![OSIsoft]

IOT AND WATER

How Big Data is Transforming the Water Industry

INTRODUCTION

Rising power prices, new environmental regulations and budget constraints are prompting many utilities— and large industrial users of water—to start looking at the Internet of Things. By fine-tuning existing processes or leveraging predictive analytics, large water consumers are finding ways to reduce their costs and carbon footprint without major retrofits or new hardware investments. While water utilities and large water consumers have employed SCADA systems and automation for years to control their operations, this shift to digital analytics will mark a fundamental turning point in the industry. Water utilities will literally be able to accomplish more with less.
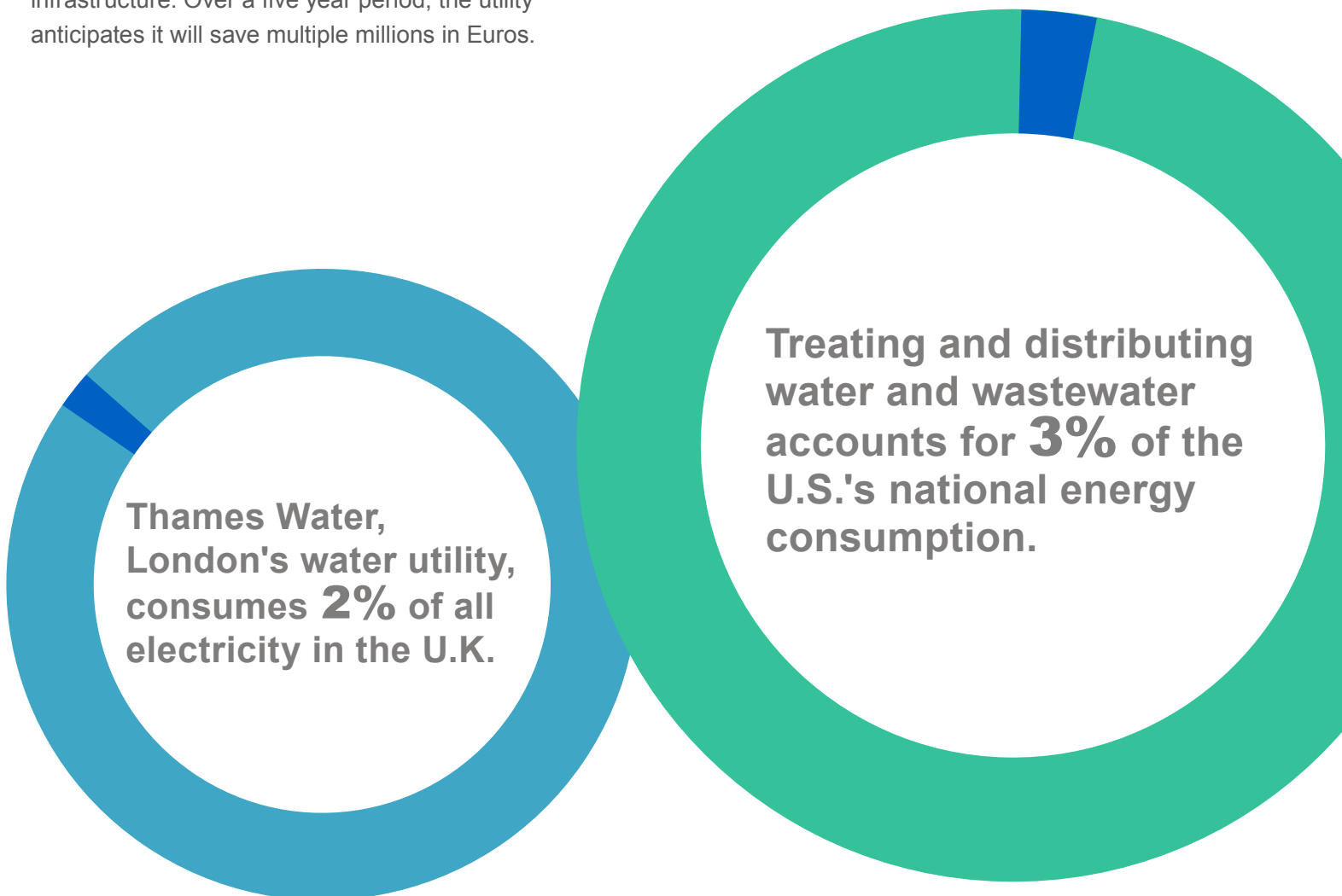
THE ENERGY AND WATER NEXUS

