



## Discover how we distribute water

### Webinar Transcript

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Key:

C = Caecilie Hougaard Pedersen

S = Stuart Moss

K = Frank van der Kleij

B = Fionn Boyle

J = Jeremy Heath

N = Nick Blamire-Brown

C: Okay, welcome everyone. Welcome back and also welcome to anyone who's joining us for the first time. Feel free to introduce yourself in the chat, who you are, your organisation, where you're joining from, so that we can all get to know each other. Before we get started, there is just a little bit of housekeeping, so if you have any issues during the webinar, please feel free to use the chat. We have a team there ready to help you, and they'll also be sharing relevant materials and links throughout the presentation.

At the end of the webinar, we will have plenty of time for our live Q&A. For this Q&A, we will be using Slido. The platform is live and ready. Please use the QR code that you see on the screen, or you can use the link in the chat, and ask any question that you might have. You can add questions during the presentation or during the Q&A, and we very much hope to get through all of the questions, but feel free to email us directly if you have any questions, which are still unanswered at the end of the webinar. If your question is for a particular speaker, feel free to add that, when you add your questions. Otherwise, we will open the question up to the full panel. Without taking up any more time, I will hand over to Stuart Mass from Isle Utilities to get us kicked off.

S: Thank you, Caecilie. As you heard this week we are focusing on distributing water and the challenges that are faced. In the previous webinar, we discussed the source of the water and the treatment processes. We discussed that water comes from primarily ground and surface water sources, is treated and provided with a dose of chlorine before being stored for distribution. This week we'll focus on how it gets from these centralised treatment facilities into the homes and businesses across the network. I will provide a brief overview and then we'll have three industry experts to give us their view. Treated water is stored in various above and underground vessels waiting for the demand from customers. The previous analogy that I used was a fuel tank within your

car. It is primed with the fuel ready to be put to work when you need it. Just like stored treated water in tanks or water towers or treated water reservoirs ready for when they are needed. That water needs to remain wholesome.

We talk about water age. The water becomes old and stagnant when it stays still for too long. It's like your cart and a fruit smoothie. You need to shake it before you drink it to mix any settled fruit. There are lots of old assets within the network and therefore need to be monitored for condition. Water companies are concerned with leakage, which is the loss of treated water, but also ingress water entering the tanks from storm water, which could contaminate the treated water. These tanks are monitored for integrity, sometimes drained down and cleaned. Sometimes water is mixed and additional chlorine is added, and the water quality is monitored regularly to ensure the water remains wholesome. Water is heavy and citizen towns are varying topology, and therefore a huge amount of energy is consumed to transfer water from one place to another via pumps.

Water companies are also required to provide customers with water at a certain pressure to ensure we can all fill up our kettles quickly for that desperate cup of tea and shower with our power showers. The official measure is the ability to fill a 15-litre bucket in 100 seconds, an activity in high demand in most households. I think you'll all agree. Moving water around networks is incredibly expensive for water companies. Pump technologies is incrementally improving. But how can we ensure we are not over pressurising the network and wasting energy and water through leakage?

Water is distributed through pipes. Pipes that vary in diameter, age, material condition. The pipes are also sat within differing soil conditions and across different environments under the road versus in a field. This all impacts on the performance and the life of the pipe. This pipe infrastructure is aging and deteriorating. We're therefore gathering lots of data on the network to better manage our assets, but there's an opportunity to innovate and use this data for further analysis to achieve a more advanced data-driven asset management.

One of the biggest challenges is leakage. You might have heard the terms non-revenue water, water loss, leakage. They're all slightly different as water can be lost through holes in the pipe, but also through theft or inaccurate water meters. Pipes leak due to a variety of reasons. It might be due to ground movement, corrosion, pressure bursts, damage from excavations. These leaks are all difficult to find, but there's been lots of advancements in the identification of leaks, but the industry's still looking for new solutions to help prioritise, which leaks to repair and understand the early onset of leaks. Repairing pipes is an area that has not seen much innovation. There are very few options available to water companies, and those options almost always mean closing down the road and digging up the road to access the pipe. This is very disruptive. There is a great opportunity to innovate in this area, but remember the water quality stresses the water companies are under. Any product that enters the pipe for assessing the condition or for repairing the pipe needs to be improved to ensure it doesn't have an adverse effect on the drinking water quality.

That was a quick spurt through the water distribution network and some of the associated challenges. Now, let's hear from our guests, Frank van der Kleij, Fionn Boyle and Jeremy Heath. I'll ask a series of questions and I want some quick fire answers.

Okay, then. Question one, what's your name? Who do you work for, and what is your role from a day-to-day basis?

K: Hello, my name is Frank van der Kleij, and I'm a principal consultant, asset management with Stantec UK. On a day-to-day basis, I work with various clients in the water industry on developing their long-term asset management plans. This is primarily for the clean water side, but in essence it covers all the assets across raw water, clean water, and also waste. I'm specifically looking at certain areas such as operational resilience. How can a company ensure that their assets are more resistant against low likelihood, high impact events that are only going to be potentially quite more frequently in the future due to adverse weather, climate change, growth, but also asset failure. On the short term and the shorter plans, I'm assisting companies with their submissions for PR24. So very much looking at what are the best asset planning interventions for both AMP8 and AMP9.

