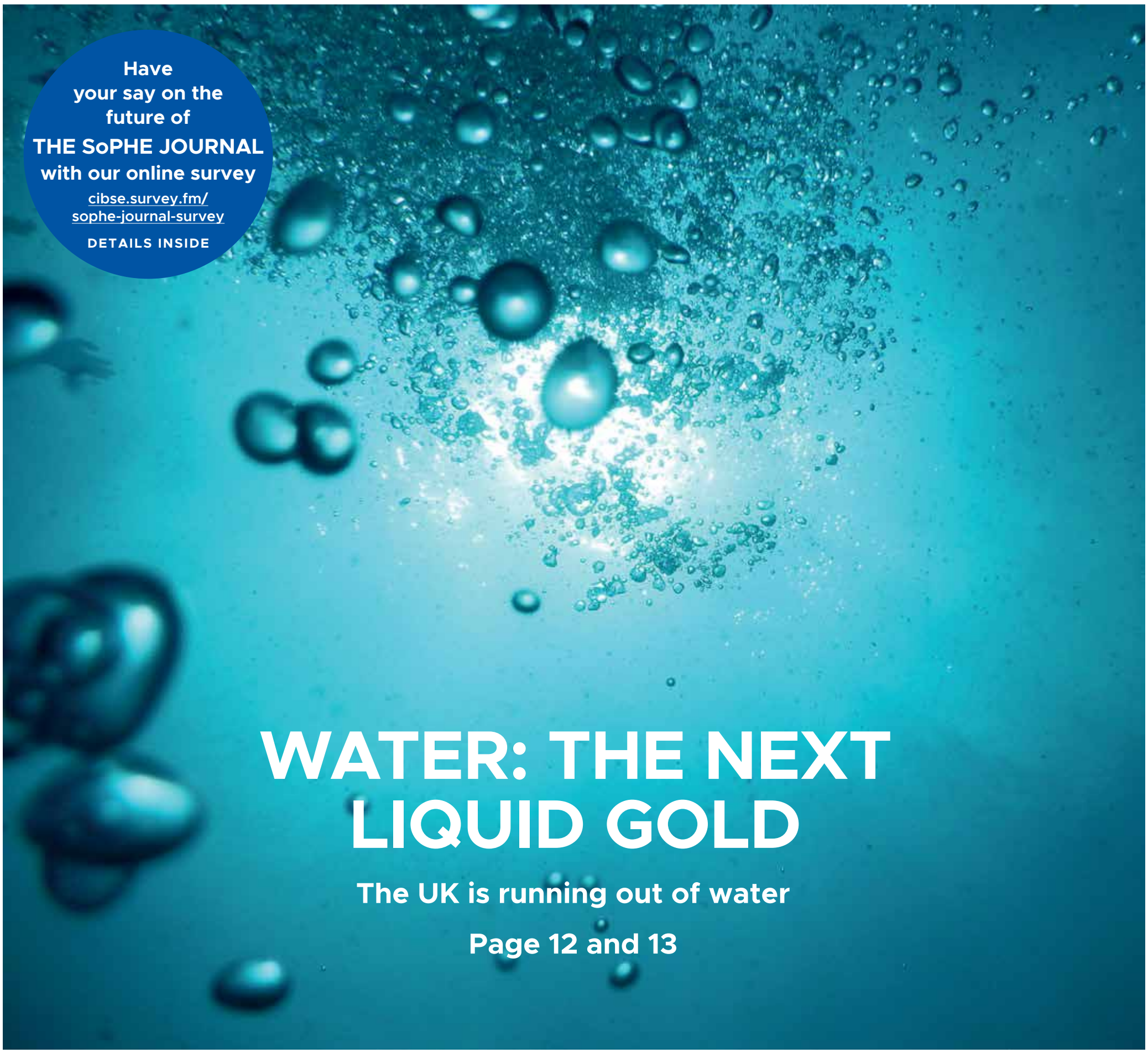
SoPHE JOURNAL

2020 | Your update from The Society of Public Health Engineers | Issue 1



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DETAILS INSIDE

WATER: THE NEXT LIQUID GOLD

The UK is running out of water

Page 12 and 13

Public health, COVID-19 & beyond

The pandemic has shown the strengths and weaknesses in our buildings systems

Page 4

All about Biocides

The types and what precautions to take

Page 6

The heat is on hot water

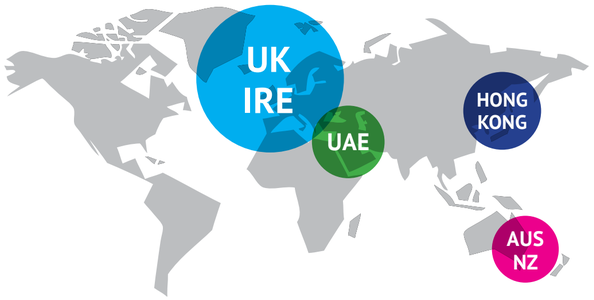
Design and regulation constraints for UK residential projects

Page 7

Plus all the News, Regional Round-Ups and forthcoming events

The SoPHE network

SoPHE is an international organisation that aims to provide a higher profile and focus for public health engineers within CIBSE. We run technical events, site visits and provide support to our members around the world.



SoPHE membership

Includes members, affiliates, associates, fellows, honorary fellows, industrial associates and student members.

UK	1065
Ireland	34
UAE	104
Hong Kong	77
Australia and New Zealand	49

In this issue

The COVID-19 pandemic has tragically demonstrated the importance of public health engineering and the importance of the term "public health". As individuals many of us have had firsthand experience or at least known someone who has been directly or indirectly affected by the virus. We wish a speedy recovery for the survivors of the virus and condolences to those who haven't made it through or heavily affected by this pandemic.

As an industry we have experienced the critical role in designing, supplying, constructing and maintaining systems for public health. We have been instrumental in providing temporary solutions for existing hospitals to full blown temporary site hospitals to account for a larger disaster, with companies rising to the challenge without question or quarrel. It proves the connectedness of the industry and the essential services we provide.

In this edition we have the first Plumbing Centre of Excellence and SoPHE Young Engineers Practical Competition and the collaborative success of that event. ARUP presents a focus on Public Health and the COVID-19 pandemic, which includes hospital oxygen systems. The Water Management Society has provided us the first series of toolbox talks with the first on Biocides and Steve Vaughan raises an interesting debate around hot water temperatures. Amanda Stanley raises an interesting challenge around water scarcity and a potential day zero scenario. There is also a tribute to the sad passing of Arthur Churchyard, who many of us knew well and was one of the founders of SoPHE. We also welcome Ross Wakefield from New Zealand to SoPHE and look forward to his NZ regional updates. Hopefully it is not just All Blacks rugby results!

Member Survey

Going forward we are keen to get your views and essential feedback on what you would like to see in the Journal. With that in mind we would kindly ask that you type the link below into a web browser (or if viewing as a PDF just click on the link) to participate in an online survey regarding the content of our journal.

cibse.survey.fm/sophe-journal-survey

We are also keen to hear from you, so please get involved, write an article and have your voice heard! If you have an interesting subject, knowledgeable information or captivating project you would like to produce an article about please contact the SoPHE Journal team.

Many thanks for reading,

James Ziebarth
Editor

A word from the Chair

In this edition **Jonathan Gaunt** talks about a turbulent year and changes to come.

Welcome, SoPHE members to the Autumn 2020 SoPHE Journal, our second edition since our successful relaunch last year. Many thanks to all those that provided constructive and encouraging feedback on the new look and content – it's always useful and interesting to hear what our members hope to see addressed in their industry press. Details of a recently launched on-line survey were given in the last Edition of the Journal – following this announcement we have received strong feedback from our members which has helped us understand the topics and types of articles that people would like to see included. This will undoubtedly help shape future Journals.

We find ourselves in a period of global uncertainty in the grip of the Covid-19 virus, now formerly labelled as a Pandemic. This has resulted in unprecedented actions taken by Governments and business across the world in a bid to minimise spread and contain the virus as much as possible. Actions taken by Governments around the world have been developing at such a pace that this introduction has been rewritten a few times in a bid to keep it as up to date as possible at time of print!

I believe all of our members will have been impacted so far to one degree or another, whether it be of minimal impact including having to modify our working habits, to the more extreme where people may have contracted the virus (of which we hope very few instances exist across our friends and colleagues). What has become clear over the last months is the importance of hygiene and maintaining public health and the systems we design. One of the key messages delivered by the government and healthcare specialists in the early stages of the Pandemic was to minimise the spread of the virus through regular hand washing with warm water. This simple and obvious action is so often taken for granted within the modern world but is now proving to be so important to our future health – it goes without saying that this reflects the importance of a small part of the design and installation work we do as Public Health Engineers. We should not lose sight of the role we play in maintaining the health of the general population.

As the world looks to try and return to some level of normality, workers will start returning to buildings that had been mothballed, some of which at very short notice with little time to perhaps follow recognised industry mothballing guidance. As Public Health engineers, we find ourselves in a unique position to offer technical support to clients, colleagues, friends and family as to how to suitably manage water systems within buildings that were previously mothballed to minimise potential bacterial threat before being brought back on line. We should not miss this opportunity to offer our support and knowledge to assist in this aspect of overcoming the Pandemic.

