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cycle. At the same time, more than 600 million people lack access to safe water worldwide, plus three times that number have to use a source of drinking water contaminated by faeces. In response, the first Action Day for Water in the history of United Nations Climate Change Conferenc-

courses in Dubai, consumes 550 li-

tres of water a day. A pair of Levi's

501 jeans uses 3,781 litres in its life

ater access is not fair.

An average resident

in the United Arab

Emirates, home to golf

OVERVIEW

JIM McCLELLAND

es took place in November, at the COP22 summit in Marrakech. Countries had identified water as being key to adaptation in 93 per cent of their national climate action

plans or intended nationally determined contributions. A priority of the Water Day was climate justice, marked by the launching of the Water for Africa initiative,

with potential social ramifications of scarcity and stress spelled out by Dr Charafat Afailal, minister in charge of water for Morocco. "We need to realise what is at stake, since water insecurity leads to increased conflicts, tension between populations and provokes migration that threatens overall stability," she says.

The universality of water issues seems almost incontrovertible, observes Eleanor Allen, chief executive of Water For People, a non-profit international development organisation. "Water is one element that connected nearly all 17 global sustainable development

goals (SDGs). The dedicated water goal SDG6 - ensure availability and sustainable management of water and sanitation for all – is critical for social progress.'

However, she also questions how it can be that with all SDGs targeted for completion by 2030, we still find ourselves in 2016 with so many lacking access to safe water and sanitation.

Some 2.4 billion people, nearly one third of the global population, currently lack access

to a toilet or latrine. The scale of the problem remains a daunting prospect to fix, Ms Allen concedes. "It will take \$114 billion a year for the next 14 years to get clean water and working toilets to everyone on the planet and meet SDG6. Getting everyone safe water and a toilet, forever, is a much

greater challenge," she says. Within the corporate sector, the business case for water stewardship has already won acceptance among some of the more progressive market leaders. In 2014, Marks & Spencer became the first retailer to receive triple certification by the Carbon Trust for water, carbon and waste. One year earlier, prime-mover status in hospitality went to Whitbread, owner of such chains as Costa Coffee, Brewers Fayre and the UK's largest hotel brand Premier Inn.

For organisations taking water conservation seriously, efforts go beyond just low-water taps and dual-flush toilets, says James Pitcher, corporate social responsibility director for Premier Inn and Restaurants. "Whitbread is a fast-growing company and we must be sensitive to the impact we have on the environment. One of the ways we are doing this is by minimising water consumption, which is why we've committed to improving water efficiency by 20 per cent by 2020. We now have 59 water recycling systems at Premier Inn, which result in

> a 92,444 cubic metres annual saving." General levels of action and even awareness among the business community are, however, much less impressive, says Professor Jacob Tompkins, managing director of Waterwise. "Business risks are huge, from direct impact of drought on pro-

"Many of the problems we face cesses and prorequire mass engagement, from wa-

ter efficiency to blocked sewers. We should use the power of new media and the internet of things to provide people with information and enable them to take actions that aggregated together provide solutions to things like floods and droughts."

Water is a shared resource, but will need to become a shared problem if we are to move towards an equitable solution.



ACONTEUR.net	BUSINESS	CULTURE	FINANCE	HEALTHCARE	LIFESTYLE	SUSTAINABILITY	TECHNOLOGY	INFOGRAPHICS	Reconteur.net/future-of-water-2016

planet by 2030

Source: World Bank 2016

duction to restrictions on effluent discharges as a result of lower river flows," he says.

"But most businesses are unaware of the threat. They don't realise things like transport and power are impacted by water scarcity, and don't consider the water needs of their data centres and distribution hubs."

Professor Tompkins calls for a non-party-political UK approach to water at government level that is both strategic and holistic, rather than tactical responses to extreme weather events. He does not believe

is needed a year to get clean water and working toilets to everyone on the

Why water politics

matters to business

Clean water may be in plentiful supply in the UK, but

shortages elsewhere in the world bring death, social

injustice, political instability and economic stagnation

projects. "The answer is certainly not more reservoirs, a national water grid or other big infrastructure projects: it requires distribution infrastructure," he says. "It needs us to work with nature, reconnect rivers to their environment and slow them down to reduce flooding, but also increase recharge of our aquifers. The solutions to floods and droughts are the same."

in simply throwing money at grand

He also champions the need to retrofit homes for resource efficiency, water security and utility bill reduc tions. Rainwater harvesting would help with water storage and runoff, plus smart technology could cut leaks and optimise usage.

These options are available now, but the real catalyst for water sector transformation is the culture shift and behaviour change needed to go with them. Professor Tompkins concludes: "The future is positive, but it will require a fundamental change in attitudes and policies. People are interested in water, but we have not communicated the issues properly.





Next Generation Technology Becomes Reality On schedule to begin operations in 2020, Agua Via is now completing the engineering of a next-generation, biomimetic water membrane. Biomimicry uses Nature as the inspiration to provide high purity water at low energy and low costs. What others are saying:

"The broader impact of this technology is, of course, astounding." — United States National Science Foundation, SBIR Award Review

"Transformative technology that can revolutionize water applications across all market segments. This membrane offers a long list of key benefits, e.g., small footprint, higher yield, and reduced fouling. By creating a oneatomic-layer-thick nanomembrane, (the) technology moves to the lowest filtration energy possible under the laws of physics, and transforms the relationship. By combining low energy with tremendous specificity in filtration, the membranes achieve the long-sought goal of separation science." — United States Department of Energy, SBIR Award Review

The technology has been give multiple awards and grants from the US Department of Energy's Advanced Manufacturing Office and the US National Science Foundation to develop massively parallel manufacturing and real-time quality control systems for producing the membranes in large quantities at high quality.

Water industry professionals in Europe, the Americas, Asia and Africa have reviewed Agua Via's technology, and are working to help the company turn the technology into a reality.

Please contact us to explore how we might help provide higher purity water, cut costs and reduce energy use. contact@aguavia.com



Technology solutions can tap the world's dwindling water supply

Imaginative solutions from frugal innovations, doing more with less, to those relying on replicating nature or biomimicry, can help boost the Earth's scarce freshwater resources

TECHNOLOGY OF WATER NICK EASEN

O1 LOW-WATER WASHING MACHINE

A washing machine uses a lot of water, so Sheffield-based company Xeros has developed a device that uses 80 per cent less. It has replaced the liquid stuff with polymer beads. Each machine could potentially save more than a million litres of water over its lifetime. This is equivalent to the same volume used by an average UK household in a decade. A large commercial machine uses a staggering 500 litres of water every time it's switched on. The patented, award-winning system also uses up to 50 per cent less energy and roughly 50 per cent less detergent than traditional systems. It's a great British export success.





02 PORTABLE WATER TREATMENT

Swedish organisation Solvatten has developed a portable water treatment and heater system that gives access not just to safe drinking water, but also to hot water. It's designed to be used by off-grid households in the developing world. Roughly 250,000 people are using this system in tropical regions. Each unit contains two, five-litre containers, a fabric filter and a heating unit. Natural ultra-violet light from the sun destroys harmful micro-organisms in the water, which is also heated to 75C. Each unit costs up to \$100, but will last a decade. Solvatten has 45 active projects across the globe from Papua New Guinea to Mali.

Polluted tap water is a big issue in many countries, especially in India and China, and purifying it takes lots of energy or chemicals. Danish company Aquaporin has developed a groundbreaking technology that purifies water by mimicking nature. The company has developed a membrane that's embedded with a protein found in all cells from bacteria to humans, called aquaporins. These allow living things to filter out pollutants and get clean water into cells. The manufactured membrane relies on forward osmosis and uses a lot less energy than current technologies. In total, 62 patents have been granted worldwide. It can be used to treat wastewater and is very efficient – one gramme of aquaporins can cope with 2,700 litres of water a second.





