Cadent

Your Gas Network

Developing networks for the future
Long-Term Development Plan 2021

October 2021

Cadent
Your Gas Network

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We are Cadent

Your Gas 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.

Cadent
Your Gas Network

Welcome to the Long-Term Development plan (LTDP) 2021

It's been an exciting 12 months for Cadent with hydrogen taking centre stage, being recognised by many as a necessary contributor in the move to net zero. HyNet, an ambitious project that will tackle industrial decarbonisation and unlock a low carbon economy for the North West reached an important milestone this year, selected as a lead project for UK Government investment. It aims to generate, store and distribute hydrogen, this is a great first step in decarbonising the area.

We believe our gas network has a crucial part to play in the move to net zero, it's a valuable asset that is getting renewed annually through our pipe replacement programme and work undertaken over the last year, has shown conversion to hydrogen is possible for our customers before the 2050 net zero deadline. As such, we have a pivotal role in stimulating debate, developing and investing in technology, and working collaboratively with a wide range of stakeholders to shape the future.

This annual document shares our thoughts on the future and the evolution of the network, and which investments we plan to make to keep our customers' supply safe and secure, while maintaining the high reliability the network can deliver.

Our business plan commits us to continuing investment in our network to allow new demand to be connected, and increased volumes of low-carbon biogas to be transported. It also includes the continuation of our asset investment programme, notably the iron mains replacement programme which is improving the safety of our network, reducing our greenhouse gas emissions and getting our network one step closer to being hydrogen-ready.

We have 38 biogas connections to our network and are investing to allow greater volumes in the future, there are also 121 gas fired power generation units supplying electric at peak periods to customers.

Working with our industry, our hydrogen development work is accelerating. In addition to our work looking at blending hydrogen, HyNet will decarbonise heavy industry in the Cheshire, Liverpool and Manchester regions and potentially provide hydrogen to decarbonise domestic heat as part of a trial.

It's becoming clear regional plans and whole energy system solutions could be the way forward to ensure costs for net zero do not greatly impact our customers. We will need to work collaboratively to ensure we understand customer demand and can respond to the changing needs and patterns of energy use.

We're planning now to prepare our networks for the future. I hope you find this report both interesting and informative. We welcome any views you have on the plan, including ideas for improvement. Please share your feedback with us at **cadentgas.com/ltdp**.

Dave Moon, Director of Asset Investment

Customer and stakeholder engagement

We have continued to engage with a wide range of stakeholders and customers to ensure that our brand remains relevant to society's changing needs.

Stakeholders have asked us to take a leading role in helping Britain 'build back better' by supporting the 'green economy' and 'levelling up' agendas. We have risen to the challenge, transforming our business operations, values and purpose, investing significantly in people, processes and systems to drive a future focused culture. Our new Force for Good strategy, which is built on the premise of making life easier, fairer and greener for our communities will create a lasting and positive social impact, demonstrating our commitment to delivering excellence today and seeking better solutions for the future.

Our Purpose: **Keeping people warm, while protecting the planet.**

Our Values: **We work together, we take responsibility, we drive performance, we shape the future.**

Strengthening and maintaining relationships with multiple stakeholder and customer groups and putting them at the heart of all we do has contributed significantly to the positive culture shift, allowing a proactive and continuous response to changing customer needs.

Figure 1: Our customer engagement pathway

Our stakeholder and engagement strategy

Our engagement strategy is centrally defined and regionally delivered. It is fully embedded in our business and ensures the strategic alignment of engagement activities across the whole company. It allows us to engage in a way that is tailored to our customers and stakeholders and has the following aims:

- To inform and support the delivery of our Business Plan
- To assess how we are performing against our company's purpose, values, the strategic objectives that underpin them and whether we need to do more
- To be a key element in building trust with our customers, stakeholders and employees
- To establish and maintain a fully engaged workforce with a clear and consistent focus
- To ensure our stakeholders are kept informed in a timely way

- To be a key enabler in helping us to anticipate changing customer/societal needs and expectations; when we consider the current uncertainty that exists around future energy policy and aligning thinking across the industry and beyond
- To gather critical insights on how we can make things fairer, easier and greener to ensure that no one is left behind in the UK's energy transition

Our commitment to ongoing engagement

As we continue our engagement journey, we are exploring and implementing various ways to engage with our customers and stakeholders. Each year, we review our enhanced engagement strategy with stakeholders and customers to ensure it is in line with their expectations and that their insights are helping us to deliver better outcomes.

Customer engagement

Our Customer Forum continues to be an engagement channel that allows us to test our strategies and plans with a diverse group of people living across all our networks. This includes our hard-to-reach audiences such as customers in fuel poverty, people with compounded vulnerabilities, future generations and those whose first language isn't English. The forum has grown to 150 informed and uninformed customers to ensure that we have a range of views from different perspectives.

Strategic relationships

Enhancing our relationships with partners remains a priority as our services have expanded in response to stakeholder feedback and evolving customer requirements. Our partnerships are grouped into categories: strategic, programme and project, depending on the breadth and longevity of the relationship and the associated activities. We regularly review outcomes and performance using our partnership evaluation tool to ensure that the partnership is delivering against its aims and re-categorise depending on the outputs and conclusions.

Maximising digital technologies

With less opportunity to meet face-to-face this year, 85% of our engagement has been via digital methods such as online focus groups, roundtables and events conducted on Teams and Zoom as well as one-to-one video calls and webinars. We have also introduced week-long online communities, during which participants complete daily activities and share their feedback via a plethora of media.

If you would like to find out more about our engagement journey, please visit **cadentgas.com/engagement**

The role of renewable gas

Contributing towards a green economy

In the immediate future, the gas networks will play a leading role in reducing emissions using renewable energy. There are several areas where we support cost-effective solutions to deliver emissions reductions, such as the growth of green biomethane plants and the use of gas in the transport sector. We support and facilitate green fuels connecting to our networks, and work with the industry to remove barriers to their continued growth. Introducing new sources of gas into the existing gas network represents a relatively low-cost decarbonisation option, allowing us to improve the reliability of the UK's energy infrastructure.

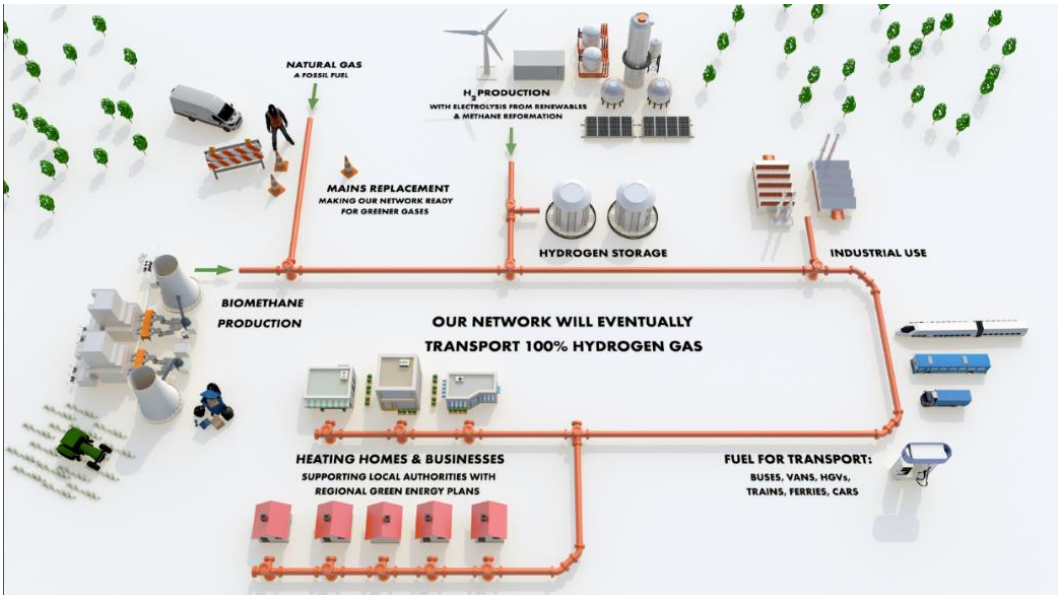


Figure 2: Introducing greener gases into our network for decarbonisation

When considering the supply of renewable gas, we consider domestic heat and transport to decarbonise the UK and to meet emissions reduction targets and energy efficiency ambitions. We have highlighted the possibilities in this area in our 'Future role of gas' series of publications. In this series, we aim to promote discussions with our stakeholders and inform debate across the industry.

