Powering digital transformation in the energy sector

Realising a digital future that's efficient, secure and sustainable

Introduction

Global energy is in a time of huge transition.

Across the entire sector, many energy and natural resource organisations are navigating a shift towards diverse renewable energy sources, setting out aggressive strategies for net zero and forging new paths to recruiting and protecting their workforce. As these organisations are trying to reshape the industry as we know it, Energy 4.0 is being widely recognised as the most direct route to achieving these goals.

But building a future towards a fully integrated energy cloud ecosystem that connects and intelligently manages disparate assets, technologies and partners isn't always straightforward. Before any digital transformation can be successful, organisations must overcome significant challenges - from legacy networks, inconsistent architectures, fragmented operations and uniting departments behind organisational change.

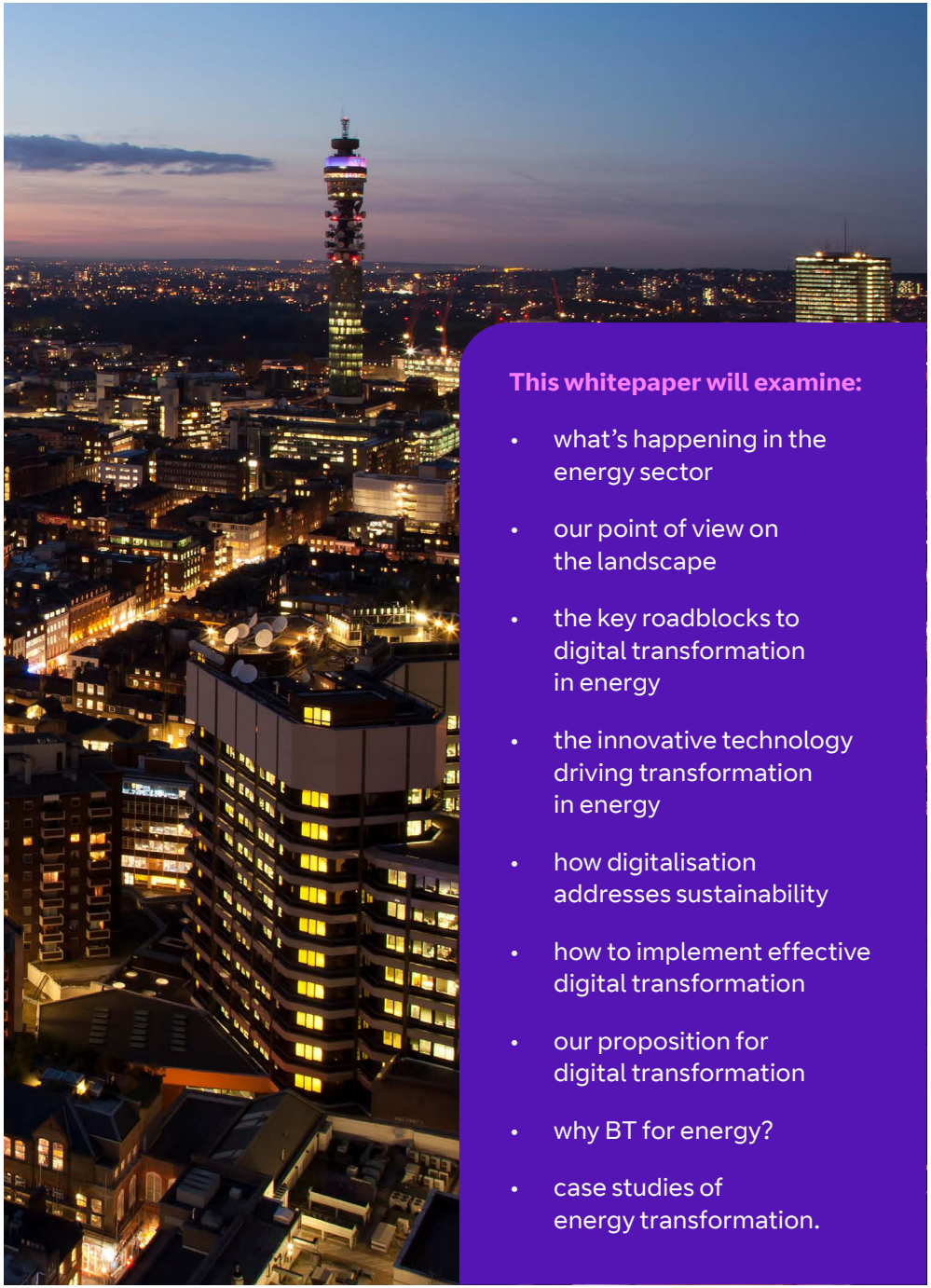
In our experience working with global energy providers, we've found that secure connectivity is the foundation that underpins every digital transformation strategy.

Without secure and reliable connectivity, it's impossible to introduce the technology you need to capture, analyse and action data insights across every level of your business and create a safer, more efficient and sustainable operation.

In fact, energy companies that have applied digitalisation successfully can facilitate 2-10% improvements in production and yield and 10-30% improvements in cost. Digital energy is also creating opportunities for innovative business models and is helping organisations unlock new and diverse profit streams.

To help you on your journey, we've created this whitepaper to support your thinking about digital energy and shape your plans for the future. Do get in touch if you'd like to discuss anything further.

Eyad Shihabi
Global industries and government, MD, BT



This whitepaper will examine:

- what's happening in the energy sector
- our point of view on the landscape
- the key roadblocks to digital transformation in energy
- the innovative technology driving transformation in energy
- how digitalisation addresses sustainability
- how to implement effective digital transformation
- our proposition for digital transformation
- why BT for energy?
- case studies of energy transformation.

