UtilityWeek™

Digital Transformation Transformed

Net zero and technology
strategies in UK utilities

appian

Contents

UtilityWeek

— In association with —

appian

Foreword

Mike Heffner
vice president, solutions and industry go-to-market **Appian**

The energy sector is at a crossroads. As you'll see in this research, the ambition to reduce carbon emissions and move towards a net zero future is high on the agenda for decision makers, but there's a perilous gap between that ambition, and the culture and large-scale investments seen as necessary to get there.

The established approach to meeting a challenge on the scale of net zero is to make big ticket technology investments to demonstrate innovation in the hope that later it's adopted at scale. But in the face of growing pressure to meet carbon neutrality targets can this approach deliver quickly enough?

What's needed now is not just aspiration for seismic shifts, but real, small iterative improvements in operational processes that contribute every day to chipping away at your carbon footprint and improving resilience to climate threats. We're talking about process automation – automating everyday processes now and bigger picture automation, such as carbon modelling, to support better investment decisions.

The key to making incremental – but important – changes to operational processes is agile, iterative development. Choose a handful of processes, unpick the itinerant parts – the people, data and systems needed – and then use agile methodologies to improve those processes over time. Change, on the scale needed to fulfil most firms' targets, won't happen overnight, but will be achievable through small adjustments that add up.

As well as unlocking the hidden efficiencies in individual processes, automation can hold the key to making better capital and operational investment decisions. By that, we mean gaining a more unified, holistic view across data, systems and processes can benefit business decisions in the here and now - and for years to come.

Right now, there are no standard rules or datasets for tracking carbon - part of the problem of innovation in isolation - meaning each firm likely has disparate systems and data. By orchestrating that data in a single workflow, unifying new systems with legacy, decision makers have the holistic view they need to make better decisions. That includes understanding where to invest for the future, and how to maximise efficiency in current operations.

One of the common pitfalls we hear from energy customers is that legacy data systems don't play well with new investments – or new investments take so much time to bed-in that they are no longer relevant once fully deployed. An organisational stance on unifying and orchestrating data sources with people and systems is needed through something like a low-code development platform, allowing workflows to be designed, deployed and revised without relying on specialist developers.

That's another issue facing the industry: a skills shortage amongst developers and IT professionals. And, when it comes to realising the intent of carbon neutrality projects, the IT department is often at a distance to the business areas most keen to see them through. With low-code, business and IT can work together to describe and implement new workflows, without relying on line-by-line coding. That saves time and can bring governance and compliance around the same table, ensuring that workflows are created to truly meet their goals.

Speed and agility have never been more important in IT for the energy sector, as you'll see in this report. With the right approach, digital can accelerate zero carbon initiatives, without waiting for larger capital investments or cross-industry agreement.

UtilityWeek

— In association with —

appian

Introduction

The UK is falling behind on adapting to climate change and the gap between the level of risk faced and mitigation efforts underway has widened alarmingly.

This was highlighted in a recent report by the Climate Change Committee, which said that despite having capacity and resources to respond effectively to climate change risks, the UK has failed to do so.
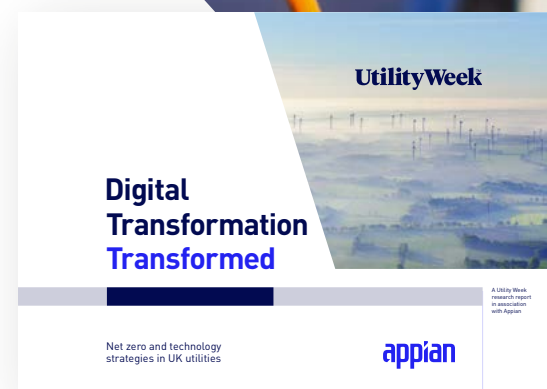
Released almost two years after the UK government enshrined a net zero by 2050 target into law, the findings lay bare the urgency and scale of change needed across the infrastructure sector, especially in relation to the ways companies and their supply chains operate and the way they weave environmental sustainability and resilience into the fabric of decision making.

Nowhere is the need for this transformation more evident than in the utilities sector which has the opportunity, through digital innovation and bold applications of emerging technology, to make a substantial contribution, both to reducing the UK's carbon intensity and to improving its climate change resilience.

But even as utilities step up to play this leading role in the UK's net zero transition, they are encountering challenges in applying the digital transformations which might enable substantive emissions cuts or enhanced understanding of resilience.

Legacy technology systems, skills limitations, resource pressures and cultural challenges are all slowing down the pace at which digital potential can be leveraged.

To better understand the way in which UK utilities are responding to this multi-layered net zero challenge, Utility Week partnered with technology company Appian to conduct a bespoke industry research project.

UtilityWeek

Digital Transformation Transformed

A Utility Week research report in association with Appian

Net zero and technology strategies in UK utilities

appian

The resulting insights from that research are collated in this report and shed light on how utility companies are currently preparing to reach net zero and what digital innovations are being put in place to help them on this journey.

The findings also highlight which areas within their business operations and processes utility companies believe offer scope for achieving the quickest net zero wins and which digital innovations will be most helpful in accessing these. Finally, the findings also identify the biggest barriers which senior industry decision makers believe could hold their organisations back from achieving their net zero goals.

UtilityWeek
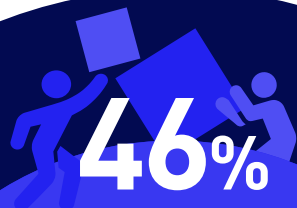
— In association with —

appian

91%
say net zero has triggered or accelerated **substantial organisational change**

46%
say organisational change for net zero has had a significant impact on **digital transformation**

Respondents see most **potential for digital innovation to support net zero** goals in relation to:

optimising renewable energy investments (80%)

driving down process-related emissions (73%)

reducing emissions from field operations (69%)

net zero ⬤

1/3 say **low code automation** could play a big role in achieving their net zero goals

77%
… say **lack of robust data** to support effective decarbonisation is the biggest internal barrier to achieving net zero goals

also say their organisational response to net zero has included the introduction of **stretching decarbonisation targets**

The technologies expected to be most helpful in meeting net zero goals are:

Advanced data analytics
(80%)

Machine learning
(78%)

AI
(75%)

44%
are extremely confident their organisation will realise its net zero goals in a timely way

UtilityWeek

— In association with —

appian

Executive Summary

The results from **Utility Week's** industry survey on net zero and digital transformation, conducted in association with **Appian**, show a UK utilities sector divided between an ambition to drive towards a net zero future and the reality of what is needed to get there.

While the survey findings showed companies are responding to the government's 2050 net zero commitment with major organisational repositioning programmes, it also highlighted a number of barriers around executing the digital innovation that will be required to deliver these. For example, digital monitoring and analysis of the carbon embedded in assets or endemic to certain operations and processes was widely acknowledged to be unsophisticated and a far cry from what is needed to drive effective carbon-conscious decision making.

Despite this disconnect however, respondents overall appeared positive and determined in their efforts, with a large chunk saying their organisations are setting stretching net zero objectives for the assets and operations. Furthermore, despite a lack of robust carbon monitoring and reporting, many were also confident that these targets will be met in a timely way.