With the news of Covid-19 currently blanketing the news and media, I thought I would lighten the mood by touching on past SoPHE activities. Since we last met in this column, SoPHE held the 2019 Society Annual dinner at the Royal Gardens Hotel in Kensington. This dinner is certainly seen as the Society's annual Blue Ribband event and the 2019 dinner did not fail to live up to expectations. With 26 sponsors, 320 guests, delicious food and a 'flowing' bar it certainly seemed as though a good night was had by all!

However, this seems a fitting time to announce that in 2020, SoPHE were intending to 'up sticks' and change location for our annual dinner with a move to the Royal Lancaster Hotel. This new venue promises to help raise the benchmark for the annual dinner even higher – befitting a growing successful Society. It is with great sadness that after much discussion with the Industry Working Group and the Steering Group over the summer months, it was agreed to postpone this year's dinner to November 2021. This was clearly the correct decision reflecting on the latest restrictions the country are now being faced with.

When the annual dinner returns in 2021, it will boast a new venue and will be bigger and better than ever – something to really look forward to!

In addition to the postponing of the annual dinner, SoPHE were forced to postpone the second IWG Trade Event which was scheduled to be held at the Building Centre (central London) in July. This was due to incorporate guest speaker sessions covering industry 'hot' topics in addition to trade stands provided by the ever supporting Industrial Associates. As I am sure you can appreciate, we do not have any revised dates for this event at present, but rest assured, this initiative has now become part of the SoPHE annual calendar and when circumstances permit, will be rescheduled.

With the inevitable steps of transferring face-to-face SoPHE CPD technical evenings to online events, it is encouraging to see attendance numbers have increased significantly, peaking at 155 attendees joining the online presentation.

To finish on a high note – I am delighted to announce that the SoPHE Technical Working Group spear headed by Jassim Daureeawo and closely supported by Colin Gwyn have now issued the second SoPHE Bulletin entitled 'TB02 Rainfall Intensities and Drainage Design for Flat Roofs', authored by Dr. Malcolm Wearing. Congratulations and thanks to the Technical Working Group for producing this document which is now available for member download from the CIBSE Knowledge Portal website. The team are now dedicated to producing two further Technical Bulletin's addressing Grease Management Systems and Building Drainage Waste and Ventilation Systems for High-Rise.

As we are all aware, Government guidance is changing rapidly and regularly to react to the Covid-19 Pandemic. It is becoming evident that it is unlikely that face to face technical and social events will be permitted in the following few months. SoPHE events will adapt to the Government guidance given but are likely to continue as 'Virtual events' for the foreseeable future – please lookout for emails and Society of Public Health Engineers LinkedIn posts for future events and initiatives in 2020-21 to ensure you are up to date. I thank you all for your support and wish you all good health for the following months.

Best regards,

Jonathan Gaunt
SoPHE Chair

chairman@sophe.co.uk

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The views and opinions expressed in this edition of the SoPHE JOURNAL are not necessarily those held by Chartered Institute of Building Services Engineers. SoPHE JOURNAL is circulated to Public Health engineers who are members of SoPHE, as well as CIBSE.

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This edition has been produced in association with PAM Saint-Gobain, Jets Group, Heatrae Sadia, ABG Blue Roof and Pump Technology Ltd.

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Honorary Treasurer: Nigel Green

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James Day (Education)
Sanjay Modasia (Contractors Working Group)
James Zeibarth (Communications Officer)
Steve Vaughan
Simon Oliphant
Amanda Stanley

Representatives from Industry Working Group:
Alan Flight

Industry Working Group committee members

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Scotland: Position Vacant
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Education: Kevin Reed
Communications: Craig Chamberlain
YEN (acting): Phil Henry
Events: Miker Darvill

Plumbing Centre of Excellence

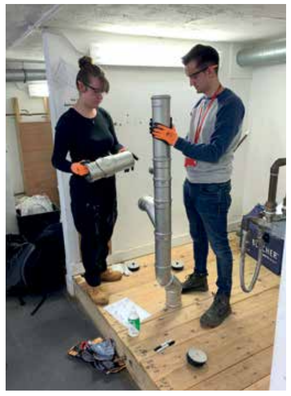
By Jonathan Gaunt
Cundall, Associate Director

On February 4th of this year, SoPHE held its first combined Plumbing Centre of Excellence (PCE) and SoPHE Young Engineers (YEN) Practical Competition at Havering College in East London. Last years event was held solely for Level 1, 2 and 3 PCE students – this year saw partnerships between YEN and PCE students, providing our Young Engineers with some practical experience, while giving the PCE students an opportunity to talk to practicing engineers and to gain an insight into the world of consultant engineering.

The day included mixed pairs from the two groups participating in tool box talks with a number of manufacturers before being tasked to fabricate a section of a drainage installation comprising a stub stack, swept bend, branch connections and rodding eye. Each pair were allocated a specific material from a selection of Cast Iron, Stainless Steel and HDPE pipework. A time slot of approximately 2 hours was allocated for the fabrication, and once complete, the pair were tasked with undertaking a pressure test to ensure the installation was of suitable quality.

While undertaking the installation work, the YEN and PCE participants were judged on their attention to detail, willingness to learn, attitude and overall quality of installation. The judging panel found it challenging to pick out the highest performing individuals due to the general overall enthusiasm in the room.

There was a real heir of excitement across the day with plenty of competitive input. I think it's fair to say all those that attended – competitors, tutors and judges alike thoroughly enjoyed the event and look forward to a repeat competition in 2021.



The overall PCE student winner will be awarded the 2020 Chris Sneath bursary which will support them with educational material to help with their studies. Additional 1st, 2nd, and 3rd prizes will be awarded to the PCE students and Young Engineers that were deemed to be most deserving through the judging process. The prizes and bursary were initially intended to be awarded on 11th March marking World Plumbing Day. However, due to the growing concerns of Covid -19 and the wide geographical range of those attending the event, it was decided to delay the event to a later date in the PCE term. I'm afraid the suspense of the awards will have to wait until then!

I would like to take this opportunity to thank Sanjay Modasia (JA Brooks), Mark Davis (Kylemore) and Steve Vaughan (Aecom) for masterminding the event and to the following IWG members for providing technical support and materials on the day, Blucher, Saint Gobain, Hargreaves, Geberit, MEP Hire – it wouldn't have happened without you!

Industry Working Group update

By Alan Flight
Bright Water, Director

Since officially taking on the mantle of Industry Working Group Chairman there has been much work done in driving forward what the Industry Working Group contributes to supporting SoPHE. Each year the IWG pushes to widen and expand its overall contribution to SoPHE, Public Health Engineering and the wider Plumbing industry.

However, at the point of writing our industry and country have been thrown into turmoil; the like of which we have never seen in our lifetime. Coronavirus has savaged our industry and affected all of us in how we carry on with our lives. Our own Industry Working Group committee of just 15 members have been affected directly by being either Furloughed, company redundancy or indeed hospitalised.

So, it is with this backdrop that we have seen many of our activities for 2020 curtailed and put on ice. However we are working hard now in putting together a programme of events for SoPHE during 2021, some of which we will be able to conduct within the Covid restrictions plus other events that we hope will be able to be conducted normally as restrictions lift moving forward.

The single largest update to report is that our most prestigious event the Society of Public Health Engineers Annual London Dinner is to change venue. After many successful years at the Royal Garden Hotel in Kensington we have booked a new venue for 2021 the Five Star Royal Lancaster Hotel overlooking Hyde Park.

The Hotel has recently undergone an extensive refurbishment with a complete refit and facelift with £millions spent on the foyer and Gala Dinners areas. We will be one of the first events to sample and enjoy what is London's premier 5 Star Gala Dinner resort!

The hotel has also just been awarded "The London Best Venue Award". For 2021 this will certainly be the blue-ribbon event of the Society – let's hope that by then we can have an Annual Society Dinner!

Alongside our flagship annual dinner, the Industry Group are planning for its array of normal activities and also expanding further upon these.

Included in the plans for 2021 is a Public Health Exhibition with keynote speakers to be held in July at the Building Centre in Central London. After the success of the inaugural exhibition last year we have refined and improved upon it for next year – and hope to welcome even more of you to next year's event.

Malcom Atherton has also been beavering away with the Industry Group Events organiser Mike Darvill to put on an extravaganza of an event for 2021 to celebrate the 10th Anniversary of the SoPHE Northern Dinner – Society members get your name down for a free ticket with your Manufacturer friends and fingers cross we can go ahead!

As is normal the Industry Group will be proving charitable donations at both dinners to the Society's nominated Charities, as well as sponsoring awards for The Young Engineers Competition.

Another active area for the Industry Group has been the working on training programmes with colleges for plumbing apprentices. This has been conducted through our Contractors Group and spearheaded by Sanjay Modasia of J.A.Brooks. The Contractors Group and Sanjay have over several years liaised with Havering College and worked in assisting setup the Plumbing Centre of Excellence at the College. It is now intended that in 2021 we will talk with other colleges so that we can expand upon this success. In fact, just prior to the lockdown the Industry Group contributed over a £1000 for prizes of tools for an Apprenticeship Competition run by Havering College.