B: Hi, thank you. My name's Fionn Boyle. I work for Anglian Water Services and I am our strategic innovation and shop window lead. I lead a team within our wider innovation community. We work with numerous other teams across our business to understand future strategies, and what we need to be adopting as a business. We actually predominantly use memberships and partnerships to be able to bring in the best of the best from the sector and beyond, and then we look to deliver innovation projects across various different horizons. It could be from early-stage research, right through to scaling solutions across what we call our shop window incubator area. That is a specific part of our operational area that we've dedicated to going beyond a test bed.

We've had a test bed function within the shop window for a number of years, and we still keep that, but we're now building additional capability that allows us to build a version of our company, the future water utility, but do that today. Within this capacity, I also play a role in forming and then delivering offer innovation funded work. In addition to strategy and delivery, I'm also responsible for managing our international partnerships that we have with other leading utilities across the globe. A typical day for me, well, it involves a lot of coaching and providing direction to our internal project teams. Ensuring that what we're delivering is aligned best to what our business needs. Then I spend a lot of my time working with business leaders and SMEs to make sure that we understand their expectations and the needs of our customers. But if I'm not working with them internally, typically I'll be speaking to various different suppliers about different offerings they have or that they're looking to provide, so that we can really help them make sure that they bring the best offering to the table and not just for Anglian Water, but for the industry as a whole.

J: Good morning. My name is Jeremy Heath. I work at SES Water and I am the innovation manager.

S: Thanks, all. Good to have you on board. Thanks for joining us today. Isn't it great to have these esteemed guests with us? We really appreciate it. So moving on to the next question. Tell me the biggest challenges related to water distribution from your perspective.

K: For me, the biggest challenge that we currently face in relation to water distribution is, how can we manage our water distribution network in the most cost-effective manner?

How can we manage our assets in the most efficient way? The assets in the industry are aging. It's a very old network. On average, the network tends to be 50, 60-year-old, but we increasingly are being asked as an industry to improve performance, which is in the best interest to our customers and also everybody involved. From an environmental point of view is, we don't want to have high leakage levels. We don't want to interrupt our supplies, and we certainly want to deliver water at its lowest cost. I think in that context to have a distribution system that is aging, but at the same time the industry is being challenged to improve performance significantly. I think that's the biggest challenge that we face.

- B: It is a tough one to say for an absolute, but I guess, for me, if you bring it to maybe a higher level, it would be things like long-term operational resilience kind of in the rounds. Things like leakage, water quality, interruptions to supply, there's some of our key performance metrics that are associated to operational resilience. I guess underlying all of these then is probably just the sheer complexity of our systems. I always think about my heating at home. I'm trying to think of an analogy that would make sense to those that don't understand or aren't familiar with the industry. That system is complex. I wouldn't dream of trying to work on it myself and I don't think many would.

The same is true, but maybe slightly less relatable for things like a factory producing either food or drinks, producing a food grade product. Well, we have these huge systems connected across tens of thousands of kilometres of network providing a food grade product to everyone in our region, everyone in the UK on a 24/7, 365 day of the year basis. That in itself is hugely complex and all of the things that then sit within that in order to make sure that we can provide that service. That we can enhance that service working with other stakeholders in our region to ensure that what we're doing is right for the customer and not just for today, but actually for the long term. It's that complexity that I think is the biggest challenge when it comes to managing our distribution systems.

- J: One of the biggest challenges that we face with water distribution at the moment is water leakage or the water companies have been challenged to reduce water leakage by between 15 and 20%. Certainly in this amp and in the next amp asset management period, it's gonna be at least the same, if not more, in terms of reduction. We are looking at all sorts of ways of reducing leakage. We tend to use an acronym, PALM, to prescribe the various ways of reducing leakage. So prevent, aware, locate, mend. We have a lot of solutions in awareness and location and there is a good pipeline of solutions coming through there. We have some solutions in prevent, but where we are really lacking solutions at the moment is mend.

Most of the time we repair pipe by digging up the road, cutting out the bad bit and then piecing through putting in a new section. That's very disruptive. It means we have to shut off the water supply as we do that, and there are social and environmental costs that go along with that. We are extremely interested in solutions that would allow us to repair pipes without having to carry out excavation or that would allow us to repair using a small excavation akin to microsurgery, for example. Those are some of the solutions that I'm actively searching for at the moment.

- S: Thanks all. Much appreciated. What I'm hearing is aging assets, leakage, resilience, complex systems, microsurgery. This sector really has some juicy challenges. Let's find out about the innovative solutions that are out there. Tell me about an innovative solution you've tried, tested, reviewed, that's addressed the challenge described, and what were the outcomes?
- K: I've been involved with innovation throughout my career, and one very good example is the work I did when employed by a water company previous to joining Stantec. This was a project which was done in conjunction with a university and a manufacturer. Together as a tripartite, we developed a concept called Dynamic Network Area Management. Essentially this improves the way the network distribution system was managed by, on the one hand opening up the area, but on the other hand, bringing in new technology and innovation to manage that open network in a much more efficient way. Several systems were introduced and there was really good evidence that there were improvements in terms of water quality, reducing the impact of interruption of supply and improving leakage levels.
- B: There's probably a few that come to mind. If you'll let me go with that rather than perhaps picking out a single one. The first probably that comes to mind is the proliferation of advanced sensing that we've seen over the last, well, probably felt by the industry over the last five years but having been developed for a longer period before that. But then you move into things like increasing operational awareness. Through things like visualisation, coming from a lot of that operational technology those sensors and providing that data into the business. Then I guess more recently or as companies are still developing through that capability. Bringing in more advanced analytics to actually make sense of that data, bring different data sources together and then produce greater insight that allows us to make decisions, either in near real time or take preventative measures in order to avoid any impact to service.