Key findings

1 The government's 2050 carbon commitments are driving industry change.

90 per cent of respondents said the net zero commitment has triggered or accelerated a process of substantial change in thinking about organisational ppurpose and which opportunities should be pursued in the future This was particularly the case for transmission networks, where 57 per cent of respondents have seen significant changes in thinking.

2 Digital strategies will support companies in their transformation towards net zero.

46 per cent of respondents said organisational change for net zero has had a significant impact on thinking about what is required from digital transformation. Altogether 89 per cent of respondents said that their focus on both digital transformation and what they were looking to achieve through digital innovation has changed either slightly or significantly.

3 The net zero commitment has prompted companies to set stretching targets.

77 per cent said their organisational response to net zero has included the introduction of stretching targets to reduce the impact of assets/operations on the environment. Of those that remain, 16 per cent of respondents do have targets to decarbonise their operations but felt they should be easily achievable.

UtilityWeek

— In association with —

appian

But industry commentators reserved a certain amount of scepticism around the high-level of confidence reflected in the survey and questioned whether organisations were setting genuinely stretching targets or were being realistic about what they needed to do to achieve them.

Utility Week and Appian's survey found that there were three key areas where digital innovation has the most potential to drive organisational change towards net zero. These were the same core areas which respondents said they expected to offer up net zero "quick wins" within the next five years.

These three areas included optimising renewable energy investments, driving down process-related emissions, and reducing emissions relating to field operations, the latter of which was a popular focal point for industry commentary on the research findings.

One commentator, for example, highlighted the importance of improving data management as a key factor in reducing field-related emissions. Others pointed to the electrification and intelligent monitoring of operational fleets, along with better optimisation of field resources, as near term priorities for driving down emissions.

Meanwhile, although it wasn't ranked as a priority overall, it is notable that energy retailers responding to this survey placed a heavy emphasis on an urgent need to leverage digital innovation to help customers take control of their emissions.

Tying in with the points above, there were three digital technologies that respondents felt will help them on their journey towards net zero, with no real surprises here. Advanced data analytics, machine learning and artificial intelligence (AI) came out on top showing a broad consensus between respondents and commentators around the digital which will support organisational net zero ambitions, and reinforcing the need to correct a reported paucity of data on carbon and wider sustainability factors which exists in the industry today.

Key findings continued

4 An overwhelming majority are confident they can decarbonise by 2050.

44 per cent of respondents were extremely confident their organisation will realise its net zero goals in a timely way. 51 per cent of respondents were somewhat confident and only 5 per cent were not very confident that they could be achieved by the 2050 target date. The highest level of extreme certainty was seen across the distribution networks (75%).

5 Digital innovation has the potential to drive organisational change towards net zero.

The areas where respondents saw most potential for digital innovation to support delivery of organisational net zero goals were in relation to optimising renewable energy investments, where 80 per cent rated the potential highly, driving down process-related emissions at 73 per cent, and reducing emissions related to field operations at 66 per cent. Reducing emissions relating to company buildings/data centres was seen as having the lowest potential, with 48 per cent of respondents having only low or medium confidence in the impacts of digital innovation here.

6 Some areas are seen as quick wins and others as longer-term targets.

Areas where respondents felt the quickest wins were to be gained in delivering net zero ambitions varied by organisation type, but broadly, optimisation of renewables and reduction of emissions relating to field operations were felt to have the greatest potential for quick wins. Meanwhile, reducing emissions through the supply chain was seen to be a longer-term goal. Helping customers reduce their emissions was an immediate focus for energy retailers and distribution networks (with two-thirds seeing it as a quick win).

UtilityWeek

— In association with —

appian

Highlighting the barriers ahead, respondents cited a lack of funding and robust data as the top two things that will hold them back from achieving a smooth, digitally-enabled transition to the net zero future.

Again, this is something that commentators recognised. The collection of high-quality data was considered by most experts as a time-intensive and costly exercise and there was a sentiment amongst respondents that the utilities sector may not have the money to spare for it. One survey respondent commented that low margins in the retail sector made it difficult to invest, while another highlighted the financial costs of regulation across the industry.

There was a recognition among commentators that cultural change was one of the biggest challenges that companies need to address internally.

Another important barrier to net zero ambitions which was identified by a significant proportion of respondents, was a lack of digital and technology skills within the utilities sector to support a transition to smarter operations and investment planning. There was hope held out by some commentators however, that this barrier could be overcome with new approaches to technology partnership, or the adoption of emerging technology fields like low-code automation, which reduce the need for certain specialist in-house skills.

Power distribution networks demonstrated themselves to be most likely to consider the use of options like low-code automation to overcome digital innovation challenges - indeed this subsector generally showed itself to be most proactive in considering the widest range of potential digital solutions to enable the shift to a net zero future. For commentators, this was the unsurprising consequence of the scale, pace and complexity of change which decarbonisation is pushing into the electricity distribution system today.

Perhaps more importantly though, was a recognition among commentators that cultural change was one of the biggest challenges that companies need to address internally. Several

Key findings continued

7 Digital technologies have great potential to help the drive towards net zero over the next five years.

Respondents said advanced data analytics, machine learning and AI were the technology fields which will be most critical in unlocking near term net zero wins. Meanwhile, 35 per cent of respondent attributed fair or substantial significance to the emerging technology field of low-code automation as a net zero enabler. Energy distribution networks exhibited the strongest appetite for applying low-code automation in the near term.

8 More resources will be needed to support the industry's net zero ambitions.

A lack of funds and robust data to support understanding were seen as the key barriers to achieving net zero transformation ambitions. Respondents said the biggest internal barrier to achieving net zero ambitions was a lack of robust data with which to drive focused and effective decarbonisation initiatives. This was rated as a barrier by 77 per cent of respondents.

9 External barriers to achieving net zero goals included poor regulation and the conditions of the market.

Factors in the market environment and/or the regulatory and policy regime were cited most prominently as external barriers to achieving net zero goals. These included the costs induced by any regulatory processes and low margins in the retail sector.

10 The pandemic has caused an acceleration of organisational change and digital transformation programmes.

In terms of the impact of the pandemic on net zero transformation and digital transformation programmes, 43 per cent of respondents said it has significantly increased the focus and level of ambition in the way their organisation is transforming for net zero. Meanwhile, 59 per cent said it has increased the focus and level of ambition in digital transformation.

UtilityWeek

— In association with —

appian

industry experts observed that most companies in the sector are bound to "big bang" style approaches to technology projects and a cultural need to set sequential goals for deployment or associated organisational change. To achieve the necessary scale and pace of change for net zero, these commentators recommended the adoption of more agile ways of working, with many parallel and iterative innovation processes being managed at once.

By working in this way, with relentless attention to delivering incremental net zero gains across myriad workflows utilities will move more swiftly towards their ultimate strategic visions, our experts agreed. In full circle, the survey finished by focusing on the impact of the pandemic on the sector's push towards net zero emissions, with findings showing that this, too, has only accelerated digital transformation programmes.

On this, commentators noted the potential and perhaps necessity of digital solutions has been highlighted by a year of reduced staff levels and home working, reinforcing the pace and urgency of change.