You can read the full series at **cadentgas.com/news-media/document-library.**

Biomethane connections

Biomethane is produced by fermenting organic matter, with feedstocks ranging from farm and animal waste to food and sewage waste, crops and silage. In addition to energy decarbonisation benefits the production and injection of biomethane into the gas grid affords a green and sustainable solution to waste management for industrial, commercial and domestic users as well as providing an additional green, revenue stream.

Figure 3: Biomethane sites on our network

We continue to engage with our customers so we can refine our processes to facilitate continued growth in the biomethane sector resulting in greater volumes of green gas production and injection into our network. Alongside this, developing a collaborative maintenance framework to meet our legislative obligations whilst the plant is operational and flowing biomethane into the gas grid.

We have now successfully connected 38 biomethane sites to our network, which have the potential to heat up to 243,997 homes annually. We are continuing to work with any new biogas customers since the introduction of the new Green Gas Support Scheme which has resulted in a renewed interest in the connection of biomethane sites to our network.

Since our first connection in 2013, we have sought and responded to customer feedback to help drive down costs and improve our processes and commercial frameworks. We are continually reviewing and refining our processes through lessons learned following project commissioning. We are encouraged that we have seen an increase in enquiries from our customers for connection of plants, with several plants confirmed for connection during 2021/22. This is driven from the certainty of a continued subsidy mechanism through the Green Gas Support Scheme. Specifically, we are seeing a move of existing Anaerobic Digestion sites from a sole CHP, to combined with a new gas to grid connection.

RIIO Plan	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21	21/22
Sites connected	1	10	22	28	29	32	35	36	38
TWh Actual	0.07	0.64	1.44	1.78	2.03	2.38	2.52	2.62	2.80

Table 1: Total Biomethane connections and TWh production

Low-carbon gas supply

> "In the medium term, biomethane can readily be accommodated in the gas distribution pipeline system alongside hydrogen blended at a rate of up to 20%."

Renewable gas can be injected straight into the existing gas distribution network, and customers won't need to make any changes to their appliances for heating or cooking. Whilst renewable gases contain the same methane molecules as natural gas, they contribute a significant overall reduction in greenhouse gas emissions due to their sustainable production, along with the avoidance of methane emissions from waste feedstock. In the future, we can offset the minor emissions produced by renewable gas using carbon capture.

We sponsored a **study by Anthesis Consulting Group PLC and E4tech UK Ltd**, looking at the potential scale of bioresources available within the UK to make low carbon gas. The study showed that the potential for renewable gas from waste and biomass feedstocks could be as high as 174TWh by 2050, with a central estimate of 108TWh. This is enough renewable gas to meet over 50% of domestic gas demand or to supply all the homes in the south of England. This could be supported further by energy efficiency, imported waste and biomass, and government policy to encourage growth in the appropriate feedstocks.

This is achievable with continued support and longer-term certainty afforded by government incentives through the Green Gas Support Scheme. We will continue to work closely with government to communicate clearly the vital role gas plays in the energy mix, so that investors and the supply chain can have confidence for the long term. We will play a full role in supporting the flow on our network by investing to provide capacity where it is required and working with our colleagues across the gas networks to share best practice.

Facilitating distributed entry gas

From our day-to-day interactions with renewable gas developers, we understand that a primary issue for the networks to address is the availability of network entry capacity. Current commercial arrangements do not facilitate reinforcements to provide entry capacity, meaning developers must find connection points where there is existing spare capacity. We are striving to access further capacity within the network through the Network Innovation Allowance (NIA)-funded project OptiNet, where we aim to unlock the true potential of an integrated network through in-grid compression and optimised pressure control. The purpose of this project is to prove the concept of a network solution that can be replicated in capacity-restricted areas to facilitate the opportunity for more injection of unconventional sources of green gas, supporting the UK's target of net zero greenhouse gas emissions by 2050.

Capacity restricted areas within our network can be a barrier for connection due to the saturation of biomethane sites already connected in these areas and we continue to offer biomethane sites with variable flow rates to enable continued growth. To facilitate further connections with a continuous flow rate within areas with capacity constraints we are developing a more flexible network with one initiative in development being a compression solution. This project enables the unlocking of capacity in the lower pressure tiers of the network through compression to the higher-pressure tiers. This solution will be built and operational by mid-2022 and following a successful monitoring period can facilitate greater opportunities of further connections.

We continue to encourage increased biomethane injection into the network, demonstrated not only by the new connections but also facilitating increased capacity in plants that are already operational and connected to our network.

Biomethane is playing a vital part in the transition to a sustainable future, endorsed by government and fully supported by the anaerobic digestion (AD) industry. We will build on the experience that we have gained to date delivering the existing 38 biomethane connections and continue to work collaboratively with the AD community to drive further innovation to maximise the full potential of AD to gas grid.

Biomethane producers are currently required to add propane when injecting into our network, in order to bring the Calorific Value of the gas in line with our current billing method of Flow Weighted Average Calorific Value. This practice is costly and reduces the green credentials of the gas.

A changing network

The renewable gas connections to our networks are changing the role and nature of the UK energy system. To help support the growth of green energy, we have led a project with the other gas distribution networks (GDN) to standardise elements of the design and commissioning process for biomethane projects. We have implemented change to several key process areas collaboratively with biomethane producers and their service providers.

To drive further change, the Gas Entry Forum has been formed to enable entry connections processes, standards, and associated commercial arrangements to be kept under review. This will help promote standardisation across the networks, remove barriers to connect, share best practice, enable efficiencies and improvements, and respond to industry developments. Membership will encompass gas networks, AD industry association bodies, regulators and biomethane producers.

With the support of the Energy Networks Association (ENA), We have been working with the other GDNs to standardise activities across the design, build and construction project delivery stages together with the annual maintenance and testing requirements. This has seen the development and publication of technical guidance and the implementation of standardised methodologies providing consistency for developers and their supply chains when working across the gas distribution networks.

To find further information on our entry gas connection services for biomethane, or other forms of distributed gas, please visit **cadentgas.com/biomethane**.

Enabling cleaner transport

On the road to a zero-emission future

We recognise the government and industry focus on replacing UK cars with electric vehicles as a positive step. However, around 19% of transport emissions come from buses, heavy goods vehicles (HGVs) and other vehicles that we rely upon to deliver the goods and materials needed by our economy.

Unlike smaller city-purpose cars, these vehicles are not as suitable for battery-electric solutions due to their higher mileage requirements and much heavier weights. Fortunately, renewable gas provides more practical and feasible green alternatives for such purposes.

Figure 4: Our zero-emission fleet

Decarbonising transport

We have been promoting two primary routes to power these vehicles: biomethane (via compressed/liquefied natural gas – CNG/LNG) and hydrogen (via fuel cell electric vehicles - FCEVs), each at different levels of market readiness.

We see an important role for both biomethane and hydrogen in delivering the fastest decarbonisation of transport possible. This was supported by the **Government Hydrogen Strategy update** in August 2021. Emerging evidence demonstrates the important role for biomethane in delivering emission reductions from HGVs throughout the 2020s and early 2030s, as shown within our **Green Gas Transport Pathway report.**

The benefits from leveraging our gas networks to support the transport sector include:

- Supporting UK CO_2 emissions reduction and cleaner air in cities.
- Maximising the use and benefit of our gas networks with new demand from a new sector.
- The potential for our gas networks to form the backbone of a national filling station infrastructure (the Zemo Partnership WTT report found that network-transported 100% hydrogen provides the most efficient, lowest emission distribution pathway).

