

Opportunities and challenges for sustainable hydropower in the European Union and in Europe

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ABSTRACT: Hydropower provides an important contribution to renewable energy, with multiple benefits associated to water reservoirs. However, it can also cause considerable environmental damage to river ecosystems. Hence sustainable hydropower needs to achieve a good balance between electricity generation, impacts on ecosystems and benefits on society, supporting the achievement of the Green Deal targets and the objectives of renewable energy and water policies. Several sustainable hydropower options exist, whose potential is of high relevance especially in the European Union. Amongst others, these are: modernization of the existing hydropower fleet, hydropower integration and hybridization with other energy technologies (floating photovoltaics, heat extraction from generators, batteries), tapping hidden hydropower in water and wastewater distribution networks, hydropower in existing and non-removable barriers (e.g., water mills), reservoir interconnection and hydrokinetic turbines. Digitalization is also emerging as a relevant strategy to mitigate impacts along rivers and optimize hydropower generation taking into account weather, technical, market and environmental factors.