More details on the above issues, and others raised in the course of our research, are addressed in the following report chapters:
- Transforming for a net zero future
- Focussing on digital innovation
- Barriers to net zero

Methodology

To assess the impact of net zero on the utilities sector's digital transformation strategies, Utility Week – via our independent market research partner, Insight Advantage – approached a broad sample of organisational leaders in the following utilities segments:

- **Energy retail**
- **Energy networks (transmission and distribution)**
- **Water retail**
- **Water wholesale**

We targeted respondents with executive or director level seniority across a range of business functions felt to be relevant to net zero and digital transformation, including:

- **IT and data management**
- **Innovation and standards**
- **Customer service/experience**
- **Operations and asset management**

A strong sample size of 44 participated in the survey. Of these, the majority (52 per cent) represented water companies, followed by energy retail, which accounted for 32 per cent of respondents.

The most strongly represented group in terms of seniority of job title was chiefs or heads of departments, followed by director/board director.

This report is based on the aggregated and anonymised contributions of our research participants, combined with qualitative commentary from relevant industry representatives.

UtilityWeek

— In association with —

appian

Transforming for a net zero future

The UK government's 2050 net zero carbon commitment has prompted many sectors to take action to decarbonise their processes and operations, with utility companies amongst those who are looking hard at methods of change.

Our survey findings showed that 90 per cent of respondents believe the UK's commitment to net zero emissions has either triggered or accelerated a significant process of strategic transformation in their organisations.

For industry commentators across the board this came as little surprise and representatives from the water sector pointed out that an industry-wide commitment to achieving net zero emissions by 2030 means water companies are under particularly urgent pressure to alter they way they operate and make decisions.

One professional within the water industry said: "Fundamentally the UK water industry has a tougher target and a faster target than the UK government and many other industry segments."

UtilityWeek

— In association with —

appian

91% of respondents say the net zero commitment has triggered or accelerated a process of substantial change in thinking about organisational purpose and which opportunities should be pursued.

The data presented has been rounded to the nearest whole number

	Yes, it triggered a significant change in how we think about our future organisational purpose and the opportunities we want to pursue	Yes, it accelerated our ambitions to transform our organisational purpose and target new kinds of business opportunities in the future	No, it made no/ little impact on our ambitions to transform for a low carbon future	No, the net zero goal won't change our business or the kinds of opportunities we look to pursue
Overall	36%	55%	7%	2%
Energy generator/ retailer	29%	57%	7%	7%
Transmission network	57%	43%	0%	0%
Distribution network	46%	54%	0%	0%
Water wholesaler/ retailer	39%	52%	9%	0%

" How we merge data and operate twin systems with other organisations to optimise performance will be important because when we get towards zero carbon, every kilowatt [will] count."

Water industry commentator

Supporting that strategic shift was a clear and growing digital agenda, with 46 per cent of respondents saying their net zero transformation programmes have had a significant impact on the way they think about digital transformation.

For PWC's director and subject matter expert for energy and low carbon transition, Adrian Del Maestro, this link between net zero and digitalisation provides a helpful reinforcement to a drawn out process of digital change which has been taking place int he sector for a number of years.

"The energy sector has been pushing digital transformation in a big way since around 2016, lagging slightly behind oil and gas which had its big pivot towards digital in response to the 2014 price crash.

"[Until recently] the focus has been very much on proofs of concept and on the role of different types of technology solutions, from AI to drones." However, Maestro added, the combined impacts of the pandemic and net zero mean focus has now shifted into digital adoption at a much faster rate.

As for what that transformation looks like, industry commentators painted a varied picture. One gas network representative described a foundational project, now 90 per cent complete, which it is undertaking in partnership with the Digital Catapult to identify the existing, emerging and future technology solutions most likely to support delivery of its strategic net zero goals.

They said the project has helped build confidence around to leverage data and digital innovations in ways which will deliver operational efficiency today while "building towards a very different operational future."

They added: "We need to have the confidence today to execute low or no regrets innovation that will give us the foundation for a vision in the longer term."

UtilityWeek

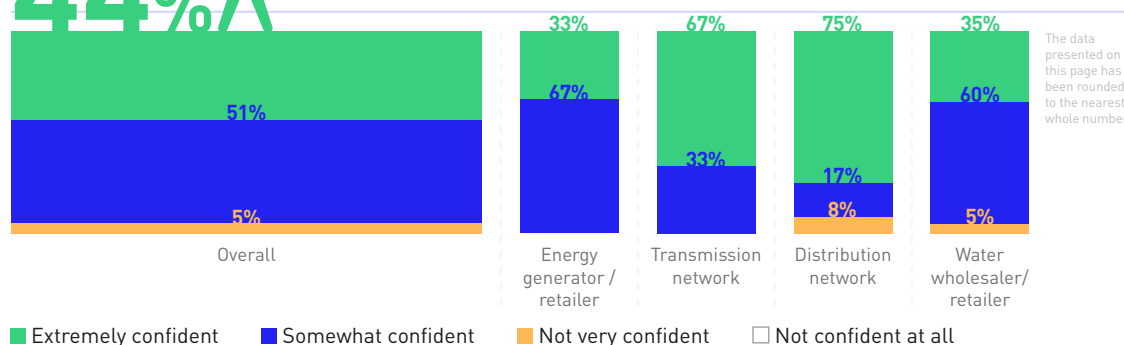—— In association with ——

appian

Meanwhile, a water company representative said their company is currently engaged in a three-way project with two other infrastructure providers to understand how inter-sector digital twinning can help them build stronger resilience, including to climate change-related risks, and help improve understanding of system interdependencies.

Their overriding point here was that cross-sector collaboration will be key to decarbonising on a mass scale: "This is a complicated digital twinning operation around a relatively small geographical area with three or four different partners and it's really, really hard to do it. This is in part because the data sharing agreements are complicated, but also in part because it's a lot of data and it's hard to merge this all together when everybody's got different systems."

Building on these comments, the commentator emphasized that the net zero transition will force an increasing focus on how companies "merge data and operate twin systems with other organisations in order to optimise all of our performance."

Most commentators agreed with the principle that this kind of collective and collaborative approach to digital transformation for net zero is critical. However, for the moment, they also agreed it is not the primary route through which they are

44% are extremely confident their organisation will realise its net zero goals in a timely way

	Overall	Energy generator / retailer	Transmission network	Distribution network	Water wholesaler/ retailer
Extremely confident	44%	33%	67%	75%	35%
Somewhat confident	51%	67%	33%	17%	60%
Not very confident	5%			8%	5%

The data presented on this page has been rounded to the nearest whole number

■ Extremely confident ■ Somewhat confident ■ Not very confident □ Not confident at all

looking to achieve the "stretching" net zero targets which 77 percent say their organisations have introduced.

Asked how confident they were in reaching these targets, respondents were largely upbeat, with 44 per cent saying they were 'extremely confident' their organisation will realise its net zero goals in a timely way. A sizeable 51 per cent said they were 'somewhat confident'.

This prompted a somewhat sceptical response from industry commentators, particularly in regard to those who said they were 'extremely confident' in meeting their targets. Ellen Fraser, partner from Baringa, said, "I do worry whether they've challenged themselves enough. In reality, if you've set yourself a stretching target, you're

never going to be comfortable delivering it by the nature of the target."

PWC director of commodities trading and risk management, Ed Gray, was also surprised at the 44 per cent, saying, "Given the complexity of the shift towards net zero and all the different impacts it's going to have on organisations, and their operation models, I'd say that's a pretty bullish position to be in."

