SGN
Your gas. Our network.

Forecast Methodology 2026/27

Contents

Standard Special Condition A57

In December 2020 OFGEM published their RIIO-2 Final Determinations for the transmission and gas distribution price controls. These set out the key elements of the price control from 1 April 2021 to 31 March 2026. This included a new licence obligation for the gas transporter licence holders to comply with an enhanced obligations framework in relation to the exit capacity booking process.

Standard Special Licence Condition ("SSC") A57 (Exit Capacity Planning) of the gas transporter licences requires the licence holder ("licensee") to comply with the Exit Capacity Planning Guidance ("the Guidance") which is available here: Exit Capacity Planning Guidance | Ofgem

The Guidance comprises a set of requirements relating to the following areas of capacity booking activity. However, in this initial year specific transition arrangements are in place to confirm a reduced set of requirements.

- Methodology: GDNs must provide information on the structure of their networks known as Network Topology, and both GDNs and NGT must provide information on their forecasts of demand and the details of the processes in place to calculate these forecasts.

- Engagement: the GDNs and NGT must collaboratively work with each other and with other stakeholders to maximise booking efficiency across the gas transportation network as a whole.

- Reporting: licensees must report annually to the Authority on capacity booking methodology, stakeholder engagement, decision-making and data to demonstrate efficient booking outcomes.

This document has been produced to support the forecasting methodology requirements of SSC A57 Exit Capacity Planning.

Some of the information may be redacted due to its sensitivity in line with DESNZ and the CPNI general principles of security around its wider disclosure.

Introduction

This publication details the methodology behind our demand forecasting process. It has been written to enable an understanding of the entire process including the inputs which go into the analysis.

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

Each year we work with expert industry partners to produce a forecast of how we see demand may develop for the following 10 years. The starting point for this work 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 allows us to develop the most efficient booking strategy possible with National Grid as well as giving us greater confidence when planning work on our networks and the suitability of investment decisions we make on behalf of our customers.

The outputs of this process are:

- Annual demand
- 1 in 20 peak day demand
- Daily demands statements under standard, cold and warm conditions for use throughout the planning processes.

  For annual and peak demands, these are split out by load categories (load bands) as set out in the Uniform Network Code (UNC). These are:

- NDM1[1] (0-73 MWh/yr)
- NDM2 (73-732 MWh/yr)
- NDM3 (732 - 2196 MWh/yr)
- NDM4 (2196 - 5860 MWh/yr)
- NDM5 (> 5860 MWh/yr)
- DM[2]
- Shrinkage

This document will be reviewed annually to ensure it reflects the current methodology.

[1] Non-Daily Metered

[2] Daily Metered

Types of forecast methodology

We use two approaches throughout our forecasting processes, these are referred to as bottom up and top down analysis.

Historically top down analysis has been used extensively throughout the energy industry in forecasting and this has proven very effective for many years. More recently, due to changes in the energy industry and markets, this single approach alone has become a less effective way of determining future demand levels.

As a result, wherever possible the methodologies underpinning our forecasting have moved from top down to bottom up analysis.

Bottom up analysis

Bottom up analysis looks at the specific elements which impact gas demand from a granular customer based perspective, establishing what these elements have been historically and how they've impacted on gas demand in the past. This approach requires good data and is not suitable where this is not available.

We continually review what is happening throughout the energy industry including the impact of technological changes, legislative influences and both central and regional government economic advice and projections. This informs us how each element may impact on gas demand and the separate sectors are then brought together to form our overall forecast of demand.

This type of analysis covers over two thirds of SGN's annual demand[3]

The benefits of this approach to forecasting are:

- Transparency - The impact individual elements of the forecast have on the outputs can be clearly seen
- Flexibility - We can add or remove elements of the forecast relatively quickly each planning cycle as we see change occurring
- Agile - Enables what if analysis and scenarios so we may test the impact of a number of elements of the forecast such as Future Homes Standard

Top down analysis

Top down analysis looks at total demand or sectors of demand as a whole and establishes why demand has changed historically compared to high level indices, establishing a relationship between them.

The most common type of top down analysis for demand forecasting is known as econometric forecasting however it can also be non econometric. We use both types of top down forecasting throughout our demand forecast.

Econometric analysis looks at why annual demand has changed historically compared to high level indices to establish a relationship between them.

[3] 73% of 2020 weather corrected demand (excluding the minimal impact of domestic behaviour change)

Econometric forecasting works well when there are consistent patterns of changes in demand and economic indices supported by consistency across those governmental policies which impact on gas demand. In recent years this has not been the case, with recessions, pandemics, and more importantly significant changes in energy policies impacting gas demand.

We show how the different types of top down analysis is used in our analysis later in this document.

Regional elements of the Forecast

Where available we will use regional specific data within both the bottom up and top down analysis as a primary input to inform the forecast. This approach improves the quality of the analysis avoiding inaccuracies created by using national statistics at a local level. This data is published at NUTS 1[4] regional levels. There are 13 NUTS1 regions in UK.

Postcode data for our customers is used to map the NUTS1 regions within our LDZs. This creates a proportional contribution for each NUTS1 region which is used to attribute regional sensitivities to the LDZ. The output of this is:

- LDZ SC covers 100 percent of NUTS1 region Scotland and no other area.
- LDZ SE covers over a third of London and nearly half of South East NUTS1 regions
- LDZ SO covers around 40% of South East NUTS1 region, and very minor amounts of South West, East and East Midlands regions.

This is used in many areas of the forecast to make our forecast inputs more relevant to our LDZs. These areas are:

- Economic indices for top down forecasting used in commercial and manufacturing forecasts, such as employment, manufacturing and service outputs.
- Insulation statistics
- Smart meter stats

Premise of the forecasts

Our annual demand forecasts are carried out at Local Distribution Zone (LDZ) level and published in our Long-Term Development statement in line with our GT licence and section O of the UNC. These forecasts are updated each year to take in to account any changes in the economy and government legislation. This allows decisions on the directions towards the renewable economy to be included in our forecast when actual decisions have been made.

Our forecast:

- Assumes all current energy and housing incentives, policies, and legislation remain as is throughout the forecast period, until new ones have been confirmed and committed to financially and legally whereupon they will be included as part of the forecast.
- Remains a forecast not a scenario. Direct comparison with energy scenarios such as National Grid's Future Energy Scenarios is not entirely appropriate. Benchmarking with other forecasts such as National Grid's 5 year forecast and DESNZ - Energy and emissions projections occurs as part of the process.

[4] NUTS Level 1 (January 2018) Full Clipped Boundaries in the United Kingdom - data.gov.uk

Scenarios and sensitivities are considered as part of the forecasting process along with decarbonisation of the wider energy system via inputs such as a greater requirement for gas generation to back up renewables at times of low renewable outputs.