)4 TURNING WAVES

Existing desalination plants devour huge amounts of energy and belch out concentrated brine into oceans, jeopardising marine ecosystems. A new device could create drinking water from the sea using wave power. The SAROS desalination buoy is the brainchild of two graduates from the US University of North Carolina. Their device pressurises water and performs reverse osmosis to purify brine. It currently produces 500 gallons a day. They're now scaling up to produce 5,000 gallons per buoy in waves that are only 2.5 feet high. A US demonstration project will be in place by early-2017 with pilot projects in Puerto Rico and Nicaragua towards the middle of next year. It could one day provide clean drinking water for remote islands.

HARVESTER

05 PERSONAL PURIFICATION STRAW

LifeStraw is a plastic cigar-like straw that isn't for sucking up fizzy pop, but removing potential pathogens, such as dysentery, typhoid and cholera, as well as other parasites from what would normally be undrinkable water. The portable filter uses a hollow-fibre micro-filtration technology. Up to 1,000 litres of water can be made fit to drink without electricity or additional attachments. It is available on the consumer market, via Danish healthcare company Vestergaard, for trekkers and outdoor pursuit enthusiasts. For every LifeStraw purchased, one schoolchild in a developing country receives safe drinking water for an entire school year. It is used in projects in more than 64 countries around the world from Kenya to India.





\bigcirc \bigcirc affordable water pump

Some of the most frugal innovations make the greatest difference when it comes to water technology. KickStart design and sell very low-cost, human-powered irrigation pumps to poor farmers. These use the power of people's legs or arms to pump up ground or river water to water crops. In Africa only 4 per cent of farmland is irrigated. In India it is 35 per cent where micro-irrigation schemes have helped lift many smallholders out of poverty. Small-scale farmers can boost their income by 400 per cent if they water their fields. To date KickStart has sold 291,000 devices across 16 countries in sub-Saharan Africa. The non-profit social enterprise claims to have created 200,000 profitable businesses and lifted a million people out of poverty.

07 microbial fuel cell

We're one step closer to personal wastewater treatment plants thanks to an invention from a Boston-based company that has developed a self-powered, bio-based system. The energy for the treatment processes come directly from electrically active microbes. The fact is cleaning up wastewater is a power-hungry business, so Cambrian Innovation has developed what's known as a microbial fuel cell, in which microbes pass electrons to and from electrodes. The wastewater is treated and electricity generated. BioVolt is now being tested for domestic wastewater treatment in remote, off-grid locations. The system is containerised, mobile, and can be easily scaled up. The US Army ran a field test of BioVolt in the summer of 2016.



Gambarini Gia nan drea/Shutterstock

08 fog harvesting

In the Atacama Desert, in Chile, it hasn't rained for hundreds of years, but it does get plenty of fog. Poor communities here need freshwater to drink, as well as irrigate crops and aid with reforestation. So they've developed large mesh fog collectors. These hillside devices use a fine polypropylene mesh, which is highly efficient at capturing water-laden fog. Juan de Dios Rivera, from the Pontifical Catholic University, is a global expert and alongside Jacques Dumais, from the University of Adolfo Ibáñez, is developing large-scale systems that could supply whole communities and compete in price with sea water desalination. "We want to follow the development of wind power and develop the equivalent to a modern multi-megawatt wind turbine," says Mr de Dios Rivera.

O9 SUCKING WATER

The WaterSeer relies on condensation and simple wind power to generate clean water from the atmosphere. It promises to generate up to 11 gallons of safe drinking water every day from thin air without the use of electricity or an external power source. A fan pulls warm air down a long metal tube and underground; water in the air then condenses and is stored in a bell-like reservoir. It could potentially run forever. A prototype is being tested in the field and a new model will be available in 2017. Currently, US not-for-profit organisation VICI-Labs is crowdfunding to scale up the idea. It could provide developing communities with water forever.





1 ATMOSPHERIC WATER

Italian designer Arturo Vittori and his team have created a water-catchment system that can produce potable water by harvesting dew, rain and mist using a unique tower structure. Warka Water is made up of a bamboo frame, recyclable mesh, rope and a water collector. The device can be assembled cheaply and easily by six people in roughly four days. This biomimetic water harvester takes its inspiration from nature including termite hives – their airflow, shape and geometry have helped shape the device. It's been trialled in Ethiopia and Italy. The structure relies on gravity, condensation and evaporation to generate drinking water, and doesn't require electrical power. Each tower costs about \$1,000, significantly less than other water relief options available. The C.D.P. slimline rainwater harvesting system can be fitted in domestic builds and can contribute to a level 3 or higher of the **Code for Sustainable Homes** by helping to drastically reduce annual mains water consumption in each home.

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*depending on size

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Competition is coming to water in England...

Water supply to businesses throughout England is soon to be opened up to competition in a similar way to the energy market

BUSINESS MARKET KARMA LOVEDAY

Some 1.2 million English businesses of all shapes and sizes will be able to switch their water supplier from next year. Surprised? Probably, because there has been very little public fanfare about it. But behind the scenes, many have been beavering away to make possible something that was long considered unfeasible and remains unheard of outside of the UK – competition in water.

Business customers, which includes public sector organisations and charities as well as commercial entities, will continue to receive the same water through the same pipes, and their waste will be treated at the same plants. So this is not a plumbing bonanza. But what customers will be able to choose is who they interact with to pay for and manage these services.

Rather like in energy, where retail supply activities are divorced from networks and production, water companies have carved the "retail" activities they perform for non-household customers – primarily billing, payments handling, meter reading and contact management – out of their main operations. These activities will be subject to competition from April 2017. The remaining "wholesale" activities will remain regional monopolies.

A massive programme of preparatory activity has been underway not only within water companies, but also to create a central market. Badged the Open Water programme, this central work has been conducted by the government in partnership with water regulator Ofwat and a newly created organisation called MOSL (Market Operating Services Limited), which has been responsible for the design and build of the IT system that will underpin the market.

Preparation remains work in progress for all parties. But things are on track. Right now the market is operating in "shadow" mode, a sort of dry run. Short of a curve ball, we can confidently expect customers to be able to start switching in four months' time. MOSL's chief executive Ben Jeffs has described the effort required to get to this point as "heroic". Scotland was the trail-blazer for water competition. Its market opened in 2008. Back then, Scotland's only water company, Scottish Water, legally separated its business retail arm, which has since been trading as Business Stream. Its chief executive Jo Dow comments from a position of experience. "The shadow market has got off to a good start, with the technical infrastructure now in place to switch customers," she says. "There's still lots of work to be done and we should never underestimate the challenges ahead. We only have one chance as an industry to get this right for customers."

So what's in it for customers? The market will offer only thin pickings in terms of straightforward price discounts. Ofwat has allowed an average 2.5 per cent net margin (6 per cent gross) for retailers, arguing this will be sufficient for the market to prosper. But a wide range of stakeholders, including customer groups and prospective new entrants, have said this

water Water companies eated are set to compete arket with each other for business customers



is too low to enable attractive sums to be sliced off customer bills.

Nevertheless there are other prizes worth considering. Customers who have sites in more than one water company area stand to benefit from the simplification that rationalising suppliers would bring. Competitive pressures should also improve the accuracy and timeliness of bills.

Moreover, with easy discounts off the menu, retailers are widely expected to try to attract customers by offering them help to consume less as a means to cut measured bills, for instance through leak detection and repair services, advanced metering, and recycling technologies. Some will offer additional "value-added" services such as emergency back-up supplies, boreholes and on-site treatment plant. Others still will look to bundle in non-water services, for instance around energy and carbon saving.

A good example here is Anglian Water Business. Its home region of East Anglia is one of the driest and fastest-growing regions of the country. It has carved out a strong identity for itself in the Scottish market and in its home patch as a water efficiency specialist, and through a partnership with SaveMoneyCut-Carbon last year added energy and carbon-saving expertise to its portfolio. Managing director Bob Wilson says of the move: "It all comes back to enabling customers to make signifi-



Source: Utilitywise 2016

cant savings – double-digit savings, not the 1 or 2 per cent savings you would get from a price discount – on their bills."