Another commentator within the water industry also lamented that it will become increasing difficult to hit targets as companies work towards their environmental goals.

"It's almost two steps forward, one step back, because you will be doing things that mean overall it's better for the environment, but your carbon will go up to achieve that. If you think about environmental parameters and the work that needs to be done to improve water quality, for example. That will mean more chemicals and more energy."
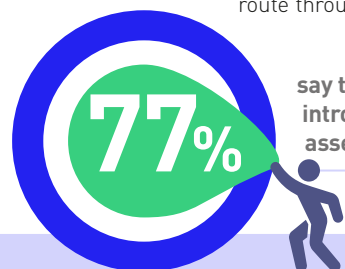
77% say their organisational response to net zero has included the introduction of stretching targets to reduce the impact of assets/operations on the environment.

UtilityWeek

— In association with —

appian

Focusing on digital innovation

With almost all respondents reporting significant or slight impacts on their digital transformation plans as a consequence of net zero, our survey delved further to uncover some useful insights into the key business areas and technology tool kits expected to feature prominently in a new phase of digitally-enabled net zero business transformation.

Asked where respondents saw the most potential for digital innovation to support their journey to net zero and three key areas shone through.

The first was around optimising renewable energy investments, with 80 per cent rating this as having 'high potential'. A further 73 per cent ranked driving down process-related emissions highly, while nearly 70 per cent pointed to reducing emissions relating to field operations.

These top three areas were also viewed as focal points for achieving quick wins in the race for net zero. More than half noted that driving carbon out of field operations

in particular should be a priority in the near term, alongside optimising renewable energy assets.

In terms of what digital innovation looks like in these core areas, Baringa's Fraser said much of it boils down to good data management.

She explained how a lot of the carbon footprint linked to asset management was associated with having to send operatives out into the field for maintenance purposes – something which she argued could be vastly improved with better data management.

"The carbon footprint associated with [maintenance such as drainage system leaks] is significant given the need to get people and

UtilityWeek

— In association with —

appian

13

materials to failure points, and the logistics associated with removing, disposing of and replacing materials."

"So, getting much better data on your asset network, in future perhaps even aspiring to a digital twin, which tells you where it's going to break, how you prevent that, and how you manage your maintenance schedules as efficiently as possible from a carbon standpoint, means there's a massive opportunity there."

The challenges associated with creating a digital twin, however, were flagged by one sustainability expert within the water industry, who questioned whether this could work on a national scale, using examples within the NHS and police of where similar systems had "crashed and burned".

"If we have the view that we can invent some kind of IT super system where everybody can communicate and get any piece of data we want, then I'm sure we're quite a long way from that. And maybe reaching that high might be much more of a task," they said.

On this, however, Appian, vice president of solutions and industry go-to-market, Mike Heffner, noted that focussing on incremental, digitally enabled efficiency ans sustainability gains might be a better way to go about delivering net zero goals than shooting for grand, cross industry transformation from the get-go.

He said, "Field operations is essentially a series of processes – from incident management, to field service and asset management. The more you can digitise those processes, bringing people, data and technology together, the more you can reduce human error and wastage and increase efficiency. It's not about throwing technology wholesale at the problem, however. It's about

finding the right process and then unpicking how technology can unify each part of that process.

"Every utilities firm can find two or three field ops processes now that could be automated to make incremental – but nevertheless important – improvements to efficiency. Take an area and break it down into bitesize deliverables that can be implemented now without waiting for major capital investments in systems and infrastructure. For too long, the industry has relied on big ticket tech projects, but you can make changes without that – and do it now."

Elsewhere, commentary presented examples where technology was already having an effect on carbon reduction. One professional from the gas industry said they were currently using technology within their gas pipes to remediate and pre-empt gas escapes.

They explained: "We have just completed a programme where we put a robot inside about 40 kilometres of gas pipes. This remediated the joints on those to reduce future leakage and therefore the carbon impact of getting gas to those sites."
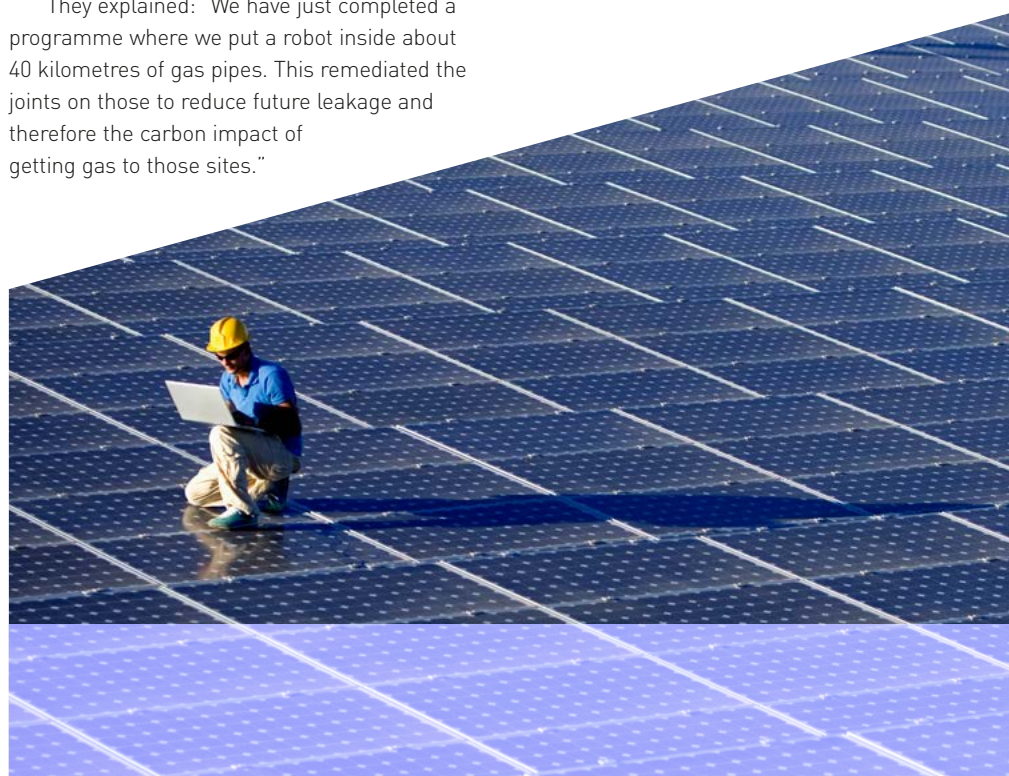
> ❝ It's not about throwing technology wholesale at the problem... It's about finding the right process and then unpicking how technology can unify each part of that process. ❞
>
> Mike Heffner, vice president, solutions and industry go-to-market, **Appian**