Our demand forecasts are discussed further in our Long-Term Development statement which may be found on our website here.

Analysis groupings

The primary forecasting inputs, as shown in orange on our methodology overview graphic in Appendix A, are assessed within specific groups, shown in grey, according to how they influence the analysis.
In this section of our methodology, we show what these categories are and describe how they relate to the forecasting process.

Secondary heating

This refers to the impact of households replacing gas fires with wood burning stoves. We include this element to assess the significance of woodburning stove installations on gas demand for existing houses.

Energy efficiency

Energy Efficiency is an important element within our domestic forecast covering both thermal and non-thermal energy efficiency.

- Thermal efficiency is anything which reduces heat demand of a home if comfort levels are unchanged. This includes insulation, glazing as well as draft proofing measures.
- Non thermal efficiency is anything which reduces wastage when delivering heat from gas, including boiler efficiency and heating controls.

Comfort levels

For existing homes, the temperature people heat their homes to can be established once all impacts of energy efficiency and secondary heating are removed from the assessment of demand. The remaining changes in gas demand are relative to changes in comfort levels.

Historically these levels have varied in line with wider economic metrics, ultimately affordability. That is when household disposable income increases or gas prices are cheaper we see higher comfort levels. This historic trend is clearly visible in the years preceding the Covid19 pandemic.

New homes

Current building regulations result in new homes having higher levels of energy efficiencies than many existing properties, so to improve the accuracy of our forecast, we assess demand for existing and new homes separately.

To aid robust analysis for this forecast element, we look at the impacts of new homes retrospectively, considering anything built from 2010 as a new home and anything prior as existing housing stock.

Currently, the average new house connecting to our network uses less than half the gas demand of an average existing one. This is consistent across all three of our LDZs.

The growth of new houses is the single largest factor increasing gas demand in the domestic sector.

Econometric analysis

Whilst the preferred approach to our forecasting analysis is bottom-up forecasting, where this isn't possible we use econometric analysis.

Econometric analysis looks at the relationship between past economic indices and demand then uses these historical patterns to establish a gas demand forecast.

This works well in those sectors which have a relatively consistent year on year gas demand which can be linked to economic indices. However, stability of inputs especially within the domestic sector is decreasing hence our introduction of granular bottom up analysis. We now reserve econometric analysis for the non-domestic sectors and specifically to determine behaviour change within the domestic sector forecast.

Annuals and Peaks

The aim of the analysis is to produce a view of what demand may be over a 10 year planning cycle for each of our LDZ's. The analysis is carried out annually with subsequent years analysis benefiting from an appraisal of the accuracy of the previous years. Each year we produce an annual demand forecast for each of the 10 years of the planning cycle. The annual demand forecasts then undergo further analysis to arrive at our 1 in 20 peak demand forecasts.

In this section we will show how annual demand is forecast per category of demand and then how the 1 in 20 peak demand forecast develops from there.

Annual demand

Annual Demand is the amount of gas used in a year by customers on our network. There are several categories of demand, referred to as load bands. Some of these load bands have subcategories. These are forecast separately then added together to establish the annual demand forecast.

All elements of the annuals forecast undergo correction for weather variations to enable a like for like comparison between years.

Peak demand

Peak demand is the potential maximum amount of gas any customer may use. Peak demand is determined once the annual demand forecast is complete. We use peak demand throughout our planning processes to ensure we are able to maintain our 1 in 20 obligations on behalf of our customers.

Load Bands

Our customers may use gas at differing amounts at different times of the day and year. To ensure we are able to assess each type of customers demand effectively we use load bands throughout our planning and forecasting processes.

Load bands allow us to apportion specific sensitivities to each type of customer to arrive at an accurate picture of overall demand. They are an industry standard embedded within the Uniform Network Code (UNC) and our Gas Transportation license.

How each load band or subcategory of load bands is forecast is highlighted below, with more detail in the following sections.

- NDM1 (0-73 MWh/yr)

  - New houses – bottom up
  - Retrofit Energy efficiency – bottom up
  - Behaviour change – econometric
- NDM2 (73-732 MWh/yr)
  - Econometric
- NDM3, 4 & 5 (>732 MWh/yr)
  - Econometric
- DM
  - Embedded generation – bottom up
  - Large loads - bottom up
  - Other DM - econometric
- Shrinkage [5]
  - Own use gas
  - Theft of gas
  - Leakage

Domestic 0-73 MWh

This load band consists of:

- Standard domestic housing
- Large domestic housing
- Small retail
- Very small commercial premises.

This sector is predominantly domestic housing, some of which can be fairly large with a level of demand similar to a retail or commercial property. Also included within this load band are small retail and commercial properties. Irrespective of the type of customer all usage is based on typical domestic demand patterns i.e. space and hot water heating.

Forecast method

- Predominantly bottom up
- Top down econometric forecasting is used specifically to determine domestic behaviour change

Overview

The bottom up forecasting elements are appraised separately before coming together to create a base domestic forecast.

In a separate assessment domestic behaviour change is determined prior to being applied to the base demand analysis with the result being the final domestic demand forecast.

Detail

We use large amounts of detailed information in our bottom up assessment of the sensitivities which go into this sector's forecast of demand. The information is analysed to determine how gas demand has changed over the previous 10 years. Econometric analysis is used solely to determine the behaviour change element or the comfort levels i.e. how warm we heat our houses.

[5] Shrinkage Leakage Model Review 2020_Final Report_V4 (1).pdf (gasgovernance.co.uk)

Main forecast elements: - (Green boxes)

- Secondary heating – Woodburning stoves
- Energy Efficiency – Retrofit boilers
- Energy Efficiency – Retrofit thermal efficiency inc Solid Wall insulation (SWI), Cavity Wall Insulation (CWI), Loft Insulation (LI), double glazing, draft proofing
- Energy Efficiency – Retrofit controls
- Energy Efficiency – Retrofit smart thermostats and meters
- Comfort levels - Behaviour change
- Efficiency of new homes – Gas demand per new home
- Built number of new houses – New homes connected to our networks each year

Main Data and Data Sources – (Orange boxes)

- English Housing Survey (from Ministry of Housing, Communities & Local Government - MHCLG)
- Scottish Household Survey (from the Housing and Social Justice Directorate of the Scottish Government)
- DESNZ Household Energy Efficiency Statistics (for Energy Company Obligation (ECO))
- DESNZ Energy Consumption UK
- DESNZ smart meter GB quarterly reports and impact assessments.
- MHCLG - SAP ratings new houses per year and existing houses
- MHCLG Net additional dwellings report
- MHCLG insulation in existing houses
- Heating and Hotwater Industry Council (HHIC) – boiler sales
- ONS – number of UK homes
- SGN data of domestic meter points from Xoserve
- SGN data postcode areas covered by SGN LDZs
- Office of Budget Responsibility GDP forecasts
- ONS - Economic indices – GDP, GVA, household disposable income, RPI, CPI bank of England Base rate, employment rates
- DESNZ – domestic gas prices

The majority of these data sources are used within the bottom up forecasting. All economic and price data sources are used to analyse and forecast behaviour change via econometric forecasting, although some of the economic data is used in the development of the number of new houses.