A further area of activity for the Industry Group has been in helping and assisting the Young Engineers – looking after tomorrows Engineers and the future of our Industry. To this end we help and assist in Sponsoring Young Engineers events and offer an increasing range of technical CPD training presentations of which details can be found on the CIBSE website.

In addition to the above to ensure a minimum level of activity for 2021 are planning several Technical CPD Accredited webinars that will be available to the entire SoPHE membership online.

Our IWG membership now despite all the problems of 2020 still maintains a very healthy membership of 70+ manufacturers whom we should offer our thanks for donating much needed funds from their companies marketing budgets to allow us to keeping doing our good work for our Industry.

If you would like to know more about the Industry Working Group or would like to contribute, please contact me. Email **alan.flight@bwater.eu**

The Journal from The Society of Public Health Engineers

Collaborative Working Group updates

COVID Pandemic Guidance Documents, available online:

WMSoc: bit.ly/WMS-COVID-GUIDANCE

CIPHE: www.ciphe.org.uk/contentassets/6afad4c40757443c88e68cf4c6a4f2b3/mitigating-the-risk-of-building-water-systems.pdf

Water Management Society (WMSoc)

Steve Vaughan

We have been working with the WMSoc to develop a bespoke training course relating to Legionella Risk Assessments for Water systems which will have a specific focus on domestic water systems and associated water treatment and commissioning methods. Working with their specialist training staff, the course has been developed to provide practical hands on experience using the training rigs at the WMSoc Centre. It will aim to provide a knowledge suitable for young engineers or those with limited experience in legionella control within domestic water systems.

The training course will be City and Guilds Accredited. Although progress has been somewhat delayed we are planning to finalise details in early 2021 and hope to have the course available next summer.

There have also been several opportunities for SoPHE members to attend WMSoc events for free or at members rates during that last eighteen months, such as their "Designing Out 3" conference in November as well as promoting online presentations such as the overview of Water Safety Plans (BS 8680:2020 Water Quality) and their very helpful "Water Safety Guidance for Small Businesses" which focused on returning buildings back to service following the COVID-19 pandemic. This document can be downloaded here

We would also like to remind members that past editions of "Water Line", the journal of the water management society can be downloaded for free from their web page www.waterlinepublication.org.uk, the summer 2020 edition includes a feature article on disinfection of domestic water systems as well as President Trumps UV disinfection idea!

IHEEM Collaborative

Malcolm Atherton

The collaboration between SoPHE & IHEEM has been on hold, primarily due to the COVID-19 pandemic. However, as you can imagine IHEEM have been busy as they continue to support the United Kingdom's National Health Service (NHS) during the COVID-19 pandemic.

According to IHEEM sources, a very successful – "Healthcare Estates in Focus" online Digital Week, occurred between Monday 5th October & Friday 9th October 2020. Healthcare speakers from all different sectors of the Estate were able to provide some fascinating insight into how the Healthcare Sector is coping & evolving with the every changing environment we all find ourselves in; how it's important that we all need to work together & adapt as circumstances change; how everyone was able to pull together & create the new Nightingale Hospitals that we've seen built in different parts of the United Kingdom in a very short space of time.

CIPHE – Mitigating the risk in building water systems

Martin Shouler

Stagnant, or standing water can cause conditions that increase the risk for growth and spread of Legionella and other biofilm-associated bacteria. As the prolonged lockdown is lifted, care must be taken to ensure the safety of building water systems and devices. The CIPHE has recently produced guidance on mitigating the risk of building water systems post Covid-19.

Many buildings were closed down extremely quickly in response to government-imposed social distancing measures, in some cases, with limited ongoing maintenance taking place. The guidance is available here

In addition, the new British Standard, BS 8680:2020 Water quality – Water Safety Plans – Code of Practice provides guidance on the management of water risks in buildings was recently published including Legionella. The Code of Practice provides direction to Water Safety Groups to ensure they have a holistic approach to water safety across all types of systems and equipment which use or contain water.

Martin Shouler was part of the British Standard panel who drafted the new standard.

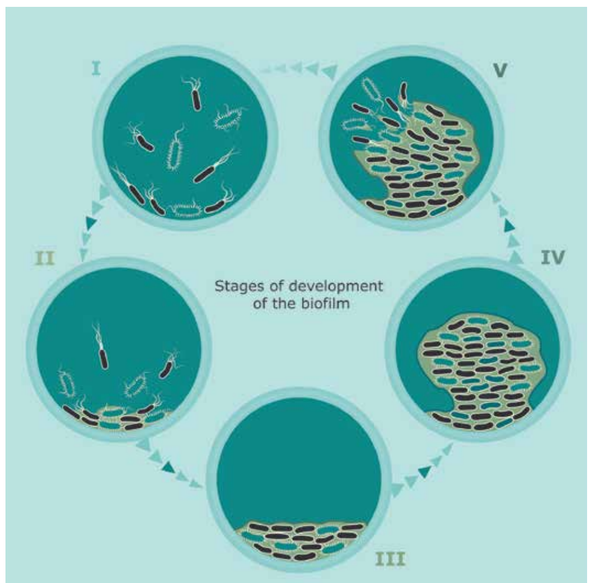
Public health, COVID-19 & beyond

The COVID-19 pandemic has shown us a true reflection of the strengths and weaknesses in our buildings systems. Our initially well-designed water systems have been left unused in normal operation for months, while our hospital oxygen systems are pushed beyond capacity, writes **ARUP London** and **ARUP USA**.

As water management issues came to light, the issue of system flushing, and anti-stagnation procedures had to be addressed by landlord's during lockdowns. Public health engineers worldwide have experienced the fragility of their health care systems, and in the forefront of this fragility is the vital medical oxygen supply to ventilators helping to keep COVID patients alive. Our oxygen systems have been stretched far beyond their design capacities on a truly global scale. In some countries the lack of oxygen has resulted in overwhelming consequences for patients. In Peru the oxygen crisis in hospitals has been so limiting that individuals line up at oxygen supply stations in streets with personal oxygen bottles.

Water Challenges

While buildings have been partially or fully closed, water distribution through buildings has become more isolated or in the worst case, completely stopped. This isolation and stagnation can cause a myriad of events to occur. These events include cold water becoming warmer, hot water becoming cooler, and degeneration of disinfectant levels (both in the utility mains feeding a building as well as the systems within the building), all resulting in possible biofilm and microbial growth within the piping systems.



All these issues combined can also lead to heavy metal leeching from piping materials, increased piping corrosion, and perhaps most unsettling, is the increased risk of waterborne illnesses, such as Legionnaires' Disease.

The flip side to water stagnation is draining either the full system or part of the water system. However, this can have implications with re-commissioning and corrosion of the system due to oxidation. Also, normally wet rubber/mastic seals can become hardened and brittle when dried and then leak when water is restored.

The COVID-19 pandemic has confirmed how important it is to maintain proper hygiene in our water systems and to provide clean environments to help prevent the spread of diseases. The challenge for public health engineers will be to advise logical and enhanced solutions for new water services designs to meet the new challenges ahead. Non-touch smart solutions for washrooms, dynamic water supply systems that suit the building occupancy and stagnation prevention should be strongly evaluated with each system design going forward.

Building Water Safety Plan

The incorporation of a building Water Safety Plan is shown to be more relevant than ever to help protect the public using the facilities and to help protect a building's infrastructure and equipment. As an industry we should encourage our clients to have an appropriate water safety plan in place for their space, building, and portfolio. This is documented via a concise assessment that encompasses the hazards, control measures, monitoring and validation of the public health water systems and connected equipment (that stores or uses water), in the form of a Water Safety Plan.

A building Water Safety Plan could be revisited and implemented during the entire building lifecycle including design and specification; construction and installation; commissioning, decommissioning and recommissioning; maintenance and operation; alteration and refurbishment; and deconstruction.

Water Safety Plans differ from a legionella risk assessment as they cover all aspects of a buildings water system, even extending to items related to drainage where appropriate. All incoming and outgoing water is being considered throughout the life of a building in a circular approach. The Water Safety Plan would also be expected to compliment or include items from any legionella risk assessment. An in-depth and methodical assessment of the building would also ensure all parts and components of a system are taken care of, such as grease waste systems, fixture water seal P-traps, backflow valves, gas feeds, water heaters, and water filtrations systems.

Globally, the process of Water Safety Planning for buildings can be guided by adapting the World Health Organisation 'Water safety in buildings' guidance. This has been done in the UK via the BS 8680:2020 Water quality – Water safety plans – Code of practice, and in Hong Kong, via the 'Guidelines for Drinking Water Safety Plans for Buildings'. Whilst not addressing all building premises, many countries may have similar methodologies that can be applied for hospitals e.g. Centers for Disease Control and Prevention (CDC) 'Developing a Water Management Program to Reduce Legionella Growth & Spread in Buildings' and

Santa Rosa Lima Hospital, oxygen supply in Covid-19 pandemic

'Requirement to reduce Legionella risk in healthcare facility water systems to prevent cases and outbreaks of Legionnaires' disease', and ANSI/ASHRAE Standard 188 'Legionellosis: Risk Management for Building Water Systems,' USA.

