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DAMS AND TERRITORIES

NEW ROLE OF LARGE DAMS IN ENERGY TRANSITION AND TERRITORIAL DEVELOPMENT IN EUROPE

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Dams and territories, Trento, October 2026

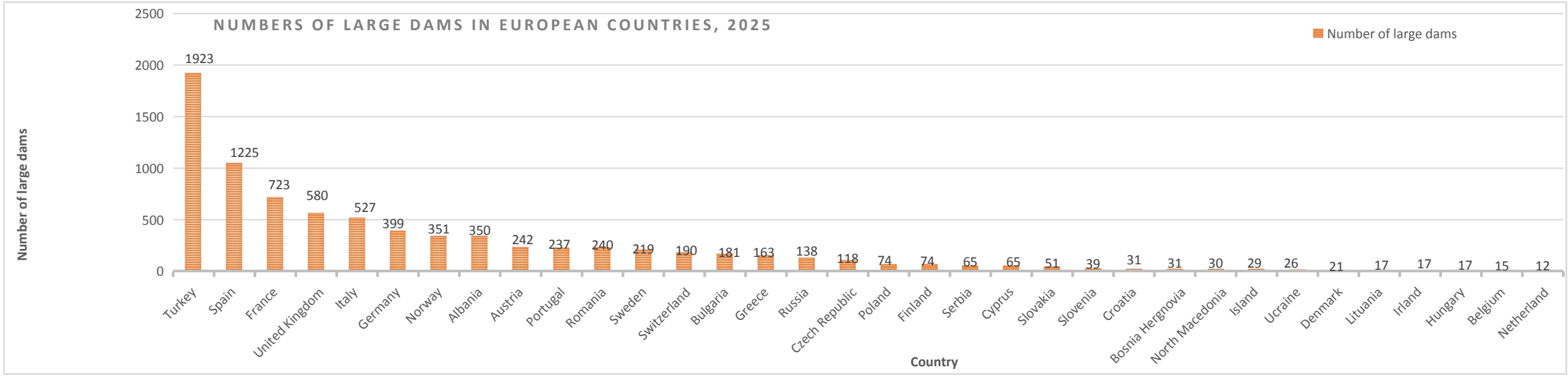
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Introduction

- Dams in Europe are critical assets for Hydropwer production, Irrigation, flood protections, Water supply and Urban development

- Europe dams infrastructure includes more than 8200 large dams, many of which were constructed between 1950s and 1990s and are now entering an special stage of their service life

- At the same time, climate change is increasing the frequency and intensity of the extreme hydrological event, creating new challenges for dams owners and operators.

