SMART WATER: WILL NEW TECHNOLOGIES TRANSFORM THE WAY WE THINK ABOUT WATER?

First there was the smart grid, now technology promises to overhaul the often arcane water industry. Is a smart water revolution likely, or is it wishful thinking? Mike Scott investigates.

In the energy world 'smart' is all the rage – smart grids, smart meters and smart appliances are considered vital to reducing consumption and increasing efficiency.

To an extent, the same thing applies to water. The application of smart technology to the industry is set to be a big theme as the full extent of global water scarcity starts to make itself felt, and as the finite nature of the world's water supplies becomes more widely understood.

Dr Peter Williams, chief technology officer for IBM's Big Green Innovations initiative, says there are many analogies between smart technology in water and energy – both have a focus on conservation, efficiency and the roll-out of alternative sources of supply. He told a conference earlier this year that more detailed data will enable greater levels of control and responsiveness and that advanced metering can deliver price signals and capture data about both consumption and network status.

However, Phil Sweetman, an expert in smart infrastructure at the PA Consulting Group, says the word 'smart' is over-used when it comes to water because there are limits to transplanting the smart concept into the water industry.

The smart grid, for instance, is designed to compensate for the fact that electricity is hard to store but, as anyone who has ever left a wheelbarrow out in the rain knows, water is easy to store. Furthermore, electricity can be transported over huge distances with relative ease, yet moving water is costly and energy-intensive.

Water pressure: utilities are turning to smart technology to detect leaks and to learn about how much is consumed and by whom.

Source: Wikimedia Commons

"There is no equivalent to the smart grid in water," says Tom Fryer, commercial director at metering company Sentec. "One of the features of the electricity smart grid will be two-way communications and flows of power. Water is only ever going to flow one way."

Nonetheless, improving water meters is one of many big opportunities in the water industry. Old-style meters are "very poor quality", according to Fryer. "They only last 10 years, they wear very badly and they don't actually measure anything at very low flow rates." This is prompting a move to polymer-based, solid-state meters that have no moving parts.

Most water companies have made some investment in automatic meter reading (AMR) technology, says Sweetman. "The benefits of these are pretty clear; for example, meters are capable of being read remotely by a man driving down the street. It will be unnecessary to visit each meter individually."

Demand for AMR is strong and growing, says Jerry Lauzze, head of the water business at US-based metering company Elster. "More and more, utilities are able to see value in investing in technology that does not leave them stranded with old infrastructure.

"The company expects the wave of adoption of AMR to be followed in time by advanced metering infrastructure (AMI) solutions." These communications networks will be used to better monitor and report water use to utilities and customers, deal with leaks more quickly, monitor water quality and offer automatic control of supply.

"Accuracy is a key theme," Lauzze adds. "Lost and unaccounted for water is a big focus for regulators."

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Leakage is a huge concern in areas of high water stress. Leaks not only mean lost water and revenue, they also increase water companies' energy bills for pumping and treating water that never gets used. Detecting and dealing with leaks is therefore set to be a huge market.

Many leak detection technologies take advantage of the fact that water escaping from a pipe generally makes a noise. Canada-based Pure Technologies, for example, has a range of acoustic leak-detection products, including the Smartball, which travels with the water flow, detecting and locating leaks as it rolls. The company is in the process of moving up from the TSX Venture Exchange to the Toronto Stock Exchange.

TaKaDu, another leak detection company, takes a different approach – it looks at information gathered by sensors in water networks to look for anomalies.

Some of the world's biggest companies such as IBM and Intel are driving the integration of AMR technology with other monitoring and leakage detection technologies, says Paul O'Callaghan, principal at water consultants O2 Environmental. "There is an interesting synergy between what the big corporations are pushing and what the smaller companies are doing," he says.

Kevin Brophy of Meidlinger Partners, a US private equity firm focused on investments in the water sector, says: "Water industry dynamics allow for significant value creation by smaller technology and service-based companies focused on advanced water treatment."

Early-stage investors focused on water and the "bluetech" markets include Toronto-based XPV Capital, which invests exclusively in water companies, as well as Emerald Technology Ventures, Perella Weinberg, Khosla Ventures and Kleiner Perkins Caufield & Byers.

Much of the technology development takes place in hubs focused on areas that are water-stressed in one way or another. These include California, Singapore, Israel, Australia and, perhaps less obviously, Ontario in Canada. Israel boasts several of the leading companies in the sector such as Amiad and Netafim, while Singapore leads the way in the use of recycled water.

According to Global Water Intelligence, the worldwide water market was worth about $424bn in 2010 and is expected to grow to $1 trillion by 2020. The growth rate across a range of water technologies is expected to be 4-6% per year, compared to global GDP growth of 1-2%, says Brophy.

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The water industry may be full of potential and fast-growing, but investing in the market is not all plain sailing. Simon Gottelier, an investment manager at Impax Asset Management, says large, diversified global companies such as Danaher, Pentair, ITT, Siemens and GE tend to buy technological innovators at a very early stage which reduces the number of opportunities for investors. "The best-in-breed get taken out early, which leaves a relatively limited opportunity set from which to pick stocks," he says.

Emefcy, an Israeli start-up, is backed by VC funding. The firm has developed a technology that uses microbial fuel cells to treat wastewater and generate electricity at the same time. It has recently received an undisclosed investment from Energy Technology Ventures, a joint venture between GE, NRG Energy and ConocoPhillips.

In other recent deals, BASF bought German ultra-filtration membrane producer Inge Watertechnologies for an undisclosed sum, and Pentair bought the clean process technologies division of Dutch firm Norit from private equity house Doughty Hanson for EUR 503m ($712m).

The global water market may have been worth $424bn last year but it only attracted around $120m in venture capital funding, according to Global Water Intelligence data. Part of the problem is that, unlike clean energy where individual sub-sectors such as wind are sizeable, the water market remains fragmented.

"The biggest water technology of the past 50 years is probably the reverse osmosis membrane – but RO membranes are not even a $1bn market. Compare that to renewable energy companies which have their eyes on a market currently valued in the trillions of dollars a year, and you can understand why water is less exciting close up," said a Global Water Intelligence analyst.

In the longer term, says O'Callaghan, one of the big growth markets will be source separation and waterless technologies. This will require a significant change in thinking, he believes. "We do not need water for everything that we use it for. And where we do need water, we don't need all of it to be potable," he says. He cites the examples of airline toilets, which use hardly any water but do exactly the same job as toilets on terra firma, or the move to hydroponics in agriculture.

In future, there will be more separation of water sources into yellow water, black water and grey water. "There's no point in taking urine water, diluting it massively with other water supplies and then trying to take the nutrients out. If you can isolate the water at source, getting at the nutrients becomes much more efficient. The nature of waste water is going to change. With source separation it becomes clear that there are multiple types of water but this is still a relatively new concept to those outside the industry," O'Callaghan says.

In assessing how the industry will change in future, he uses a striking analogy. "At the moment we are using a chainsaw to cut butter – but instead of working out how to switch from a chainsaw to a butter knife, we are focused on ways to make the chainsaw more efficient." ■

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