Annual Load Profile

Demand Estimation
March 2024

Glossary of Terms

- Non-Daily Metered (NDM) – of the c.25m Gas Supply Meter Points the majority are Non-Daily Metered
- Daily Metered (DM) – Supply Meter Points that are read Daily - usually very high consumption
- Annual Quantity (AQ) – An estimate of the amount of gas (in kWh) that a Supply Meter Point will use in the coming year under seasonal normal weather conditions
- End User Category (EUC) – Categorise gas consumers by their different usage patterns. Each NDM supply point belongs to an EUC.
  - For Lower consumption Bands (0 to 293 MWh pa) this includes separate EUCs for Domestic and Non-Domestic and Pre-Payment and Non-Prepayment meters
  - Higher Consumption Bands (>293 MWh pa) are grouped into 4 separate EUCs based on their Winter/Annual Consumption Ratio (WAR) which provides an indication of the consumption seasonality
- Local Distribution Zone (LDZ) - Each LDZ represents a geographical area of the country. Each LDZ is 'owned' by a specific gas transporter and determine the area for which they distribute gas.
  Here is a helpful LDZ Map.

Annual Load Profile – What is it ?

- An Annual Load Profile (ALP) is one of the key outputs from the Demand Estimation process, as described in Section H of UNC:

*The "**Annual Load Profile**" for an End User Category for a Day is a factor representing the Seasonal Normal Demand of the End User Category for that Day as a proportion of the average Seasonal Normal Demand (for all Days of the Gas Year) of the End User Category.*

- So, the Annual Load Profile is a daily value which represents typically how each LDZ/EUC combination is likely to consume gas, assuming average weather, for the Gas Year
- Each End User Category (EUC) will have its own set of daily Annual Load Profiles
- The daily value is a ratio and typically ranges from 0.04 to 2.5 across all EUC combinations. The bigger the ALP value the more Seasonal Normal Demand is expected on the day
- The sum of all ALPs for each EUC will always add up to 365, unless it is a Leap Year in which case they will sum to 366

Annual Load Profile – Why is it needed? (1 of 2)

- The Annual Load Profile's primary function is a key parameter in the formula which is used to calculate the bottom-up estimate of daily demand for the NDM population in Gemini

- The NDM Supply Meter Point Demand formula is:

$$\text{NDM Demand}_t = (AQ/365) * \mathbf{ALP}_t * (1 + (DAF_t * WCF_t))$$

For each day 't' where: DAF = Daily Adjustment Factor and WCF = Weather Correction Factor

- The ALP provides a view of Seasonal Normal Demand for the EUC prior to Weather Correction

- The NDM demand formula is required for NDM Nomination and Allocation processes:
  - NDM Nominations are forecasts of demand **ahead** of the Gas Day
  - NDM Allocations are estimates of demand **after** the Gas Day

- The formula is applied each day to each LDZ/EUC combination

Annual Load Profile – Why is it needed? (2 of 2)

- The Annual Load Profile is also used in UK Link for AQ Calculation and Read Estimation processes

- The NDM AQ formula is:

AQ = Metered Quantity * 365 / Sum [**ALP** * (1 + (DAF * WCF))]

  - This formula allows for differing time periods between meter reads and corrects for the weather conditions over the periods to provide a 'Seasonal Normal' AQ
  - The weather correction is performed using the Weather Adjusted Annual Load Profile (WAALP) in this part of the formula Sum [**ALP** * (1 + (DAF * WCF))]

- The Read Estimation processes in UK Link also use the WAALP as a means to calculate estimated meter readings for a relevant period

Timetable

Each August a set of industry approved Annual Load Profiles are required for each End User Category for the new Gas Year

Gemini and UK Link are updated in readiness for calculating NDM Demand and Rolling AQ respectively for the new Gas Year

Annual Load Profile – How is it calculated?

- The Annual Load Profile for each EUC is calculated as:

$$ALP_t = \frac{\text{Seasonal Normal Demand for the EUC } (SNDE)_t}{\left(\frac{\text{Sum}(SNDE)_t \text{ for the Gas Year}}{\text{The number of days in the Gas Year}}\right)}$$

where:

- $SNDE_t$ is the Seasonal Normal Demand for the EUC for Day 't'

- Estimates of Seasonal Normal Demand are derived from EUC Demand Models, another key output from the annual Demand Estimation process

- The Demand Estimation Sub Committee (DESC) is responsible for the production of the Annual Load Profiles each year, including any changes to the formula which is set out in the UNC document: "NDM Demand Estimation Methodology" – see final slide for link

Annual Load Profile Example

EUC: WM:2301BND
Gas Day: 19 June 2024:
ALP: 0.310932

$$ALP = \frac{5{,}102.5}{(6{,}006{,}194/366)} = 0.310932$$

where:

- $SNDE_t$ for 19 June 2024 is 5,102.5
- Total Seasonal Normal Demand for the Gas Year is 6,006,194
- There are 366 day in the Gas Year (as 2024 is a leap year)