Medical Oxygen Supplies

Medical oxygen in hospitals during the COVID pandemic has been the backbone system for life supporting ventilators. Ventilators are generally used in Intensive Care Units (ICU) to support and assist critical patients who do not have the lung capacity or ability to sustain their own life. Medical professionals discovered in the early stages of the virus spread that oxygen therapy administered via assisted ventilation increased chances of survival and enhanced patient recovery. However, this oxygen therapy requirement, in conjunction with the large increase in patients requiring ventilators, exponentially overwhelmed hospital ventilator availability and increased the strain on global oxygen systems.

In many countries (including the UK and Ireland) oxygen is not designed to be the main gas supply for ventilators, traditionally ventilators are primarily driven by medical air via compressors. This change in supply strategy, coupled with the large increase in ventilator usage to cope with patient influx, prompted a global oxygen supply emergency to; 1. Increase, review or prioritise the oxygen pipe flow capacity, 2. Assess the site oxygen plant capacity on existing systems and 3. Provide new temporary or permanent oxygen supply systems in record time.

The increase in oxygen flow exceeded the design capacities for many hospitals in terms of pipework size and plant delivery capacity. To give an example of major issues faced, the flowrates before and during the pandemic for the UK National Health Service (NHS) under HTM 02-01 are outlined below.

Medical ventilator intensive care unit for covid-19 coronavirus patients

However, the issue didn't just stop at the hospital site. How do you obtain an increase in oxygen supply on an existing site in an emergency as quickly as humanly possible? This was the biggest challenge! In Ireland cryogenic oxygen vessels (new and existing offline) were sourced from existing industrial and pharmaceutical sites to be relocated to hospital sites. In the UK, the Department of Health took control over national oxygen reserves and prioritised hospitals such as the temporary Nightingale Hospitals and other strategic hospital sites. The physical manufacture of oxygen was running critical and the delivery of oxygen via companies like BOC was rationed by the Department of Health. For many of us this is un-precedented, the rationed supply of resources and national supply risk failure is truly like nothing experienced since the World Wars.

Intensive Care Units (ICU) – Design flows for Terminal Units – Undiversified

Medical Air Supply – Before COVID	Oxygen Supply – Before COVID	Oxygen Supply – During COVID
80 l/min	10 l/min	**30 – 80 l/min***

*Estimated only, not including existing ventilators already operating on oxygen. Dependent on the patient, oxygen concentration/mix and ventilator type.

Some hospital locations using Pressure Swing Adsorption (PSA) technology, which produces oxygen onsite with no external deliveries, may have been more fortunate. Traditionally however, cryogenic and gas cylinder oxygen is often the main supply source, which relies on an external supply chain.

This pandemic is highlighting the need to review oxygen supply systems for existing and new hospitals across the world. The need for future adaptability in hospital ward designs and hospital services designs has been brought to light during the pandemic. Have we enough resilience for the continued pandemic? Have we enough resilience for the next pandemic? Have we enough future expansion of a system? Are ward designs flexible and suitably adaptable in future?

To conclude

The full impact and final outcome of the COVID-19 pandemic may only be revealed to us in the future. However, as a collaborative industry there is now a real need to look beyond the standards and codes and delve further into the realm of risk assessment with clients. As we start to re-occupy office spaces, hotels, etc and continue to fight the COVID-19 pathogen in our hospitals, we as a collaborative industry now need to analysis the current design norms and use a collective, critical thinking design approach.

Our overall goal is to provide a safe and functional space for the public and building occupants. By working together as a unified team, architects, engineers, building owners, manufacturers, suppliers and the public health industry can successfully collaborate for overall enrichment of our societies. From ensuring that good hand washing practices can be undertaken, to providing life supporting oxygen systems, we really are integral in the defense and support of public health.

Biocides

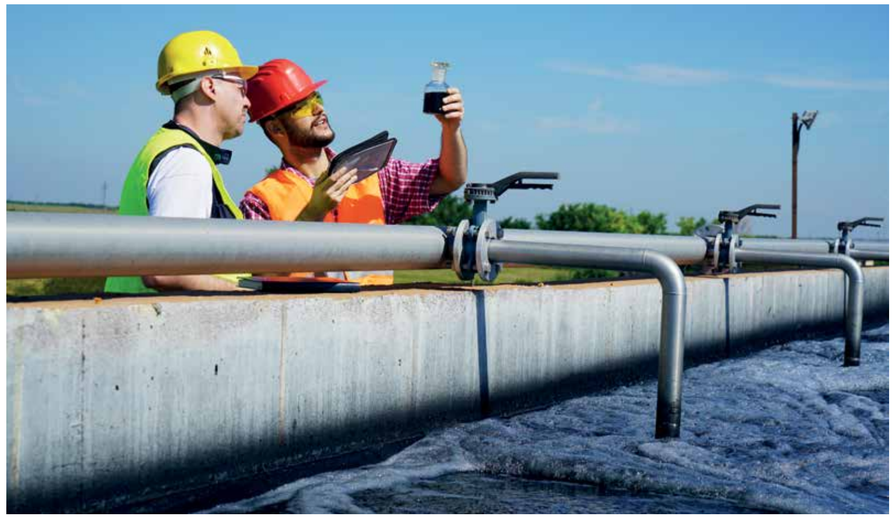
THE WATER MANAGEMENT SOCIETY TOOLBOX TALKS

What is a biocide?

In the water treatment industry, a biocide is a general term used for a chemical compound that will destroy or make a micro-organism or bacteria harmless so that it cannot reproduce and multiply.

They are harmful to aspects of human health such as contact with skin or eyes – you must always use suitable precautions when handling and be aware of the risks they present to you and others. Read and act on all safety data. You do not want these chemicals on your clothes or skin, in your eyes or inhaled.

Biocides are also dangerous to the environment if released inappropriately.



We use biocides to prevent 'bacteria in water' related problems - some of which harm human health. These include Legionella (which can cause pneumonia) and slime and biofilm* formers which can block heat exchangers and reduce system efficiency. Corrosion of metal surfaces due to bacterial activity also occurs frequently.

Biocides must be applied above a minimum concentration for a minimum time to be effective. There may be other factors such as temperature or pH* that affect how well they work. Usually adding more biocide for a longer contact time 'kills' more bacteria more quickly – but this may not always be suitable for the system being treated. Below this concentration or time, they may not work at all.

They are usually supplied in liquid or solid form. The application method and control can vary widely.

Biocides are used in 'open' and 'closed' water systems.

Types of biocide

There are two major groups; oxidising biocides and non-oxidising.

Oxidising biocides

These are widely used and effective at low concentrations. The most common ones are chlorine based (often as sodium hypochlorite), bromine, peroxide-based products and chlorine dioxide. Less common are ozone and iodine. Ultraviolet (UV) light is NOT an oxidiser.

- Generally easy to measure in water both manually using simple test kits, or automatically – though control can be more difficult – so they can be regulated to give a good result at minimal cost
- Work quickly and broadly easy to add/dose
- Normally low cost per cubic metre of water but may 'gas' to atmosphere readily
- Can be added continually or as short term shot doses – if the bacterial kill is acceptable
- Have no dispersant effect, killing only the surface layer and allowing bacteria to live in underlying matter – so usually require a bio-dispersant/secondary biocide (see below)
- Over dosing has little benefit and tends to cause corrosion/plastic embrittlement; can still be under-dosed
- Not always compatible with process in use (contamination) or other water treatment chemicals
- Still need to be selected correctly, handled and used correctly as may release toxic gases or dust, cause fires or potentially explode.

Non-oxidising biocides

These are usually added as liquids and are relatively complex chemical compounds and usually need to be added at relatively high concentrations and be present for a few hours to achieve a good 'kill'. It is common for a compound to be effective against many bacteria – but not all. This would allow the remaining bacteria to grow freely, possibly using the dead ones as a food source – so a second biocide, which works in a different manner, is added to ensure this does not happen. This is often called an alternating biocide programme – though the biocides do not have to alternate equally. It is common for at least one of the liquids to have a dispersant or cleansing effect to prevent deposits forming.

- Relatively easy to add via some form of automatic dose equipment, usually involving a pump, typically timed or based on water volume added
- One often used to supplement an oxidiser such as bromine tablets
- Relatively difficult/expensive to measure the concentration manually or automatically
- Relatively expensive, especially on high volume, hardworking evaporative systems
- Will not kill all bacteria; bacterial resistance is known
- Appropriate selection is required and dose programme adjustment to suit the site.

In all cases

- It is common for biocide effectiveness to be monitored using basic bacterial tests such as dipslides or lab samples.
- Environmental awareness, COSSH and all relevant H&S controls should be understood – and met
- Dose equipment should be suitable, 'understood' by those using it – and maintained – and allow biocide consumption over time to be measured.
- Treat all these chemical compounds with care – they can cause significant harm to you and others.

Summary

This is a huge and complex subject.
If in doubt, seek advice from the supplier, equipment suppliers, consultants etc. as required.

*Discussed in other WMSoc Toolbox talks.

The heat is on hot water

By Steve Vaughan, Regional Director and Public Health Engineering Technical Lead at AECOM as well as a member of CIBSE SoPHE Technical and Education steering groups.