Business Stream's Ms Dow cites data from her company's Scottish experience. "Customers in Scotland have realised significant benefits in the eight years since the retail market opened, with £160 million in financial savings delivered for Business Stream customers," she says. "We've also helped our customers use less water, with 42,000 tonnes of carbon saved as a consequence, which is equivalent to taking 11,767 cars off the road. When the market opens in April 2017, we want to ensure that customers in England can access these benefits too."

Will business customers in England be interested? Certainly large users





In April 2008, Scotland led the world in opening its water and sewerage retail market fully for the country's 130,000 nonhousehold customers. In the early years of competition, switching levels and the number of new entrants were low. In 2010-11, less than 0.5 per cent of the customer base had switched away from the incumbent retailer Business Stream and only four retailers operated in the market. Since 2011, both the volume of switching and the number of new entrants have increased dramatically. This followed the regulator, the Water Industry Commission for Scotland (WICS), allowing retail margins to increase while wholesale costs fell. The gross retail margin was around 9 per cent in 2008-09, rising to a peak of 20 per cent in 2013-14. This attracted more retailers into the market and enabled greater discounts to be offered to customers, which prompted more switching.

A contributory factor in the upturn was news that the English market would open, which encouraged more suppliers to test out strategies north of the border. There are currently 23 retailers in Scotland, 19 of which have entered since 2012. Business Stream's market share,

by number and by volume supplied, is now close to 50 per cent. A key deal was struck last year when the Scottish public sector – 200 organisations with more than 15,000 sites – switched from Business Stream to Anglian Water Business, taking the latter's market share to around 25 per cent.

The English market has been modelled to a large extent on the Scottish experience. In fact, the WICS team and in particular its chief executive Alan Sutherland played a crucial role in laying the foundations for the English market before MOSL was established. However, there are also important differences, including much smaller retail margins in England, and a much larger and more complex market.

COMMERCIAL FEATURE

OPENING WATER TO COMPETITION

The water industry's longest-serving chief executive, Wessex Water's **Colin Skellett**, gives his view on how competition will open up other markets

reeing up businesses to choose their water and sewerage supplier is a positive move in terms of making Britain's water industry more competitive – and hopefully this Open Water initiative for England is only the start.

The most significant issues currently facing the industry, from dealing with climate change and resilience to meeting customer expectations and keeping bills down, cannot be dealt with simply by carrying on as we are. It's vital that water companies embrace innovation to meet these challenges, and this innovation is most likely to come if markets and competition are involved.

Take climate change, for example. We're already seeing more intense rainfall and longer dry periods so we are going to need to be innovative about how we persuade people to use less water, how we deal with leakage, as well as about water storage and water transfers.

This might involve working with farmers or landowners in different ways so they can release water in times of need or slow water through the system during periods of excessive rainfall. With Brexit and the changes that will inevitably come with leaving the Common Agricultural Policy, there is an enormous opportunity to introduce a new way of working with the farming industry and landowners.

At the moment, the country spends about £13 billion a year



on environmental resilience and catchments; but how, through innovation, could this be better spent?

Initiatives like EnTrade, which involves running a reverse auction with farmers, in which they bid for how much they need to be paid to take a certain amount of nitrate out of the system, are the way forward. This preventative approach is far more cost effective than putting in expensive treatment processes to remove chemicals from supply. But innovation like this won't come unless there are market mechanisms in place to make it happen.

So where else could competition be introduced? It is likely that trading between water companies will become more common, while at the other end of the value chain there will be more competition in We'll probably see the development of multi-utility services, so instead of having different providers and bills for broadband, energy and water,

the biosolids market through wasteto-energy businesses.

customers will deal with

a single company

There's also the question of creating a household retail market. Customers are in favour of this, but at the moment the financial benefits are marginal, in the region of about £6 to £8 a year - no one is going to switch on that basis. Instead, we'll probably see the development of multi-utility services, so instead of having different providers and bills for broadband, energy and water, customers will deal with a single company.

However retail competition develops, it's important the water industry does not follow the energy market; the major problem there is the clunky hand-offs between retailers and wholesalers as well as between meter readers and retailers. Companies need the right systems to ensure that the customer experience is seamless.

I think this is a challenge that can be met. And if we can get Open Water right – as Wessex Water plans to do with water2business – it's likely to provide a terrific platform on which to build the competition and innovation that is so crucial to the future of the industry.

The market will offer only thin pickings in terms of straightforward price discounts

mouth Water will exit to an independent company from the Scottish market, Castle Water.

Some firms are doing tie-ups to compete better together, including United Utilities and Severn Trent through Water Plus, and Pennon and South Staffordshire Group.

Many retail arms of traditional water companies have rebranded, some also relocating and recruiting new staff. The most radical to date is Three Sixty, the retail business from the Yorkshire Water stable, which has consciously moved away from a water-focused moniker.

Welsh companies are not governed by the new rules due to devolved government policy.

From having no choice, business customers from April will have quite a few choices to make. They can do nothing or use the threat of competition to negotiate a better deal with their existing supplier. Or they can switch some or all of their sites to one or more suppliers, and can switch water and sewerage services separately or together. They can even self-supply by buying direct from the wholesaler, though this option requires thorough understanding and commitment.

Ultimately, each business will have to choose a strategy that is right for its circumstances. But all should look to see if there's anything to gain from the new opportunity. A useful online resource, which can put customers directly in touch with retailers, is under development from markets specialist Gemserv, under the brand England on Tap.

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UK WATER SENTIMENT

are. According to research published

in the summer by industrial and

commercial consumer representa-

tive the Major Energy Users' Coun-

cil, 81 per cent of its members, many

of whom are household names, are

considering switching at least some

of their sites, with the biggest lures

being cheaper prices and consoli-

dated bills. Some 65 per cent of mul-

It is harder to call how smaller cus-

tomers in England will respond. Re-

search published this autumn from

the Consumer Council for Water found

only 8 per cent of business are aware

that they would soon be able to switch.

Retailers have to secure a licence

from Ofwat and accreditation from

MOSL before they can participate in

the market. Most retail arms of the

regional water companies are plan-

ning to try their hand, though the

Companies do not have to compete

and can instead sell on their business

customers to a third party. Southern

Water is exiting to Business Stream,

and both Thames Water and Ports-

picture is complicated.

ti-sites favoured a single supplier.

Survey of members of the Major Energy Users' Council - typically multi-site businesses with annual water and sewerage bills of more than $\pounds 250,000$

ARE YOU LIKELY TO SWITCH SUPPLIER FOR AT LEAST SOME OF YOUR SITES?



WHAT ADDITIONAL INFORMATION WOULD YOU LIKE?



_ Source: Major Energy Users' Council 2016

BEST SERVICE FOR BUSINESSES

Wessex Water and Bristol Water provide industryleading customer service, and the retail arm they've formed as part of the new Open Water initiative will offer the same high standards.

water2business has promised to offer large and small businesses, schools, hospitals, charities and councils tailored water and wastewater management that will help improve efficiency and deliver savings.

Organisations that switch to water2business will benefit from consolidated billing for multi-sites – even those not in the Wessex or Bristol areas – and, through its partnership approach, firms could improve sustainability and environmental credentials.

Director of business retail Geoff Smith says: "We pride ourselves on providing firstclass customer service and our priority is ensuring that customers get the best out of their water supply.

"With our huge industry knowledge we can tailor our services to individual needs and help companies become more efficient."