What's happening in your market

Digital transformation isn't new, but the energy sector has sometimes been slow to embrace it. Today, competing pressures within the sector mean that's about to change as four key developments drive digitalisation in energy.

Transformation driver #1 – the move to a dispersed, multifaceted energy model

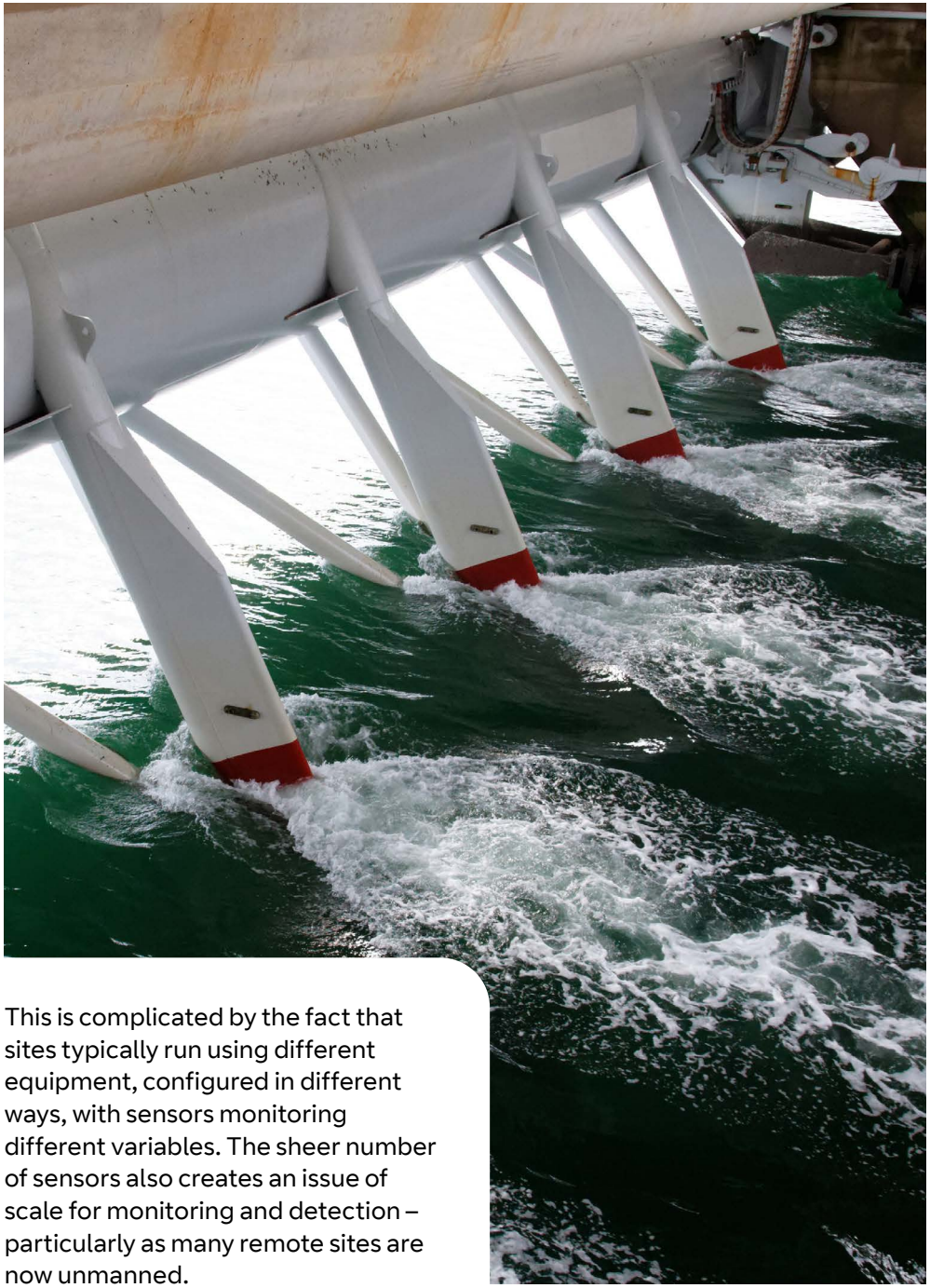
The need to invest in diverse and renewable energy sources is increasing the complexity of the energy ecosystem. The ways energy is created, stored, distributed and consumed have evolved and the days of linear distribution - from rig to plant to customer - are numbered. Today's multifaceted model incorporates traditional, renewable, consumer and decentralised energy solutions, with power travelling both to and from the grid, so it's critical that everything works in synergy.

Reliable connectivity and the ability to utilise vast quantities of actionable data insights lie at the centre of an efficient, coordinated and strategic energy supply chain. Organisations need to be proactive about harnessing, analysing and acting on real-time data from assets and equipment that are becoming more varied, distributed and difficult to reach.

Transformation driver #2 – the need to secure connected assets

An increasing number of distributed energy resources inevitably requires an increase in Operational Technology (OT). Connecting these OT assets and harnessing their data insights underpins digital transformation, but increased OT connectivity also significantly increases the threat landscape as every connected device becomes a potential entry point for a cyberattack. The energy sector is a prime target for both environmental hacktivists and political, state-sponsored attacks. Energy was the number one target for cyberattacks in 2019, attracting 16% of all attacks worldwide, and renewable sources such as wind turbine farms are increasingly falling victim to these attacks.

Securing the ever-growing number of connected machines, devices and people requires threat visibility, including any legacy infrastructure.



This is complicated by the fact that sites typically run using different equipment, configured in different ways, with sensors monitoring different variables. The sheer number of sensors also creates an issue of scale for monitoring and detection – particularly as many remote sites are now unmanned.