Looking into the longer-term – hydrogen has very significant potential to decarbonise sectors that have proven highly difficult to 'electrify', such as heavy transport. This presents a great opportunity for the existing gas network to add major value to the decarbonisation of transport – if a reliable, accessible and economical refuelling infrastructure is developed.

This is visualised in our green gas transport roadmap below, key imminent signposts (from 2021–2025) which will support the transition to a zero-emission transport future include:

- The sale of CNG and liquified natural gas (LNG) trucks accelerates to between 7,000 and 12,000 per year in 2025 (13-23% of sales).

- The number of CNG and LNG stations expands rapidly, resulting in between 50 and 100 stations providing national coverage by 2025.
- The first 100-200 hydrogen trucks are tested in commercial operation.
- Planning and funding are completed for the first industrial hydrogen production site with CCS.
- The first trial of hydrogen distribution by dedicated pipeline.

Each 100% biomethane-powered HGV typically saves up to 84% (typically 130-150 tonnes per year) of CO_2, compared to the same vehicle powered by Euro VI diesel (a standard diesel blend).

We are actively decarbonising our own fleet, converting our HGVs to bio-CNG, which will reduce our greenhouse gas emissions by more than 500 tonnes/year. We are also operating three CNG vans in our North West and West Midlands networks to understand how these will reduce the emissions associated with roadside working.

Figure 5: Warrington bio-CNG refuelling station

The Warrington bio-CNG refuelling station, which is owned and operated by *CNG Fuels* and connected to our network, is the largest bio-CNG station in Europe. The facility can refuel 12 trucks simultaneously from ten dispensers and is capable of dispensing more than 300GWh of biomethane per year - which equates to a reduction in greenhouse gas emissions of 100,000 tonnes per year. In order to meet the increased gas demand, we carried out key reinforcements to the local gas network.

Connection Type	East Anglia	East Mids	North London	North West	West Mids	Total
CNG Fuelling Stations	1	2	2	4	1	10

Table 2: Total CNG connections to our network by area

The number of natural gas filling stations for HGVs has started to grow, with ten now fully operational including Hatfield (in partnership with *GasRec*), which is supporting *Ocado*'s growing fleet of 29 gas-powered vehicles. We are pleased to update that *CNG Fuels*' large-scale, publicly accessible refuelling station at our National Distribution Centre in Erdington, Birmingham – capable of refuelling over 500 HGVs per day is due to be completed imminently and will reduce emissions from our own vehicles and other fleet operators in the area. We are also connecting new *CNG Fuels* stations in Knowsley (75% complete, 500 HGVs per day) and Corby (work to commence soon).

Electrification of our FCO fleet

Towards the end of 2019 we commenced operational trials of electric vans (EV) for our North London First Call Operative (FCO) fleet. Expanding from this, we are now rolling out EVs across all four of our networks - with a RIIO-2 commitment to make every one of our 1,100 FCO vans zero-emission across our networks by 2026, in line with our Environmental Action Plan.

We currently have 35 electric FCO vans in operation, and we will induct a further 30-40 by the end of next year. Thus far the trial has been valuable, highlighting several challenges we must overcome (namely improving recharging infrastructure) to facilitate a fully net-zero fleet across our networks. We have learned many lessons, putting us in the best place to deliver on our promises and approach the full roll out in an informed and structured manner – drawing from advising partners such as *Cenex*. In addition to this we are exploring the potential to use electric motorcycles for our first responder riders.

Transitioning the energy networks to net zero

Our focus is on enabling an effective transition of our gas network to green gases

Over the past year, the UK has embraced the net zero challenge as the impacts of both climate change and a global pandemic have offered a rare opportunity to both think about and tackle things differently. We have specifically focused on developing our overall approach to net zero, through the biggest impact that we can have. That is encouraging and enabling the switch away from fossil gas, that we transport through our pipes today, to green gases such as hydrogen and biomethane. We can say with near certainty that in 30 years' time, we will no longer be doing what we do today. It is likely however that green gases will play a key role.

We have organised ourselves to be the most effective in thinking about the near, medium and long-term solutions where the existing infrastructure, that our customers have already paid for, could be repurposed to carry low carbon gases.

We have invested significantly in our Future of Gas programme over the past year, which has created a positive momentum both across our research activities, but also in providing a clear pathway for hydrogen as a viable energy source of the future.

Figure 6: The UK's first homes with appliances entirely fuelled by Hydrogen

This covers both blending hydrogen into the gas network at a concentration of up to 20% and then later, a full transition to 100% hydrogen in the gas network.

Our work, combined with the collective work across the sector, is supporting the Government and other key stakeholders in their decision making around the plans needed for the UK to achieve net zero by 2050. The Government's Hydrogen Strategy for the UK published in August 2021, and previous Energy White paper and 10-point plan acknowledge that Hydrogen has a role to play.

The importance of hydrogen in the delivery of net zero

There is now more certainty of the role that hydrogen will play in the future of the UK. The UK's gas pipe network is an asset of enormous value and one which we can operate and should continue to serve the country for many decades to come. Fortunately, this network can be adapted to deliver low carbon green gases, such as hydrogen and biomethane.

Over the past year hydrogen has been discussed as a central component of achieving net zero, because of its ability to support the decarbonisation of areas previously thought difficult to reach. Due to the flexibility of hydrogen as an energy vector, it is expected to play a significant role in the decarbonisation of industry, flexible power generation, aspects of transport and heat. Hydrogen is recognised as a key component in creating a balanced and resilient energy system, allowing the peak demands of winter energy needs in the UK to be met at lowest cost to the customer.

Hydrogen is a place to store energy and utilising the gas network for this, plays to the strengths of the sector allowing electricity and gas to work in tandem.

The amount of hydrogen required by 2050 is still an area of much debate, but most net zero pathways centre around a figure close to 300 TWh of hydrogen per year. This is as large as the current annual UK electricity demand.

Kick starting the hydrogen production has already begun, with a focus around the industrial clusters in the UK (e.g. Merseyside, Aberdeen, Teesside and Humberside).

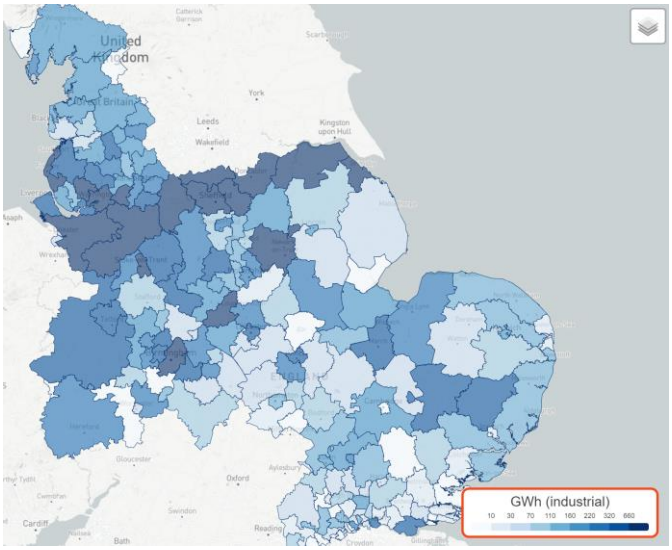


Figure 7: Largest industrial usage across our networks

Domestic heat

The role of hydrogen in domestic heat is also becoming more certain as the strengths of utilising the gas system are becoming clearer from both a safety aspect, but also the technical feasibility of both blending hydrogen into the gas grid and the successful development of hydrogen ready appliances. Hydrogen provides a low disruption pathway to heating homes for consumers, without the potential hassle associated with some of the electrified options on offer. As set out in our last annual report, our Future of Gas programme has been focused on all aspects of innovation required around a future hydrogen economy.

In order to share our progress, we have split the programme into 3 core areas;

- **Advocacy:** building stakeholder and consumer knowledge for a green gas future through sharing information
- **Safe and technically feasible:** Gathering the necessary technical evidence to demonstrate that hydrogen is safe and technically feasible across the value chain
- **Transition planning:** designing the future hydrogen network and how we transition safely and cost effectively to it.

