medioambiente.asturias.es/general/-/categories/765754

Balear Islands: http://www.caib.es/sites/atmosfera/es/introduccion-3183/

Canary Islands: https://www3.gobiernodecanarias.org/medioambiente/calidaddelaire/inicio.do

Cantabria: https://airecantabria.com/

Castilla-La Mancha: https://www.castillalamancha.es/gobierno/desarrollosostenible/estructura/vicmedamb/actuaciones/vigilancia-y-control-de-la-calidad-del-aire

Castilla y León: https://medioambiente.jcyl.es/web/es/calidad-ambiental/atmosfera.html

Cataluña: https://mediambient.gencat.cat/es/05_ambits_dactuacio/atmosfera/index.html

Valencian Community: https://agroambient.gva.es/es/web/calidad-ambiental/calidad-del-aire

Extremadura: https://www.airextremadura.es/

Galicia: https://www.meteogalicia.gal/Caire/index.action

Madrid Community: http://gestiona.madrid.org/azul_internet/run/j/AvisosAccion.icm

Madrid Town Hall: https://airedemadrid.madrid.es/portal/site/calidadaire

Murcia Region: https://sinqlair.carm.es/calidadaire/

Navarra Community: https://www.navarra.es/es/calidaddelaire

Vasque Country: https://www.euskadi.eus/web01-a2ingair/es/contenidos/informacion/red_calidad_aire/es_def/index.shtml

La Rioja: https://www.larioja.org/medio-ambiente/es/calidad-aire-cambio-climatico

Ceuta: https://www.ceutaica.es/

Melilla: https://www.melilla.es/melillaportal/contenedor.jsp?seccion=s_fdes_d4_v1.jsp&contenido=3703&nivel=1400&tipo=6&codResi=1&language=es&codMenu=200&codMenuPN=601&codMenuSN=8.

In addition to the regional and local air quality assessment networks, the Ministry manages, through the State Meteorological Agency, the EMEP/VAG/CAMP network, which has the following objectives:

- To know the structure and physical and chemical composition of the atmosphere over the national territory.

- To obtain information on transboundary pollution (understood as atmospheric pollution whose physical source is totally or partially located in an area under the national jurisdiction of one State and which produces harmful effects in an area under the jurisdiction of another State at such a distance that it is generally not possible to distinguish the contributions of individual sources or groups of emission sources) and on background atmospheric pollution (understood as the levels of pollutants present in areas not directly affected by their emitting sources and which are representative of a large extension of territory).

- To comply with the obligations acquired by Spain through the Geneva Convention on Long-range Transboundary Air Pollution, and specifically through its Cooperation Program for the Continuous Monitoring and Evaluation of Long-range Transmission of Air Pollutants in Europe (EMEP); the Global Atmosphere Watch (GAW) project, part of the World Meteorological Organization's (WMO) Programme for Research on Atmosphere and Environment (PIAMA); and the Oslo-Paris Convention (OSPAR) for the Protection of the Marine Environment of the North-East Atlantic, specifically its Comprehensive Atmospheric Monitoring Program (CAMP).

In the AEMET web page the real time information of the stations of the network as well as information of the EMEP/VAG/CAMP programs can be consulted, where it can be found, among others, a description of the stations and the historical data obtained in the same ones.

(3) Non-Governmental /General public based initiatives to monitor implementation (names + weblinks)

AEMET: http://www.aemet.es/es/eltiempo/observacion/contaminacionfondo
CIEMAT: http://www.ciemat.es/cargarLineaInvestigacion.do?identificador=21&idArea=7
CSIC-IDAEA
http://www.idaea.csic.es/index.php?option=com_ogngrups&view=detall_grup&Itemid=97&cid=40&lang=es
IGN: http://www.ign.es/ign/main/index.do
ISCIII: https://www.isciii.es/QueHacemos/Servicios/SanidadAmbiental/Paginas/CalidadAire.aspx
Ecologistas en acción: https://www.ecologistasenaccion.org/areas-de-accion/calidad-del-aire/
Greenpeace: https://es.greenpeace.org/es/
Bio-diversity foundation: https://fundacion-biodiversidad.es/
Charity Water: https://www.charitywater.org/about

Aquae Foundation: https://www.fundacionaquae.org/

Clean Water Fund: https://cleanwaterfund.org/

Global Water Challenge: https://globalwaterchallenge.org/

Global Water Leaders: https://www.globalwaterleaders.org/

The Water Project: https://thewaterproject.org/

World Resources Institute: https://www.wri.org/

Water.org: https://water.org/

(4) What solutions/products are already practiced? What, when, coverage, etc (text, links)

Genaq: A firm that has developed an atmospheric water generator that replicates the natural process of rain and can operate in areas with up to 20% relative humidity. http://www.genaq.com/es/.

Cartometrics: Firm oriented to water and wastewater infrastructure management, which can be applied in public and private facilities, municipalities or large industries. It has developed a platform based on satellite and machine learning. The platform also uses statistical data on consumption patterns, detecting possible fraud in the use of water, among others, https://www.cartometrics.com/.

Aquaradar: Water quality monitoring technologies that can be applied in public and private infrastructures, municipalities, industries and water agencies or authorities. In this area, It is an early warning system for sustainable water management, which generates data through sensors and external sources, collects all the information in your cloud and transforms it into useful information for decision making: https://www.aquaradar.net/.