I think everyone loves to use the term artificial intelligence. I've certainly been guilty of throwing that one out there on occasion. But I really think, when it comes to analytics, even some fairly basic scripting or automation can have a huge impact in terms of how we've become better in providing service to the industry and to our customers. That's before we even get into some of the big stuff like true artificial intelligence or machine learning. But I think probably the solution lies in the development of the various different things that we've been able to produce.

I think where we've seen biggest impact with that has been where we've been able to bring together the world of data science, alongside the domain knowledge and expertise of our internal subject matter experts. Then produce something that actually applies some of that fantastic and leading science to our industry and makes it relevant to our operations. When we've been able to do that and put those teams together, we've seen some of the biggest improvements across the board. Whether that be through the use of transient pressure data, through acoustic noise logging being deployed across our systems, through into things like near real time modelling. It's bringing together those different minds in order to produce a solution that is actually tailored for what our industry needs, that I've seen the best sort of progress from.

- J: One of the solutions that we've been looking at is to increase the number of clamps that we use as opposed to cut-outs. A clamp is effectively almost like a clamshell design that

folds around the main and allows you to repair it without having to shut off the water supply. Now certainly they have great benefits. One of the issues is, is that you can only carry out a repair that is the length of that clamp. One of the solutions that we've been using, from Germany, allows us to interlock clamps and allows us to actually put together three or even more clamps so that we can deal with a split or similar arrangements on our pipe that allows us to carry out repairs without interrupting customers. Certainly very useful and we are adopting those as are a number of other water companies. However, it still requires an excavation. It still requires us to shut down the road. It still requires us to dig. There's considerable carbon costs and as I said, environmental and social costs associated with that. Although that's a good interim solution, I would still like to look for solutions that don't require me to excavating road.

- S: Thanks all. It's really interesting to see the blend there of digital solutions mixed with the more fundamental engineering like the pipe clamp. It really demonstrates the complexity of the challenge and also the different skill sets that are required to make sure we achieve the outcomes that are desired. Onto the next question then. Tell me about the key innovation opportunities that you see within your area of work.
- K: There are multiple areas of innovation that I think we can introduce. One area is data and insight. There's lots of data in the industry and I think there's a lot of opportunity for innovation of better using that data for both root cause analysis, decision making and introduction of interventions. The second area is about how we can cost effectively maintain and repair our network. How can we facilitate cheaper ways to repair and refurbish the mains network, the surface pipe in the network? It's very costly to do repairs. How can we facilitate a much cheaper way of repairing our assets? Thirdly, how can we also introduce a more cost effective of renovating our network? We need to renew our assets, but currently the cost of doing that is significant. To meet our long-term performance commitments, the key driver behind that is a more cost effective and innovative way on renovating the mains network.
- B: Forgive me, you might be looking for something slightly different to this answer, but for me, this question is never about the technology. It just simply isn't. Technology will come and it will go, and that process will be fast and it's only gonna get faster. The most important opportunity we have is that of being able to build effective partnerships. Knowing who we can learn from, work with, and hopefully learn with, is probably the most paramount to how we are going to be able to keep meeting the needs of our customers today and into the future. You might see that as a little bit of a cop out. I'm not trying to stay impartial here, but I think we all recognise that there will never be a silver bullet as much as we might wish that there was that's gonna come along and solve all of our problems.

The solution that solves our problem today isn't gonna be that that solves our problems tomorrow. We need to be able to make sure that we continue to find those possible solutions, find the best way to develop them and work with the great minds that are developing them to provide the best offering for the industry. It's only through an ability to build these effective partnerships and work with a broader range of stakeholders with different suppliers and different parts of academia or other sectors that we're gonna be able to make sure that we stay ahead of the game. That we are able to keep meeting the needs of our customers and continue to enhance how we protect the

environment that we all live in and benefit from. So yeah, that might be a little bit of a cop out to some people, but for me that is the most important opportunity we have to be able to find ways to build those partnerships and continue to find that next relationship that's gonna result in a benefit for everyone.

J: Although some innovations start absolutely from scratch and invent something that nobody has ever seen before, a lot of innovations come about because somebody takes something that has worked well in another industry and adapts that and shows how that can be used in your own industry. For pipe repairs, I'm extremely interested in solutions that have been developed elsewhere, and can be adapted into the water industry. For example, oil and gas. In oil and gas where there is a spill, there's far higher consequences, and so therefore they are far more prudent about making sure they capture and quickly repair any fault that goes wrong. I'm interested in the solutions that they've got there. Another area I think would be fruitful to look at would be medical technology. There's a lot of work that's gone on in terms of keeping your blood supply inside your body in as non-traumatic way as possible. I mentioned microsurgery before. There's devices like stents that can go inside the bloodstream. I'm interested in medical technology and the methodologies that they use to carry out repairs of blood vessels and how that may be adapted into the water industry.

