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Long Term Development Statement 2023


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Contents

Foreword

Paul Denniff, SGN Network Director

Thank you for taking some time to read our 2023 Long Term Development Statement (LTDS). Our LTDS is our annual opportunity to show how we approached our gas demand forecasting obligations for this planning period as well as share the results of this vital analysis with our 6 million customers and wider stakeholders.

This last year has been a difficult one for many but especially our domestic customers who have been impacted to the greatest extent by recent increases in the cost of living, increases which have dominated changes in demand over the last year, resulting in the highest level of demand reductions seen since 2009 following the 2008 global banking crisis.

Up until the Prime Minister Rishi Sunak's announcement on Wednesday 20 September, whereby he outlined what could prove to be a fundemental review of how the UK might deliver on its net zero obligations, there was little in the way of fresh energy policy over the last year to result in any significant changes in demand.

The fact the UK's net zero energy policy remains subject to ongoing review validates our continued approach to demand forecasting, whereby our focus is on the performance of legislated rather than yet to be legislated policy. This longstanding methodology is key to ensuring we are able to play our part in the collective journey towards a zero carbon future whilst maintaining a reliable source of energy on behalf of our customers and delivering on our license obligations.

As you read this years LTDS you will see our demand forecasts are completed by March each year, following this we begin producing our LTDS which is completed early September to enable publication by the regulatory deadline of Tuesday 31 October. As a result you will not see further mention of the governments late September net zero anouncement within our LTDS and our forecasts remain unaltered.

We will, as always, continue to assess any changes to energy policy incorporating those elements which become legislation into our forecasts as appropriate.

I hope you find this publication both useful and informative. If you have any questions or feedback on our LTDS, or any aspect of our forecasting process, please contact one of our industry experts listed in Appendix C.

LTDS annual cycle

Our Long Term Development Statement (LTDS) is the product of a yearly cycle of data gathering, analysis and consultations with our stakeholders all of which allows us to understand how our business may develop over the next ten years and beyond.

We use the LTDS to inform our operational strategy as well as our investment and business decisions. It also allows our customers to identify and evaluate opportunities for entry and exit gas connections.

Each year we update our demand forecasts with learning from the previous year. This ensures we're in the best position to deliver a reliable gas supply for our customers whatever challenges the future may hold.

Our LTDS is produced by our Network Capacity team with input from across our business. If you have any comments or suggestions on the publication please feel free to get in touch with the team at network.capacity@sgn.co.uk or contact one of our experts via the contact details in links and contacts.

February

We provide pre-forecast information to National Gas Transmission (NGT)

February / March

We meet with NGT to discuss pre-forecast data

April

We provide our initial forecasts to NGT

June

We meet NGT to discuss our final forecasts

July

NGT provides calorific value (CV) forecast

October

We publish our LTDS

The research we carry out to inform our LTDS is completed by the end of May each year

Our operational footprint

We believe our gas networks are key to delivering the least cost, lowest impact future energy solution for our customers in Scotland and southern England.

Our unique operating footprint is as an opportunity to engage with a variety of stakeholders and regional environments, not only across the two regions, but our three Local Distribution Zones (LDZs).

Scotland

Our Scotland LDZ distributes gas across all of Scotland to around 2m customers, including remote areas at Stornoway, Thurso, Wick, Oban and Campbeltown.

Southern England

South LDZ and South East LDZ stretches from Milton Keynes in the north, to Dover in the east and Lyme Regis in the west, including London boroughs to the south of the River Thames feeding approximately 3.9 million customers.

Engaging with our customers to understand their current and future energy requirements is fundamental in ensuring we continue to plan, develop and correctly manage our networks on their behalf, delivering a safe and reliable source of energy now and as the UK delivers on its net zero obligations

The forecast year in review

We have continued to focus on using a bottom-up approach to our forecasting methodology wherever appropriate. This enables the various analysis inputs to be appraised separately. For example, our domestic demand assessment enabled us to consider comfort levels and the cost-of-living impact separately to the installation of available insulation and heating options and how they influence current and potential future levels of demand.

Increased living costs during 2022 resulted in a domestic demand reduction of 10.6% compared to the previous year. This is the greatest year-on-year reduction in domestic demand since 2009.[1]

This significant drop creates a challenge when viewing this year's forecast figures as the ten-year differential change appears larger as a result. The percentage change over the forecast should instead be understood as a recovery in demand to pre-2021 levels rather than growth.

Limited changes to domestic energy policy over the last year has meant our forecast inputs remained relatively stable and consistent with last year.

We continue to review UK energy policy and implement methodology changes to ensure our forecasts fully reflect the direction the UK is taking on the journey to net zero.

Cost-of-living increases and growth in power generation have resulted in the largest impacts on gas demand over the last year.

Non-domestic demand sectors have proven more resilient to the current economic situation. Change this year has been minimal compared to last year's forecast, with these sectors showing slightly higher levels of demand.

[1] Domestic demand fell 11.8% following the 2007/8 financial crisis

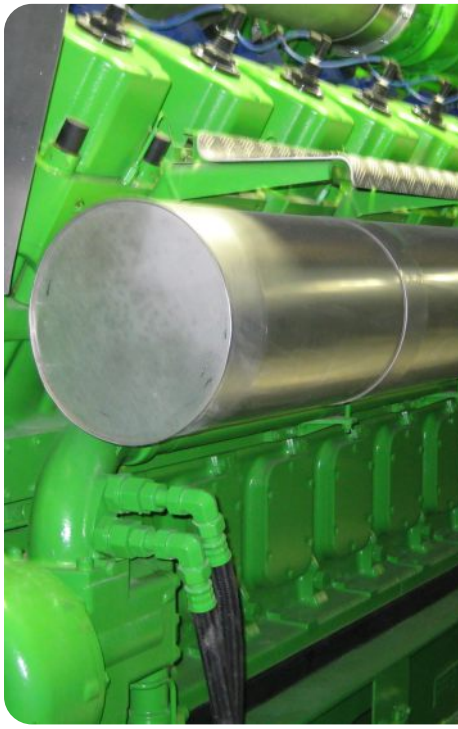
Our cross-industry engagement and market assessments indicated this to be a nationwide phenomenon with other gas distribution networks and National Grid Gas Transmission, now National Gas Transmission, also under-forecasting to varying degrees in the non-domestic sectors. We believe the main driver for the resilience is continued high demand for essential products despite the increased costs being passed on to the consumer.

As the UK reduces its reliance on carbon-intense forms of energy, by using more renewable electricity generation and electric vehicles, the electricity transmission and distribution systems will increasingly rely on a variety of other sources of electricity generation for the periods of low renewable availability. This gap in electricity supply is currently being met with small localised flexible generation.

Over this last year, we have continued to see increased activity in this area. While new enquiries appear to have temporarily plateaued in some areas, all sites already connected have shown higher levels of demand for longer periods of time. This is partly the reason why we are seeing growth within our forecasts this year. This has been more evident in Scotland than our southern LDZs, accounting for the majority of the demand increases in this region.

To help maintain the accuracy of our forecasting we need to be able to account for how customers are adapting to net zero solutions and pathways. We have continued to expand on last year's customer engagement program, increasing our assessment of the specific demand requirements of our largest and most network sensitive customers and how their usage is looking to change in their transition to net zero, be it switching to alternative sources of energy or looking for support for transition to hydrogen.

Much of the benefit to our forecasting assumptions will only come once our customers better understand the optimal net zero pathways available to them. We are doing all we can to support them in this shared journey by building those relationships we will need in the coming years as well as informing them on our plans to transition to low and zero carbon fuels such as biomethane and hydrogen.



This year's analysis of fuel price market indicators showed retail fuel prices reducing at the end of the year but remaining relatively high for the remainder of 2023. The result of this being small reductions in domestic demand. However, the analysis also showed prices reducing from 2024 onwards which, if historic behaviour prevails, will result in a corresponding upturn in domestic demand due to customers increasing their comfort levels.

If this does occur, domestic demand is likely to be close to 2021 levels by the end of the forecast period. However, the actual levels of demand in 2032 will be dependent upon how net zero initiatives become more widespread, impacting on customer behaviour and types of energy we all use.

A key message in the Committee on Climate Change's (CCC) 2023 Progress Report to parliament recognised the UK Government's lack of urgency on developing a policy framework for net zero. The CCC noted that while the framework has developed over the last 12 months, it is "not happening at the required pace for future targets". This is evidenced by little in the way of new legislation to significantly begin a large-scale transition away from gas as the primary form of heating UK homes, in either our immediate assessment of demand change or the latter years of our forecast.

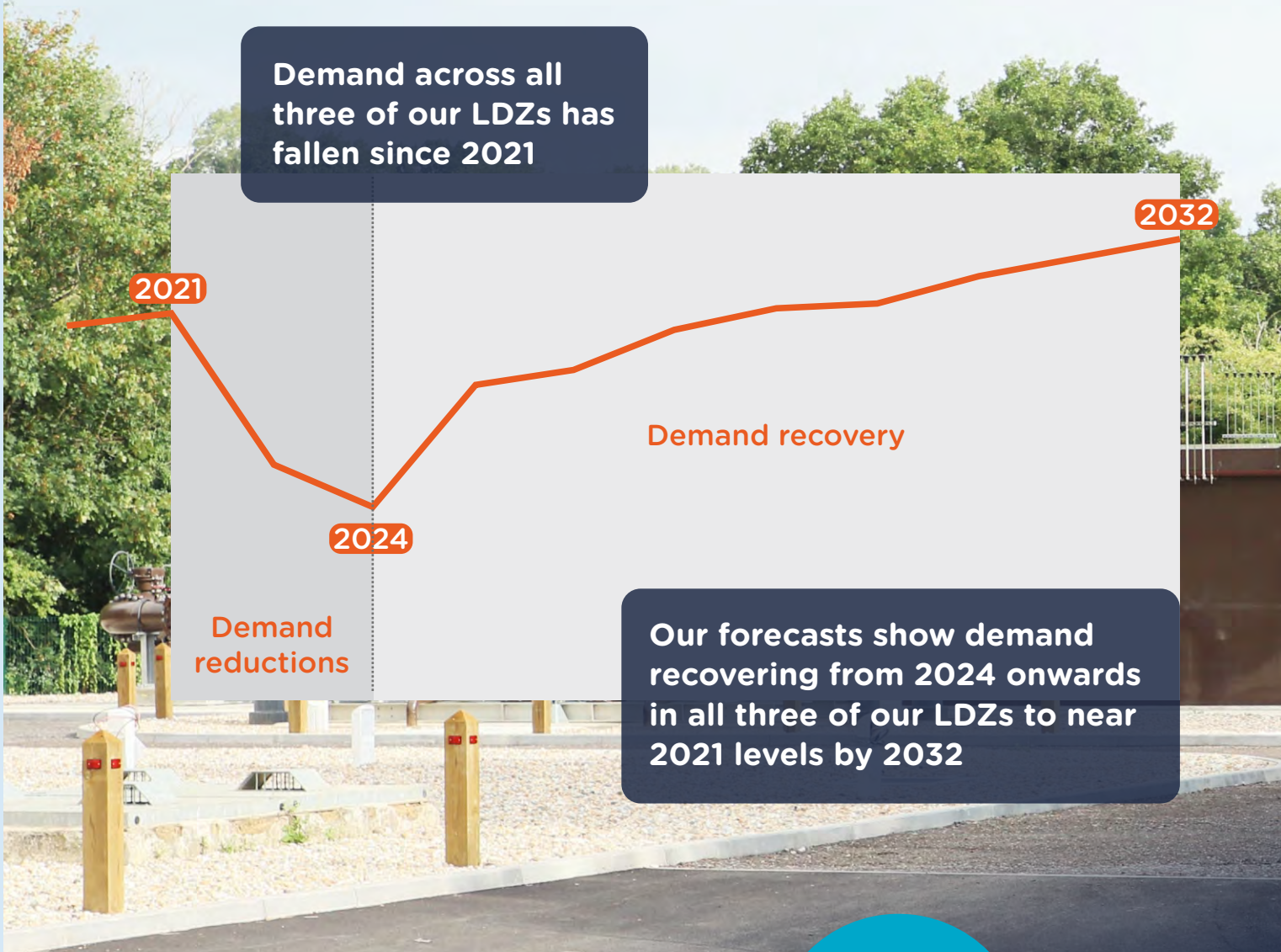
Both the Boiler Upgrade Scheme (BUS)[2] and the Energy Company Obligations (ECO) are underperforming against original targets, plus the two main schemes designed to potentially ban gas heating in new homes, Scotland's 2024 New Build Heat Standard II and central government's 2025 Future Homes Standard, were still not legislated at the time of our forecast or the writing of this year's LTDS. It is worth recognising both these schemes are likely to have a negligible impact on our forecast due to new builds accounting for only 0.8% of total domestic demand in 2032.

In summary, without significant legislative change we are unlikely to see a move away from gas as a primary energy source in our forecasts and domestic demand is likely to remain relatively flat as a result.

[2] Boiler Upgrade Scheme is available in England and Wales only

The next ten years

Our forecast covers a ten year planning horizon based on a detailed assessment of existing government legislation, historic and projected economic trends, as well as current, past and forecasted customer behaviour.



Over this ten year forecast period, we expect to see net demand increases across our three LDZs

Annual demand of 11.7%

Peak Day of 1.8%

The outputs from our analysis enables us to plan and manage our networks to ensure a safe and efficient supply of energy is delivered to our 6 million customers.

The factors influencing our 2023 forecasts the most are...

Cost-of-living impacts on domestic customers

Increased activity in Embedded Power generation

Large load customer growth

The factors which do not influence our 2023 forecasts are...

- Potential fossil fuel boiler ban
- 600,000 heat pump installations per year
- Great British insulation scheme
- Impact of EV rollout

These sensitivities are not yet developed enough to be included within our forecasts. They include proposed legislation by both central and regional governments as well as technological developments designed to enable net zero.

Impacts of cost-of-living increases

The current economic pressures have had a significant impact almost universally, but most notably, domestic customers – our single largest group of customers – have been greatest affected by cost-of-living increases.

The conflict in Ukraine has been the underlying driver of rising energy prices, but these increased costs have also fed into other inflationary pressures such as the price of food and household items. This has resulted in our domestic customers reducing their energy usage via behaviour change: people are heating their homes for shorter periods and to lower temperatures.

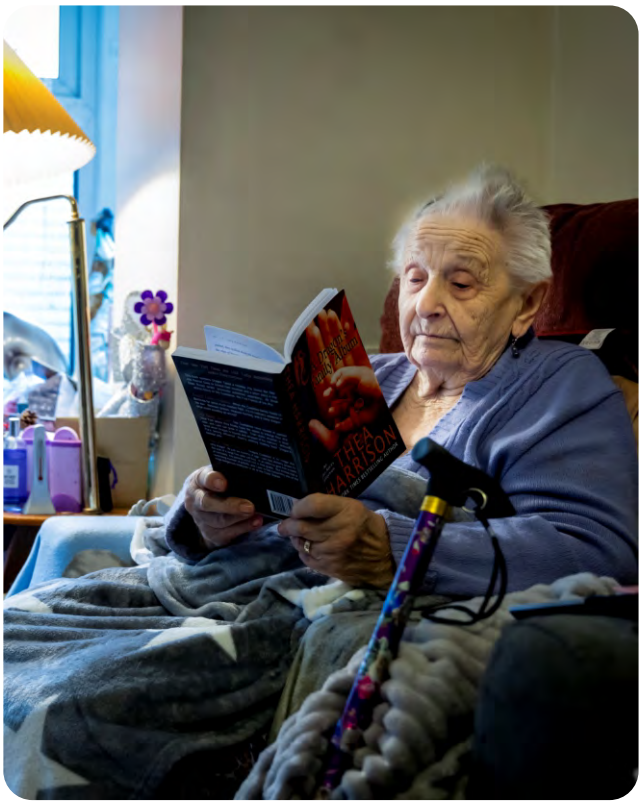
There are two domestic heating seasons each calendar year. While these vary from household to household, our forecast is based on these heating seasons generally occurring between January and March and October and December.

In 2022, most of the increase in domestic energy bills impacted just the October to December heating season.

However, the high prices will impact both 2023 heating seasons. This means we're likely to see further demand reductions within 2023 predominantly led by the domestic sector. As prices begin to reduce from 2024 onwards, demand increases year on year until it returns near to 2021 comfort levels towards the end of the forecast period of 2032 for all three of our LDZs.

Our assessment last year of the potential impact from cost of living increases proved to be accurate.

This element of the forecast continues to exert the most influence on demand over the next two years of this periods forecast



Embedded power generation

Gas-fired embedded power generation continues to grow to support the UK's increasing reliance on renewables for electricity energy generation.

The longer term dispatchability offered by these generators helps the electricity system operators maintain security of supplies at times of low renewable availability.