Advocacy: Sharing our knowledge about hydrogen

Our advocacy programme has had the foremost aim of getting the decarbonisation of the gas grid on the national and regional political and public agenda, by providing information and education about the cost-effective role that it can play and what the gas industry needs from government to enable this to happen.

Our External Affairs team together with senior members of the business have spoken at over 300 events over the past year. This has included speaking at webinars, political engagement, cross sector working, and collaborative workshops, including groups such as the Energy Networks Association and their Gas Goes Green campaign, as well as the Confederation of Business Industry and the Hydrogen Taskforce. The teams have used these platforms to share the research and trial outputs, in support of the case for including Hydrogen in the UK's energy plans. Our close engagement with key members of the Government and their advisors, has already helped influence the Government's Hydrogen Strategy and earlier 10-point plan, where the language has moved away from banning boilers, to moving to hydrogen ready boilers and referencing large scale blending trials and industrial clusters, such as our own flagship project, HyNet.

In August 2021 we launched our Greenprint: Future Heat for everyone. This document, which is linked below, sets out our views on the technical, consumer and economic elements needed to transition to low carbon heat. We are committed to supporting the UK in achieving the net zero challenge, we have also published our Hydrogen 10-point plan, setting out the role we intend to play, subject to the Government's support.

- **Executive Summary - Our Green Print**
- **Full report - Our Green Print**
- **Our Hydrogen Ten Point Plan**

Figure 8: Our Green Print and Hydrogen Ten Point Plan documents

HYDEE – Hydrogen Chatbot

We also know how important it is to bring our stakeholders and employees along with us and have set up internal and external web content on the Future of Gas programme, such that our own employees can act as educators and ambassadors. This includes the first ever hydrogen 'chat bot,' which we have named HYDEE (Hydrogen Digital Education Expert) in a competition with employees. The chat bot answers question about hydrogen and since its launch in October 2020, it has had over 4,000 conversations with the public.

- **https://cadentgas.com/future-of-gas**

Figure 9: HYDEE chatbot on Cadent website

Safe and technically feasible: Hydrogen

For several years we have been working on the evidence required to demonstrate that both blends and 100% hydrogen are safe in a converted gas distribution network and in the home. The Government requires this information in order to make a policy decision on the inclusion of hydrogen for home heating. The safety aspects have been split across the gas distribution companies and has been made possible with effective and co-ordinated innovation funding. In addition, our programme to renew and replace older metal pipes with polyethylene (plastic) means that our network is capable of being repurposed for the transportation of green gases including hydrogen.

HyDeploy – 20% hydrogen blending for domestic gas

We have been focusing particularly on the development of blending hydrogen, as well as co-funding other key programmes such as the H21 programme, which is testing the compatibility of hydrogen with network assets. Blending hydrogen into the gas grid is important in the plan to achieve net zero and the Government 10-point plan has set a target to enable blending by 2023. This has been driven by our successful work on the HyDeploy project. HyDeploy has completed its work demonstrating the blending of hydrogen into the private network at Keele University and this year we also published a report detailing the necessary policy changes that would be required to make blending a reality.

Blending into the gas grid not only enables an immediate reduction in the carbon emissions of gas users but provides hydrogen producers with certainty of demand. This is key to kick starting scaled hydrogen production in the UK.

Transition planning: HyNet – 100% hydrogen with CCS

Our flagship industrial cluster project, HyNet delivered on the pre-engineering design work and has progressed to the front-end engineering design and consenting phase. Our role in the consortium is the construction of the UK's first regulated hydrogen pipeline, that will distribute 100% hydrogen to multiple users and to blending points for the cities of Manchester and Liverpool. The consortium has gained much political interest, with the project winning the competition for funding from the Industrial Decarbonisation Challenge (led by UKRI) earlier this year.

Figure 10: HyNet NW – one of the UK's first Hydrogen Industrial clusters

The HyNet and East Coast Clusters have been confirmed as track 1 clusters through the government's carbon capture, usage and storage (CCUS) cluster sequencing process. On 19th October 2021, the Energy, Clean Growth and Climate Change Minister, **confirmed** the cluster sequencing process, which has £1bn to provide industry with the certainty to deploy CCUS at pace and scale. Having completed the first phase of the evaluation of five cluster submissions, HyNet North West and the East Coast Cluster will now be taken forward into Track-1 negotiations to begin decarbonising industry from 2025.

Our priorities for 2021/22

2021 is proving to be a pivotal year for the gas sector. The Government published its Hydrogen Strategy, which set out the UK's ambition to build a hydrogen economy. COP26 itself is also expected to be an opportunity for the UK to showcase how innovation in hydrogen sets the UK in the lead on the world stage. We therefore have several key priorities for the next period:

- Continue to focus on developing the safety case for hydrogen in the gas grid and homes, that enables the next phases of demonstration projects and pilots to happen
- Progressing our support for the regulatory framework that enables hydrogen blending to happen. This is important as it unlocks a significant demand centre for hydrogen producers
- Progressing our plans to demonstrate how a town conversion to hydrogen could happen
- Building on our economic assessments and consumer research, to ensure that heat decarbonisation is fair and just

Taking a whole energy system approach

Collaboration between gas and electricity network operators

As the energy networks face increasing challenges from decarbonisation and our journey to net zero, coordination between electricity and gas network operators grows increasingly important.

Extracting the most value from the electricity and gas network infrastructures can be achieved by developing and implementing initiatives that optimise their collective utilisation. This approach will deliver the least cost, least disruptive solutions our customers and stakeholders require urgently to meet our carbon emission reduction ambitions.

In addition, we have added additional senior resource to our team, to manage the complex stakeholder relationships regionally, to support the education of the future of the gas network and provide joined-up and collaborative solutions.

Local authority engagement for whole energy system solutions

We want to continue with this type of local area energy planning, and welcome contacts from regional bodies that may be keen to pursue a similar approach for their geography. We would also be interested in supporting whole system solutions for off gas grid communities, where extending the gas grid to provide access to low and zero carbon gases may be a credible option. Whole energy system planning for such communities can ensure robust, efficient, sustainable solutions with minimal disruption are identified to decarbonise their complete future energy needs, including both heat and transport.

We are also actively supporting the ENA's Open Networks project, to explore whole system solutions facilitating local authority growth ambitions. How this will be taken forward is still under development, but the ambition is to provide a higher value efficient service to local authorities by providing a one stop shop for whole system optioneering. We would be very pleased to hear views from any local authority that would like to find out more and help shape the future services provided by the gas and electricity networks in this area.

Another great illustration of the value of whole system cooperation is the connection of gas-fuelled power generation sites. Whilst renewable power generation will take an increasing proportion of the electricity demand, secure, reliable, dispatchable power generation is required for when intermittent renewables are not available. Gas-fuelled powered generation is playing an increasingly vital role in this sector, which is pushing up peak gas demands in certain areas of our networks. We welcome early conversations from parties seeking to connect power generation onto our network, so we can ensure we can provide the necessary capacity efficiently and within the required timescales.

Billing in a low-carbon world

How it could be managed

As the UK prepares for a future where a range of sources provides us with low carbon energy, it is crucial that the way customers are billed keeps pace with this.

With 84% of UK homes currently heated by gas, we want to help customers move to low-carbon energy, through hydrogen and other green gases, in a way that's affordable and convenient.

As with all innovation, we have a technical challenge to overcome: each gas has a different energy content, so current regulations mean that the gases must be processed to meet billing standards. This can even include adding carbon back into the process, which is simply not consistent with our low carbon ambition. With the Future Billing Methodology (FBM) project, we aim to remove the need for this processing by creating a way to measure the blend of gases we are likely to use in the future. If we succeed with this project, we can deliver low-carbon gas to customers and pave the way for larger carbon reductions.

We installed sensors across East Midlands and East Anglia networks to track the zone of influence of gas being injected from two embedded biomethane sites.

This has provided valuable data on how gas flows change with network dynamics such as demand. The data correlated well to gas flows predicted by network modelling, which in turn could be used to allocate energy content more locally. FBM is a 'proof of concept' project, and the next step is to share the findings with industry.

