Next generation smart water:

Your solution to global water challenges

The climate changes sweeping across the globe put untold pressure on water networks at both extremes; some areas are water stressed and others are prone to increased rainfall and flooding which take their toll on the amount of infrastructure needed to address the problem. The excess water requires treatment and pumping which exponentially increases the amount of energy used by the utility – and this in hand drives CO2 emissions up. Even by implementing sub-optimal pressure management, the energy used would be decreased, lowering CO2 emissions and even bringing in 15% savings for the utility in operational costs.

Water utilities throughout Europe, for example, are faced with a problem spanning 3.5million km[1] of aging distribution networks and these require a solution that can provide tangible results. EU governments are taking note of these savings and their repercussions on the environment and are actively seeking answers. Those in the Asia Pacific, Australia and the Americas are also looking for solutions to the insurmountable levels of water lost each year. The need to solve this crisis is leading utilities to find new ways of addressing the most common challenges suffered across the water industry. These include the unknown risks of integrating with both new and existing technologies; if done incorrectly and with technology suppliers that do not have the relevant experience and know-how, the utility could face untold costs to rectify. Equally as important as using the appropriate technology supplier is the skill-set available within it. To ensure a smooth end to end process, it is essential to have an array of highly qualified software integration experts, embedded sensor experts, leakage engineers and ex-utility industry personnel - to name a few. A common challenge is evaluating just one element of the utility's issue as opposed to taking in the whole picture which allows for a more holistic approach of the relevant solution. The latter often gives way to the challenge of defining the appropriate end to end solution with reliable asset life, guaranteed secure data transmission and a competitive level of coverage.

Utilities of different sizes and ownership will also have different challenges and varying priority lists. This means it is equally important to find a technology supplier with a solution that can accommodate those ranging from having trialled smart meters; to those responding to a governmental directive or those simply concerned with decreasing a revenue loss that could be linked with non revenue water. Often, challenges begin with the uncertainty of 'new' technologies and the unlikelihood that 'one size fits all'. The simple answer is to invest in those who have tried and tested experience, as well as the ability to tailor their offering. The practical challenges faced by the utility industry have been similar for many years and have often ranged from technology adoption to integrating legacy technology; however, what is different, is evolution of the solutions available. The world is changing and the winning solution will be

[1] *smartwater4europe.com*

one that enables organisations to streamline their operations, raise environmental awareness and receive an offering tailored to their business model.

Commonly an aging infrastructure that is overly stressed by a rapidly increasing population is the root cause of leaks and burst pipes. Cities are expanding at a very fast rate, with a projected 70% of the world's population living in urban areas by 2050[1]; with a historical lack of investment in pipe replacements and network management, the solutions for putting an end to this water loss are being furiously sought.

One third of utilities around the globe report a loss of more than 40% of clean water due to leaks

More than a third of the world's drinking water is lost before it reaches consumers and this loss alone, could have met the needs of millions of people worldwide[1]. Not only does this inefficiency affect an organisation by increasing operational costs and failing to provide a satisfactory customer service – but it also has a huge impact on the environment. Water is a scarce resource, with shortages set to affect one third of the world's population by 2025[2].

These figures alone are sufficiently shocking to convey the importance of protecting our environment and convey why governments now across the globe are delivering mandates that put sustainability at centre stage.

Another factor not to be forgotten when encapsulating the challenge that is the loss of water / or non-revenue water (NRW) is its chemical composition. Many utilities worldwide are beginning to fully appreciate the importance of having a near real-time view and control over the levels of chemicals needed to treat water. For the safety of the utility's customers, it is vital that a distribution network operates in a preventative and proactive manner through constant monitoring.

Stepping away from the world of water and into the boardroom, the pressing and somewhat silent stressor many utilities are also faced with is the task of putting together a comprehensive business case outlining the benefits of what is ultimately a game-changing investment. Amongst other operational efficiencies we highlight, this paper outlines how utilities can save up to $4.6 billion annually on lost water alone.

Advanced analytics - how data decisions improve your business

A smart water network is a fully integrated set of products, solutions and systems that enables water utilities to remotely and continuously monitor and diagnose problems within the network. It also allows utilities to comply transparently and confidently with government regulatory and policy requirements on water quality and conservation, as well as provide customers with the information and tools they need to make informed choices about their behaviours and water usage patterns. Ultimately the benefits reaped from a smart water network implementing a full analytics framework that collects accurate data, helps save the planet and the yearly budget.