In the field of precision agriculture, which can be useful both for crops and for cities or municipalities, some Spanish companies have provided their solutions.

the Graniot grenadine, which consists of a web platform for irrigation management, based on satellite, climatic and input data from farmers, and can program irrigation and manage irrigation networks through soil moisture monitoring: Graniot: https://graniot.com/.

Aonchip: it has developed IoT sensors to monitor and control water use, which allows the control of landscape irrigation in cities and the monitoring of water stress and irrigation programming in crops: https://www.aonchip.com/.

Spherag has developed an innovative platform that combines cloud and IoT for farm control. It combines solar-powered wireless sensors and a digital twin platform (using satellite and weather data). It allows to monitor the flow and follow the water consumption in real time. It Includes calibration and alerts, irrigation management, field monitoring and crop remote sensing: https://spherag.com/.

UTW has developed a model, called CropSense, integrated into a platform that, thanks to Hybrid Remote Sensing (HRS) technology, gives farmers personalized recommendations on water requirements, saving up to 30% of irrigation. It increases crop yields through machine learning data services and includes plot digitization, irrigation water management and monitoring of water stress to production and crop monitoring: https://www.utw.es/.

(5) What solutions/products are under development, which are not yet in full scale? (text, links)

Aero-H2O: it is a spin-off of the startup company Huvr Trek Group SL, which makes jet engines using green fuels from liquid nitrogen and dry icehttps://sites.google.com/view/aero-h2o/home

Agualytics: It has developed a digital platform for monitoring and asset management using IoT. It obtains data that is stored in the cloud and processed through big data to transform it into useful information in decision-making, an affordable and versatile solution that guarantees access to quality water to the agricultural sector: https://agualytics.com/.

(6) What are the national trends

The Plan de Impulso al Medio Ambiente para la Adaptación al Cambio Climático en España (PIMA Adapta) is an initiative launched by MAPAMA in March 2015 with the aim of launching, on a pioneering basis and with a vocation for continuity over time, specific projects for adaptation to climate change. PIMA Adapta is part of the National Plan for Adaptation to Climate Change (PNACC) and includes actions in the areas of coasts, the public water domain and National Parks.

The development of PIMA Adapta in the area of water management and the associated public water domain is known as PIMA Adapta-AGUA, and its objective is to improve knowledge and monitoring of the impacts of global change and climate change in this area, minimizing its risks and increasing the resilience of the system in the face of climate change.

Its period of validity extends until 2020, coinciding with the Third Work Program of the PNACC, in accordance with the European Adaptation Strategy.

PIMA Adapta-AGUA projects and actions are developed along four strategic lines, which include all the categories of adaptation options proposed by the Intergovernmental Panel on Climate Change in its Fifth Assessment Report (AR5):

River nature reserve (RNF) management and adaptation measures.

Adaptation to extreme events.
Assessment of the impact of climate change on water resources and development of adaptation strategies.
Development of climate change adaptation projects in the public water domain.

Short-term Framework Action Plan for high pollution episodes
The Environment Sectorial Conference, in its meeting of July 9, 2021, approved the Short-term Framework Action Plan in case of high pollution episodes for airborne particles below 10 microns (PM10), particles below 2.5 microns (PM2.5), nitrogen dioxide (NO2), ozone (O3) and sulfur dioxide (SO2).

The plan establishes homogeneous values and actions for all the administrations, so that the responses to pollution alert situations and the actions that could be implemented are similar for each of the levels of action, regardless of the geographical area.

The ultimate aim of the Plan is to avoid, as far as possible, reaching the alert threshold established in the legislation and to reduce the number of occasions in which the limit or short-term objective values (daily, hourly or 8-hourly) of the legislation are exceeded in order to protect the health of the population from poor air quality. As a novel element, the plan introduces the predictive component.

Administrations that already have short-term action plans and protocols for action in the event of pollution episodes will have a maximum period of 18 months to adapt them to the provisions of this Framework Plan.
In January 2023, Royal Decree 34/2023 was approved, amending Royal Decree 102/2011, together with other environmental regulations, to incorporate the provisions of the aforementioned Framework Plan for short-term action in the event of high pollution episodes.

(7) Are there any R&D or/and innovative projects completed/on going? (text, web links)

The Blue Future: This company works in soil regeneration and saving water with a patented system of irrigation with microalgae. https://thebluefuture.org/.

Innosuns: for the treatment of waste water. Its technology consists of the treatment by an electrochemical process, called electrocoagulation, which simultaneously separates heavy metals, solids, emulsified organic compounds and many other pollutants from water, using electricity instead of chemical reagents. http://www.innosuns.es/es/

Any other comments/information

Not answered

Please upload any documents, photos etc here (if yiu have zip files, please use filemail.com or wetransfer.com to upload them. Pl send the link to harsha@nmbu.no)

Nettskjema

water and air quality surveillance.jpg
(8520 bytes)

Nettskjema

Submission: 26848270

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Please choose the CSUD area you wish to response (Please use the link again to reply under a new area)

Innovative/intelligent water supply – treatment and distribution

(1) National ambitions and legislation (names & weblinks)

Royal Decree 3/2023, of January 10, establishing the technical-sanitary criteria for the quality of drinking water, its control and supply; https://www.boe.es/eli/es/rd/2023/01/10/3

Royal Legislative Decree 1/2001, of 20 of July, which approves the revised text of the rewritten text of the Water Law: https://www.boe.es/eli/es/rdlg/2001/07/20/1/con.