How the forecast is built

We initially forecast the impact of existing and new houses separately however once this is complete we include a common element which is behaviour change.

It should be noted we will only include the impact of existing domestic energy policies within the forecasting process. We do not include any policies which have yet to make it into legislation. We do however assess these for potential impact if they fall within the forecasting period via a number of sensitivities.

Existing houses

- Forecasts of energy efficiency in existing houses are created from bottom up analysis of these elements.
  - Boilers
  - Windows
  - Heating controls
  - Insulation (Cavity Wall, Solid Wall, and Loft)
  - Smart Meters & Smart Technology
- Impact of alternative sources of heat
  - Woodburning stoves – replacing gas fires as secondary heating.

New houses

- Gas demand for new houses is established via bottom up analysis of 'Built numbers of new homes' and 'Efficiency of new homes'.
  - Built numbers of new homes – This uses numbers of new domestic connections from Xoserve and DESNZ to establish how many new houses have connected to our network over the last ten years.
  - Energy Efficiency of new homes – Is forecast from bottom up analysis of EPC values of new houses for the last 10 years.

Any legislated changes to government policy for new houses is also incorporated into our analysis.

Behaviour change

Behaviour change or comfort levels, or the temperature which we heat our homes, is established by removing the impact of all energy efficiency elements from historic domestic gas demand.

The analysis establishes the best relationship between historic behaviour change and economic indices. A forecast of economic indices is then applied to this relationship to determine changes in gas demand as result of changes in comfort levels.

The impact of behaviour change is applied once all other assessments are completed for New and Existing houses.

Commercial 73 -732 MWh

This load band consists of:

- small commercial/retail premises
- small industrial.
- Extremely large houses may fall within this band

Forecast method

This sector has relatively consistent year on year demands with limited opportunities to gather large amounts of granular data, making it most suitable for top down econometric forecasting.

Main forecast inputs to econometrics: - (Orange boxes, Purple lines)

Historic data:

- Service Outputs (LDZ specific and UK wide) (from ONS)
- Service outputs per job (from ONS)
- Bank of England Base Rates
- Commercial gas prices (from DESNZ)
- CPI (from ONS)
- Regional employment statistics per sector (from ONS)
- Wholesale Gas Price (National Grid)
- GDP / GVA (from ONS)
- Weather corrected demand data / Demand Data (from Xoserve)

These historic inputs are examined each year to establish the best relationship with past demand prior to beginning the main work of forecasting for this sector.

This pre forecast work determines which elements of the historic data inputs are most suitable for the current year's analysis.

Once the best data set is established we use this and current forecasts from the list below to create the forecast for the sector.
Current data:

- Office of Budget Responsibility - OBR[6] forecasts
  - The main fiscal outputs – GDP, GVA, CPI RPI
- Other independent forecasts and benchmarks where available.
  - Including benchmarking gas price forecasts against DESNZ & National Grid projections
- Regression analysis of recent trends in indices
- Specific knowledge of the areas – such as higher space constraints in SE LDZ reducing headroom for growth compared to other LDZs.
- The output of the analysis is then benchmarked against the following:
- DESNZ - Energy and emissions projections
- Previous history of highest and lowest demands
- Previous history of maximum and minimum annual growth rates.

Industrial >732 MWh

This load band consists of:

- Large commercial
- Industrial sites
- Embedded power stations (those not DM)

The above are sub-categorised into:

- NDM3 (732 - 2196 MWh/yr)
- NDM4 (2196 - 5860 MWh/yr)
- NDM5 (> 5860 MWh/yr)

These sectors are forecast as a single sector then split proportionally by each load band's actual demand.

Forecast method

This sector has relatively consistent year on year demands with limited opportunities for to gather large amounts of granular data, making it most suitable for top down econometric forecasting.

Main Data and Data Sources – (Orange boxes, Green line)

- Regional employment statistics per sector (from ONS)
- Wholesale gas price (from National Grid)
- GDP / GVA (from ONS)
- Weather corrected demand data / Demand Data (from Xoserve)
- Manufacturing output (LDZ specific and UK wide) (from ONS)
- Industrial gas prices (from DESNZ)
- Manufacturing outputs per job (from ONS)
- Manufacturing jobs per region (from ONS)

These historic inputs are examined each year to establish the best relationship with past demand prior to beginning the main work of forecasting for this sector.

[6] OBR is an official independent fiscal watchdog, that produces detailed five-year forecasts for the economy and public finances twice a year.

This pre forecast work determines which elements of the historic data inputs are most suitable for the current year's analysis.

Once the best data set is established we use this and current forecasts from the list below to create the forecast for the sector.

Current data:

- Office of Budget Responsibility - OBR forecasts
  - The main fiscal outputs – GDP, GVA, CPI RPI
- Other independent forecasts and benchmarks where available.
  - Including benchmarking gas price forecasts against DESNZ & National Grid projections
- Regression analysis of recent trends in indices
- Specific knowledge of the areas – such as higher space constraints SE LDZ reducing headroom for growth compared to other LDZs.

The output of the analysis is then benchmarked against the following:

- DESNZ - Energy and emissions projections
- Previous history of highest and lowest demands
- Previous history of maximum and minimum annual growth rates.

DM (Daily metered)

DM sites are the largest customers on our networks.

This load band consists of:

- Very Large Daily Metered customers (VLDMC)
- Large Industrial Sites – with site specific intelligence (non VLDMC)
- Large Industrial Sites – without site specific intelligence (non VLDMC)
- Embedded power stations
  - Large existing embedded power stations (inc VLDMC)
  - Connected sites
  - Accepted quotation sites

Metering a customers demand daily allows us a better understanding of how their gas usage can affect the networks and how we may best accommodate them.

To be daily metered, customers need to be using large volumes of gas or have abnormal patterns of usage. Large volumes and abnormal patterns of gas usage have the potential to disrupt both long- and short-term forecasting as well as in-day capacity management.

For our forecasting processes we split these customers into 3 categories:

- 1 - Specific DM – Large Loads:
  - VLDMC's
  - Large Industrial Sites – with site specific intelligence (non VLDMC)
  - Large existing embedded power stations (inc VLDMC)
- 2 - Specific DM – Embedded generation:
  - Accepted quotation sites
- 3 - Non Specific DM:
  - Large Industrial Sites – without site specific intelligence (non VLDMC)
  - Connected sites (Embedded generation)

These 3 categories are forecast separately, then added together to establish the forecast for the DM sector.

