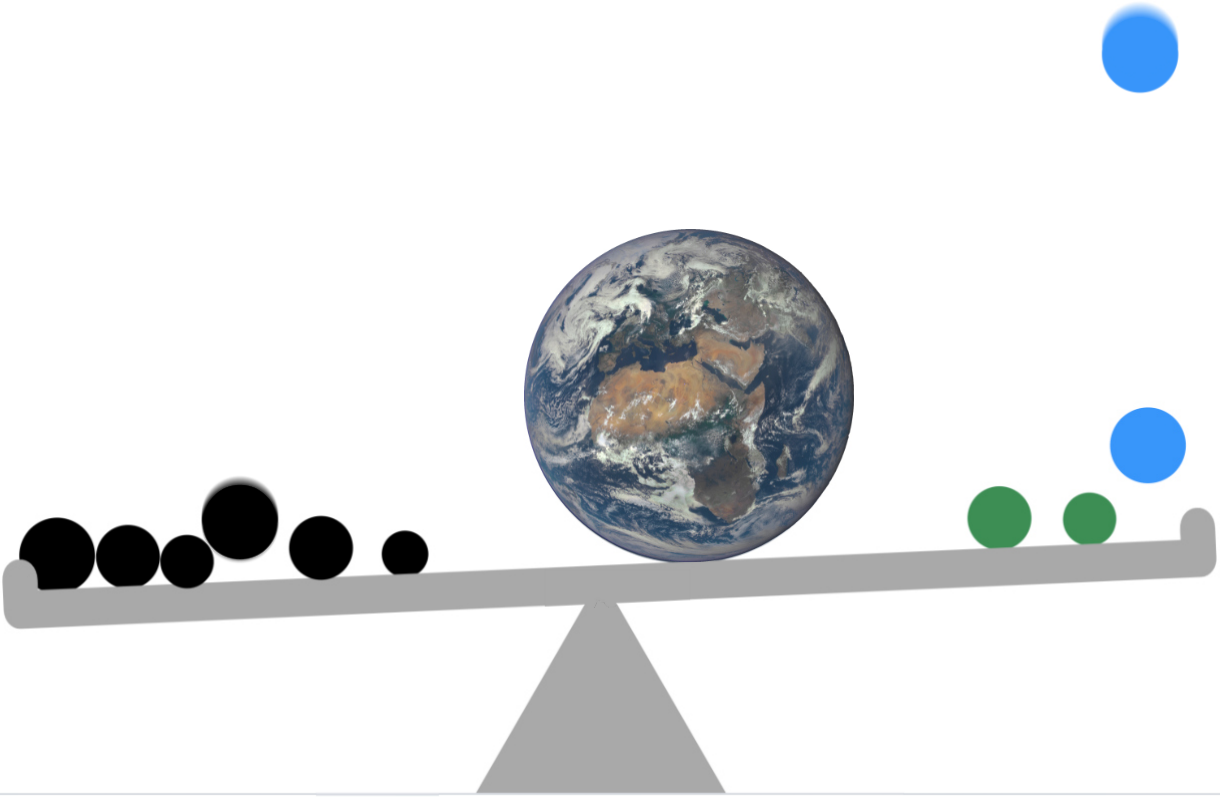
2022 Water Climate Discussion

Positive Tipping Points



Report from the discussion held on 3 November 2022

edited by:
Laura Fonseca, Neil Edwards, Jane O'Connor & Laura Currie

organised by:

Royal Society of Chemistry · IChemE Institution of Chemical Engineers · Institute of Water · IWA the international water association · British Water · SocEnv Society for the Environment · WaterAid

Welcome

The Water Climate Discussion

creates a space to come together and help the water sector build its leading role in addressing the climate crisis.

This series is the result of close collaboration between water institutions who recognise climate change as an existential threat.

This report is based on the recorded Positive Tipping Points discussion which was held live on Thursday, 3 November 2022. Our host, Martin Currie, was joined by Jo Burgess, MD of Isle Utilities South Africa, Peter Lefort of the University of Exeter's Green Futures Network, over 30 video contributors and the interaction of the online participants.

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The Speakers

Peter Lefort

University of Exeter's Green Futures Network

Peter, an expert in Positive Tipping Points from the University of Exeter's Green Futures Network, joined us live to advise on how we can turn our water-climate innovations and initiatives into Positive Tipping Points.

Jo Burgess

Managing Director of Isle Utilities South Africa

Jo, Managing Director of Isle Utilities South Africa, joined us live to tell us about a couple of successful climate finance projects, and to answer questions on the Trial Reservoir and other water-climate issues.

Martin Currie

CEO of Aqueum

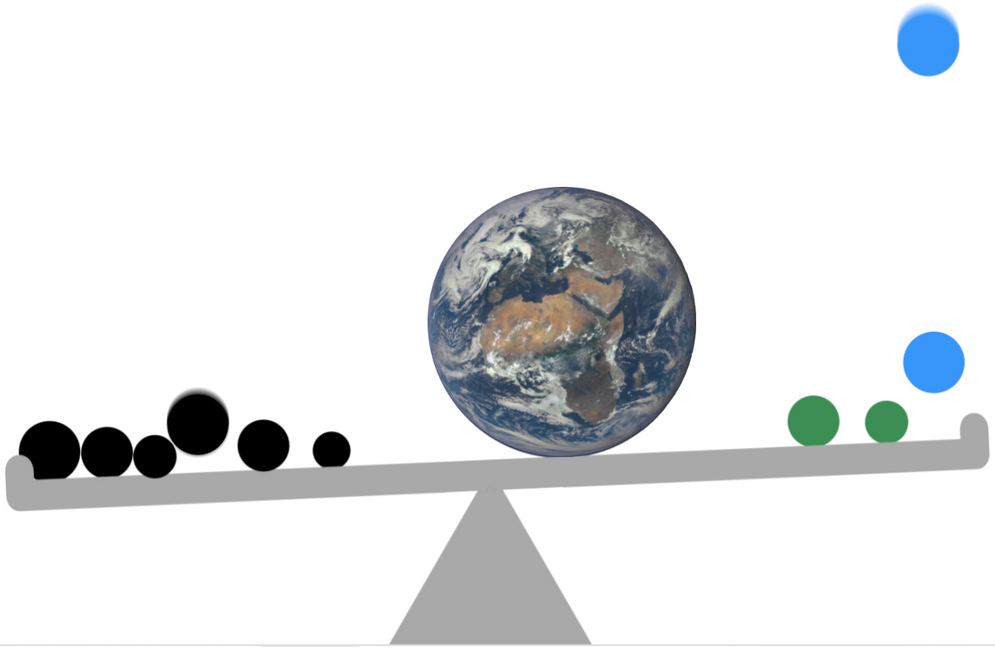
Martin, CEO of Aqueum, hosted the discussion introducing Peter & Jo and highlights from 33 other speakers who had submitted their video contributions in advance.

MWH Treatment

Water Climate Discussion Conference 2022

MWH TREATMENT an RSK company

Chapters



1. POSITIVE Tipping Points

A tipping point is reached when a series of small things trigger a much larger consequence, which may even be irreversible.