The first and most obvious way IoT can help is through cutting energy. Typically, energy accounts for 30% of their operational expenses, an amount second only to personnel. Often, water utilities are the largest or second largest consumers of energy in their regions. The energy consumed annually in treating and distributing water and wastewater in the U.S. accounts for around 3% of national energy consumption. Thames Water, the water utility for London that serves over 15 million customers, is roughly equivalent to 2% of all of the electricity in the U.K.

Energy savings come about in indirect and surprising ways. Some techniques of reducing power purchased from the grid—reducing the number of active assets at a site, repairing failing equipment or harvesting biogas for internal operations, etc.—are fairly straightforward. The AORTA (Asset and Operations Real Time Analytics) initiative at Thames Water is part of an overall effort to optimize the overall efficiency and energy performance of its water and wastewater infrastructure. Over a five year period, the utility anticipates it will save multiple millions in Euros.

In Boston, the MWRA leverages their real-time information and infrastructure, the PI System, to reduce energy costs by $14 million a year.

They employ time of use electricity rates and work closely with the ISO New England power utility to reduce demand and costs through time of use and other incentives. MWRA also supplements power by burning digester gas through their co-generation engines.

Thames Water, London's water utility, consumes **2%** of all electricity in the U.K.

Treating and distributing water and wastewater accounts for **3%** of the U.S.'s national energy consumption.

THE LOST WATER PROBLEM

But what about leakage control? In many cities, <u>30% or more</u> of the potable water prepared by a utility never makes it to customers, thanks to leaks in pipes. Imagine if your company lost 30% of their product on the way to market.

Maynilad, the privatized water authority for Manila, serves millions of customers over 540 square kilometers: it manages nearly 7,500 kilometers of water and sewer pipes and 19 reservoirs. In 2007, nearly 20% of the citizens in its service territory could not even get service, roughly had did not have 24-hour service and over half did not have sufficient pressure.

As part of an operational overhaul, the company pursued an aggressive program to monitor metrics like water flows while mapping consumption against its geographies. By 2013, it was servicing <u>94.7% of its customers</u>, 97% had 24-hour service and 99% had sufficient pressure. At the same time, Maynilad

recovered 640 million liters of treated water, thereby reducing losses by 27%, while increasing its customer base from 6.4 million to 9 million.

Halifax Water in Canada, meanwhile, manages water and wastewater for about 325,000 residents. The water distribution network consists of 1300km of pipe and they manage water loss in real-time which saves 38 million liters of water per day in real losses. Through aggressive data management, Halifax Water has reduced leakage of potable water, a direct savings of almost $600,000 per year. This is equivalent to saving almost $2 per person served each year.

WHITE HOUSE UTILITY DISTRICT

A data-driven leak remediation effort at the White House Utility District (WHUD) in Tennessee has had similar impact across their operations.