For more information please visit www.water2business.co.uk or call 0345 850 0714

Worldwide water crisis calls for fresh thinking

The future calls for fresh thinking about freshwater with businesses and governments collaborating to manage sustainable water use - and avoid a global crisis

SUSTAINABILITY JIM McCLELLAND

ur planet might be blue, but we may still be left thirsty. While almost three quarters of the Earth's surface is covered in water, less than 3 per cent of that resource is actually freshwater, of which maybe only 1 per cent is readily accessible. We depend on that 1 per cent.

Not surprisingly, the critical hundredth is in high demand. Research published in the journal Science Advances found that as many as four billion people worldwide, more than half the global population, suffer water scarcity at least one month a year.

For many, sadly, things might only get worse, before they get better. Mark Fletcher, global water leader at Arup, says: "Growing water scarcity is an overarching global problem. At least two thirds of the world's population will face 'water stress' by 2025 and the number of people affected by floods could increase by a factor of three by 2100."

In its ranking of the top five global risks of greatest concern over the next ten years, the World Economic Forum rated water crises number one, marginally higher than failure of climate change mitigation and adaptation, and significantly ahead of extreme weather and food crises. All four risks are interrelated.

The effects of water scarcity are particularly severely felt in Africa, where the cost is being counted across entire economic regions. Dr Richard Munang, co-ordinator of the Africa Regional Climate Change Programme of the United Nations Environment Programme, says: "The World Bank estimates that water scarcity exacerbated by climate change could cost some regions in Africa up to 6 per cent of GDP by 2050 due to impacts on agriculture, health, and incomes. This is in addition to the very low baseline, where sub-Saharan Africa will require investments of some 2.7 per cent of GDP, or \$7 billion annually, to reach goals of water and sanitation.

Alongside climate-related effects, there are two other major global megatrends accelerating impact of water scarcity world-

banisation.

population already lives in cities and that proportion is forecast to grow towards 66 per cent by 2050. This will mean more than two that we should increasingly conbillion extra inhabitants needing sider the context in which we opwater for drinking, washing and food preparation. The UN predicts close to 90 per cent of this increase will be concentrated in Asia and Africa.

Water stress as a result of urbanisation cuts across all climate maps and geographies. For instance, cities in Brazil, a country famous for rainforests and home to one eighth for leadership and an increasing of the world's freshwater, are surprisingly experiencing drought conditions similar to those faced in Iran, known for its deserts.

São Paulo, located in the south east of Brazil and the largest megacity of the southern hemisphere. has been wrestling with the effects of the worst

drought for generations. Equally, Tehran. capital of Iran, and now home to over one tenth of its population, is once again warning citizens about water rationing.

There is good news, however. De- cost of inaction on water secuspite desperate situations and dire forecasts, there are abundant opportunities for change.

Dr Munang, for one, is adamant both policies and proven technologies exist to mitigate against even the worst of water crises projections. With application of these known solutions, he insists the outlook remains highly optimistic for Africa. "Improved water stewardship pays high economic dividends," he says. "When governments respond to shortages by boosting efficiency and allocating even 25 per cent of water to more highly valued uses, such as more efficient agricultural practices, losses decline dramatically and for some regions may even vanish."

Key solutions include integrated technology applications combining water conservation and protection of catchments, plus improved water-use efficiency through such measures as recycling, as well as leak monitoring in distribution infrastructure to cut losses. In addi-

wide – population growth and ur- tion, ecosystems-based adaptation technologies that restore biodiver-More than half the world's rising sity are critical to enhancing riparian reserves that are the source of water.

Mr Fletcher also argues strongly erate, looking to be in tune with the water cycle and placing emphasis on the role of natural infrastructure in what will become bluer and greener cities. As well as natural capital, he also champions the importance of human capital and creative thinking. "Do not underestimate the need dependence on social structures and community engagement as essential considerations to ensure greater resilience for all," he savs.

Leadership and engagement on water are rapidly, if belatedly, becoming issues of importance for the business

The value of water is now an emerging metric on the balance sheet

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value of water is now an emerging metric on the balance sheet. Head of water at global environmental reporting system CDP, Morgan Gillespy, says: "The

community. The

rity is getting higher every year. This year companies reported \$14 billion in water-related impacts through CDP, up from \$2.6 billion. Companies can no longer afford to treat water as a free and plentiful resource.'

Just as happened with energy and carbon before it, water is starting to be seen as a potential performance differentiator for corporates, not just in terms of environmental impacts, but the financials of business risk and asset management.

Water is also a shared resource and companies are becoming more conscious of the local context of their abstraction and usage activities. Highlighting Ford Motor Company recycling 100 per cent of its industrial wastewater in water-scarce India, so offsetting freshwater consumption, Ms Gillespy adds: "There are signs we are on the cusp of a sea-change companies are starting to consult and factor in wider stakeholders in water risk assessments, targets and policies.

"We are already seeing companies look outside their own walls and work collaboratively to manage water resources with governments, local communities and civil societies. And we are seeing companies work at the river-basin level, with the aim of ensuring sustainable and equitable water use for all."

According to CDP, there is a great opportunity to think about water as part of climate mitigation, with 24 per cent of business actions to reduce greenhouse gas emissions dependent on stable and secure supply. Encouragingly, it found 53 per cent of companies successfully reduced emissions via improvements to water management.

Joined-up thinking can drive change, concludes Ms Gillespy. "Understanding synergies between climate and water will be key to realising opportunities and securing our low-carbon future." she says.

Of course, having your business based in the extreme near-rainless heat of the Atacama Desert in Chile can give a certain edge to your appreciation of the worth of water, as chief executive at Neptuno Pumps, Petar Ostojic, explains: "Being located at the driest place on Earth has heavily influenced us to use our scarce and valuable resources in the most sustainable and efficient way. Furthermore, we are also at the heart of the world's biggest mining industry, which is highly intensive in the use of water and energy, motivating us to design innovative and energy-efficient pumping solutions."

According to Mr Ostojic, mining companies in Latin America generate up to 400 tons of waste metal scrap a month. By reusing and recycling this material in up to 60 per cent of its products, Neptuno can reduce its own energy consumption and carbon footprint by 70 per cent, manufacturing pumps which help the mining industry recycle up to 80 per cent of its water, with 30 per cent less energy and carbon footprint.

This kind of resource win-winwin for energy, water and waste illustrates the opportunities that still exist even in traditional sectors. It requires innovation of mind, as much as of matter.



DISTRIBUTION OF THE EARTH'S WATER

Fre Grou Pe Surface and atr Fr Soil Atm

Source: W





Sub-Saharan Africa

South Asia

East Asia

South-East Asia

Other regions

Rivers 1.5% getation

1.5%

′orld Bank



Latin America and the Caribbean

South Asia

🔵 East Asia

Sub-Saharan Africa

South-East Asia

Other regions

_ Source: UN Water 2014

70%

Irrigation

20%

Industry

INNOVATE AND COLLABORATE TO AVERT WATER CRISES

With the UK facing huge challenges from drought, flooding and an expanding population, innovative solutions are needed to establish long-term, resilient water supplies

love every drop

Water will be one of the defining issues of this century. Research already suggests that water crises are the third biggest global risk and that 40 per cent of the global population will be living in areas of severe water stress by 2050. Yet in spite of this, business leaders are not factoring water into their decision-making and long-term business strategy.

However, Anglian Water is a company leading the way. It operates in the country's fastest-growing and driest region, with some areas having a lower average rainfall than Jerusalem. Unlike other water wholesalers in far wetter parts of the UK, Anglian Water has seen droughts in 1979, 1995, 2005 and 2012, yet it's managed to avoid frequent hosepipe bans and successfully maintained water supplies in the face of growing demand.

In 2010, Anglian Water launched its pioneering Love Every Drop strategy to transform the way we use and value water. The company is encouraging different behaviours and attitudes to water among customers, sharing sustainability best practice, and working to ensure water is high on the corporate agenda.