1 - Specific DM - Large Loads (Orange boxes, dashed yellow lines)

This grouping represents the largest loads in the DM sector and are the largest loads on our networks.

These customers are forecast separately because they may potentially have a very large impact on our networks. Where we can, we prefer to use regular stakeholder engagement with as many of these customers as possible. Where this is not possible we use publicly available site specific information which provides insight into reasons for demand variations including potential future changes in demand.

Forecast method

- Bottom up forecasting

Main Data and Data Sources

- Demand data (from Xoserve)
- Site specific customer engagement (from SGN planning processes)
- Current capacity bookings (from SGN planning processes)
- New Connection data (from SGN planning processes)
- Site specific intelligence (from Publically available sources)

Customers within this grouping are forecast individually on a site by site basis. We look for changes in patterns of demand over the previous 10 years both annually and for shorter term periods to determine a suitable level of demand for these sites. These patterns may be outages or periods of higher or lower flows.

We also monitor each sites demand patterns against booked capacity, changes in ownership, site upgrades and reported expansion, changes to energy sources and production lines as triggers for potential changes to future demand.

To improve transparency and understanding of our forecasts we have increased the number of sites within the large loads category beyond the UNC requirement and now forecast over 25 sites. Our increasing customer engagement supports this increase and we now get better information directly from the sites on their views of future demand.

2 - Specific DM – Embedded generation - Accepted quotation sites. (Orange boxes, dashed yellow lines)

This forecast category encompasses all embedded power generation sites with a quote acceptance.

Embedded generation continues to grow with customer enquiries and commitments for new connections increasing each year. Only those sites which have accepted a quotation are included in our forecasts.

Modelling methods

- Bottom up forecasting

Main Data and Data Sources

- Demand Data (from Xoserve)
- Site specific customer engagement (from SGN planning processes)
- Current capacity bookings (from SGN planning processes)
- New connections data (from SGN planning processes)
- Site specific intelligence (from publicly available sources)

These sites are forecast separately because:

- Embedded power generation customers use patterns of demand which require specific attention to ensure we allow for these sites as best we can within the analysis.
- Specifically, a lack of DM data means we need to make a number of assumptions regarding potential demand patterns.
- These customers have the potential to significantly impact network capability and our capacity management.

Each year we use known embedded generation data from the sites which we have daily flow information to create an annual flow pattern for all embedded generation sites.

This results in a diversified level of demand from the booked Standard Offtake Quantity (SOQ) i.e. the actual demand usage of those sites we have demand data for.

We then apply this relationship to the SOQ for all sites to establish a potential annual gas demand level for these customers. As more sites connect we are able to increase our understanding of how these customers use gas. However, our demand forecast of this sector and our ability to manage their daily gas requirements would be greatly improved if they were all DM.

3 - Non Specific DM (Orange boxes, solid yellow lines)

The category represents all DM sites which are not described within the Specific DM category. Whilst these customers levels of demand will be sizeable they will generally have lower annual demands and their operations are less likely to impact our management of our networks than the Specific DM sector.

This group consists of:

- Large Industrial Sites – without site specific intelligence (non VLDMC)
- Connected sites (Embedded generation)

Modelling methods

- Econometric Forecasting

This sector has relatively consistent year on year demands with limited opportunities to gather large amounts of granular data, making it most suitable for top down econometric forecasting.

Main Data and Data Sources

- Regional employment statistics per sector (from ONS)
- Wholesale Gas Price (from National Grid)
- GDP / GVA (from ONS)
- Weather corrected demand data / Demand Data (from Xoserve)
- Manufacturing output (LDZ specific and UK wide) (from ONS)
- Industrial gas prices (from DESNZ)
- Manufacturing outputs per job (from ONS)
- Manufacturing jobs per region (from ONS)
- Site specific customer engagement (from SGN planning processes)
- Current capacity bookings (from SGN planning processes)
- New connection data (from SGN planning processes)
- Site specific intelligence (from Publically available sources)

The historic inputs are examined each year to establish the best relationship with past demand prior to beginning the main work of forecasting for this sector.

This pre forecast work determines which elements of the historic data inputs are most suitable for the current year's analysis.

Once the best data set is established we use this and current forecasts from the list below to create the forecast for the sector.

Current data:

- Office of Budget Responsibility - OBR forecasts
  - The main fiscal outputs – GDP, GVA, CPI RPI
- Other independent forecasts and benchmarks where available.
  - Including benchmarking gas price forecasts against DESNZ & National Grid projections
- Regression analysis of recent trends in indices
- LDZ specific considerations as a result of in variations in policy between central and devolved governments.

The output of the analysis is then benchmarked against the following:

- DESNZ - Energy and emissions projections
- Previous history of highest and lowest demands
- Previous history of maximum and minimum annual growth rates.

Shrinkage

Shrinkage represents all unmetered gas. [7]

It includes:

- Own use gas
- Theft of gas
- Leakage

Forecast method

This sector uses data supplied by National Grid.

Main Data and Data Sources

- National Grid forecast

Overview

This data is part of our annual engagement and information exchange process with National Grid. Shrinkage is a very small proportion of our total forecast.

1 in 20 Peak demand

Once we have completed the Annual demand forecast, the analysis undergoes further processing to arrive at the 1 in 20 peak demand for the forecast period. The process used is dependent on the type of demand. See

[7] Shrinkage Leakage Model Review 2020_Final Report_V4 (1).pdf (gasgovernance.co.uk)

Figure 1: 1 in 20 peak processes.

We establish the peak demand for each demand type then combine these to produce the peak demand for each LDZ.

The different groups of peak demand forecasts created separately are:

- NDM demand – via NDM Demand Assessment is a combination of
  - 1 in 20 CWV process - This uses the 1 in 20 CWV (Composite Weather Variable) to derive 1 in 20 peak demand for NDM sector.
  - Peakiness assessment - This is a separate element for domestic peak
- DM demand split into these categories
  - Specific DM peak demand assessment – Peak demand from our Large Loads and new embedded generation
  - Non Specific DM peak demand assessment – Daily metered demand that is not our Large Loads or new embedded – uses Peak load factor assessment to establish peak from this element.