- Law 10/2001, of July 5, 2001, on the National Hydrological
National Hydrological Plan: https://www.boe.es/eli/es/l/2001/07/05/10/con.

- Royal Decree 907/2007, of July 6, 2007, which approves the Regulations which approves the Regulation of the Hydrological Planning: https://www.boe.es/eli/es/rd/2007/07/06/907.

- Order ARM/2656/2008, of September 10, 2008, approving the
September, approving the Hydrological Planning Instruction:
https://www.boe.es/eli/es/o/2008/09/10/arm2656.

- Regulation of the Public Domain that develops the preliminary, I, IV, V, VI, VII and VIII of the revised text of the of the rewritten text of the Water Law, approved by the Royal Legislative Decree 1/2001, of July 20, 2001: https://www.boe.es/buscar/act.php?id=BOE-A-1986-10638.

(2) State organizations and authorities responsible in coordination/implementation of the legislations (names & weblinks)

Ministry for Ecological Transition and
Transition and the Demographic Challenge (MITERD): https://www.miteco.gob.es/es/

Ministry of Agriculture, Fisheries and Food (MAPA):
https://www.mapa.gob.es/es/

(3) Non-Governmental /General public based initiatives to monitor implementation

(names + weblinks)

National Water Council:
It is the Government's advisory body on water matters, attached to the MITERD, which reports on the draft of the National Hydrological
project of the National Hydrological Plan of Basin
before its approval by the Government.
Demarcation Water Council: It is a planning body that raises
to the Government through the MITERD the hydrological plan of the
the hydrological plan of the basin and its subsequent revisions.
revisions.

Exploitation Boards of the Hydrographic
Hydrographic Confederations: Management body that coordinates the exploitation of hydraulic works and resources.

Commissions for the Discharge of the Hydrographic
Hydrographic Confederations:
They are in charge of deliberating and
formulate proposals to the President of the
Confederation on the filling and emptying regime
and emptying of the basin's reservoirs and aquifers.
basin.

Committee of Competent Authorities:
This is the body for cooperation between the
different competent territorial administrations.
administrations. Taking into account that
the administration (state, autonomous and
local) has competences in the management and
protection of waters (inland and coastal)
(inland and coastal), the need arises to establish
a committee that brings together representatives of all of them
all of them to promote their collaboration and
and cooperation in this field. This committee
is regulated in the Water Law in the case of the hydrographic
the case of river basin districts with intercommunity basins
with intercommunity basins and, in addition,
its composition, operation and powers are
regulated by Royal Decree 126/2007, of February 2, 2007.
Decree 126/2007, of February 2.
The objective of these committees is to guarantee

cooperation in the application of water protection
of water protection regulations, and their creation does not affect the ownership of competences in matters related to water management related to water management that correspond to the
the different administrations, nor those corresponding to the
administrations, nor those corresponding to the
to the State Administration deriving from international, bilateral or
international, bilateral or multilateral agreements.
In practice, however, the Competent Authority Committees are
of Competent Authorities are almost a regional lobbying
almost a regional lobbying element in the demand for
and actions on rivers, being relatively politicized
and actions on the rivers, being relatively politicized,
which can be detrimental to decision
decisions related to Hydrological Planning.
Hydrological Planning.
Likewise, cooperation between the different levels of
levels of government, despite being accommodated in these
in these committees, still needs some improvement to be effective and efficient.
to be effective and efficient.
Despite the existence of these bodies,
it should be noted that economic, social and environmental
economic, social and environmental organizations are only
only represented in the National Water Council and the Water Council and the Demarcation Water Council
Council, but they do not participate in the confederations' management bodies of the confederations, and therefore, it is common for them to demand and their participation quota to ensure that their interests to ensure that their interests have a greater weight in decision-making.
interests have a greater weight in decision-making. There is still
There is still a great weight of traditional users, and the
traditional users, and there is a lack of functional working
functional working groups and conflict resolution
systems.

(4) What solutions/products are already practiced? What, when, coverage, etc (text, links)

The main instruments for dealing with the problems and challenges posed by water management in Spain and the impacts of climate change are described below.
Demarcation Hydrological Plans
The 2022-2027 hydrological plans differ from the previous ones in that they contemplate more extensively and explicitly the risk of climate change and the need for water resource management to adapt to this risk, in order to increase water security and the resilience of the systems.

