



MANIFESTO

Dams & Reservoirs

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EurCOLD is the European regional interest group created in 1995 by the International Commission on Large Dams (ICOLD) to facilitate the interchange of knowledge and experience between countries with common interests, socio-economic backgrounds and environmental status.

By means of this **Manifesto** , EurCOLD aims to create awareness in Europe on the role that dams and reservoirs play in our society and, thus, call for a smarter governance framework.

This Manifesto is aligned with the **ICOLD** World Declaration “**Dams and Reservoir for Energy Transition and Adaptation to Climate Change** “



Encouraging the exchange of up-to-date information, guidelines and research studies on issues related to design, construction, operation and maintenance of dams, reservoirs and water resources systems, while boosting their sustainable development

Participating in public awareness activities to explain the social, environmental and economic benefits of dams and reservoirs and encouraging the organization of regular European Symposia on Dams and Reservoirs, including the launch of the DAMS and RESERVOIRS DAY

Facilitating the exchange of information on the legislation, standards and best practices applied in all countries for the safety assessment of dams, reservoirs and ancillary works and for the improvement of their sustainability to preserve environmental integrity

Co-operating in the professional training of young engineers in relation to dams and reservoirs through their participation in Working Groups, Technical Committees, symposia, conferences etc., promoting exchanges of experiences between different countries

Providing information to advise European decision-makers on emerging issues related to dams, reservoirs and sustainable water management, making them aware of the climate mitigation and grid-balancing services these systems can deliver for the energy transition





This **MANIFESTO** consolidates the collective effort of all sectors represented in EurCOLD, including government agencies, industries, universities, research centres, enterprises, professional associations etc. It represents a commitment by the European dam industry to the effective, efficient, socially concerned, transparent and responsible management of renewable water resources



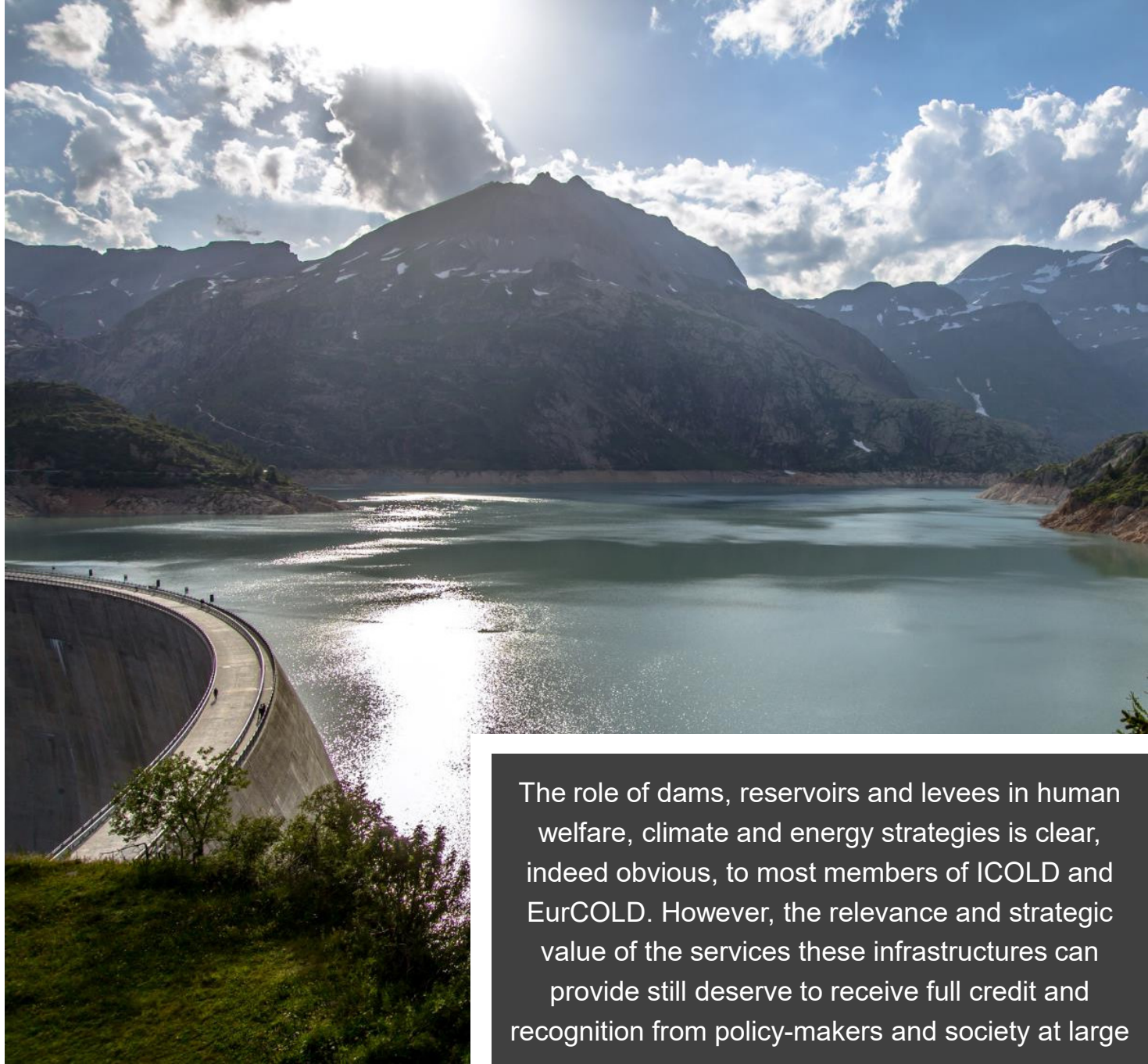
In the **world** there are nearly **62,000 large dams** which **store and regulate more than 8,700 km³ of water** (ICOLD, 2023), namely about more than twice of the world's annual renewable freshwater withdrawals for human use (FAO AQUASTAT, 2021)