S: Brilliant. Thank you all. I think these three speakers have presented a great view of the sector. The great innovation that's happening in the sector, but also the demand for more and the desire for more innovation. Thank you. Thank you all for joining us today, Frank, Fionn, [s.l Jers 0:24:37], much appreciated. To summarise what I heard during the session just then was aging assets. We are bringing a food grade product through assets that are 50 to 60 years old to every household in the UK. It's just bonkers to think about that and all the packaging that we see on our food grade products in the stores. That's a real challenge that we face. There's also that increasing demand on performance as well that the water companies face. They're being asked to improve networks all the time and increase their leakage performance and their water quality performance all the time. That's a really important factor.

Then the final one was really that call out from Fionn really around effective partnerships. Learning from other sectors as Jers mentioned, and also those diverse stakeholder groups that you need to surround yourself with to learn from others and understand what others are doing elsewhere and how we can bring that into the sector. That's exactly what this Discovery Challenge is all about. Understanding suppliers, innovators from outside the water sector and how they can support our great sector. This has been a second in a series of six webinars that we are running, which will travel through the water cycle. I hope you are getting benefit from these sessions and learning about the sector and understanding some of the challenges that the sector faces. I hope you've got some questions that you put forward through the Slido app. I think in the chat, the Slido link will be there if you haven't accessed it already. I'd just like to invite all the speakers to come off mute and be ready to answer your questions. We've also got Nick Blamire-Brown from Isle to answer some of the questions as well. Caecilie, over to you. Thanks for picking it back up.

C: Thanks so much everybody. Just to repeat what Stuart was saying and jump into the chat, the link is there for the Slido, which I can see is already live and going with lots of questions popping in. Secondly, I just wanna let everybody know that we're just gonna

push a poll for it now. It'll be open until the end of the webinar, but do answer, I think there's five questions there, so do give us a quick answer to those questions and it will help us make the webinars even better for the rest of the series.

Before we kick to the actual Q&A, also just a reminder that obviously there's lots of information available on the website already as well. We've got the Innovator handbook, there is a whole page full of frequently asked questions, et cetera as well. You might be able to find lots of answers to your questions there as well after the webinar, but you can definitely also email us with any questions that you might have. But without anymore, I will kick us straight into the questions. We're gonna start from the very top. I'm gonna throw the ball over to you, Jeremy. The first question that popped in is, how do I get my teenage son to use less water when he's showering? We'll ping that one over to you first.

J: I find the best method is to bang on the door on a frequent basis going, "Do you have any idea how many people are waiting to use the shower at the moment?" To be honest, so the big bit about this is getting information back to consumers. Consumers have absolutely no idea how much that uses. I remember when first the energy monitoring came out and I stuck the energy monitor on and started to get that information out in the house. A member of my household flicked on the kettle and couldn't believe what that did. For the first time, they actually realised how much more energy a kettle uses when it's heating up water. Now, with shower usage, and it's really interesting you pick up on that, that's one of the largest discretionary uses that we have within the property.

Outside the property, when you start getting into sprinkler usage is even larger, but shower usage is a huge one. A survey from Thames found that the average showering time was I think typically about 13 minutes or so. It goes up for teenage lads, way, way higher. They are the worst culprits. The issue is, is getting real time information. If I asked you, whoever posted this question, how much water do they use, you only know in terms of they're in there for 20 minutes, whatever. You've no idea what volume of water they use unless you stick the plugin and get 'em to pull it while they're actually doing it. That's one of the big issues. We have no measure of saying, "Do you know how much water you're using?" What we're seeing at the moment is smart metering coming through. A number of companies doing that.

Fionn here from Anglian, they've got a big smart meter rollout going on at the moment. Thames have got the largest smart meter rollout. You're seeing almost every water company starting to use that as a process and investigating smart metering. The slight issue that we have is what we call the granularity of data, we come back, so when we talk about data coming back to our companies, we talk about frequency and granularity. Frequency is how often you communicate it. Granularity is how often you measure it. The systems that we're using at the moment for smart metering are typically one hour granularity and then probably either a four hour or one day frequency. You're bringing back one hour data, and even with one hour data, it's useful to be able to say, "Look, this is how much water use happened between 8:00 and 9:00 in the morning." It's still difficult for us at the moment to be able to say, "Okay, this is how much you used for that particular shower."

The other way of doing it is to actually put something into the shower and actually measure in the shower. We're seeing solutions that come through like that where you



can actually put something into your shower that actually is like a timer. I have one in my house where effectively you saw a, I think it was a polar bear or an ice block and you used more and more water, the ice block would melt and eventually the poor old polar bear would drown. That was used as an incentive for the younger generations to kind of go, "Right, okay. I don't want the polar bear to drown because I'm using the shower so much." We are seeing solutions come through. You may question why we can't get a higher granularity and frequency. Typically that's battery life. We have a 15-year life generally upon our meters. We don't wanna be going back and replacing batteries. That's very costly and therefore as a result, that tends to be the standard at the moment in the UK. I'll stop there. I could talk for a day on this one, but there we go. Hopefully that gives you some answers.

