

## INSIGHT REPORT

# Control risks today – shape a safer culture of work tomorrow



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#### VIEWPOINT

Chris Tagg, Head of OS Connect

Utilities know they must remain ever alert to the challenge of ensuring high standards of health & safety with new risks constantly emerging, not least due to developments in other industries and the impact if the pandemic. This report seeks to identify the key challenges and drivers for change and how utilities are responding.



## Introduction

Maintaining and improving health and safety in the utilities industry is a constant challenge due to the high-risk nature of the technologies and the distributed geography of both energy and water networks.

According to the Health and Safety Executive, the utilities industry has relatively mature and stable health and safety systems and industry figures show that safety is improving year on year. The all injury frequency rate amongst energy network staff has seen a 74% reduction in the last ten years.

Despite this, certain areas continue to deliver health and safety incidences, and while performance is improving in traditional areas of risk, developments in other industries and the pandemic have brought new health and safety challenges for the industry.

While some utility assets are inherently high risk due to dangerous gases and chemicals, or high voltages, many health and safety situations

arise from working in new locations across utility companies' geographical areas.

These include utility strikes from construction and maintenance works, collisions with low-voltage cables and reconnecting customers in difficult conditions after bad weather.

Wellbeing is also becoming an increasingly hot topic in the utilities sectors, as emergency situations often see employees putting in long hours, while lone working is also prevalent.

Ensuring the safety and wellbeing of their own workforce out in the field is enough of a challenge, but utilities are also faced with the task of trying to prevent potentially deadly interactions with their networks by members of the public.

The nature of these interactions has been heavily influenced by the recent pandemic and also technology developments such as drones, meaning both water and energy networks must strive to stay ahead and anticipate new areas of risk.

In many of these scenarios better location data, and an increased use of data generally could help result in better health and safety outcomes for both workers and the public, as will the increased use of technology such as telematics in the utilities industry.

To explore the potential for location data in maintaining and improving health and safety outcomes in the utilities industry Utility Week has partnered with Ordnance Survey to produce this report which covers key topics including:

- **The main health and safety challenges**
- **The drivers for change**
- **How utility companies are protecting their workers**
- **The challenges of safeguarding the public**

Many thanks to the varied commentators who gave their time and insights to help form the content of this report.

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“The sector is a well-established mature sector in terms of health and safety and all the large companies including Northumbrian Water have health and safety teams and what I would say are good systems and procedures.”

Brett Stinton, head of health, safety, environment and quality, **Northumbrian Water**

### What are the main health and safety challenges and drivers for change?

Figures compiled by the trade union which represents both electricity and gas distribution operators suggests that the electricity industry is 10 times safer than it was before privatisation occurred in 1990.

The Energy Networks Association (ENA) released the figures in 2015 as part of an update about its health and safety strategy; [Powering Improvement](#).

The Powering Improvement campaign is the latest effort by ENA and Energy UK member companies, trade unions and the Health and Safety Executive (HSE) to bring about continuous improvement in safety and occupational health.

Since it was launched in 2010 the campaign has focussed on a different area each year with the overall ambition of making the UK electricity industry a world leader in health and safety performance by 2020.

As a result of the strategy the HSE now regards the electricity industry as being “lower risk”.

While it is lower risk, threats to both workers and the public do remain, with fatalities resulting from interactions with the electricity network still being seen on an annual basis.

Clearly the industry is always aiming to eradicate the potential for fatalities, but there is also a focus on reducing lost time incidences and improving wellbeing.

While most health and safety risks are known, David Spillett, head of safety, health and environment at the ENA, says that new risks are emerging all the time as a result of changes in behaviour due to the recent pandemic and technological developments in other industries.

While the water and gas sectors do not have health and safety strategies to mirror the Powering Improvement campaign in the electricity sector, they are mature industries with well-developed health and safety policies.

“The sector is a well-established mature sector in terms of health and safety and all the large companies including Northumbrian Water have

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health and safety teams and what I would say are good systems and procedures,” says Brett Stinton, head of health, safety, environment and quality at Northumbrian Water.

Similarly for the gas transmission and distribution industries the risks are well-known and managed, with the HSE flagging the risk of fire and explosion associated with the loss of gas as the biggest risk.

This could occur due to ageing infrastructure, safety competence and third-party interference.

Some of the main risk areas for creating lost time incidences are similar across the three industries, with the task of trying to keep workers safe on site being one of the main challenges.

“The two main areas for Northumbrian Water are high hazard risks on fixed assets that don’t change and are always there,” says Stinton. These include dangerous gases and chemicals.

