

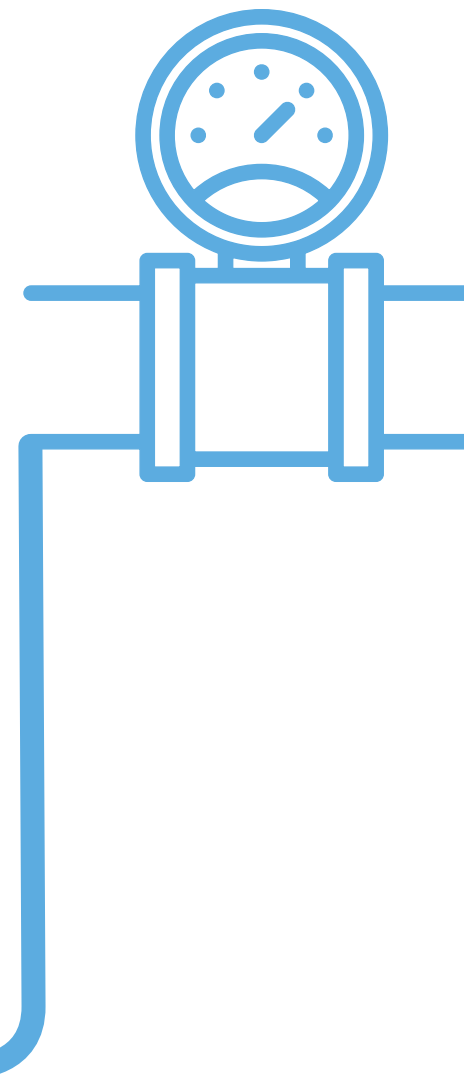


## Ensuring a resilient network

We own, operate and maintain the largest gas distribution network in the UK, providing our customers with the energy they need to stay safe, warm and connected.

Our skilled engineers and specialist teams are committed to the communities we serve, working day and night to ensure gas reaches 11 million homes and businesses.

Our networks comprise over 131,000 km of pipeline, with some parts of the networks originally built 200 year ago. This presents us with a range of challenges: from continually improving the safety of our networks; to ensuring exceptionally high levels of reliability, so that gas is there when people need it, and responding quickly when it isn't.



# Ensuring a resilient network

## Responding to keep you safe

We are focused on delivering reliable gas supplies, when our customers need it. We are proud to say we consistently provided overall network reliability of 99.996% this year.

A typical residential consumer on our gas network could expect to lose their gas supply just once in 200 years and, on average, they should expect to have their supply restored within 9 hours.

In 2018/19, we have focused on reliability and responding rapidly to restore supplies. We have performed well against most measures, with particular strength in our response to reports of potential leaks; and in completing repairs on our networks, which finished the year at a long term best.

# 99.996%

Overall network reliability

## Renewing our network for the future

Since the late 1970s there have been coordinated programmes to replace aging gas network infrastructure. In 2002 the gas network operators, HSE and Ofgem, agreed a 30 year programme to replace metallic mains prone to fracture with new, plastic, lower-emission assets. This programme was set in place by the Health and Safety Executive, with Ofgem, to improve safety for members of the public living close to gas transport assets.

The programme will run until 2032 delivering improved safety and reducing greenhouse gas emissions. In 2018 we replaced 1,701 km of our networks and prevented the loss of over 180 GWh of energy. Since 2012/13 we have replaced over 10,000 km of our networks.

We have developed plans to accelerate the programme to achieve our RIIO-1 target by the end of the price control period. We have expanded our programme of other asset improvements, to ensure we provide a reliable network for the future, and to meet our Network Output Measures. We have increased investment in asset health improvements by 50%, upgrading and replacing assets – from high-pressure, above-ground installations outside major urban areas, through to valves securing individual buildings.

