Smart water management: 5 innovative solutions to water scarcity offered by the IoT

Water covers 70% of our planet. If you think this figure is reassuring and wonder why should we care about such a plentiful resource, then think again.

Water scarcity is a growing issue. According to several UN reports, it will directly affect nearly 20% of the human population by 2025. By 2040, roughly 1 in 4 children worldwide will be living in areas of extremely high-water stress. This is not limited to developing countries. Indeed, **freshwater**—the one we drink, bathe, grow our vegetables with, and cook with— **is incredibly rare. Only 3% of the world's water is fresh water, and two-thirds of that is hidden away in frozen glaciers or unavailable for use.**

According to several NGO's, **about 1.1 billion people worldwide lack access to water, and a total of 2.7 billion find water scarce for at least one month of the year**. Climate change and a growing population are the main reasons for this but they aren't the only ones: collapsed infrastructure and

distribution systems, pollution, conflict, overloaded water systems, and poor management of water resources are just a few of the human factors that are increasingly denying people their right to safe water and sanitation.

And when water is scarce, sewage systems can fail and the threat of contracting diseases like cholera, typhoid fever and other water-borne illnesses surges. Ecosystems around the world are suffering. And the price of water becomes more expensive which indirectly influences the countries' economies.

The IoT has the ability to lessen this worrying picture. Smart Water Monitoring and Management Systems, based on the combination of sensors, big data and AI technologies, can provide to water utility operators, farmers and companies the ability to measure, monitor and control their water distribution networks as well as the quality of the water distributed. Less waste, less consumption, and a better management of the water's quality can improve dramatically the preservation of our planet's resources.

Let's take a look at **how Smart water Management systems can help addressing the growing lack of available fresh water...**

What are Smart Water Management systems and how do they work?

Smart Water Management is the activity of planning, developing, distributing and managing the use of water resources using an array of IoT technologies which are designed to increase transparency, and make more reasonable and sustainable usage of these water resources.

It applies to multiple sectors: agriculture, farming, industry, services, cities... Monitoring water consumption in houses, checking water levels, checking the quality of drinking water, detecting chemical leakages in rivers around plants, tracking pressure variations along pipes or checking water quality in aquariums are a few examples of the many useful applications.

Microcontrollers and sensors —such as ultrasonic sensors, flow sensors, temperature, salinity, conductivity, humidity, pressure, or luminosity sensors— placed on pipes or pumps measure the

water levels, flow, temperature and quality of the water in real time. Message alerts and data generated by the sensors are transmitted over the Internet to a cloud server, where it is processed, analyzed, sometimes with the help of AI, and sent to a terminal for the user to consult.

The system can then control and regulate the usage and quality of water resources as well as facilitate the maintenance of the default equipment.

5 benefits of Smart Water Management Systems

Here are five specific benefits of Water management technologies and activities, and how they can help address the growing problems of water scarcity.

1. Reducing waste of water-intensive industries

Agriculture, manufacturing or power production use very high volumes of water. Farming alone accounts for 70% of all water consumption. The same sector is liable for wasting approximately 60% of that water according to the UN's Food and Agriculture Organization.

Producers have to contend with increasingly erratic weather patterns which result in hotter and drier growing seasons.

Real-time water metering and other applications such as smart irrigation systems or crop water management systems can help farmers reduce waste while maintaining soil health, improving water conservation, and increasing crop yield:
-    Water flows, humidity, and temperature data collected by IoT devices, can be used to train machines to trace treatment processes.
-    It can be used to evaluate the impact of an individual treatment process.
-    The data collected using soil and light sensors can be analyzed to recommend the quantity of water and fertilizers required in a field.

Libelium —a client of Saft— is one of the leading companies in IoT solutions for the agriculture. Their devices cover a wide range of applications, from water distribution network management, water consumption/metering, irrigation water management, flood/disaster management, water losses and leak detection, water storage (tanks,

reservoirs, etc.), Aquarium Management and more.

These installations are designed to measure the essential aspects of a plantation, **reducing the environmental impact thanks to responsible use of energy and natural resources, and by improving soil fertility and maintaining water quality.**

In this case study, Libelium explains how their connected sensors and actuators allow an organic farming plant to lower costs and increase the quality of production:
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Libelium have calculated that overall, their solutions could help **reduce the water consumption per capita by 10%, reduce leakage by 20%, reduce billings accordingly, predict potential failures and diminish the maintenance costs, while helping better manage water pressure and consumption**. All of which allowed their clients to **augment their revenue**.