And, no less important, the need for these plans to contemplate the European and global objectives that Spain has committed to meet and that Spain has undertaken to comply with, especially the European Green Pact, as a framework that must make water security and the resilience of the systems compatible.
For this reason, a fundamental axis The environmental quality of water bodies is prioritized as the main indicator of the robustness and guarantee of water management systems in our country. management systems in our country.
In addition, river basin hydrological plans are coordinated with different sectoral plans in order to harmonize the needs of the different sectors that have an impact on water, such as land use, energy policy or irrigation policy.
As regards the way in which each plan addresses the responses to the problems, the well-known DPSIR (Driving Forces-Pressures-State-Impacts-Responses) methodology of the European Environment Agency is applied.
Environment Agency, which constitutes the reference framework for the application of the Water Framework Directive.
National River Restoration Strategy
The National Strategy for River Restoration (ENRR) was launched in 2005. A little more than 15 years since its initial promulgation, a second phase of ENRR development is currently underway, to update the Strategy's objectives and development mechanisms.
Its most important lines of action are: improvement of the hydrosedimentary regime of watercourses, restoration of longitudinal connectivity through the removal or permeabilization of transverse obstacles,
the restoration of transverse connectivity by reconnecting channels and floodplains, the restoration of aquatic habitats, and the
restoration of aquatic and riparian habitats, eradication and control of invasive species in inland aquatic and riparian environments.
and riparian habitats, the eradication and control of invasive species in inland aquatic and riparian environments, the implementation of awareness-raising and
and awareness-raising activities and the development of actions to improve knowledge and innovation.
A fundamental element for understanding river restoration and concretizing it in concrete and representative actions is the catalog of Hydrological Reserves, which constitute a figure of protection aimed at preserving those bodies of water with little or no human intervention and in very good ecological condition.
As part of the process of revising the Hydrological Plans for the third planning cycle (2022- 2027), a number of hydrological reserves have been identified, whose characteristics make them worthy of being catalogued as hydrological reserves. With the approval of this proposal, the National Catalog of Hydrological Reserves will now include a total of 289 reserves, of which 161 are river nature reserves, 19 are river nature reserves, and 22 subway nature reserves. Special mention should be made of the climate change monitoring proposed for 37 intercommunity river nature reserves. intercommunity nature reserves.

Strategic Plan for Wetlands (PEH)
Wetlands can play an important role in mitigating climate change, in flood mitigation, in providing water security, and in providing water security and enriching the biodiversity of ecosystems. The Wetlands Strategic Plan identifies the main threats to wetlands. And it establishes numerous lines of action to revitalize these ecosystems for their undoubted social, environmental and economic values.
Flood Risk Management Plans (PGRI)
The Mediterranean arc in which Spain is located has precipitation intensity indexes that are difficult to compare with other European areas.
In some areas of our country the maximum daily precipitation can be of the order of the average annual precipitation.
This causes, in conjunction with the characteristics of the basins, a great disproportion
Currently in Spain there are 19,900 km of delimited and published flood zones, but it is necessary to generate new cartography of the public hydraulic domain and flood zones in alpine areas.
and floodable areas of at least.
Special Drought Plans (PES)
The highly irregular rainfall pattern in our country means that management systems must be prepared to cope with extreme drought situations. To be prepared to deal with extreme drought situations. This phenomenon is likely to be aggravated by the effects of climate change.
The irregular rainfall patterns in our country mean that management systems must be prepared to deal with extreme drought situations.
drought planning a fundamental element of water management in our country.
It should be noted that the special drought plans do not deal with the problem of structural shortages, associated with permanent problems of meeting water demand and not the result of a temporary situation originated by the anomaly in the precipitations.
This structural shortage has to be analyzed, assessed and solved through the ordinary hydrological planning.
However, water management systems cannot be designed to operate normally in temporary situation of extreme scarcity, because it would mean assuming extraordinary costs and installing an excess of water.
For this reason, the Special Drought Plans (PES) are not, in any case, a framework for the approval of new construction projects.
new construction projects, but are rather resource management plans for extreme situations,
The Special Drought Plans (PES) include systems of indicators, which are an objective and useful tool for decision-making.
and useful tool for decision making. Thus, the objective application of measures in the initial phases of scarcity delays, and sometimes prevents, the and sometimes avoids the arrival of the most severe phases (alert and emergency).
Groundwater Action Plan
Groundwater is an essential resource for meeting
essential to meet water demands along with other types of resources with other types of resources,

within the framework
integrated water resources management.
They are also a strategic resource in drought situations.
drought situations. Reasons why a priority objective of the
of the strategy should be to achieve and maintain a good
and maintain a good quantitative and chemical status of groundwater bodies.
However, given that there are still 40% of groundwater bodies in our country in poor condition, and the fact that no significant improvements have been observed in recent years, the need arises
the fact that no significant improvements have been observed in recent years, the need arises to enhance knowledge and proper management through the Groundwater Action Plan.
to enhance their knowledge and correct management through the Groundwater Action Plan.
The main lines of action considered in the Action Plan are as follows: improving knowledge of groundwater, improving the
knowledge of groundwater, the extension and improvement of control networks, the analysis of the representativeness of the data
of data representativeness, the measurement, monitoring and control of groundwater uses, protection against groundwater
protection against groundwater deterioration, particularly against nitrates and pesticides, emerging pollutants and marine intrusion, the improvement of regulations and the necessary legal and regulatory modifications.
Water Treatment, Sanitation, Efficiency, Saving and Reuse Plan (DSEAR Plan)
The DSEAR Plan was approved by ministerial order in 2021 with the objective of revising the intervention strategies for the implementation of the measures that materialize the water policy in areas such as water treatment, sanitation and reuse,
sanitation and reuse.
The DSEAR Plan is not an ordinary planning, in the sense of including the determination of what, when, how and by whom certain actions are to be carried out, nor certain actions, nor is it associated with a list of investments. It is an instrument of governance in which a critical analysis of the water treatment sectors is established,
and reuse of water in Spain, identifies the problems detected in seven areas or objectives of governance, and develops a list of investments.
PERTE Digitalization of the water cycle
The digitization of the water sector, either by compiling data and information on water resources data and information on water resources, or by making it available so that administrations,
water users and citizens can use it, and by setting up a computerized system and by setting up a computerized system that
system that facilitates citizens' relations with the water administration, is an essential task in relation to the efficient and fair
in relation to the efficient and fair management of water.
In this sense, by Agreement of the Council of Ministers of March 22, 2022 approved the Strategic Project for the