The flexibility our networks provide by supporting these power generation sites allows the UK to use more renewables for baseline energy generation. Through this, gas system operators are playing an important part in the decarbonisation of the UK energy system. The impact of growth in these customer types is reflected in this year's forecasts with both peak and annual demand increasing.

New enquiries for these connections have in some areas reduced or flattened out, and we're looking to understand the underlying reasons for this, but demand for those customers already connected continues to increase.

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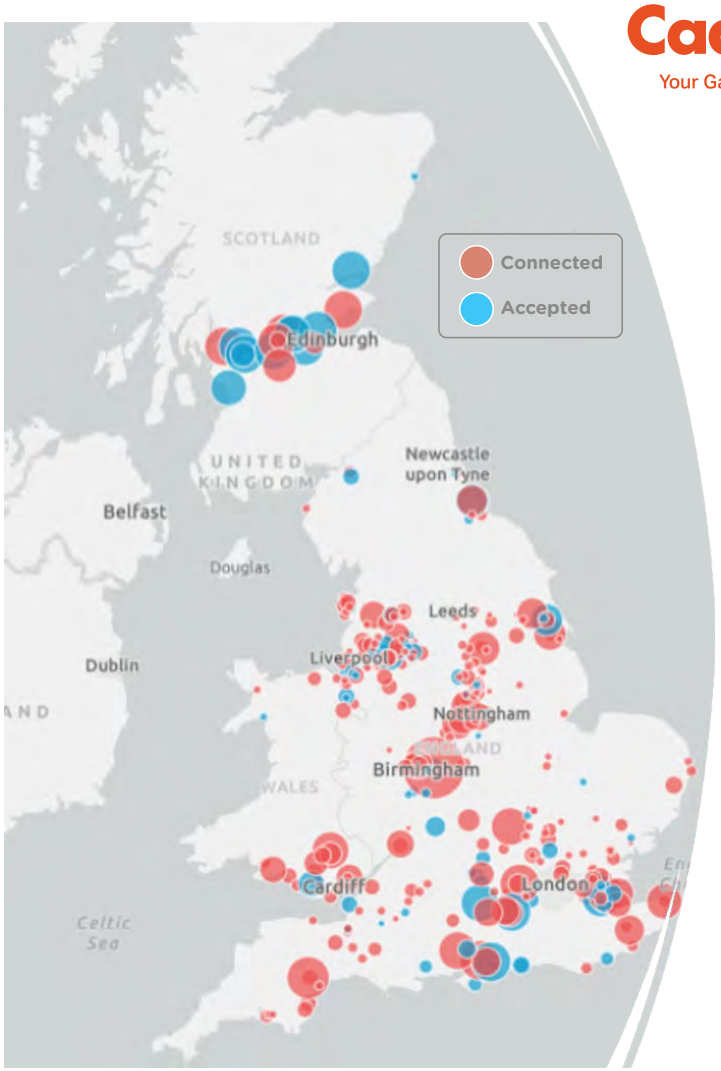
WALES&WEST UTILITIES

IGEM Engineering a Sustainable Gas Future

Cadent Your Gas Network

Northern Gas Networks



Sites

270 flex gen sites across GB towns and cities, accessing gas network storage

Share the network with homes, commercial properties & distributed industry

80 further flexible generation sites due to come online soon

Capacity

4.2GW of power output at present

6GW of power output once all sites in-progress have connected

Integration

Help to balance supply and demand of energy to keep the lights on

Support electricity demand peaks and renewable intermittency

Highlight the integrated nature of electricity and gas DSOs

Domestic energy policy and low carbon heating

We have included the ECO standards in our assessments of domestic energy efficiency for several years. This analysis of both historical and forecasted performance is based on published regional delivery of ECO mapped to our LDZs.

Replacing boilers with more efficient condensing models remains the single largest influence reducing domestic energy efficiency for existing homes

The UK government estimates over the four years of its lifecycle, ECO4 will result in improved energy performance to around [3,4]450,000 homes nationwide.

Our analysis has shown ECO4 is likely to have a slightly higher impact than ECO3. This is specifically due to new legislation including:

- The requirement for 150,000 low-efficiency, privately-owned homes to be included
- 90,000 solid wall installations over the four years of the scheme

The removal of broken boiler replacements as an option previously reduced the number of retrofit insulations, as scheme compliance could be met by replacing broken boilers or electric storage heating instead of improving thermal property standards.

Scotland has seen significantly higher energy efficiency measures than our southern areas due to the devolved government developing its own policies to improve energy efficiency in Scottish homes over the last decade.

These energy efficiency improvement schemes are delivered via Home Energy Scotland and include Warmer Homes Scotland, plus the recently introduced Grant and Loan Scheme, which provides grants and loans to householders to increase insulation, low-carbon heating and solar generation.

The grant element of the Grant and Loan scheme was not included when we completed our 2023/24 forecasts, but this will be assessed as part of our 2024/25 forecast. While its impact is anticipated to be beneficial to Scottish homes, it is not expected to have a significant impact on our overall forecast for the region.

[3] ECO4: 2022 -2026: government response (publishing.service.gov.uk)
[4] Design of the Energy Company Obligation ECO4: 2022-2026 - GOV.UK (www.gov.uk)

The Great British Insulation Scheme (formerly known as ECO+) was not legislated at the time of our forecast and the writing of this year's LTDS. While this scheme will reduce overall energy use, government figures suggest it is only intended to benefit 300,000 homes over the four years the scheme operates: even with a 100% uptake, approximately a quarter of those properties are likely to be located within our footprint, and we've therefore forecasted its impact to be low.

There is currently very little low carbon heating replacing gas boilers, and our forecasts for this remain low

The UK government's target to install 600,000 heat pumps in homes each year remains in place, albeit there is wide acknowledgement additional policy and associated supply chains are required to achieve this. Most notably, the CCC stated the UK "needs significant new policies and programmes to underpin the delivery of low-carbon heat and energy efficiency" in its 2023 Progress Report to parliament[5]. Currently the mechanisms available in England are the Future Homes Standard and Boiler Upgrade Scheme (BUS). Scotland's main policy is the aforementioned Grant and Loan Scheme.

Only the BUS had been legislated at the time of our forecast. The BUS incentivised the delivery of just under 12,000 heat pumps in its first year, with approximately half replacing gas boilers. Heat pumps replacing gas boilers in existing homes therefore have very little impact on our forecasts.

Each energy efficiency measure listed above is reviewed annually to understand how and if they should be incorporated within our forecasts. To date, our assessment is their overall impact is low and the latest revisions don't appear likely to create significant difference to the outcomes of our forecast, but we'll continue to monitor these and reflect any changes within our forecasting.

[5] 2023 Progress Report to Parliament - Climate Change Committee (theccc.org.uk)

Future homes standard and new build properties

The impact of new homes on gas demand is much less than generally expected. While energy efficiency measures in new homes mean they use half the gas of the average older property, it equates to an additional 0.2% to total annual demand across our three LDZs.

New build numbers add only 0.5% to the total housing stock each year

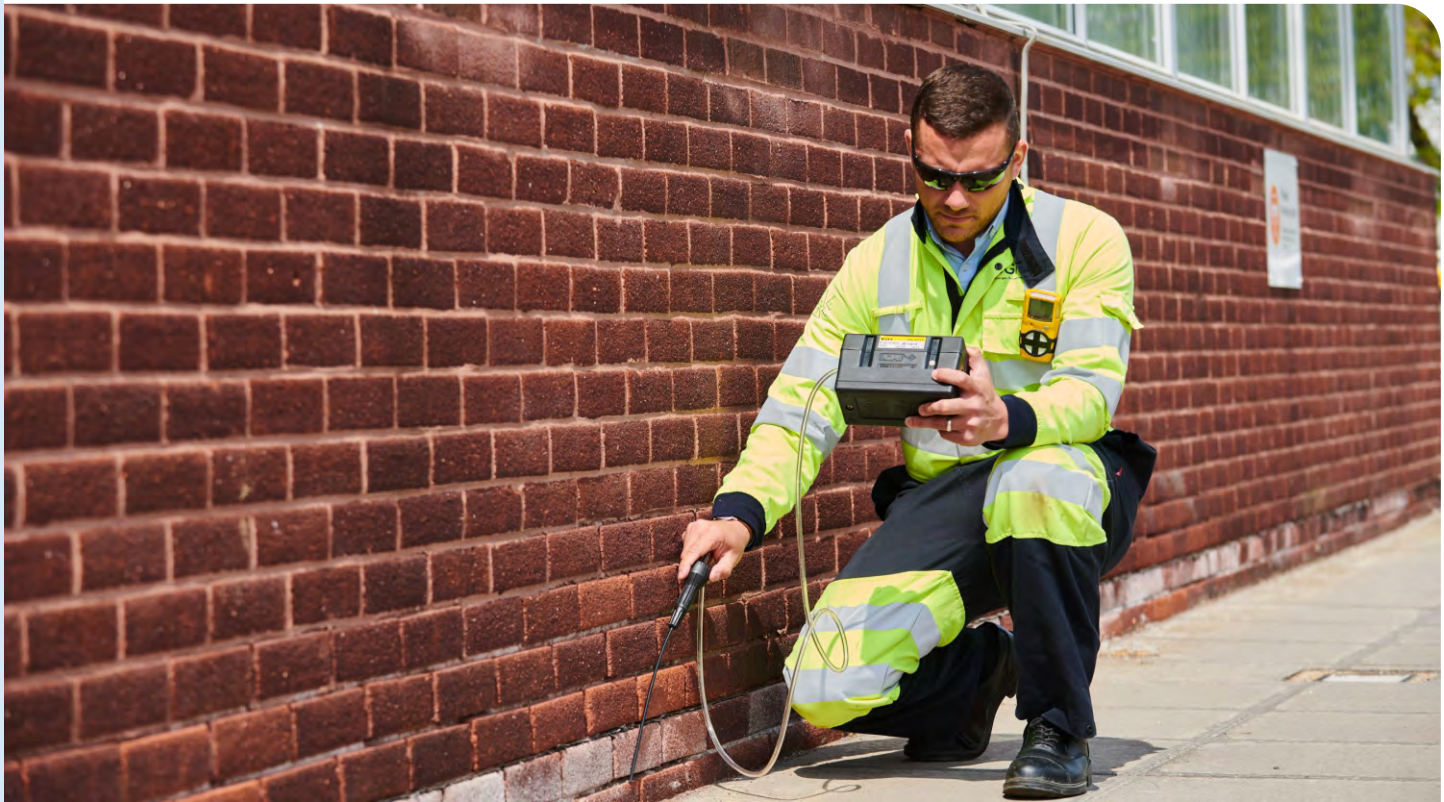
The UK government has signalled their intention, via the Future Homes Standard (FHS) consultation process, to explore removing natural gas as a heating option for new homes from 2025. The Scottish Government is in the process of legislating to do the same by April 2024.

Our forecasts are reflective of legislated policy and not potential energy scenarios or pathways

An interim FHS was introduced to increase thermal efficiency requirements of new houses and has been legislated and fully incorporated into this year's forecast. However, at the time of producing our forecasts, the full FHS was not legislated, and the consultation phase was still not completed.

In June 2022, the CCC recommended a consultation on the full technical specification of the new standard take place in 2023, to enable legislation in 2024 and achieve the 2025 timescale. This recommendation was repeated in June 2023.

As the actual framework of the FHS and Scottish legislation is still not fully resolved, it is too early and inappropriate to include their changes and potential impacts within our forecasts. We do however continue to assess how these proposals may affect demand.



Planning and forecasting review

To continually improve our planning and forecasting process, we evaluate how we forecast and collect data to support the analysis. This work ensures we develop a forecast which remains current and accurately reflects how demand may change.

Alongside embedded power generation growth, we've also seen increases in our traditional large power generation customers.

In our South East LDZ, our largest power generation customer continues to increase their levels of demand year on year. The reasons why they are able to attract more and more generation activity in support of the electricity grid, is due to their efforts to improve the site's energy efficiency, which makes it a more suitable generator of energy, as well as its location within our LDZ and the electricity distribution area it supplies. These allow the customer to play their part in resolving electricity network constraints in the south-east of England.

In our South LDZ, one customer accounts for 12% of overall annual demand. They've advised they intend to continue expansion activities during our regular stakeholder engagement. This means their demand will continue to increase to around 65% above their historic levels by 2024. Due to the significance of this customer's gas usage, we remain in regular contact to discuss their requirements.

We've continued the work we began last year to increase the individual number of customers we're able to include in our forecast and planning activities. We choose these customers based on their potential impact on network operation (due to either their location or flow patterns) and their potential as early adopters of low or zero-carbon energy.

The aim is to be able to analyse their flow patterns further and expand our engagement with these customers. This will improve our understanding of future demand and therefore the impact on annual and peak demands overall on our planning process as our customers transition to net zero.

Over 400 sites have been identified for extra analysis, as part of our continuous improvement of the planning process.

This helps to ensure new and existing customers are able to utilise the network at least cost.

Internet of Things (IoT)

We re-evaluate the impact of smart technologies within our forecast annually, assessing any new technological developments or research in this area which might influence how our customers are using energy.

Recent developments have been aimed at the integration of Solar PV and home battery systems, particularly in domestic systems. However, these only help customers with their electricity demand and there remains minimal development in smart technologies which improve how our customers may manage and reduce their gas usage. As a result, the IoT continues to have little impact on our gas demand forecasts, but we continue to monitor them for new developments.

System transformation and hydrogen

The UK and Scottish Governments have legally committed to reducing greenhouse gas emissions to net zero by 2050 and 2045 respectively. As part of this transition to net zero, demand for unabated natural gas must be phased out and replaced with low-carbon and renewable energy sources. This will require the transition of natural gas connections to low-carbon alternatives.

SGN's decarbonisation strategy is underpinned by converting gas networks from natural gas to 100% hydrogen, establishing an energy vector for low-carbon and renewable energy.

We aim to collaboratively provide evidence – which feeds into heat policy decisions – to enable system transition of the gas networks to 100% hydrogen through an extensive programme of R&D and demonstration projects, including our world-first green hydrogen neighbourhood trial (H100 Fife), Multiple Occupancy Buildings and the LTS Futures Programme.

Hydrogen is a clean burning alternative to fossil fuels which has a wide range of applications across energy sectors, including heat, power and transport. Green hydrogen can be created using clean energy like wind power, meaning there are no harmful carbon emissions involved.

In parallel, our system transformation projects are developing the plans, roadmaps, and infrastructure requirements to enable the conversion of the gas networks to 100% hydrogen. This activity is supported by our system transformation pre-FEED projects across the East Coast and Central Belt of Scotland and Southern LDZ. These projects are designing and routing new hydrogen transmission pipeline backbones connecting hydrogen production, storage and network injection locations required for the phased conversion of the below-7 Bar distribution networks to hydrogen. These in-progress pre-FEED projects and future pre-FEED and FEED projects represent the technical and commercial development of SGN's hydrogen rollout, which are aiming to demonstrate and ensure the timely and practical delivery of the system transformation to hydrogen, feeding into heat policy decisions and enabling the delivery of the system transformation once the required policy decisions are in place.

These projects are developing the strategy to ensure the existing system, across all pressure tiers can be converted to hydrogen practically and affordably, without compromising the security of supply of natural gas and hydrogen as the two supplies are gradually managed down and up respectively.

Pre FEED

Preliminary Front End Engineering Design

See glossary for full explanation

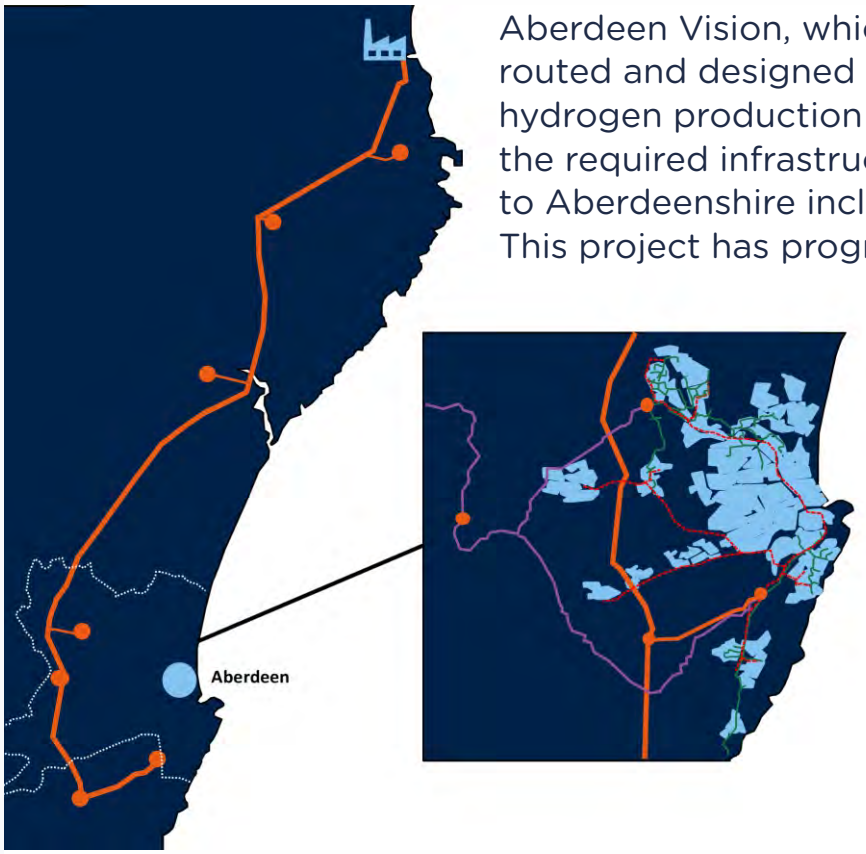
Our three live flagship system transformation projects are the Southern pre-FEED, the Scottish pre-FEED(s) and Aberdeen Vision, with further pre-FEED projects also planned covering the remainder of SGN's geographical footprint.