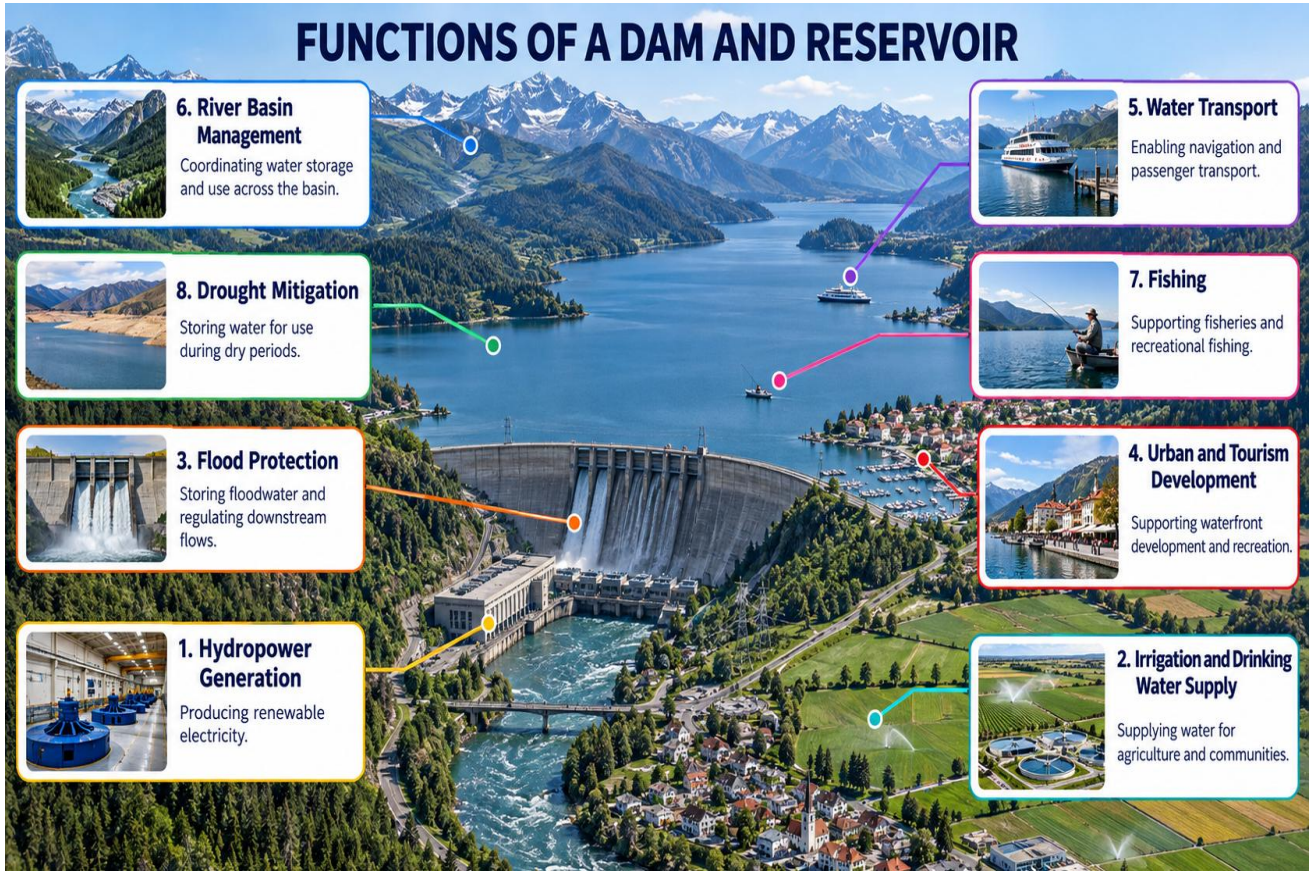


Why Dams still Matter

- *Climate change and energy security are redefining the role of Dams*
- *Large Dams remain strategic infrastructure for Europe*
- *Their Value extends far beyond hydropower generation*
- *Dams are becoming integrated territorial assets supporting energy, water, urban infrastructure development and communities*

Traditional Main Functions of Large Dams and Reservoirs

- *Hydropower Production*
- *Irrigation and Water Supply*
- *Flood Protection*
- *Drought Mitigation*
- *Water Regulation*
- *River basin management*
- *Fishing*
- *Water Transport*
- *Urban Development*
- *Tourist Atractions*



The Transition Towards Multi-Purpose Reservoirs

Large Dams are evolving into:

- ✓ *Energy Storage Hubs*
- ✓ *Renewable energy platforms*
- ✓ *Climate adaption infrastructures*
- ✓ *Recreational and Tourism destination*
- ✓ *Environmental and Educational assets*

Pumped Storage Hydropower: The Missing Link

New Role of Dams and Reservoirs as base of Pumped Storage Hydropower:

1- Pumped Storage represents the largest mature energy storage technology worldwide

2- It enables the integration of intermittent renewable energy

3- It supports grid stability and flexibility

4- Alpine reservoirs and exceptional opportunities for the future development

Dams and Solar Energy

New concepts include:



- *Hybrid hydro-solar power plants*
- *Floating photovoltaic systems on Reservoirs*
- *Shared electrical infrastructure*
- *Increased efficiency of renewable generation portfolios*

Dams and Reservoir as Territorial and Urban Assets

Modern Reservoirs can become:

- *Tourism Destinations*
- *Outdoor Recreation centres*
- *Educational laboratories*
- *Cultural and Landscape landmarks*
- *Local economic growth*
- *Landscape enhancement*



Reservoirs should become territorial assets and not only technical infrastructure
Relationship between dams and local communities is becoming increasingly important

The European Vision

Europe is increasingly considerating dams as strategic assets for:

- *Energy Storage*
- *Water Resilience*
- *Climate Adaption*
- *Flood Protection*
- *Urban infrastructure development*
- *Dam and downstream risk reduction*
- *Decarbonization*

Reservoirs are becoming Europe's energy Batteries

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The Role of Universities and Research Institutions

The next generation of dams projects will involve a broad alliance among:

- *Universities*
- *Research Institutions*
- *Dam Owners*
- *Technology Companies*
- *Governments Authorities on dam safety*



Scientific Research and Innovation are becoming the main drivers of the future dam sector

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The Role of EURCOLD

1- Supporting the European energy transition through the sustainable development of dams and reservoirs;

2- Promoting the transformation of Reservoirs into multi-purpose strategic infrastructure;

3- Encouraging the development of Pumped Storage Hydropower projects and other innovative energy storage solutions;

4- Promoting research, innovation and digital transformation in the dam sector;

5- Supporting climate resilience, water security and sustainable terrtiorial development.

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Vision of EURCOLD and ICOLD in the future

Dams and Reservoirs should evolve into safe, resilient and multi-purpose infrastructure that support sustainable territorial development, strengthen water and energy security and improve the well-being of present and future generation through:

- ✓ *Innovation -driven development;*
- ✓ *Digitalization and Artificial Inteligence for Dam monitoring*
- ✓ *Development of multi-purpose infrastructure;*
- ✓ *Integrated water- energy systems;*
- ✓ *Climate resilience and sustainable*
- ✓ *Nature- based Solutions;*
- ✓ *New Role of dams and Reservoir for urban and territorial development*
- ✓ *Strengthening cooperation between Univrsities,Research Centers and Industry;*

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The Valuable Italian experience:

- *Italy possesses on of Europe's richest experience in dam engineering*

- *Strong expertise in*
  - ✓ *Alpine dam engineering*
  - ✓ *Hydropower development*
  - ✓ *Dam safety and monitoring*
  - ✓ *Rehabilitation of ageing inftrastructure*
  - ✓ *Integration of Reservoirs within territories*

Italy possesses a unique combination of technical expertise, operational experience and innovation capacity. Italy can become on of the European leaders in the development of next generation multi-functional reservoirs

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Key Message for the future

Dams and Reservoirs in the future should be:

- *an Water integrated management system*
- *an Environmental and Strategic asset*
- *an Territorial urban development engine*
- *an Energy storage facilities*
- *an Climate resilience strategic infrastructure*

The future of dams and reservoirs are no longer only about Water and Hydropower

It is about energy, storage, climate resilience, Innovation, tourism, territories and people.

The future of European dams and reservoirs depends on Innovation, Cooperation and scientific knowledge

Dam and Territories, Trento, October 2026

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A Call for European Action

1- Invest more in research and Innovation for dams and Reservoirs

2- Promote Integrated water-energy-territory planning

3- Develop digital and climate -resilient dam infrastrucure

4- Empower the next generation of dam proffesionals

5- Promoting Dams and Reservoirs as Strategic Assets for People and Economy

6- Accelerate the development of Pumped storage hydropower and Solar plants

7- Strengthen cooperation between European dam safety organizations, Industry, Universities and Research centres

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