



## Achieving Carbon Neutrality in the Water Sector: Unlocking Co-Benefits Between Climate Mitigation and Adaptation

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The UN disaster report highlights that 90% of disasters from 1995 to 2015 were a consequence of hydrometeorological changes. An analysis by the World Meteorological Organization revealed that water-related disasters, including droughts, heatwaves, typhoons, and floods, which are partly driven by climate change, caused extensive global property damage and loss of life. Despite concerted global efforts for net-zero carbon emissions, there is a noticeable lack of integration of water in decarbonization strategies.

Traditionally, the water sector's response to the climate crisis has primarily centered on establishing policies and systems for water management to adapt to vulnerability, rather than actively participating in greenhouse gas reduction (mitigation). This strategic preference is largely attributed to the absence of a distinct organizational classification for the water sector in the national greenhouse gas inventory, leading to an unclear identification of the sector's own emissions profile.

In light of these challenges, this study addresses the critical need for assessing greenhouse gas emissions within the water sector and advocates for the establishment and implementation of carbon-neutral policies tailored specifically to the sector's unique characteristics. By delving into these imperatives, the study seeks to bridge the gap between global climate efforts and the water sector, fostering a more comprehensive and sustainable approach to climate resilience and mitigation."

Within the study's scope, the organizational boundary of the water sector was meticulously delineated. It encompasses water supply, wastewater, and livestock manure treatment services, as well as water resources facilities such as dams, reservoirs, and river spaces. Comprehensive assessments were conducted to calculate greenhouse gas emissions and absorption within these boundaries. This nuanced approach aims to provide a detailed understanding of the carbon

emissions associated with key components of the water sector.

Moreover, the study identifies and assesses potential trajectories for attaining carbon neutrality in the water sector through the development and examination of three distinct scenarios. The demand-led scenario prioritizes water efficiency, leakage management, adoption of a vegetarian diet, and achieving energy self-sufficiency. The technology-led scenario emphasizes innovative technologies and substantial financial investments, while the combined scenario integrates elements from both the demand-led and technology-led pathways, offering a nuanced and balanced approach.

In conclusion, this case study illuminates a promising trajectory toward achieving carbon neutrality in the water sector by 2050, particularly when adopting a mixed scenario that combines elements from the three outlined scenarios. The comprehensive insights garnered from this study contribute to a more sustainable, resilient, and low-carbon future, highlighting the integral role of the water sector in global climate objectives.

Additionally, the study concludes that efforts towards carbon neutrality in the water sector represent a policy direction that enhances the public benefits of adaptation and reduction strategies. By actively engaging in mitigation measures, the water sector not only contributes to climate goals but also enhances its adaptive capacity, creating a synergistic approach that maximizes positive outcomes for both the environment and society. This integrated strategy highlights the potential for carbon neutrality initiatives in the water sector to serve as a model for broader climate action policies, emphasizing the interconnected benefits of sustainable practices.