UtilityWeek

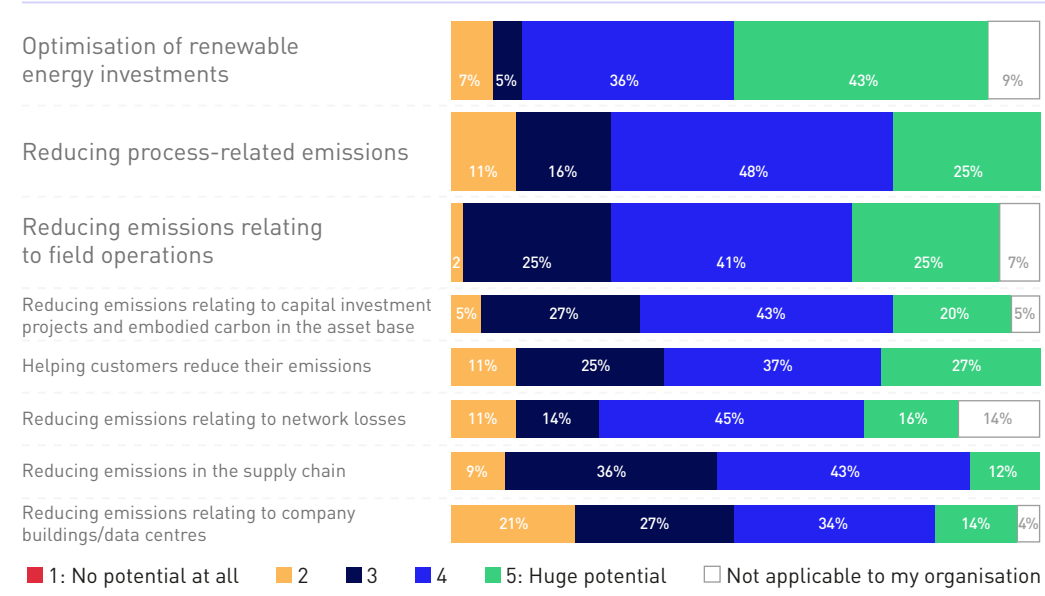— In association with —

appian

14

A number of organisations were also looking at electrifying their fleets as a way of reducing their field operations emissions. On this topic, one industry commentator from the water sector said electric vehicles (EVs) could also offer a solution around the storage of energy being generated from growing renewable energy investments. Though they noted that managing energy flows across a system like this might be a complex task requiring sophisticated digital foundations.

Following on from this, PWC's Maestro warned that companies should be prepared for the fact that fleet electrification might come with knock on effects for organisational operating models which need to be modeled and managed. "As [organisations] begin looking at the electrification process, they quickly realise that the way they operate will have to change. You need the data and the digital capability to map out driving patterns and charging patterns. That is really important so you can identify the best ways to electrify fleet.

"But then they also begin to realise as the electrify that they might need to make changes elsewhere. Suddenly they're needing to think – do I need all my in-house engineering capability [for fleet maintenance]? Do I outsource that to an OEM? If I keep it in house, what upskilling are my engineers going to need? That is all impacting on your operating model and the way you run your business.

"So, you start on this apparently simple journey of decarbonising your fleet and suddenly you realise that the way you run your business has changed. There are many other ways in which people haven't yet had the opportunity to think through fully all

The areas where respondents see most potential for digital innovation to support delivery of organisational net zero goals are

The data presented on this page has been rounded to the nearest whole number

Area	2	3	4	5: Huge potential	Not applicable
Optimisation of renewable energy investments	7%	5%	36%	43%	9%
Reducing process-related emissions	11%	16%	48%	25%	
Reducing emissions relating to field operations	2	25%	41%	25%	7%
Reducing emissions relating to capital investment projects and embodied carbon in the asset base	5%	27%	43%	20%	5%
Helping customers reduce their emissions	11%	25%	37%	27%	
Reducing emissions relating to network losses	11%	14%	45%	16%	14%
Reducing emissions in the supply chain	9%	36%	43%	12%	
Reducing emissions relating to company buildings/data centres	21%	27%	34%	14%	4%

■ 1: No potential at all ■ 2 ■ 3 ■ 4 ■ 5: Huge potential □ Not applicable to my organisation

the operating model implications of the commitments they have made around net zero."

Beyond using digital innovation to drive carbon out of internal operations, it's also highly noteworthy that half of respondents were eager to apply new digital tools to help consumers reduce their emissions. Unsurprisingly, this was particularly important to energy retailer respondents to the survey, although energy networks also showed a keen interest.

This finding struck a chord with Baringa's Fraser who said: "There's a huge role in terms of helping customers decarbonise their homes and the volume of data required to support and optimise that in terms of thinking about when to withdraw from the grid, when to store, how

to heat your home, when to charge your electric vehicle is large. Building out our thinking on data should really be done in parallel with work associated with work on the home like improving the EPC rating via insulation or switching from a gas boiler."

In contrast to the above areas of focus for digitally-enabled quick wins against net zero goals, harder to tackle areas identified by our respondents included the challenge of driving emissions out of supply chain operations. While this was seem to be important as pressure ramps up on companies to step up to "scope three" emissions targets - as described by the international Greenhouse Gas Protocol - most were pushing it into the long grass while

UtilityWeek

—— In association with ——

appian

15

interventions more directly within the their control are made.

Another interesting view on longer term emissions challenges for utilities to keep an eye on was that the very process of digital innovation will come with its own carbon footprint as the need for powerful data storage and processing facilitates ramps up.

Rondolph Brazier, director of innovation and electricity systems at the Energy Networks Association acknowledged this is something the trade body is looking via its Data and Digitalistion Steering Group. But he cuationed against over-egging the problem.

"Yes, more data and more digitisation means, more cloud services, which means more servers, which use a lot of energy – there's no doubt about that. But actually, the benefits that are unlocked from that digitalisation, both in terms of jobs, services, exports, but also reduced cost – not just reduced costs of running networks – but also reduced costs of even

Top technologies expected to be most helpful in meeting net zero goals are:

Advanced data analytics
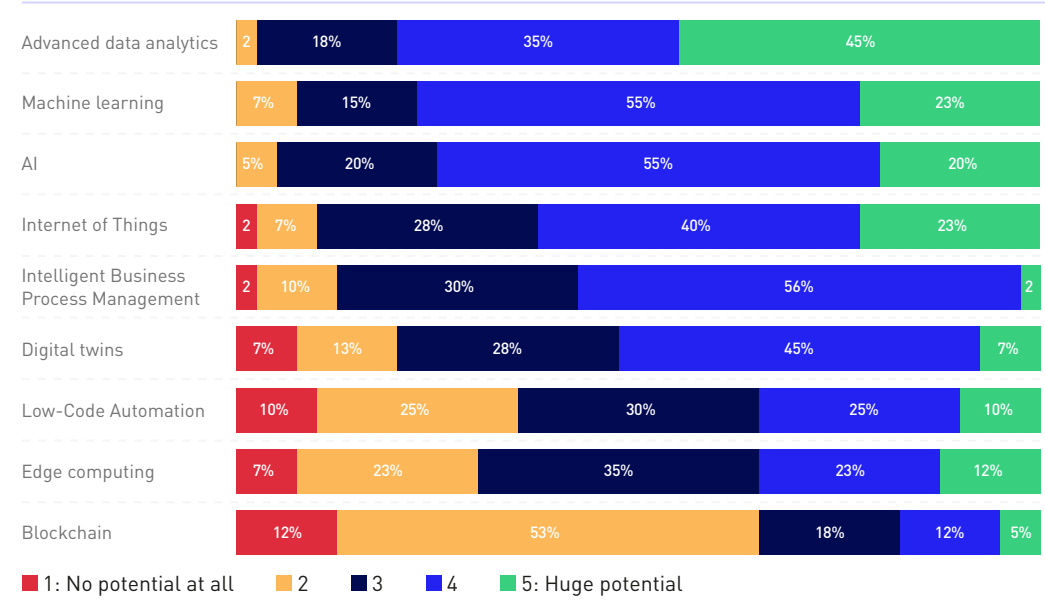**80%** of respondents expected good or huge potential