In **Europe** there are **more than 6,200 large dams**, around 10% of the total number of dams in the world (ICOLD, 2023), which **store and regulate nearly 230 km³ of water**, more than 3% of the world's existing reservoir capacity (FAO AQUASTAT, 2021)



Water governance, supporting technologies and necessary infrastructures, such as dams, are playing an increasingly important role in our society due to their broad impact in water supply, food security, renewable energy production and storage, electric grid safety and reliability, climate change mitigation and adaptation, drought management, flood risk mitigation, integrity of aquatic ecosystems, transport, recreation, as well as their contribution to achieving the Sustainable Development Goals and improving the overall resilience of society



The role of dams, reservoirs and levees in human welfare, climate and energy strategies is clear, indeed obvious, to most members of ICOLD and EurCOLD. However, the relevance and strategic value of the services these infrastructures can provide still deserve to receive full credit and recognition from policy-makers and society at large

DAMS FOR HUMAN WELL-BEING AND FOOD SECURITY



A large part of the European population lives under highly water-stressed conditions (World Resources Institute, 2023).

Agriculture accounts for roughly 70% of freshwater withdrawals but industrial ($\approx 20\%$) and domestic ($\approx 10\%$) uses are the main drivers of increasing water demand (UNESCO, 2024).

Enhancing water use efficiency and management systems is key to slowing down freshwater withdrawals. This encompasses a spectrum of strategies to foster advanced irrigation and control techniques in agriculture and water-saving technologies in industry.

Currently, about 35% of existing reservoirs supply irrigation water for rural areas and nearly 14% drinking water for millions of people, even covering the time and space mismatch between water availability and demand.

A loss of 28% of storage capacity from sedimentation is expected by 2050 (Perera et al., 2023). Therefore, to fully leverage sustainable water resources innovative techniques of sediment removals, heightening of existing dams, multi-purpose use of water reservoir, and reservoir interconnections must be fostered.

DAMS AND ENVIRONMENT



The 8th Environment Action Programme (EAP, 2022) is shaping European environmental policy through 2030, recognizing that **human well-being and prosperity depend on healthy ecosystems**.