[1] *smartwater4europe.com*
[2] *http://www.miya-water.com/water-efficiency/the-challenge*

Smart water networks can help utilities address the challenging and precious resource that water has become. Globally, utilities spend nearly $184 billion each year related to the supply of clean water, $14 billion of which is spent on the energy costs of pumping water around the current networks. These figures do not include the revenue lost from burst pipes and leakages.

Intelligent water networks utilising smart data management monitor a network's health, the microbiological and chemical parameters of the water and contribute to making the world a more sustainable place. The combined value of these factors is priceless when the end result could be reversing the estimated 1.8 billion people drinking contaminated water.

Data: Improving the accuracy of your system whilst delivering invaluable savings to the environment and your business

Top 10 benefits that a complete Smart Water solution can bring your business

1. Improved leakage and pressure management

One third of utilities around the globe report a loss of more than 40% of clean water due to leaks. Being able to pinpoint the exact location in the network where there is the potential for a leak, or where there is one occurring, is vital. However, an area often forgotten about is customer side leakage but through the implementation of advanced metering technology that is sensitive to flows as minimal as 1 litre per hour, leaks that other meters cannot detect are found.

By decreasing the amount of water leaked, smart water networks can reduce the amount of money spent on producing / purchasing water, the consumption of energy required to pump water and treating water for distribution. Both large and small utilities can benefit from trialling a smart network regardless of the access they have to investment funds as tailored business models can be made dependent on the technology supplier.

With multiple connected sensors and advanced water network analytics you can get the full value of the investment in a complete smart water solution. By integrating data and analytics across the organisation you achieve huge operational savings by automatically verifying all leak alarms, as well as eliminating false leak alarms.

The world's largest smart water network platform was deployed for Public Utilities Board (PUB) in Singapore.

Visenti, a Xylem brand, deployed their ViewTM innovative technology platform in the City area of Singapore, in collaboration with PUB to monitor in real-time the water distribution systems.

As a result of using this platform and having access to accurate data from sensors throughout the network. Real-time email alerts and data visualisation have helped PUB identify operation inefficiencies, perform remedial actions and immediately validate the results of these actions.

Every year, 32 billion cubic meters of treated water leaks from urban water supplies

2. Improve operational efficiency and maintenance

Saving money, increasing operational efficiency and actively helping the environment sounds good in and out of the boardroom, especially when the operational improvements can bring in savings of over $2.1 billion.

The critical data delivered by a full smart water solution, enables remote operations which can lead to the automation of tasks associated with routine maintenance and operation of the water distribution system, resulting in increased efficiency overall.

3. Improve the accuracy of your system

By using a mix of sensors you can improve your leak detection programme and lower your capital expenditure costs with fewer sensors in the infrastructure.

Using combined data analytics to identify and pinpoint the location of the leak more accurately allows for multiple data sets to be cross-referenced in order to eliminate false alarms. It also utilises in-pipe hydrophone sensors with pressure transient sensors to provide more accurate location information. Using accurate data enables invaluable savings to be delivered not only to your business, but the environment too.

Accuracy in 10 year old meters can register under 50% in low flow rates

4. Know your asset life - strategic prioritisation and allocation of capital expenditures

Using dynamic asset management tools can result in a 15% savings on capital expenditures by having the information to strategically direct investment. In order to minimise the gap between the capital spending required and the amount of financing available, utilities need access to accurate and reliable data which will help them understand the evolving status of their network assets.

Accurate network data allows utilities to not only understand the supply and demand of the water, but also calculate all that goes in hand with this; having the ability to predict when a pipe will burst or a pump will fail, ensures capital expenditure is not made until it needs to be. More often than not has these capital expenditure decisions are based on time: the length of time that an asset been deployed alongside its guaranteed lifespan; whether it is an intelligent asset, and so on.

Additionally a reduction in the demand of water results in the water supply infrastructure being less taxed and therefore lasting longer.

Did you know? $14 billion is spent annually in energy costs to pump water around non-smart water networks

5. Reduce energy consumption

Collecting regular and precise data provides utilities with an accurate water balance. In turn, this data allows them to model in a more detailed manner the demand for water, therefore only producing and pumping the required amount - ultimately reducing the energy used and making savings of the current cost of pumping water which can amount to an estimated $184 million per year.

Accurate and frequent network data delivers efficiencies in water production and distribution and in turn reduces carbon footprint; commonly, bigger utilities consider this as one their top priorities when looking to revamp their technology supplier.

However, more often than not it would be large and well established utilities who would. It also greatly reduces the amount of travelling that was previously required to manually record outputs. Many countries are currently facing government mandates to lower CO2 emissions and having an efficient data system in place could, in many cases, achieve various business goals simultaneously.