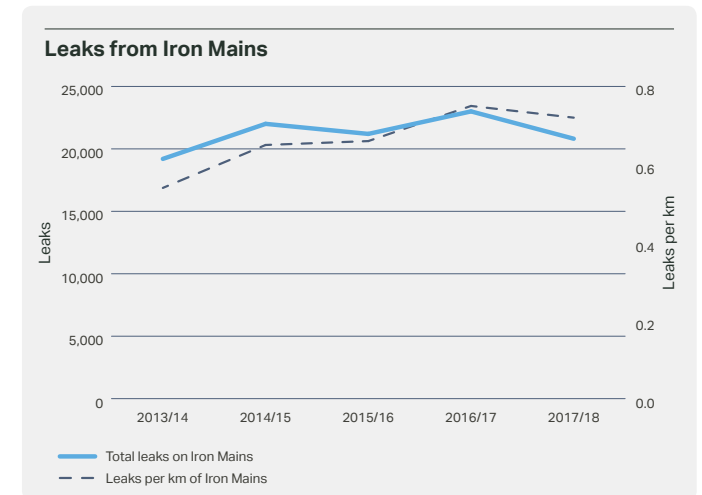
We expect to further increase investment over the remaining two years of this price control period. Our investment unit cost performance is strong relative to our peers, despite significant pressures on costs, due to the high demand for skilled labour in the construction industry. We will continue to manage these pressures alongside the step-up in workload over the coming years.

## Building resilient networks

We are responding to challenges posed by population growth and the changing infrastructure and environments around our networks. The work we do today is helping deliver the networks of tomorrow with the capacity to deliver fuels for the future including hydrogen:

- reinforcing our medium-pressure network in London;
- upgrading the security at a number of our critical above-ground assets; and
- enabling the delivery of HS2.

The figure below demonstrates that the aging population of old gas mains still in place are failing more frequently leading to possible uncontrolled gas escapes on our network. This key indicator strongly supports the need for continuation of our iron mains replacement programme. Further, as the UK moves to meet its climate change objectives, we anticipate that further investment in the resilience of our networks will be required to provide the capability to efficiently and sustainably transport a range of low carbon fuels.



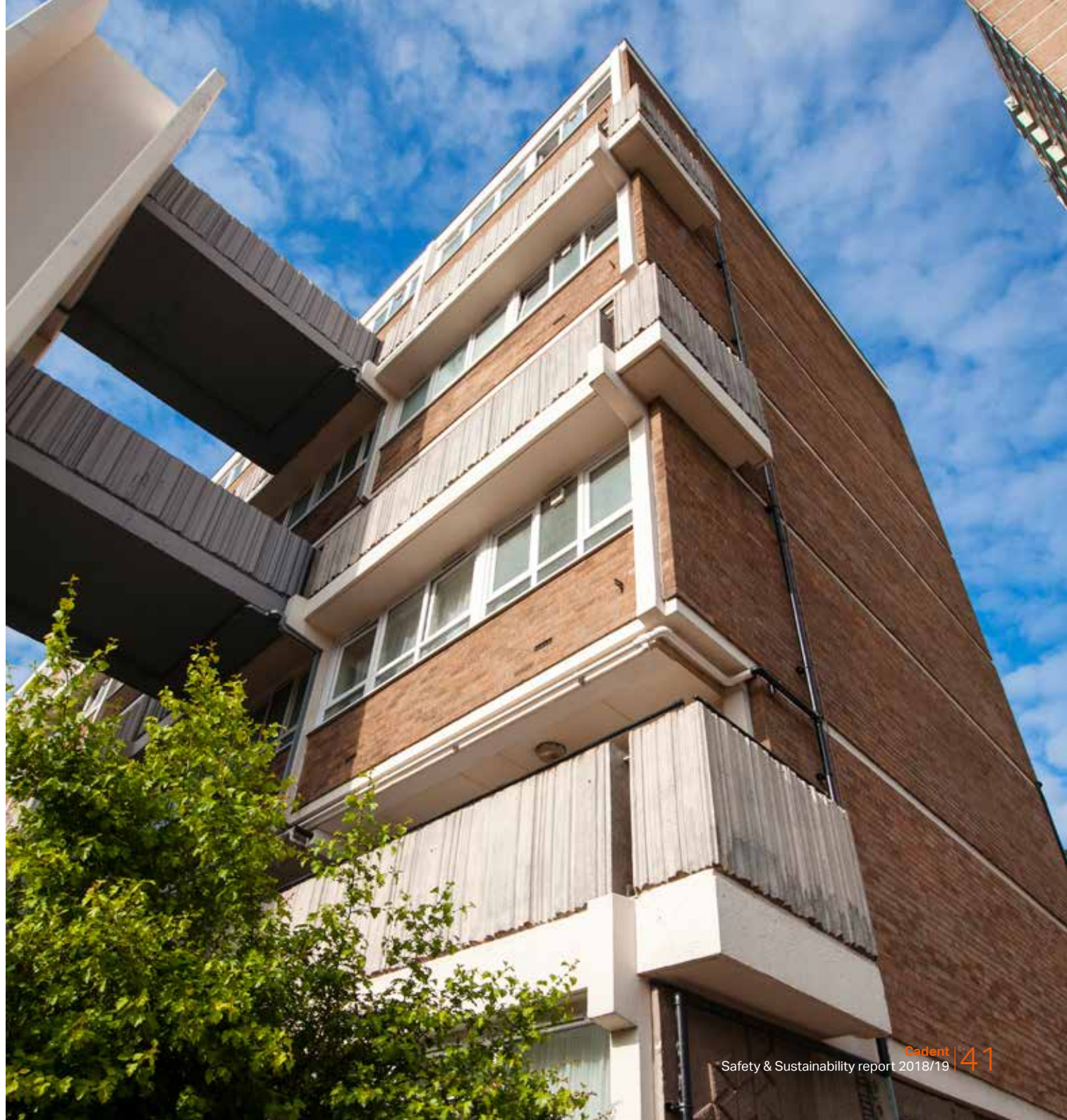
### **Improving service in multi-occupancy buildings ('MOBs')**