We have also been exploring the impacts of blending green gasses such as hydrogen and biomethane under the current billing regulations through a small Network Innovation Allowance funded project;

- ***I-0343 Calorific value and gas quality impact assessment of hydrogen and biomethane blends.***

Next, we plan to consult with industry on the options explored and to recommend the optimal solution for the billing of low caw carbon gasses as we transition to a net zero future.

Our environmental performance

Cadent shrinkage

Shrinkage is gas that leaves our network without passing through a meter. It is estimated using an Ofgem approved methodology. Shrinkage includes gas that leaks or is vented from our system (leakage), gas that is used for our operational purposes, for example preheating prior to pressure reduction (own use gas) and gas that is stolen upstream of the meter (theft of gas).

The largest contributing factor to a gas transportation network's greenhouse gas emission is leakage, therefore the leakage of natural gas contributes to global warming. Shrinkage gas also contributes to customers' bills and therefore any reduction in emissions will decrease our environmental impact and deliver customer savings.

Calculating shrinkage

To estimate leakage from our gas distribution system, we assess the emissions from our pipes and above ground assets, in addition to an estimate of leakage associated with specific pipe interference damage incidents.

RIIO-1 performance

We are proud of the progress made in reducing emissions over the RIIO1 regulatory period (2013 to 2021) as we focused on three key areas:

- Delivery of the pipe replacement programme by inserting plastic into our metal pipes.
- Optimisation of system pressures in the local networks.
- Injection of monoethylene glycol (MEG) into our networks, which helps reduce leakage by swelling pipe joints.

Based on an assumed typical annual consumption of 12,500kWh for a domestic customer, the reduction in emissions over RIIO1 is equivalent to the typical gas usage of over 150,000 domestic properties.

	Opening	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21
East of Eng (tCO2e)	667,714	624,133	602,472	581,418	580,663	566,945	542,885	527,822	503,170
London (tCO2e)	351,099	334,911	324,160	316,670	308,933	293,229	276,328	264,695	255,892
North West (tCO2e)	512,493	480,094	463,835	443,553	430,192	416,704	396,603	380,565	354,664
West Mids (tCO2e)	430,920	413,224	399,318	381,785	377,816	367,828	355,861	338,573	327,652
Cadent (tCO2e)	1,962,227	1,852,361	1,789,786	1,723,426	1,697,604	1,644,706	1,571,678	1,511,655	1,441,378
Cumulative % Reduction		-6%	-9%	-12%	-13%	-16%	-20%	-23%	-27%

Table 3: Carbon reduction performance for RIIO-1 (Global Warming Potential 28)

Mains replacement

The biggest reduction in our year-on-year emissions is from the delivery of the mains replacement programme which replaces ageing metallic pipes with polyethylene. The benefit from this is enduring – once the metallic pipe has been replaced, the environmental benefit is continual.

Average system pressures

We have introduced bespoke operating strategies for our largest networks; these strategies include specific settings to ensure pressure compliance whilst running the networks in the most efficient manner to reduce leakage.

Monoethylene glycol injection

In some of our networks we still have a large percentage of iron mains that have lead yarn joints. These joints, which can dry out and cause leaks, are treated using monoethylene glycol, which reduces the rate at which gas leaks from them by swelling the joint.

Future emissions

Our emissions will mostly be influenced in the future by the progression of the mains replacement programme. Over the coming ten years we anticipate a 30% reduction in emissions as the number of metallic mains in the network decreases.

Based on an assumed typical annual consumption of 12,500kWh for a domestic customer, the reduction in enduring emissions for the next ten-year period is expected to be equivalent to the typical gas usage of approximately 157,000 domestic properties.

Facilitating connections to our networks

We are continually assessing the service we provide to customers who want to connect to the gas grid to receive a safe and reliable gas supply.

Connections

In 2020-21, we facilitated 15,300 new connections for our customers. We envisage this figure to rise in the medium term until at least 2025; it is difficult to forecast past this date with the uncertainty around the use of fossil gas boilers in new homes and net zero ambitions.

We offer a variety of services to our connection's customers, including:

- Household connections and alterations
- Business-to-business connections and alterations, including more complex projects.

Our service extends beyond connecting paying customers; we recognise the importance of supporting fuel poor customers. Living in a cold home can have much wider impacts than just financial ones, affecting areas such as the physical and mental health of families, and educational attainment of children. We offer free and discounted connections under the Fuel Poor Network Extension Scheme (subject to eligibility criteria) and connected over 4,200 households at risk of fuel poverty in 2020-21. By offering this service, we reduce fuel poor customers' energy costs and improve their quality of life.

Gas-fired power generation

We continue to see an increase in the number of enquiries and quotation applications for power generation sites across our networks. We currently have 121 power generation sites connected to our network, generating 1658MW of electricity, and a further 86 sites in progress. We have continued to work with the Power Generation community over the last 12 months, providing support throughout the lifecycle of the projects with increased focus on design and commissioning phases.

We have also been working with the other Gas Distribution Networks (GDNs) to facilitate an Engagement Workshop scheduled for later in 2021 and will be hosted by Wales & West Utilities. The workshop is an opportunity to provide the progress we have made on our agreed commitments from the workshop held last year and for the community to share impacts the pandemic has brought and to understand the immediate and future market direction.

Connection Type	East Anglia	East Midlands	North West	West Midlands	North London	Total
Power Generation Sites	15	44	45	9	8	121

Table 4: Total Power Generation connections to our networks by area

Competitive connections

We also process competitive connections within the industry, such as:

- **Connections to IGT networks:** These independent networks are connected to ours, but the IGT owns and operates the network
- **UIP connections:** A UIP is responsible for designing and constructing the network, which will then be owned and operated by us or an IGT

Our Connections Team is continuously improving our service to customers. We recognise that understanding our customers' needs will allow us to evolve our proposition to meet and exceed expectations.

Detailed information on all our connections services, including contact details, incentives for fuel poor areas, charges, and terms and conditions, can be found at **cadentgas.com/get-connected.**

Off gas grid decarbonisation

Government is considering how to reduce carbon emissions from high-carbon domestic heating systems such as oil and coal. We believe that in some circumstances, where the gas network is nearby, extending the gas grid to a community represents the lowest cost pathway for the residents. Gas is an attractive option which minimises disruption compared to the alternatives. We commissioned a report to assess the wider socio-economic benefits of switching from oil or coal to gas, and this showed a minimum net present value of over £6,000, with a much higher amount when switching from the more polluting fuels.

There is therefore strong evidence that switching from oil or coal to natural gas achieves significant benefits, including carbon emissions reductions, and these would be further improved by renewable gases. Indeed, the new heating systems could be futureproofed to accommodate a future switch to hydrogen.

With this clear benefit, our future plans include stepping up the support we can provide for off gas grid communities seeking to connect to our network. We are also trialling gas network extension, to demonstrate the added value and provide the evidence needed to influence regulatory changes and ensure such extensions become business as usual.

We would welcome feedback on such an approach, particularly from any off-gas grid areas where extending the main gas network may be supported. You can share your feedback with us at **cadentgas.com/ltdp**.

A culture of innovation

Driving change through curiosity

By embracing innovation, we are finding the most up-to-date tools, techniques and practices to keep gas flowing safely, reliably and with minimal disruption to customers. We have moved from a process-driven structure to a regional customer-focused structure, striving to create an innovation ecosystem to address issues at a local level and share best practice throughout our networks. Each of our four Network areas has their own Innovation Project Management capability to drive local ownership as well as ensuring they are close to their own operational colleagues.

We believe we can respond in an agile way to the changing needs of the communities we serve and work collaboratively with the other gas distribution networks on specific projects and share learning and best practice from our day-to-day work.

We recognise that working together ensures the maximum benefit to customers, by enabling all parties to embrace new, value-adding technology and ways of working.

The Gas Network Innovation Strategy has been developed by all the gas distribution networks, and is designed to bring together all of the most important challenges and opportunities facing the UK gas transmission and distribution networks

As we have moved into RIIO-2, we are focusing on and securing NIA funding on innovation that addresses opportunities around customer vulnerability and the energy system transition.

