

## Reducing emissions from UK's largest gas network

# Cadent Gas

### The Challenge

- Reduce methane emissions leakage by more than 30% by 2030

### The Benefits

- Accurate insight into where leakage occurs
- Case studies of up to 90% reduction in methane emissions
- 40% faster abatement of emissions from old pipes
- Better asset management in readiness for green gas

Driven by its mission to reduce its environmental impact, Cadent has introduced a new approach to detecting methane leaks from underground gas pipelines. Powered by ArcGIS Online, the solution enables Cadent to initiate more targeted, proactive repairs and achieve significant reductions in greenhouse gas emissions.

### The Challenge

The UK's largest gas distribution operator, Cadent has a clearly stated commitment to protecting the planet. In its Environmental Action Plan, it specifies thirty actions that it is taking to decarbonise its business operations, reduce its environmental impact and facilitate a low-carbon future. Within this plan, one of the company's key priorities is to reduce the quantity of methane that leaks from old and damaged pipes. It estimates that over a million tonnes of carbon dioxide equivalent emissions leaked from its gas pipes in 2022/23, and it aims to reduce this leakage by more than 30% by 2030.

As Cadent has responsibility for over 131,000 km of pipes, however, finding the source of emissions is an enormous challenge. To help it achieve its ambitious target, it needed to find an accurate way to locate and measure emissions throughout its network and then respond proactively to reduce them.

### The Solution

Cadent partnered with Picarro, a supplier of enhanced optical spectroscopy technology, and fitted survey vehicles with scientific environmental monitoring instruments. These instruments were fine-tuned to detect the exact combination of methane and ethane emitted from gas pipes, as opposed to other sources of methane like farming.

Taking one region at a time, the survey vehicles drive roads along the gas network, collecting emissions data within a 200 metre radius of their routes, as well as GPS coordinates and data on wind speed and direction. This data is then transferred seamlessly from Picarro to Cadent's ArcGIS Online solution, where it is presented visually, overlaid onto digital maps of the gas network. Consequently, staff at Cadent can, for the first time, now see focus areas with high levels of emissions.

To share its new insight, Cadent has created an ArcGIS Dashboard that clearly shows detected emissions by region. This dashboard also shows regions inspected, so managers can see where survey vehicles have been and easily monitor progress throughout the gas distribution area during the course of each year. Using the dashboard, it is also possible to carry out quick data analyses, answer queries and share information visually throughout the business.

Every day, when new data is received, analysts at Cadent review the ArcGIS Dashboard, see where emissions are above a certain threshold, pinpoint the likely source and raise a maintenance request. A work task is created and a repair is initiated to proactively lower emissions in that region. In the future, Cadent plans to extend its ArcGIS-based emissions detection system and integrate it with its SAP work management system to completely streamline and automate this workflow in real time.

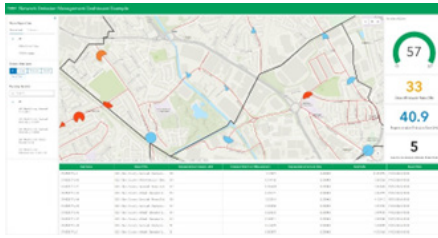
### The Benefits

#### Accurate insight into where leakage occurs

Previously, Cadent could only forecast where emissions might be escaping, by modelling

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John Batterson, Digital Transformation Manager, Cadent



The Cadent Network Emission Management Dashboard showing the location of methane emissions (with fictional data)

data from a small sample of historic leaks. Now, however, it knows exactly where emissions are occurring – and precisely how significant these leakages are. Furthermore, data from ArcGIS Online is being used in conjunction with artificial intelligence to calibrate a new predictive model for leakage across the entire network. “Our new approach will massively improve the accuracy of emissions reporting,” says John Batterson, Digital Transformation Manager at Cadent.

**Up to 90% reduction in methane emissions**

Critically, this new ArcGIS-based emissions detection system allows Cadent to precisely target locations of high emissions. “Using ArcGIS, we are shifting our company from being reactive-only to being more proactive,” explains Batterson. “Then we can find a leak ourselves and repair it, before a member of the public smells it and reports it. In the first twelve months, we proactively detected and fixed more than 200 leaks responsible for methane emissions and, in one particular location, we reduced emissions by 90%.”

**40% faster abatement of emissions from old pipes**

All gas distribution network operators have a statutory obligation to replace old mains and higher-risk iron pipes. Now, however, Cadent can prioritise which pipes it replaces first, based on more accurate information about emissions. “We replace around 1,600 km of mains every year,” says Batterson. “Now, using the insight from ArcGIS about emissions, we can make better-informed decisions about which mains we replace first. In this way, we think we can increase the abatement of emissions by 40%.”

**Better asset management in readiness for green gas**

By making more proactive repairs, in the right locations, Cadent is improving the condition of its pipeline assets, which will, in turn, help to prepare the network to deliver hydrogen in the future as part of the UK’s decarbonisation strategy. “Being able to demonstrate that we have a really good understanding of our network and where emissions occur – and being able to respond to them quickly – is a good thing,” says Batterson. “It demonstrates our management capability and gives confidence to our regulators and stakeholders that we are managing our network assets in a better way to be green gas ready when the time comes.”