Transformation driver #3 – difficulties recruiting and protecting the workforce

Accessing scarce natural resources has often meant that employees have to work in dangerous environments with associated health and safety risks – like injury, kidnap, and sometimes loss of life. Over the last 10 years, many experienced employees have left the industry due to retirement and forced layoffs, for instance when the price of oil plummeted to $20 a barrel. Often referred to as the 'Great Crew Change', many of these experienced workers were never replaced, leading to a significant skills gap.

It's now becoming very hard to replace these seasoned oil industry engineers as younger people are put off by sustainability concerns around the oil, gas and mining industries, as well as the negative PR relating to on-site dangers. Organisations, therefore, need to make the best use of existing staff and the experience they have, and should be looking to technology to support their most remote or risky environments.

Transformation driver #4 – the push for more sustainable energy solutions

Across the world, governments are setting aggressive targets for carbon reduction and renewable energy adoption to support sustainability goals. COP26, 2021's UN climate change conference, intensified this by setting new, firm commitments and around 90% of the world is now covered by net zero targets. As investors divest from organisations that are heavy users of fossil fuels and consumers seek out more environmentally friendly organisations, the pressure is on for energy companies to increase sustainability across every aspect of their operations.

As with other business targets: if you can't measure it, you can't manage it, and the best way for the energy industry to get a handle on their emissions is to baseline through extensive data collection and analysis. With a clear understanding of where emissions are coming from, it's then possible to use digitalisation to optimise efficiency – reducing waste and emissions.

Our point of view

Energy 4.0. is now a reality for those operators ready to make the move.

Forward-thinking energy leaders are using powerful digital technologies such as cloud, the Internet of Things (IoT), big data information management, Artificial Intelligence (AI) and machine learning to optimise their energy production and sharpen their competitive edge. They're building a future where energy cloud ecosystems will intelligently manage data from disparate sources, technologies and partners to coordinate distributed, cleaner, two-way energy flows.

This coordinated future depends on bringing together very different resources in a consistent and secure way. Oil fields, wind and solar farms, energy consumers and prosumers, and more, all need to be visible, monitored parts of the intelligent energy ecosystem. Secure, resilient connectivity is at the heart of making this happen, particularly as the industry is pushed into increasingly remote and volatile environments.

Without the right connectivity, it's impossible to introduce the technology to capture, analyse and action the data insights that will make the industry safer, more efficient, and more sustainable.

And yet, in many cases, the way the market is developing makes achieving this connectivity harder. As organisations look to acquisition to grow their renewable capabilities, they're adding more systems into their estate. Systems that are often connected, secured and managed differently, making accessing data in a consistent way a complex issue.

We believe solving the connectivity question should be a priority. Collecting data from all sides of the operation, including the edge, and delivering it to the cloud, can involve integrating satellite and IoT connectivity with fixed networks to ensure complete, useable data. Energy operators need to create a federated and secure global network that can connect any region to core cloud services, to bring disparate sites and energy operators together. Resilience is essential. Many Energy 4.0 technologies are only as good as the connections they're running on. In many situations, if the connection fails, work has to stop completely – costing operators at large oil producing sites around $22,500 per hour in lost production.

The management and visibility of every site and asset on the connected network is also important – and often overlooked. Energy operators need to be able to monitor their infrastructure 24/7, mostly for productivity and maintenance reasons. Effective data management will pick up minute changes that can signal an emerging problem, triggering proactive maintenance.

And underpinning this resilient connectivity is security. As OT and IT converge, new vulnerabilities to cyberattacks emerge. Retrospectively fitting security is often the most expensive option, so a big part of the Energy 4.0 evolution must be building security into the process by design. However, this won't be a 'one size fits all' solution. The highly individual structures of each energy operator will need a bespoke assessment and security rollout and, potentially, a plan that brings expertise together from several security specialist providers.

Compliance with all relevant regulations is another absolute essential for operators as they plan their future operations. Classified as critical national infrastructure, the energy sector must take into account the EU's recent proposed directive on the resilience of critical entities. For operators, this will mean undertaking risk assessments, boosting resilience measures and reporting disruptive incidents. Nations are also increasingly asking the energy sector to take on additional responsibilities for the cybersecurity of power assets and organisations. The EU NIS Directive, for example, has given regulators powers to assess critical industries and make sure plans are in place to prevent cyberattacks.

A successful shift to digital energy is also strongly linked with the business need to increase sustainability. Consumer consciousness and regulation around how the energy sector uses scarce resources and generates carbon emissions is at an all-time high. Prioritising sustainability and using digitalisation to harness more environmentally friendly production methods will set industry leaders apart.

The key roadblocks to digital transformation in the energy sector

In our experience working with global energy producers to achieve digital transformation, we've found that the same issues, concerns and attitudes emerge. Recognising what's holding your organisation back allows you to address the roadblocks in your digital transformation strategy.

1. The great unknown – legacy equipment

Today's energy sector still has roots in petro-chemical assets and the legacy networks that support these. Many organisations would be hard-pressed to identify exactly what legacy equipment they have and finding out would mean trawling through extensive paper records to create an up-to-date inventory. It's daunting that a significant proportion of equipment isn't even connected over ethernet, and every site typically operates using different technology. Also, much of the equipment is often managed by a mix of large and small oil services companies further compounding the problem.