Chief executive Peter Simpson says: "The region we supply has seen huge growth in the years since the water industry was privatised. It's home to some of the UK's fastest-growing economies, such as Cambridge, Peterborough and Milton Keynes, and the number of homes we supply has grown 27 per cent.

"Yet we actually supply slightly less water than we did in 1989 thanks to long-term reductions in leakage, encouraging the majority of customers to use a water meter and by installing water efficiency devices in people's homes."

Anglian Water's innovative approach to tackling leaks has made it an industry leader, with the lowest level of leakage of any water company.

"We're waging war on leaks," says Mr Simpson, "with £60 million being invested between now and 2020 to drive it even lower, and we're working hard to help customers become more water efficient.

"But the population continues to grow and climate change is likely to place evermore pressure on water resources.

"To meet future demand we need to work with others, including agriculture, businesses, customers and conservationists.



"We're putting this into practice through our Water Resources East initiative, which takes a long-term, collaborative view to securing water supplies for the future."

At a national level, Anglian Water was asked to lead a resilience taskforce looking at the nationwide risk and economic cost of water shortages, and reporting directly to the UK water minister. This will map out the steps required to avoid a repeat of major incidents like the 1976 drought.

The report found investment needed to increase resilience is relatively modest compared with the enormous social and economic cost of a severe national drought, which could total £1.3 billion a day. In such a scenario, no commercial sector would escape unscathed.

Whether it's the 450 litres of water it takes to produce a single pound of potatoes or the astounding 8,500 litres to make a pair of shoes, water powers our economy and should be firmly on the agenda of every business.

With the stakes so high, Mr Simpson has become an international advocate on drought management and climate change. He sat on the National Drought Management Group in 2012 and was among business leaders calling for action at the Paris climate summit last November. This year, he met with the Environment, Food and Rural Affairs Committee to discuss the challenges posed by more extremes of weather as the demand for new housing continues to grow.



He says: "Climate change threatens to make our weather less predictable and more extreme, that's why I am unrelenting on the drought agenda, even when it's raining or other things seem more important.

"If more extreme weather patterns continue to impact the nation, and if we fail to deal properly with the consequences of climate change, many communities and businesses will be under threat.

"I've been reassured by the positive contribution from water minister Therese Coffey, who has been actively engaged and is ensuring her team at Defra continue to work successfully alongside the industry.

"Our country's water and sewerage infrastructure is often out of sight, out of mind, but is absolutely vital to our health and prosperity. We must ensure all water companies are resilient enough to face these challenges, and ultimately we must protect vital water supplies and the millions of families, communities and businesses that depend on them."

Innovation will be vital in meeting these challenges. To foster this innovation, Anglian Water has launched a major new project in Cambridgeshire called Shop Window. It's trialling new tools, techniques and ways of working to shape the water company of the future.



Water powers our economy and should be firmly on the agenda of every business



BELOW LEFT

Anglian Water is building new infrastructure, such as this new pumping station at Grafham Water in Cambridgeshire, part of a £28-million investment to make the region more resilient "This is one of the most exciting and revolutionary initiatives in the water industry, with innovation applied across the entire water cycle.

"We'll be trying to answer big questions, such as how can we minimise leaks, floods and pollution? How can we become energy neutral and build a circular economy? How do we help people reduce usage to truly sustainable levels?

"Successful innovations will be rolled out to the wider region, bringing benefits to customers, the environment and our business."

And with the prospect of so much economic uncertainty in the months and possibly years ahead, a key message for businesses is there are opportunities to make substantial costsavings by putting water at the heart of their agenda.

From April 2017, all businesses in England, including charity, public sector and not-for-profit organisations, will be able to switch their water supplier and their sewerage or trade effluent supplier, in a similar way to switching their energy and telecom suppliers. Competition will allow companies to find a retailer that meets their business needs and also delivers costsavings, efficiencies and environmental responsibilities through innovation.

Mr Simpson concludes: "The world is changing fast and we need to keep pace if we're to meet the challenges and take advantage of the opportunities that brings. Get it right and water will be the key that unlocks truly sustainable growth and shared prosperity. We will continue to lead and to collaborate, and hope that our example will inspire others. Together, we can continue to make all the difference in the world."

For more information please visit www.anglianwater.co.uk

Ganges superbugs are threat to world health

The UK is helping India clean up life-threatening and septic contamination of the sacred River Ganges which endangers world health



INDIA CELESTINE CHEONG

he River Ganges in India is the most precious of rivers to Hindus. Believed to be an extension of God, the water is so sacred that no Hindu dares to lie or be deceitful when holding Ganges water in hand.

Hence it is most famous as a place for retirement or cremation. Dr B. D. Tripathi, an environmental and water pollution expert at Banaras Hindu University, estimates 32,000 human corpses are cremated there each year with up to 300 tonnes of half-burnt human flesh released into the water.

There is belief that Ganges water can break *samsara* (the cycle of wandering) and earn you *moksha* (eternal liberation), turning death into a positive event. How positive it is for those still alive, on the other hand, is questionable.

Combining reverence with pre-election gambit, devout Hindi and India's prime minister Narendra Modi said: "It is my destiny to serve *Maa Ganga.*" Aptly called this – *maa* being mother – the Ganges has nurtured the rise of Indian civilisation.

Originating from the Gangotri glacier at Gaumukh in the Indian

Himalayas at 4,100m above sea level, the Ganges flows 2,525km across northern India before meeting the Bay of Bengal in east India and Bangladesh.

As a water source, the International Water Management Institute says the Ganges supplies water for drinking, bathing, laundry, agricultural irrigation and energy production to more than 40 per cent of India's population, a staggering 500 million people.

The irony is, despite the Ganges being regarded as hallowed used for deliverance from sin and attainment of nirvana, many use it as a dumping site without compunction. And so, along certain parts, the river is fetid.

Heavy metals such as chromium, mercury and lead make up the thick soup of untreated toxic waste that typically pour in from hospitals, chemical plants, hospitals, textile mills and distilleries seated along its banks.

Floating ingredients such as faeces, human and animal rotting flesh, and modern plastics add to the 2,723 million litres of sewage pumped into the Ganges' tributaries on a daily basis, as measured by the Central Pollution Control Board. The general rule of thumb is the more downstream the river, the more acrid the water. According to the India Brand Equity Foundation, India's leather industry accounted for 12.9 per cent of the world's leather production in 2015-2016. Kanpur, which lies midway between New Delhi and tourism hotspot Varanasi, is the centre of this vast industry.

Tannery operations there result in chromium-rich open disposal effluent systems. Used as a hardening agent in leather production, if improperly handled, chromium can cause lung cancer, liver failure, kidney damage and premature dementia.

Although a vital and intensive sector for growth and export, its pollution-intensive processes rely on cheap labour, with many workers living and working under extremely poor conditions.

ANCIENT HINDU PROVERB

He who purifies himself in the river of a subdued spirit, the waters of which are truth, its waves compassion, and its shores excellent temper and conduct, will be liberated from this world; but liberation cannot be obtained by just outward observances.



A study conducted by *National Geographic* in 2013 showed that tanneries were pumping out approximately 79 million gallons of contaminated water into the Ganges a day.

At the best of times, when there are no power outages, as northern India's electricity infrastructure is notoriously unreliable, only a portion of tannery effluent is recycled or treated while the rest drains into the river.

Further downstream in chaotic Varanasi, where high faecal coliform levels and other vast quantities of contaminants merge with the putrid flow from upstream, measurements of the levels of dissolved oxygen in the river water are as low as zero.

To put this bold figure into perspective, if dissolved oxygen levels in water drop below 5 milligrams per litre, fish are unable to survive for very long. At 0 to 1 milligrams per litre, the water is considered septic.

The river has breathed new forms of life recently though, in the form of unwelcome bacteria. In 2008, two water-borne superbugs in New Delhi, NDM-1 and NDM-4 – NDM is short for New Delhi metallo-beta-lactamase – were discovered. So alarming was their rapid spread, more than any other type of antibiotic resistance across the globe, a warning was sparked by the World Health Organization, albeit two years later.