We're familiar with the negative global tipping points that we're hurtling towards, but things can also tip in a positive direction. Like an LED light bulb moment, when everyone realises that LEDs are better and buys them even if they don't care about the carbon savings.

Climate scientists describe tipping points in terms of social, technological and ecological systems.

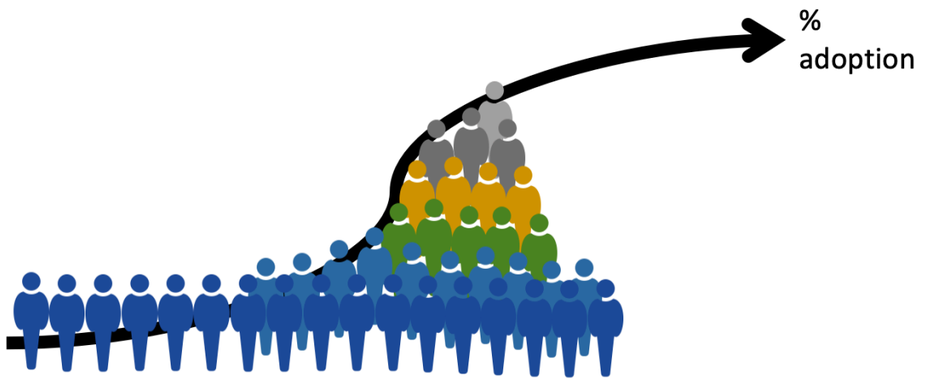
Social

With social tipping points, we start off with an 'innovator', who does something new. If they hide this innovation, the story stops here: a small change that may help them, but likely does little for the world. However, if they're open with it and willing to share or sell their innovation, some forward thinkers, called 'early adopters' are likely to try their innovation.

If all goes well, and the early adopters show off the benefits, the 'early majority' will see the advantage and make the change too.

By this point, most people can see the benefits of the innovation, it might be considered best practice, so the 'late majority' will start to adopt it too. There will always be some who resist change, the scientific term is 'laggards', but they eventually catch on too – perhaps due to regulation, or obsolescence of the old way.

So, social tipping points form an S-curve. Adoption starts off slowly then ramps up rapidly as the majority catch on, then it slows down to reach saturation.



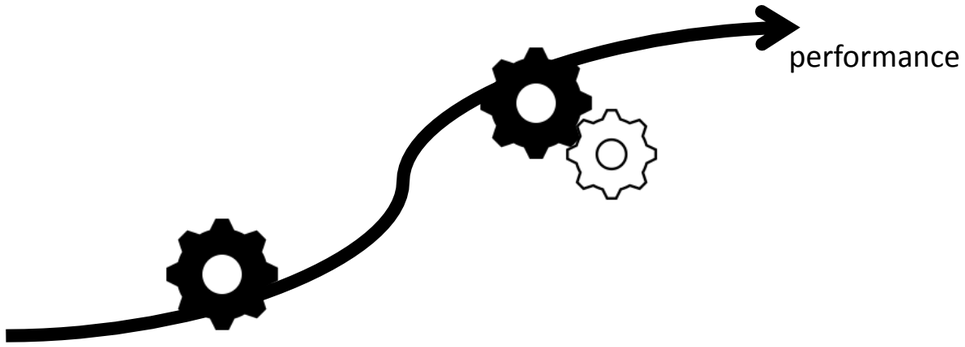
Social Tipping Point - Graphic by Martin Currie, Aqueum

With climate initiatives in the water sector, your voice is important wherever you are in this S-curve. If you're an innovator, you need to get your innovation out there to maximise impact. And if you're an early adopter, your voice as a trend setter is critical. Reference projects and testimonials are hugely important given how risk-averse our sector is. But without hearing from the early majority, the rest of the majority are unlikely to adopt. And it's still important to hear from the late majority: These are companies that the laggards are likely to trust more than firms that they think would follow any trend.

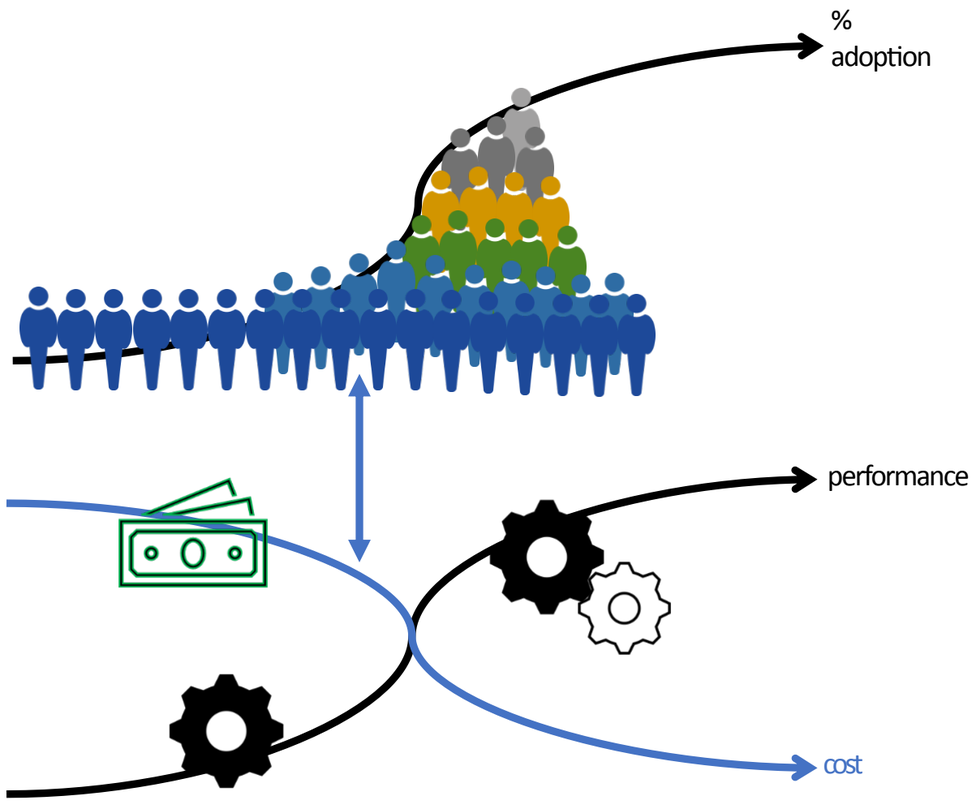
Technological

Then there's Technological tipping points, new technologies need to reach a certain level of maturity before taking off. And synergies can be important. Smart phones only really took off when apps became a thing, and now way more people have mobile phones than have access to toilets.