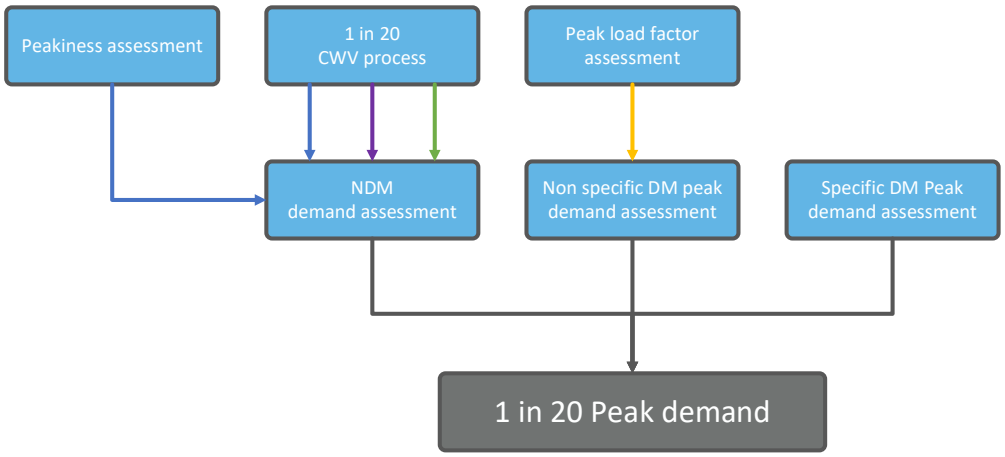


Figure 1: 1 in 20 peak processes

1 in 20 CWV process

Non daily metered demand (NDM) is weather sensitive, this sensitivity can be measured and forecast. Weather / demand curves are established to create a relationship between historic demand and weather, from this we input the 1 in 20 peak weather conditions to establish the 1 in 20 peak demand for the sector. See **Defining the Peak 1 in 20** below for more detail..

This process is carried out on behalf of the UK gas industry via the methodology used by Xoserve in the CWV process. We use the 1 in 20 CWV published by Xoserve to establish our 1 in 20 peak. This is

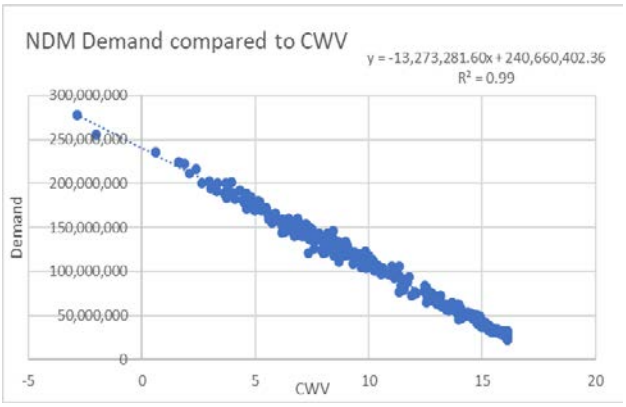
detailed in a process derived from the original gas demand methodology used in industry since 1987 - British Gas TD76 methodology [8].

It should be noted this methodology is carried out using non holiday days and days of the week Monday to Thursday in line with the Demand Estimation Sub Committee (DESC) [9], Xoserve methodology and the basis of TD76. The reason for this is holidays and those days of the week, Friday to Sunday, generally have lower demands due to reduced consumption from commercial and small industrial sites as some close or reduce output at these times.

Our analysis is also carried out using the same principles for our own internal demand statements as part of our planning processes. In addition we also carry out separate analysis to establish the variations in demands for holiday periods, these are then applied to the demand statements.

Our modelling echoes the DESC, Xoserve methodology calibrated in line with the most recent cold weather event available. The latest weather period currently being the cold weather during Winter 2017/18, commonly referred to as the 'beast from the east'.

The weather demand curves are established from actual demands in the 2017/18 year. The CWV for each day is compared to the total NDM demand on each day. These are then plotted over the year to establish a linear best fit curve. As Xoserve and DESC do a lot of work to align CWV with a linear curve, the linear relationship is very good, even for just this one year. It has an R^2 value of 0.99.



The best fit line is then extended to establish the demand at 1 in 20 CWV provided by Xoserve via DESC to return the 1 in 20 peak.

As the 1 in 20 peak is from the demand in 2017/18, the process returns the 1 in 20 for that year as a calibration point.

In line with Xoserve established methodology we now assume; how demand changes with CWV remains the same for the forecast but the underlying demand changes with annuals. Therefore, a percentage change in annuals returns the same percent change in peaks.

The demand changes from 2018 are now established from actual annual demand and forecast annual changes.

As mentioned earlier, the reason we use 2018 is it was the last period of extreme cold weather. The most recent cold weather period prior to 2018 was in 2011/12.

[8] TEMPERATURE/DEMAND METHODOLOGY FOR PLANNING PURPOSES THE TD76 CODE OF PRACTICE (gasgovernance.co.uk)

[9] Gas Demand Estimation | Xoserve

Peakiness assessment

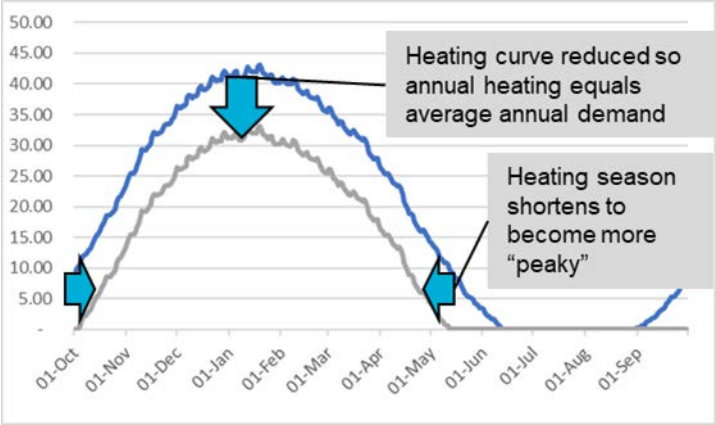
The Peakiness assessment is a forecast element specific to our processes which we apply to domestic peak demand to further enhance the accuracy of our assessment of 'heat' in the domestic demand sector.

The domestic sector is the most weather sensitive of all demand sectors. If thermal efficiency of our homes improve or comfort levels reduce annual demand reduces.

Crucially, this also has the impact of reducing the heating season, the number of days in the year when we choose to heat our homes, due to the fact comfort level reductions or thermal efficiency improvements both result in heating not being used until lower outside temperatures occur.

The impact of this is annual demand reduces by a proportion, but peak demand reduces by a lower proportion making demand "peakier" which we are referring to as 'peakiness'.

We model this using daily domestic demand to enable us to validate the theory and quantify its impact. Our bottom up domestic modelling enables us to model just the space heating element of daily gas demand for the year establishing the impact the change in peakiness has on peak gas demand.



As a result, we have established a small but notable impact on changes to peak from domestic demand. Our analysis concludes peak domestic demand reduces by around 2/3 of any annual demand reduction forecast, i.e. if annual demand reduces by 3%, peak demand will reduce by about 2%. Whilst we do not expect the factors impacting on the length of the heating season to change we will review them yearly to ensure they remain valid.

NDM demand assessment

The result of the **1 in 20 CWV process** and the impact of the domestic **Peakiness assessment** is the NDM demand assessment creating the final 1 in 20 Peak demand forecast for the whole NDM sector.

Peak load factor assessment

The peak load factor (PLF) assessment is applied to the Non-Specific DM sector i.e. the DM demand which is not Large Loads or accepted quotation embedded generation.