Strategic Project for Economic Recovery and Transformation (PERTE) for the digitalization of the water cycle, which is
cycle, which is expected to mobilize 3,060 million euros in the
3.06 billion euros in public and private investments over the next few years, and will activate the
3,060 million in public and private investments, and will trigger the creation of nearly
3,500 quality jobs, especially in the fields of engineering, data
engineering, data processing, science and telecommunications,
The PERTE will finance aid programs for the promotion of digitalization
digitalization of the different users of the Nerja WWTP, Cuencas Mediterráneas Andaluzeas
Nerja WWTP, Cuencas Mediterráneas Andaluzas (Málaga, Andalucía)
20
Executive summary
Strategic Orientations on Water and Climate Change
water, with an investment by the General State Administration of some 1,700 million euros. In addition,
225 million euros to modernize and promote digitalization in the basin organizations and the Automatic Water Information Systems.
in the basin organizations and the Automatic Hydrological Information Systems.
Improving water governance
The improvement of water governance includes the review and strengthening of legal and regulatory frameworks,
coordination and institutional mainstreaming of water policy, participation of relevant social stakeholders, access to information
access to information, transparency and accountability as preliminary steps for participation, and, very importantly, access to information, transparency and accountability as preliminary steps for participation.
participation, and very importantly, the review of the financial mechanisms that are known, have worked and can work.
and can work.
MITECO undertook an ambitious study in 2020 to detect these governance gaps and propose institutional, legal, participatory and participatory solutions.
institutional, legal, participatory and financial solutions, in the "Green Paper on Water Governance in Spain", a document that
in Spain", a document that provides appropriate guidance on how to address water governance in the coming years in our country.
governance over the next few years in our country.
These principles are consistent with the characteristics promoted by the Green Paper on the general model of governance, which inspire
governance model, and which inspire this Strategy: coordination and coherence of sectoral policies, participation and co-responsibility, and information, participation and co-responsibility, and information, participation and co-responsibility,

participation and co-responsibility and information, monitoring and continuous evaluation to apply decision-making criteria in the prioritization of actions.
criteria in the prioritization of public actions.
Adaptation of the legal framework
The Revised Text of the Water Law (TRLA) is the main regulation that establishes the bases for water management in our country.
management in our country. It is a text that was originally approved in 1985, and since then it has undergone many reforms, especially in the area of water management.
has undergone multiple reforms, especially in relation to European water legislation, but also in an attempt to improve different aspects of water management in Spain.
For this reason, the strategy will emphasize the need to
the need to approve a new amendment to the TRLA with the
to establish a clearer and more structured text that will
that attempts to resolve the numerous problems in water
problems in water management that have been observed in recent years, focusing on environmental on protection and water security and seeking a more streamlined and modern water administration.
Reform of the economic-financial regime
The objectives related to the economic-financial
financial regime must make effective the application of the
the application of the polluter-pays principle, the principle of
recovery of costs and, of course, and in relation to the human right to water.
It should be recalled that according to Spanish legislation, the amount collected for water use is only intended to recover the costs that the administrations assume to serve the water.
is only intended to recover the costs that the administrations assume to serve the water. However, the current economic system only serves to recover 70% of the costs of water, which is passed on to the end users of the water.
The existing collection gap is a major barrier to the implementation of the measures needed to achieve the environmental objectives in the environment.
to achieve the environmental objectives in the water environment. In the coming years, steps should be taken to achieve full cost recovery, which would achieve full cost recovery, with the exceptions already included in the current regulations.

In order to develop this Strategy, articulated in the sectoral plans described above and coordinated with the National Plan for Adaptation to Climate Change, the time horizon established is
with the National Plan for Adaptation to Climate Change, the time horizon established is 2030, with four significant milestones:
- Year 2022: approvals of the main water planning instruments: Basin hydrological plans, river basin management plans, water management plans, and water resources management plans.
plans, Flood Risk Management Plans, National River Restoration Strategy, and Groundwater Action Plan.

- Year 2025: completion of the first work program of the National Plan for Adaptation to Climate Change.

- Year 2027: completion of the third cycle of hydrological planning and the second cycle of flood risk planning.

- Year 2030: completion of the horizon of the Strategy and the National Plan for Adaptation to Climate Change.

These strategic orientations on water and climate change will be reviewed and updated during the year 2030.
in coordination with the revision of the National Plan for Adaptation to Climate Change 2021- 2030.

(5) What solutions/products are under development, which are not yet in full scale? (text, links)

Giving continuity to the regional work programs developed in Ibero-America by the Permanent Technical Secretariat of the Conference of Water Directors of Ibero-America (CODIA) and in the Mediterranean, through the Mediterranean Network of Basin Organizations (MENBO) and continuing with the work program of the Commission for the Implementation and Development of the Convention (CADC).
Creating a "Spanish Water Partnership" made up of institutions of the Public Administrations, representatives of companies in the water sector, research centers and universities, with the aim of facilitating Spain's presence in the numerous international water forums.