There is a huge connection between social and technological tipping points, with many positive feedback loops. One of these



Technological Tipping Point - Graphic by Martin Currie, Aqueum

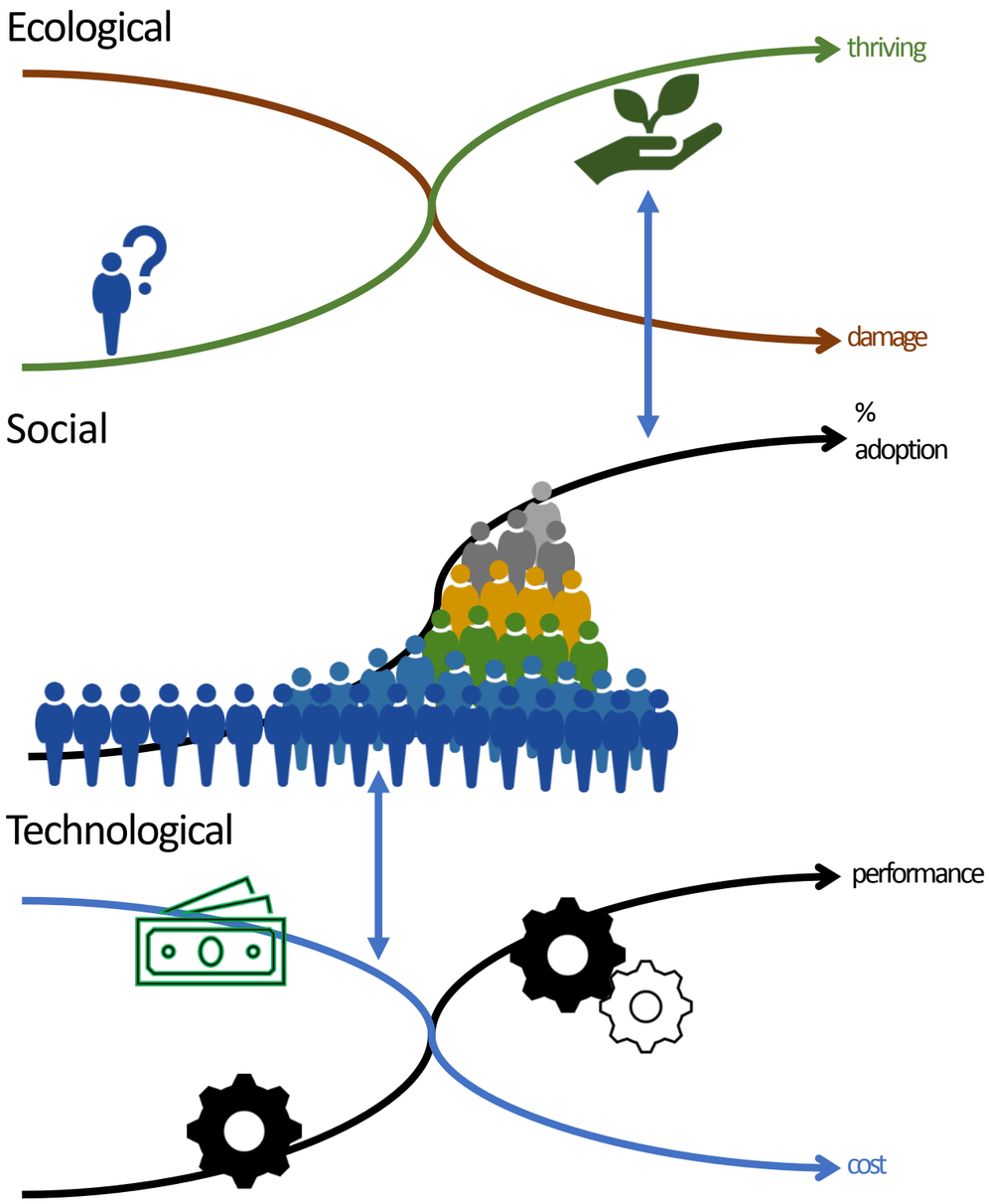


Connection Between Social & Technological Tipping Points - Graphic by Martin Currie, Aqueum

is efficiency of scale. As more people or companies adopt a technology, the price comes down.

Ecological

And finally we have ecological tipping points. Martin's favourite example here is Nature Based Solutions. We start out not understanding the environment, draining wetlands and felling forests to make room for agriculture. With hindsight we now know this is a bad idea… But as we start to employ nature based solutions, we get a positive reinforcement loop. The Nature Based Solutions deliver the better water quality or the flood resilience that they are designed for. But we also get increases in biodiversity, and wellbeing, and many other benefits,



Social, Technological & Ecological Tipping Points - Graphic by Martin Currie, Aqueum

which in turn result in greater demand for more nature based solutions.

Whatever climate initiative you're working on, implementing or considering, sharing it is one critically important step in it becoming a positive tipping point. And that's the purpose of this water climate discussion: to share good ideas.

Photo of Grafham Solar Array, Anglian Water

The discussion then followed with our usual categories of Mitigation, Adaptation, Finance and Collaboration:

2. MITIGATION

Solar

- Heidi Mottram, CEO of Northumbrian Water, advised that by 2024 Northumbrian Water plans to generate 175GWh of green energy through Advanced Anaerobic Digestion, Gas to Grid, Solar and Hydro, with 5 new solar arrays currently being installed.
- Peter Simpson, CEO of Anglian Water, shared the news that their largest water treatment facility, supplying over 1 million customers, is now powered by a large solar array with 12 MW capacity.
- Peter Lefort confirmed that solar is an example of technology where momentum is carrying it forwards rather than our having to push against resistance. It will become even more dominant as we have innovation, demand, accessibility and affordability in place for solar power generation.
- As a great example of this momentum, Mark Taylor shared in the chat how Portugal has significantly increased photovoltaic (PV) electricity generation in recent years. Not surprising due to the amount of sunshine and space available. But also, many industrial, commercial and domestic properties generate hot water using solar heating systems. Water is warmed even on cloudy days and even though the water might not be hot enough to shower with in December and January, it can reduce the electricity needed to raise the temperature to the required level, plus it can be useful for dish, clothing and hand washing. He thinks that every property that uses heated water in the UK would benefit from solar heating in reducing energy costs, usage and any associated waste emissions.
- Another interesting comment from the audience was received by Rebecca Ellis, who thinks that, from an educational point of view, explaining that water companies are installing solar panels helps make the link that providing water and wastewater treatment takes energy. This could help to get across the message to children who often don't get the link about how wasting water is bad for the planet.

> “…we’re on target to achieve net zero carbon in 2025.”
>
> Zoe Czempinski,
> Yarra Valley Water

Green Solar Roof - Photo by W.L Tarbert, Public domain, via Wikimedia Commons

- Other participants in the chat are a bit more sceptical, both Kazuya Naito and Vincent Clench are dubious about the solar panels' end-of-life and how easy the recycling or reuse of these materials will be, particularly in larger deployments.
- Alice Elder from Affinity Water noted that the decision to follow solar projects is difficult due to combined pressures on land use and the possibility to use the land either for increasing biodiversity, that is, for solar arrays or planting trees. This is exacerbated by the difficulties to quantify the relative climate benefits of increased biodiversity.
- To this Deryck Irving commented that the use of green solar roof systems as an example in which solar and biodiversity interventions shouldn't be mutually exclusive.

Control

- Michael Keating, from Northumbrian Water, told us that they are investing in a real-time energy management software solution to deliver improvements in water production and distribution, integrated with SCADA, to enable pumping at the most economic times. This will improve efficiency by 8% and deliver savings of 12%.
- Rob Fuller proposed regulatory reform to allow more use of sensor data for compliance monitoring - rather than costly sample transport to fixed laboratories.
- Related to this, Rob suggested that water companies could also innovate by introducing autonomous drones to deliver time-sensitive samples from remote sites to laboratories.