2. Inconsistency due to site autonomy

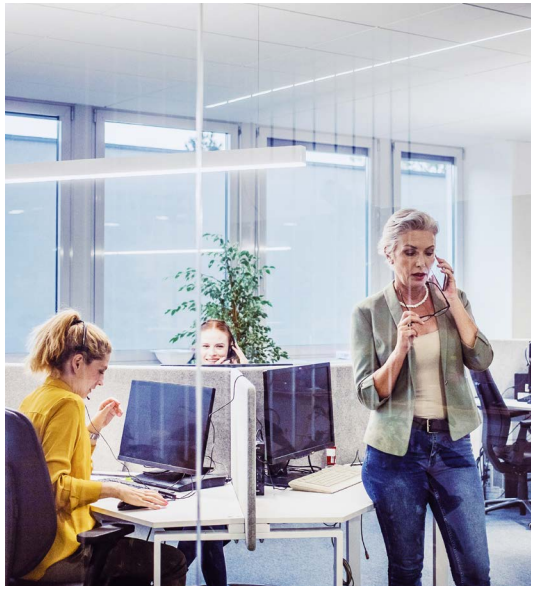
Due to remote locations, globally dispersed operations, and the acquisition of new renewable energy producers, every site operates slightly differently and there's a high level of autonomy over site solutions. This has led to inconsistent architecture and a fragmented approach to operations where two parts of the same organisation could be operating on completely different equipment and connectivity. This fragmented approach can create significant security risks as local teams may be able to autonomously connect IoT devices to the network, making them invisible to the central security team and Chief Security Officer (CSO). The resulting incompatible data from all these devices also leads to further diverged processes and digital solutions, which is a difficult foundation on which to digitalise in a consistent, repeatable way.

3. Getting compute and edge technology to where it's needed

Equipping disparate, non-standard, often difficult to reach sites with edge compute capabilities is complex, as is managing it and handling software updates remotely. It's a logistical and connectivity challenge. What's more, sourcing reliable specialist compute equipment adds an extra layer of difficulty. This is further compounded where there is explosive risk, so the equipment – or enclosure surrounding it - needs to be certified as ATEX level 1 or 2 compliant.

4. Uniting departments behind change

Identifying which team is most appropriate to lead digital transformation can be a struggle, particularly if teams have territorial, entrenched attitudes to their respective silos. OT often sees IT as a threat vector that has the potential to seriously disrupt production, and both OT and IT can see the security team as a brake on their productivity. Often OT and IT teams don't understand each other's worlds, including risks, priorities, and even terminology.



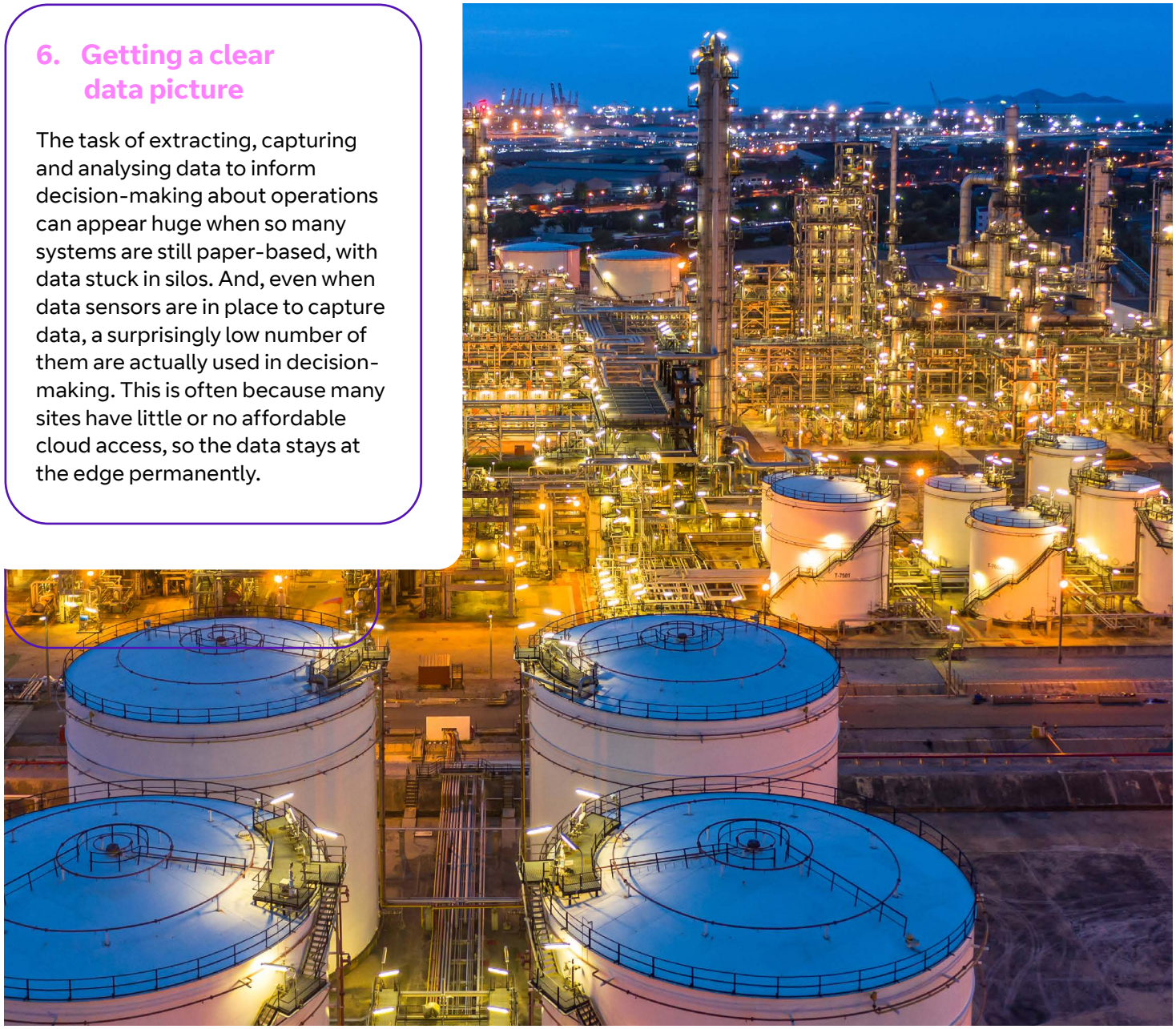
The key roadblocks to digital transformation in the energy sector

5. Establishing connectivity across the entire energy operation

Extracting hydrocarbon-based fuels is pushing organisations into more challenging environments that are remote or subject to volatile governance and political instability. It's a significant challenge to establish connectivity and it's not uncommon for terrestrial government-provided connections to be unexpectedly severed. Companies need to have strong connectivity strategies and robust back-up capabilities to prevent disruption to critical operations. Plus, as methods of generating energy become more diverse, the breadth of different equipment used is also a connectivity challenge. And developing consumption methods, such as the emerging Electric Vehicle (EV) network, make the situation even more complex.