With the ever increasing urgency to reduce the energy consumption within buildings, the focus on the energy requirements for generation of domestic hot water (DHW) has never been so critical. Particularly when you consider that within a modern apartment the space heating connected load can be as low as 1 or 2kW whereas the DWH load will often be in excess of 35kW. So it's plain to see that there is potential for significant energy savings associated to DHW generation. Furthermore, when you also consider LTHW distribution heat losses (which also contribute to the risks of building overheating), the challenges become even greater.

This article focusses on design and regulation constraints for UK residential projects (multiple apartments), however there may be aspects discussed below relevant to other countries or project sectors such as healthcare.

In my role at AECOM I have been involved with the CIBSE Domestic Hot Water working group which includes representatives from SoPHE, consulting building services engineers and other leading experts to provide guidance and technical support to develop a workable solution with regard to reducing the energy demands for domestic hot water supply.

At this stage the priority is to reduce the industry standard instantaneous DHW delivery temperatures (non-storage low water content systems), from HIU's for example. It is also likely that regulations and guidance will need to be updated and therefore engagement with the regulatory bodies is also ongoing as part of the CIBSE Domestic Hot Water working group.

Heat Interface Unit (HIU)

DHW delivery Temperatures

The common design approach is to select 55°C (45°C delta t) as the DHW delivery temperature from an instantaneous hot water generation unit. This allows for the CWM temperature to drop to 5°C (or 5°C temp drop from heater to outlet) and maintain current code compliance which requires a minimum delivery temperature of 50°C at the outlet.

The requirement for a minimum delivery temperature of 50°C is based on the requirements of temperature regime as the method of legionella bacteria control within domestic water systems.

Legionella bacteria is found everywhere in the environment. It is a natural inhabitant of water and can survive in sterile tap water and survive and multiply in non-sterile sources. Warm water between 20–45°C is the perfect water temperature for the bacteria to multiply, it is killed at temperatures above 60°C.[1] You cannot usually get legionnaires disease from drinking water containing the bacteria.[2]

Initial working group proposals focused on a reduction from 55°C to 50°C. However, technical/approval constraints for limiting domestic hot water supply temperature to baths where thermostatic mixing valves (TMV2) are provided to ensure a maximum fill temperature of 48°C would be compromised. This is because a DHW supply of 50°C will contravene the TMV approval constraints which, for TMV2 require a minimum DHW supply to the valve of 52°C with manufacturers also often stipulating a minimum delta t between DHW supply to valve and blended outlet temperature of 5 or 10°C.

So ironically, lowering the DHW supply temperature to 50°C would introduce a no compliance with regard to temperature stability and scalding risk!

Constraints

There is now a consideration to further reduce DHW instantaneous delivery temperature to 45°C which may result in the omission of the TMV for bath fill. However this raises further challenges with regard to compliance across several codes such as:

HSE (Health and Safety Executive) and Water Regulations with regard to legionella control:

- Temperature regime for legionella control will be compromised
- Biocide water treatment to be considered as the primary method of legionella control

Building Regulations:

- As the HIU will now be the controlling device for DHW temperature control rather than the TMV

1. Source – Safe Drinking Water Foundation, www.safewater.org
2. Source – www.nhs.uk/conditions/legionnaires-disease/

National House Building Council (NHBC), Water regulations and HSE with regard to appliance delivery temperatures:

- A reduction to the required minimum delivery temperature of 55°C (NHBC have already reduced their specification requirements from 60 to 55°C for kitchen sink DHW temperature)

Product constraints:

- TMV certification (KIWA), BS EN 1111 and BS EN 1287 for construction and general specification
- Temperature stability of shower valves (many of these are calibrated based on a DHW supply temperature of 60°C, or a minimum delta t between DHW supply and blended temperature of 10°C)
- Stability and safety for DHW temperature control as part of the instantaneous DHW generation unit (such as HIU or Electric)
- Avoiding dead legs on DHW system and technical constraints associated to temperature maintenance tape.

Ironically in some multiple residential projects, consultant Public Health engineers often provide a method of biocide water treatment (usually a chemical dosing system) as a safeguard for water hygiene (legionella and biofilm control) where there is concern about overheating of the cold water supply (which will compromise the temperature regime requirement to keep the cold water supply below 20°C) due to building overheating issues which can emanate from the LTHW circuits. Therefore lowering the DHW temperature will obviously reduce unwanted heat gains but it may be necessary to retain the biocide control method due to lower DHW temperatures!

Thermostatic Mixing Valve (TMV)

Chemical Dosing Plant

Reducing the temperature will also reduce the risk of scale build up within the DHW generation equipment such as plate heat exchangers or electric heating elements which in turn extend plant life and lifetime efficiencies.

With so many regulations to be considered such as building regulations, water regulations, NHBC policy and Health and Safety Executive guidance documents as well as client expectations there are numerous potential conflicts and challenges. Particularly if moving away from temperature regime for legionella control.

What's next?

If it's possible to lower the instantaneous DHW delivery temperature to 45°C then LTHW F&R temperatures can be significantly reduced which also have a positive impact on the central LTHW energy requirements, reduction in distribution losses, pipework sizes and reduce the potential for building overheating.

Reduced LTHW temperatures also brings the opportunity to use low grade reclaimed heat sources and alternative heat generation plant such as Air Source Heat Pumps also become much more viable.

As with many complex engineering challenges, further issues and questions emerge as we delve further into this subject. Below are some of the issues that are also being considered:

- If biocide dosing is to be adopted as the primary method of legionella control then it is critical that the water treatment programme is properly monitored, maintained (relating to both functionality and health and safety aspects). More rigorous system monitoring is likely to be necessary. It may not be suitable or practical to adopt this approach on some projects, particularly where there won't be onsite facilities management teams (unlike healthcare projects for example). But on the other hand, are all systems which only use temperature regime as the legionella control method maintained and operated to ensure full compliance with code?
- Will additional filtration methods need to be introduced such as water storage tank pre-filters to reduce the risk of organic material entering the system?
- Should higher pipework design velocities/ smaller pipework sizes be considered to reduce the risk of biofilm build-up?
- Could local point of use DHW generation units (multiple) be considered instead of a typical single unit within each apartment?
- Are other methods of legionella control such as Ozone or Ultraviolet disinfection now more appropriate? Such methods provide no residual effect, with the systems stated within the HSE guidance (HSG 274 part 2) as a supplementary measure and only effective at or very close to the point of application. However, could individual UV be considered for each apartment or local to the DHW generation unit instead of a whole system treatment system?

Washing dishes also needs to be considered, as the perception is that this is not effective at lower water temperatures (i.e below 50°C). The CIBSE working group also have a specialist on board who reports that most household detergents are tested and efficient as temperature of around 40°C to effectively dissolve the grease on kitchen crockery. However, as mentioned earlier this also conflicts with the requirements stated by NHBC, if this specification is to be adopted by a project client.

A very important point with regard to the above is that this is all based on ONLY instantaneous DHW generation within domestic dwellings i.e. no hot water storage with limitedØ DHW distribution pipework. There are many more critical constraints where larger systems (with larger water content within the pipework distribution/ plate heat exchanger(s) or storage is required) and these will be addressed as part of separate research.

The future of hot water

The design principles and options for hot water generation has and will continue to change at an unprecedented pace.

Whether to meet government targets for Net Zero Carbon, reduce energy consumption and the reliance on fossil fuels it is inevitable that these challenges will impact on DHW delivery temperatures as well as the methods that we use to generate domestic hot water.

This, as stated above is likely to impact on the methods of legionella control and the health and safety issues relating to scalding risks.

With the emergence of ambient loop primary water distribution systems, the opportunities for heat reclaim from for example, waste water systems or solar thermal systems will increase.

Ambient loop systems also lend themselves to apartment based water to water heat pumps and DHW storage. However, technology needs to continue to advance to improve efficiencies without the need to add in series air source heat pumps with water to water heat pumps or electric immersion heaters to achieve acceptable DHW storage temperatures.

There are air source heat pumps available for direct DHW generation which can efficiently deliver adequate temperatures (such as CO2 heat pump units) but technology and manufacturers needs to advance to provide more options and to improve efficiencies for air source Heat Pumps or water to water heat pumps via closed loop LTHW systems which are coupled to central space heating and DHW storage.

This fundamental concept to lower instantaneous how water delivery temperature and move away from the industry standard of using temperature regime as the primary method of legionella control within domestic hot water systems is one of the biggest challenges we are facing within the industry for a long time therefore we welcome your thoughts.

For further information on Thermostatic Mixing Valves and certification refer to:

The KIWA Guide to Certification for the Kiwa UK Certificate for:

- **Thermostatic Mixing Valves** (Type 2 TMV and Type 3 TMV)
- **Tempering valves**

www.kiwa.com/gb/en/products/tmv-testing/guidance_doc_tmv.pdf

Pre-Assembled Stack System by PAM

Saint-Gobain PAM UK has now launched its new Pre-Assembled stack solution for the Ensign BS EN 877 cast iron above ground drainage system. After close collaboration with mechanical and public health contractors FMS Ltd, on the Peninsula Hotel project in London, they all believed it could save them up to 60% on the installation time. The service however, offers so much more than just pre-assembled products.