It is expressed as the daily average demand as a percentage of the peak day demand.

- If the PLF is 50%, peak demand is twice the average daily demand.
- If the PLF is 25%, peak demand is four times the average daily demand.

The lower the PLF the "peakier" demand is.

This process establishes the peak for the Non Specific DM sector.

- The analysis examines the daily flows of the DM sector as a whole once the Large Loads are removed.
- Looking at the last ten years of daily flows.
- Establishing if there have been any significant changes in flow patterns historically.
  - We discount any data for those years prior to significant changes in flow patterns. These patterns are generally due to either one or a number of this type of customer changing their behaviour.
- In all situations at least 7 years PLFs are considered although most recent years are more relevant to the analysis.

The PLF is established from the analysis and specific site intelligence referencing new connections over the previous few years. If flow patterns are consistent we will use these, if not we will arrive at a suitable PLF which best reflects forecasted flow patterns.

Non-specific DM peak demand assessment

Once the PLF is established we divide the average Non- specific DM demand by the PLF to give the 1 in 20 peak for this element of DM demand.

Specific DM Peak demand assessment

This is split into these 2 categories with the Peak demand being created separately then added together later in the process.

These shall be discussed separately.

- Specific DM - New embedded generation
- Specific DM - Large Loads

You can see how this split occurs from The assessment of large load and embedded generation activity on the diagram in Appendix A

Specific DM - New embedded generation

In recent years there have been a notable increase in small, embedded gas fired generators connecting to our networks. This has been as a result of the need for gas fired generation to backup increasing renewable supply especially in the context of electricity generation which has seen significantly decreasing coal fired generation.

These sites are incentivised in the Electricity Market Reform (EMR) processes via the Capacity Mechanism (CM) auctions. The CM is there to ensure there is enough generation to cover winter electricity peaks, paying generators to be available at these times.

We are responding to a high level of enquiries with an increasing number of these progressing to a connection. All LDZs have flexible generators who have committed to capacity with us in the next two years. These sites alone have been included in our forecasts.

These customers by their nature are more variable in supply than larger existing power generators as they do not operate as a "baseload" or steady underlying generation capacity but as flexible backup called upon to react at short notice to support the electricity system as required. As a result, their demand patterns are hard to predict.

Our analysis looks at the flow patterns of the sites we have DM data for on a diversified basis. We then apply these patterns to the new embedded generation customers also on a diversified basis. We do this in lieu of detailed DM data from these customers.

For those sites we have data on we establish their diversified peak flow. We then compare this peak flow to the total of theses sites' SOQs to establish a Peak Load Factor (PLF). We then apply this PLF factor to the SOQs of those sites due to connect in the first two years of the forecast period to arrive at a potential Peak demand for these customers.

Please note this is only to establish the impact on peak of new embedded generation. Existing embedded generation is included in the diversified analysis for the **Non-specific DM peak demand assessment**.

Specific DM - Large Loads

If we were to use all of these customers potential peak demand within our forecast it would result in overly high booked capacity for this sector. As a result, we treat these customer in two ways.

As part of this analysis, we review annually:

- Whether to use the SOQ for each site or the highest flow seen in recent years, considering any significant changes to a sites flow patterns. Those which have operated at or near their SOQ will be included using that rate.
- Those which are operating below their SOQ will be analysed with diversification of their peak and are forecast as a group. This methodology is described in subsection **Non-specific DM peak demand assessment.**
- We also assess annually if the highest flows are around periods of coldest weather. If it isn't, a site does not have its peak forecast separately but as group with the remainder of the DM sector. This methodology is described in **Non-specific DM peak demand assessment**.

Primary data sources

This part of our forecast methodology shows the data sources we use throughout the forecasting process. We have grouped into the Domestic and Non Domestic demand sectors and included links to the source of the data. You may find it useful to refer to Appendix A as you read these inputs as this will help you understand how they fit into the bigger picture of the analysis.

Please be aware each element is assessed annually to ensure its relevance to the planning period therefore we may not use all the data sources in every planning year.

Domestic data inputs

The following details the inputs we use for our assessment of domestic demand. Inputs are selected each year for suitability, as a result some may not be used in a particular year.

Housing surveys – Scottish Government and Ministry of Housing, Communities & Local Government (MHCLG)

Source:

English Housing Survey - GOV.UK (www.gov.uk)
Scottish Household Survey: publications - gov.scot (www.gov.scot)

Demand sector:

Domestic 0 -73 MWh

Relevance:

The assessment of energy efficiency for new and existing domestic housing

Type of forecast:

Bottom up analysis

Elements of data from this source which we use

- Boilers - used within Energy efficiency
  Historical boiler efficiencies are established from the English and Scottish housing and household surveys for the last 10 years to forecast ongoing efficiency improvements. This is also benchmarked against the UK boiler sales figures we get via Hot Water and Heating Council (HHIC).
- Windows - used within Energy efficiency
  MHCLG English Housing Surveys and Scottish Housing Survey show the extent of double glazing in the existing housing population.
- Heating controls - used within Energy efficiency
  The numbers for Thermostatic Radiator Valves (TRVs) are established from the English Housing surveys to determine the growth in TRVs in the existing housing population.

Housing data - MHCLG

Source:

Housing supply: net additional dwellings - GOV.UK (www.gov.uk)

Demand sector:

Domestic 0 -73 MWh

Relevance:

The assessment of number for new homes

Type of forecast:

Bottom up analysis

Elements of data from this source which we use

- Built numbers of new homes – used within New homes
  Data on housing numbers from Housing Surveys are supplemented with nationwide net additional dwellings data published by MHCLG. This is further corroborated using the number of New homes from DESNZ postcode data and Connections data from Xoserve.

Connections data – Xoserve

Source:
Annual data share from Xoserve

Demand sector:
Domestic 0 -73 MWh

Relevance:
The assessment of numbers for new and existing homes

Type of forecast:
Bottom up analysis

Elements of data from this source which we use

- Built numbers of new homes – used within New homes
  Connections data from Xoserve. This is further corroborated using the number of New homes from DESNZ postcode data and housing numbers from Housing Surveys are supplemented with nationwide net additional dwellings data published by MHCLG.

Postcode data – DESNZ

Source:
Sub-national gas consumption data - GOV.UK (www.gov.uk)

Demand sector:
Domestic 0 -73 MWh

Relevance:
The assessment of numbers for new and existing homes

Type of forecast:
Bottom up analysis

Elements of data from this source which we use

- Numbers of new houses are determined via changes in numbers of domestic gas meters per postcode on an LDZ basis.
- Corroborated by Connection data from Xoserve and Housing data from MHCLG

Hot water and Heating Industry Council (HHIC)

Source:
Data received directly from HHIC

Demand:
Domestic 0 -73 MWh

Relevance:
The assessment of Energy efficiency (existing homes)

Type of forecast:
Bottom up analysis

Elements of data from this source which we use

- Boilers
  National Boilers sales and boiler population data by efficiency band from HHIC are used to corroborate the main boiler forecast establish from the Housing Surveys data.