Since 2000, the Water Framework Directive (WFD) has been the cornerstone legislation for the protection of water status in Europe through the implementation of **River Basin Management Plans** (RBMP), valid for a six-year period and based on a river basin district approach. In 2012, the Water Blueprint Strategy officially introduced the concept of **Ecological flows** (E-flows) with the aim of achieving a good status in all water bodies as required by the WFD.

The positive mindset and increased awareness among European dam operators

towards the preservation of ecosystems, the restoration of wetlands, and the establishment of oases for biodiversity and ecological health must be stressed.

Agreements are signed with institutions and stakeholders to manage the circular reuse of sediments and bolster local economy.

Many operators have pursued voluntary environmental certifications to assess the performances of their facilities. **Sharing this data with environmental organizations is crucial for receiving recommendations to improve these practices and fostering proactive collaboration.**

The **Hydropower Sustainability Standard** has been introduced to demonstrate the environmental, social and governance performance of new hydropower projects.



DAMS AND CLIMATE CHANGE

Human activities are responsible for global warming, resulting in more frequent and severe extreme weather events worldwide. **Currently, floods and droughts rank among the most catastrophic water-related disasters.**

From 2003 to 2022, floods affected an estimated average of 74.6 million people globally (32.4 million in 2023), while droughts impacted around 57.1 million individuals on average (21.8 million in 2023).

The persistent lack of rainfall and snowfall, coupled with above-average temperatures and heatwaves, has affected more than a third of Europe.

This has implication for local freshwater availability, agriculture and biodiversity, ecosystems, alongside the intrusion of seawater into inland areas.

Dams, reservoirs and levees are crucial for managing floods and droughts.

Studies by EurCOLD have assessed that the reduction in flood peaks ranges from 12% to 100%, with an average decrease of 54% (EurCOLD, 2010). In response to the 2022 water crisis, in Europe reservoirs increased their water releases to support agriculture.

Understanding the complex inter-sectoral dynamics of water, climate, energy and food nexus is a cornerstone to streamline water-related policies to achieve the overarching goals of the European Green Deal, fostering a sustainable (clean and circular) and competitive EU economy. Given that climate change affects water cycle and its availability, worsening inequalities in water access, **hydraulic works must take a proactive role in climate adaptation actions, boosting the efficient, responsible, sustainable, and trans-boundary use of water resources.**

DAMS AND ENERGY TRANSITION



The energy sector is at the forefront of the green transition from fossil-based to zero-carbon sources to turning Europe into the first climate-neutral continent by 2050. Accelerating the exploitation and development of renewable energies is necessary to achieve the EU's ambitious climate and energy targets. However, integrating an ever-growing share of typically intermittent generation from wind and solar sources does indeed entail the **need for balancing services** to stabilize the grid frequency.

Hydropower is called to play a paramount role in this energy transition, not only because it is the largest Renewable Energy Source (RES) both globally and in Europe (EMBER, 2024) but also due to its current ability to provide those balancing services (such as flexibility and storage capacity) that are crucial to securing the

electricity grid and consumer energy supply. At present, **hydropower accounts for nearly one-third of the global capacity for flexible electricity supply** and has the potential to provide even more (International Energy Agency, 2021).

However, **enhancing its storage capacity will require new regulatory frameworks in the energy market**.

Strengthen the role of hydropower, supported by innovative technologies aimed at enhancing generation flexibility and energy storage capacity, is essential for delivering grid-balancing services. Additionally, its reliable, efficient, and cost-effective production has the advantage of not depending on energy imports or fluctuations in fuel price.

Finally, **tailing dams are crucial works that ensure a safe and sustainable supply of critical raw materials**.

DAMS AND SUSTAINABLE SOCIETIES



In Europe, dams and hydraulic works in general offer numerous advantages, including climate mitigation and adaptation services that enhance water governance, territorial protection, food security, and overall human well-being, along with sustainable energy production and grid-balancing services that facilitate the energy transition.