(6) What are the national trends

Adequate implementation of the EU regulatory framework and policies. Mainly the Water Framework Directive 2000/60/EC (WFD) and its related directives, the Urban Waste Water Treatment Directive 91/271 on Urban Waste Water Treatment, Directive 91/676 on the Protection of Water against Nitrate Pollution, Directive 2007/676 on the Protection of Water against Nitrate Pollution, and Directive 2007/60 on Flood Risk Assessment and Management, and Directive (EU) 2020/2189/EC. Directive (EU) 2020/2184 on the quality of water intended for human consumption, among others.
Water planning in a framework of adaptation to climate change
Implementing the new hydrological planning cycle (2022-2027), which is expected to be approved during 2022 in the 25 demographic 2022 in the 25 river basin districts. The purpose of the hydrological plans is to achieve the environmental environmental objectives for the bodies of water and associated ecosystems, as well as meeting the demands for the different uses, compatible with the
demands for the different uses, compatible with good water status, within a framework of adaptation to climate change, in coordination
to climate change in coordination with the Law on Climate Change and Energy Transition and the implementation of the
the implementation of the First Work Program of the National Plan for Adaptation to Climate Change

2021-2030.
Recovering, restoring and protecting rivers, lakes, aquifers and wetlands.
Promoting the National Strategy for River Restoration (ENRR), including actions aimed at conserving and recovering their good condition and recovering their good condition, minimizing the risks of flooding through a correct management of the fluvial space, compatibility management of the fluvial space, the compatibility of land uses with flood zones, the reordering of flood-prone areas, the recovery of flood-prone the recovery of riverbanks and meanders, and the expansion of river areas and green infrastructures through the implementation of several green infrastructures through the implementation of various nature-based solution projects.
Implementing measures for the recovery of aquifers through the reduction of groundwater abstraction by replacing groundwater extraction by replacing it with alternative resources, especially from reuse and desalination.

Increasing water security. Promoting projects that contribute to saving and reducing water consumption through the efficient and rational use of resources, the reduction of water consumption, and the reduction of water consumption.
Promoting the expansion of the capacity of existing desalination plants and the construction of new facilities in certain cases, as well as and developing renewable energy projects that contribute to energy optimization and the reduction of energy and cost reduction.
Incorporating circularity measures in the water cycle, considering treated wastewater as a resource and not as waste, especially for use in agriculture and in the territories with the greatest water imbalances.
Developing integrated water systems that take into account all conventional and non-conventional resources and facilitate the management
conventional and non-conventional resources and facilitate the management of basin organizations, especially for the use in agriculture and in areas with the greatest water imbalances.

Advancing in water sanitation and purification
Promoting sanitation and purification actions in urban agglomerations included in the infringement procedures opened by the EC against the Kingdom of Spain or in those that are in a situation of infringement proceedings opened by the EC against the Kingdom of Spain or in those that are in a situation of non-compliance with the non-compliance with the Wastewater Directive.
Incorporating the latest innovations and technological advances in wastewater treatment facilities, which will allow them to be adapted to the new adaptation to the new requirements that will foreseeably result from the revision of the European Waste Water Directive.
European Wastewater Directive.
Promoting specific action plans for small and medium-sized urban agglomerations, which have greater difficulty in meeting the requirements of the European Wastewater Directive.
Establishing measures to reduce plastic pollution, seeking solutions to prevent these synthetic materials from reaching the sea.
Tackling diffuse pollution

Ensuring compliance with regulatory instruments aimed at protecting bodies of water from pollution caused by plastics.
pollution caused by nitrates, such as Royal Decree 47/2022, of 18 January, on the protection of water against diffuse pollutioncaused by nitrates from agricultural sources, approved in 2022.
agricultural sources, approved in 2022.
Implementing practices for the sustainable use of phytosanitary products, promoting integrated pest management and using alternative techniques to alternative techniques to phytosanitary products.
Advancing in flood risk management through the PGRIs.
Managing flood risks in a coordinated manner, integrating the effects of climate change into risk management and proposing
adaptation measures in the hydrological basins that minimize risks, such as natural retention measures and nature-based solutions such as green infrastructure.
infrastructures.
Modernizing hydrological information systems, linking weather forecasts from the AEMET with numerical models
AEMET weather forecasts with numerical models, real-time information and hazard maps, transmitting information to the
and promoting flood risk preparedness as a key tool of the National Civil Protection System.
Advancing in drought risk management through the PES
Managing drought risks in a coordinated way, integrating the effects of climate change into risk management and proposing
and proposing measures to manage these extreme situations according to the stage of drought in which drought is.
Improving the systems of indicators of prolonged drought and scarcity and developing models for forecasting these indicators in the short and medium term.
Recovering emblematic areas
Developing the Framework of Priority Actions for the Recovery of the Mar Menor, the actions to improve the knowledge and management of sediments in the Mar Menor, the actions to improve the knowledge and sediment management in the final stretch of the Ebro River within the framework of the Plan for the protection of the Ebro Delta, the measures for the policing of the public hydraulic domain.
And continuing with the Special Plan for Special Plan for the Control and Use of Water in the Zone of Influence of the Tablas de Daimiel National Park.
Innovating, researching and applying new technologies
Updating water status and quality monitoring systems, developing surveillance systems, and early warning of floods and droughts and improving the information available on the Ministry's web services.
Ministry's web services.
Advancing in the digitalization of hydraulic infrastructures, incorporating new management tools such as drones or Big Data analysis.
drones or Big Data analysis, which will be combined with remote sensing and the use of geographic