EUC Demand Model – Background

- The derivation of the EUC Demand Model is the responsibility of DESC
- Each year DESC sets out the principles to be followed in its 'Modelling Approach' document
- Typically, EUC Demand Models are based on 3 individual years of analysis of daily demand data collected from a sample of consumers within the relevant EUC
- The behaviours learned from the 3 years are then averaged or 'smoothed' in order to produce an EUC Demand Model which provides year on year stability, by minimising impacts of single warmer or colder years
- Seasonal Normal Demand (SNDt) from the EUC Demand Model is calculated as follows:

$$SND_t = P_t * (C_1 + C_2 * SNCWV_t)$$

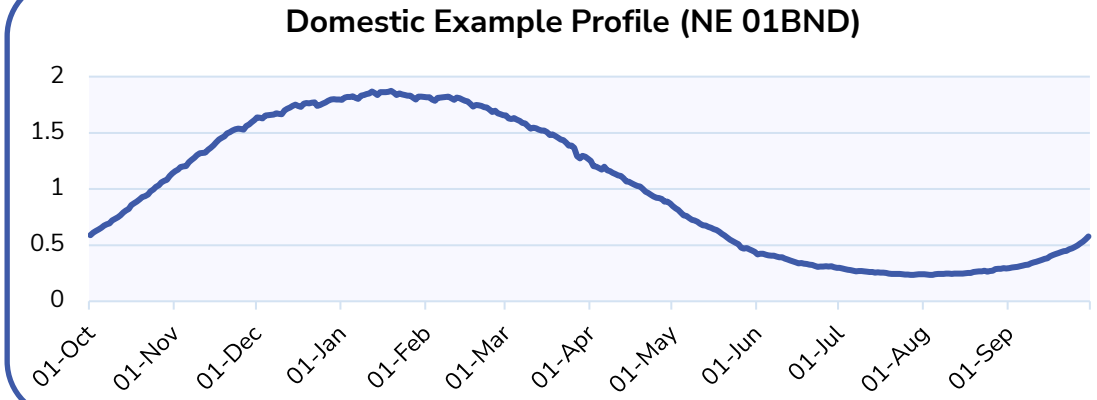
- where:

C_1 is the constant derived from the smoothed EUC Demand Model
C_2 is the weather sensitivity from the smoothed EUC Demand Model
$SNCWV_t$ is the seasonal normal value of the CWV on day$_t$
P_t is a factor which represents weekend and holiday effects

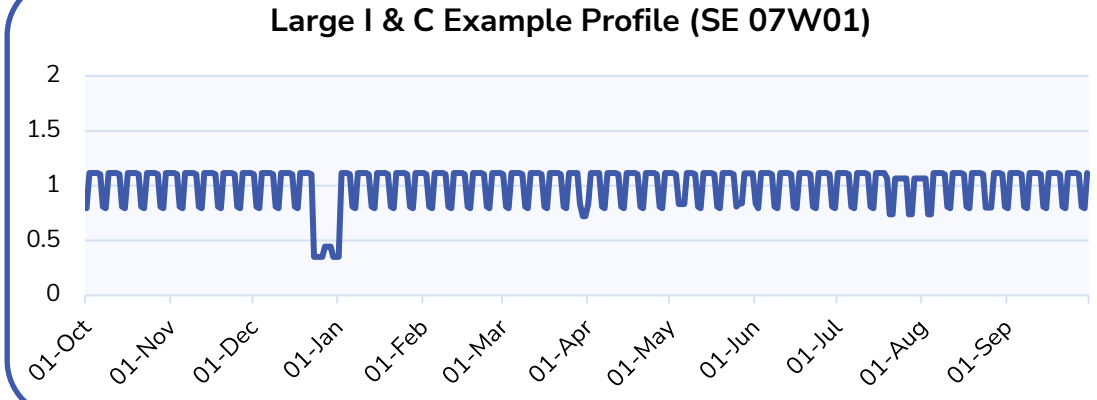
More Information

For more information on the Demand Models see the Demand Estimation home page here

Annual Load Profile – How do they differ?



- Little variance between weekdays and weekends
- Profile driven by heating loads; high in the winter and low in the summer
- Small changes in forecast during holiday periods



- Significant drop in consumption for weekends compared to weekdays
- Flat across the year, with no seasonal variance
- Holiday Periods reflect reduction in usage, particularly over Christmas and New Year

Annual Load Profile – Why do the values change?

- Each Gas Year DESC will produce a revised set of Annual Load Profiles which have been derived from the latest set of EUC Demand Models

- As part of the annual process, the following factors can result in changes to the Annual Load Profiles (when compared to the previous year):

  - DESC may change the Demand Modelling principles

  - New individual single year model will replace oldest year model which will naturally mean different sample sites (2 of the 3 years used in smoothing will remain the same)

  - Gas Industry weather history will have ‘moved on’ by one year

  - An update to the Seasonal Normal basis (normally every 5 years)

- The approach of applying model smoothing minimises year on year volatility

Annual Load Profile – Where to find more information

- Uniform Network Code (UNC): Section H (Paragraph 2.3: Annual Load Profile)
- UNC Related Document: NDM Demand Estimation Methodology (Paragraph 3.4)
- NDM Algorithms Booklet - Section 9: UK Link Docs: Folder 18. NDM Profiling and Capacity Estimation Algorithms / Gas Year / 4 NDM Algorithms Booklet
- Demand Estimation Sub Committee (DESC): Terms of Reference
- Annual Load Profiles for current Gas Year available on the Demand Estimation page of Xoserve.com. Select Download "Latest derived factors" from right hand side of page. File name begins ALPDAFyy and also contains the Daily Adjustment Factors (DAFs)
- Please raise any questions on Annual Load Profiles via the Help Centre on Xoserve.com here and your query will be directed to the CDSP's Demand Estimation Team