The Southern and Scottish pre-FEEDs are preparing the system transformation plans for the majority of the South LDZ and the east coast of Scotland (south of Aberdeen) respectively through:

Routing and designing H2 Connect (South LDZ) and H2 Caledonia (Scotland LDZ), these are the new systems of hydrogen transmission pipelines required to connect blue and green hydrogen production, hydrogen storage and hydrogen demands, including strategic network locations and industrial demands.

Developing network conversion and sectorisation plans for each grid within the geographies of the projects, detailing the network reinforcements and adaptions required to sectorise each grid and establishing a strategy to transition each grid safely and progressively from natural gas to hydrogen, without compromising security of supply.

Managing the interface between prospective hydrogen producers, hydrogen users across multiple sectors, and storage operators, ensuring development timelines are aligned between projects.



Aberdeen Vision, which is near completion, has routed and designed the pipeline connecting hydrogen production at St Fergus terminal with the required infrastructure to enable conversion to Aberdeenshire including the city of Aberdeen. This project has progressed to pre-FEED level.[6]

This work is establishing the new hydrogen transmission infrastructure requirements to establish the availability of hydrogen across the optimised networks and will be in future FEED phases to maximise the reuse of existing transmission pipelines, informed by the LTS Futures Programme and other work.

[6] Preliminary FEED (front end engineering and design)

More detail

This section and appendices A and B provide a more in-depth view of the information and econometric assumptions used to develop our forecasts. Please get in touch if you would like to discuss the forecasting process further, or feel we've not covered everything here. See contact details on page 47.

Regulatory obligations

We produce our LTDS in accordance with our Gas Transporter Licence and Section 'O' of the Uniform Network Code Transportation Principal Document obligations. In addition, the Uniform Network Code Offtake Arrangements document sets the framework for exchanging the necessary information to assist transporters to generate long-term demand forecasts. The publication of our LTDS forms part of this process.

This publication provides our customers an overview of our ten-year forecast of annual and peak-day gas demands which we use in the management of our gas networks.

These forecasts' primary function is to ensure we maintain our 1 in 20 licence obligations, ensuring our domestic customers can benefit from an affordable, safe and reliable supply of gas.

Forecasting process

We work with expert industry partners to develop our annual forecasts. The starting point is actual demand data from the previous year which is analysed along with information obtained from recognised industry sources. The results are tested against our previous year's forecast to improve accuracy year-on-year. This gives us greater confidence when planning work on our networks and the suitability of investment decisions we make on behalf of our customers.

Over time, this forecast methodology has proven very reliable in ensuring we're able to keep the gas flowing, even during more challenging times of unusually adverse weather, such as we saw in late February and early March 2018 and more recent cold periods during 2021 and late 2022.

Validating our 1:20 peak day

There have been relatively few periods of extreme weather conditions approaching peak-day demand in recent history.

A 60-year weather dataset has been used to establish 1 in 20 peak weather conditions, with the last 20 years used to establish potential peak demand condition, with adjustments for changes in annual demand.

Particular focus has been paid to cold periods of 2010, 2011 and 2018 for this work. The cold periods of 2018 have been used to calibrate our peak demand forecasts. This has been corroborated with demand during the cold weather periods in 2021 and late 2022, which also had some notably cold days.

Peak demand this year has also been calibrated against our previous peak demand forecasts, with favourable results and adjustments made for minor changes in annual demands between years.

Improving our forecasting process

We recognise while our forecasting regime has served us and our customers extremely well, the UK's energy infrastructure will be undergoing significant changes to facilitate a low-carbon future and this requires us to understand the role we will play within the energy mix. In recognition of this, we continue to increase our engagement year on year with our customers and industry partners including other GDNs and National Grid ESO, in their production of the FES. We analysed over 400 customers demand patterns this year as part of our continuous improvement.

Each year we review the previous year's forecast. We analyse the difference between actual demand and the first year of the previous year's forecast. This is then used to inform the start point for the current year's analysis. The key findings of this analysis are detailed below.

Last year's domestic demand forecast was very close to actual demand, considering the substantial change of over 10% in demand, accurate to within 2%. We also established behaviour change for domestic demand across all LDZs is closer than forecasted in our 2022 forecast.

The period of time when our domestic customers were forecast to return to 2021 comfort levels differed by five years across our three LDZs in our 2022 forecast: with customers in the South East LDZ returning in 2026 and Scotland LDZ in 2031. In this year's forecast, we have been able to look at last year's demand impacts from the changes in the cost-of-living, enabling us to refine this element of the forecast. We now expect similar behaviour across all three LDZs with the return to 2021 comfort levels differing by two years across all LDZs in this forecast. The result is domestic demand in our Scotland LDZ is slightly higher, South East LDZ slightly lower and South LDZ very similar, compared with last years forecast.

Non-domestic, non-power generation demand did not reduce in line with our forecasts. This was viewed similarly across the industry with other gas distributions networks and National Grid ESO seeing lower than expected non-domestic demand reductions. We think this is largely due to increased production costs being passed onto consumers. Consequently, levels of non-domestic demand in our 2022 forecast were proportionally higher than our 2021 forecast.

In the power generation sector, our customers have increased usage over the last year with patterns of use generally becoming more "peaky" than last year. This trend has been observed over the last few years and we will continue to factor this behaviour into our forecasts.

Our ten-year forecast is based on current energy markets, policies and incentives. It includes change we understand to be happening rather than change which may occur. This means our networks are planned using known inputs while avoiding speculative assumptions.

UK view

Readers looking for an understanding of the UK's overall energy supply position and security of supply assessment can refer to National Gas Transmission for its ten-year system (NTS), plus other publications and consultations including the Future Energy Scenario process (FES). Gas Ten Year Statement (GTYS) | National Gas

Demand forecasting process

In this section we demonstrate how demand based on weather corrected actual throughput numbers changed in 2022 and how we approached our 2023 forecasting process.

As you read this information, please be aware when we talk about a particular year's forecast it generally relates to the current year's ten-year forecast. In addition, when we refer to our networks, we generally only talk about Scotland and Southern, although for the purpose of regulatory reporting we are uniquely required to discuss our local distribution networks (LDZs) individually. So, you'll see 'Scotland', plus 'South East' and 'South' shown separately for Southern.

Please also note the changes shown in the following review of domestic, commercial and industrial gas demand. This has been corrected using the latest Seasonal Normal Composite Weather Variable (CWV).

0-73 – Domestic

The year-on-year change in our customers' domestic gas demand has been minimal for several years. In the decade prior to 2021, we typically observed increasing boiler efficiency reduced domestic demand by around 1% annually, with thermal efficiency improvements also reducing domestic demand by around 0.3% per year. These figures are typically offset by new houses contributing around 0.2% and increasing comfort levels around 1 to 1.5% per year. While year-on-year increases in comfort levels reduced recently , there is minimal overall change in gas demand from our domestic customers from one year to another. On average over the last decade, the year-on-year change has seen increases of approximately 0.25%, with the 2020 to 2021 change being very close to this average at a 0.3% increase. However, cost-of-living increases in 2022 had a significant impact on domestic demand, with a 10.6% reduction from the previous year.

This is the highest reduction seen in the domestic sector since 2009. Around 10% of this was due to customers lowering their comfort levels to reduce the impact of higher gas bills.

Scotland LDZ: We saw a 11.1% reduction in gas demand primarily due to behaviour change of our customers in this LDZ. 10.4% was due to customers changing their energy use patterns because of the increased cost-of-living impact. All other impacts were much less than this. Boiler replacements and thermal efficiency

improvements, via retrofitting insulation to properties, followed historical trends, reducing demand by 0.8% and 0.1% respectively which was slightly more than the Southern LDZs, reducing demand by 0.8% and 0.1% respectively. The impact of new homes has added 0.4% to demand in Scotland.

South East LDZ: Very similar pattern to our Scotland LDZ, we saw a 11.0% reduction in this LDZ. Again, almost all due to behaviour changes in our customers' energy use as a result of the cost of living. This behaviour change reduced demand by 10.3%.

New boilers and thermal efficiency savings were 0.6% and 0.06% respectively.

Increases from new homes in this region were the lowest of all 3 LDZs, at 0.1%. This was due to it having proportionally the least number of new houses connected to a gas network and they are also generally smaller in size than our other LDZs.

South LDZ: This LDZ had the least change as it had the lowest rate of behaviour change, although similar to the other LDZs. Overall demand was 9.35% lower than the previous year, driven primarily by behaviour change of 8.5%. This is slightly less than other LDZs, which we attribute to this LDZ's demographic make-up. Changes due to boilers and thermal efficiency improvements were almost exactly the same as South East LDZ. The impacts of new houses were higher than South East LDZ, at 0.2%, as it had proportionally more houses connecting to the gas network in 2022 and they were generally larger homes. As with all LDZs, the main impact was down to behaviour change.

73-732 - Commercial

Demand behaved differently to how our analysis and econometric forecasts for the commercial sector had suggested in last years forecast.

We expected a moderate reduction in gas demand for 2022, but this did not occur with overall demand increasing by less than 1%. This was common to all LDZs. Our industry-wide engagement this year showed similar patterns within the GDN's and National Grid ESO's analysis, which they use to inform their FES.

Our understanding for this is largely because of two reasons; increased costs tended to be passed on to end consumers and econometric forecasting can have difficulty predicting very large gas demand, as a result large changes in economic indices.

The only LDZ to reduce in this sector was Scotland LDZ, with a reduction of 1.6%. Our South East LDZ had the largest change increasing by 2.8%, and our South LDZ increased by 1.2%. These demand changes show the resilience of this sector.

>732 - Industrial

The industrial sector takes in a wide range of industries with various types and sizes of demand. As a result, the factors which go into understanding changes in demand are complex. Generally, our small industrial customers' behaviour has mimicked our commercial customers' demand patterns for the same reasons, with our Scotland LDZ demand decreasing 2.3 % from the previous forecast, South East LDZ increasing the most by 3.9% and South LDZ in between, increasing by 1.5%.

Larger sites include a mixture of load profile types using gas in several ways. Consequently, there are a complex number of factors influencing demand in this sector. Embedded power customers and our very largest loads have the biggest influence on this sector.

Embedded demand increases more than offset underlying reductions in other sectors leading to an overall increase of 2.8% in Scotland LDZ compared with the previous year.

In South East LDZ ,the 5.5% increase was a result of the increased demand from our largest power generation site more than offsetting underlying decreases. Without its increase, the underlying demand change would be a decrease of 6.5% as there is little embedded and little change in embedded generation in this LDZ from the previous year.

The 7.8% decrease in South LDZ was due to demand reductions from our largest site resulting from outages required for its expansion. Without this there would have been a small increase of around 1% in this LDZ due to embedded generation, which was smaller than in Scotland LDZ which has the greatest increase in embedded generation.

Without the impacts of embedded generation, our analysis shows there would have been an underlying demand reduction of between 5% and 8% from the previous year for the larger industrial sites.

Approach to the forecasting process

Our approach to the forecast is largely unchanged from previous years. We're continuing to find the current methodology is working very well. We use a detailed granular bottom-up approach wherever possible, particularly for the domestic sector, where we split out changes in demand with many various factors. This allows us to link historic demand changes to specific elements of the forecast to benefit from a clearer picture of what's occurred and why. The most influential elements are boiler efficiency, new houses, behaviour change, thermal insulation and any move away from gas as a heating source, for example heat pumps. This methodology has been heavily stress tested with all the changes in 2022 from the increased cost-of-living.

Looking at specific elements individually before bringing them together improves our understanding and confidence in the outputs of our forecast. This is particularly important as it allows us to benchmark our analysis against the wider industry to increase understanding of what needs to be done to help the UK decarbonise.

This granular bottom up approach has enabled us to isolate reasons for the changes in our customers' behaviours and assess where this has worked well and what needed changing for the 2023 forecast. It has also helped our engagement activities by enabling us to articulate what has occurred more easily. One example of this being the 2022 reduction in domestic demand due to behaviour change: knowing this occurred part way through the year gave us confidence to further reduce our forecast for this element of demand in 2023, before increasing it thereafter.

This approach has been predominantly applied to our domestic forecasting and increasingly our forecast of specific medium to large loads as we engage further with those customers whose pattern of demand are deemed unusual or have the capacity to disrupt the accuracy of the forecast. This has also been extended, where possible, to 'smaller' individual customers and customer types which have a larger bearing on our network operation and planning due to either their location, flow profile or type of industry. We've created a dataset of around 400 customers where these parameters apply. This is particularly relevant for new power generation sites as they have a relatively high impact on demand due to their variable flow patterns. The 'bottom-up' approach covers around three quarters of our total forecast demand.

Last year, in our appraisal of the best way to incorporate the impacts from the increased cost-of-living and fuel prices on demand, we recognised, at peak weather conditions, comfort requirements will generally override economic considerations with households looking to maintain heat levels within the home whenever possible. As a result, we incorporated a degree of smoothing to remove the worst of the impact from the econometric analysis on domestic demand. An example of this is shown in Figure 1 for illustration.

In our review this year of the 2022/23 forecast, we found no evidence to change this approach with corroborative evidence for the colder days experienced in December 2022 validating this process. The coldest weather period was not quite cold enough to be fully definitive, however we have chosen to continue this approach for the 2023/24 forecast and will look for further cold days to further validate our assumptions.

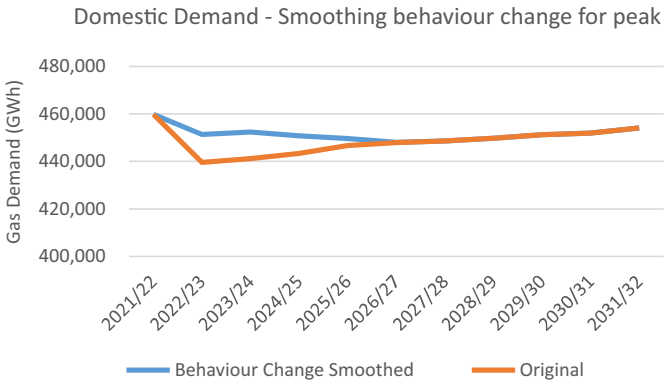


Figure 1: Example of smoothing on Peak demand

Inputs to forecast

This section provides a general overview of the key inputs to our forecasts. These inputs are a combination of economic indicators as well as the specific elements of the 'bottom-up' forecasting which are particularly dominant within the domestic sector. Economic indices have a higher impact than in the last couple of years as large gas price and cost-of-living increases have a greater bearing on all sectors in this forecast, especially the behaviour change element of domestic demand which we determine via econometrics.

Domestic demand

Domestic demand contributes to around two thirds of our total demand. As with previous years, we continue to separate the individual elements impacting gas demand to see how they have changed historically and why. We then forecast each element individually over the ten-year period at an LDZ basis.

We continue to engage in extensive research on the domestic elements gathering information from: DESNZ, English and Scottish housing surveys, Ministry of Housing, Communities & Local Government (MHCLG), Heating and Hot water Industry Council (HHIC) as well as the Energy and Utilities Alliance, among others.

The reasons for gas demand changes over the last ten years can be seen in Figure 2. The graph displays measures we've included within the analysis to support the forecasts. The numbers of houses in our South East and South LDZs are scaled to enable a comparison with Scotland.

The two main elements which stand out are, the high impact of behaviour change and boiler replacements over the last decade (with legislated boiler replacements reducing gas demand considerably in the last decade, more than all other efficiency measures). Since last year, behaviour change shown in this chart has reduced immensely by around 80% as almost all the increases in comfort levels in the past ten years have reversed in 2022, due to the cost-of-living pressures.

While the underlying message is the same for all LDZs, there are specifics to each. Most notably, higher levels of energy efficiency insulation in Scotland is down to how the devolved government prioritises these measures.