Machine learning
78% of respondents expected good or huge potential

AI
75% of respondents expected good or huge potential

Data Analytics, machine learning & AI have the greatest potential to support near-term net zero ambitions

Technology	1: No potential at all	2	3	4	5: Huge potential
Advanced data analytics		2	18%	35%	45%
Machine learning		7%	15%	55%	23%
AI		5%	20%	55%	20%
Internet of Things	2	7%	28%	40%	23%
Intelligent Business Process Management	2	10%	30%	56%	2
Digital twins		7%	13%	28%	45%	7%
Low-Code Automation	10%	25%	30%	25%	10%
Edge computing		7%	23%	35%	23%	12%
Blockchain	12%	53%	18%	12%	5%

■ 1: No potential at all   ■ 2   ■ 3   ■ 4   ■ 5: Huge potential

The data presented on this page has been rounded to the nearest whole number

building networks, I think would far outweigh any sort of additional energy use because we're using more data."

From there, the survey data looked at which technologies had the greatest potential to support near-term net zero ambitions, with data analytics, machine learning and AI coming top, according to respondents.

Advanced data analytics was seen as having either huge or good potential for driving net zero emissions over the next five years by 80 per cent of respondents, with machine learning coming in at 78 per cent and AI at 75 per cent.

Tying in with this, the data showed that respondents are proactively pursuing the potential offered offered by these technologies

with most reporting existing use of them as well as fresh investment plans fr the near term.

The same stats also offered some interesting insights into which sub-sectors within the utilities industry are investing most proactively. Notably, energy distribution networks stood out as embracing the widest set of technology solution to support their net zero ambitions.

Explaining this Baringa's Fraser said the complexity of the network today was such that it will require intensive and pervasive digitalisation in short order.
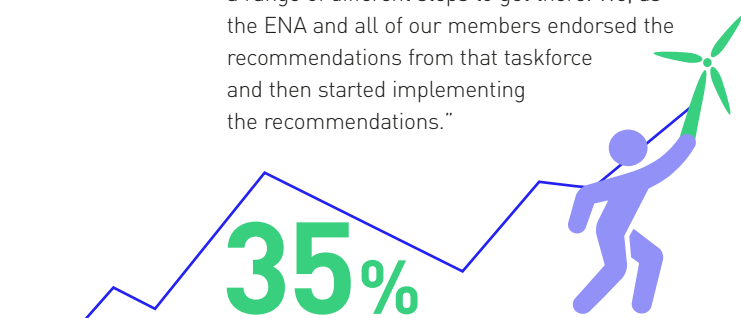
"Historically, a power station would input energy into the grid and it would flow in one direction to customers so they could consume. Now, you've got all sorts of distributed

UtilityWeek

—— In association with ——

appian

generation assets sitting all over the grid, some of them exporting, some of them importing.

"Customers are now consuming, but they might also be exporting onto the grid depending on how they're charging the electric vehicle or whether they've got solar PV on the roof. So that whole grid machine is materially more complex, and you've got no way of managing that through traditional mechanisms. So, digitisation of controlled systems, for example, becomes a massively different agenda."

Brazier added that the RIIO regulatory regime under which networks operate has substantially incentivised digital innovation and experimentation in recent years.

He also said: "Another kickstarter for all of this was the government's Energy Data Taskforce, which was launched in 2018. The Energy Data Task Force released a report which basically said that networks need to digitise their networks and they've got to take a range of different steps to get there. We, as the ENA and all of our members endorsed the recommendations from that taskforce and then started implementing the recommendations."

35%

recognised the **potential of low code automation** to support agile delivery of their net zero ambitions

The data presented has been rounded to the nearest whole number

Low-code automation 'emerging tech'

Relatively few respondents thought of low-code automation as a key digital tool to support net zero-focussed busienss transformation with just 55 per cent recognising the term. (Both recongnition and early adoption was highest with energy network companies.)

This low awareness came as little surprise to experts at PWC, with senior manager, digital transformation in commodities and energy trading, Mohammed Ismail, describing it as an "emerging technology field", the potential for which has yet to be really appreciated.

Low-code tech automates certain business processes without the need for large amounts of coding, meaning businesses don't need to rely heavily on developers or software engineers.

PWC director, commodities trading and risk management, Ed Gray, said a key challenge before increasing take-up of

low-code automation was the difficulty many firms encountered in articulating the business case for investment in it given that the benefits involved can shift significantly depending on the use case.

Ismail added: "Another key primary consideration to get value out of something like low-code is that you need to be confident your data is clean. If you are using data from multiple legacy systems which are not really in sync you're going to run into issues."

For Gray, however, the technology has real potential – particularly in regard to making smaller incremental gains towards your carbon goals. "I don't think there are very many utilities who are sticking their hands up for large scale transformations of their existing IT infrastructure. In that sense, low-code automation is ideal because it allows you to leverage value which exists in your organisation."

UtilityWeek

— In association with —

appian

Barriers to net zero

The survey showed the biggest barriers holding companies back for achieving their net zero transformation goals are a lack of robust data and meagre funds for digital investment.

When asked which intenral barriers are most likely to hamper net zero ambitions in the utilities sector a lack of robust data to underpin sound carbon-conscious decision making stood out head and shoulders above other issues, followed by a lack of funds for investing in key technologies.

Industry commentary backed these findings up with many saying they feel company are a long way off achieving the sophisticated monitoring and reporting systems for capital, operational or process related carbon which will be important for the future.

One water company representative for example, said they were keen to explore the sustainability benefits of a wider use of green gas (a sewage treatment by-product) in decarbonising multiple aspects of company operations.

However, they added: "That creates a very complicated multi-dimensional and multi-party system that needs to be modelled and overhauled and to decide when you're going to invest in it or not you need some fairly sophisticated modelling to understand how you're going to get best value from it."

Despite this, they revealed that integrating the IT and data systems required to get that modelling was not seen as a business priority today, adding: "They [the business] haven't realised they're going to need to do this".

UtilityWeek

— In association with —

appian

This disconnect between grand ambition and the incremental gains needed to get to net zero was further highlighted by another senior energy industry representative.

They discussed the need for "a granular level of data" to help educate customers to reduce their emissions by switching to renewable energy or reducing their energy usage.

The challenge here, however, is a lack of available data to make this a reality. The commentator explained, "One of the biggest challenges around how we encourage customers to start using more renewable energy or more renewable energy sources is getting the data to educate them. At the moment, smart meters go down to half hourly usage, but you don't get that until the day after so it's not real time.

"There is some equipment that you can put in but that means getting someone to install it and connect into their power network and to get an electrician out to install something, means people have got to be really engaged, so longer-term engagement is going to be hard but the more data you can get, the more you can start nudging customers."

Appian's Heffner explained how companies can make data-based intelligence accessible and visible across an organisation quickly without being held up by legacy systems.