6. Getting a clear data picture

The task of extracting, capturing and analysing data to inform decision-making about operations can appear huge when so many systems are still paper-based, with data stuck in silos. And, even when data sensors are in place to capture data, a surprisingly low number of them are actually used in decision-making. This is often because many sites have little or no affordable cloud access, so the data stays at the edge permanently.



Innovations to drive your digital transformation

Secure connectivity is the foundation that underpins almost every game-changing innovation in the energy sector. As energy industry priorities shift to lower carbon, lower cost initiatives, and the volume of data steadily rises, the need for reliable and secure connectivity has never been greater. It's only with reliable, secure connectivity that innovative technologies can improve efficiency, boost sustainability and maximise the lifespan of assets.

In terms of connectivity, 5G is, without a doubt, the technology of the moment across all digital industries. However, we see it as a facilitator for other innovations rather than as a standalone technology. Its latency is approximately half that delivered by 4G, and it provides consistent connectivity without the dropouts that can happen with 4G. This combination of low latency and high reliability minimises the likelihood of a safety failure and opens the way for new advances.

Across the energy sector, the volume of data is growing by

100%

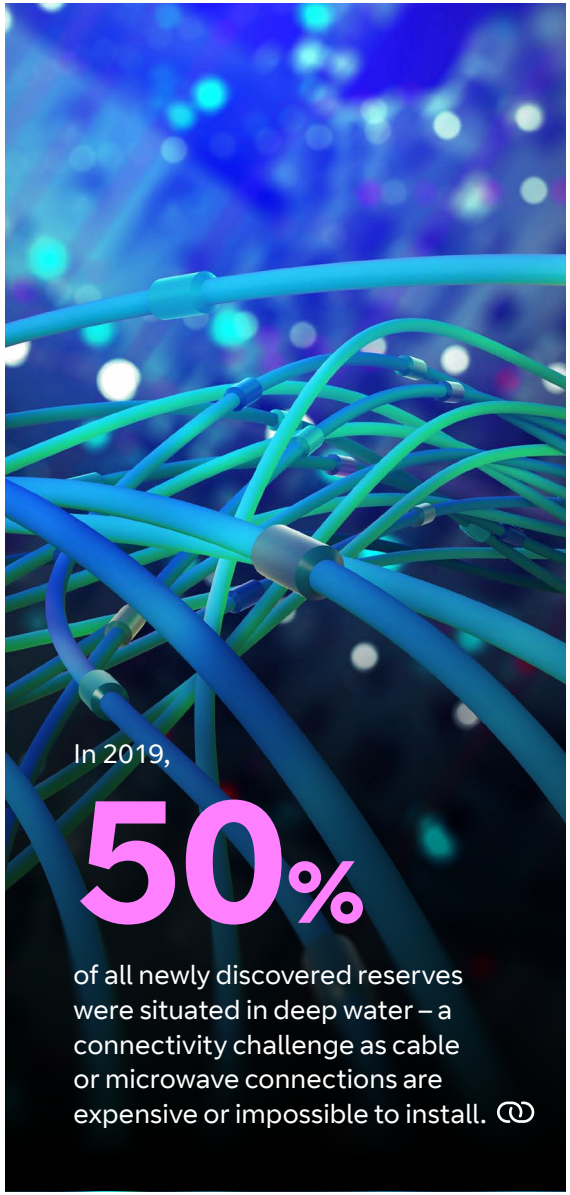
every 12 to 18 months.

Here are three innovation areas that are critical to digital transformation in the energy industry:

1. Connected assets and IoT

Creating connectivity between equipment and automated architecture is the first step to uncovering and acting on data insights, paving the way for the intelligent, optimised energy production of IoT-driven Energy 4.0. However, connectivity is also a reason why the IoT's roll-out has been slow. Across many operating environments it's difficult or cost-prohibitive to lay fibre, and even terrestrial 5G is unlikely to ever reach these locations.

This is where satellite technology can fill a vital connectivity gap. Offering low latency that's ideal for automation and other near real-time connections, Low Earth Orbit (LEO) and Medium Earth Orbit (MEO) satellite services can deliver the high-speed connectivity to reliably connect IoT assets. This can connect edge computing to the network, avoiding the need to send large quantities of data to a central processing centre, with sufficient computing power. Satellite offers scalable high throughput, low latency networks that can complement or create connectivity – helping the energy sector to maximise the value of data investments via cloud and other compute technologies.



2. AI and edge compute

Leveraging sensors, edge computing and machine learning tackles the challenge of connecting and maintaining sites in remote and harsh locations. By gathering behavioural information about remote assets, and analysing this through machine learning algorithms and big data techniques, maintenance can become a more calculated, strategic process – making it cheaper and safer. Instead of emergency call outs to deal with equipment that's already down, predictive maintenance maximises equipment lifespans, allows maintenance to be aligned with planned downtime, and results in less disruption to production. Using real-time data collected at the edge, AI can also provide the insights to optimise processes and energy. Ultimately, ubiquitous AI and a secure communications infrastructure will transform smart grids into autonomous, self-healing networks with attached controllable assets.