- A video from bronze sponsor iVAPPS demonstrated the benefits of their smart valves in network control, leak detection and repair.
- Bronze sponsor Agua DB subsequently provided a video on their nitrate removal and reuse system.

Efficiency

- Gordon Reid, from Scottish Water, advised of the investments being made in blowers, pumps, VSDs and advanced control systems, to improve efficiency. The real-time control of wastewater treatment facilities and water distribution networks, and enabling improvements in leakage will also deliver greater efficiency.
- Northern Ireland Water's Lillian Parkes discussed their electrolyser demonstration project, where they split water into hydrogen and oxygen, and then use the oxygen in their wastewater treatment process. In this way, it is possible to up-rate existing assets, which mitigates the significant embodied carbon impact of building new assets. NI Water is the largest single user of power in NI and plans to use curtailed wind power at night to charge the electrolyser.
- In the chat discussion, Kazuya Naito shared her perception that leakage control is the most important action for zero emissions and reminded the audience of Ofwat's announcement that even though southern England is suffering from drought this year, there are still many leaks at each operator.
- On the other hand, Jo Parker pointed out the carbon cost to removing leakages either by fixing leaks or replacing pipes. She thinks that the best approach is preventive actions, such as ensuring calm networks or pressure control. Also, when construction work is required, techniques with low or no excavation should be used.

Drone - Photo by Erik Odiin on Unsplash

Beyond

- Zoe Czempinski, explained that Yarra Valley Water, Australia, have committed to being carbon neutral by 2025 and will then continue to reduce carbon to address legacy emissions, through solar, food waste to energy and green hydrogen.

Biomethane

- Northumbrian Water's Heidi Mottram and Tony Rutherford discussed their Advanced Anaerobic Digestion. By 2030, they plan to use biomethane to heat up to 150,000 homes. Their Howdon Biosolids treatment facility treats 40,000 tonnes of dry solids per year, which is treated to create an enhanced product, using thermal hydrolysis, and is used in agriculture. This produced 80GWh of energy per year, passed to the gas grid (G2G) to heat 7,000 homes annually.

Sludge

- Yorkshire Water needed a 50% reduction in the volume of sludge transported from the Seamer wastewater treatment facility. They engaged Orège to improve dewatering and conditioning of primary sludge. This was achieved with Orège, and delivered a six figure sum reduction on operational costs and saved 120T CO2e/year. Yorkshire Water plans to invest in 3 more similar installations.

Waste Heat

- Anglian Water is supplying waste heat from sewage for use in greenhouses, providing heat for the production of 10% of the commercially grown tomatoes in the UK. This is a very effective example of the circular economy. Other opportunities to offset heating in homes are being explored.

Biomethane Production - Northumbrian Water

Greenhouses for Tomato Production Heated with Waste Heat - Anglian Water & Oasthouse

- In the chat discussion, James Powell calls attention to the possibility of using thermoelectric generators that convert waste heat into electricity. He thinks that the technology should receive more attention and funding for R&D as it seems a flexible technology that could create energy savings. On the other hand, pwheel4 reminded the participants on the importance of considering other factors such as the energy input required to drive the waste heat recovery.

Process Emissions

Process emissions are a significant challenge for the water industry, as Martin Currie reminded us that nitrous oxide has 273 times the global warming potential of carbon dioxide. As such, many of the videos focused on the importance on monitoring approaches and managing these emissions:

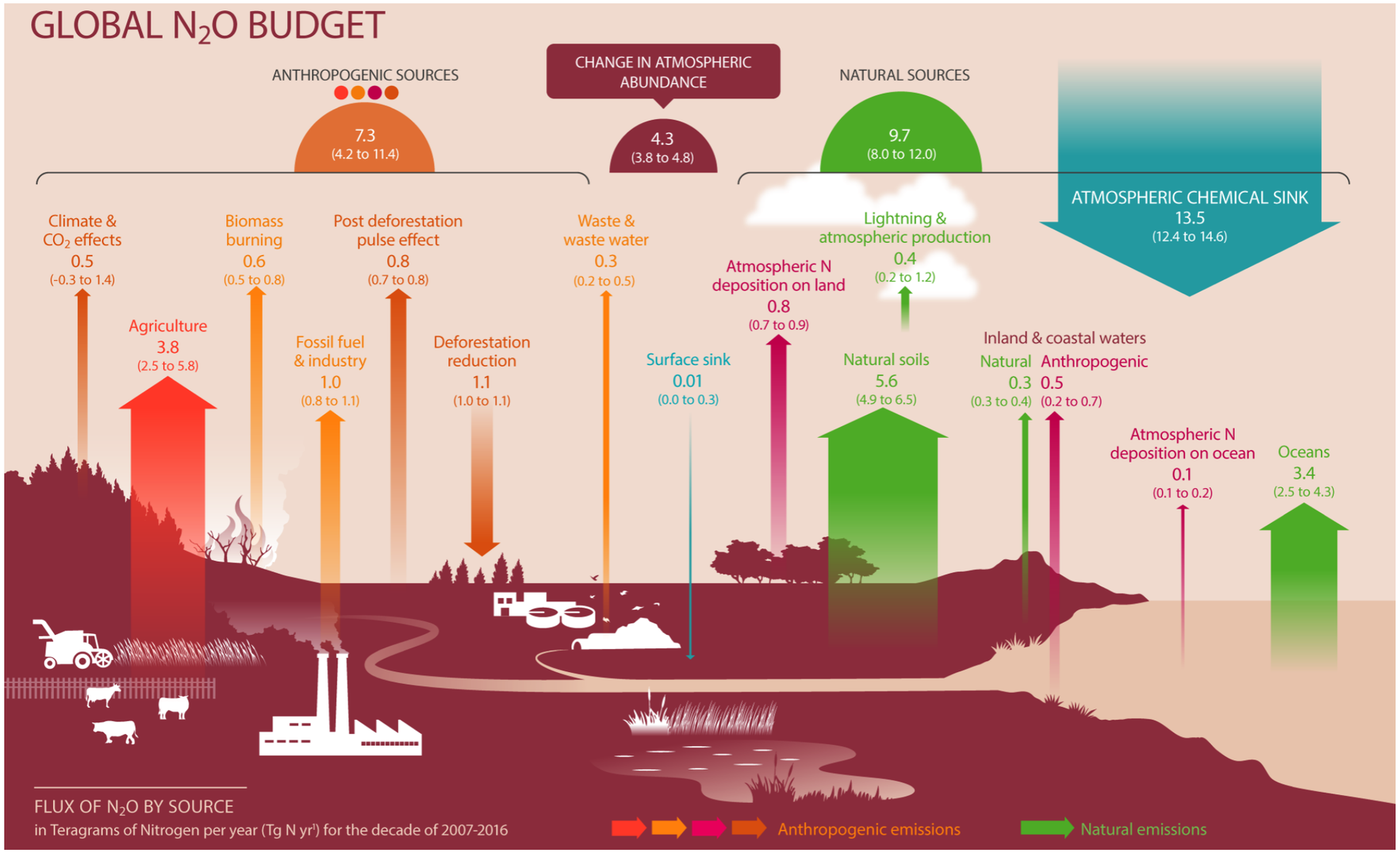
- Peter Simpson highlighted that the water industry needs to work together to understand process emission baselines, technologies and the approaches needed to manage process emissions.
- Gordon Reid shared Scottish Water's efforts investigating innovative artificial intelligence solutions to help with the control of wastewater treatment processes to reduce nitrous oxide production. To improve their understanding of process emissions, Scottish Water will deploy monitoring on 20 sites.
- Amanda Lake, from Jacobs, advised that more monitoring is needed at facility level to improve understanding and enable data modelling, hybrid modelling, etc. There have been exciting and emerging developments in the modelling of nitrous oxide and some have been incorporating these into digital twin models of installations or facilities. Collaboration and discussion is needed and the industry will need to work together and share knowledge to