S: Can I jump in please, Caecilie?

C: Yeah, of course. Yes.

S: I don't think I caught it from Jers then, but one of the other additions could be the shower head. There are quite a number of shower heads that are coming into the market right now. I'm a little bit of a plug I guess, but one of the upcoming water action platform webinars that are gonna be being pushed out soon, some of the Isle staff are trying different shower heads that have water saving devices on. But there's a price issue with that. The one that I'm trialing right now in my house is from a company called Altered, and it's £180 just for the shower head. I just think that's astronomically high when you can pick them up from Wilkinson's for like 5.99. But it'll be interesting for you to watch that recording to see the views going in from various staff across Isle.

C: It might be a high price for a shower head. But if it's gonna subsequently save you a lot of money on your water bill and also protect the system a little bit better, then it might be worth it. But, yeah. Great. That was a great kick off into the Q&A. I'll jump us on to the next question. Stuart, I'll open this one on with you as well. There's a question here coming in around how partnerships are sourced. Is it from innovators coming to you, like coming directly to the water companies or do water companies scout for innovations and innovators across the UK as well? I'll open that one with you, Stuart, but anybody else on the panel, feel free to jump in afterwards as well.

S: Yeah, sure. Really good question because I think, as Fionn highlighted so perfectly is all about partnerships. We can't solve these challenges by ourselves as individual entities, and we need to come together as a collective good. I think it's a bit of both, to be honest. I think you'll find that most water companies on their innovation section of their website will have a contactless section and they'll sometimes post challenges as well around specific issues. That's how they'll form partnerships. But also the water companies will employ some scouts internally to actively seek for new solutions. They'll use programmes that are out there such as the technology approval group that Isle delivers which scouts for new technologies, new innovators coming from across the globe and form partnerships in that way. I think it's the combination of both. Hopefully you've heard today that there's a desire and appetite to partner and we can support you with that Isle, but there's direct route to go directly with the water companies. I don't know, Jers or Fin, you wanna pick up on that?

J: I was just gonna comment as well. Absolutely correct, sure, in terms of the ways, I think one of the things to recognise is there's WOCs and WASCs, which are two things you've not come across yet. There are WASCs, the water and sewage company. Fionn, I was gonna say to my right, you can see I'm pointing there because he's there on my screen, Fionn. I'm a WOCs, so I'm a water only company. We don't deal with the sewage side. That's quite important for two reasons. Number one is, if you've got a sewage one, please, love to hear from you, but I'm not gonna be able to offer you any business. Sewage ones have all gotta go to the WASCs. The second bit is size, is typically your WOCs are smaller and therefore, we don't tend to have the budgets and the innovation size that the larger WASCs will have.

The one thing that we do tend to have is we tend to be a bit more agile in terms of bringing in solutions. We can roll things out faster. Just to understand that when you're talking to companies, there's a difference there. The second bit I noticed there's a question as well about how we set our innovation areas. I think that feeds into that as well, is that typically you'll find particularly with the WOCs, is we will focus our innovation on certain areas where we know we can operate in. Particularly with my company, it's networks and leakage. We do a lot of work in innovation in that area. We tend to use solutions from other companies that we've seen work well for the other ones. WASCs tend to have a wider agenda. They can afford to look over a wider agenda and tend to deal with a lot more issues, whereas the WOCs tend to be more focused. Fionn, can I just draw you in? That's your experience as well?

B: Yeah, I would say so, Jers. It's definitely as Stuart said, it's both ways. We have active lines for trying to find the right suppliers or not even just supply chain, other UK water companies, other UK water companies globally and other industries. We do that in Anglian at least through a number of different memberships and partnerships. Stuart rightly said, we do work very closely with Isle for their technology approval group. We get a lot of benefits through that. But also we have our own water innovation network through which we post challenges to encourage the supply chain to come into us. Also we do a lot of work to try and explain our areas of interest. As Jers said, typically they'll be tied to our business planning cycles and where we're gonna have investment or where we have need.

But we also work with other companies. There's a company based in Nevada in the United States called Waterstart. They run challenges and actually help with securing funding to help get these companies up to scale and across. It just depends on the needs of, for me, my clients in the water company in Anglian Water trying to find what they want and what they need and then finding the right route to provision that. But we always have our areas open because we're very aware we don't know everything. As I said in some of those responses, partnerships are really key. We always want to talk and explore potential roots.

C: Thanks everybody. I think I'll just add a note from the delivery team to that question as well, that with the Water Discovery Challenge, this is obviously an opportunity for innovators sitting outside the sector to gain access to water companies such as SES or Anglian, and work more directly with them in the future. The water sector is very heavily involved with the challenge, kind of like looking at the selection process, but also in a sector led mentoring programmes supporting the finalists throughout their development phase. If you are looking to work out if a partnership is possible or work

more closely with the water companies across UK and Wales, Discovery is also set up as a path for that. Just wanted to draw that parallel in for the audience as well. The next question that's plugged in, Fionn, this one was coming in directly to you. We've got someone in the audience who would like to know about the existing sensors that you mentioned. How have these been used and is there anything that they cannot currently measure or detect?

