

Self-Cleaning Networks from Watershare®



A water company's water transport and distribution network is its single largest investment and most valuable asset. It is the physical connection between water production and the actual customer at the tap. As the water flows through the network it comes into contact with materials, varies in velocity – sometimes coming to a stop (residence times) – and is subject to settling and resuspending particles. These physical processes can affect the water's quality and ultimately lead to customer complaints about its taste, odour or discolouration. Moreover, network failure or leakage can naturally cause supply interruptions. Despite these obvious problems, the underlying processes at the root of such quality and quantity anomalies are not completely known.

In the Netherlands over the last couple of decades extensive research has resulted in a changed concept of the water transport and distribution process. This is most strikingly reflected in self cleaning distribution networks, which are now being implemented by several Dutch drinking water companies. Typically the **Self-Cleaning Networks** concept focuses on the network's "last mile" – also known as the smallest "valve sections" – which represents 70 to 80% of the total network. It consists of the pipes in the street, and it is in this part of the network most of the taste, odour and supply continuity problems express themselves. Under this new concept these last-mile pipes are designed as branched pipes, which are connected with one valve (in combination with two back-up valves) to the main network. In addition, the pipes' diameter is tapered towards the end of the section to sustain a "self-cleaning velocity". This self-cleaning velocity is attained at least once a day, when demand is at its maximum, and is capable of resuspending any particles that might have settled during

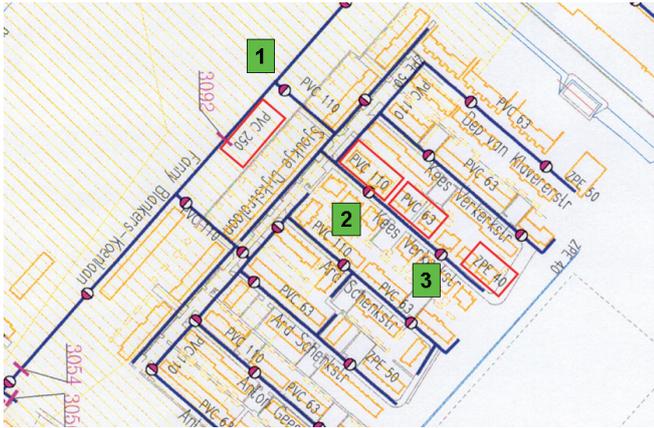
the periods of lower velocity. The application of the **Self-Cleaning Networks** concept results in 10% shorter networks (the loops are not closed), and involves the use of 10% less raw materials (the pipes have smaller diameters and fewer valves are used). And, of course, there are no more operational costs related to cleaning.

What we can do for you

The Watershare® **Self-Cleaning Networks** tool provides decision-making support for implementation of new distribution network concepts. The tool involves a series of steps leading to an optimal network design. The first step consists of taking stock of the existing situation, particularly of the stakeholders, like fire departments, and of the existing design procedures.

We can help you in understanding the new principles for distribution network design and assist you to set priorities in the needs of the stakeholders. The implementation of the **Self-Cleaning Networks** concept is a complex programme, involving a host of models.

The process affects almost every component of the water company, and its success depends on effective change management. This entails taking a systematic approach and giving careful consideration to each of the steps and stakeholders involved. The process concentrates on the technical steps that are needed to enable the incorporation of the **Self-Cleaning Networks** concept into the network. Subsequently this technical information feeds the communication process involving customers and public.



Implementation case

The development of the **Self-Cleaning Networks** concept is in fact a result of the discovery in drinking water of trihalomethanes, which are by-products of chlorine disinfection. This prompted the Dutch water companies to find a way of eliminating the use of chlorine and providing their customers with pristine water. The effort to do without this last sentinel of biological control eventually led to the development of the **Self-Cleaning Networks** concept. Additionally, the Dutch drinking water industry has traditionally been strongly aware of the importance of network quality, which is testified in its performance figures: leakage rates below 5% and annual failure rates of 0.07 failure/km. These figures are amongst the best in the world and may serve as targets for future performance following the implementation of this novel approach.

Self-Cleaning Networks benefits

- Optimal distribution network design, in terms of both quality and costs.
- Investment and operational savings of about 20% in new and rehabilitated networks.
- Source-to-tap control, sustaining high-quality drinking water and a requirement for considering chlorine-free drinking water.
- Satisfied customers who are not confronted with discolouration or other obvious water quality deficiencies.

A number of Dutch water companies has gone through a 10 step change-process plan, with as final result that the total length of such networks in the country now exceeds 6,000 km, including both new and rehabilitated networks. The reported benefits include: a cut down in investment and operational costs and the control of discolouration problems in networks at Eindhoven (Brabant Water) and Purmerend (PWN).

The Watershare® Concept

KWR has launched the Watershare® concept, which is dedicated to the sharing of expert water-related tools with selected partner knowledge institutes. Watershare® encompasses a wide range of benchmarked practical tools designed for areas like water quality and health, sustainability, water technology, asset design and management, and water systems.

Partnering in Watershare® offers the knowledge institute substantial benefits, and contributes significantly to improving the institute's and its end-users' performance and effectiveness. The Watershare® partners become members of a family of trusted and highly reputable institutes, and have the opportunity to build an attractive business model.

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