Making life easier for customers

While keeping our customers safe and warm in their homes, we are also committed to drawing on best practice within and outside our sector to enhance the experience they have with us. By embracing new tools, techniques and processes, we are leaving a more positive impact on the communities we serve.

Connecting with our customers: Smart video surveying

We are here to help customers who request a new gas connection or a change to an existing gas connection. Due to COVID-19 lockdowns we had to adapt and change and for many customers a face to face visit was not practicable or desirable. The proposed solution is a product called Vyntelligence, which will enable customers to control the survey process by capturing video footage themselves, the solution offers further computing intelligence to pick out words and prompt actions, driving right-first-time data capture. After a period of development and testing, we are now trialling in a region in the West Midlands. Through this technology we hope to significantly reduce lead times for our customers and provide a greater end-to-end customer experience.

Support for customers in vulnerable situations
Best in class customer experience

We have focused on equipping colleagues and partners with the tools they need to respond to local needs. We have made sharing data a priority so that we embed best practice across all our partners. To ensure all colleagues have access to real-time insights enabling them to make better decisions, we have launched a suite of dashboards which are available to everyone and tailored to their needs. Managers and supervisors are equipped with the tools to make evidence-based decisions to improve performance and frontline engineers can see their own performance against targets. Through these measures, we have laid the foundations for an innovation ecosystem that is centrally governed, but locally defined.

Mechanical Purge End

Last year we shared the details of Mechanical Purge End, a solution which is quickly and easily fitted to the end of the gas pipe during gas pressure testing – preventing the waste we would generate by disposing of single-use fittings.

We now plan to roll out the technology in late summer 2021. The benefits of this technology were recognised at the Utility Week Awards 2021, where Mechanical Purge End won Product of the Year.

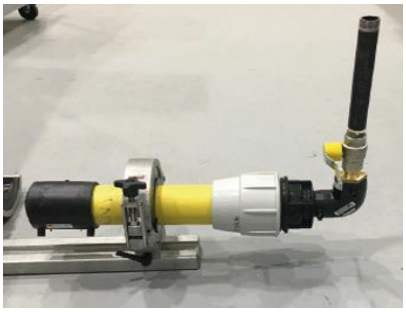


Figure 11: Mechanical Purge End

Replacing service pipes at pace: Kobus Pipe Puller

As part our gas mains replacement process and through repair activities, we must replace customers' service pipes to their properties. The Kobus Pipe Puller is a trenchless technique for replacing gas service pipes of small diameter, designed to speed up the process and minimise avoidable disruption for customers.

This year, we carried out 15 successful field trials, on ¾" and 1" service pipes. This allowed us to take a sample of each inserted pipe for further lab testing by the experts at Rosen. Following the lab tests, it was established that all samples passed core requirements, allowing us to close the trial phase and move into implementation.

The above are some of the innovations we are carrying out and we look forward to driving our innovation capability to the next level throughout RIIO-2, deploying transformative solutions at pace and meeting and exceeding the needs of our customers for the foreseeable future.

Energy Networks Association: Innovation

At the start of the new regulatory period RIIO-2 in April 2021 Britain's network companies introduced the Energy Network Innovation Process providing full governance details of the end-to-end industry led process for reporting, collaboration, and dissemination of Ofgem funded NIA projects in GB.

This new process will include reporting against an Innovation Measurement Framework (IMF) Energy Networks will report on a range of innovation outcomes, including collaboration and partnerships, the speed at which successful innovation is transitioned into BAU and the benefits innovation has delivered for network customers.

RIIO-2 has also introduced a Strategic Innovation Fund (SIF) to support the transition to net zero. This fund supports large-scale transformational research and development projects and will be available to Gas Distribution (GD), Gas Transmission (GT), Electricity Transmission (ET) and the Electricity System Operator (ESO) in the first instance.

Our Energy Innovation Forum set out the networks' priorities for 2021, and showcased the improvements made to provide greater clarity on participating in projects.

All network companies supported the redevelopment of the Smarter Networks Portal. This update will ensure a system to better to facilitate learning and collaboration in the industry.

You can find out more information about individual projects at the Smarter Networks Portal, **https://www.smarternetworks.org/**

Demand forecast

Demand forecast across our four gas distribution networks for the next decade

Appraisal of scenarios

Our demand scenarios are based on planning assumptions we have derived from market observations and stakeholder engagement. The scenarios consider the need to reduce our carbon emissions, which is critical to meeting the UK's decarbonisation targets by 2050. They also include the views of specialist consultancies and data collected from National Grid's Future Energy Scenarios (FES) consultation process.

The FES consultation involves market participants, including suppliers, customers and stakeholder groups. It provides important feedback on the impact of market developments.

Demand overview

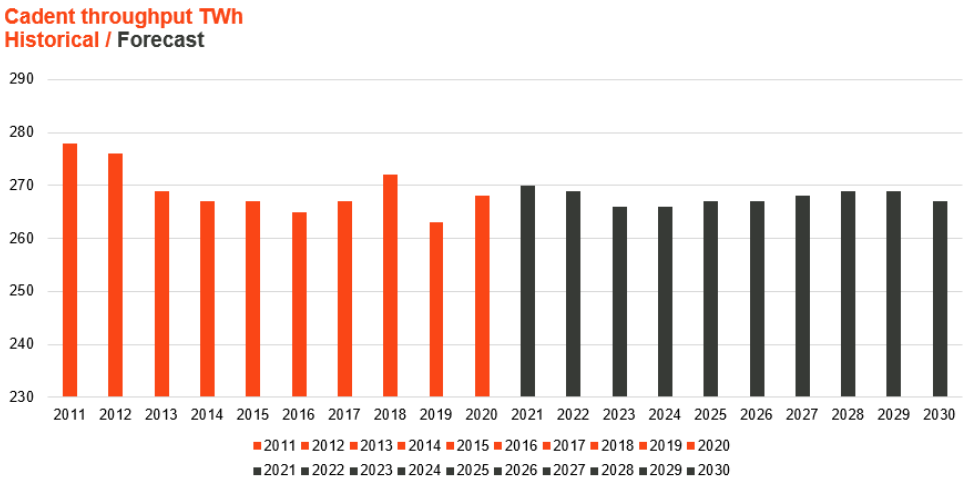
The latest peak gas demand forecast shows minimal change over the next ten years. All forecasts are based on annual demands, which are then converted into peak demands.

In a world that is constantly changing, we are continually challenging and reviewing the way we forecast to ensure it remains appropriately robust and accurate.

Forecast demand

This year's projection for future demand is similar to the previous year's forecast. This has seen an increase in peak demand, with a slight decrease in annual demand over the ten-year period.

The increase is partly due to additional peaking electricity generation plants connecting to our network, requiring capacity at peak gas demand times. Other factors include the change in how peaks have been calculated, incorporating experience from the Beast from the East in March 2018.



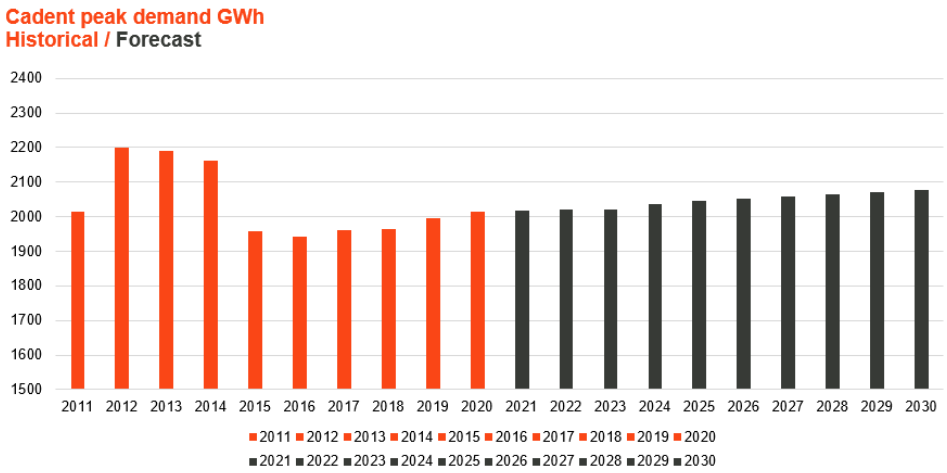
Graph 1: Annual throughput – 10 year historical and 10-year forecast

In 2018, Ofgem requested that networks across transmission, distribution, gas and electricity agree a common set of factors and assumptions for developing their core view of the future. As part of this review, we debated the key areas that will affect and drive behaviours in gas demand over the next ten years.