“Then there is dynamic risk which every day changes depending on where the workers are out on the public highway, and that generates the most risks in terms of day-to-day accidents, bumps and scrapes, and knocks and falls, and also that’s where we interact with the public in most occasions as well.”

This means a risk assessment of each site must be carried out, with 100,000 holes being dug by Northumbrian Water across its network every year.

In the electricity transmission sector a safe distance must be maintained from certain assets while any work is being carried out, and these must be mapped on each occasion.

One of the biggest risks to workers on site, both in the utilities sector and also the construction industry, is cable strikes.

Storm Arwen  
27 Nov 2021  
Image supplied  
by Electricity  
North West)



Cable strikes occur when live underground electricity cables are damaged during construction and maintenance works and pose a serious risk to worker welfare.

There were more than 2,500 cable strikes of various severity reported to the Utility Strike Avoidance Group in 2019.

According to the ENA, 354 workers suffered life changing injuries due to cable strikes between 2015 and 2020.

Outside of the utilities sector, it says that construction workers are most at risk of damaging cables as nearly a third fail to check for underground cables before starting work.

While these have been the traditional risk areas for cable strikes, the increase in DIY seen during the pandemic resulted in an increase in the number

of utility strikes occurring in back gardens and on private property by the public.

High pressure water mains and gas pipes can also be an issue if they are struck during works, with gas mains particularly being at risk of damage from the agricultural sector during digging works for drainage.

Agricultural workers are also at risk from collision with overhead power lines as farm machinery continually gets bigger and taller.

The HSE says that on average two agricultural workers die each year from contact with overhead power lines and many more are injured, with the haulage sector also seeing incidences.

The other two main areas where risks can change are with keeping the public safe on or around utility assets and maintaining safety during emergency repair work to networks after storm damage.



## How utilities are protecting their employees

It is estimated that there are as many as 4.7 million excavations in the UK each year, with 60,000 resulting in a utility strike, many of which pose a serious risk to worker safety.

In 2018, the Geospatial Commission, which was established to set the UK's geospatial strategy, identified better quality and more easily accessible location data for underground assets as a way to cut utility strikes.

The Commission is now in the process of creating a national digital map of all the UK's 1.5 million kilometres of underground utility assets which all involved parties can access before starting any works.

This map will be known as the National Underground Asset Register (NUAR) and will cover England, Wales and Northern Ireland.

The NUAR project is still in the early phases of development so its actual impact on safety is yet to be seen, but Northumbrian Water, which was involved in one of the pilots that led to the development of NUAR is convinced that better data is key to safety improvements.



“The better your knowledge of your assets and where they are precisely, the less likely someone is to hurt themselves when they are digging.”

Brett Stinton, head of health, safety, environment and quality, **Northumbrian Water**

“The better your knowledge of your assets and where they are precisely, the less likely someone is to hurt themselves when they are digging,” says Stinton.

Following on from its involvement in the NUAR pilot, Northumbrian Water is undertaking Project Z, which sees it creating a model of network depth.

While all underground assets should be buried according to NJUG standards, with water pipes sitting at between 0.85-1.2m, changes on the surface, and obstacles under the ground may mean pipes are actually shallower or deeper than this standard.

The Project Z model is updated every day as depth information is taken from each dig site across Northumbrian Water's geographical area, recalibrating itself to more accurately reflect the real-world scenario.

The aim is to allow field workers or those planning a job to ask how deep an asset is, and also the expected accuracy of that information, enabling them to plan jobs better and find services in the ground first time.

“We are piloting it for the water industry but we expect it to catch on when we show the results, and it could be applied to gas and electricity where the safety benefits would be much greater and knowledge of depth is really crucial,” he adds.

The water industry is leading the way in mapping underground assets as their workers are often at greatest risk of utility strikes due to water pipes often being the deepest assets.

“You can have a risk from water if a high-pressure pipeline is hit and debris and parts of the pipeline come off, and I'm aware of a couple of incidences in the past where a mains has

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been struck and debris has caused damage to surrounding areas,” says Stinton.

“But the risk isn’t really around water, it’s getting to water. The more data we have and the richer that data is gives the crew doing the work more information about that because ultimately the main risk is hitting electricity or gas - electricity being the main hazard which is more likely to see injuries occurring,” he adds.

“That is why the NUAR is so important to us because it gives us so much more information and is so much more of a usable tool for field workers.”

Holger Kessler, geoscience technical adviser at the Geospatial Commission, believes further safety improvements could be achieved through NUAR in due course.

Start-ups such as Fyld, an AI-driven field service management solution, are keen to access the data to help digitalise the health and safety aspects of site management.

“Companies such as Fyld are at the cutting edge, they are a really good example of why we are doing this,” he says.