HETAS data - DEFRA

Source:

Wood burning impact assessment (publishing.service.gov.uk)

Demand sector:

Domestic 0 -73 MWh

Relevance:

The assessment of secondary heating in the existing domestic housing

Type of forecast:

Bottom up analysis

Elements of data from this source which we use

- Number of Wood burning stoves installed in UK for last ten years.

Energy Consumption UK (ECUK) – DESNZ

Source:

Energy consumption in the UK 2020 - GOV.UK (www.gov.uk)

Demand sector

Domestic 0 -73 MWh

Relevance

The assessment of Energy efficiency (existing homes)

Type of forecast

Bottom up analysis

Elements of data from this source which we use

- Boilers - used within Energy efficiency
  Corroborative data used to validate MHCLG housing survey information.
- Windows - used within Energy efficiency
  Corroborative data used to validate MHCLG housing survey information.
- Insulation (All types)
  Corroborative data used to validate Energy Company Obligation (ECO) information from DESNZ.

Energy Company Obligation (ECO) – DESNZ

Source:

Household Energy Efficiency Statistics - GOV.UK (www.gov.uk)

Demand sector:

Domestic 0 -73 MWh

Relevance:

The assessment of Energy efficiency (existing homes)

Type of forecast:

Bottom up analysis

Elements of data from this source which we use

- Solid Wall insulation (SWI)
  - Number of installations per year per NUTS1 region converted to number of installations per LDZ.
  - Used within the analysis for ECO installations along with Cavity Wall Insulation (CWI) and Loft Insulation (IL) numbers.
  - The total yearly number of installations are established from ECUK and English and Scottish Household Survey data.
- Cavity Wall insulation (CWI)
  - Number in installations per year per NUTS1 region converted to number of installations per LDZ.
  - Used within the analysis for ECO installations along with SWI and LI numbers.

- The total yearly number of installations are established from ECUK and English and Scottish Household Survey data per LDZ.

- Loft insulation (LI)
  - Number of installations per year per NUTS1 region converted to number of installations per LDZ.
  - Used within the analysis for ECO installations along with SW and CWI numbers

Smart stats

Sources:

Smart meter statistics - GOV.UK (www.gov.uk)
Almost a quarter of Britons now own one or more smart home devices | YouGov

Demand sector:

Domestic 0 -73 MWh

Relevance:

The assessment of energy efficiency of existing domestic housing

Type of forecast:

Bottom up analysis

Elements of data from this source which we use

- Smart Meters
  UK government's quarterly reports to determine numbers of smart meters installed
- Smart Thermostats
  The numbers and growth of smart thermostats in recent years has come from research from latest reports on smart numbers, such as YouGov's Smart Homes Report. For the impact on gas demand, we have used DESNZ impact assessment.

Wholesale gas price

Sources:

Transmission operational data | National Gas
Future Energy Scenarios | National Grid ESO [10]

Demand sector:

Domestic 0 -73 MWh

Relevance:

Assessment of Comfort Levels for new and existing houses

Type of forecast:

Top down econometric forecasting

Elements of data from this source which we use

- Wholesale Gas Price (System Average Price) SAP
  Average yearly SAP established from National Grid FES publications and National Grid Transmission operation data, for latest year. Inputs to the comfort levels forecast.

Weather corrected demand

Source:

From SGNs internal WCP database. This is updated regularly by Xoserve demand data, directly with Xoserve.

[10] Used to determine historic gas price only

Demand sector:
Domestic 0 -73 MWh
Relevance:
All areas of domestic demand
Type of forecast:
Top down econometric and bottom up analysis
Elements of data from this source which we use

- Weather corrected demand
  Data is from Xoserve held in our internal database. The weather correction methodology is as per the industry standard processes set out by the Demand Estimation Sub Committee (DESC).

Demand data – Xoserve

Source:
From our internal WCP database. This is updated regularly by Xoserve demand data, directly with Xoserve.
Demand sector:
Domestic 0 -73 MWh
Relevance:
Peakiness Assessment, 1 in 20 CWV, NDM Demand Assessment
Type of forecast:
Top down and bottom up analysis
Elements of data from this source which we use

- Daily Demands – Establishing flow patterns for weather demand relationship to calculate CWV demand relationship, peak demand and peakiness assessment

Income

Source:
https://www.ons.gov.uk/people population and community
Demand sector:
Domestic 0 -73 MWh
Relevance:
Assessment of Comfort Levels for behaviour change
Type of forecast:
Top down econometric forecasting
Elements of data from this source which we use

- HHDI – Household Disposable Income

Inputs to the comfort levels forecast to establish best economic relationship with demand.

Jobs

Source:
https://www.ons.gov.uk/employment and labour market
Demand sector:
Domestic 0 -73 MWh
Relevance:
Assessment of Comfort Levels for behaviour change
Type of forecast:
Top down econometric forecasting
Elements of data from this source which we use

- Total Jobs per region

Established from ONS data mapped to LDZs via NUTS1 / LDZ mapping.

Gross Domestic Profit (GDP) Gross Value Added (GVA)

Source
https://www.ons.gov.uk/economy/gross domestic product

Demand sector:
Domestic 0 -73 MWh

Relevance:
Assessment of Comfort Levels for behaviour change

Type of forecast:
Top down econometric forecasting

Elements of data from this source which we use

- GDP and GVA
  Data is from the ONS establishing a high level historical relationship of GDP to GVA. This is then applied to the Office of Budget Responsibility forecast.

EPC ratings

Sources:
https://www.gov.uk/government/statistical-data-sets/energy-performance
https://www.gov.scot/collections/scottish-household-survey/
https://www.gov.uk/government/statistical-data-sets/live-tables-on-energy-performance

Demand sector:
Domestic 0 -73 MWh

Relevance:
The assessment of energy efficiency of new domestic housing

Type of forecast:
Bottom up analysis

Elements of data from this source which we use

- SAP levels existing houses
  Average SAP levels per area established from English and Scottish data sources. These are converted to Average SAP levels of houses per LDZ via NUTS1 areas conversion.
- SAP levels new houses
  Average SAP levels per area established from English and Scottish data sources. These are converted to Average SAP levels of houses per LDZ via NUTS1 areas conversion. The changes between new and existing houses SAP levels established and applied to new houses as proportional change in gas demand per new houses built, per LDZ.

Non Domestic demand inputs

The following details the inputs we use for our assessment of Non domestic demand. Inputs are selected each year for suitability, as a result some may not be used in a particular year.