On average, predictive maintenance increases productivity by

25%

reduces breakdowns by

70%

and lowers maintenance costs by

25%

3. First line worker solutions

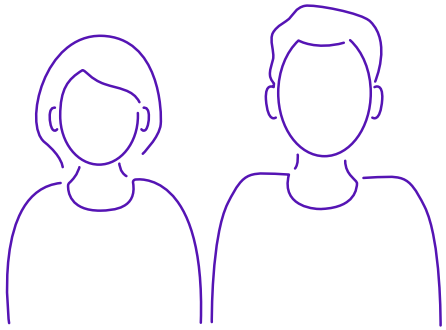
Remote working technologies have the power to make the industry safer and bridge skills gaps globally. As technologies like drones, robotics, mixed reality and virtual reality like smart glasses are developed to conduct increasingly complex functions, they are not only effective at increasing asset lifespans through quicker maintenance and fault response, they also have the potential to take people out of the world's most hazardous locations and remotely deliver expertise to the most inaccessible corners of the world. This makes the industry safer and creates more opportunities for workers to develop industry-leading technology skills – both of which make the sector more attractive to new recruits. Strategically distributing these technologies to manage contingent workers, particularly when integrated with walkie talkies and other voice services, will be a competitive differentiator in the energy industry.

The key to harnessing the potential of these digital solutions is through underlying connectivity, often using a combination of network solutions. Accurate, effective deployment requires reliable, low latency connectivity - and because wi-fi and micro-wave links are usually insufficient, private LTE or private 5G is typically the best option.

First line workers make up

80%

of the workforce and are the fastest growing contingent.



Addressing sustainability through digital energy initiatives

Greenhouse Gas (GHG) emissions are the most significant contributing factor to climate change, and the energy sector is a significant producer. In the UK alone, the energy supply sector was responsible for around 21% of UK GHG emissions in 2020, with the bulk of emissions coming from fuel combustion in electricity generation at power stations.

There's strong regulatory and public pressure to cut energy usage to increase sustainability. Pledges like the Paris Agreement shine a spotlight on emissions via public reporting, and the goal of net zero by 2050 is gaining momentum through legislation and support from organisations like the UN. How can the energy industry respond?

At the heart of sustainability initiatives is the need to efficiently measure, track and reduce GHG emissions. Understanding emissions across scopes 1-3 helps to baseline progress to a net zero goal. For obvious reasons, the energy sector faces one of the most difficult journeys to become carbon neutral. Its emissions are primarily within scope 1, meaning fewer quick wins and greater operational upheaval.

Offsetting and acquisition are only part of the answer

Initial responses have focused on offsetting and acquiring renewable energy companies in order to meet sustainability targets and improve brand perception. Supply and demand pressures mean carbon offsetting is predicted to boom, however, it's less effective than actually reducing emissions. Equally, renewables are a finite resource, and often unpredictable, so the best course of action is to minimise waste and energy usage as a priority.

Knowledge is power

Increasing sustainability will depend on taking every opportunity to reduce emissions, and closely monitoring the organisation's sustainability data will be important. All operators will need to thoroughly understand the picture the data reveals and know how energy efficient their whole estate is, from buildings to plants to turbines. AI should be the first instrument energy organisations reach for in their sustainability toolkit. It's the most effective way to reduce waste, lower emissions and optimise energy efficiency across operations. However, it's key to keep the human in the loop too to ensure that the AI, whilst saving energy, doesn't compromise production quality or safety.

Accelerating connected distributed solutions

As the unit costs of solar and wind energy decrease, and the move to renewables gains pace, energy organisations must be ready to rapidly scale their existing operations. At the same time, it's vital new innovations such as carbon capture, utilisation and storage (CCUS) are also harnessed and connected to storage within integrated smart grids to optimise systems more broadly. This will not only help with decarbonisation efforts, but also reduce energy organisations' downstream scope 3 emissions.

Delivering maintenance remotely

To reduce travel emissions and enable remote decision making, many organisations are turning to the real-time, immersive experiences offered by advanced Augmented Reality (AR), AI and IoT solutions. These technologies help to distribute knowledge effectively across the workforce, including onsite training, maintenance support, building familiarity with hazardous environments, or carrying out safety inspections. And, if experts aren't available for support, solutions such as smart glasses can use AI computer vision for intelligent, real-time object detection and safety monitoring, or guiding workers through digital workflows using earpieces.

Sustainable connectivity

Despite its many sustainability benefits, digital optimisation relies on real time data – increasing the use of data centres which inevitably lead to scope 1 and 2 emissions. To head off this increase, energy organisations must make strategic, sustainable decisions about the data centres they select, mitigating any negative impact by focusing on data centres with low power usage effectiveness (PUE), low carbon usage effectiveness (CUE), and high data centre infrastructure efficiency (DCiE). Local processing using edge compute is also part of this conversation as it can reduce scope 2 GHG emissions by enhancing the efficiency of operational assets and resources. Processing data at the edge usually involves less duplication, comes with lower network energy costs, and gives the user greater control in terms of the use of clean energy, not always possible when using cloud data centres.

Algorithms exist that deliver energy savings of between

6-12%

within 1-2 months.

Make sustainability part of everything you do

The potential to deliver energy more sustainably is increasing as innovation and digitalisation grows within the sector. The critical point is to stop thinking of sustainability as a separate topic. Instead, leading organisations are seeing sustainability as a thread that runs through all aspects of operation.