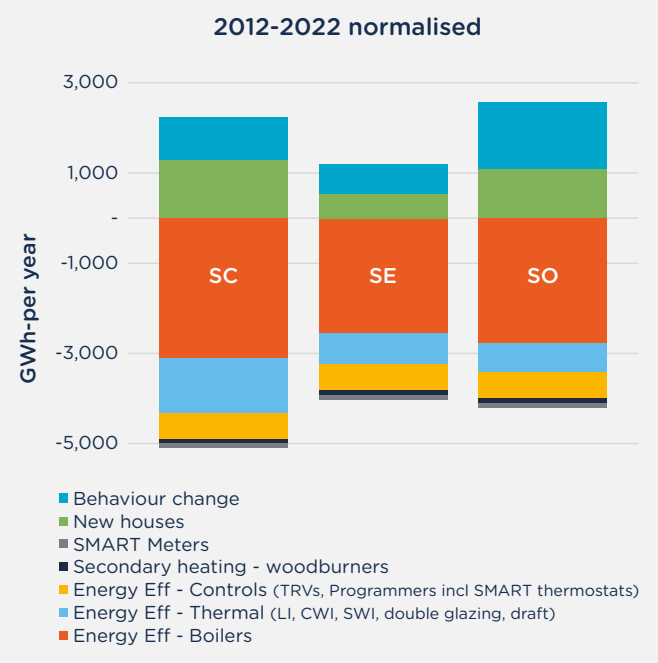


Figure 2: Ten year view of domestic demand change

Energy efficiency in the home

ECO

Loft, cavity and solid wall insulation as well as double glazing efficiency levels improved considerably under the Carbon Emissions Reduction Target (CERT), which ran from 2008 to the end of 2012.

Since CERT has closed, rates of retrofitting energy efficiency measures have reduced significantly. The main scheme currently incentivising retrofit insulation is Energy Company Obligation (ECO). In each update of ECO, rates of retrofitting energy efficiency measures have reduced. This is something our analysis has shown and has been mentioned by the CCC in their 2023 Progress Report to Parliament who stated: "The Energy Company Obligation (ECO) has been the main programme for delivering energy efficiency over the past decade – each new round of ECO has delivered less than the one before."

ECO received an update in early 2022, via ECO4. It has not increased rates of retrofitting energy efficiency measures above that delivered by ECO3.

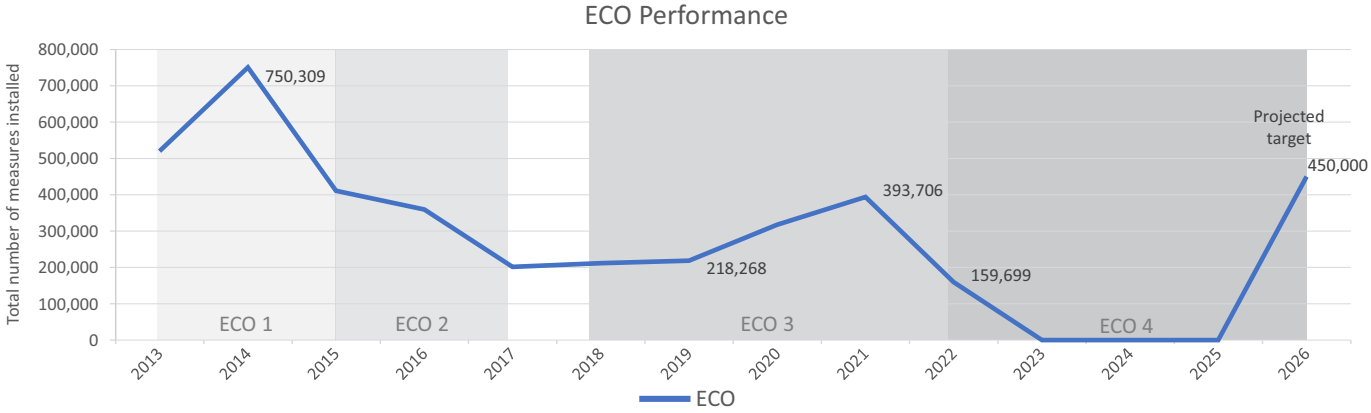


Figure 3: ECO Performance

Boilers

The UK Government's mandate in 2005 for all new gas boilers to be higher efficiency condensing boilers has made this the element of greatest reduction in gas demand in the domestic sector. There's still a high number of boilers which haven't been replaced and replacement rates remains at around one and a half million a year nationally over the last year. Condensing boilers are also more efficient than those from 2005. This leaves considerable reductions still to be gained in gas demand from replacing not only old non- condensing boilers, but also an earlier older condensing boiler with a more modern model. This has been reflected in our forecast. With the exception of behaviour change in this year's forecast, this remains the single largest element reducing gas demand across all of our networks.

Internet of Things (IoT)

Here we refer to thermostatic radiator valves and programmers including SMART thermostats. These have created a notable but relatively small reduction in demand over the last decade. We've included a consistent level of impact as before within our forecasts, but there is still possibility for more gains to be had from these technologies.

Secondary heating - wood burners

Wood burning heating has continued to grow and come under some scrutiny for the impact it has on air quality. Recent legislation has been introduced to help curtail the associated particulate emissions.

Even with recent increase installations accounted for, wood burners have a very low influence on gas demand due to relatively few being installed as a primary source of heat. The impact we allow within our forecasts across all three LDZs is very low.

Smart meters

More than 32 million (57%) of all meters in Britain are classified as smart, according to the latest data[7].

While smart meters offer good potential for energy and cost savings as part of a connected home, when new systems such as batteries and solar PV are installed, there is very limited impact on gas demand. This has been the conclusion of our analysis of customer trials, engagement with National Grid ESO in their production of the FES and other GDNs. As a result, smart meters' influence on gas demand continues to be very low in our forecasts for all three LDZs.

[7] Update on the rollout of smart meters - National Audit Office (NAO) press release

New homes

The extra demand created by new homes is less than would be generally thought. This is mainly because the proportion built year-on-year is small compared to the number of homes already connected to our networks. In addition, their thermal efficiency is much better than existing housing stock, resulting in gas demand at around half that of an average older UK home.

Scottish and UK governments have similar legislations in development, neither of which were in place at the time of production of the forecast. At the time of writing this report, Scottish legislation looked more likely to progress, while uncertainty around the UK legislation covering England remains.

We've included the impact of the Interim Future Homes Standard on energy efficiency of new homes into our forecasts as this has been announced as new legislated policy. We've not included the full Future Homes Standard as it remains at the consultation stage at the time of writing.

Our expectation is the government will consult about technical aspects of the Future Homes Standard in late 2023 before again updating the regulations prior to them coming into force in 2025. We expect legislation will come into force earlier in Scotland as it is at a more advanced stage.

Behaviour change

Between the 2008 recession and 2021 there has been fluctuations in economic activity, but with a general increase in prosperity, resulting in an average annual increase in gas demand overall of around 1%, directly related to increasing comfort levels or the temperature which people heat their homes which broadly equates to an annual increase of 0.1 degree C on average.

Households looking to reduce the impact of inflationary pressures by reducing their energy use as much as possible has driven a large degree of behaviour change by our residential customers.

In 2022, behaviour change reduced domestic demand by 10%. In this year's forecast, we see a further reduction in domestic demand via behaviour change. This is not an increase in behaviour change as such, it is a matter of how much of the year the behaviour changes are experienced for in the 2023 compared to 2022. Each year we experience two distinct heating periods, the first few months of the year and the last few months of the year. In 2022 cost-of-living impacts occurred after late February, and therefore only really impacted one heating

period. These will impact both heating periods in 2023, and therefore result in a further reduction on annual demand compared to 2022. We actually forecast gas prices and inflationary pressures, while remaining high, to start reducing late in 2023, and continue to do so thereafter. This means we're likely to forecast increased comfort levels and domestic demand from 2024 onwards.

In our forecast, behaviour change is forecast through our 'top-down' econometric forecasting process. The main factors to influence this are domestic gas prices and Household Disposable Income (HHDI).

Our updated forecast has less variation in the timings for each of our LDZs returning to 2021 levels. Last year there was a difference of five years, now behaviour is more aligned with differences of two years. Scotland LDZ returns to 2021 comfort levels earlier around 2028/29, South East LDZ around 2028/29 and South LDZ around 2029/30.

Domestic energy efficiency policy

Boilers

While there are no changes to boiler regulations, those that exist remain very successful in reducing gas demand for our customers. The 2005 regulation requiring all new boilers to be condensing boilers and the 2018 Boiler Plus regulations, essentially strengthening the 2005 regulation mandating what was already occurring, require mainly new boilers need to be above 92% efficiency levels. These regulations continue to drive considerable reductions in domestic gas demand. They are the elements which result in the most demand reduction within our forecast and are a great example of the potential impact of effective energy policy.

ECO (Energy Companies Obligation)

ECO started relatively strongly in 2013 with nearly 500,000 installs that year. This has since reduced annually to less than 100,000 in 2022. ECO is not the only means for increasing retrofitting energy efficiency measures, but it accounts for a considerable number of overall installations. We use ECO as part of our understanding of the underlying reasons for insulation measures reducing.

ECO changed last year with the introduction of ECO4 replacing ECO3 in Spring 2022. These revisions are intended to increase thermal efficiency via greater levels of insulation compared to ECO3. Its performance in the first few months has been incorporated into our forecast. However, the amount of retrofit insulations delivered via ECO has a relatively small impact on our forecasts as the impact of boiler replacements is much more significant.

ECO+ was due to be launched soon after ECO4. It has since been renamed the Great British Insulation Scheme.

Great British Insulation Scheme (previously ECO+)

The Great British Insulation Scheme is a new UK government backed scheme designed to help people insulate their homes: making them more energy efficient and saving money on their bills. The scheme was extended to support a wider range of low energy efficient households. The scheme was intended to be launched in the summer of 2023 and run until March 2026.

The £1 billion scheme aims to help around 300,000 UK households with the cost of installing new home insulation. As it had not yet been launched and further details were not available at the time of the forecast, it has not been incorporated into the forecast. However, its impact has been evaluated and our analysis suggests the improvements to the 1.2% of UK homes eligible for funding are unlikely to have large impact on our forecast.

Home Energy Scotland Grant and Loan Scheme

These measures began in May 2017 as a loan only scheme with the grant funding element becoming available from December 2022. There are grants of up to £7,500/£9,000 available and interest-free loans of up to £38,500 to all homeowners, including new home builders, who wish to make their homes more energy efficient. The scheme focuses on thermal efficiency improvements and the installation of heat pumps.

Grant funding for heat pumps is up to £7,500 or £9,000 for households which qualify for a rural uplift (remote and rural island areas) with the option of a £7,500 interest-free loan over ten years. Equally, solid wall insulation grants of £7,500 are offered with an optional interest-free loan of £2,500.

In lieu of specific data to indicate how these schemes are behaving, we aligned the potential impacts within our forecast to the closest available existing schemes – the Boiler Upgrade Scheme and ECO. We will monitor these assumptions, re-evaluating suitability of the assumption and any available data, in next year's forecast. The expectation is any impact will be minimal however, in line with the performance of similar incentives.

Renewable Heat Incentive (RHI)

The Renewable Heat Incentive was introduced in April 2014 to incentivise retrofitting of renewable heat in homes and businesses. It led to a consistent but relatively small number of renewable heating installations, with the domestic side of the scheme resulting in 10,000 installations of heat pumps each year across Great Britain, some of which replaced natural gas to heat homes.

The RHI scheme finished in March 2022. It was replaced by the Boiler Upgrade Scheme. Considering the end date and installation numbers, we've not created a separate forecast for the RHI as the impact on our gas demand has been low. Any changes to the number of gas heated house numbers are also captured in our base data from Xoserve and DESNZ.

Boiler Upgrade Scheme

The Boiler Upgrade Scheme (BUS) offers £5,000 off the cost and installation of an air source heat pump and £5,000 off the cost and installation of a biomass boiler or £6,000 off the cost and installation of a ground source heat pump to replace a gas boiler. Unlike the RHI it's a domestic only scheme.

BUS was launched in Spring 2022 and was originally intended to last for three years with its funding being capped at £450 million. This could potentially fund the equivalent of 90,000 air source heat pumps over its lifespan. It has since been extended to 2028. Last year, our analysis concluded the numbers of installations were likely to be in the region of 15,000 per year and we therefore capped the potential number of installations at this level. This year we have actual data for the scheme's performance, which delivered just under 12,000 heat pumps, around half of which replaced gas boilers. This year's forecasts have been updated to incorporate the lower replacement rates. We will continue to appraise year-on-year performance of the scheme and adjust our assumptions accordingly.

Economic inputs

Each year, our forecasting process compares historic changes in demand with a large range of corresponding economic indices. Those indices which return the best relationship are then used inform the econometric element of the subsequent year's forecast analysis, this year cost-of-living increases dominated.

All economic indices which we have used are detailed below.

Gas prices - wholesale and retail

Wholesale gas prices steadily reduced in the first six months of 2023 from the high levels we saw in 2022, where the highest wholesale gas prices ever seen averaged over 200p per therm for the year. Our price forecast for domestic, industrial and commercial sectors has high prices in 2022 and 2023, reducing either in late 2023 or 2024. We expect it to continue to reduce beyond this, albeit not returning to 2021 levels within the forecast period.

Historical links to domestic, commercial and industrial gas prices are used to create price forecasts for these sectors. This connection results in prices in all sectors remaining higher for a little longer than wholesale prices due to delays in linked prices.

Our assumptions around domestic gas prices also take account of the domestic price caps and the Energy Price Guarantee at the time of the forecast. Gas price has an impact on all sectors of gas demand but has the largest impact on domestic behaviour change in our forecast as it is the one element impacted by increasing living costs. Our domestic price forecast is shown in Figure 4 to illustrate.

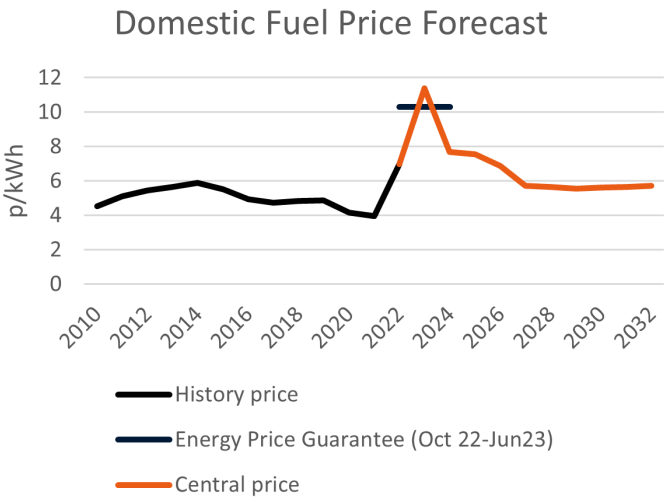


Figure 4: Domestic fuel price forecast

Household disposable income

As per last year, this has had a large impact on our forecasts this year with increasing costs mainly from increased food and transport factored into our forecast of household disposable income (HHDI).

Our assessment of HHDI over the forecast period of ten years is the Office of Budget Responsibility (OBR) Central forecast –detailed in the November 2022 OBR Economic and Fiscal Outlook. They forecast UK inflation to reach its

highest rate in 40 years and drive historic falls in real household disposable income. On a fiscal year basis, disposable income fell by 4.3% in 2022/23, followed by a fall in 2023/24 of 2.8 %. These are the largest and second largest falls since ONS records began in 1956/57. This would be only the third time that this measure has fallen for two consecutive fiscal years.

By 2027/28, disposable income is expected to recover to its 2021/22 level but remains over 1% below pre-pandemic levels.

It should be noted that HHDI is only one element of calculating cost-of-living. Gas prices have a higher impact on this element of the forecast and are accounted for separately. We include them as a separate element to avoid cross influence of non-connected factors within the analysis.

GDP

As in previous years, we base our forecasts of GDP on the latest available OBR forecast. This year using the central forecast announced in November 2022 OBR Economic and Fiscal Outlook.

The OBR forecasts show after significant dips and recovery between 2020 and 2022, a dip of 1.4 % in 2023 recovering over the next few years to a year on year enduring growth of 2.2% from 2026.

See figure 5. Note: OBR chart shows cumulative % changes compared to the 100% in the 2019 Q4 base period)

Inflation

Food, energy and transport costs are some of the key elements contributing to current high levels of inflation. While these relate to the increased cost-of-living, the relationship of Inflation to historical demand was again not significant enough to for us to include it as an individual index within this year's forecasts. If we were to include it, any forecast of inflation would be in line with the OBR. The OBR forecast from November 2022 shown here has reductions from very high levels in 2023 to negative inflation in 2025 before returning to the Government's enduring target of 2% in 2027. We will re-evaluate and include within next year's forecast if appropriate.