B: That's a really good question. I'll refer back to what Jers said actually around smart metering in terms of frequency and granularity of data. That comes into this as well as the actual things that we are measuring. But I think typically you would look at pressure, flow, noise in terms of vibration in the water column, either through hydrophones or accelerometers, that are typically the sensors we use to do that for leakage purposes. They're more of your performance things that we measure and then you have things related to conditions. Most are current for some of our pumps, oil and various things around that. We of course monitor water quality very closely and we've done that through spot sampling for years and years and through sensors typically on our water treatment sites. Now more so we are seeing water quality sensors for the distribution system themselves.

But I would say this is an area still ripe for innovation, both in terms of increasing the granularity and frequency of data that we get back, but also the reliability of those sensors themselves. Currently, they're very intensive in terms of the maintenance and calibration required to make those work. I think there's a huge area for opportunity to get that level of insight. In terms of things that aren't measured currently, I think more in water quality could be explored, but I think it's more about understanding how we get better with the sensitivity of the premises we are already measuring and making those more cost efficient in terms of the options we have. If we want wide scale deployment, then we need to find a price point that can work.

But if you really wanna go further into the future, I think then we'll start to see a proliferation of the use of virtual sensors, which require obviously a greater level of quality in our data and consistency so that we can trust the models that we have and build them to be that sort of consistency. Then being able to drive the analytics off the back of that. That's the future that I see for sensing. Having said that, and I'll probably say this to every question, I don't know all of the answers. Often, we find something through one of those partnerships, whether it be with an academic institution or a single person in their shared innovator type who wants to just propose a parameter, listening to those people and understanding potentially how they can be applied. Absolutely, have seen some great examples of good work coming out of that and opportunities to scale up. Our ears are always open to potentially what you think you could offer in order to help us meet those challenges that we've talked about already.

C: Great. Thank you so much. We will jump in. I think this might be a question that will open up with you again, Fionn. There's a question that popped in around, are water companies using nature-based solutions to reduce CSO flood risk? Before I hand the ball over to you, I just wanted to tell the audience as well that we'll actually touch a lot more on this particular topic in some of the webinars that are coming up later on in the series. If you are looking for more information, you can jump onto the website and register for any other webinars that comes out throughout February and March as well. But I'll just ping that question over to you, Fionn.

- B: Yeah, that's fine. I'm sure Jers might be able to comment and others on this. But in short, yes, we are. We use SUDS actively through this amp period and we have done in previous. I think it's only gonna become a more prominent part of our business planning process and the things that we deliver. There are differences to nature-based solutions for CSO reduction. I think traditional SUDS in single properties or in large square meterage roofs, in terms of stopping that sudden flow into the sewers is one. Also then starting to use that in conjunction with smart control systems for our sewers. That is a big focus for us as we move forward similar to how we've built that capability within our water distribution network. Then further into that is about, the water companies not always being the sole player in those schemes. A lot of those schemes when it comes to nature-based solutions is working in partnership with others like the local authorities or other groups within different places in order to best deliver most value for the customer and the environment whilst achieving the outcomes for each of those individual parties.
- C: That's great. Thank you so much. Jers, we'll jump over to you again, I think. Next question that has plugged in the Q&A is to what extent is the problem of leakage from storage assets such as service reservoirs being looked at?
- J: We are starting to look at leakage on a far wider breadth now and certainly storage. We have to report upon that we have to do some calculations. We did a study recently. There's a body called UKWIR, UK Water Industry Research. UKWIR is a joint funded research body. All of the water companies contribute to that. It divides the industry into 12 areas. BQ2 or big question two, how do we get leakage down to zero? Is effectively the one that I look after. We did a study recently looking at precisely this kind of area about looking at trunk main monitoring and starting to look at other monitoring as well. Companies will report on storage leakage, and in addition, most companies, I'm gonna say all companies should be doing this, is draining down and actually checking their reservoirs.
- J: You do a pressure drop test where effectively you're gonna isolate and you're gonna look at whether it drops. In addition, we do res cleaning. We actually drain the entire reservoir. We clean them. I don't know, there're a number of companies, myself included, we use robotic inspection as well to look around inside. There is work that goes on looking at the storage reservoirs. It's not deemed as being a huge area at the moment. We don't believe that there is massive leakage from the storage reservoirs. Most of our investigation goes on the distribution network and on customer side as well. Those are the big areas that we look at. While I'm talking about that, is worth mentoring, understand the UK is unique in one area, not unique. There's a very, very small number of companies in the world that do this.
- J: Our leakage we report and the leakage figures that you'll see in the press don't just report the company leakage. It reports customer side. That's almost completely different from the rest of the world. The rest of the world you'll see something called non-revenue water meaning water that we don't charge for. Anything that goes through a meter, that's alright, that's being paid for. We are not concerned about leakage that occurs there. In the UK because we started off with a very unmeasured base when we first started doing leakage back in the 80s, we had very few water meters out there. Therefore, it was a different method. That methodology means that we have to include customer side leakage as well. It's reckoned on being about a third of our leakage is on the customer side. We're interested in solutions that reduce leakage on the customer

side as well. It also means that any solution that you look at and you're thinking, "Oh I can bring that into the UK 'cause their leakage is really high," take a third of our leakage, is not as high as you think.