Digital transformation can support sustainability by:

- automation to take people and cost out of dangerous operational situations
- IoT sensors to optimise asset performance, enable predictive maintenance and reduce the energy waste associated with production downtime
- AR headsets to share knowledge, make decisions remotely and cut travel
- computer vision using cameras to minimise quality issues, subsequent rework and its associated waste
- 3D printing processes to cut carbon emissions, energy consumption and the level of materials wasted, by making spare parts on location
- AI to make recommendations on the optimal settings for machinery – whether it's a plant, building or marine vessel – to reduce energy and water usage.

How to implement effective digital transformation

Digital energy looks slightly different for every organisation, every site and every method of production, but our stepped approach guides effective digitalisation.

1. Where are you starting from?

Your journey to Energy 4.0 must start with a thorough understanding of where you are right now. Any strategy needs a baseline to limit the unknowns that could hamper progress later down the line. Look at your infrastructure holistically, assessing each site individually to gauge its efficiency and connectivity potential. Make sure you're fully aware of your regulatory responsibilities as a critical national infrastructure provider and how these will affect your planning.

2. End-to-end cybersecurity

Working out what's connected to what in your energy networks, and where there might be vulnerabilities or gaps is an essential part of successfully connecting OT and IT. The majority of malware that gets into energy sites comes from the IT world, and many current energy production systems have vulnerabilities that make them susceptible to cyberattacks. Plus, adding in IoT functionality increases the attack surface and creates long and porous borders, and once data leaves a site you need to know it's distributed and stored securely. To counteract these potential vulnerabilities, it's essential to build cybersecurity into your transformation by design.

Think about establishing intelligent segmentation and behaviour monitoring, using firewalls to minimise the blast radius. Developing a joined-up Network Operations Centre (NOC) and Security Operations Centre (SOC) should also be a priority, including security information and event management (SIEM) from both your IT and OT estates. And the remote access that your Original Equipment Manufacturer (OEM) and other third parties have should be secured and tightly controlled.

3. Getting the supporting infrastructure right

Digitalisation requires a network that's resilient and able to collect and process data locally, as well as one that can share data securely across the organisation and into the wider ecosystem. As part of your network refresh, identify where additional sensors would provide useful data and incorporate them. Then, evaluate how much processing power you're going to need locally, and develop an edge compute strategy that will enable repeatable solutions. Blueprints are also essential to make sure infrastructure is integrated and designed to support the increasing number of connected 'things' on various sites, and the increase in data that will follow.

From there, consider what's the right network connectivity for your data. Distributed Energy Resource (DER) systems should be connected securely to hybrid cloud and, depending on the accessibility of any given site, satellite connectivity can fill a vital gap. And focus on building in Unified Communication and Collaboration (UCC) tools at this stage, rather than as an add-on later down the line. They create a competitive edge by increasing motivation, efficiency and productivity, while making tangible savings through reduced travel and faster decision-making.

4. Get insight data from distributed assets

Focus next on creating a foundation on which to build more efficient processes by being able to quickly access data insights. Measure asset status, usage and sustainability and use Natural Language Processing (NLP) to mine unstructured data sources. Back this up with thorough integration with DER systems and energy Enterprise Resource Planning (ERP) systems with service management. Because energy ERP software typically includes asset management, cost control, compliance documentation and project management, integrating it with technology service management provides end-to-end visibility to ensure maximum uptime.

Our digital energy proposition

We provide industry-specific, global managed services that enable secure data distribution across global supply chains, operations and businesses.

Our ambition: to become the world's most trusted connector of people, devices and machines.

To power the digitalisation of your business, we can help you with:

- an end-to-end-infrastructure design, based on composable architectures
- the products, tools and services to support your digitalisation globally
- a service framework supporting your business on a scalable basis
- a security-by-design approach that protects your data, assets and business.

What your business can achieve with our digital energy solutions:

1. ensure your network infrastructure is digital-ready
2. resolve your cybersecurity challenges
3. deliver your data securely and globally to improve business outcomes.

Connect people devices and machines	Enhance customer and employee experience	Connect to low-latency resilient infrastructure	Securely transfer insight from the edge	Detect and protect against cyberattacks	Connect and manage the multi-cloud	Enable your partner eco-system
Wells, rigs and mines	Digital and hybrid work	IoT sensors	IoT gateways	Remote access	Public, private and hybrid cloud	QiO
Solar and wind farms	First line worker	Wireless access	Edge computing	Identity management	Carrier Neutral Facilities	Everyangle
Plants (hydro, bio-fuel, power)	Cloud contact centre solutions	Industrial and Enterprise SD-LAN	SD-WAN	Firewalls	Fabric port	Purple
Residential, commercial and industrial sites		4G and 5G	Internet	Threat management	IoT platforms	Librestream
Forecourts and many more		Bluetooth LE and Zigbee	MPLS	OT security		M-Cube
			Satellite			Zebra
						Honeywell and many more

Industry-specific global managed service across **infrastructure, security and digital workplace**

Why BT for digital energy?

We put energy front and centre

Our digital energy portfolio is the result of hundreds of conversations with our energy customers that our experts have used as the bedrock for developing their solutions. Even with this energy-centric approach, we remain open to the fact that we may need to further tailor our solutions to precisely meet your requirements and your regulatory responsibilities.

We're experts at building successful business cases

Our experts combine the right solution for you with proof of value exercises, a drive to establish excellent returns on investment and support to build a winning business case. This consciousness of cost extends to our partner choices in a marketplace where 89% of UK organisations run open source code to manage costs.

We build trust before solutions

We understand that solutions that feel imposed upon energy site teams are rarely as successful as those that are co-created. Recognising that your people know more about your business than we do, we value the trust of your teams on the ground, underground and at sea, and work collaboratively with them to develop a solution.