"By bringing data together from different sources and legacy systems, an organisation can become more iterative, agile and process-focused. Data orchestration – and orchestrating between people, data and systems in single workflows – is increasingly important to the utilities sector. Having greater visibility over data also improves decision making.

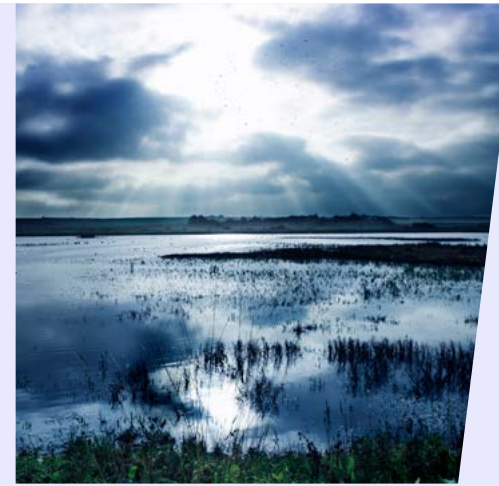## Anglian Water, Capital Carbon Programme

An overriding theme within this report was the sector's lack of sophisticated ways to measure and monitor their carbon. To date, the sector has been focussed understanding and setting a longer-term vision for net zero transformation, rather than taking immeidate steps to build that data foundations which will enable it and drive climate-conscious decision making on investments and ways of operating.

One company bucking this trend, however, is Anglian Water, which has a mature capital carbon programme that assesses the embodied energy in the pipes and various other assets they construct.

Using carbon models based on 2010 carbon values, Anglian assesses the carbon intensity relating to its materials and construction processes to come up with a capital carbon value for any proposed investment or asset intervention.

Having used this form of assessment since 2015, Anglian says it has forged a "cast-iron relationship" between the capital carbon and the cost of its assets, with the conclusion that reduced carbon equals reduced cost.

With this knowledge, Anglian then iterates the design of the asset through the investment phase and design phases, with approval gates to drive out the capital carbon, and therefore also reduce cost.

As proof of its effectiveness, as of 2020, Anglian has achieved a 61 per cent capital carbon reduction on its 2010 baseline.

Capital carbon is so closely linked to cost that Anglian has a carbon element running through its financial planning models, recorded inside its totex management system, with a target for 65 per cent reduction by the end of the current AMP and a 70 per cent target by the end of the following AMP.

"The more power we can put in the hands of people who handle day to day processes, the better, more efficient, and cumulative, the effects will be. Too often the ambition is to invest in new systems entirely, rather than seeking to integrate what's already there into something meaningful where the data can be interpreted and acted upon by automated workflows or human decision makers. Thinking small when it comes to technology needed to achieve your sustainability goals, is the key."

Beyond a paucity of data, the second biggest perceived barrier to achieving utilities net zero transformation goals was a lack of available funds for investment in enabling digital tools.

UtilityWeek

—— In association with ——

appian

One technology leader at a major gas network bemoaned the "drastic" cuts imposed by Ofgem to their intended digital spending plans for the RIIO2 period. Over in water there were similar feelings about a legacy of short-sighted restrictions on digital investment via the sector's price control process, though one senior sector representative acknowledged that Ofwat seems to be becoming inclined towards generosity and long-termism in this regard.

"There is potentially a softening up of 'it's only done in five-year cycles', which I think can only benefit the water industry, carbon footprint and customers," they said. Beyond this, industry commentary questioned whether it was culture rather than technology that was an inhibitor to making genuine change within organisations.

It was felt that the key to digitalisation was the need for a clear, centralised understanding from both the business and IT of what data, processes and resources were needed in the delivery of key workflows within field operations, management of network losses or supply chain logistics.

With that in place technology such as AI, machine learning or more emerging tech such as low-code automation could be integrated to digitalise and optimise these workflows.
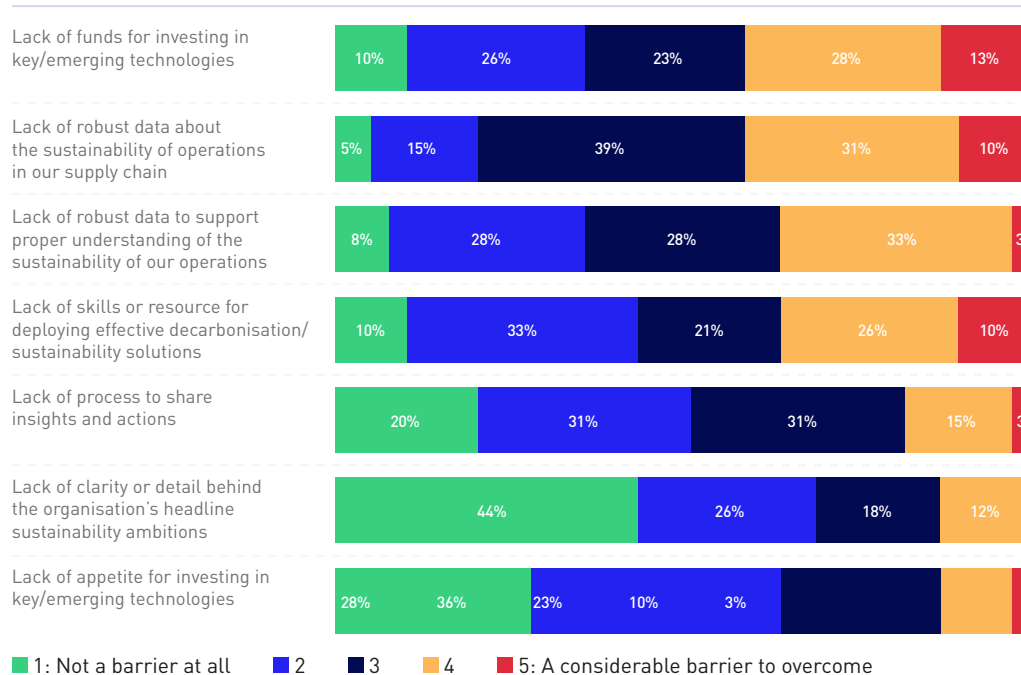
Hand in hand, with this need for cultural change is the need for more tech skills within the sector, said one innovation expert within the water sector. "The more skills you get the more the culture changes. From a water point of view, there are a lot of people that spend their entire careers at a water company. That is definitely changing through apprentices, kick starters and graduates. As a result, you end up getting a more flexible and a higher turnover on the younger generation but they are also the ones who are going to embrace a digital industry future more readily and who are highly motivated by the idea of playing a role in the net zero transition."

Beyond internal barriers to digitally-enabled net zero transformations, repsondent also identified some key challenges in their operating environment, including challenging market conditions (mostly strongly cited by energy retailers) and unsupportive regulatory or policy regimes.

In relation the the former point, one energy retail leaders said a lack of liquidity in the market is a challenge, while another said the sector's low margin's made innovation and forward-looking investment difficult to support.

Elsewhere, both survey respondents and industry commentators highlighted the role the regulator needed to play in reaching net zero.