information systems.
Improving modeling studies of the hydrological cycle in order to anticipate future scenarios, which will enable correct decisions to be made.
This will allow correct decisions to be taken.
Incorporating into the Automatic Hydrological Information Systems (AHIS) the control of flows supplied to the main water users.
and connecting with the systems of other organizations and entities, and developing Decision Support Systems.
and developing Decision Support Systems (DSS) for flood and inundation management.
Promoting sustainable economic activities
Boosting economic reactivation and employment through the investments in water management and its infrastructures of the
infrastructure of the Recovery, Transformation and Resilience Plan (PRTR).
Supporting business projects that promote water circularity and water savings and efficiency in water use and focusing on nature-based solutions and green infrastructure.
Strengthening financing
Mobilizing from the General State Administration 10,000 million euros in 6 years in water management and its infrastructures.
and its infrastructures. At least 1.7 billion will come from the Recovery, Transformation and Resilience Plan (PRTR), which will
Resilience Plan (PRTR), promoting projects aimed, among others, at the recovery of rivers and aquifers, the minimization of flooding risks, sanitation, purification and reuse, as well as digitization.
Under the framework of the ERDF 2021-2027 program, investments for the recovery of rivers and aquifers, the minimization of flood risks, sanitation 2021-2027 program, investments for the next 8 years in water, estimated at about 1.5 million euros.
Building a transparent, equitable and participatory
transparent, equitable and participatory
Improving coordination between the different levels
of the administration and socio-economic stakeholders
for the proper functioning of the urban water cycle.

Integrating all social agents (users,
companies and administration), in the decision making process
and promoting the dissemination to citizens of the problems and challenges of water management.
Environmental volunteering.
Promoting the international water agenda
Promoting active participation in the multilateral organizations in which Spain is represented, in particular in the Intergovernmental Hydrological Program, WMO and OECD, and collaborating with UN-Water in the SDG6 Acceleration Framework.
Strengthening the role of water in climate change adaptation within the actions derived from the United Nations Framework Convention on Climate Change.

United Nations Framework Convention on Climate Change and the Paris Agreement, and in the Convention on Biological Diversity.
Promoting bilateral cooperation with countries with which agreements have been signed, in particular with Morocco, Algeria, France and Italy.

(7) Are there any R&D or/and innovative projects completed/on going? (text, web links)

Secaflor: rhttps://secalflor.de/es-co
Agrowanalytics: https://www.agrowanalytics.com/
visualNACert: https://visualnacert.com/
Butplanet: https://buntplanet.com/es/
Sinafis: https://www.sinafis.com/es/
Soonapse: https://www.soonapse.com/en/

Any other comments/information

Not answered

Please upload any documents, photos etc here (if yiu have zip files, please use filemail.com or wetransfer.com to upload them. Pl send the link to harsha@nmbu.no)

water.jpg
(6225 bytes)

Nettskjema

Submission: 27058371

Name

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Please choose the CSUD area you wish to response (Please use the link again to reply under a new area)

Intelligent transport solutions for freight and passenger transport (bus, ferry, trains, cars, bicycles etc),

(1) National ambitions and legislation (names & weblinks)

intelligent transport systems in the functional traffic area of the City of Split (https://strukturnifondovi.hr/natjecaji/poziv-za-sufinanciranje-uvodenja-inteligentnih-transportnih-sustava-na-funkcionalnom-prometnom-podrucju-grada-splita/)

(2) State organizations and authorities responsible in coordination/implementation of the legislations (names & weblinks)

The city of Split
The city of Solin
Croatian roads
Split Port Authority
Split County Road Administration

(3) Non-Governmental /General public based initiatives to monitor implementation (names + weblinks)

KING ICT https://king-ict.eu/
Ericsson Nikola Tesla https://www.ericsson.hr/

(4) What solutions/products are already practiced? What, when, coverage, etc (text, links)

-

(5) What solutions/products are under development, which are not yet in full scale? (text, links)

the introduction of intelligent transport systems that represent a management and information-communication superstructure of the classic transport system that will contribute to the creation of a more efficient transport system in the form of increased safety, productivity, transport efficiency and sustainability and the reduction of traffic congestion in the functional transport area of the city of Split, which, in addition to the city of Split, includes the area of the city of Solin.