[DFM Software Solutions](#), another one of Saft's client, has developed highly specialized hardware

and software solutions such as soil moisture probes, for farmers in South Africa, victims of conditions that are drier than ever before. The system monitors critical data round the clock and continuously logs water levels, salinity, oxygen, and plant root development. Based on the data provided by soil moisture probes, farmers can **optimize the management of their crops and soil and use water resources more efficiently.** Read the case study: [Battery solutions for smart agriculture – DFM use case](#).

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2. Monitoring water quality to fight pollution and diseases

Manufacturing and other human activities can be responsible for polluting rivers and the groundwater table. **Sensors and IoT technology for real-time monitoring and control can help monitor and prevent pollution and even improve the water quality.**

To do so, IoT systems connected with AI-based software are deployed to capture standard parameters for monitoring the water quality: pH, Total dissolved solids (TDS)—including Oxygen, the

Oxidation reduction potential (ORP) or the Temperature of different types of water. Using machine learning algorithms, the devices can be trained to **predict the quality of water, monitor the effectiveness of a sanitizing agent or adjust the water treatment plan accordingly.**

In the UK for example, outbreaks of the Legionnaires' disease have been reported over the past few years. It is caused by Legionella, a bacteria that develops in uncontrolled soil and water environments. It infects the body through inhalation of contaminated water droplets and can cause a potentially fatal form of pneumonia. To combat this illness, <u>Wavetrend</u>, created **legionella detecting sensors that use Saft batteries**. The IoT actively monitors hot and cold outflow, and will activate an alert on high-risk temperatures that could lead to spread of the bacterium, enabling quick action to be taken. Read the complete case study here: <u>Helping to protect UK's water from Legionella with their temperature sensors.</u>

3.   Improving the efficiency of water systems

Smart water systems allow the collection, treatment, distribution and recycling of water. These systems, often deployed underground, can leak, freeze, or breakdown. These systems are widely deployed on infrastructures nowadays. **By monitoring the pressure, flow, moisture, temperature, time difference between points and other parameters directly within the systems, the IoT can facilitate maintenance prediction and avoid breakage, leakage, and equipment downtime.**

One such example is [Fuji Tecom's](#) "Quatro Core" LC-5000, a system powered by Saft batteries, that can automatically **pinpoint the location of a leak by calculating the time difference of the detected noise caused by the water leakage between sensors**. A combination of 4 sensors allows for complete accuracy of the system and distance calculation from the measuring point. The sensors are also used as a radio repeater, extending the wireless communication, and avoiding poor connections due to obstacles. The solution can

record up to 6 routes simultaneously and display the data on one screen, which expedites maintenance operations. Find out more about their product in our case study: [Fuji Tecom is offering more efficient operation thanks to an innovative water leakage detector](#).

4.   Creating awareness of household water use thanks to smart meters

Many households are guilty of wasting water, without really knowing how or how much a change of behavior could benefit them.
Most utility providers have now deployed smart meters to easily and remotely monitor and bill consumption. The information is also readily available to final users, which is a real incentive. **Individual consumers can now make savings by lowering their water bill while preserving water supplies on a daily basis.**

[Techem](#), is the European leader in individual water and heating metering in collective housing. The company created an innovative smart reading system for utility meters connected to end devices wirelessly per OMS throughout a building. These

smart readers send consumption and status info per mobile communication via cloud to the Techem data center which then automatically creates billing and energy reports for the properties.

Not only does the system offer precise and automatic monitoring and billing, but the residents are informed of their exact consumption and are subsequently incentivized to reduce consumption. The combination of billing and consumption monitoring verifiably **reduces heating and water consumption by about approximately 20%.** Read the article "[Techem- providing value to residents with smart metering](#)" and the case study and the case study "[Battery solutions for smart utility metering systems – Techem case study](#)".

Similarly, in Saudi Arabia where drinking water is a scarce resource, [IoTSens](#) developed a network of Watchmeter data loggers. The system monitors consumption patterns, without having to break into water mains to install an inline-meter, thanks to the detection of high-frequency vibrations in the water distribution network. The

result is that customers can monitor, control — and reduce!—their own consumption. Find out more in our case study: [Battery solutions for smart water networks – IoTsens use case](#)

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5.   Providing running water through innovative solutions all around the world

Managing water is not just about delivering it efficiently. Sometimes it is about delivering it to all. In many developing countries, many people do not have easy access to running water. Water utility infrastructures suffer from lack of investment, lack of public water points, irregular delivery services. Chlorine pills are expensive and unreliable. As a result, **people with irregular or low incomes are faced with daily hardships in procuring water.**

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