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## **TECHNICAL NEEDS ASSESSMENT OF THE WATER SECTOR TO THE ADAPTATION TO THE CLIMATE CHANGE IN UKRAINE**

Ukraine is characterized by a relatively low availability of internal water resources compared to other countries in Europe: it ranked 124th among 181 countries by the amount of internal renewable water resources available per capita in 2014 (World Bank, 2016). Ukraine is the 17th among 20 countries of Europe by the amount of total renewable water resources available per capita.

The water resources of Ukraine are vulnerable due to their limited total amount, uneven annual internal and external contributions to the total renewable water resources, and heterogeneous distribution of available water within the country. In addition, water quality is also a very important issue, with surface water resources (mainly river flow) contributing 97% of the total amount. In this regard, the issue of the future is crucial for Ukraine.

Climate change impacts, driven by temperature rises and shifts in precipitation patterns, could lead to changes in flood or drought frequency, water availability, and seasonality of water discharge. Such changes may have adverse effects on agricultural, energy, transport, and social sectors, dependent on water resources. To avoid the risks and damages associated with such impacts, adaptation strategies in regional water resource management have to be developed to ensure the readiness of the water-dependent sectors to meet the future challenges.

In recent years Ukraine has started to integrate into the European Union. To comply with the EU legislation requirements, the harmonization of Ukrainian national standards to European ones in economic, social, and environmental fields has to take place. In this respect, there have been initial steps made in water resource management, planning, and policy. One of the main priorities, but also a concern, is the adoption and implementation of the Water Framework Directive (WFD) goals and standards in water resource management. It requires an improvement in water quality and complex assessment of the state of riparian ecosystems. Ukraine has made some progress in the implementation of the Integrated River Basin Management approach, promoted by WFD, especially for its transboundary catchments. As cited in the WFD, water dynamics and quantity play critical roles in the functioning of aquatic systems and for reaching environment goals. Therefore, climate change as a driver of potential future changes in water resources is important and has to be studied.

In many studies (Pluntke T. et al., 2010; Snizhko S. et al., 2010; Fisher et al., 2014; Loboda N., 2015; Didovets Y. et al., 2017, 2019) it is noticed the possibility of a significant impact of the climate on river water flow and water resources now and in the next future. Therefore, there is an urgent need for adaptation measures in water sector to climate change.

The use of adaptation technologies has been broadly defined as “the application of technology in order to reduce the vulnerability, or enhance the resilience, of a natural or human system to the impacts of climate change” (UNFCCC, 2005). In the water sector, site-specific solutions need to be considered within the broader context of integrated water management approaches.

What kind of water sector technologies are best suited to a country's specific climate change situation in Ukraine? Understanding technology needs is the starting point for effective action on climate change. Before investing in technologies that reduce greenhouse gas emissions and adapt to climate change impacts, it is essential to assess and analyze a country's specific needs, as relates to its specific set of circumstances. This information can then be used to set priorities and identify appropriate technologies.

To determine the priority adaptation technologies for the water sector Ukraine to climate change have to use a fundamental methodological framework developed and tested for a long time within global project "Technology Needs Assessment". This Project is funded by the Global Environment Facility and is implemented in close collaboration with the UNFCCC Technology Mechanism, being the Technology Executive Committee and the Climate Technology Centre and Network.

The Technology Needs Assessments Project supported 36 countries between 2009 and 2013, and 26 countries between 2014 and 2018. In 2018, 23 additional countries, including mainly Least Developed Countries and Small Island Developing States, have joined the project.

Ukraine joined the project in 2018. This year under auspices of the Ministry of Ecology and Natural Resources of Ukraine was created National Technology Needs Assessment Team that also includes experts on water sector adaptation. They are authors of this report.

Technology Needs Assessments are designed to do precisely this type of in-depth analysis. Using national sustainable development plans as a starting point, Technology Needs Assessments strengthen countries' ability to analyze and prioritize climate technologies, guiding them towards implementation of the UNFCCC Paris Agreement. Through the Technology Needs Assessments Project, UN Environment, through UNEP DTU Partnership, helps Ukraine determine its technology priorities for adapting of water sector to climate change.

A TNA can be defined as a set of country-driven, participatory activities leading to the identification, selection and implementation of environmentally sound technologies to decrease CO<sub>2</sub> emissions (mitigation) and/or to decrease vulnerability to climate change (adaptation). As a country-driven process it should not be conducted in isolation but rather integrated with other similar ongoing processes aiming to support national sustainable development.

The TNA process has three main objectives:

- 1) To identify and prioritise adaptation technologies for selected sectors/sub-sectors
- 2) To identify, analyse and address barriers hindering the deployment and diffusion of the prioritised technologies including enabling the framework for the said technologies
- 3) To articulate, based on the inputs obtained from the two previous steps, a Technology Action Plan (TAP) with suggested measures/actions presented in terms of project ideas