develop positive tipping points in this area. Interesting developments are being made in real-time monitoring and control, and feedback loops. Further considerations are the value of process optimisation, asset health and operational excellence. Additional monitoring for process emissions will have complex maintenance requirements, which in turn could launch a cultural change in how the water industry manages and maintains these assets to deliver this.

- Craig Bowe questioned others in the chat about the possibility of using in tandem the electrochemical reduction of nitrous oxide with water.
- On the subject of methane emissions, Gordon Reid mentioned a successful pilot investigation into methane recovery downstream of a digestion plant that Scottish Water is now looking to deploy at scale.
- VCS Denmark's Ivan Vølund highlighted an innovation which delivered a 5% increase in their biogas production. A vacuum system was added to their post digestion and pre-dewatering sludge storage. The pressure decrease released the biogas, which would have been released as process emissions in storage without the vacuum system.

Construction

- Gordon Reid, from Scottish Water, shared that there has been a focus into reducing emissions from Scottish Water's Capital programme, through the use of newly-available materials. The main challenge is getting the project teams to consider this but it has the potential to make a huge difference in emissions.
- Addressing the carbon footprint of infrastructure during the chat discussion, Deryck Irving thinks that the water companies need to find lower emission materials but also to look for more treatment in catchment (via nature-based and other solutions) and to look critically at decisions on reuse/ repurposing, rather than decommissioning existing infrastructure.
- Northumbrian Water have also made changes to improve culture and behaviours to ensure they become carbon-conscious. Their conclusion is that they need to work collaboratively to prioritise carbon in their business delivery process, as they have done in other areas. The key is progress not perfection.
- Nigel Rumvura, from Platinum Sponsors MWH Treatment, described how they have made improvements through the use of alternative fuels (HVO - hydrotreated vegetable oil) as opposed to diesel, for construction plant and machinery. MWH Treatment are also using solar-powered on-site welfare facilities and solar-powered pods for remote sites, rather than the traditionally-used diesel generators.



Global Nitrous Oxide Budget 2020 - Global Carbon Project, CC BY 4.0 <https://creativecommons.org/licenses/by/4.0>, via Wikimedia Commons

- Jo Parker, VP Engineering at the Institute of Water, discussed the benefits of using minimum dig technology to repair water mains. Conventional repairs are very carbon intensive, with ground excavation, traffic management, and reinstatements all generating emissions. Minimum dig technologies are now being developed with learning from the gas industry.
- Paul Wallis, from Kier, described a minimum dig approach using long-handled tools and suction excavators. This approach will improve timelines for repairs and deliver a better customer experience and is safer, faster and produces lower carbon emissions than the traditional methods.
- Lisa Ehrenfried from Yarra Valley Water in Australia discussed the increased use of recycled and low carbon materials such as crushed glass sand as an alternative material for sewers.
- Vincent Clench questioned whether collaborative road works, where multiple utilities work on a road at the same time as a matter of routine, would be considerable as a stop-gap mitigation for carbon emission reduction.

Life Cycle Analysis

- Ivan Vølund from VCS Denmark utilises Life Cycle Analysis to optimise tank construction material, choosing steel tanks over concrete for their sludge storage solution.
- Matt Simpson commented in the chat about the need to appraise full life cycle carbon impacts from consumptive supply chains as a way to prioritise treatment process selection. He thinks that methods using sustainably sourced energy to destroy, not concentrate, contaminants on site must be the route to long term carbon reduction.

Steel Sludge Storage Tank - VCS Denmark

Boiling

- Jo Burgess, MD of Isle Utilities South Africa and Head of Trial Reservoir, discussed a Trial Reservoir project using smart taps and smart tags in two villages in The Gambia. Approximately 500 households in the villages are supplied with water using gravity and solar power. Customers load credit onto the smart tags, which are then used to dispense water from smart taps, drawing down the credit. The cost is approximately $6/ year for a household of 5 people. There are no individual household connections in the villages, rather these centralised points for water collection. The alternative would be for residents to collect river water using taxis, using petrol or diesel and then boil the river water to ensure it is safe to drink. The

Trial Reservoir - eWater Smart Tags for Smart Taps

“The smart tag and smart tap alternative saves 3 kg of CO2e for every litre of water.”

smart tag and smart tap alternative saves 3 kg of CO2e for every litre of water. This is a financially and technically sustainable approach as local people are trained to maintain the water supply and collection system. There is also a social benefit as there is a clean and safe supply of water close to all homes in the villages.

Transport

- Nigel Rumvura described the move to all new Electric Vehicles (EV) fleet cars for MWH Treatment colleagues. MWH Treatment are also rolling out smart charging points to facilitate this change. There is also a new car benefit scheme for employees to encourage employees and their families to invest in EVs. They have reached a tipping point with EV transport as transport is no longer the largest emitter of carbon for the business.

- Gordon Reid advised that Scottish Water is in the process of converting its 800 diesel van fleet to EVs over the next few years and is searching for alternative hydrogen-based fuels for HGVs.
- Steven Lee of Panton McLead shared how they use Microsoft Teams to avoid the need for some clients and technical experts to travel to site. Instead, live inspection images can be conveyed to their home or office where they can advise on findings remotely.
- Hayley Dyson of Yorkshire Water cycles to work. Working from home or local offices and using green transport arrangements all contribute towards lowering individual carbon footprints due to transport.
- During the chat discussion, Wilfried Spierenburg questioned how much CO2 is emitted by all the server centres supplying Google, Microsoft services, etc.. for this work from home. Deryck Irving agrees adding that, as a society, we need to look more holistically at emissions, as it isn't enough to simply shift these onto individuals or other organisations/places.

Capture

- Scottish Water's Gordon Reid discussed carbon capture with 100 hectares of new woodland being planted. They plan to plant several thousand hectares of woodland on Scottish Water land. They have also invested in peatland restoration which will also improve biodiversity.
- Vincent Clench shared with the chat discussion the importance of planting additional trees considering the long term lifecycle of the woodland outside of AMPs; trees hit a point where their carbon capture is in equilibrium with carbon emissions if left to grow to full size, so as part of this lifecycle, there is work needed on species selection and maintenance (coppicing is better for soil preservation vs fell and replant).
- An innovative technology was shared through the chat by Kevin Mooney: Algal Bioreactors can sequester CO2 as well as removing NH4 and P, and produce residual algae for use in processes such as natural printer ink production.