We have carried out more than 2,000 high-rise building surveys across our networks in 2018/19, improving and replacing assets in 583 multi-occupancy buildings ('MOBs').

We have created multi-occupancy managers to improve the customer experience and are working hard to ensure we communicate well with our customers, and they understand our role in managing the assets in MOBs.

Not all MOB customers require gas for heating and hot water; some are connected to communal boilers. We have established an energy exchange programme for people who only use gas for cooking, to replace their gas appliance with a new electric version, plus compensation.

When customers agree to participate in the energy exchange programme, it minimises the disruption to all the building residents by avoiding the need to replace the gas pipes.



## Ensuring a resilient network

### Focus on process safety

Process Safety management is about ensuring the integrity of our networks and making sure that gas in pipes and other equipment does not cause harm to people or the environment. Our Process Safety management framework is designed to protect people and property from the hazards of stored energy, in our major hazard pipelines and plant, and also from the risks associated with significant gas leakage conditions.

This starts with the design of our network, incorporating the whole life cycle of all our equipment, from construction, making sure they are operated safely, well maintained and regularly inspected through to replacement or removal from our networks.

Process Safety in the gas industry has traditionally been focused on high pressure gas transmission assets. We believe this risk should be managed right across the pressure range, with the right Process Safety measures in place and effective key performance indicators.

Through 2018/19 we have refreshed our approach to managing Process Safety, issuing our Process Safety commitments document that sets out our four key elements: Process Safety Leadership, Risk Identification & Assessment, Risk Management and Review & Improvement.

Our network operates across a wide range of pressures, receiving the gas from the National Transmission System at high pressure, and safely managing this pressure (stored energy) until it is delivered to the gas consumer's meter. Each of the pressure tiers has specific regulations and requirements that we must comply with. Our pipes are buried in both public highways and private land so we must also ensure our pipes are protected from third party interference or damage.

Through the year we have undertaken a fundamental review of our Process Safety framework, ensuring that we have the right risk identification and control measures in place, supported by leading and lagging performance indicators. We have also refreshed our Process Safety scorecard and making sure it meets external benchmarks.

We are raising awareness and through 2018/19 we have updated and refreshed training materials for key functions in the business. It is important to us that our safety message starts at the very top. In 2019 our Board and executive team have taken the lead in undertaking a full day Process Safety training course and will provide additional direction in establishing our goal of leading Process Safety standards.

We distribute energy to

# 11 million

Homes and businesses across our network





#### Case study:

## Reducing disruption for our customers with CISBOT

A small team of Cadent engineers completed a pipeline rehabilitation programme in the heart of London's West End.

Working closely with robotics experts, our Cadent team successfully repaired 850 metres of large diameter gas main running beneath The Strand. This was a job that would normally take nine months, but our team had it completed inside nine weeks.

Their efficiency was down to an innovative new approach, using CISBOT robotic technology to restore and rehabilitate mains rather than replacing them. This meant there was no need for many excavations in an area of central London where gas works typically mean significant disruption for pedestrians and traffic. Not a single gas supply was affected during the works, which were followed up by a second operation in nearby Oxford Street, where footfall averages 13,560 people every hour during the day.

Rehabilitation rather than repair is the secret to CISBOT's success. It is a formula that is set to be rolled out on a further 33km of our pipeline in high-profile locations, including Regent Street, Long Acre and Park Lane in the final two years of our current regulatory period.

