

Sector	Water
Sub-sector	Water supply
Technology name	Water saving technology
Option name	Reducing water leakages in water management facilities
Scale	Medium-scale
Availability	Available
Technology to be included in prioritization?	Yes
<p>Background/notes</p> <p>Water losses in water management systems consist of three categories: unbilled authorized consumption; apparent losses; and real losses. Unbilled authorized consumption (e.g. water donated to a non-profit organization) usually makes up a small fraction. Apparent losses include unauthorized consumption (e.g. illegal connections) and meter inaccuracies; these often account for a considerable percentage of total NRW, especially in developing countries. Real losses consist of any water that is physically lost from the system before it reaches a consumer's water meter. A small fraction of this may include overflow of storage tanks owned by the utility.</p> <p>However, the vast majority of real losses are due to leakage in distribution systems; this chapter focuses on detecting and addressing this leakage.</p> <p>Management, detection and repair of small leaks in a distribution system are critical functions of system operation and maintenance, yet they are often neglected.</p> <p>Acoustic methods are able to recognize leaks based on the characteristic patterns of sound that leaks create; they have been and continue to be the most common leak detection methods. The choice of an appropriate leak detection technology must consider the pipe material and pipe diameter of a system.</p> <p>Acoustic methods have been successfully used for leak detection in metallic pipes for many years. However, their application in non-metallic piping is more challenging as the sounds created in plastic and concrete pipes tend to be lower-frequency and attenuate more quickly. Despite these challenges, recent technological innovations have enabled the successful application of acoustic methods to these types of piping.</p> <p>Advantages of the technology:</p> <p>In contrast to the existing situation, leak management, detection and repair programs generally pay for themselves by enabling early repair of leaks and reducing water waste. Leaks often damage pipes through erosion; therefore, additional benefits of early detection include reduced maintenance costs and lower probability of catastrophic failures. Monitoring systems remotely also enables confirmation that pipes are in good condition, preventing premature replacement.</p> <p>Disadvantages of the technology:</p> <p>The initial cost of these systems can be higher than other systems. Higher costs are generally associated with the costs of infrastructure and installation.</p> <p>Opportunities for leakage management, detection and repair programs should abound when decision makers are made aware that the economic benefits often outweigh the costs. The economic benefits of these programs are particularly favorable when: (1) energy costs for transport, treatment and distribution are expensive; (2) infrastructure is aging and leakage is high; (3) high-profile water main breaks, leading to media attention and political pressure; (4) there is water stress or water scarcity conditions; and (5) water conservation is valued.</p> <p>By contrast, motivation to prevent leakage may be low when water is inexpensive and abundant, and when water utilities are short-staffed or under-funded.</p>	
Implementation assumptions (How the technology will be implemented and diffused across the subsector)	Used methods for leak detection in intermittent systems will involve isolating a small zone of the network, closing the stop taps to customers, providing temporary water pressure to that zone, and then using conventional or modified leak detection methods. The basics of these methods can be found in the references.
<p>Impact statements (How the options impact countries development priorities)</p>	

Countries social development priorities	<ul style="list-style-type: none"> • Contributes to water security priority by increasing water availability • Leads to improved living standards of population and sanitation
Countries economic development priorities	<p>Increasing access to piped water at home leads to large gains in health and development. However, per capita demand for water increases rapidly during the development transition. As population expands and water resources are stressed, economic development can be hindered. Leakage prevention can slow the onset of water stress and preserve limited water resources. Additionally, these programs often pay for themselves through water conservation, reduced costs for treatment and distribution, and reduced maintenance and pipe replacement costs.</p>
Countries environmental development priorities	<ul style="list-style-type: none"> • Reduces water losses • Reduces health and environmental issues related to water (increase of salty ground water level, mixture of fresh water with waste waters and other polluted waters)
Other considerations and priorities such as market potential	<ul style="list-style-type: none"> • Saved water can be used in different areas of economy
Costs	
Capital costs over 10 years	<p>The costs of leak management, detection and repair include staff training, management, labor, and equipment. There is a need for 2-3 million USD for initial assessment of leak detection and implementation of repair works.</p>
Operational & maintenance costs over 10 years	<p>Operational and maintenance costs will be around 45,000-50,000 USD per year.</p>
Other costs over 10 years	<p>Additional costs will be needed to provide necessary capacity building activities for local residents.</p>