Commonly inhabiting the bowel, the only route it can enter the water is through faecal contamination, according to biochemist Professor T.R. Sreekrishnan of the Indian Institute of Technology.

"If you do not properly treat the waste before it is discharged into the rivers, you are not only contaminating the water, you are also assisting the proliferation of antibiotic resistance," says Professor Sreekrishnan. In India, 58,000 thousand infants are known to die each year from infectious diseases made resistant to antibiotics. By 2050, antimicrobial resistance could cost ten million lives globally a year, according to the *Review on Antimicrobial Resistance*, commissioned by the UK government.

But not all is dire. Prime minister Modi has promised a clean-up of the river by October 2019, in time for the 150th anniversary of Mahatma Ghandi's birth.

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Some 32,000 human corpses are cremated there each year with up to 300 tonnes of half-burnt human flesh released into the water

Entry-level activities planned by the Ministry of Water Resources include works such as repair, modernisation and provision of public amenities, treatment of directly discharging drains in villages along the river, and repair, renovation and construction of crematoria.

Mr Modi also intends to ensure there are toilets in every school throughout India, as well as deploying improvised wood-based cremation platforms, advanced trash-skimming machines for removal of floating solid wastes, bio-toilets and bioremediation-based sewage treatment in rural areas.

International efforts are underway too. Ben Piper, technical director at consultancy Atkins, says the UK can play a role. He cites the UK Water Partnership and the development of the India-UK Water Centre to exchange knowledge on governance and regulation, science and innovation.

"The crucial thing is governance, regulation and the setting up of water quality standards," says Mr Piper. "How you regulate municipalities and industries to make sure their infrastructure is working properly is key."

A scoping study to provide strategic direction on how to deliver water security benefits to India is currently being conducted by the UK's Department for Environment, Food and Rural Affairs.

Mother Ganges is sick and it could take some time for her to return to good health.



of India's population is supplied with drinking water from

Source: International Water

Water Management Institute

WASTEWATER MIKE SCOTT

ater is essential to life, but most people focus only on the journey it makes from reservoir to tap. The back-end of the system, so to speak, is taken for granted – out of sight, out of mind.

"Water resources are like an Aston Martin purring down the fast lane of the motorway, while wastewater is more like a Trabant sputtering along in the slow lane," says Sarah Mukherjee, director of environment at Water UK, which represents the country's water companies. However, for the system to work, what happens after consumption is just as important as what happens before.

"We are in the midst of a water crisis," says Morgan Gillespy, head of water at CDP, a non-governmental organisation that collects data from companies on their use of resources including water. "Water is a finite resource. Wastewater treatment is vital to make sure that the water we return to the natural environment is clean and fit for future consumption, and that we don't hurt the environment. We also need to make sure that water resources are being sustainably used and managed."

It is becoming increasingly clear that failure to do this will create significant risks to businesses. Ms Gillespy adds: "Many companies have, up to now, assumed that water is completely plentiful and that the right quantity and quality of water will always be available to them. This is no longer always the case. Water scarcity is impacting businesses today and they need to be able to reduce their exposure – one way is to treat and reuse their wastewater."

Billions of litres of water are constantly travelling through hundreds of thousands of miles of pipes, being treated and returned to the environment, according to Water UK in its *21st-Century Drainage* report. Some 16 billion litres of sewage are treated in the UK every day.

"Wastewater treatment is an area of ongoing focus for the water companies and the wider water sector," says Elaine Coles, managing editor of *WaterBriefing*. Among the key issues now firmly on the agenda



Flood of wastewater must be recycled

As demand for clean water increases, exacerbated by climate change, reusing wastewater is becoming a cost-effective imperative to conserve scarce resources

are the growing challenges presented from issues such as pollutants introduced because of pharmaceuticals and other emerging micro-pollutants.

And the system faces a number of future structural challenges as the population increases, more people move into towns and cities, and climate change exacerbates rising demand on the water system as a result of hotter weather, droughts and increased disruption from extreme weather events such as the floods that swept Cumbria in 2015.

As well as having to deal with a greater amount of wastewater, the industry also has to treat a wider range of materials and chemicals within it. "With drainage, you have no control over what you are going to get," says Ms Mukherjee.

As new medicines, fertilisers ABOVE Pollutants from and pesticides are developed, the pharmaceuticals wastewater system has to deal and other emerg-ing micro-pollutwith the residues to ensure these substances do not find their way ants are a growing challenge for back into the water we drink and water companies the food chain. There is particular concern that certain chemicals could upset the hormone systems of both humans and animals in a process known as endocrine dis-

THERE'S 'BRASS' IN SLUDGE



The wastewater treatment sector is starting to realise that wastewater sludge or bioresources is more than just a waste to be disposed of. Earlier this year Ofwat, the water industry regulator, published proposals to open up the market for sludge, highlighting forecasts that the burgeoning sludge market could produce benefits of up to £780 million and enough power for 500,000 homes. The consultancy PwC says this market liberalisation could unleash a

wave of technological innovation. There are now 159 sewage plants in the UK producing energy or biogas equivalent to 203 megawatts of electric power, says the Anaerobic Digestion and Biomass Association. Severn Trent Water has 36 sites

severn Frent Water has 36 sites with anaerobic digestion plants, the biggest of which treats the sewage of more than 2.1 million people in the greater Birmingham area. "At our Minworth site, we have 16 digesters, which essentially act like giant stomachs," says Simon Farris, renewable energy opportunities manager at the company. The digesters treat the sewage

that flows into the plant in a four-stage process that produces 3,500 cubic metres of biogas an hour, two thirds of which goes to a combined heat and power plant which provides energy for the site's operations. The rest is injected into the national gas network. The "sludge cake" that remains is sold to farmers as fertiliser. The Minworth site helps to reduce the company's energy bill by about £1.7 million a year.

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Water scarcity is impacting businesses today and they need to be able to reduce their exposure – one way is to treat and reuse their wastewater

ruption, although current research is inconclusive.

Microbeads, tiny fragments of plastic that are used in cosmetics, toothpaste and cleaning products, have received a lot of attention in recent months because increasing amounts are finding their way into the ocean and being found in the fish we eat. Following pressure from Parliament's Environmental Audit Committee, the UK government has pledged to ban them by 2017. However, there are other sources of microbeads, such as fleece jumpers, that are receiving less attention.

A particular bugbear of the industry at the moment is wet wipes, which many manufacturers label as flushable even though wastewater companies say they cannot be recycled. "Our sewerage systems weren't built to cope with wet wipes. When flushed, they don't disintegrate like toilet paper and they typically contain plastic, so once they reach the sea they last for a very long time." says Dr Laura Foster, head of pollution at the Marine Conservation Society.

"We have had years of conversation with manufacturers and retailers, but there has not been much progress," adds Ms Mukherjee. Now almost 300 organisations in 20 countries have called for the products to have proper information on disposal so they are no longer flushed.

Another challenge is that the drainage system is far more complex than the water system, which is controlled by a small number of heavily regulated utilities. Wastewater, on the other hand, is dealt with by a range of players, including local authorities, supermarkets and factories, as well as the water companies. And they all have their own standards, operating procedures and infrastructure, which makes it more difficult to come up with coherent policy responses.

However, many countries are seeing increased regulation of water use and tighter standards. This is leading companies to look at alternative ways of treating their wastewater. In water-stressed India, the motor company Ford has started recycling its industrial wastewater, while the paper company UPM is one of many that has realised the benefits of capturing the gas created by its wastewater treatment and selling it to energy suppliers.



b

litres of

sewage are treated in the

UK every day

Source:

Water UK

SUCCESS FOR WATER INDUSTRY IS ABOUT MUCH MORE THAN FINANCIAL CAPITAL

To meet a growing number of challenges, water companies need to unlock their natural, human and social capital, as well as financial

AECOM

Built to deliver a better world

rom politics and population to the environment, the water industry is facing greater and more varied challenges than ever before. Population growth is particularly pressing, with the UK population projected to increase by 9.7 million to 74.3 million in mid-2039. Compounding this is the increase in single-occupancy households, which tend to use twice as much water per head than a property with four people.