C: That's great. I think that was a great answer to that and I think that's probably something that a lot of people wouldn't have known. There's a couple of questions that's come in. I'm gonna try and link them a little bit together 'cause they're all within the same area. Nick, I'll ping them your way first and then we can open it up. But there's some questions coming in around, how does water companies set their innovation areas? Are they all focused on the same? Then also a question popping in around, what's the best way to get in touch with these innovation managers within the companies? It looks like someone has tried to go through LinkedIn, it's yielded some mixed results and direct contact details are not always visible or available on the website. How are the areas that...are they all focused on the same and how do innovators get in touch with you if they do have a solution?

N: Nice. Yeah, really good question. I guess you would've seen from this presentation and some of the conversations today that a lot of the challenges that face the UK water sector are shared between the companies with the difference there that Jers explained around WASCs and WOCs having slightly different areas of focus. But the prevalence and importance of some of those issues is gonna vary on a regional basis. One company might hold...well, all of them hold leakage in very high importance, but some of those other focus areas might be less important if you are in the North of England compared to the South of England. Generally speaking, water companies have fantastic innovation teams where they'll be individuals who will look across the operational areas and try to understand the needs of that organisation in relation to innovation.

N: So, looking at where the challenges lie and what potential solutions might exist that can help solve them. That relates back to that question raised earlier around are companies actively scouting for solutions. Yes, they are. In addition to that, the sector recognises that there is crossover. I think a couple of years ago the water companies in the UK got together and defined innovation strategy for UK water companies, that goes up to 2050 and that is available if you wanted to look at that, I believe on the Spring Innovation website where that's currently hosted. I'd recommend going have a looking at that. Jers also mentioned, a second ago, UKWIR big questions. UKWIR being that UK Water Industry Research body, definitely recommend having a look there as well 'cause that explains some of those shared challenge areas.

N: To try and just quickly cover off some of that, how would you get in contact with water companies? Like Fionn mentioned, it differs depending on which water company you're trying to get in contact with, but a lot of them will have customer facing or supply chain facing portals. At Anglian it's the Water Innovation Network. Jers will be able to share what it is at SES, but other companies like Wessex Water for example have a marketplace where they actively publish what their challenges are and what they're looking for solutions for and you can connect in via those various different routes. But Jers, Fionn, please do add anything else in there if there is anything.

B: Well, I was gonna go to the sector wise strategy, Nick, first and foremost, that was developed at the same time as the launch of the Ofwat innovation fund preparing us as a group to think about how we work more collaboratively albeit we already have been for

a number of years through things like UKWIR and especially around that sort of academic research. I would say broadly, our innovation programmes are very aligned. We tend to look to each other to learn and I think certainly for distribution and leakage that Jeremy has led a piece of work around a leakage heat map for us as an industry. Which has been incredibly helpful to map out where we have similar projects and where we can talk and learn from one another and get more alignment in terms of what we deliver going forward.

B: The regional difference is, I always try and explain to a new supplier when they come to meet with us is go and have a look at the water company's business plans. The published documents that some water companies will have long-term strategic direction statements, but the business plans lay out where investment will be made in specific areas and therefore it gives you a really good indication of where their focus is for that next five-year period. As we move forward in through PR24 and into the next 25 years, all of the water companies are now building out long-term delivery strategies as well as the five-year investment period. They will all have really useful material, really interesting and tangible evidence of where a water company will be going.

B: If you can come to a water company and tell the story about how your solution helps deliver on some of those investment areas and make that a better outcome for the customer and improve the opportunity for a water company, your pitch is already 10 times stronger than just coming in and talking about the solution. Talk about how you have a solution to a real problem rather than just a solution and looking for a home. That's not always possible. Completely understand that and we will help you get to that point anyway, but that research ahead of time and doing bit of that reading will absolutely help you learn better within those companies. In terms of contact, yes, for us it's the Water Innovation Network. We are all on LinkedIn, but LinkedIn isn't always the most reliable way of getting contact back. Not everyone is on LinkedIn every day or every week. Sometimes those things don't get looked at for a period of time. Coming through something like the Water Innovation Network for us gives a consistent level of service to the people who are contacting us through that.

C: Great, thank you. I'm just gonna jump down, just make sure that we cover this one before we close the Q&A. But there was a question that came in around who's actually assessing the applications? I assume this is for the Water Discovery Challenge, whether this is water companies or Ofwat. It's actually neither. We have a pool of independent assessors that comes through the delivery partners that has a range of technical skills and abilities and knowledge areas who will do the assessment and the scoring of all of the entries. Once we have a short list through that assessment process, we then have a pool of sector reviewers who are looking at that short list and just providing some high-level feedback on an entry's ability to become viable within the water sector in UK and Wales.

C: Then, as with all of the challenges throughout the innovation fund, Ofwat does make the final decision on who is awarded funding and who moves further along at the competition? It's neither the water companies or Ofwat who are assessing them. It's a pool of independent assessors who will look at them, shortlist them, score them, and then they will provide feedback who Ofwat will then base their decision on that. Just to make sure that we got that one covered. Then I will jump down. I think we might have time for just one or two questions more. Nick, I'll jump to you first for this one. Is water

contamination a big concern for water companies such as lead contamination from pipe leak from lead piping? We'll jump Nick to you and then maybe we'll open it up, Jers, to you afterwards.