Our renowned global network

We're a reliable partner with global experience and credentials, and the research and development capabilities to turn the latest innovations into resilient and trusted services on a global scale. We've delivered thousands of solutions globally with our ever-increasing choice of secure services and solutions. Our approach means that multiple technologies and legacy systems can be easily managed to create a single, secure global network infrastructure for your business.

The breadth and depth of our portfolio

Through our broad portfolio of solutions, we can easily integrate with the collaboration applications, data and third-party cloud providers you need globally. Then our end-to-end management of your entire solution simplifies operations for you – and improves user experience for your team and your customers. Our portfolio combines our deep expertise and extensive capabilities in cloud, networking and security services. We also provide an extensive array of UCC tools, along with tailored adoption plans to ensure effective uptake across the business.

We're security specialists

Our experience and expertise in protecting governments, nation states, critical national infrastructure and large global corporations from over 6,500 cyberattacks each day gives us a ringside seat on the complex security threat landscape. We use this unique position to support organisations to detect and respond to threats in a Zero Trust world with real-time visibility and monitoring, drawing on the expertise of our 3,000 security experts and 350 consultants in our security operations centres around the globe.

Our extensive and experienced partner ecosystem

We offer an ecosystem of partnerships to transform the way you run your operations. Our links with leading public cloud providers delivers flexible connectivity into hyperscalers and regional datacentres. And, through leading industry partnerships, we blend the latest specialist technologies into what we offer.

Our investment in R&D and innovation

A commitment to innovation is part of our DNA. We've invested £2.5bn in research and development over the last five years, making us the third largest investor in R&D in the UK. Our 13,000 scientists and technologists worldwide have filed over 10,000 patents since 1990 to push forward the boundaries of what we can help our customers achieve. We have a particular focus on technologies that will shape energy, such as satellite, AI and the security around these.

We take an open approach to innovation, working in close collaboration with our customers and strategic partners or specialist innovators such as universities, government organisations, standards bodies and technology companies. Our innovation scouting teams are always scanning the horizon for ideas and expertise generated by third party organisations that we can incorporate into our search for the next technological breakthrough. Our own BT Labs at Adastral Park is a globally recognised centre for telecoms research and a key source of UK Intellectual Property, and our 4,000 scientists, IT experts, engineers and collaboration partners based there continue to push the boundaries of innovation.

Our long-standing commitment to sustainability

We've been on a climate action journey for over 25 years, since setting our first carbon reduction target in 1992. Since 2017, we've reduced the carbon emissions intensity of our operations by 57% and have reduced carbon emissions by 19% in our supply chain over the same timeframe. We've pledged to be a net zero and circular business by 2030, and 2040 for our supply chain and customers. We hold a platinum EcoVadis rating, reflecting our comprehensive sustainability approach.

Make digital energy happen

Our experts are ready to help you bring digital energy to life in your organisation. To find out how to unlock the potential of digital energy, get in touch with your account manager today or visit our webpage.

Digital energy in action

Business critical connectivity

The challenge
De Beers delivers over a third of the world's diamonds, mining regions in the Arctic, under the ocean, and at increasingly remote on-land sites. More than 20,000 employees work in 28 locations and as well as connecting with loved ones, they need secure, robust, real-time connectivity to share huge amounts of vital business data.

The solution
We moved De Beers to a shared BT IP Connect Global managed network that connects all 28 locations. Satellite or microwave links provide access to the backbone for the short hop to our Internet Connect Global. This speedy and resilient Wide Area Network (WAN) optimises bandwidth and is perfect for long-distance collaboration. Meanwhile our IP Connect Global network automatically prioritises time sensitive traffic, like voice, video and critical application data.

The result
Everyone, from accounts to exploration teams, is more productive. Whether using a video connection to remotely advise mine workers on repairing faulty equipment, pre-screening new job candidates or attending industry conferences.

Delivering a secure and flexible network

The challenge
The world's leading producer of explosives, Orica operates in 120 countries and employs over 13,000 people. As remote working became widespread and the marketplace shifted, Orica needed the ability to work securely anywhere, anytime.

The solution
The key to creating greater flexibility was to transform Orica's inflexible, static, MPLS infrastructure – moving instead to SD-WAN and helping the organisation to become a cloud-enabled business. We also oversaw robust security through controls like DDoS protection, firewall, secure web gateways and a Zero Trust approach to network access, complete with segmentation and endpoint detection.

The result
The move has meant greater productivity and lower costs across the entire business. Employees can now work remotely on various devices, securely accessing cloud-based workloads and programs. We also continue to work closely with Orica to scale projects to support its developing network requirements.

Connectivity to make digital energy possible

The challenge
Anglo American is a mining company that works in some of the most remote corners of the globe. Its connectivity challenges are immense and it needed a fast, resilient network to increase asset automation, improve productivity and drive collaboration across and between its businesses.

The solution
We replaced numerous different service providers with a single IP Connect Global infrastructure. Hundreds of legacy private branch exchanges (PBX) were replaced with our One Enterprise solution, using Cisco Unified Communications Manager (UCM) technology to improve communication. Meanwhile, One Voice makes sure that (where regulations permit) we carry international fixed and mobile calls over our network, so they're only charged as local calls. We also supported Anglo American's move to cloud services and tackled low latency issues with a secure internet gateway and peering arrangements.

The result
Now, Anglo American cloud traffic travels at high speed over our IP Connect global infrastructure. Employees have access to video conferencing and six Cisco TelePresence suites, while class-of-service functionality speeds up and prioritises data like video conferencing above less time-sensitive data.

Offices worldwide

The services described in this publication are subject to availability and may be modified from time to time. Services and equipment are provided subjectto British Telecommunications plc's respective standard conditions of contract. Nothing in this publication forms any part of any contract.

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