The PAM commercial team invite engagement with specifiers and contractors at very early stages of a project to evaluate the possibilities and benefits of using the pre-assembly install system. Through collaboration the team can identify any unique requirements to maximise the number of Pre-Assembled components and then provide a full take-off estimation service from the PAM technical team.

PAM will provide detailed CAD drawings of the stack arrangements for site approval and all Pre-Assembly stacks are included in the latest version 3.0 BIM library. The stacks are fully compliant with BS EN 12056 Part 2 ensuring all soil stack discharge branches are swept radius in accordance with the guidelines.

Each stack is fully assembled at PAM's Telford site and air tested to 0.5 bar pressure for 5 minutes exceeding the requirements of BS EN 12056 part 2. These can then be delivered on bespoke stillage's with timed delivery's, ready for quick installation. PAM's pre-assembled stacks are designed to be manageable by one operative, so averaging around 20kg, well under the health and safety guidelines.

One of the main issues with pre-assembly and off-site manufacturing is finding variations on site that can render the supplied pre-assembly useless if it cannot be adjusted. The benefit of cast iron pre-assembled soil stacks is the flexibility it affords to the installer, as each stack can easily be adjusted to suit unforeseen issues. Each stack configuration is designed to around 1.75m in length and fits through the slab and normally above the access point. This enables flexibility as the straight pipe above this can be cut on site to take up any site height differences between floors.

The benefits of offsite manufacturing have long been understood by the building and construction industry. Traditional materials such as cast iron would perhaps not immediately spring to mind for "modern methods" of construction, but Saint-Gobain PAM is proving that it's time to change perceptions around cast iron. A pre-assembled soil stack system meets the pressures of tight deadlines, overcomes the problem of skilled labour shortages, minimises the need for movements & storage on site and ensures consistent quality through a strict factory-controlled quality inspection routine with full testing prior to dispatch.

In the future more projects will need to be delivered using modern methods of construction and its good to see FMS Ltd, The Peninsula hotel project and Saint-Gobain PAM delivering such an effective solution.

Cast Iron Pre-Assembly specification simplicity equals high performance

In this ever more complicated world it is often the simplest of solutions which can give the best results. All too often we see the focus on cost as a key focus without truly understand the knock on impact to other issues such as linked product specification, time on site, installation risks and ultimately end user comfort.

Drainage systems are a key example of this and the specification of the material will have a dramatic effect on both short and long term impacts. By specifying Cast Iron, you will be selecting a material that is A1 fire rated and combined with a mortar slab infill will give the best fire protection. As an example by specifying HDPE you now have to consider the use of a fire collar and the performance required, but also the added risk linked to wrong or poor product installation and its effective life in service. The performance difference has been recognised in recent changes to the Building Regulations Doc B. Fire safety in buildings has moved to stipulate the use of non-combustible materials for the external elements on a building over 18m high including balconies, which would include any pipework. Also, Open sided Car parks with natural ventilation have gone further stipulating all materials should be A1. Should this change also be extended to the internal compartments in buildings?

Cast Irons acoustic performance can also simplify your design and specification, again linked to simplicity. The performance gap between Cast iron and the best acoustic plastic can be at least 6-8 dB(A), therefore this could be the difference between further materials being used to achieve the required room performance saving you space in the room, installation time, reduced cost, but most importantly enhancing the comfort of people in buildings.

It is clear to see that the combination of high performance, simplicity and modern manufacturing methods is now highlighting that traditional materials such as Cast Iron drainage systems still have a key role to play in the future of our buildings.

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Regional round-up

Thank you to all SoPHE members, including our Technical, Industry and Contractors group members for their continued support for the various regional groups.

DATES FOR THE DIARY

Wednesday 2nd December 2020
SoPHE Northern CPD by Viega

Thursday 3rd December 2020
Water Safety Plans
by Dr Susanne Surman-Lee
Water Management Society members rates apply

Wednesday 13th January 2021
note change in date!
SoPHE Northern CPD by Spirax Sarco

Wednesday 3rd February 2021
SoPHE Northern CPD by Alumasc

Friday 26th February 2021
New Technologies by Jonathan Waggott
Water Management Society members rates apply

Wednesday 3rd March 2021
SoPHE Northern CPD by BWT

It is intended that through supporting SoPHE North West, additional on-line CPD events will occur through Autumn/Winter 2020 and through into 2021.

SoPHE North West

As a result of the National Lockdown at the end of March 2020 (due to the pandemic), it meant that our popular Technical Evenings have temporarily stopped – as well as the SoPHE Northern Dinner which was due to take place in May 2020 (which I'll mention later). However, undaunted by this & following discussions with a number of Industrial Associate (IA's) members, on 4th June we held our first SoPHE Northern Virtual CPD – kindly provided by Clearwater – which was entitled "Covid 19 – Water Treatment" A total of 54 people logged-on to this; thank you to CIBSE (Julian Jones) for sorting out the technical side of things!

Subsequent to this, we've done further CPD's: 2nd September – "Energy Efficient & Hygienic Water Systems for Modern Buildings" provided by Oventrop UK (178 people logged-on) & 7th October – "Energy Efficient Hot Water" provided by Zip Industries (150 people logged-on). At the time of writing, our next CPD is scheduled for 4th November – "Evac Vacuum Drainage – The alternative to Gravity Drainage" to be provided by European Vacuum Drainage Systems. All CPD's start at 4.30pm (BST/GMT).

As much as we'd like to return to the Rain Bar in Manchester, for the foreseeable, we shall be continuing with these Virtual CPD's until at least March 2021; we'll review the situation then, before deciding what to do next.

Unfortunately, our 10th SoPHE Northern Dinner was unable to take place this year; however, it is our intention to try to put this event on providing Government Guidelines permit, this will take place on Friday 7th May 2021 – usual venue & timings. Our guest speaker – comedienne Lucy Porter – is still intending on being with us & we still intend on presenting to one of the PH Engineers a Honorary Fellow Award – I will keep you all updated to progress as & when I can.

SoPHE West Midlands

SoPHE West Midlands started off 2020 with a presentation in February on the Durapipe Vulcathene system, unfortunately a global pandemic then ensued. All of our following meetings were put on hold/ postponed and eventually cancelled due to social distancing restrictions.

In June we delivered our first virtual seminar in association with Geberit looking at embedding acoustics in drainage pipework systems.

EVDS delivered an interesting virtual seminar on vacuum drainage systems in July.

On 21st October, Polypipe Building Services presented their Mecflow water system, discussing the benefits of such a system.

Cistermiser will follow in November discussing the use of the internet for temperature modelling to reduce the risk of legionella.

We are working closely with CIBSE on our upcoming virtual seminars which will hopefully allow a wider audience to attend.

It is hoped that we can continue this format for the foreseeable future, if any of the SoPHE Industrial Partners would like to use the SoPHE West Midlands forum to deliver a technical presentation please feel free to get in touch.

SoPHE South West

We are trying to promote events through the CIBSE SW Linkedin page for MEP, although we have not hosted any SoPHE specific events since lockdown. We are looking to host some virtual CPDs in the near future.

The sharing of knowledge in the South West is important and we are trying to select events which will obtain a good turnout. We have achieved this with our previous events by combining with CIBSE or other institutes on a shared topic. The South West is looking forward to organising events again in the near future. With these being digital hoping that the South West peninsular regions will have the ability to join and we can share to a wider audience of SoPHE Members.

SoPHE New Zealand

Hello SoPHE members!

I'm Ross and I recently joined SoPHE as an associate member.

I live in New Zealand (NZ) and recently had the opportunity to connect with a few SoPHE and CIBSE members in this corner of the world at the CIBSE ANZ AGM hosted in Auckland.

I'm based in the capital city Wellington, and work for the NZ government's Ministry of Business, Innovation and Employment (MBIE) within the Building Performance and Engineering team.

My position in our team is Senior Advisor for Plumbing and Hydraulic Services, and I'm focusing on further developing the parts of the NZ Building Code which relate to Plumbing and Drainage systems.

My passion for this industry started while training to be a Plumber, Gasfitter and Drainlayer in the Royal NZ Army Engineers. Since packing up my tools I've spent time working as a Local Government Plumbing and Drainage Inspector, Industry Training Assessor and Hydraulic Services Design Consultant (Public Health Engineer equivalent).

Outside of work, I'm a keen tramper and enjoy passing on my passion for the outdoors to my kids by getting out in the bush to explore the many amazing tracks around Wellington.

I look forward meeting more of the global SoPHE community, and appreciate this opportunity to introduce myself to the wider membership.

Warm regards,
Ross Wakefield

SoPHE Scotland & SoPHE London

Due to the challenging times we have faced during 2020 it has been difficult to make progress in these regions. However, it is intended thhat through supporting other regions, additional on-line CPD events will be held though Winter 2020 into Spring 2021.

SoPHE UAE

The SoPHE UAE chair has changed from Keith Perry to Giovani Tauckoor. We thank Keith for all his hard work and commitment to the SoPHE UAE region and wish him well in his future endeavours.