Service sector output

We use both national and local service sector output indices matched to the individual LDZ. These are sourced from the Office for National Statistics (ONS). We apply regression to the historical national and local indices within our analysis. While both national and local indices are used, there are variations between LDZs, nationally output increases 1.2% per year over the forecast.

Manufacturing output

The ONS is also a source of information for local outputs and national inputs relative to manufacturing for inclusion in our econometric forecasting. We've seen year-on-year variations in national and regional output but a clear long-term trend of consistent increase. We forecast this to continue and apply the ten-year long-term trend for these indices, equating to a growth of 1.6% year-on-year.

This data is granular and used according to suitability relative to the individual LDZ. In our southern area for example, the local outputs are used to forecast smaller manufacturing sectors as this gives us better relationships with historic demand whilst enabling more specific forecasting for the South and South East LDZs.

Jobs in each region

We also source this data from the ONS. Separately analysing the data for commercial, industrial and total jobs to include a factor within commercial, industrial and domestic demand. The jobs per region analysis has influenced demand to varying degrees depending on the LDZ but to a lesser extent than changes in gas prices and HHDI.

Our forecasts for jobs per region are based on the OBR forecast, detailed in the November 2022 OBR Economic and Fiscal Outlook. This varies across LDZs but overall there is a small growth forecast averaging 0.7% per year across the forecast period.

Figure 5 Source: Office of Budget Responsibility

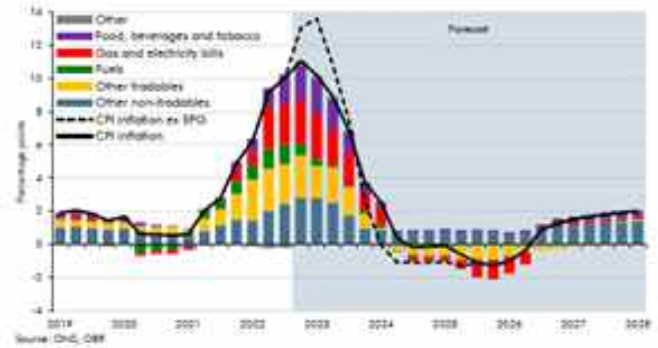


Figure 6 Source: Office of Budget Responsibility

Regional and specific variations

Behaviour change

This is assessed on an individual LDZ basis using a mixture of national and regional economic indices against a background of historical data.

We have validated our behaviour change assumptions within our forecasts by looking at the relationship of actual price fluctuations and the corresponding change in actual demand over the last year.

This analysis has shown our Scotland LDZ has been slightly less sensitive to price than we expected last year, South East has been slightly more sensitive and the South LDZ has remained the same.

As a result, this year's forecast shows our Scotland LDZ returning to 2021 comfort levels earlier around 2028/29, South East LDZ around 2028/29 and South LDZ around 2029/30. This is a spread of around two years across our three LDZs rather than the five years we observed within last year's analysis. This indicates closer behaviour across our LDZs than our analysis showed last year.

Domestic energy efficiency

We use geographical area based data from DESNZ which shows the installation of domestic energy efficiency measures which we update each year mapping them to our LDZs via post codes.

Some key points to note are:

- Housing in Scotland benefits from higher insulation rates than the rest of the UK, partially due to ECO and partly due to the devolved government considering housing as an infrastructure asset. This has helped investment in more energy efficiency projects in Scotland proportionally than in England especially with regards to those who are considered to be fuel poor.
- Scotland also has slightly higher boiler replacement rates. As with insulation this is partly because the devolved government considers housing as an infrastructure asset.
- Scotland has extra policy aiding retrofitting domestic energy efficiency, most notably Warm Homes Scotland and the new Grant and Loan scheme
- In the South East, there's been less additional gas demand from new houses as London tends to have smaller properties than the rest of the country including a higher proportion of flats. Plus, there's a higher proportion of new properties being built without gas.
- The Boiler Upgrade Scheme (BUS) only applies to England and Wales. Scotland's equivalent is the new Grant and Loan scheme which is more generous offering typically up to £7,500 per Heat pump installation and a loan, compared to the typical £5,000 of BUS.
- At the time of writing, Scotland's New Build Heat Standard II, which looks to restrict direct emission heating systems in new buildings both commercial and domestic, is in the process of being legislated. Details of the final scope of the scheme have not been published yet but the aim is currently for implementation in April 2024. We anticipate this to be in legislation for our 2024 forecast, whereas the Future Homes Standard affecting our southern LDZs is less certain.

Embedded power

As the UK's electricity system decarbonises and introduces more renewable technologies, the need to back these up with others forms of generation increases. The UK Government incentivises this back-up market through the Capacity Mechanism to ensure the electricity networks have the required flexibility at times of low or no renewable electricity generation. A considerable amount of this back-up, which we refer to as embedded generation, is gas-fired as it's a low-cost established technology which is currently lower in carbon than many alternatives.

Our forecast analysis shows an increasing need for flexibility within the electricity networks will result in the number of embedded power stations growing considerably. There are variations to the amount of embedded generation required within each of our LDZs, however Scotland continues to see higher growth in embedded generation with the greatest increases in individual site usage. We believe this is due to a combination of higher renewable generation, electricity network constraints and closures of older gas, coal and nuclear power stations in recent years as the UK transitions to low carbon electricity. This is the primary reason for our Scotland LDZ having a larger change in demand forecast compared to last year than our other LDZs.

As part of our data gathering, we note analysis conducted by National Grid ESO for their 2022 ETYS[8] suggests there may be a wider network management requirement impacting generation demand in our South and South East LDZs relating to interconnector usage.

We will continue to monitor developments, engaging with National Grid ESO via our regular bilateral meetings to help inform our forecasts.

[8] ETYS – Electricity Ten Year Statement - Electricity Ten Year Statement (ETYS) | ESO (nationalgrideso.com)

Large loads

Daily Metered demand (DM) is dominated heavily by one large site in South LDZ and two large sites in South East LDZ. Our customer in our South LDZ continues their program of substantial expansion and in the South East LDZ one of these customers patterns of demand continues to vary considerably compared to the information shared with us during our annual engagement meetings.

These two customers heavily influence the demand forecast for our southern LDZs due to the volume of gas consumed and the variations in demand. As a result, we have seen a more variable pattern of demand in both the South and South East LDZs, creating challenges with both long and short range forecasting. We don't currently have any similar sized customers in Scotland influencing demand to such an extent and therefore it is more consistent.

Service sector econometrics

Our analysis continues to show the South East LDZ's services sector will be increasingly affected by the implications of population density and expense for service sector premises in London. As a result, employment and output remain limited from the middle of the forecast for this LDZ. These are constituent parts of the econometric forecast for South East LDZ which we do not make for Scotland and South LDZs as these dynamics have less impact outside London. However, this remains a relatively small part of the South East LDZ's demand accounting for around 10% of the overall demand.

Forecast methodology

In 2021, our regulator Ofgem, introduced Special Standard Licence Condition ("SSC") A57 (Exit Capacity Planning). This new licence condition includes a requirement for all licensees to report on their forecast methodology in full. As a result, to avoid duplication of information the methodology content of our LTDS has been replaced with a comprehensive understanding of our forecasting process in-line with the requirements of SSC A57. Our methodology may now be found on our website here.

Demand forecasts

This next section provides an overview of our latest annual and peak gas demand forecasts through to 2032/33. These forecasts have been developed around the UNC load band categories and relate only to gas transported through our systems.

A more detailed overview can be found in Appendix A from page 26, which includes demand forecast tables for both annual and peak demand on a year-by-year and LDZ basis.

Annual demand

These figures show historical annual gas demand and the forecast going forward. The large reductions in 2022 along with further forecasted reductions in 2023, the first year of the forecast, are mainly due to increases in fuel prices and increased cost-of-living impacting the domestic sector.

Demand increases at our largest customers site in our South LDZ offset the any reductions of our domestic customers in our South LDZ. The behaviour change element of the domestic forecast which contributes to the dip in demand during 2022 and 2023 is lessened within our peak forecast. This is due to an allowance included for domestic customers choosing to stay warm in the very coldest conditions outweighing the requirement to save on bills in a 1 in 20 peak day.

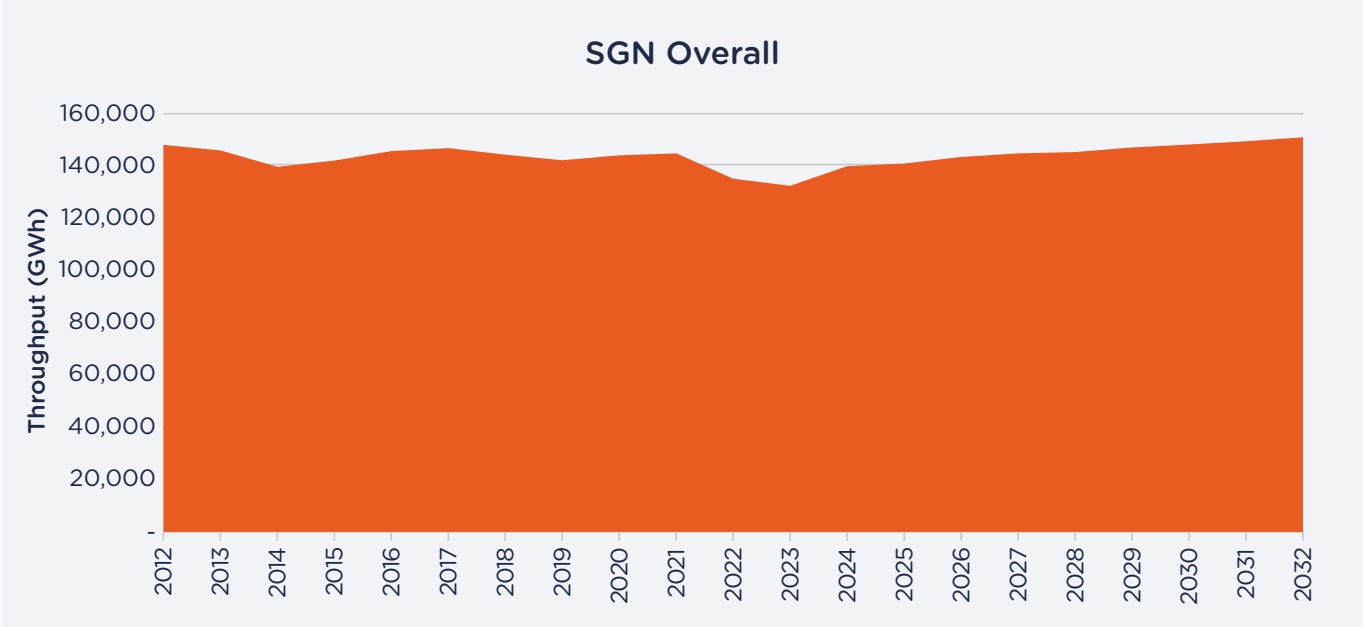


Figure 7: Change in historic and forecast annual demand - SGN overall

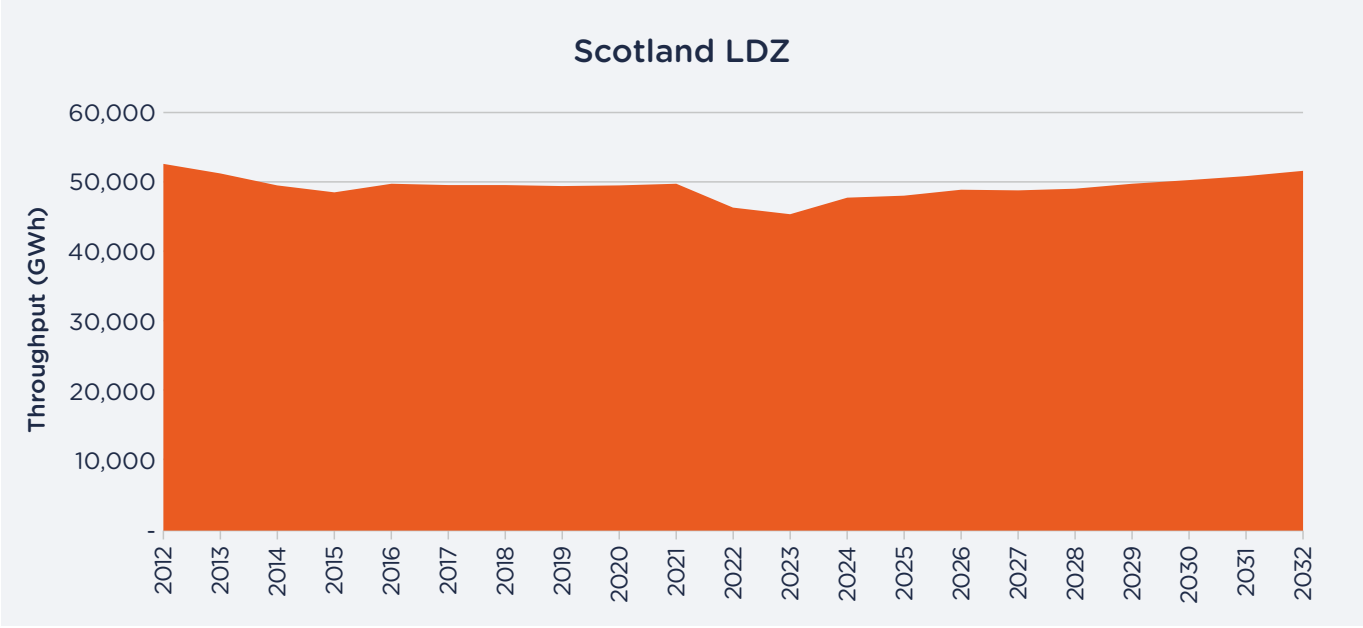


Figure 8: Change in historic and forecast annual demand – Scotland LDZ

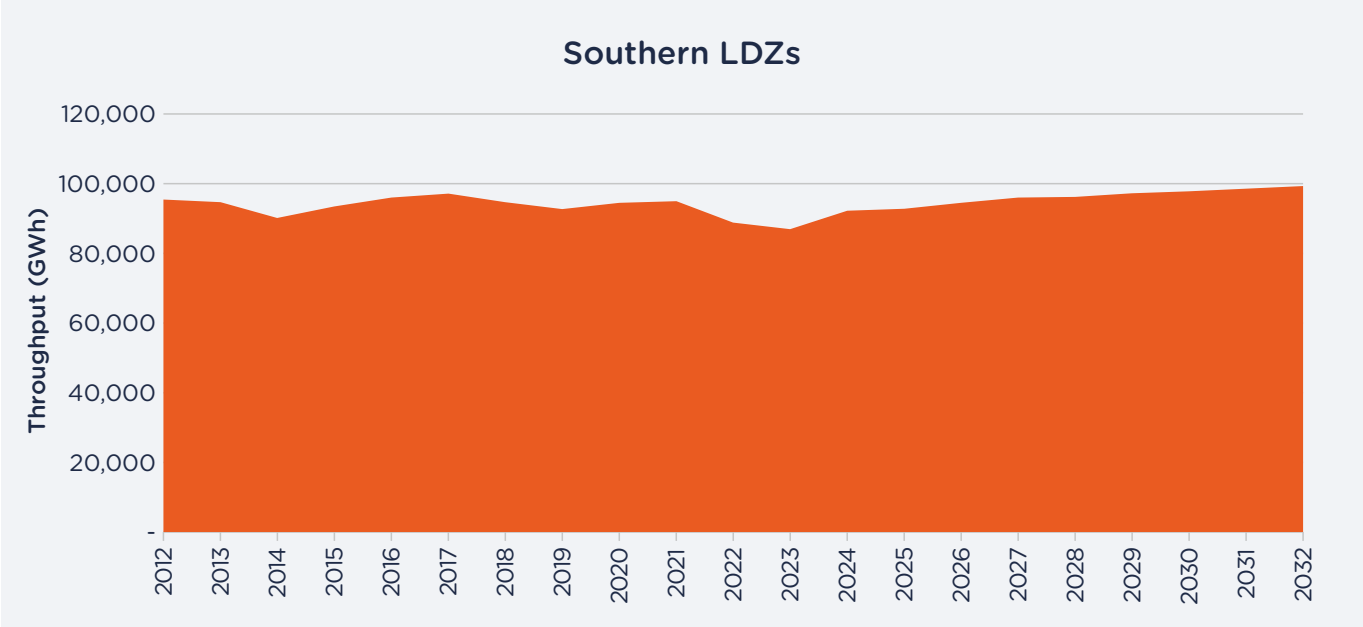


Figure 9: Change in historic and forecast annual demand - Southern LDZs

Average annual change in forecast Annual demand growth (2022–32)			
	SGN	Scotland	Southern
Annual demand growth	1.2%	1.1%	1.2%

Table 1: Change in forecast Annual demand growth (2022 - 32)

Peak demand

The following graphs show the equivalent view for peak demand. Peak demand is the key driver for planning investment.