Added to these pressures, water companies around the country are likely to continue to see their revenues restrained, as seen in the 5 per cent average reduction at the 2014 price review, while there is a growing requirement to provide customers with a better service, protect the environment and consider the needs of society as a whole, still satisfying other stakeholders.

According to a number of industry thought leaders, such as AECOM, a fully integrated global infrastructure firm that advises a number of the largest water companies in the UK, to meet these challenges the water industry needs to think beyond purely financial considerations.

"The industry is doing a lot, but it needs to become more forward looking," says Martin Williamson, government and public sector lead for water at AECOM. He argues that water companies need to consider natural, human and social capital, as well as financial, in their business planning. "These other capitals have been around for some time, but people have sometimes struggled to include them in their business cases. By making use of monetised values, which are becoming more accepted now for these other forms of capital, the leaders in the sector can realise long-term benefits that provide not only medium-term solutions, but a long-term legacy. Invest now and you will see the outcomes.

An adviser to the Department for Environment, Food and Rural Affairs (Defra) on ecosystem services,

YORKSHIRE WATER COSTS

BY ACCOUNTING FOR NATURAL AND SOCIAL CAPITAL WHEN DECIDING BETWEEN DIFFERENT WATER TREATMENT OPTIONS, YORKSHIRE WATER IS ABLE TO GET MORE NATURAL AND SOCIAL CAPITAL VALUE FROM ITS TREATMENT PLANT FOR THE SAME FINANCIAL CAPITAL COST



AECOM also leads the Natural Capital Coalition's operations group focused on the practical application of the Natural Capital Protocol.

Mr Williamson's colleague Adrian Rees, director of asset management for water, offers an example of these other capitals in action: "Installing a sewer will prevent flooding and that will have an immediate effect. However, you could opt instead for a more sustainable drainage system that creates more green spaces and provides activities and involvement for local people. This has much wider benefits – natural, social and human capital. Anglian Water, for instance, is quantifying the social benefits of its volunteer programmes in beach and river care."

Employing natural capital requires longer-term, more holistic thinking. "You might have a water treatment works that's treating discoloured water to remove discolouration," says Mr Rees. "One of the reasons for that discolouration will be runoff

Thinking beyond just the traditional financial-capital model and exploiting natural, social and human capital is helping to build a more sustainable, more financially secure water industry

from peaty catchments. So if you use a number of techniques to manage those upland catchments, you reduce the discolouration and you reduce your capital and operational expenditure by not having to treat that water as intensively. But you also get collateral benefits because the flow from those uplands is slowed and so downstream areas are less prone to flooding."

A catchment management approach can take a while to bed in and produce returns, but Defra, water services regulator Ofwat and others are encouraging it, whereas in 2004 there



was just one example of sustainable catchment management in companies' plans – United Utilities' SCaMP project – ten years later there were more than 600 actual or potential schemes put forward to Ofwat.

Already some water companies are making changes to their structure to embrace natural, social and human capital. "Engineers aren't environmental economics specialists and why would they be?" says Adrian Rees. "But we provide tools that in essence tell them 'if you do this you'll attract these benefits'. For example, at Yorkshire Water's Rivelin Water Treatment Works, we've been able to show the economic benefits of partially burying the plant and incorporating a green roof in terms of natural and social capital. They're applying this thinking to every investment decision across thousands of their assets - you can imagine the benefits this will generate.

has the advantage that the finance and regulation director sits on the Accounting for Sustainability board and the Natural Capital Coalition board."

Alongside this the human and societal elements require a change in customer behaviour and companies need to take a lead here, for instance, by reminding customers that foreign objects thrown down toilets lead to costly blockages. "It's about using social and human capital available to them to deliver a financial capital benefit," says Mr Williamson.

A growing number of water companies are appreciating the need to deliver more with less, not so much as a challenge, but as an opportunity. Thinking beyond just the traditional financial-capital model and exploiting natural, social and human capital is helping to build a more sustainable, more financially secure water industry.

For more information please visit www.aecom.com

"You need buy-in at senior stakeholder level. Yorkshire Water

SLUDGE ONCE UNWANTED IS NOW CREATING ESSENTIAL CAPITAL

Once unloved and unwanted, sludge is offering new and exciting examples of the circular economy at work. It's long been a problem for water companies, but is now creating essential capital.

A new technology called thermal hydrolysis, which works like a huge pressure cooker, prepares the sludge so you can get increased production of methane from it. This also reduces the amount of solids that need to be disposed of.

"In a recent project we saw an increase in methane of 40 per cent over the traditional process – this biogas can be used as a renewable energy source, providing energy to power the treatment plant, making it almost cost neutral," explains Steve Baker, utilities sector lead for water at AECOM.

"Fewer solids mean that you're transporting less waste products which means fewer lorries. We can also look at removing phosphorus and using it in fertiliser. There's even the possibility of removing precious metals from it. This is the circular economy and natural capital in action."



SELF-SUPPLY TOM IDLE

I the opening up of the UK's water retail market next year is all about giving business customers more choice over where and how they source their water, then the ultimate manifestation of the new regime comes with the ability for non-household customers to supply themselves.

From April 2017, companies based in England will get to choose their water retailer for both supply and sewerage for the very first time. But the regulatory shake-up will also give them a chance to apply for a self-supply licence to take more control over their own water use and treatment – and how that impacts on the bottom line.

A self-supply licence enables any business using more than 50 million litres of water a year to buy their water and wastewater services at the wholesale price – a protected price that all utility retailers pay. Ofwat, the UK's water regulator, has made sure the wholesale contract of a self-supply licensee is on the same terms as all other retailers to ensure a level-playing field in the new, open market.

Essentially, a company would take on the role and responsibility for the retail functions of a traditional water seller, taking on billing, meter reading, customer inquiries, debt management and finding water efficiency savings. This becomes attractive when a business has, say, a main production facility, a secondary finishing plant close by and an office block further up the road, all using water and wastewater services to varying degrees.

Self-suppliers are only able to supply the premises that are associated with the company. They are not allowed to supply retail services to third-party sites, such as supplying other business customers unrelated to that business – a point made clear by Ofwat's recent consultation on the matter as it thrashed out the details of the licence conditions.

"The main benefit is that the supplier pays the price that retailers pay to the water company and not the margin added by the retailers in the open water market," says Lois Vallely from *Utility Week*.

Companies would hold a water supply and sewerage licence (WSSL), granted by Ofwat at a cost of £5,250, allowing them to use the supply system of an appointed water or sewerage company.



Businesses can supply their own water

Uptake of licences by businesses in England to self-supply water at wholesale prices may yet turn from a trickle to a flood

BENEFITS OF SELF-SUPPLY

As a self-supply licensee, you will...

- O1 pay wholesale prices the prices that retailers pay to the water companies
- $02 \,$ not pay the retail margin added by the retailers in the open water market
- 03 acquire certain rights, including membership of, and voting rights in, the running of the market operator
- 04 be able to supply water services to multiple sites for your business

Source: Ofwat 2016

On paper, obtaining a self-supply licence might seem like a no-brainer; a chance to save money and avoid unnecessary servicing costs is something businesses rarely pass up. According to think-tank Policy Exchange, the new UK market presents a range of options for multi-site businesses to deal with just one supplier for their water and wastewater services, which can drastically reduce paperwork and administration costs.

It points to one such business customer who receives more than 4,000 paper bills a year for its range of different premises. Consolidating to one supplier could save the company between £80,000 and £200,000 a year in reduced admin costs.