#### How CISBOT works

Once a single excavation is completed and shuttered, the CISBOT module is inserted into the gas main. The robot is operated by a joystick and touchscreen from a vehicle, with the operators watching on screens. Rehabilitating each joint, CISBOT is set to transform the way we work and extend the lives of our pipes by decades. Although it is not currently suitable for every kind of job we need to do, we plan to use it more and more in the future.



#### Driving efficiencies

Our strategic approach to Street Works means we now deploy CISBOT on a regular basis in London and expect to use it in other networks in the near future. Our teams have been working with key stakeholders, such as the Department for Transport, on the Street Manager Project, and we intend to replace the existing system with a new Street Manager system to enable better compliance with legislation.

We have won a prestigious Street Works UK awards for a complex mains renewal programme in Stratford-upon-Avon, by the West Midlands partnership with Warwickshire County Council.

## Ensuring a resilient network

### Case study:

## Taking care in construction: HS2

One of the first jobs in the HS2 high speed railway programme is to ensure our infrastructure does not present any obstacles to development, by diverting our pipes.

The first of these is underway near Uxbridge, where a high pressure pipeline is being buried deep in a tunnel beneath the planned HS2 route. The environment around the site was sensitive and the extent of works including deep tunnelling under the HS2 route presented significant design and safety issues. A full environmental impact assessment was carried out before the works and a full environmental management plan ensured that we met our requirements and HS2's. Despite local concerns the project is taking the needs of all stakeholders into account, especially with regards to traffic management at road crossings and site entry points.

At our project site in Uxbridge, we have introduced grey water harvesting to service the site's water needs, and lighting fuelled by hydrogen fuel cells, reducing noise and emissions. The project received a Gold Award at the 2019 Considerate Constructors scheme for the range of good practice employed, and the care we have taken in working with our neighbours.



**To be recognised for making a major contribution to London and its infrastructure is a real pat on the back for everyone involved."**

**Andrew Hejdner**  
Cadent Project Manager



### Case study:

## Safeguarding the future: London's gas infrastructure

We are proud that our multi-million pound flagship project to safeguard the future of London's gas infrastructure has been nominated for a top industry award.

Our teams liaised with 15 separate organisations during the two-year operation to build the 330 metre Chelsea to Battersea Tunnel beneath the River Thames. After 12 months creating the tunnel, installation of the gas pipeline is nearly complete.

The £18 million project, part of our £1 billion investment to replace aging gas mains across the capital, was shortlisted for three awards by the Institution of Civil Engineers.

Our project was nominated for the prestigious People's Choice Award, while we were named in the Best Infrastructure and Greatest Contribution to London categories.

The project team secured the 20 different permissions needed for the work, which included digging two 30 metre deep shafts beneath Battersea Park and the grounds of the Royal Hospital in Chelsea. We also removed all trace of the work in time, covering the shaft with a massive landscaped concrete slab, so events such as the Chelsea Flower Show were not affected.



### Case study:

## Protecting our pipes: the River Mersey

When a routine survey revealed a stretch of high pressure pipeline was in danger of being damaged as half a century of erosion took its toll, we had to act. The flow of the river had moved by a staggering 45 metres so the integrity of the pipe, which was first laid around 50 years ago, was at risk. The power of the water had gnawed away at the land at a bend south of Didsbury and north of Cheadle, eroding its banks and putting the integrity of the pipeline that feeds the whole of Manchester at risk.

Matt Goode, one of our Network Supervisors in the North West, worked with subcontractor Cain BioEngineering, to restore the river back to the course it took in the 1960s.

Matt Goode said: "The river has salmon and there are nesting birds and electricity pylons nearby, so we've worked with the government's fisheries department and Environment Agency on getting all the Environmental Permitting Regulations right."

This was a major project to restore the eroded 350 metre section. Excavators moved hundreds of tonnes of earth to excavate the original channel of the Mersey and construct a new bank to force the river back along its former path. To reduce the flow of the river and prevent further erosion, it was widened and fitted with "riffles" (underwater speed bumps) to slow down the water.

Matt said: "It's a complex but fascinating job with a team of 15 people working on it and yes, it will mean we've moved the Mersey."

The £1m project went beyond the feat of moving a river – it had to accommodate the wildlife which makes the Mersey its home. They include sand martins, which nest in the banks, and migrating salmon which make their way upstream to spawn.

The final phase of the work was delayed until autumn to ensure the birds have left the banks for warmer climes and saw willows and wild grasses planted on the riverbank to restore natural habitats.