Giovani is a Chartered Public Health Engineer with 17yrs experience in the Building Services sector and has worked and lived in Mauritius, Seychelles, United Kingdom and United Arab Emirates as a Public Health/Project Engineer. Giovani is currently involved on various prestigious projects in the UAE and is keen to be part of the SoPHE regional group. As chair, Giovani is committed to work with SoPHE & CIBSE to enhance the SoPHE UAE regional profile.

Adam Smith from Polypipe Middle East will be the new vice chair, Adam has been in the region for over 10 years and brings with him diverse innovation and supply chain knowledge to the team. Polypipe have committed their continued support to SoPHE UAE and will continue to sponsor the society for the 5th year running. We would like to express our deep appreciation to Polypipe for supporting SoPHE since the regional launch to date.

The key objective of SoPHE in the UAE region is to facilitate knowledge sharing via CPD's and promote more integration among industry stakeholders. SoPHE UAE is looking forward to resuming the technical events once safe to do so, and have proved to be very successful prior to the COVID-19 era. The seminars & technical events are primarily focused on key challenges in the MENA region and help promote knowledge and relationship building across the sector.

SoPHE and CIBSE UAE committee have collaborated on a set of regional design guides for building services in Dubai, which was released in June 2020. The same will be developed for other UAE regions which have different authority jurisdiction. SoPHE aims to bridge the gap between the authorities and consultants, facilitating the approval process and at the same time ensuring consistency and good engineering practice from project to project.

SoPHE UAE acknowledge the challenges that Public Health Engineers faced in the region with aggressive deadlines, type & scale of developments and difficult climate conditions. SoPHE UAE will have a strong emphasis on membership aiming to upscale the profile of Public Health Engineer and safer buildings in the region.

We are currently working on similar guides for Abu Dhabi & Saudi Arabia and aiming to issue them to CIBSE for review by the end of November.

SoPHE Technical update

SoPHE embraces Digital Engineering with the support from CIBSE's Society of Digital Engineering (SDE). A number of joint initiatives are currently underway between SoPHE Technical and SDE, including the planning and framework for digitalisation of CIBSE Guide G and also the development of standard calculation tools to assist engineers with their design, aiming to bring uniformity and consistency within the Industry.

Technical events organisation and delivery within SoPHE have been directly affected by the COVID pandemic. However, this ongoing situation has forced the Industry to shift drastically towards adopting tools (which were previously available but under-utilised) for virtual interactions and collaborations.

To enable CPDs to be provided to our members, we will be organising Online CPDs which will be open to all members irrespective of their regions. Online CPDs can accommodate for much larger audience without the need to worry about room availability and capacity.

As part of our commitment towards Knowledge Sharing and publication of Technical Bulletins, we are pleased to announce that we have released in April 2020; Technical Bulletin (TB) TB-02 **"Rainfall Intensities and Drainage Design"**, which are available to the SoPHE members.

Current SoPHE Technical Bulletins in the pipeline for publication includes the following:

- **TB-03 – Grease Management System** – Specifying to BS EN 1825 – Out for final comments by Technical Committee – Expected release Q4-2020
- **TB-04 – Building Drainage Ventilation** – Out for Initial comments by the Technical Committee – Expected release Q1-2021

Future Technical publications under discussion:

- "Blue Roof Design"
- "Optimising Water Storage design to promote water quality and to minimise stagnation"

If you are a SoPHE member and would like to obtain copies of relevant SoPHEs' publications or if you would like to see publications in relevant topics please send us your suggestions at **technical@sophe.co.uk**.

Contact SoPHE's Events team at **events@sophe.co.uk** should you wish to propose some ideas on future events.

By Jassim Daureeawo, SoPHE Technical Chair

Arthur Churchyard Obituary

It is with deep sadness that we report the passing of Arthur Churchyard.

He died at home with his wife on Sunday 29th March 2020 He was 88 years old and had been suffering for about 25 years with Parkinson's Disease. He put up a very brave fight and never complained, unfortunately his condition deteriorated and eventually he required 24 hour nursing. It was his wish that he did not go to a Care Home. His wife Clodagh courageously nursed him at home with the assistance of carers. This continued for many years.

Arthur will be remembered as one of the stalwarts in our industry, very technically competent while being both kind and considerate. He came from a plumbing background, his farther was a plumber. He served his two years National Service as a Hygiene Assistant in the Army Medical Corps; his duties took him overseas to Egypt and Malta. He returned in 1952 and joined Matthew Hall as a Public Health Engineer where he continued to serve all his working life. During this time they grew from a small family concern into a very large firm of Contractors specialising in Multi-Discipline Engineering. He worked in the Public Health Design group where his abilities were recognised and he was appointed head of the department. He was one of a small group of Public Health Engineers who approached CIBSE resulting in the formation of the group that developed into SoPHE. He followed the progression and achievements of the group and was so proud of the increasing recognition of Public Health Engineering.

His wife Clodagh, son Douglas and daughter Kerry survive him.

Education Group update

As the SoPHE annual dinner was postponed for a year due to COVID-19, the education committee agreed that the SoPHE Young Engineers Award should also be postponed. It was felt that making a presentation and making the award over a video call did not have the same gravitas as at the annual dinner. I hope you can all appreciate the predicament were in and agree with the group's decision.

However, there is a silver lining, this postponement gives us plenty of time to prepare a fantastic competition for next year. To this end I ask that if anyone has ideas for the annual competition or is willing to take part in the running of it, please let us know. All ideas are welcome, if they are not used this year we will keep it in the back pocket for the following years.

The group has struggled to meet this year so there is not much to discuss here now. Nevertheless, we are progressing where we can.

The Public health masterclass modules will be progressing after our upcoming meeting with CIBSE so watch this space!

The Plumbing center of excellence at Havering college is on hold as is the rollout to other colleges, we anticipate this to kick off again after COVID restrictions are lifted.

We hope you all stay safe and stay well.

By James Day

The SoPHE LinkedIn group destined or 1000 members

The CIBCE SoPHE group on LinkedIn include for a diverse range of Public Health related professionals from around the world.

Designers, consultants and other specialists including academics, contractors, planners, also many experienced manufacturers and equipment suppliers are among the members.

The aim of the group is to share the knowledge and experience while promoting activities, building services engineering and making a connection with other likeminded professionals.

Be inspired to join the group to share your views or to ignite any technical conversation or challenge!

'COVID-19: MANAGING WATER' – a seminar showcasing how to ensure water systems are safe during and post COVID-19 is one of the recent CPDs advertised on our SoPHE LinkedIn page. This webinar, free to attend as many others of this type, reached hundreds of members in many countries. Don't forget to visit the group webpage to check our future events.

Are you missing the sounds of keyboards, fluorescent lighting and a broken printer down the corridor of your office – stop! Keep in touch! Stay up to date with new technologies and know what's brewing in your SoPHE region.

To join us on LinkedIn search: "CIBSE SoPHE"

Water: the next liquid gold – Day Zero is coming

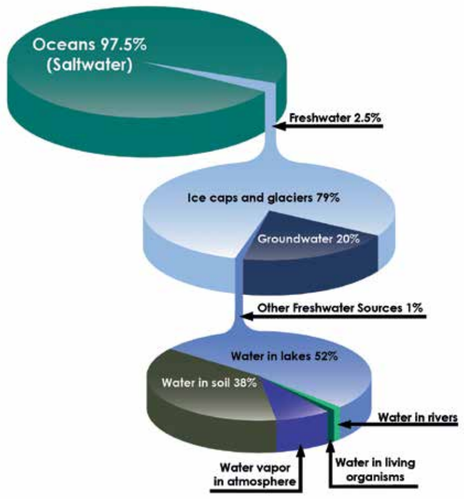
While the world grapples with the impending 'Climate Emergency' another lesser known crisis is emerging. The UK is running out of water, writes Amanda Stanley Senior Public Health Engineer, from Elementa Consulting London.

In the United Kingdom, the widely held assumption is that fresh potable water is abundant, readily available and cheap. Since it is an island surrounded by water and known to have regular rainfall, this is an understandable mistake.

The truth is that the sustainability of the UK's water supply is affected by multiple factors. Regardless of rainfall volume, conditions in and on the earth determine how much of that water is added to the usable water supply. Climate change, population growth and irresponsible water use are all contributing to a water shortage. Water supplies are being stretched, as this essential resource is being taken for granted.

Breaking the myth that water is abundant

There is approximately 1.386 billion km^3 of water in the world. Sounds like a lot! But how much can we easily process to drink Worldwide?



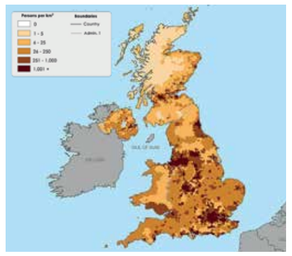
World wide water distribution[1]

The adjacent flowing pie chart shows only 2.5% can be classed as fresh water, 99% of which is held in the ground or ice caps. Out of the remaining 1% but only half of that can be easily obtained and treated to be suitable for consumption.

With an average UK family having 2.4 children, population growth is inevitable, even without considering immigration. This means that water demand is increasing, and natural aquifers and reservoirs are potentially being drained faster than they can fill.

What effect has Climate Change had on the UK's water supply?