By managing their data, WHUD:

saved
$900,000
in leaks

found a leak
that had been
running for
30 years

deferred
$20 million
in capex

reduced
leakage ILI
from 2.86
to 1.49

serves
90,000
people

found a
147 million
gallon/yr leak
3.5 days after
the system was
implemented

saved
$200,000
by avoiding
SCADA
upgrades

reduced
daily prep time
from 6 hours
to under ten
minutes

saved
$30,000/yr
in workflow
optimization

FIX IT

E vides, the second largest water company in the Netherlands, manages industrial water, wastewater and drinking water for 2.5 million people. The GAMEs playground (Geographical Asset Management @ Evides) was created to leverage best of breed technologies to address key business issues including leakage, flood depths, risk, metering and others. In 2016, a large 630 millimeter pipe burst in Vlaardingen. Pressure dropped from 30 meters to 6 meters while flow increased from 700 cubic meters per hour to approximately 4,300 cubic meters per hour. GAMEs let Evides pinpoint the individual pipe that burst and serve up information on which valves needed to be closed to isolate flooding. GAME also allows Evides to send messages to customers in the affected area to warn them of the problem. Operations returned to normal in around two hours.

Another Dutch water company, Vitens, has created a Vitens Innovation Playground (VIP) that uses the same ODMS technology to detect a leak within two minutes through sensor data.

THE GAMEs SYSTEM

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BIG INDUSTRY GETS INVOLVED

IBM employed analysis of real-time operational data and environmental data like local weather and dew point to reduce water consumption in its semiconductor fabrication facility in Burlington, Vermont by 27% at a time when it also increased the overall capacity of the facility by 30%. While reducing water cut expenses, it also enabled the company to curtail energy costs: water purification is one of the primary drivers of energy consumption in a fab. Combined, water and gas reductions save IBM Burlington approximately $10 million a year. (The facility is now owned by Global Crossing.)

Similarly, the Seattle Mariners, a major league baseball team, cut consumption 10% over three years, or 2 million gallons, through "hard" upgrades like low flow toilets and softer ones like better data monitoring.

"There was a month in the off season when we saw a large spike in water use that didn't make sense," Joe Myhra, groundsman for the Mariners, told the Guardian UK. "We were able to look at data and realized we had a leak in one of the fire hydrant lines. The leak wouldn't [otherwise] have been visible until it was too late."

CONCLUSION

It is evident that energy and water are inter-dependent and their uses are bound to each other. In order to increase efficiencies and to reduce the consumption and demand for both water and energy, information is needed. Decision makers rely on easily accessible, accurate real-time and historical data to make the best informed decisions while remaining sustainable.

IBM'S SEMICONDUCTOR FABRICATION FACILITY

REDUCED WATER AND ENERGY COSTS

SAVED $10 MILLION A YEAR

ABOUT OSISOFT

With the belief that people can improve process efficiency, manage assets and mitigate risk if they have access to the data they need, OSIsoft created the PI System as a common data infrastructure to capture and store real-time data and make it available however and wherever needed. For over 30 years, OSIsoft has delivered the PI System with the singular goal of creating a common data source to connect enterprise data with people making decisions and solving problems.

Today, the PI System is trusted to do just that. Processing over 1.5 billion data streams across 19,000 sites, the PI System is embedded in operations and critical infrastructure in over 125 countries. Our customer base includes Fortune 100 and Fortune 500 companies in power generation, oil and gas, utilities, metals and mining, transportation, critical facilities and other industries.

To see any of the 1100+ customer success stories, product descriptions or global initiatives, please visit **www.osisoft.com.**

Corporate Headquarters:
1600 Alvarado Street
San Leandro, CA 94577, USA
Contact us at +1 510.297.5800

ABOUT THE AUTHOR

Gary Wong,
Principal, Global Water Industry, OSIsoft

Gary Wong has extensive international experience providing sustainable, strategic and cost-effective business solutions, particularly in the water industry. Prior to joining OSIsoft, he has held positions with Metro Vancouver and as a consultant directing both public and private sectors on sustainability, IT strategy, planning, operations, and engineering. Mr. Wong holds a Bachelor's Degree in Chemical Engineering, is registered as a Professional Engineer in Computer Engineering, holds an M.B.A. from the Queen's School of Business and is also a Chartered Professional Accountant.

Email: gwong@osisoft.com

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