As mentioned earlier, the behaviour change element of the domestic forecast which contributes to the dip in demand during 2022 and 2023 is lessened within our peak forecast. This is due to an allowance included for domestic customers choosing to stay warm in the very coldest conditions outweighing the requirement to save on bills in a 1 in 20 peak day. This results in the dip in peak demand being less than annual demand.

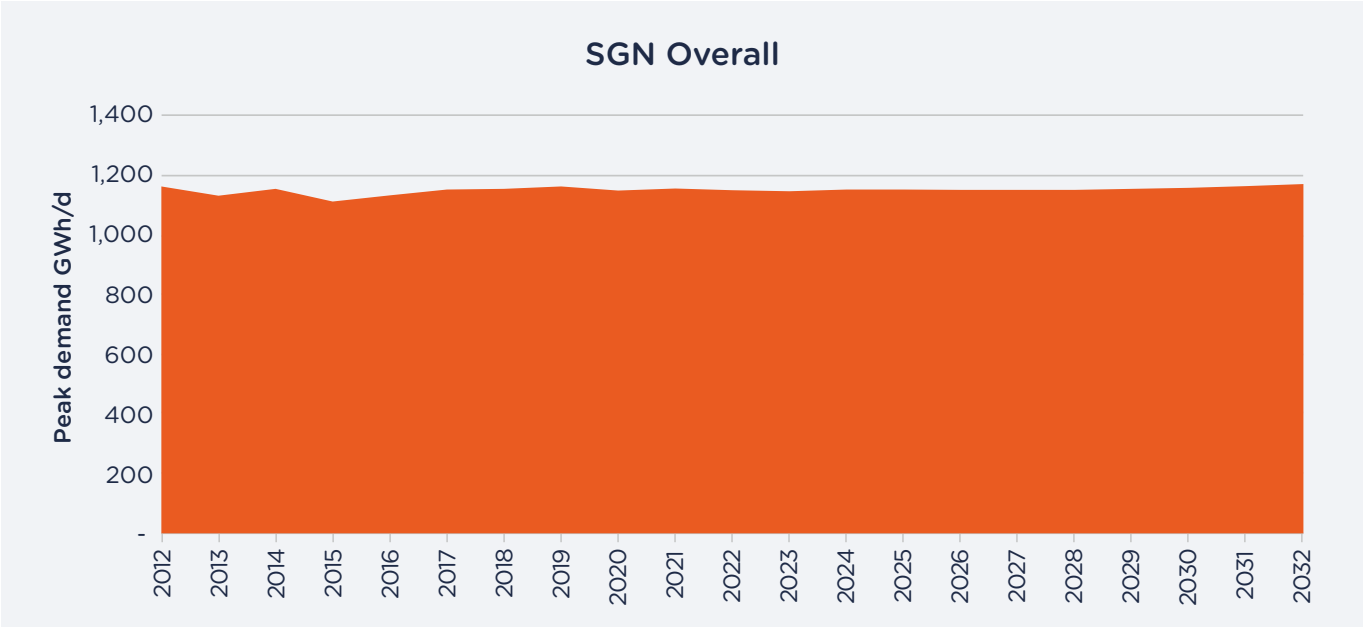


Figure 10: Change in historic and Peak demand - SGN overall

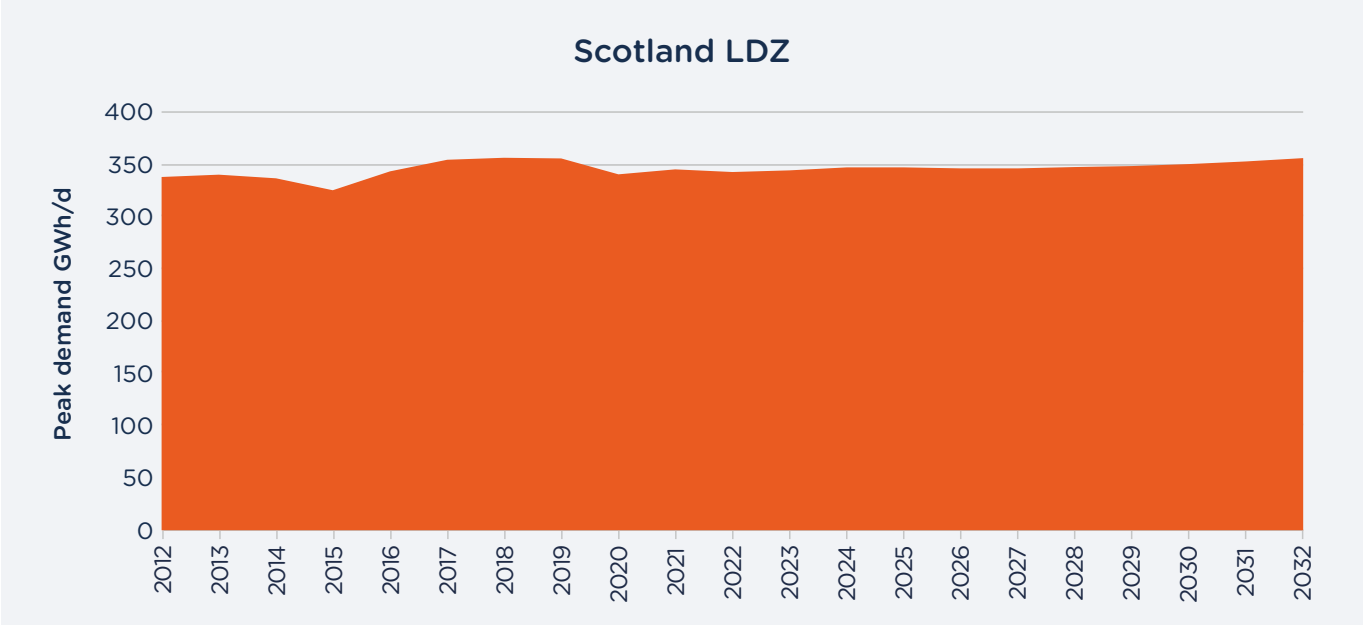


Figure 11: Change in historic and Peak demand - Scotland LDZ overall

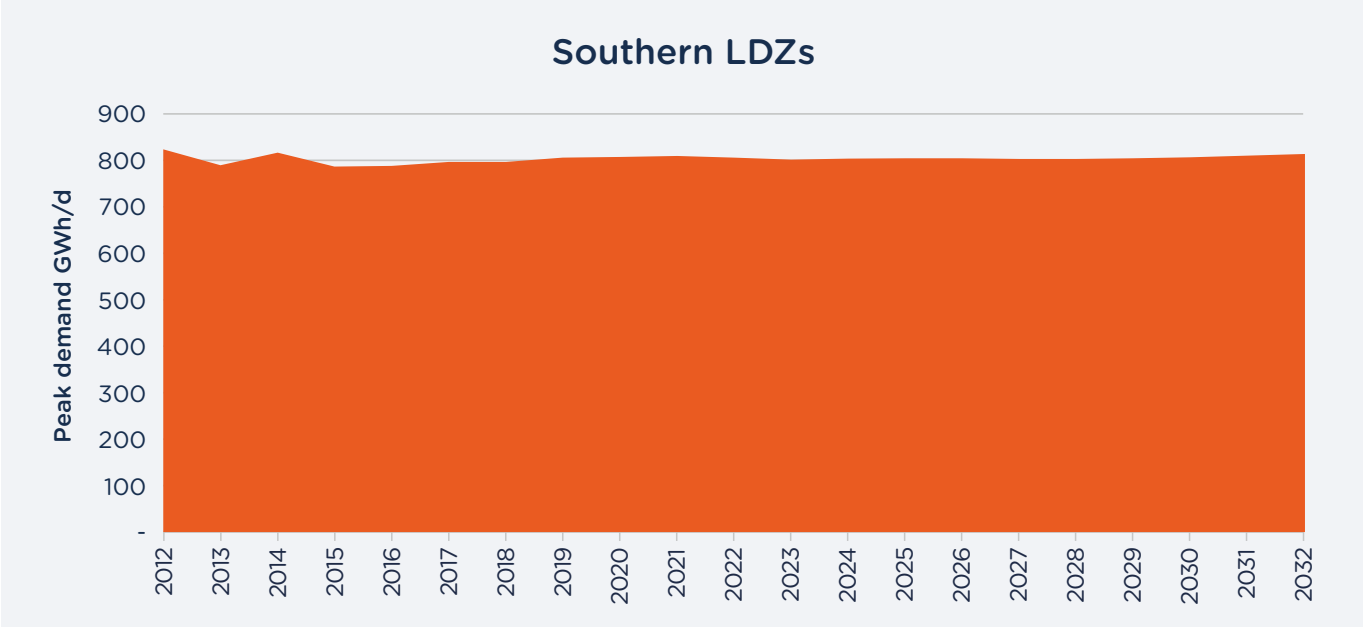


Figure 12: Change in historic and Peak demand - Southern LDZs

Average annual change in forecast Peak demand growth (2022-32)			
	SGN	Scotland	Southern
Peak demand growth	0.2%	0.4%	0.1%

Table 2: Change in forecast peak demand growth (2022-32)

Forecast comparisons

Scotland LDZ

Scotland has seen the largest change in demand forecast of all our LDZs. The main reason for this is the increase in our forecast for embedded generation demand. This is due to several reasons. We have seen more sites connected and more forecast to connect. In sites that already exist, we have also experienced notably higher generation, both in the frequency of sites' operating patterns and their total demand amount on days with colder weather. This has occurred in Scotland LDZ and South LDZ in particular, but as Scotland LDZ has more embedded generation its impact is greater on annual and peaks than in our South LDZ.

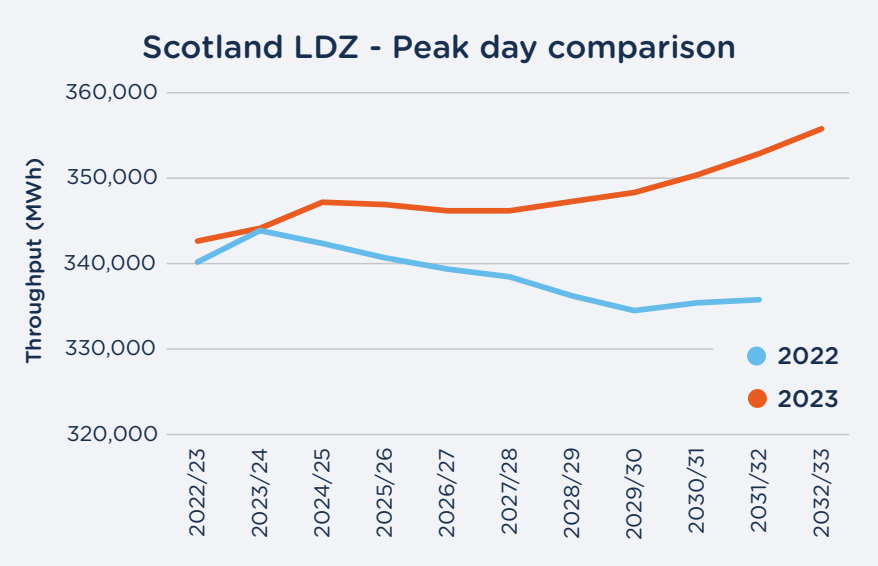


Figure 13: Scotland LDZ Peak Day Comparison

The remaining non-domestic demand was also higher than forecast last year, although the difference this has made is less than the increase in embedded generation and this has also been reflected in the current forecast.

South East LDZ

There is very little change from last year in this LDZ. Unlike other LDZs flow patterns from existing embedded generation has changed little in South East and hence our forecast. This LDZ also has the least embedded generation of all our LDZs so any changes would make less difference than in other LDZs.

As with Scotland LDZ, the remaining non-domestic demand was also higher than forecast last year, although its impact is low, overall these factors contribute to peak demand being only slightly higher than last year.

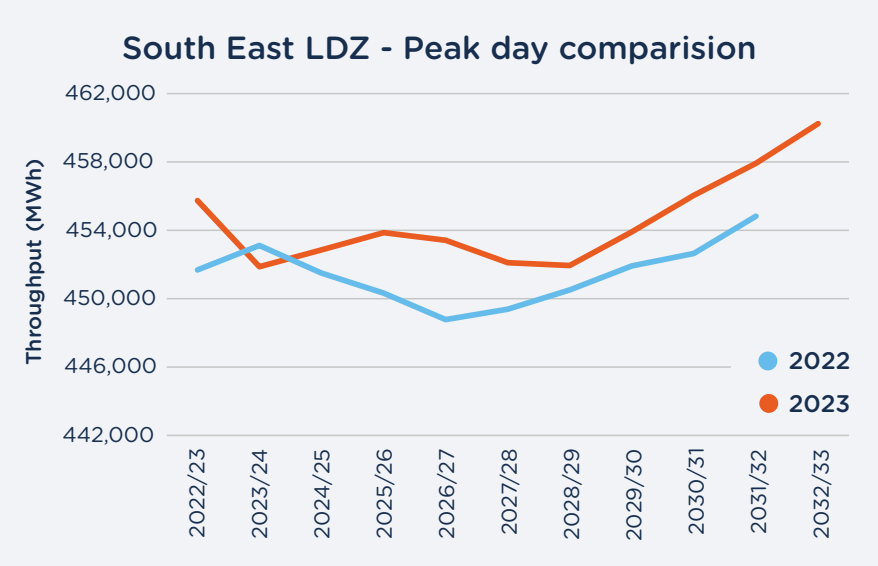


Figure 14: South East LDZ - Peak day comparison

South LDZ

This LDZ has a relatively small change compared to last year. Increased power generation in the power sector has been the key driver in any change. As with Scotland, this is because of the number of connections and the demand patterns of existing sites; but as there are less in South LDZ, its impact is not as high. In this LDZ increased activity occurs due to network constraints on the electricity system transporting moving wind generation south of London.

As with other LDZs, the remaining non-domestic demand was also higher than forecast last year, although its impact is low, and less than embedded generation changes.

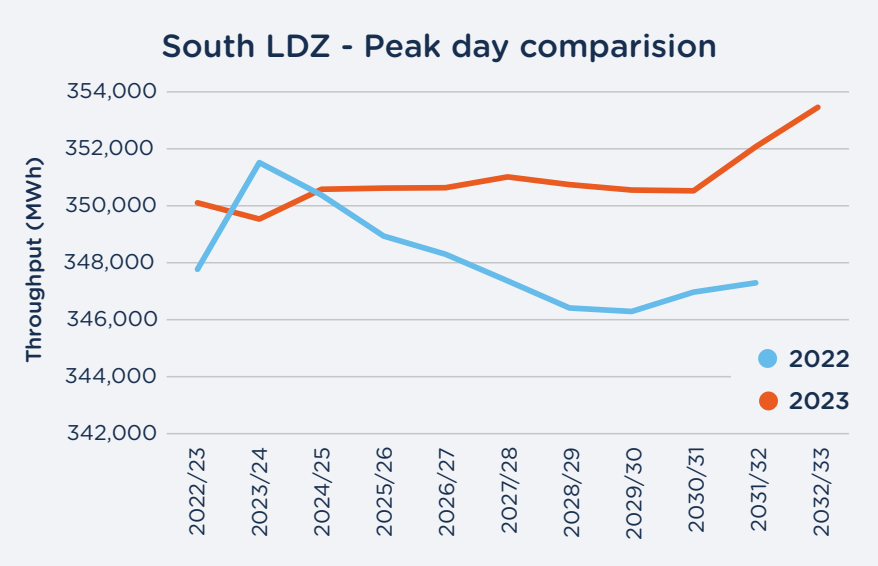


Figure 15: South LDZ Peak day comparison

Appendix A

Demand forecast tables

Annual demand forecast by load category – SGN overall											
Calendar year	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
0 - 73.2 MWh	83.3	78.4	83.4	84.0	86.3	87.4	87.3	88.8	89.7	90.6	91.7
73.2 - 732 MWh	12.5	12.1	12.0	12.3	12.5	12.8	13.1	13.2	13.3	13.4	13.4
732 – 2,196 MWh	5.8	5.5	5.4	5.5	5.6	5.6	5.6	5.7	5.7	5.7	5.7
2,196 – 5,860 MWh	3.6	3.5	3.4	3.5	3.5	3.5	3.6	3.6	3.6	3.6	3.6
Total small user	105.2	99.5	104.3	105.3	107.9	109.3	109.6	111.2	112.2	113.3	114.5
>5,860 MWh	7.1	6.8	6.7	6.7	6.8	6.9	6.9	6.9	7.0	7.0	7.0
DM consumption	22.3	25.4	28.3	28.2	28.1	28.0	28.1	28.2	28.3	28.4	28.7
Total large user	29.3	32.2	35.0	34.9	34.9	34.8	35.0	35.1	35.2	35.4	35.7
Total LDZ	134.5	131.7	139.3	140.2	142.8	144.2	144.6	146.3	147.5	148.8	150.3
Shrinkage	0.6	0.6	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
Total throughput	135.1	132.3	139.9	140.9	143.4	144.8	145.2	147.0	148.1	149.4	150.9