A lack of funds and robust data to support decision making are seen as the key barriers to achieving net zero ambitions

Barrier	1: Not a barrier at all	2	3	4	5: A considerable barrier to overcome
Lack of funds for investing in key/emerging technologies	10%	26%	23%	28%	13%
Lack of robust data about the sustainability of operations in our supply chain	5%	15%	39%	31%	10%
Lack of robust data to support proper understanding of the sustainability of our operations	8%	28%	28%	33%	3
Lack of skills or resource for deploying effective decarbonisation/sustainability solutions	10%	33%	21%	26%	10%
Lack of process to share insights and actions	20%	31%	31%	15%	3
Lack of clarity or detail behind the organisation's headline sustainability ambitions	44%	26%	18%	12%	
Lack of appetite for investing in key/emerging technologies	28%	36%	23%	10%	3%

1: Not a barrier at all   2   3   4   5: A considerable barrier to overcome

UtilityWeek

— In association with —

appian

A technology leader from a major gas network said the regulator must cross sector strides in digitalisation of operations and processes to support net zero, by helping to coordinate and priortise where companies are focusing their efforts.

Without a common set of digitalisation priorities, they said, progress will be slow and piecemeal. Other commentators agreed that coordination and knowledge sharing on the ways in which digital innovation can make utilities fitter for the zero caron future are key. However, others were less keen to see the regulator set the agenda here. Another gas sector representative said that all companies are now required to publish digital transformation strategies and that the ENA is now leading on efforts to ensure these strategies are not misaligned.

The survey report ended by asking respondents how the pandemic had influenced their net zero transformation and digital transformation programmes. Unsurprisingly, the findings resoundingly reflected a feeling from respondents that the pandemic has increased focus and pace of change, around both strategic business transformation for net zero and digital transformation.

In associated commentary however, multiple industry leaders raised concerns that as society and the economy return to normal, some of the gains made in the past year may be reversed - at least temporarily. One commentator said they expect 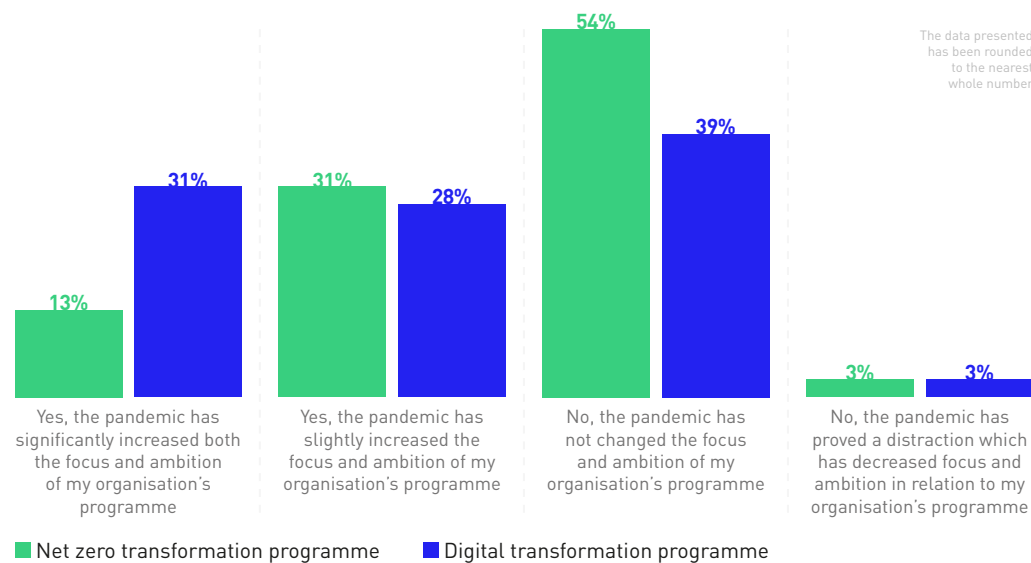a slight uptick in operational emissions, for example, while another said that increased domestic water use during the pandemic has left the idustry with a mountain to climb on encouraging consumer water efficiency.

The same commentator added: "Clearly that increased domestic water usage has also created issues in terms of the volume of water we've had to treat and therefore the energy we have consumed."

> "The more power we can put in the hands of people who handle day to day processes, the better, more efficient, and cumulative, the effects will be."

Mike Heffner, vice president, solutions and industry go-to-market, **Appian**

As a result of the pandemic, organisations are now more focused on both strategic and digital transformation programmes

The data presented has been rounded to the nearest whole number

Legend: ■ Net zero transformation programme ■ Digital transformation programme

Chart categories and values:
- Yes, the pandemic has significantly increased both the focus and ambition of my organisation's programme — Net zero: 13%, Digital: 31%
- Yes, the pandemic has slightly increased the focus and ambition of my organisation's programme — Net zero: 31%, Digital: 28%
- No, the pandemic has not changed the focus and ambition of my organisation's programme — Net zero: 54%, Digital: 39%
- No, the pandemic has proved a distraction which has decreased focus and ambition in relation to my organisation's programme — Net zero: 3%, Digital: 3%

UtilityWeek

— In association with —

appian

Conclusion

This research makes clear that while UK utilities have embarked on major organisational transformation programmes to align with a net zero future, substantial work is needed to better understand the incremental steps which now need to be taken to deliver these.

There is a recognition that digital innovation will play a major role on this journey but there is a clear disconnect between organisations' longer-term vision of their net zero carbon future and clarity on the immediate, pragmatic steps that need to be taken to lay the foundations for that future, such as creating more substantive data to drive decision making on asset investments and interventions.

Industry commentary laid out some tangible examples of how companies' current and planned use of data could help drive out carbon and improve broader environmental sustainability and resilience, but several comments also suggested that these projects are not always recognised as important. It was also clear that a handful of companies taking strides to digitalise robust carbon measurement and reporting processes are currently in the minority.

In short, our survey shows a clear need for companies to identify and and grasp opportunities to make incremental gains today on the digitalisation of processes and operations which will lay the foundations for their longer term business transformation ambitions.

This focus on relentlessly capturing marginal efficiency and carbon reduction gains needs to start at home. But as several comments highlighted, companies also need to bear in mind the benefits which can be gained via collaboration and coordination with other players in the sector and beyond. This will help speed up the pace and efficacy of a digitally-enabled transition to net zero and also encourage resilience by ensuring system interdependencies are recognised.

Before either company-specific or cross-sector transformations can occur however, our survey clearly highlighted a need to make key data sets available and accessible. Without a significant improvement in the volume, quality and accessibility of data on metrics such as the carbon intensity of key assets, materials, processes etc, the industry cannot hope to integrate climate-responsibility into strategic decision making in a meaningful or sustained way.

Focus on relentlessly capturing marginal efficiency and carbon reduction gains needs to start at home.

UtilityWeek

— In association with —

appian

appian

Appian helps organisations build apps and workflows rapidly, with a low-code automation platform. Combining people, technologies, and data in a single workflow, Appian can help companies maximise their resources and improve business results. Many of the world's largest organizations use Appian applications to improve customer experience, achieve operational excellence, and simplify global risk management and compliance.

appian.com

UtilityWeek™

Utility Week is the UK's unrivalled provider of utility news, insight and impact analysis. It provides a complete understanding of market changes, the impact and steps to take. Its membership empowers utility leaders and their teams to transform with confidence – improving outcomes for stakeholders and customers.

utilityweek.co.uk