6. Faulty meters? Improve your network management

A lack of accurate data often means utilities don't know which of their meters or sensors is reading correctly or not. If this information is not transmitted to the utility, they face making huge losses both in terms of water and revenue. Data that reports the health of the network's endpoints increases revenue and improves the efficiency by reducing the amount of truck rolls that utilities use to identify faulty or missing meters.

Depending on the size of the utility - data integrity can increase revenue by 20%

Intelligent networks allow for a near real-time understanding of the health of a network. This accurate way of overseeing a system is very different to the more common 'shift and lift' approach. This method sees sensors being taken out of the network for a period of time to download the data, and then returning the sensors back to a different part of the network to record once more.

A continuous and frequent flow of data being read and transmitted ensures around-the-clock information about a network, giving utilities a comprehensive insight into network pressure and identifying transients that can potentially cause catastrophic damage.

Utilities have a huge amount of data at their fingertips, however this is often held in disparate data sets across a number of teams. If data and analytics are integrated across the organisation then better data-driven business decisions can be made.

Asset management tools can help save up to $5 billion annually

Using accurate data to better manage your smart water network reduces liabilities to regulators for fines, as well as the potential substantial legal liabilities from backflow incidents. A utility that receives regular information about its smart water network stands a much higher chance of avoiding these instances as a data driven system functions in a proactive, rather than a reactive, manner.

An accurate and efficient automated system will reduce the amount of man-power needed, thus lowering labour costs. Utilities can make up to $2.1 billion in savings annually in labour and vehicle costs. The precise data received from the network ensures the location of leaks or ageing infrastructure is correct when work is started and consequently, decreases the amount of field operations and maintenance.

7. Forecast demand and improved water quality

If a utility is able to have a comprehensive understanding of their network due to near real-time data, it allows them to accurately forecast the demand of water, which is an increasingly important factor considering the scarcity of this invaluable resource.

Hydraulic modelling can also facilitate accurate forecasting by using consumption data/ meter data coupled with other network data sets to better anticipate demand and inform the pumping of water to reduce energy used, whilst also improving the quality of water.

The safety of a utility's customer is very important, so ensuring that correct information on the water's health is being transmitted correctly is imperative. A state of the art data package can provide utilities with savings of around $5 billion annually. This data allows utilities to oversee their network in near-real time, as well as being able to detect unusual levels of chemicals and maintain an optimum level of temperature to prevent the propagation of bacteria.

Real-time detection of issues: keeping an intelligent eye on your assets

8. Reputation management

Effective management of a utility's reputation is very important. Some of the factors that help maintain it are ensuring the utility has low levels of non-revenue water; managing leaks effectively; fixing burst pipes and ensuring that good customer relations are upheld. Reputation management with regulators and the public alike helps avoid unnecessary costs

and increases revenue opportunities and customer satisfaction.

9. Value added services

Implementing data in a smart network not only provides revenue through overall increased efficiency, but also because it allows utilities to provide non-core services like social care. Smart water networks can help reduce the cost of household insurance and provide monitoring services for the aged or less able.

10. Improved customer service

A smart water network equipped with sensors collecting data significantly improves customer service and the customer experience. The detailed, accurate and regular information sent back to the utility, allows them to evaluate and address enquiries in real time. It is also possible to make this data available to customers via a portal so they can access their accounts at any time and on the move. This improves customer-side operational efficiency and reduces the cost of customer contact.

Did you know? One deployment in Cape Town saw savings of $5 million per year by implementing pressure management

Business case: solved

The world's population is increasing at an unprecedented speed and its effects are being amplified by the palpable climate change scouring the planet. The societies we live in are not only being affected by these changes, but also by the state of the distribution networks underpinning the very core of daily life: energy and water. The key difference between these factors is that some of these challenges cannot be controlled and some can; aging infrastructures can be. Market leading technologies with extensive coverage, long asset life and the secure and guaranteed transmission of accurate and granular data make being smart achievable. Now is the time to take action and implement a solution for today's practical challenges, whilst future-proofing these vital networks for tomorrow's generation.

The global directive to reduce CO2 emissions by 2020 is a clear call to water utilities to implement a smart water network as it is a long-term solution encapsulating the needs of the distribution system, the environment and simultaneously guarantees to bring in financial savings whilst streamlining operations.

Safe-guarding this precious resource whilst making intelligent business decisions can be achieved by forming a partnership between people and technology. When the advantages are so clear, one could argue that the only disadvantage of a full smart water solution would be to not implement it.

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