- N: Yeah, cool. Specifically in relation to lead, lead leaching is a concern and lead leaching occurs largely from supply pipes that have been built from lead material. This exists in the UK to a largely unknown extent, although it's probably quite prevalent. The way that water companies approach it at the moment is through dosing orthophosphoric acid into the water during the water treatment process. This helps create a protective barrier between that lead pipe and the water that you consume so that lead leaching doesn't cause those negative contamination impacts. In addition to that, water companies are going through lead replacement programmes where they're helping to cut out those sections of supply pipe and replace those lead materials with plastic materials that don't have that contamination risk. But yeah, I don't know if I'm fittest but it's a massive challenge and there's still gonna be an unknown amount of lead piping in people's houses. It's much safer to continue to dose a chemical that protects it rather than looking to try and completely replace all of the lead in the UK. Jers, anything to add?
- J: Yeah, completely agree with where you are. The issue that we're getting as well is what we do with in terms of how we replace the lead. I've been actually looking at solutions in the last couple of weeks, looking at lining, looking at various solutions. The big issue is, is as soon as you start to put anything down that lead, you're gonna disturb it. That can disturb that coating that builds up from the orthophosphoric dosing and causes real, real issues. It's a tricky one. You can't just simply say, "Yeah, we stick something down and line and things like that." It's quite hard to do. There's a lot of stuff on there. Do you want me just to pick up on the leakage ones quickly? I can see there's a few and one's about passive replacement.
- C: There we go. Sorry, I'll come off mute. I am aware that we're running one minute to time, but there's a couple of questions that the audience is up voting that they'd really like some answers to. I think yes, if you wanna quickly jump in, we'll get some quick snappy answers to the kinda like how frequently do you change the water pipe? What methods are being used to stem leaks? Let's try and cover those ones now.
- J: UK has a very low replacement rate at the moment. If you go abroad, you'll find 2% to 5% or even more than that in some places. UK we are typically looking around north 0.2% to north 0.3% per year. The issue that we've got is funding for that. We go to our regulator and we're saying, "Look, we do need to increase that," and our regulator's saying, "You need to be able to demonstrate that." There's some work that's going on in looking at pipe conditions and understanding that. But that's a big concern in the industry is that very, very low replacement rate and we are trying effectively to get as much life out of our assets as we can. The other bit looking at was, how do we stem leaks inside the pipes? There's a couple of solutions that we've seen started to come through that effectively allow us to inject something into the pipe and then seal from the inside. They're very new onto the industry and a number of companies have started to do trials of those ones. We're seeing a resurgence in terms of lining materials as well coming through. It's very tricky in the UK.

- J: The other thing I would talk about, we talked about the water quality issue. The other big issue we have is interruptions to supply. In the UK we have, again, almost uniquely a legislation that says you will be penalised as a water company if your water supplies are off for more than three hours. That makes it really difficult to do some of the kind of rehabilitation techniques that can be used in Europe and other places as well. Those are the kind of ones that are...the final one, Kevin, really interested in your one about fast temporary reduction or permanent repairs. I'm gonna say both. If you've got things that can reduce flow rate from a leak, we're interested in that, but we're really interested as well in permanent repairs as well. Either one of those techniques are both of interest to us. Some really good questions coming through. I'm gonna stop talking there.
- C: Great, thank you very much. I'm just gonna see if there's any last-minute comments, Fionn, that you wanna jump in with before we finally close.
- B: I would be remised if I didn't take the opportunity to just go back to the lead question and issue. Absolutely it is front of our minds in Anglian Water for solutions to help us replace lead pipes. Nick made the statement maybe they're largely unknown as to where they are. I would challenge that a little bit. I think my water quality colleagues would have an issue with me if I didn't. I would say we do have a very good idea of where we have lead in our systems. Our problem is the cost of replacing it is just far too high. We cannot afford to do it under the current models that we have. Any solution that can help us to replace lead pipe on customer side and if we did everything in our own systems, anything to do that, we would bite your hand off for and be willing to work with you to develop that solution to get it to market.
- C: I think we might have to finish on that note, three minutes past. There is a couple of questions. I can see in the Slido and in the Q&A that there are some questions that we haven't had a chance to address today. What we are trying to do is that we'll share your questions with the speakers offline and then we will upload the answers along with the recording. If you have a question sitting in Slido that wasn't answered, do check back for the recording and the PDF of questions that we'll make available in the next few days. Then you'll be able to get a written answer to the question if it wasn't addressed live today. From me, I'd like to say just thank you to everybody for being here and for being so engaging and asking all of your questions. Stuart, I'll hand over to you for our final goodbye for today.
- S: Brilliant. Thank you all and really appreciate all the questions. Really thank you all to the speakers. It's been a great session today and thanks for running through all the questions. This is the second in six webinars, so please keep an eye up for the future ones, which we'll touch more on the wastewater and bio solid side if you're more interested in the dirty side of our business. Thank you very much for your attention and your interest. Take care. Have a good day.