Services outputs (LDZ specific and UK wide) - ONS

Source:
https://www.ons.gov.uk/economy/economic out put and productivity

Demand sector:
Commercial 73-732 MWh (NDM)

Relevance:
Used in determining econometric relationship

Type of forecast:
Top down econometric forecasting

Elements of data from this source which we use
Used in the assessment of overall commercial demand

Service outputs per job - ONS

Source:
https://www.ons.gov.uk/employment and labour market

Demand sector
Commercial 73-732 MWh (NDM)

Relevance
Used in determining econometric relationship

Type of forecast:
Top down econometric forecasting

Elements of data from this source which we use
Used in the assessment of overall commercial demand

Bank of England base rates

Source:
https://www.bankofengland.co.uk/boeapps/database/Bank-Rate.asp

Demand sector:
Commercial 73-732 MWh (NDM)

Relevance:
Used in determining econometric relationship

Type of forecast:
Top down econometric forecasting

Elements of data from this source which we use
Used in the assessment of overall commercial demand

Consumer Price Index (CPI) - ONS

Source:
https://www.ons.gov.uk/economy/inflationandpriceindices/timeseries/d7g7/mm23

Demand sector:
Commercial 73-732 MWh (NDM)

Relevance:
Used in determining econometric relationship

Type of forecast:

Top down econometric forecasting

Elements of data from this source which we use

Used in the assessment of overall commercial demand

Regional employment statistics - ONS

Source:

https://www.ons.gov.uk/employment and labour market

Demand sector:

Commercial 73-732 MWh (NDM), Industrial >732MWH (NDM) & DM

Relevance:

Used in determining econometric relationship

Type of forecast:

Top down econometric forecasting

Elements of data from this source which we use

Used in the assessment of overall commercial, Industrial >732MWH (NDM) & DM demand

Commercial gas price - DESNZ

Source:

https://www.gov.uk/government/statistical-data-sets

Demand sector:

Commercial 73-732 MWh (NDM)

Relevance:

Used in determining econometric relationship

Type of forecast:

Top down econometric forecasting

Elements of data from this source which we use

Used in the assessment of overall commercial demand

Wholesale gas price

Sources:

Transmission operational data | National Gas

Future Energy Scenarios | National Grid ESO [11]

Demand sector:

Commercial 73-732 MWh (NDM), Industrial >732MWH (NDM) & DM

Relevance:

Used in determining econometric relationship

Type of forecast:

Top down econometric forecast

Elements of data from this source which we use

- Wholesale Gas Price (System Average Price) SAP

[11] Used to determine historic gas price only

Average yearly SAP established from National Grid FES publications and National Grid Transmission operation data, for latest year.

Use to establish best economic relationship with demand in the assessment of overall commercial, Industrial >732MWH (NDM) & DM demand.

Industrial gas price - DESNZ

Source:

https://www.gov.uk/government/statistical-data-sets

Relevance:

Used in determining econometric relationship

Type of forecast:

Econometric forecast

Relevance:

Industrial >732MWH (NDM) & DM

Type of forecast:

Top down econometric forecasting

Elements of data from this source which we use

Used for Industrial >732MWH (NDM) & DM demand

Weather corrected demand - Xoserve

Source:

Internal WCP database / Xoserve

Demand sector:

Commercial 73-732 MWh (NDM), Industrial >732MWH (NDM) & DM

Relevance:

All areas of non domestic demand

Type of forecast:

Top down econometric and bottom up analysis.

Elements of data from this source which we use

- Weather corrected demand
  Data is from Xoserve held in our internal database. The weather correction methodology is as per the industry standard processes set out by the Demand Estimation Sub Committee (DESC).

Demand data – Xoserve

Source:

Internal WCP database / Xoserve

Demand sector:

Commercial 73-732 MWh (NDM), Industrial >732MWH (NDM) & DM

Relevance:

1 in 20 CWV, all areas of non domestic demand

Type of forecast:

Top down and bottom up analysis

Elements of data from this source which we use

- Daily Demands - Commercial 73-732 MWh (NDM), Industrial >732MWH (NDM) - Establishing flow patterns to help establish weather demand relationship to calculate peak demand
- Daily Demands - Site loads for specific large loads helps establish daily peak and annual loads for the largest loads.

Manufacturing output (LDZ specific and UK wide) – ONS

Sources:
https://www.ons.gov.uk/economy/economicoutputandproductivity/output
https://www.ons.gov.uk/economy/economicoutputandproductivity/productivitymeasures/datasets/industrybyregionlabourproductivity

Demand sector:
Industrial >732MWH (NDM) & DM

Relevance:
Used in determining econometric relationship

Type of forecast:
Top down econometric forecasting

Elements of data from this source which we use
Used for overall Industrial >732MWH (NDM) & DM demand

Manufacturing output per job – ONS

Source:
https://www.ons.gov.uk/economy/economicoutputandproductivity/productivitymeasures/datasets/industrybyregionlabourproductivity

Demand:
Industrial >732MWH (NDM) & DM

Relevance:
Used in determining econometric relationship

Type of forecast:
Top down econometric forecasting

Elements of data from this source which we use
Used for overall Industrial >732MWH (NDM) & DM demand

Site specific customer engagement

Source:
Site specific customer engagement (from our planning processes)

Demand sector:
DM sector and New Embedded generation.

Relevance:
Used in assessment of large load and embedded generation activity

Type of forecast:
Bottom up analysis

Elements of data from this source which we use

- Specific conversations with sites and sites' owners about flow estimated patterns are incorporated into bottom up peak and annual elements of non domestic forecast.

Current capacity bookings

Source:
Internal demand management (from our planning processes)

Demand sector:
DM sector and New Embedded generation.

Relevance:
Assessment of large load and embedded generation activity

Type of forecast:
Bottom up analysis

Elements of data from this source which we use

- Capacity bookings for Large Loads
- Capacity bookings for New Embedded Generation

New connections data

Source:

Internal connections workload management (from our planning processes)

Demand sector:

DM sector and New Embedded generation. (Some new embedded generation is DM and some is NDM)

Relevance:

Assessment of large load and embedded generation activity

Type of forecast:

Bottom up analysis

Elements of data from this source which we use

- New loads connected incorporating into forecast.

Assessment of large loads

Source:

Internal demand management workload (from our planning processes)

Demand sector:

DM Large Loads

Relevance:

Used for Large Loads forecast annuals and peaks

Type of forecast:

Bottom up analysis

Elements of data from this source which we use

- Changes in Daily and annual flows from each year's data

Embedded generation activity

Source:

Internal demand management processes (from our planning processes)

Demand sector:

Used for new Embedded Generation forecast annuals and peaks

Relevance:

Assessment of large load and embedded generation activity

Type of forecast:

Bottom up analysis

Elements of data from this source which we use

- Capacity bookings – New Embedded Generation

Appendix A.Forecasting methodology overview