Photo by micheile dot com on Unsplash

Photo by Andrew Roberts on Unsplash

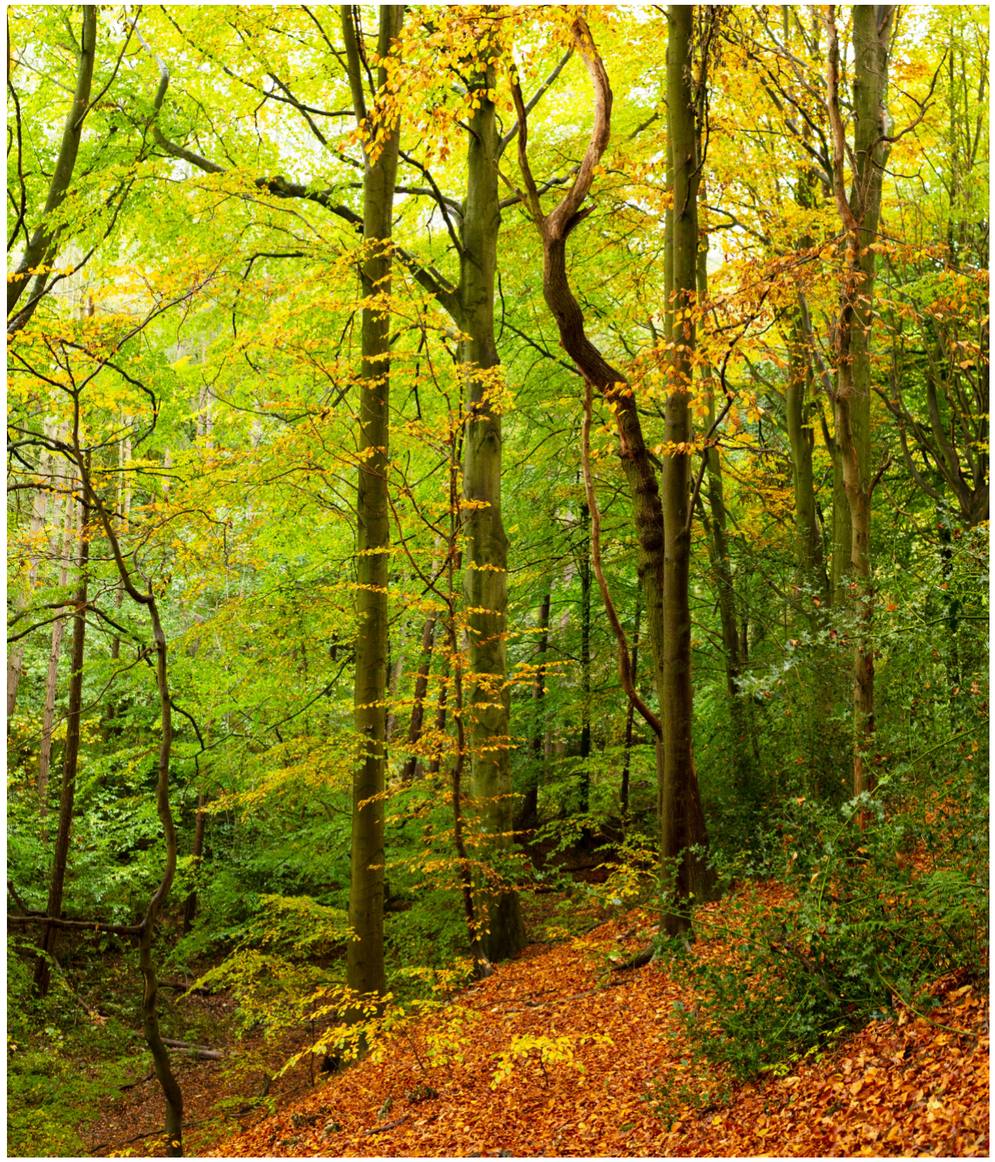


Photo by Andrew Kitchen on Unsplash

3. ADAPTATION

Storage

- Angela Day of MOSL shared her personal solution which can help dealing with flooding and drought while also reducing her water demand and carbon footprint. She can collect 600 litres of rainwater in three water butts, this water could be used for multiple activities around the house such as gardening and flushing toilets, and Angela is looking to find more innovative uses of grey water.

Demand

- Martin Currie highlighted how reducing excessive demand is probably the most sustainable course of action in terms of adaptation to drought.
- Heidi Mottram from Northumbrian Water commented on their work to help their highest consumers and work with them to find and deliver efficiencies in water which in turn help with energy reductions.
- On the other hand, Fatima Ajia of Waterwise advocates for mandatory water efficiency labelling on household appliances in the UK to reduce personal water use.
- In the chat discussion, Alice Elder commented that integral to driving down demand will be driving up consumers' perceived value of water, as it is currently too easy to waste it with little noticeable cost to the individual.
- In turn, Neil Edwards thinks that changing a perceived value of water will not necessarily change behaviour. One way of changing perceived value is to actually change the price; this could promote awareness of externality (from the perspective of the bill payer) with the intention of nudging behaviour.

DEFRA Consultation on Mandatory Water Efficiency Labelling 2022

Efficiency

- Ian Barker, VP Environment of the Institute of Water, mentioned a similar suggestion to water efficiency labelling, but at a larger scale. Building houses to a very high water efficient standard - the way the building industry does with houses energy efficiency. This will help society minimise water footprint and also help to minimise our carbon footprint. The technology is ready and the only thing missing is the will from the building industry and politicians to make this idea come true.

Food

- Nathanial Matthews, CEO of the Global Resilience Partnership, sees lots of potential from a governance perspective and has seen a wider recognition of the critical role of water resilience within the food system. He has seen dialogues embracing more resilience principles including uncertainty, long-term thinking, feedback loops and understanding the role of water in social-ecological systems.

Supply

- Peter Simpson detailed Anglian Water's strategic pipeline which will give them much more flexibility to deal with the anticipated changes in climate, and therefore, much more resilience.
- In turn, Zoe Czempinski and Lisa Ehrenfried from Yarra Valley Water, talked about how the extremely high levels of rainfall in Melbourne have pushed them to incorporate assessments around existing asset resilience on the planning for future construction and maintenance programs.

Pipeline - Anglian Water

Resilience tools

- Nathanial Matthews noted the current development of resilience tools such as “follow the water” using earth observation tools or Google's flood forecasting and alerts in India and Bangladesh. The accessibility and increased uptake of these tools have a great potential to become a positive tipping point, helping to expand society’s understanding of hydrological systems and water management under climate change.

Nature Based Solutions (NBS)

- Zainab Musa Sa'eed shared one NBS program advanced by KADSWAC, Kaduna State Water Corporation in Nigeria, who have planted more than 5000 trees at their water treatment plants.
- Other examples provided by Anglian Water were directed to tackle both of the worst consequences of climate change, drought and flood. Peter Simpson mentioned Anglian Water's Future Fens initiative - a combination of a reservoir with flood defence, opportunities to sequester carbon in peat and nature restoration.
- Katharine Cross from the Australian Water Partnership, presented many great examples of the integration of NBS as a mechanism to support adaptation in utilities’ water management strategies, please watch the full video version which expands on Katharine’s experiences in Brazil and Mexico City.