The outcome was an unprecedented level of collaboration and knowledge sharing, which has resulted in greater understanding and agreement on the common factors and assumptions affecting each network's demand forecast. This has reinforced the stance we take in all key areas, providing a strong basis on which to review and agree the position for our demand forecast.

The FES 2021 document provides four scenarios in total, with a five-year forecast. The scenarios provide guidance based on the underlying assumptions for each scenario, whereas the forecast indicates the expected demand based on these assumptions.

This year, we have used the five-year Central Forecast provided by National Grid ESO as we both believe that this represents the most realistic view of the shorter-term evolution of the energy system and is influenced less by the modelling assumptions regarding the longer-term decarbonisation choices.



Graph 2: Peak hour demand - 10 year historical and 10-year forecast

For the last 5 years we have used Steady Progression scenario to determine our 10 year forecast.

Forecast comparison and accuracy

The forecast is broken down as follows:

- **Appendix A** contains demand forecast information at a local level through to 2029/30.
  - A comparison of actual demands during 2020 with the forecasts in our LTDP
  - Maximum and minimum demand days and forecasts for winter and summer 2020/21.

Future demand factors

We have seen annual demand increases in 2021/22 as described above, then there is a gradual decrease over the 10-year period because of energy efficiency measures employed in homes and industry. The assumptions made about the impact of energy efficiency measures on gas demand continue to be reviewed as the easier measures are completed, which leaves the more costly and difficult ones to address. We do not yet know what the longer-term impact of the COVID-19 pandemic will be on demand, and we are monitoring the situation.

Our forecast demand includes alternative technologies such as air source heat pumps, which will reduce customers' use of gas. We also include gas-efficient appliance technologies like gas-sourced heat pumps and combined heat and power, which reduce carbon intensity.

These new and emerging technologies can help us be flexible as we meet our domestic peak heat demand and reduce pressure on the electricity grid.

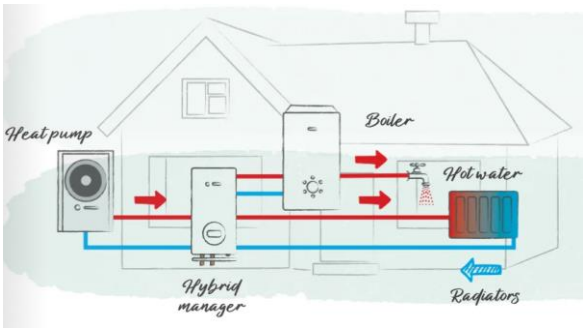


Figure 12: Hybrid heating system

New hybrid appliances powered by renewable electricity could transfer to gas at peak times, or at other times when there is not enough renewable electricity.

Other developments include smart technologies that can switch from electricity to gas depending on changes in the price of electricity, and smart appliances that can choose the cheapest or lowest-carbon fuel. Combining all these technologies is the best way to make the most of renewables across both energy supplies. It will also maximise the use of the network and associated assets that customers have already funded.

New technology and the way gas is used across the year and at peak times is changing, and this will continue as new technologies become the norm and behaviours evolve. This is leading to a clear distinction between our view on annual demands versus peak demand. Gas used across the seasons is likely to continue to decline, but the original relationships that the gas industry has built from experience are beginning to be less relevant. Through numerous innovation projects run by the gas networks, we are looking to understand the evolving relationships between peak and annual demands, and to consider whether we take a whole new approach to how we forecast future demand.

Investing in our networks

We continue to invest heavily in our networks to maintain their integrity and to provide enough capacity for peak demand periods, ensuring we meet our customers' needs.

Investment implications

Our average annual investment across our four regulatory networks over the current regulatory period set by Ofgem is over half a billion pounds. The majority of this investment relates to our gas mains replacement programme, which we have a legislative commitment to deliver with our safety regulator HSE by 2032. This investment programme has considerably reduced the safety risk on our networks since it started in 2002.

We continue to invest in reinforcing and increasing the capacity of our networks where required to respond to local authority strategic development proposals and demand from our customers in biomethane connections.

Our networks are designed and operated to meet peak capacity requirement to satisfy our 1 in 20-year demand license obligation (1st March 2018, Beast from the East as an example) and we are focused on reducing emissions and leakage to reduce our carbon footprint and ultimately costs to our customers. We also drive efficiencies in asset performance through asset investment decisions to introduce smart technology and updating our asset base with more efficient models.

Maintaining the integrity of our networks

We maintain the integrity of our networks by monitoring performance and targeting those assets whose age, current condition, performance and future expected deterioration or obsolescence pose the greatest risk to the safe and effective operation of our networks.

Both live and retrospective performance data for all critical network assets is reviewed regularly by our technical engineering and control centre teams.

The purpose of any live data monitoring is to ensure on-day demand and supply within our networks is enough, and to identify any alarms/faults which require investigation.

Retrospective asset data monitoring seeks to identify variances, patterns, trends or cycles in historic asset performance.

Figure 13: Asset monitoring and maintenance

By monitoring the performance and health of our assets, we can ensure that we balance inspection, maintenance and capital expenditure to maximise the efficient operating life of our assets with a focus on enabling a sustainable and future-ready gas infrastructure.

Monetised risk

Our Gas Transporter Licence requires GDNs to have a common Network Asset Risk Metric Methodology (NARM). NARMs are an evolution from RIIO-1 Network Output Measures and relate to the risk of asset failure. Through our asset management activities, such as replacement or refurbishment, we ensure that the risk to customers is maintained within reasonable bounds. The purpose of this approach is to track delivery of agreed risk reduction measures through the regulatory period.

Risk values are represented in monetary terms as a 'common currency' for comparison between different asset groups and failure modes. This common currency for the statement of asset risk is referred to as monetised risk. The core principle is that 'risk' is the product of probability of failure of an asset – the consequence that such a failure could lead to, and the cost (monetary value) associated with those consequences. The combination of these factors derives a statement of monetised risk for an asset base.

Asset data

We recognise the importance of asset data in the management of assets. Our Asset Data Strategy outlines how we will improve confidence in the quality of our asset data and define a holistic view of critical asset data, combining stock, location, health/condition and risk, ultimately enabling better asset management decisions for our customers. Our dedicated Asset Data Team own the delivery of this strategy and will continually drive improvements in our asset data across our four regulatory networks.

Creating local asset investment decisions

By implementing a new dedicated local Asset Investment team in each of our four regulatory networks, we will drive efficiencies as part of the localised rolling five-year Network Asset Management Programmes for RIIO-2. These teams will establish close working relationships across the network, internally and externally, to ensure delivery across all our assets whilst implementing refined systems, processes and revised monitoring regimes. This approach will proactively target replacement of mains to reduce leakage, enable hydrogen readiness and support other network-specific and company-wide initiatives, such as connecting gas-fuelled power generation sites. Our central Asset Strategy team will provide the consistent asset management framework for each local network to work from and will define the longer-term asset strategies for low-carbon gas alternatives.

Upgrading our networks for the long term

Our operating model gives us an opportunity to take a long-term strategic view on our replacement requirements for the next eleven years to the end of the 30:30 program in 2032 (all tier 1 iron pipes within 30 metres of a property are to be replaced with plastic over a 30-year timeframe). We will also consider future net zero scenarios.

Through network alignment, we have brought our design team together with our strategic planning team, providing us with the capability to take a holistic view of replacement planned work. By investing in modelling tools and the accuracy of the network models, we are creating a model of the future gas network to the end of the 30:30 programme. By also considering low-carbon alternatives (including hydrogen), we will assess the potential requirements for a net zero gas network, and this will influence our overall strategy for asset investments.