(6) What are the national trends

Not answered

(7) Are there any R&D or/and innovative projects completed/on going? (text, web links)

Not answered

Any other comments/information

Not answered

Please upload any documents, photos etc here (if yiu have zip files, please use filemail.com or wetransfer.com to upload them. Pl send the link to harsha@nmbu.no)

Not answered

Nettskjema

Submission: 26822251

Name

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Please choose the CSUD area you wish to response (Please use the link again to reply under a new area)

Stormwater and flash floods management – Blue Green solutions

(1) National ambitions and legislation (names & weblinks)

Federal Water Act
https://www.gesetze-im-internet.de/whg_2009/index.html

in addition
state water acts

(2) State organizations and authorities responsible in coordination/implementation of the legislations (names & weblinks)

State water authorities (one for each of the 16 states)

Federal Environment Agency
www.umweltbundesamt.de

(3) Non-Governmental /General public based initiatives to monitor implementation (names + weblinks)

German Association for Water, Wastewater and Waste
www.dwa.de
Association of Engineers for Water Management, Waste Management and Land Improvement (BWK)
www.bwk-bund.de

guidelines for flood protection, stormwater management and urban stormwater management on
- technical levels (Standards of DWA)
- administrational levels

(4) What solutions/products are already practiced? What, when, coverage, etc (text, links)

local stormwater management
stormwater retention
stormwater infiltration

local water balances
Stormwater harvesting systems (many companies offering installations)
decentralised treatment systems for street runoff

(5) What solutions/products are under development, which are not yet in full scale? (text, links)

forecast and control systems for decentralised stormwater management
tree trench infiltration

(6) What are the national trends

implementation of local water balances during planning processes
increase of evaporation of stormwater
smart control and monitoring systems for runoff-control
flood control by using digital tools
water as an important element of urban planning processes

(7) Are there any R&D or/and innovative projects completed/on going? (text, web links)

Artificial intelligence for runoff-simulation in urban areas
integrated simulation of run-off, transport and discharge in water bodies
managment of decentralised storage units (green roof systems)

https://www.fona.de/en/

Any other comments/information

Unfortunately all of the documents are in German language.

Please upload any documents, photos etc here (if yiu have zip files, please use filemail.com or wetransfer.com to upload them. Pl send the link to harsha@nmbu.no)

Not answered

Nettskjema

Submission: 27058463

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Please choose the CSUD area you wish to response (Please use the link again to reply under a new area)

Innovative surveillance concepts for air and water quality surveillance

(1) National ambitions and legislation (names & weblinks)

Air quality in the Republic of Croatia (https://www.haop.hr/hr/baze-i-portali/kvaliteta-zraka-u-republici-hrvatskoj)

(2) State organizations and authorities responsible in coordination/implementation of the legislations (names & weblinks)

Ministry of Economy and Sustainable Development (https://mingor.gov.hr/default.aspx?id=7746)

(3) Non-Governmental /General public based initiatives to monitor implementation (names + weblinks)

Not answered

(4) What solutions/products are already practiced? What, when, coverage, etc (text, links)

Air quality in the Republic of Croatia Portal http://iszz.azo.hr/iskzl/

(5) What solutions/products are under development, which are not yet in full scale? (text, links)

Not answered

(6) What are the national trends

Not answered

(7) Are there any R&D or/and innovative projects completed/on going? (text, web links)

AIR POLLUTION CONTROL PROGRAM FOR THE PERIOD FROM 2020 TO 2029 https://narodne-novine.nn.hr/clanci/sluzbeni/2019_09_90_1786.html

Any other comments/information

Not answered

Please upload any documents, photos etc here (if yiu have zip files, please use filemail.com or wetransfer.com to upload them. Pl send the link to harsha@nmbu.no)

Not answered

Nettskjema

Submission: 26852811

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Please choose the CSUD area you wish to response (Please use the link again to reply under a new area)

Natural disaster risk management

(1) National ambitions and legislation (names & weblinks)

Law 17/2015 of 9 July on the National Civil Protection System: https://www.boe.es/eli/es/l/2015/07/09/17

(2) State organizations and authorities responsible in coordination/implementation of the legislations (names & weblinks)

UME: https://www.defensa.gob.es/ume/CONOCENOS/que-es/
CIvil Protection: https://www.proteccioncivil.es/coordinacion/snpc
National Emergency Protection: https://www.dsn.gob.es/es/sistema-seguridad-nacional/qu%C3%A9-es-seguridad-nacional/%C3%A1mbitos-seguridad-nacional/protecci%C3%B3n-ante

(3) Non-Governmental /General public based initiatives to monitor implementation (names + weblinks)

Acción contra el hambre: https://www.accioncontraelhambre.org/es/ayuda-ong-desastres-naturales
Risk Management Organization: https://www.gestiondelriesgo.org/

(4) What solutions/products are already practiced? What, when, coverage, etc (text, links)

Risks manual for natural disasters in Spain: https://www.miteco.gob.es/es/cambio-climatico/temas/impactos-vulnerabilidad-y-adaptacion/marcoeficazriesgosespana_tcm30-524627.pdf

(5) What solutions/products are under development, which are not yet in full scale? (text, links)

Not answered

(6) What are the national trends

barometer for national disasters: https://fundacionaon.es/wp-content/uploads/2022/11/BAROMETRO-DE-CATASTROFES-2021.pdf

early alert systems: https://www.iagua.es/noticias/redaccion-iagua/gobernanza-y-sistemas-alerta-temprana-claves-evaluacion-riesgo-catastrofes

(7) Are there any R&D or/and innovative projects completed/on going? (text, web links)

1. Microchips, sensors, big data, AI: what predictive technology looks like.

2. Startups against natural disaster risks

Some innovative projects:
ZESTY
DECARTES
CLOUD TO STREET
CAPE ANALYTICS
PLANET IQ
JUPITER

Any other comments/information

Not answered

Please upload any documents, photos etc here (if yiu have zip files, please use filemail.com or wetransfer.com to upload them. Pl send the link to harsha@nmbu.no)

risk.jpg
(13054 bytes)