Early warnings

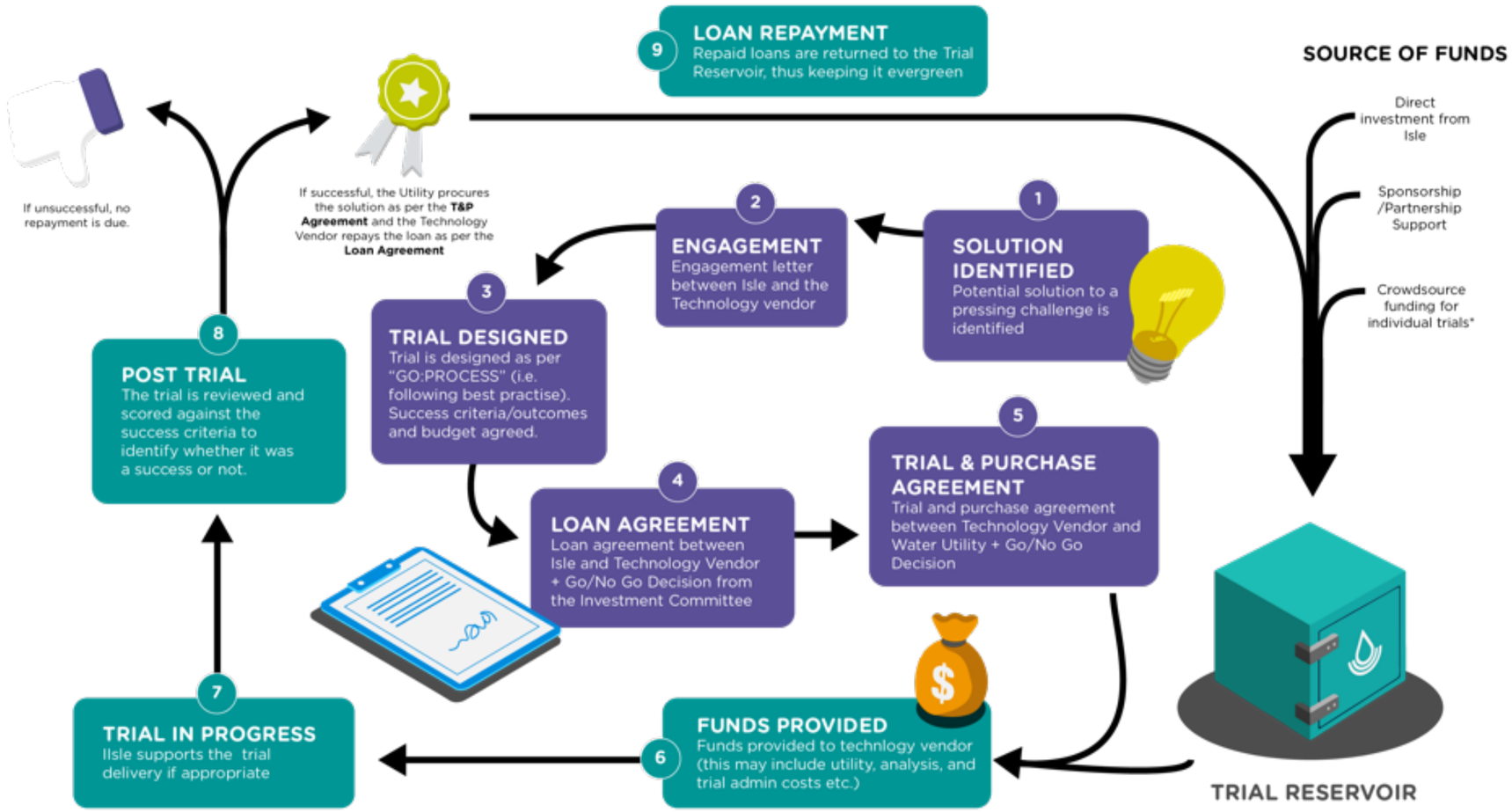
- A great example from Zainab Musa Sa'eed from KADSWAC in Nigeria was the installation of automated flood early warning systems (AFEWS) and weather observation systems (AWOS) in their Kaduna water treatment plant.
- During the discussion, Deryck Irving commented that in his view, we have made some advances in terms of adaptation, in some circumstances and in some places, but we are still a long way to go to embedded adaptation. He also questioned if anyone is looking at community resilience as an element of adaptation.
- Jonathan Wright commented that there is still a long way to go to gain public acceptance for recycling wastewater for indirect/direct potable reuse, which will become more and more necessary to alleviate water scarcity.

Future Fens - Anglian Water

4. FINANCE

Trial Reservoir

- Jo Burgess shared the Trial Reservoir initiative led by Isle Utilities. The program seeks to accelerate technology adoption to achieve net zero in the water industry and other sectors through funding, alongside matching funding from sponsors.
- The technology vendor and the technology user enter into a contract to work together in a technology trial and, if the trial is a success, the technology user agrees to procure the technology. The Trial Reservoir guides this process and takes the financial risk of the trial by providing a loan to the technology vendor. The loan is repaid once the technology is deployed on site in the case of a successful trial, or if despite everyone's best efforts, the trial is not a success, the user doesn't have to buy the technology, and the technology vendor doesn't have to repay the loan.
- Jo shared a map and a table showing the impact so far. The initiative is global with one unsuccessful and two successful trials completed to date. Isle Utilities is aiming for 10 trials a year with a range of small, medium and large trials.



Trial Reservoir Flow Chart - Isle Utilities

5. COLLABORATION

IWA Climate Smart Utilities initiative

- Brenda Ampomah from the International Water Association shared the Climate Smart Utilities initiative launched by IWA. This initiative aims to support water, wastewater and urban drainage companies in improving their climate resilience by adapting to a changing climate, while contributing to significant and sustainable reduction of carbon emissions.
- The platform not only includes several support tools but also launched the 2022 Climate Smart Utilities Recognition program to celebrate successful stories worldwide. More experiences and information will be shared via the IWA Network, www.climatesmartwater.org and Brenda's full video.

Influence in Politics

- Paul Horton, CEO of Future Water, participates in the All-Party Parliamentary Water Group and the All-Party Parliamentary Climate Change Group, and works to ensure that politicians realise how important this is as an issue.