Gas supply year	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28	2028/29	2029/30	2030/31	2031/32	2032/33
Total throughput	133.0	138.0	140.6	142.8	144.5	145.1	146.5	147.9	149.1	150.5	152.1

Table 3: Forecast annual demand by load category - SGN overall (TWh)

Annual demand forecast by load category – Scotland LDZ											
Calendar year	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
0 - 73.2 MWh	27.2	25.7	27.6	27.8	28.7	28.5	28.5	29.1	29.4	29.7	30.1
73.2 - 732 MWh	4.1	4.0	3.9	4.0	4.1	4.2	4.3	4.3	4.3	4.3	4.3
732 – 2,196 MWh	2.3	2.2	2.2	2.2	2.3	2.3	2.3	2.4	2.4	2.4	2.5
2,196 – 5,860 MWh	1.6	1.6	1.5	1.6	1.6	1.6	1.6	1.7	1.7	1.7	1.7
Total small user	35.3	33.4	35.2	35.6	36.6	36.6	36.7	37.3	37.7	38.1	38.6
>5,860 MWh	2.9	2.9	2.8	2.9	2.9	3.0	3.0	3.1	3.1	3.1	3.2
DM consumption	8.0	8.9	9.5	9.4	9.2	9.0	9.1	9.2	9.3	9.4	9.7
Total large user	10.9	11.8	12.4	12.3	12.1	12.0	12.1	12.3	12.4	12.6	12.8
Total LDZ	46.2	45.2	47.6	47.9	48.8	48.6	48.9	49.6	50.1	50.7	51.4
Shrinkage	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Total throughput	46.4	45.4	47.8	48.1	48.9	48.8	49.1	49.8	50.3	50.9	51.6

Gas supply year	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28	2028/29	2029/30	2030/31	2031/32	2032/33
Total throughput	45.6	47.2	48.0	48.7	48.8	49.0	49.6	50.2	50.8	51.4	52.2

Table 4: Forecast annual demand by load category - Scotland LDZ (TWh)

Annual demand forecast by load category – South East LDZ											
Calendar year	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
0 - 73.2 MWh	33.5	31.7	33.5	33.7	34.5	35.9	35.8	36.3	36.7	37.1	37.5
73.2 - 732 MWh	4.8	4.6	4.6	4.7	4.8	4.9	5.1	5.1	5.2	5.2	5.2
732 – 2,196 MWh	1.9	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.9	1.9
2,196 – 5,860 MWh	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.2
Total small user	41.3	39.1	40.9	41.3	42.2	43.7	43.8	44.4	44.9	45.3	45.8
>5,860 MWh	2.1	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.2	2.2
DM consumption	7.9	8.0	8.2	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1
Total large user	10.0	10.0	10.2	10.1	10.2	10.2	10.2	10.2	10.2	10.3	10.3
Total LDZ	51.4	49.1	51.0	51.4	52.4	53.9	54.0	54.7	55.1	55.5	56.1
Shrinkage	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Total throughput	51.6	49.4	51.3	51.7	52.7	54.2	54.3	55.0	55.4	55.8	56.4

Gas supply year	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28	2028/29	2029/30	2030/31	2031/32	2032/33
Total throughput	49.9	50.8	51.6	52.4	53.8	54.3	54.8	55.3	55.7	56.2	56.8

Table 5: Forecast annual demand by load category - South East LDZ (TWh)

Annual demand forecast by load category – South LDZ											
Calendar year	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
0 - 73.2 MWh	22.5	21.1	22.3	22.5	23.1	23.0	23.0	23.4	23.6	23.9	24.1
73.2 - 732 MWh	3.5	3.5	3.5	3.6	3.6	3.7	3.7	3.8	3.8	3.9	3.9
732 – 2,196 MWh	1.6	1.5	1.5	1.5	1.5	1.5	1.4	1.4	1.4	1.4	1.4
2,196 – 5,860 MWh	0.9	0.9	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Total small user	28.6	27.0	28.2	28.4	29.0	29.0	29.0	29.4	29.6	29.9	30.2
>5,860 MWh	2.0	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.7	1.7
DM consumption	6.4	8.5	10.6	10.7	10.7	10.8	10.8	10.8	10.9	10.9	10.9
Total large user	8.4	10.4	12.5	12.5	12.6	12.6	12.6	12.6	12.6	12.6	12.6
Total LDZ	37.0	37.3	40.6	40.9	41.6	41.6	41.6	42.0	42.2	42.5	42.8
Shrinkage	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Total throughput	37.2	37.5	40.8	41.1	41.8	41.8	41.8	42.2	42.4	42.7	43.0

Gas supply year	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28	2028/29	2029/30	2030/31	2031/32	2032/33
Total throughput	37.4	40.0	41.0	41.6	41.8	41.8	42.1	42.4	42.6	42.9	43.2

Table 6: Forecast annual demand by load category - South LDZ (TWh)

1 in 20 peak day firm demand forecast – at a glance											
Calendar year	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28	2028/29	2029/30	2030/31	2031/32	2032/33
Scotland	342.6	344.1	347.2	346.9	346.2	346.2	347.3	348.3	350.3	352.9	355.8
South east	455.7	451.9	452.8	453.8	453.4	452.1	451.9	453.9	456.0	457.9	460.2
South	350.1	349.5	350.6	350.6	350.6	351.0	350.7	350.5	350.5	352.1	353.4
SGN overall	1,148.5	1,145.5	1,150.6	1,151.3	1,150.2	1,149.2	1,149.9	1,152.7	1,156.9	1,162.8	1,169.4

Table 7: 1 in 20 Peak day firm demand forecast - At a glance (GWh)

1 in 20 peak day firm demand forecast – SGN overall by load categories											
Calendar year	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28	2028/29	2029/30	2030/31	2031/32	2032/33
0 - 73.2 MWh	819.4	815.9	813.8	811.9	808.8	805.3	802.4	803.4	806.0	810.3	814.5
73.2 - 732 MWh	104.2	100.9	100.7	102.7	104.5	106.7	109.2	110.2	111.0	111.8	112.5
732 – 2,196 MWh	35.8	34.3	33.8	34.1	34.5	34.7	34.9	35.0	35.1	35.2	35.3
2,196 – 5,860 MWh	22.4	21.4	21.1	21.4	21.6	21.7	21.9	22.0	22.0	22.1	22.2
>5,860 MWh	43.8	41.9	41.3	41.7	42.1	42.4	42.7	42.8	42.9	43.0	43.2
Total NDM consumption	1,025.7	1,014.5	1,010.7	1,011.9	1,011.4	1,010.8	1,011.0	1,013.4	1,017.0	1,022.4	1,027.8
DM firm consumption	121.0	129.3	138.1	137.6	137.0	136.7	137.1	137.6	138.0	138.6	139.8
Total firm consumption	1,146.7	1,143.8	1,148.8	1,149.5	1,148.4	1,147.4	1,148.1	1,150.9	1,155.1	1,161.0	1,167.6
Total shrinkage	1.8	1.7	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Total LDZ	1,148.5	1,145.5	1,150.6	1,151.3	1,150.2	1,149.2	1,149.9	1,152.7	1,156.9	1,162.8	1,169.4

Table 8: 1 in 20 peak day firm demand forecast - SGN overall by load categories (GWh)

1 in 20 peak day firm demand forecast – Scotland LDZ by load categories											
Calendar year	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28	2028/29	2029/30	2030/31	2031/32	2032/33
0 - 73.2 MWh	234.6	233.5	232.5	231.6	230.9	230.4	230.0	230.0	231.0	232.6	233.9
73.2 - 732 MWh	31.0	29.8	29.6	30.1	30.6	31.2	31.9	32.1	32.2	32.2	32.2
732 – 2,196 MWh	12.5	12.2	12.1	12.3	12.5	12.7	12.8	13.0	13.2	13.3	13.5
2,196 – 5,860 MWh	8.8	8.5	8.4	8.6	8.8	8.9	9.0	9.1	9.2	9.3	9.5
>5,860 MWh	16.2	15.7	15.5	15.8	16.1	16.3	16.6	16.8	17.0	17.2	17.4
Total NDM consumption	303.1	299.6	298.1	298.5	298.9	299.5	300.3	300.9	302.5	304.6	306.5
DM firm consumption	39.1	44.1	48.6	47.9	46.8	46.2	46.5	46.9	47.3	47.8	48.8
Total firm consumption	342.1	343.7	346.7	346.4	345.7	345.7	346.8	347.8	349.8	352.4	355.3
Total shrinkage	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Total LDZ	342.6	344.1	347.2	346.9	346.2	346.2	347.3	348.3	350.3	352.9	355.8

Table 9: 1 in 20 peak day firm demand forecast - Scotland LDZ by load categories (GWh)

1 in 20 peak day firm demand forecast – South East LDZ by load categories											
Calendar year	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28	2028/29	2029/30	2030/31	2031/32	2032/33
0 - 73.2 MWh	338.6	337.4	337.3	337.2	335.4	332.6	330.9	332.2	333.7	335.0	336.5
73.2 - 732 MWh	41.8	40.0	39.8	40.8	41.6	42.8	44.0	44.5	44.9	45.2	45.5
732 – 2,196 MWh	11.7	11.1	11.0	11.2	11.3	11.5	11.6	11.7	11.8	11.9	12.0
2,196 – 5,860 MWh	7.0	6.6	6.6	6.7	6.8	6.8	6.9	7.0	7.0	7.1	7.2
>5,860 MWh	13.2	12.4	12.4	12.6	12.7	12.9	13.0	13.2	13.3	13.4	13.5
Total NDM consumption	412.3	407.5	407.1	408.4	407.9	406.6	406.5	408.5	410.7	412.6	414.7
DM firm consumption	42.6	43.6	45.0	44.7	44.8	44.7	44.7	44.6	44.5	44.5	44.7
Total firm consumption	455.0	451.1	452.1	453.1	452.6	451.3	451.2	453.1	455.2	457.1	459.4
Total shrinkage	0.8	0.7	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Total LDZ	455.7	451.9	452.8	453.8	453.4	452.1	451.9	453.9	456.0	457.9	460.2

Table 10: 1 in 20 peak day firm demand forecast - South East LDZ by load categories (GWh)

1 in 20 peak day firm demand forecast – South LDZ by load categories											
Calendar year	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28	2028/29	2029/30	2030/31	2031/32	2032/33
0 - 73.2 MWh	246.2	245.0	244.0	243.1	242.5	242.3	241.5	241.3	241.2	242.7	244.1
73.2 - 732 MWh	31.4	31.1	31.3	31.8	32.2	32.7	33.2	33.6	34.0	34.4	34.8
732 – 2,196 MWh	11.6	11.1	10.7	10.7	10.6	10.5	10.5	10.3	10.1	10.0	9.8
2,196 – 5,860 MWh	6.6	6.3	6.1	6.1	6.1	6.0	6.0	5.9	5.8	5.7	5.6
>5,860 MWh	14.5	13.8	13.4	13.3	13.3	13.2	13.1	12.9	12.7	12.5	12.3
Total NDM consumption	310.3	307.3	305.6	305.1	304.6	304.7	304.3	303.9	303.8	305.3	306.6
DM firm consumption	39.3	41.7	44.5	45.0	45.4	45.7	45.9	46.1	46.2	46.2	46.3
Total firm consumption	349.6	349.0	350.0	350.1	350.1	350.5	350.2	350.0	350.0	351.5	352.9
Total shrinkage	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Total LDZ	350.1	349.5	350.6	350.6	350.6	351.0	350.7	350.5	350.5	352.1	353.4

Table 11: 1 in 20 peak day firm demand forecast - South LDZ by load categories (GWh)

Appendix B

2022 flows and supporting information

This appendix describes annual flows during the 2022 calendar year.

Annual flows

Forecasts of annual gas demand are based on average weather conditions. Therefore, when comparing actual demand with forecasts, demand must be adjusted to take account of the difference between actual weather conditions and seasonal normal weather. The result of this adjustment is the weather corrected demand.

Recent winters have included some of the warmest of any in the weather data history employed for demand modelling, dating back to 1960/61. Consequently, the basis of the average weather condition used for demand forecasting purposes has been adjusted to better reflect these conditions.

Anecdotal evidence to the contrary is based on specific days or weeks and not the entire winter period. As a result, the 2022 weather corrected annual demands and forecasts are based on the industry's current view and research in co-operation with the Hadley Centre, which is part of the Met Office.

Tables 12 to 14 provide a comparison of actual and weather-corrected demands during the 2022 calendar year with the forecasts presented in our 2022 LTDS. Annual demands are presented in the format of LDZ load bands/categories, consistent with the basis of system design and operation.

Note: Figures may not sum exactly due to rounding and changes in the way Xoserve report UIG.

Annual demand for 2022 (TWh) - Scotland LDZ			
	Actual demand	Weather corrected demand	2021 LTDS forecast demand
0 - 73.2MWh	26.9	28.4	27.5
73 – 5,860MWh	7.9	8.3	7.7
>5,860MWh firm	10.7	11.1	10.8
Total LDZs	43.9	46.2	46.0
Shrinkage	0.2	0.2	0.2
Total throughput	44.1	46.4	46.1

Table 12: Annual demand for 2022 (TWh) – Scotland LDZ

Annual demand for 2022 (TWh) - South East LDZ			
	Actual demand	Weather corrected demand	2021 LTDS forecast demand
0 - 73.2MWh	33.8	35.9	34.7
73 – 5,860MWh	7.9	8.4	7.3
>5,860MWh firm	10.0	10.2	9.4
Total LDZs	48.5	51.4	51.4
Shrinkage	0.3	0.3	0.3
Total throughput	48.8	51.6	51.7

Table 13: Annual demand for 2022 (TWh) – South East LDZ

Annual demand for 2022 (TWh) - South LDZ			
	Actual demand	Weather corrected demand	2021 LTDS forecast demand
0 - 73.2MWh	21.8	23.5	22.7
73 – 5,860MWh	5.9	6.3	5.7
>5,860MWh firm	8.2	8.5	10.2
Total LDZs	34.5	38.3	38.6
Shrinkage	0.2	0.2	0.2
Total throughput	34.7	37.2	38.8

Table 14: Annual demand for 2022 (TWh) – South LDZ

LDZ winter severity statistics

Sourced from the April 2023 National Grid ESO Winter Severity Report 2022/23, these statistics cover the gas industry interpretation of winter lasting from October 2022 to March 2023 inclusive.

By way of explanation, a winter can be either warm, cold or average. The 1 in 'X' is a measure of how far away from average it is and if it is either cold or warm. The most severe cold winter is the one that has happened once in the last 63 years. This would be a 1 in 63 cold winter and this occurred in 1962/63.

UK-wide, the winter of 2022/23 was the 7th warmest in the last 63 years.

1 in 'X' winter severities per LDZ	
LDZ	1 in 'X'
Scotland	11_warm
South East	7_warm
South	9_warm
National	9_warm

Table 15: 1 in X winter severities per LDZ

Maximum and minimum flows

Table 16 indicates the highest and lowest daily demands for each LDZ seen between October 2022 and September 2023 and when they occurred.

Table 17 shows % flow of forecast peak day for each LDZ on the maximum and minimum demand day of gas year 2022-23.

Actual demand on the maximum and minimum demand day of gas year 2022/23		
LDZ	Maximum day 2022/23	Minimum day 2022/23
Scotland	24.37 mscmd (13/12/2022)	3.84 mscmd (24/06/2023)
South East	30.7 mscmd (16/12/2022)	4.14 mscmd (20/06/2023)
South	21.99 mscmd (15/12/2022)	3.19 mscmd (25/06/2023)

Table 16: Actual demand on the maximum and minimum demand day of gas year 2022/23

Maximum and minimum demand of gas year 2022/23 (as a percentage)			
LDZ	Forecast peak day	Actual maximum peak day	Actual minimum peak day
Scotland	31.34 mscmd	77.76%	12.25%
South East	41.16 mscmd	74.59%	10.01%
South	31.70 mscmd	69.37%	10.01%

Table 17: Maximum and minimum demands of gas year 2022/23 (as a percentage)

Biomethane sites

Table 18 shows the total number of biomethane sites connected to our networks with contracted capacity and the equivalent number of domestic customers this gas might be able to supply based on the Ofgem average AQ of 12,000 kWh.

The total number of equivalent domestic customers supplied includes the total capacity provided at our largest facility in our South LDZ.

There are currently 17 projects at various stages of development which are due to connect between now and 2025.

Portfolio of biomethane sites		
LDZ	Total	Equivalent no of domestic customers
Scotland	18	123,278
Southern	17	139,191
Total	35	262,469

Table 18: Portfolio of sites as of end August 2023

<7bar distribution projects

We undertake yearly reviews of our networks, ensuring sufficient capacity is in place before each Winter period. Accurately tracking new connections and already-connected sites as they develop provides strong evidence when making decisions regarding any reinforcement projects. We liaise with new and existing customers, significant gas users and with local authorities to ensure we have an accurate picture of how gas demand will or could evolve on our networks.