Fyld is already being used by gas distribution operator SGN to improve the safety and productivity of its field operations.

SGN’s field workers now video their sites on arrival using the Fyld app and make an audio record of any potential hazards and controls, giving managers far greater insights than traditional paperwork.

Site controls must also be implemented for workers in the electricity transmission sector as safe distances must be maintained to live assets as governed by legal frameworks.

Keeping our people safe is our top priority at all times but extreme events like Storm Arwen, of course, bring with them heightened levels of awareness and safety communication about working in such challenging conditions and the risks associated with high winds and fallen objects.”



Gareth Pearson, head of health, safety and training, **Northern Powergrid**

National Grid Electricity Transmission uses its own in-house geospatial platform to plot safe working distances on site.

“Where we need to implement some kind of restriction or hazard zone we put a graphical overlay in that geospatial system so not only is there is physical restriction on site there is a virtual representation that can be seen centrally,” says Daniel Perry, asset management frameworks manager for National Grid.

While planned construction and maintenance sites can be carefully analysed for risks, often utility workers are responding in emergency conditions to reconnect customers after storms.

Spillett says ENA member companies have worked with the developers of mapping app What3words, which has divided the world into three metre squares and given each a three word code, and are now starting to introduce it into their workflows to track workers’ locations out on the field.

In addition, some network operators are starting to introduce telematics to help enable

them to safeguard their workers during storm conditions.

Gareth Pearson, Northern Powergrid’s head of health, safety and training, says: “Keeping our people safe is our top priority at all times but extreme events like Storm Arwen, of course, bring with them heightened levels of awareness and safety communication about working in such challenging conditions and the risks associated with high winds and fallen objects.”

Northern Powergrid’s vehicles are equipped with telematics, which helps in the allocation of resources, but the location data it provides can also play a role in safety.

“Our local teams were counting people in and out so if we had any situation where a colleague had not been in contact with our office-based teams or returned when expected we could track their vehicle to ensure they were either still working on a job or on the move,” Pearson adds.

Had there been a safety incident the telematics data would have helped inform any action the company would have needed to take.



### How utilities are safeguarding the public

At the same time as ensuring the safety of their workers, utility companies are also working to safeguard the public from any risks associated with their assets.

Most injuries and deaths of members of the public come from interactions with overhead powerlines and underground cables and pipes.

However, for National Grid Electricity Transmission (NGET) the main area of risk for interactions between their assets and members of the public stems from having large above ground assets in busy built-up environments.

Its monetised risk model looks at three key areas – safety, environment and reliability, and analyses the likelihood of assets failing against a number of failure rates.

Condition data about assets is vital to understanding that likelihood, but of equal importance is the need for NGET to understand the consequence of any risk, in which location will be a significant factor.

“Condition data about our assets is vital to our understanding of the likelihood, but then the location data and where the asset is and whether third parties could interact with the asset is important in understanding that consequence or criticality,” says Perry.

“Some of our substations in urban environments may be next to a shopping centre and that location bit is a really important piece for us to understand as we might have members of the public who are outside of our substation fence so they are not

able to walk into the compound, but they could be exposed to an event and it’s really important that we understand where those interactions could happen.”

While National Grid is able to keep the public physically separate from its assets, the same is not true for electricity and gas distribution companies as many of their assets run over or underneath land owned by others.

This results in a lot of interactions within the farming industry particularly, but also with the haulage sector.

According to the ENA, on average one person dies or is seriously injured each month as a result of contact with an overhead powerline while driving or operating road transport.

Between 2014 and 2019, 500 near-miss incidences were recorded which could have resulted in injury or death.

Location data allows land managers to locate hotspots or spot trends where there may be a pattern forming, such as a particular area on a site which seems to be attracting accidents or incidents.”

Alastair Harvey, lead countryside and woodland advisor, **Yorkshire Water**

While figures remain high in the haulage sector, the number of accidents in agriculture has seen a market improvement according to the HSE.

This is largely down to the ENA 'Look out look up' campaign which aims to communicate the risks and dangers of working near overhead powerlines, and how to minimise them.

The campaign involves attending farm events and working directly with the National Farming Union (NFU), but it has also produced a series of successful information videos.

Spillett says a lot of work has also gone into creating underground and overhead data maps of assets.

SGN is directing people to access utility maps to help ensure safer digging as excavations, ditching, drainage works and fence installation can all disturb gas pipes.

Collisions and strikes in the agriculture, haulage and construction sectors are a long-standing issue, but new risk areas are emerging all the time as a result of new technologies such as drones, explains Spillett.

The introduction of high reach washer poles to the window cleaning industry resulted in two fatalities from electrocution in 2021.