Photo by Surface on Unsplash

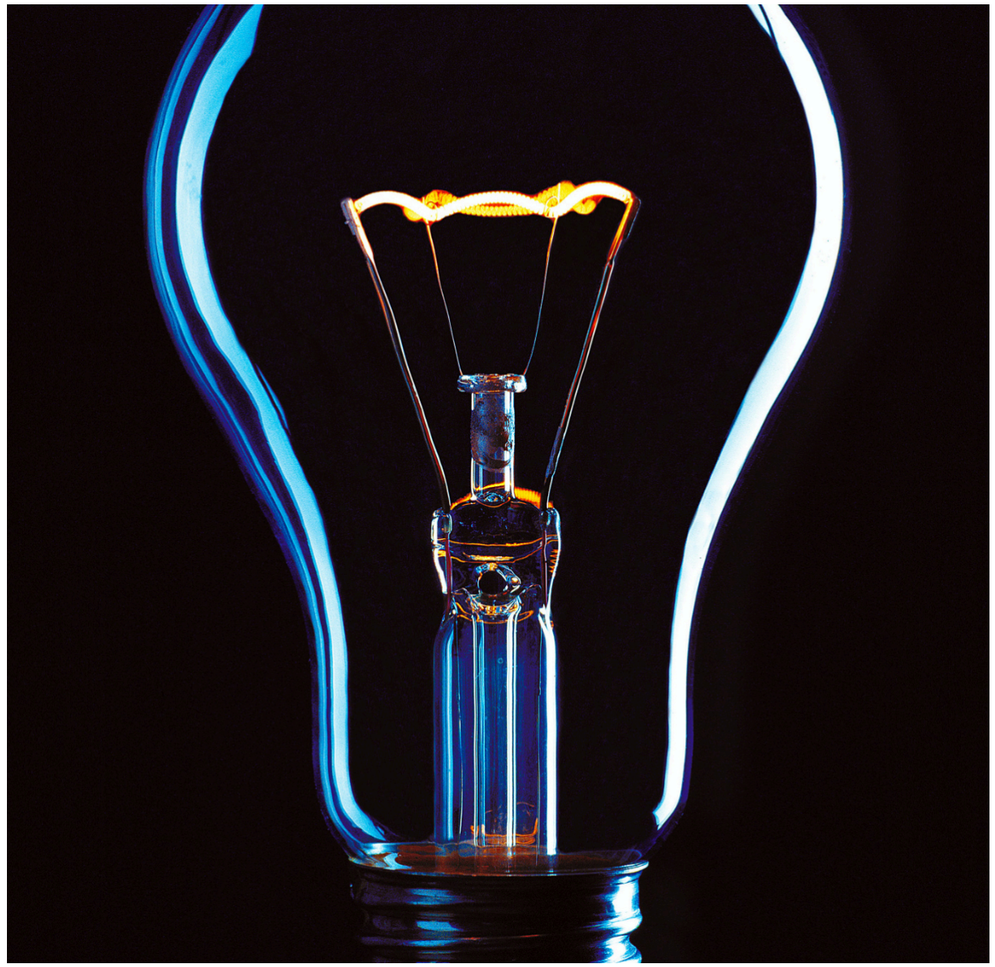


Photo by Alessandro Bianchi on Unsplash

Innovation

- Heidi Mottram and Ben Gilbert from Northumbrian Water, presented a great example of collaboration during innovation festivals.

Relationships

- Lila Thompson, CEO of British Water, said: "we are at a real tipping point in terms of collaboration and how building on the collaboration that we already have will help us advance the multitude of challenges waiting to be addressed". She encouraged all to continue to "extend our reach, deepen our relationships and continue to work collaboratively together to solve future problems".
- In the discussion chat, Ana Maria Millan highlighted how education would play an important role, not only in terms of why water companies use solar/renewable energy, but to link the amount of water that we use with its effect on the environment, and on carbon emissions.

6. Q&A

During the discussion four questions were posed to the participants:

Progress: What progress has the water sector made on reducing greenhouse gas emissions since COP26?

Innovation: What climate innovations can we replicate across the water sector?

Resilience: Are we more resilient to climate change than we were this time last year?

Tipping: What are the key potential Positive Tipping Points for the water sector?

"We are at a real tipping point in terms of collaboration and how building on the collaboration that we already have will help us advance the multitude of challenges waiting to be addressed."

Lila Thompson

Photo by Art Maltsev on Unsplash

Progress: What progress has the water sector made on reducing greenhouse gas emissions since COP26?

Around 70% of the participants had a positive opinion on the progress made by the water sector.

The majority of these views were related to raising awareness, understanding the link between the water sector and greenhouse gas emissions.

It was felt that the workforce within the water industry has acquired a wider understanding of sector impacts and opportunities leading to development of net zero roadmaps and recognising the effect of N2O, among others.

Two other examples of good progress were shared by pwheel4, who mentioned how companies are seeking nature based solutions and setting up frameworks to supply those, and Dr Fatima Ajia who highlighted that water efficiency labelling is currently under consultation.

Darl Sweetland thought that the water sector is ahead of the pathway to net zero by 2030, through operational and capital carbon reductions. Darl commented on work translating capital carbon reduction in projects in the past 10 years into a methodology to apply a sustainability hierarchy to steer growth beyond net zero and including Scope 3 emissions.

Fiona Webber also mentioned carbon calculations for new infrastructure.

On the other hand, some examples of negative opinions highlighted the lack of first-hand knowledge, low level of sewage treatment and weak global progress, as regions or countries making good progress remain a minority.

Alice Elder had a neutral opinion on the progress made. She thought that progress is limited by net zero targets that had already been set (i.e. only Scope 1 by 2035) and that there is a risk of making decisions now that will make genuine net zero more difficult to attain.

Photo by Jasmin Sessler on Unsplash

Digital Twin image - Dall-E x andeye Photography

Innovation: What climate innovations can we replicate across the water sector?

Chat participants presented examples in several areas considered during the previous Water Climate Discussion, in 2021.

Alice Elder and Darl Sweetland mentioned that innovation in capital investment is key, and discussed sharing experiences in low carbon construction methods, for instance.

James Powell mentioned the energy savings possible when adopting AI assisted pump flow rate optimisation, such as the one offered by Grundfos. And Fiona Webber commented that the industry should be replicating in-pipe turbines to power WTWs and heat exchange in sewer networks.

Edward Rhodes commented on how innovations are often the optimisation of existing systems or the recycling of the by-products of familiar processes. He asked how we can achieve a system-wide change with more wide-ranging solutions.

Jo Burgess answered that incremental improvements are more common, as they are easier to implement and usually involve lower risk. More systemic interventions usually come from developing countries, where entirely new systems are being put in place, taking the opportunity to leap frog and go straight to the better, more sustainable option.

Two comments were made around algae. Kevin Mooney mentioned a possible process intensification using algae-based nutrient removal process, while Jonathan Wright shared the carbon capture technology based on microalgae developed by UTS in Sydney, which is capable of producing algal biomass that can be used to create a whole range of natural biopolymer materials.

Marietta Sandilands from Isle Utilities re-highlighted the Trial Reservoir as an important initiative to funding trials of innovative technology through no-risk loans.

Resilience: Are we more resilient to climate change than we were this time last year?

Juan Mateos Rodriguez and Darl Sweetland have a negative view towards resilience, Darl referred to the UN report which showed 1.5 degrees is unlikely to be achieved.

UNEP Emissions Gap Report 2022

Tipping: What are the key potential Positive Tipping Points for the water sector?

Both Sally Gutierrez and Tom Williams commented that in the U.S., the Environmental Protection Agency is leading the charge for carbon reduction and water quality projects, administering funds for many carbon reduction projects across the water industry.
In addition, Tom thinks that we are at a societal tipping point in which people expected change and are now demanding it, every time with more urgency, in part helped by the fuel prices.

Photo by Katt Yukawa on Unsplash

> “I think we are at a societal tipping point. People expected change and are now demanding it. Fuel prices have helped push the urgency.”
> Tom Williams

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