We will increase our mains replacement by insertion, through proactive management of our operating pressures and identifying general reinforcements to bolster network capacity.

A whole network approach will create regional opportunities to help drive down costs for our customers into the future.

Higher insertion rates will also mean less disruption in footpaths and roads for our customers and local authorities.

We are committed to reducing leakage by identifying HSE policy mains with high leakage rates and will prioritise these for mains replacement over the RIIO-2 period.

Using our cost benefit analysis model, we will identify non-policy mains for replacement or remediation using innovative tools and techniques.

This not only benefits the environment by reducing our methane emissions, but also benefits our customers by reducing emergency work and interruptions.

Figure 14: Pipeline maintenance

This holistic approach considers all impacts on the local communities and local authorities to prioritise the mains for replacement under the 30:30 programme, including incorporating mains with low pressure due to water ingress or that are a part of the future hydrogen initiative. Early engagement with the local authorities is enabling a collaborative approach to manage the work activities within the highways limiting the impact on the communities.

By the end of the 30:30 programme, our distribution networks will predominantly consist of plastic pipe, which can carry a wider range of gases including hydrogen. As these pipes also require significantly lower maintenance than existing materials, they will deliver a low-cost, low-carbon network which will play a central role in the UK's future energy system. You can see below how our networks will become hydrogen ready from our mains replacement programme from 2021 through to 2032. The darker the green the more plastic they are.

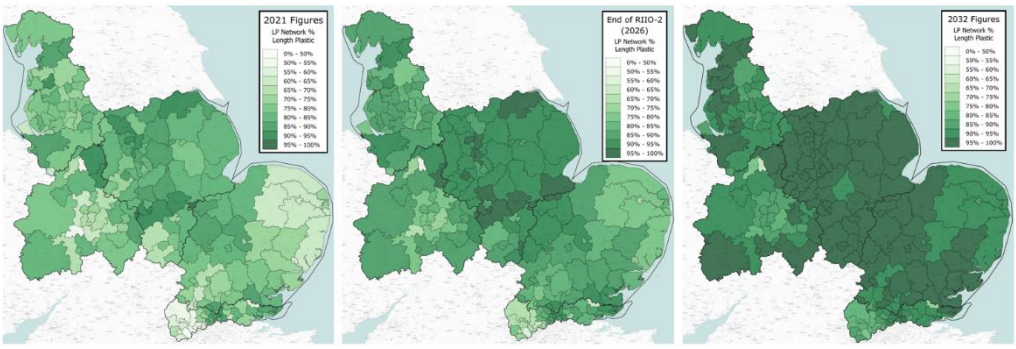


Figure 15: Plastic % of low-pressure networks from 2021 to 2032 across Local Authorities

Reinforcing our networks

Due to growth in housing and the rise in gas-fuelled power generation sites over the medium term, network capacity requirements are constantly changing. Housing developments on the extremities of our networks have continued to rise during recent years, with the fastest growth in the Eastern networks.
To ensure greatest value for our customers, we balance proactive reinforcements with optimising pressures to manage the integrity of the network and ensure we maintain supply to our residential, commercial and industrial customers.

As the working pattern during 2020/2021 has shifted due to COVID-19, we will monitor and review our reinforcement approach in order to anticipate and manage any long-term impacts of an increased number of people working from home. This will ensure that there is an enduring continuity of service as we monitor the potential changes on the demand profiles in our networks.

- **Eastern Network:** There is an ever-increasing number of power generation sites looking to connect along with a large amount of new domestic homes requesting connections.
- **North London:** Due to refurbishment of historical buildings and new large-scale developments, we are carrying out general reinforcements which are typically road crossings.
- **North West:** There has been a rise in applications for power generation and biomethane sites in this area and we are taking a balanced approach of either pressure increases, or pipe laying to secure the network.
- **West Midlands:** The main area for growth which requires reinforcement is in the Warwickshire area.

Supporting customers in multi occupancy buildings

We aim to carry out inspections on the gas infrastructure supplying medium and high-rise buildings. Our work done to date has enabled us to build a sound foundation for these core assets.

We support district heating schemes, which can save costs for customers by providing communal heat from a single central heating system. This can be especially effective in low, medium and high-rise buildings.

We will continue to help communities in multi occupancy buildings explore the best use of energy, and we are planning further specific stakeholder and customer engagement on this matter. We would welcome feedback on this proposal and would be especially interested to hear from anyone involved in regional district heating schemes. You can share your feedback with us at **cadentgas.com/ltdp**.

We have ensured we are replacing Multi-Occupancy Buildings in conjunction with the Mains replacement programme to minimise customer and local community impacts.

Closing statement

Thank you for reading our Long-Term Development Plan 2021. We hope you found the report interesting and informative.

We've given you an insight into:

- Our enhanced approach to customer and stakeholder engagement
- How we are helping the UK achieve its decarbonisation targets to achieve net zero
- Demand forecast for our networks
- The developments we are making to our connections processes
- How we are driving change through innovation
- The investments we are making to enhance our networks

Our development plans are driven by our ambition to set the standards that our customers love, and others aspire to. We will continue to develop our plans based on customer and stakeholder feedback. Don't forget to share your feedback at **cadentgas.com/ltdp** if you would like your views to be taken into consideration.

Further reading

Please follow the links below if you would like to find out more.

- **cadentgas.com/get-connected**
  - Further information if you are interested in connecting to our network.
- **cadentgas.com/digging-safely**
  - How to dig and work safely close to our gas assets.
- **cadentgas.com/news-media/document-library**
  - Information and research carried out/commissioned by Cadent, about the future role of gas in the UK energy system.
- **fes.nationalgrid.com**
  - National Grid's full Future Energy Scenarios documents and supporting information.
- **www.ofgem.gov.uk**
  - Homepage for the Office for Gas and Electricity Markets (Ofgem).
- **www.gov.uk/government/organisations/department-for-business-energy-and-industrialstrategy**
  - The Department for Business, Energy & Industrial Strategy – the government department responsible for business, industrial strategy, science, and innovation with energy and climate change policy.
- **www.energynetworks.org**
  - Homepage of the Energy Networks Association (ENA), the organisation that represents electricity and gas network operators. They influence decision makers about regulation, cost and safety matters and facilitate best practice and collaboration across energy industries.
- **www.eua.org.uk**
  - Energy & Utilities Alliance (EUA), a not-for-profit trade association that provides a leading industry voice to help shape future policy direction within the energy sector.
- **www.gov.uk/government/organisations/office-for-low-emission-vehicles**
  - The Office for Low Emission Vehicles works across government to support the early market development, manufacture and use for ultra-low emission vehicles.
- **www.gasgovernance.co.uk**
  - Home of the Joint Office of Gas Transporters. This site contains information about the Uniform Network Code and its ongoing developments.

Regulatory basis for document

This statement is produced for the purpose of and in accordance with Cadent Gas Ltd obligations in Standard Special Condition D3[1] of its DN Gas Transporters Licence and section O4.1 of the Transportation Principal Document of the Uniform Network Code in reliance on information supplied pursuant to section O of the Transportation Principal Document of the Uniform Network Code. Section O1.3 of the Transportation Principal Document of the Uniform Network Code applies to any estimate, forecast or other information contained in this statement.

Cadent Gas Ltd would wish to emphasise that the information contained within this Document must be considered as illustrative only and no warranty can be or is made as to its accuracy and completeness. Cadent Gas Ltd, nor the directors, nor the employees of any such company shall be under any liability for any error or misstatement or opinion on which the recipient of this Document relies or seeks to rely other than fraudulent misstatement or fraudulent misrepresentation and does not accept any responsibility for any use which is made of the information or Document or (to the extent permitted by law) for any damages or losses incurred.

Standard Special Condition D3 requires that a statement, published annually, shall provide a ten-year forecast of Distribution Network Transportation Activity concerning likely use of the pipeline network and system developments that can be used by companies, who are contemplating connecting to our system or entering into transport arrangements, to identify and evaluate opportunities.

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