Improved efficiency of centralized water treatment systems

Challenge: Water pollution **Adaptation response:** Improved water treatment capacity

Description

Improved efficiency of centralized wastewater treatment plants (WWTPs) is technologies and procedures that treat larger capacities of water, requiring less energy and chemical inputs, while improving its quality. System optimization could include automated systems linked to sensors, or installation of new equipment (pipes, tanks, pumps, filters, etc.) to prevent leakages or inefficient treatment. Staff training and capacity building for better system operation can also be part of such efforts.

Implementation

Water treatment facilities are usually comprised of various chambers, each with different conditions (temperatures, oxygen levels, microbial composition, etc.) to optimize wastewater treatment. Data collection from detailed monitoring of these various conditions can provide important information for managers to pinpoint any inefficiency in the system. Technological advances have made it easier and quicker, and have improved the accuracy of measuring these indicators, for example, using multi-parameter water quality sensors.

A priority list of optimization measures is created based on the system assessment. These may include interventions such as renovation or changing infrastructure, or installation of new equipment, such as sensors, aerators and automated control systems. Efficiency targets can help assess the effectiveness of the changes. These might include energy and water saving goals, chemical use reduction, and water quality targets. Water treatment facility staff training is also important to ensure maximum optimization and timely responses to any deviations from plans or emergencies.

Environmental Benefits

- Decreases the amount of polluted water released into the environment, and can support water recycling.

Socioeconomic Benefits

- Optimizes treatment systems, requiring less space, energy and chemical inputs for treatment.
- Makes systems more robust and better equipped to cope with changing conditions, including climate change.

Opportunities and Barriers

Opportunities:

- Systems require smaller areas, saving costs and making them particularly valuable in areas where land is limited, such as in densely populated cities
- Cost savings can allow for further re-investment in treatment systems and infrastructure

Barriers:

- Highly efficient systems can be expensive, and require high technical expertise to implement.

- Well-established monitoring systems are needed to ensure efficiency is maintained

Implementation considerations*

Technological maturity:	4-5
Initial investment:	2-4
Operational costs:	2-4
Implementation timeframe:	2-3

* This adaptation technology brief includes a general assessment of four dimensions relating to implementation of the technology. It represents an indicative assessment scale of 1-5 as follows:
Technological maturity: 1 - in early stages of research and development, to 5 – fully mature and widely used
Initial investment: 1 – very low cost, to 5 – very high cost investment needed to implement technology
Operational costs: 1 – very low/no cost, to 5 – very high costs of operation and maintenance
Implementation timeframe: 1 – very quick to implement and reach desired capacity, to 5 – significant time investments needed to establish and/or reach full capacity
This assessment is to be used as an indication only and is to be seen as relative to the other technologies included in this guide. More specific costs and timelines are to be identified as relevant for the specific technology and geography.

Sources and further information

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