Exacerbating the issue of population growth increasing the water demand, is the increase in climatic dry period length and the increase in the average yearly temperatures. An increase in dry period length causes the land to dry out, hardening the earth, which becomes less porous for re-charging aquifers. Reservoirs are also becoming more susceptible to evaporation losses as our seasons become hotter.



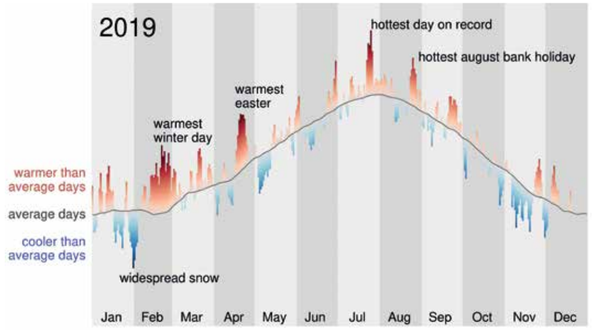
UK population density, 2020[2]

More intense rain events also result in surface water running off faster to the sea, stripping the land of valuable topsoil and causing disruption to the ocean nutrient balance. This higher velocity runoff bypasses the natural infiltration process for aquifers and causes more sedimentation in reservoirs. Ultimately resulting in a decrease in water storage yield for human use.

Due to 'Climate Change' our weather patterns are changing, resulting in longer dry spells and less frequent but more intense rain events. This has been evident in the UK in 2020 with a record-breaking wet February, followed by a record-breaking dry and sunny spring. Summer storms then ensued with many parts of the UK experiencing above average rainfalls (double in some areas) in June. As we approach winter, the 3rd of October was the wettest day in the UK on record.

Previously in 2019, according to the MET Office (Met Office, 2019) we had a record-breaking year with the driest winter and heavy snows to the warmest February ever recorded.

1. www.pbslearningmedia.org/resource/buac17-35-sci-ess-waterdistribute/saltwater-and-freshwater-distribution-on-earth/
2. sedac.ciesin.columbia.edu/data/collection/gpw-v3/maps/gallery/search/15



2019 has been a year of extremes[3]

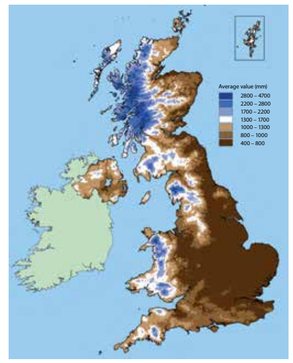
There were also some heavy storms, however due to the dry winter the land became less porous over time resulting in flooding, run-off passing directly into the sea and less being captured for water supply.

- Spring brought most of the warm weather and generally 25% less rainfall than previous years.
- Summer was similar for most of the UK, however selected regions, Cheshire, Lincolnshire, Lancashire, Staffordshire Derbyshire and Leicestershire received thunderstorms and intense rainfall. This created widespread flooding meaning that summer was both the hottest and 7th wettest recorded since 1910.
- Autumn again brought flooding in Yorkshire with record rainfalls, with Scotland at 70% and the south east recording the driest.
- Winter although, not commented within this MET Office document, again has been very changeable with warm weather and heavy rains in the center of Britain

So, easily obtained water, using natural filtration through the ground, where water treatment is minimal, is limited. Furthermore, as soon as water requires purification from salt or other contaminates this becomes costly and obtaining water from drilling deep wells requires significant capital expenditure.

Natural aquifers, reservoirs and riverways, cannot cope with these heavy rainfalls and previously captured water is running off directly to the sea. What is captured in the areas of flooding is contaminated with effluent from surcharging local foul water sewers.

It should be noted that London is drier than both Sydney and Istanbul. Other factors, such as the increase in high densely populated



Rainfall amount, annual average 1971-2000[4]

areas putting a strain on a dated water utilities infrastructure, creates a system that cannot cope with the increasing demands. This combined with the country's lowest rainfall yields. Effects of which are seen in dried up river beds and overflow rivers.

Day Zero

The Global Sustainable crisis is directly impacting our precious resources and pulling us quicker to our 'Day Zero', we need to design and install smart now for our own sustainable future.

What is 'Day Zero'? 'Day zero has been previously used to describe an ultimate water shortage level in the Cape Town water crisis from 2015 to 2018. Day Zero was effectively the day the water utilities network would be switched off and rationing of water supplies at standpipes would be implemented. Cape Town was the first major city in the world to potentially run out of water.

Now London is listed as one of the top 17 cities potentially facing its own DAY ZERO!

Some businesses are investing heavily in both water companies, and land with high concentration of water for crop production. These early stages of creating a monopoly of this essential resource, are setting the stage for water to become the next 'Petroleum' or 'Liquid Gold'. This can give rise to human rights issues.

What can we do about it?

So, what can we in the industry do to promote water conservation and prolong this precious resource, so that infrastructure can be set in place, before the inevitable happens?

Many water Providers are running schemes to promote 'Water Smart Initiatives' promoting lowering our consumption rates and offering water saving devises (it is work checking with your local provider to see what they offer). However, this approach is not going to be enough. Widespread education is needed for the general population, and we as designers and installing engineers, need to take a more direct approach.

Many in the agriculture industry are considering alternative means of production and smart irrigation technologies, using less water direct to the plant roots or reclaiming water within the process. But this comes at a cost and is all dependant on the farm's financial capacity, and its global location.

The same can easily be said for Commercial and Industrial production where the usage may have alternative methods that use less water with a re-orientation on the larger sustainable issues.

Research and development requires investment, which in turn requires repayment. Are we generally able to bare this burden? Do we have any alternatives?!

Measures here in the UK are already partially in place; from schemes such as BREEAM, former Code of Sustainable Homes, Building Regulations, Water Regulations and Government action plans. These all cover in varying degrees, methods to be undertaken to reduce waste and misuse of water.

We widely use the WAT01 calculator, but we generally only aim for 25% reduction (105 litres) from the expressed water baselines of 140 litres. This can easily be lowered with modern fitting and appliances to a 50% reduction (4 to 5 credits) and with harvesting both (a) grey and (b) blue water systems, we can achieve 'Exemplary' attainment at 65% water reduction. We can lead by example and with intelligent planning to reduce the impact and survive the coming water shortage.

Sustainable technologies that encourage onsite water re-use should always be analysed for all development, these include:

A. **Grey wastewater recycling from showers, baths and wash handbasins**
B. **Rainwater harvesting**
C. **Possible black water recycling from larger and remote developments.**

The government is demanding that water companies act on reducing leakages according to the Consumer Council for Water (CCW), 'Water UK; England and Wales, Apr 2017 – Mar 2018' states that in England and Wales, we lost 3.1 billion litres of treated potable water every day due to leakages. This equates to 20% of the national supply or 1273 Olympic swimming pools per day or 20 million people's water usage.

With a growing population using more water and climate change making it more difficult for us to maximise the benefits of rainfall, the pressures on our resources are growing stronger. To avoid 'Day Zero' we need to reduce both the usage and the waste of our water. The general population needs further education about the impending shortage and practical ways they can help. Furthermore, industry research and responsible implementation of existing sustainable systems will also help us reduce the likelihood of water restrictions, and avoid this crisis.

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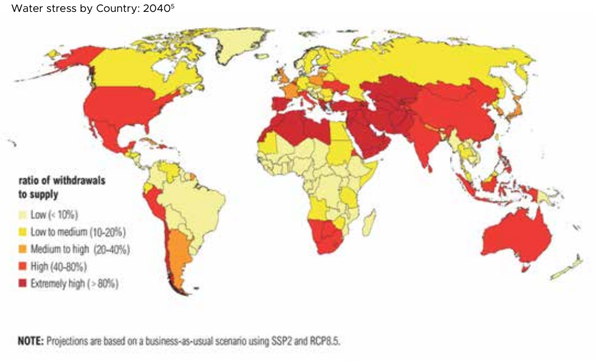
Water stress by Country: 2040[5]



> Day Zero has been previously used to describe an ultimate water shortage level in the Cape Town water crisis from 2015 to 2018. Day Zero was effectively the day the water utilities network would be switched off and rationing of water supplies at standpipes would be implemented.

Top 10 check list for water conservation to consider

1. Report leaks to your water provider if you see one
2. Add a water meter to existing properties, so usage can be reviewed which highlights abnormal water use
3. Offer recorded usage to SoPHE for data logging so calculation documents may be reviewed
4. Turn off taps between uses or install a PIR system in both commercial and domestic installations
5. Install shower instead of a bath
6. Use water saving devises and if installed make these located in a location that is not easily removed at the incoming supply
7. Specify ECO-Water fittings
8. Use a full load in both washing machines and dishwashers (ensure these are water efficient fixtures)
9. Use a bowl in your kitchen sink
10. Harvest greywater, rainwater and if possible blackwater for reuse.

3. www.metoffice.gov.uk/about-us/press-office/news/weather-and-climate/2019/weather-overview-2019
4. www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/research/library-and-archive/library/publications/factsheets/factsheet_4-climate-of-the-british-isles.pdf
5. reliefweb.int/map/world/water-stress-country-2040

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Technical articles from members, giving situations encountered and how they were overcome.

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