Distribution network operators (DNOs) have also seen a huge increase in cable and pipe strikes in domestic gardens as a result of the rise in DIY seen during the pandemic.

"The domestic member of the public is just as important as someone working in the farming or construction industry now, we see them now having a similar risk because we saw a significant

increase over the two years of the pandemic of damaged cables and gas pipes in domestic properties and gardens due to an increase in DIY activity," says Spillett.

Advice and information by DNOs to the public is critical to mitigating this risk, which includes visiting a property to locate the utility's assets.

The pandemic also saw an increase in the numbers of the public visiting blue spaces owned by water companies such as reservoirs.

Yorkshire Water's estate covers some 30,000 hectares and includes 125 reservoirs, some of which are open for the public to enjoy.

"We're lucky to look after some of the most beautiful spots in Yorkshire, and want to make sure that our visitors can enjoy them safely. We use a recognised set of guiding principles to help manage our sites which have been devised and are endorsed by the Visitor Safety Group," says Alastair Harvey, lead countryside and woodland advisor for Yorkshire Water.

Yorkshire Water is currently zoning its sites to try and prioritise and manage visitor locations even better using Geographic Information systems (GIS).



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David Spillett, head of safety, health and environment, ENA

The health and safety challenges associated with managing blue spaces is always changing, says Harvey, and can often be as a result of smart mobility.

"Electric bikes and new mobility equipment is allowing users to explore newer environments, some which they may not yet be comfortable in using. This can potentially place the user at an increased risk without the necessary mitigations in place.

"Location data allows land managers to locate hotspots or spot trends where there may be a pattern forming, such as a particular area on a site which seems to be attracting accidents or incidents."

This information enables Yorkshire Water to put in measures to increase safety or restrict access in extreme cases.

Health and safety is an area that needs constant attention from the utilities sector, and there are a number of good initiatives that those in the industry can look at and participate in to further improve their procedures and track record.

"We always look for improvement, you can't settle on your laurels, there's always going to be a challenge," says Spillett.



**Chris Tagg**Head of OS Connect  
Ordnance Survey

It is always encouraging to see the development of start-up organisations, such as those mentioned in this report, apply their ingenuity and technology to improve necessary health and safety processes. Though some may view these methods of data recording as a new means of monitoring employee efficiency, our interpretation focuses on an employer's duty of care. Rather than monitoring their employee's behaviour, they are supporting workers in a variety of situations which, before proper risk assessments can be completed, are unknown and therefore deemed 'high-risk.'

By implementing these technologies, employers significantly enhance their approach to addressing health and safety protocol. After all, a relaxed attitude to health and safety regulations poses significant increase in risk; as well as endangering worker wellbeing, and an organisation's reputation.

Fortunately, better geospatial data is helping to streamline and inform that process of preplanning for workers onsite. It is true that current datasets vary in depth and accuracy; put simply, some areas are more detailed than others. Improving access to datasets such as gas, water, and electricity supply lines in a secure way provides a significant advantage in surveying and risk assessment, that can only be further improved by even more data; thus reducing risks and helping to improve safety onsite. The development of the National Underground Asset Register (NUAR), for example, improves access to even more information, which better informs decision making processes about planning works.

But data can always evolve. New datasets which harness available satellite imagery could be made available from a variety of sources, providing details on surface types for example (such as hard pavements, soft verges etc) which can help excavators decide on tooling before they head out to site. Similarly, access to environmental data like floodplains or engineering difficulties can be used to quickly assess the risk of working in a particular area. It is only through combining datasets where you see real insight being generated.

Sourcing different datasets, ensuring data interoperability, and combining them into a single, unified truth, creates a beneficial decision support system. One which can help utilities to plan for

“New datasets which harness available satellite imagery could be made available from a variety of sources, providing details on surface types for example (such as hard pavements, soft verges etc) which can help excavators decide on tooling before they head out to site”

multiple eventualities, provide their workers with the best possible information, and optimise works during the planning stage, through the operation stage, and after the job too. Which, in turn, helps to minimise risk, unnecessary effort and expenditure, further down the line. It's a cyclical process, which can provide more insight if feedback loops are included. As more people use data, feedback further improves the quality of it. User feedback greatly benefits the wider community, which we listen to, to improve our products and services. Under our "Tell OS," programme, we act on data improvement and feedback from actual users, to drive even more value from data and technology and therefore provide even greater insight to our customers.

And improved data means better insight, reducing the risk of incident and improving the overall safety of projects the next time workers head out to site.



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We empower businesses with data insight that drives efficiency and progress in a fast-moving world.

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Our commitment to geospatial innovation helps energy, water and telecom network operators in Great Britain see a better place.

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