Utilising innovative insertion and drilling techniques to replace the iron mains with modern plastic pipes reduces the impact on the local environment, completing the works quickly and efficiently, with minimal disruption to customers and the local communities whilst future proofing our networks for low and zero carbon energy solutions.

By analysing the material makeup of each of our individual networks, we have invested in enhanced pressure control equipment, allowing us to reduce system pressures where possible thereby reducing our carbon footprint as a result of shrinkage.

Alternatives to reinforcement

All projects are regularly reviewed to ensure alternatives are explored and ultimately any reinforcements are fully justified, on-time, and not excessive, protecting our customers from funding unnecessary investment.

In evaluating each of the planned projects below, we thoroughly examined the option of interruption as a potential alternative to reinforcement. However, given the substantial size and scale of the developments which necessitated these projects to be raised, the degree of interruption required to eliminate the need for reinforcement is impractical and thus not a feasible solution. We also explored another alternative which involved increasing operating pressures in the affected areas. Nevertheless, once again, due to the size and localised nature of the reinforcement needs, elevating pressures would not have eliminated the requirement for reinforcement.

Tables 19 to 25 provide a comprehensive overview of major projects with a pressure level of less than 7bar that align with the planning horizon discussed in this year's LTDS. Major projects are works estimated to cost up to and in excess of £500,000. As a result of how we manage these projects explained above there may be adjustments to the projects shown compared to the previous year's LTDS.

Projects under construction

<7 Bar major projects under construction in Scotland LDZ		
Project	Build year	Project scope
Abbots Road, Falkirk	2023/24	0.5km x 500mm MP PE

Table 19: <7 bar major projects under construction in Scotland LDZ

<7 Bar major projects under construction in South LDZ		
Project	Build year	Project scope
None		

Table 20: <7 bar major projects under construction in South LDZ

<7 Bar major projects under construction in South East LDZ		
Project	Build year	Project scope
None		

Table 21: <7 bar major projects under construction in South East LDZ

Projects under consideration

<7 Bar major projects under consideration in Scotland LDZ		
Project	Build year	Project scope
Haddington – Dunbar IP	2023/24	180mm PE IP x 115m + 315mm PE MP x 120m & new DPG
South East Wedge, Edinburgh	2024/25	2.91km x 18" ST IP, 2 x new DPGS, 1.28km x 630mm PE MP
Tranent IP – Phase 2	2025/26	2.4km x 315 HDPE IP
Aberlady - Gullane (Phase 1)	2025/26	2.6km x 315/355mm PE MP
Great Western Road, Glasgow	2024/25	Uprating of 4.5km of MP mains & installation of 3x DPG & 400m of inlet/outlet mains.

Table 22: <7 bar major projects under consideration in Scotland LDZ

<7 Bar major projects under consideration in South LDZ		
Project	Build year	Project scope
Hithercroft Road, Wallingford	2023/24	1.6km x 250mm MP PE
Lower Farm Lane, Oxford	2023/24	2.2km x 180mm IP PE
Burndell Road, Yapton	2023/24	4.1km x 355mm MP PE

Table 23: <7 bar major projects under consideration in South LDZ

<7 Bar major projects under consideration in South East LDZ		
Project	Build year	Project scope
Cliffsend CGS	2024/25	CGS Replacement
Hawe Lane, Canterbury	2025/26	1.6km x 180mm PE MP

Table 24: <7 bar major projects under consideration in South East LDZ

Projects with low probability of progressing

Following review, the below listed projects included in last year's planning schedules have now been identified as having a low probability of progressing.

<7 Bar major projects with low probability (all LDZ's)		
Project	**Build year**	**Project scope**
Perth Bridge DPG Outlet	2025/26	2.7km x 400mm PE MP
Rocks Road, Uckfield	2024/25	0.7km x 355mm PE MP
Collier Street, Maidstone	2024/25	2km x 180mm PE MP
Newbury IP	2024/25	3.4km x 12" ST IP

Table 25: <7bar low probability projects

Appendix C

Links and contacts

Internal contacts

Paul Denniff
SGN Network Director
paul.denniff@sgn.co.uk

Jeremy Deveney
Head of Network Transmission
jeremy.deveney@sgn.co.uk

Barrie Gillam
LTS Future Systems Planning Manager
>7bar transmission system,
(Primary LTDS Contact)
barrie.gillam@sgn.co.uk

Ross Edwards
LTS Planning Manager
>7bar transmission system
ross.edwards@sgn.co.uk

Joel Martin
Regulatory Finance Manager, (point of contact for storage and biomethane enquiries).
joel.martin@sgn.co.uk

Richard Buckley
Head of Network Management
<7bar Distribution
richard.buckley@sgn.co.uk

network.capacity@sgn.co.uk
Our dedicated email address for any questions regarding network capacity, including our Long Term Development Statement.

customer@sgn.co.uk
Our 24-hour Customer Service team can be reached by email or by calling 0800 912 1700. You can also find us on Facebook or follow us on Twitter at @SGNgas.

linesearchbeforeudig.co.uk
Safety is our number one priority, before you dig always request details of our pipework's location via this online service.

lets.chat@sgn.co.uk
We are always interested in engaging with our stakeholders This is how we look to improve the way we do things by listening to your feedback.

sgn.co.uk
You can apply for a new gas connection online through our website and learn more about our Help to Heat scheme. You can also find further information about our planned and emergency works in your area.

External contacts

ofgem.gov.uk
Office of Gas and Electricity Markets. Regulating authority for gas industry and markets.

ENA
Energy Networks Association (ENA) represents the 'wires and pipes' transmission and distribution network operators for gas and electricity in the UK

xoserve
One of several service providers supporting the UK Gas Industry.

Joint Office of Gas Transporters
The Joint Office is where the UNC can be found. There are also details of live modifications to the document and the various working bodies relating to the gas industry.

DESNZ - Department for Energy Security & Net Zero
DESNZ brings together responsibilities for business, industrial strategy, science, innovation, energy, and climate change.

Glossary

Annual Quantity (AQ) - The AQ of a supply point is its annual consumption over a 365 or 366-day year, under conditions of average weather.

Bar - The unit of pressure that is approximately equal to atmospheric pressure (0.987 standard atmospheres). Where bar is suffixed with the letter g, such as in barg or mbarg, the pressure being referred to is gauge pressure, i.e. relative to atmospheric pressure. One-millibar (mbar) equals 0.001 bar.

DESNZ – Department for Energy Security and Net Zero - DESNZ took over former responsibilities of BEIS Department for Business, Energy & Industrial Strategy in February 2023

Biomethane - Biogas that has been cleaned in order to meet GSMR requirements.

Calorific Value (CV) - The ratio of energy to volume measured in Mega joules per cubic meter (MJ/m3), which for a gas is measured and expressed under standard conditions of temperature and pressure.

Climate Change Levy (CCL) - Government tax on the use of energy within industry, commerce and the public sector in order to encourage energy efficient schemes and use of renewable energy sources. CCL is part of the UK Government's Climate Change Programme (CCP).

Connected System Exit Point (CSEP) - A connection to a more complex facility than a single supply point. For example, a connection to a pipeline system operated by another gas transporter.

Cubic metre (m3) - The unit of volume, expressed under standard conditions of temperature and pressure, approximately equal to 35.37 cubic feet. One million cubic metres (mcm) are equal to 106 cubic metres, one billion cubic metres (bcm) equals 109 cubic metres.

Daily metered supply point - A supply point fitted with equipment, for example a data-logger, which enables meter readings to be taken on a daily basis. These are further classified as SDMC, DMA, DMC or VLDMC according to annual consumption. Of these the most relevant is VLDMC which is defined further on.

Distribution system - A network of mains operating at three pressure tiers: intermediate (7 to 2barg), medium (2barg to 75mbarg) and low (less than 75mbarg).

Diurnal storage - Gas stored for the purpose of meeting within day variations in demand. Gas can be stored in special installations, such as gas holders, or in the form of linepack within transmission, i.e. >7barg pipeline systems.

DECC - Department of Energy and Climate Change - In 2016 absorbed into Department for Business, Energy and Industrial Strategy.

Embedded entry points - Entry point which is not an offtake from NTS. Can be a biomethane or other unconventional source of gas.

Embedded power stations – Gas fired power stations designed to provide resilience within a local electricity power grid by generating electricity according to operational and market factors.

Exit zone - A geographical area within an LDZ, which consists of a group of supply points, which on a peak day, receive gas from the same NTS Offtake.

FEED - Front End Engineering Design is an engineering design approach adopted prior to detailed engineering, procurement, and construction. (See also Pre Feed)

Formula year - A twelve-month period commencing 1 April predominantly used for regulatory and financial purposes.

Future Energy Scenarios (FES) - National Grid's annual industry-wide consultation process encompassing the 10 Year Statement, targeted questionnaires, individual company and industry meetings, feedback on responses and investment scenarios. Previously called Transporting Britain's Energy.

Gas day – Used by gas industry for buying and selling gas on open market. Defined as running from 05:00 on one day to 05:00 on the following day.

Gas Distribution Network (GDN) - An administrative unit responsible for the operation and maintenance of the local transmission system (LTS) and <7barg distribution networks within a defined geographical boundary, supported by a national emergency services organisation.

Gas Transporter (GT) - Formerly Public Gas Transporter (PGT). GTs such as SGN, are licensed by the Gas and Electricity Markets Authority to transport gas to customers.

Gas holder - A vessel used to store gas for the purposes of providing diurnal storage.

Gas supply year - A 12-month period commencing 1 October also referred to as a gas year.

Gemini - A computer system which supports Uniform Network Code operations, including energy balancing.

GVA - Gross Value Added (GVA) measures the contribution to the economy of each individual producer, industry or sector in the United Kingdom

H100 100% hydrogen project – Our Hydrogen 100 project in Fife, Scotland is designed to demonstrate the safe, secure and reliable distribution of hydrogen to reduce carbon output and progress towards the 2050 UK carbon target. More information is available at www.sgn.co.uk/Hydrogen-100

Interconnector - This is a pipeline transporting gas from or to another country.

Interruptible supply point - A supply point that offers lower transportation charges where SGN can interrupt the flow of gas to the supply point and that is prepared to be interrupted if the Transporter needs it to.

Kilowatt hour (kWh) - A unit of energy used by the gas industry. Approximately equal to 0.0341 therms

LDUG – LDz **U**naccounted for **G**as

Linepack - The usable volume of compressed gas within the national or local transmission system at any time.

Liquefied Natural Gas (LNG) - Gas stored in liquid form. Can be firm or constrained (CLNG). Shippers who book a constrained service agree to allow us to use some of their gas to balance the system.

Load Duration Curve (Average) - The average load duration curve is that curve which, in a long series of winters, with connected load held at the levels appropriate to the year in question, the average volume of demand above any given threshold, is represented by the area under the curve and above the threshold.

Local Distribution Zone (LDZ) - A geographic area supplied by one or more NTS offtakes. Consists of high pressure (>7 barg) and lower pressure distribution system pipelines.

Local Transmission System (LTS) - A pipeline system operating at >7barg, that transports gas from NTS offtakes to distribution systems. Some large users may take their gas direct from the LTS.

National balancing point (NBP) - An imaginary point on the UK gas supply system through which all gas passes for accounting and balancing purposes.

National Transmission System (NTS) - A high-pressure system consisting of terminals, compressor stations, pipeline systems and offtakes. Designed to operate at pressures up to 85barg. NTS pipelines transport gas from terminals to NTS offtakes.

National Transmission System Offtake - An installation defining the boundary between NTS and LTS or a very large consumer. The offtake installation includes equipment for metering, pressure regulation, etc.

Network Entry Agreement (NEA) - The Network Entry Agreement sets out the technical and operational conditions for any third party site injecting gas into our networks.

Network entry facility - Sites with the necessary equipment and agreements in place which enable the injection of gas into our networks by a third party.

Non-daily metered (NDM) - A meter that is read monthly or at longer intervals. For the purposes of daily balancing, the consumption is apportioned using an agreed formula, and for supply points consuming more than 73.2MWh pa reconciled individually when the meter is read.

Odorisation - The process by which the distinctive odour is added to gas supplies to make it easier to detect leaks. Odorisation is provided at all Network Entry points.

Office of Gas and Electricity Markets (Ofgem) - The regulatory agency responsible for regulating the UK's gas and electricity markets.

Offtake - An installation defining the boundary between NTS and LTS or a very large consumer. The offtake installation includes equipment for metering, pressure regulation, etc.

ONS - Office for National Statistics.

Operating Margins - Gas used to maintain system pressures under certain circumstances, including periods immediately after a supply loss or demand forecast change, before other measures become effective and in the event of plant failure, such as pipe breaks and compressor trips.

OPN - Offtake Profile Notice. Method of notifying National Grid of the next day or future demand for gas at offtakes.

Planning and Advanced Reservation of Capacity Agreement (PARCA) - A bilateral contract between National Grid and their customer which allows entry and/or exit capacity to be reserved in advance of the completion of a connection

Peak-day demand (1 in 20 peak demand) - The 1 in 20 peak day demand is the level of demand that, in a long series of winters, with connected load held at the levels appropriate to the winter in question, would be exceeded in one out of 20 winters, with each winter counted only once.

Pre Feed - Preliminary FEED (front end engineering and design) document that is a predefined design package to prove the feasibility in technical and economics. The Pre-FEED is used to a basis of FEED deliverables or basic engineering. See also FEED.

Price Control Review – RIIO - Ofgem's periodic review of Transporter allowed returns. The current period is called RIIO-GD2 and commenced in April 2021 and lasts five years to March 2026.

RIIO stands for:

Revenue = Incentives + Innovation + Outputs.

PRI - Pressure Regulating Installation - The replacement term for PRS, district governor and all other local terms (such as STRS or TRS) when IGEM standard TD13 was introduced.

PRS - Pressure Regulating Station - An installation which reduces the supply pressure as gas passes either between different pressure rated tiers of the LTS or from the LTS to the below 7barg network or between different pressure tiers of the <7barg network.

Real Time Networks - Our Real-Time Networks project aims to make gas supply's more secure and affordable by demonstrating how a flexible gas network could be more efficient for our evolving energy market and meet changing customer demands. To do this we are capturing representative data of customer gas demand recording how much gas is needed and when from 1,200 gas meters in the south-east. More information is available on the Real Time Network pages of our website.
www.sgn.co.uk/real-time-networks

Seasonal Normal Temperature (SNT) - Seasonal Normal Temperature is the average temperature that might be expected on any particular day, based on historical data.

Shipper or network code registered user (system user) - A company with a shipper licence that is able to buy gas from a producer, sell it to a supplier and employ a GT to transport gas to consumers.

Shrinkage - Gas that is input to the system but is not delivered to consumers or injected into storage. It is either 'own use gas' or 'unaccounted for gas'.

Supplier - A company with a supplier's licence contracts with a shipper to buy gas, which is then sold to customers. A supplier may also be licensed as a shipper.

Supply Hourly Quantity (SHQ) - The maximum hourly consumption at a supply point.

Supply Offtake Quantity (SOQ) - The maximum daily consumption at a supply point.

Supply point - A group of one or more meters at a site.

Therm - An imperial unit of energy. Largely replaced by the metric equivalent: the kilowatt hour (kWh). One therm equals 29.3071 kWh.

Unidentified Gas (UIG) -The gas that is off taken from the Local Distribution Zone (LDZ) system, but not attributed to an individual Supply Meter Point or accounted for as Shrinkage, is referred to as UIG

Uniform Network Code (UNC) - The Uniform Network Code covers the arrangements between National Grid, shippers and the DNs following the selling off of four of the networks.

UKCS - United Kingdom Continental Shelf.

UK-Link - A suite of computer systems that supports Uniform Network Code operations. Includes supply point administration, invoicing, and the sites and meters database.

VLDMC - Very Large Daily Metered Customer. A site which uses greater than 50,000,000 therms a year.

Disclaimer

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These are Standard Condition 25 and Standard Special Condition D3 of their respective Gas Transporter Licences and Section O 4.1 of the Transportation Principal Document in the Uniform Network Code in accordance with information supplied pursuant to Section O of the Transportation Principal Document in the Uniform Network Code. Section O 1.3 of the Transportation Principal Document in the Uniform Network Code applies to any estimate, forecast or other information contained in this document.

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If you smell gas or are worried about gas safety you can call the National Gas Emergency Number on:
0800 111 999

Carbon monoxide (CO) can kill. For more information visit:
co-bealarmed.co.uk

Before you dig contact:
linesearchbeforeudig.co.uk

SGN
Your gas. Our network.

SGN
St Lawrence House
Station Approach
Horley
sgn.co.uk