For similarly large, multi-site retailers, the same sort of cost-savings might easily be achieved through self-supply, says Sam Williams, a director at Economic Insight, who specialises in helping businesses ready themselves for changes in regulation and competition policy. "Water retailing is the simplest part of the supply chain. If you're a multi-site business, you already have people going out to those sites on a regular basis, people that you could get to read the water meters, so why would you pay a water company to do that?" he asks.

"Perhaps more importantly, by taking on the retail role yourself, you will also have more opportunity to undertake analysis of your water consumption in a way that enables you to find efficiencies in your own business processes, but also ways to reduce your consumption more easily."



Businesses need to be convinced there is enough money to be saved

However, with the retail element of a water supply chain accounting for just 10 per cent of a total bill, businesses will still need some convincing. Despite Ofwat's best efforts to relay the benefits of self-supply, there have been relatively few takers so far. By April this year, 17 WSSL licence applications had been received, none of which were from commercial organisations looking to self-supply.

"I'm not surprised few applications have been made, but it may still happen," predicts Mr Williams. "At a superficial level, the retail element might not appear to present enough pound-savings on the table. But if companies are able to find savings on the other 90 per cent of their bill, because savings have been identified at the retail end of the chain, that will start to change materiality of it."

It is an argument that has already been made to Scottish business. North of the border, all public sector, non-profit and business customers are eligible to apply for a self-supply licence, and many have realised wholesale water efficiency-savings. According to the economic regulator the Water Industry Commission for Scotland, wholesale charges fell at a faster rate than the default retail prices over the previous regulatory period, 2010 to 2015.

"Businesses need to be convinced there is enough money to be saved. That business case has been made in Scotland and people have bought into it. No doubt, over time, it will happen in England too," says Mr Williams.

An open water market presents a wealth of opportunities for businesses to improve their bottom line by having more autonomy over how they use and pay for this precious resource. While it is not designed for every organisation, self-supply presents a useful and interesting mechanism in the broader, more complex water market coming to England very soon.



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OPINION

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Think about water

we take for granted

As businesses in England will

soon be able to choose their water supplier, should household

customers have the same choice?

CATHRYN ROSS

Chief executive Ofwat

COLUMN

COMMERCIAL FEATURE

INNOVATIVE **TECHNOLOGY TO ENABLE SMARTER** WATER NETWORKS

The water industry has achieved much over the last three decades, but has more to do in reducing bursts and leakage while improving quality of service. New technology from startup company Inflowmatix, a spin-out from Imperial College London, is leading the way

winflowmatix

nearly 30 years ago. In 1989 it

In preparation for the current regulatory period (AMP 6), water companies consulted with their customers as never before resulting in increased focus on their concerns and the levels of service they required. As a result, each company agreed its own set of outcome delivery incentives against which they can face financial penalties or bonuses for under or outperformance respectively, two common examples being leakage and unplanned interruptions, such as

Set against a background of an ageing network of water infrastructure, the resultant financial and reputational consequences to the water companies are therefore substantial and growing. UK water companies invest billions of pounds each year on capital maintenance and replace on average around 1 per cent of their mains every AMP. They must strive to maximise asset lifetimes and optimise performance while achieving the lowest cost operations and ownership. of Delivering highly targeted capital investments is therefore critical and is where Inflowmatix's monitoring technology and advanced analytics can make a real difference.

stack of hardware, management and analytical software. Outside large SCADA (supervisory control and data acquisition) systems, the de facto approach for utilities monitoring their networks has been to take measurements of pressure and flow every 15 minutes at specific sites.

he water industry has come a long way since it was privatised

was estimated that a remarkable 40 per cent of treated, drinkable water was lost before getting to customers. Tighter regulatory control and significant investment in each of the five-yearly asset management planning cycles (AMPs) that have followed have seen this figure reduced by more than half.

major bursts.

Inflowmatix offers a technology



Inflowmatix's patented technology is able to collect data continuously at an incredible 128 samples per second revealing a much more detailed and accurate picture of what is actually happening within the pipes.

The results are remarkable, showing what was previously thought to be a relatively calm network in reality contains violent, transient and constantly varying pressures which cause significant material stress in the pipes.

The insights into the significance of this dynamic behaviour are what underpin Inflowmatix. They recognise the danger of an industry becoming swamped with huge volumes of data from an unfocused proliferation of sensors and address this at source. Their sensors are optimally placed to collect precision data from the right locations and uniquely start the analytical process at the point of collection itself.

What can be measured, can be managed, it is often said and this is at the heart of Inflowmatix's proposition. Steve George, chief executive of Inflowmatix, says: "Future networks will have many challenges to overcome, some legacy and others coming from new approaches to smarter operations, coping with demand while still delivering quality

of service. This is a global issue and the only way of getting there is through cost-effective monitoring and implementation of robust solution-orientated analytics.

"Our technology gives water companies confidence, not through raw data collection, but through providing actionable information. Issues can be addressed based on performance, ahead of them becoming serious, which enables proactive, preventative management rather than purely reactive or scheduled-based interventions.

"But it's not just about the now. Strategically, accurate insight into the real operational conditions underpins enhanced models for incident management and longterm capital investment decisions. In preparing for AMP 7, forwardthinking utilities are taking this to heart."

Working with leading, innovative water companies in the UK, such as Severn Trent Water and Anglian Water, Inflowmatix is delivering this vision. It offers far-reaching benefits that previously could not be delivered due to limiting factors of technology and cost. Now they can.

For more information please visit inflowmatix.com

didn't give it a thought.' That is the first thing someone said when we recently asked them about the water sector. It isn't an unfair or unexpected reply. I imagine many of you would start there too.

We all want to know that when we turn on the tap, clean water will come out. And when we flush the loo, the wastewater will be taken away. As that almost always happens, we don't think much else about it.

But with so many profound challenges to confront and exciting changes coming, maybe we should think about it.

Maybe we should think about the impact of climate change and population change on parts of the UK with less water per head

we

than Malawi. Maybe should

think about the criticality of water wastewater and services for our society and economy. And about how we make sure our children and grandchildren have access to the services we take

for granted. Maybe we should think about why the water sector has seen so little innovation in customer service when, in every other service sector you can think of. we see a stream of new products and offers.

At Ofwat, we accept the challenge and are shaping the changes needed to ensure the resilience of these services.

In part, that means using markets to enable choice and help deliver more for less. For example, the market in so-called 'poo power', where treated sewage or bioresources is used to generate green electricity. And the new market for water companies buying and selling water between themselves, so areas where water is scarce call on those with more than they need.



market in the world opens, meaning 1.2 million businesses, charities and public sector organisations in England can choose their water retailer. They will be able to shop around,

However, the most

significant and ex-

citing change will

see head-to-head competition

part of the sector

In April, the largest

previously

by monopolies.

in

ruled

renegotiate and find the right deal. If they don't like the service they get, they can take their business elsewhere.

This market could deliver lower bills, help people use less water, improve services and see new offers emerge. But customers also want to know there is appropriate protection for them. And there is. As well as a new cus-



Maybe we should think about the impact of climate change and

population change on parts of the UK with less water per head than Malawi

We recently reviewed the costs

tomer protection

code of practice,

we will monitor the

market closely and

limit the price cus-

tomers pay if they

One question that

follows from open-

ing this market is

if businesses can

choose, why can't

all customers?

don't switch.

and benefits of extending choice to all and think it could be good for customers.

The immediate savings on bills look modest. And we would need to ensure customers could find the best deal for them and were treated fairly.

But competition could deliver the kind of innovation customers get elsewhere, bringing new offers, such as leak detection and a single utility bill, and technology helping to reduce consumption and manage your account.

As the customer we recently asked went on to say: 'I didn't give it a thought. But having thought about this, now I do feel why don't we have a choice?

If you want to give it a thought, you can find out more at www.open-water.org.uk

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be think innovate