Additionally, reservoirs and dam sites are increasingly becoming attractive places for sports competitions, recreational activities for family, and tourism in general. Society must be aware of all these benefits but also of the safety and vulnerability concerns associated with dams and reservoirs. Some key issues are here tackled.

Infrastructure Ageing, Safety, and Operational Challenges

There is a critical need to modernize aging dams, appurtenant structures, and electromechanical equipment to prevent decommissioning. The digital transition presents opportunities to enhance monitoring and control systems, as well as operating procedures.

Sustainability, Energy Transition, Climate Change

Citizens must be informed about how sustainable dams, levees and reservoirs can improve energy security and help mitigate the effects of climate change, contributing to a climate-resilient society. Attracting investments to implement mitigation measures to protect the environment and aquatic ecosystems is crucial for human well-being.

Young professionals

ICOLD has established the Young Professionals Forum

(YPF) to facilitate the transfer of knowledge and experience to the next generation, and to foster intergenerational dialogue, thus bridging the gap arisen in recent years.

Public acceptance

Public opinion significantly influences energy, climate and environmental strategies, potentially hindering hydropower development more than technological or financial challenges.

Engaging in open dialogue with anti-dam movements, environmental organizations and the community - focused on concepts of justice, equity and related social implication - is the cornerstone for gaining public acceptance of dams and reservoirs.

Widespread initiatives such as Dams & Reservoirs Days play a vital role in educating and informing citizens about the importance and benefits that dams and reservoirs provide to society.

A CALL FOR A SMARTER GOVERNANCE FRAMEWORK



To effectively **align environmental and climate targets with energy goals**, dams, reservoirs and other hydraulic works can and should play a proactive role to directly promote a smarter governance to achieve the Sustainable Development Goals (SDGs). Presently, **society still underestimates the value of water** while being on the brink of a global water crisis.

Dams and hydraulic works should pledge to be at the forefront of a **sustainable and smart water governance**. The multipurpose use of reservoirs should be strategically coordinated and prioritized in collaboration with institutions and stakeholders that have competing demands for water resources. **An integrated policy framework should aim at developing a water-resilient economy and society by adopting a nexus approach** that connects water, energy, and food systems.

Striving for a clean and circular economy will help turn environmental and climate challenges into opportunities, making the EU's economy sustainable while preserving competitiveness.

Dams and reservoirs are called upon to take a proactive role in climate adaptation actions, boosting the responsible, efficient, sustainable, and trans-boundary use of water resources to mitigate the

effects of climate change on the water cycle and availability that can exacerbate inequalities in water access.

Concurrently, the increasing frequency of severe flooding will call for the social services provided by reservoirs to mitigate these risks, thereby reducing loss of life and economic damage.

Hydropower can significantly contribute to meeting the growing demand of the

electricity grid for flexibility across short, medium and long-term by fostering balancing-oriented operation and storing the potential energy of water to be used whenever necessary.

Currently, pumped storage hydropower plants provide over 90% of Europe's electricity storage capacity.

In this way, the hydroelectric sector also embodies the energy independence of Europe.

Making policy-makers aware that the hydroelectric sector can be appointed as a major player in the decarbonization process supporting the European countries to effectively steer their climate and energy policies.

Hydropower should be recognized as a strategic option in National Energy and Climate Plans (NECPs) with its financing prioritized in governmental political and research agendas.

Reservoirs, dams and levees, jointly with other structural and non-structural measures, can represent the key system in the framework of a sustainable and smarter water governance and a green energy transition while protecting the environment. Efforts are needed, at both technical and institutional level, to seek the necessary mediation among differing viewpoints that should align for the collective human well-being.

The EurCOLD launches this MANIFESTO with the aim of promoting an honest and transparent public debate which will hopefully facilitate actions to raise awareness of European policy to support the role of reservoirs, dams and levees for water supply, irrigation and green energy production, providing an effective contribution to climate change mitigation and adaptation, preserving the environment, and increasing societal resilience.

