nationalgridSO

Winter Severity Report
Winter 2018/19

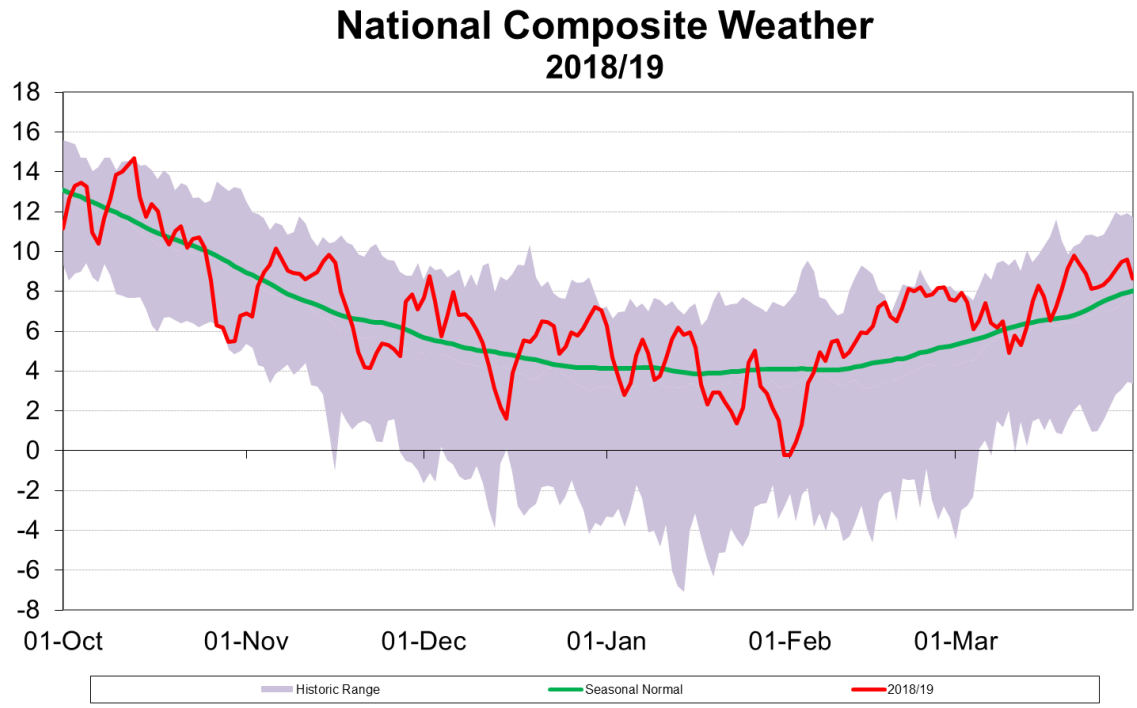
The **2018/19 winter severity**, based on the 59 winters starting from October 1960, was deemed to be **1 in 14 warm** for the 6-month period from October to March and **1 in 11 warm** for the 3-month period from December to February. This was the **5th** warmest October to March in the last 59 years.

The 6-month period from October to March has traditionally been used to calculate winter severity for gas demand purposes. BEIS and the Met Office describe winter severity in terms of the 3 months from December to February so the severities for both periods are shown in this document.

The 2018/19 coldest day was **1 in 3 warm**. The coldest day was **1st February 2019** with a national composite weather variable (CWV) of **-0.23**.

The statistics in this document are based on composite weather not temperature. Composite weather is linearly related to Non-Daily Metered (NDM) gas demand and provides a good indicator of the variation in weather-sensitive gas demand. Figure 1 compares the national composite weather variable for 2018/19 with a climate change adjusted seasonal normal, and maximum and minimum values from the previous winters.

Figure 1 – October 2018 to March 2019 national composite weather



Introduction

Weather severity is calculated using the CWV. The composite weather variable is a function of actual temperature, wind speed, effective temperature and seasonal normal effective temperature. It is defined such that a linear relationship applies between Monday to Thursday (non-holiday) daily demand in the LDZ and the composite weather variable.

Weather severity statistics can change slightly from year to year for the following reasons:

1. Changes in the historical period used to calculate the statistics by one year each year.
2. Changes to weather stations
3. Changes to the CWV parameters

CWVs are unique to each LDZ and should not be compared across LDZs. The National CWV is a weighted average of the individual CWVs.

These statistics are calculated using the version 32 CWVs and a weather history from October 1960 to March 2019. The winter is defined as October 1st to March 31st. The CWV parameters are reviewed every 5 years. Weather severity figures, for both the coldest day and the winter are based on the full history. The average CWV from the history is different from seasonal normal which has been adjusted for climate change.

From the 1st October 2015, a revised CWV relationship took effect alongside an updated weather history from 1960. This statistical review is the second to reflect these changes.

Coldest day in the winter

The coldest day in the 2018/19 winter was **1 in 3 warm** with a national CWV of **-0.23.**

LDZ	Formula Year	Date	CWV	1 in N
Scotland	2018/19	01-Feb-19	-1.18	average
Northern	2018/19	02-Feb-19	-1.08	5_warm
North West	2018/19	02-Feb-19	-0.88	5_warm
North East	2018/19	01-Feb-19	-1.07	3_warm
East Midlands	2018/19	31-Jan-19	-1.09	3_warm
West Midlands	2018/19	01-Feb-19	-0.58	4_warm
Wales North	2018/19	02-Feb-19	-0.88	5_warm
Wales South	2018/19	31-Jan-19	0.68	3_warm
Eastern	2018/19	31-Jan-19	0.48	4_warm
North Thames	2018/19	31-Jan-19	0.14	4_warm
South Eastern	2018/19	31-Jan-19	0.04	4_warm
Southern	2018/19	01-Feb-19	1.47	5_warm
South West	2018/19	01-Feb-19	-0.06	3_warm
National	2018/19	01-Feb-19	-0.23	3_warm

The following graphs show the CWVs for the coldest day each winter, in calendar order (figure 2) and in cold to warm order (figure 3). This shows the coldest day of the 2018/19 winter period was the **18th** warmest peak winter day compared to the 59-year weather history.

Figure 2 – Coldest day national composite weather in calendar order

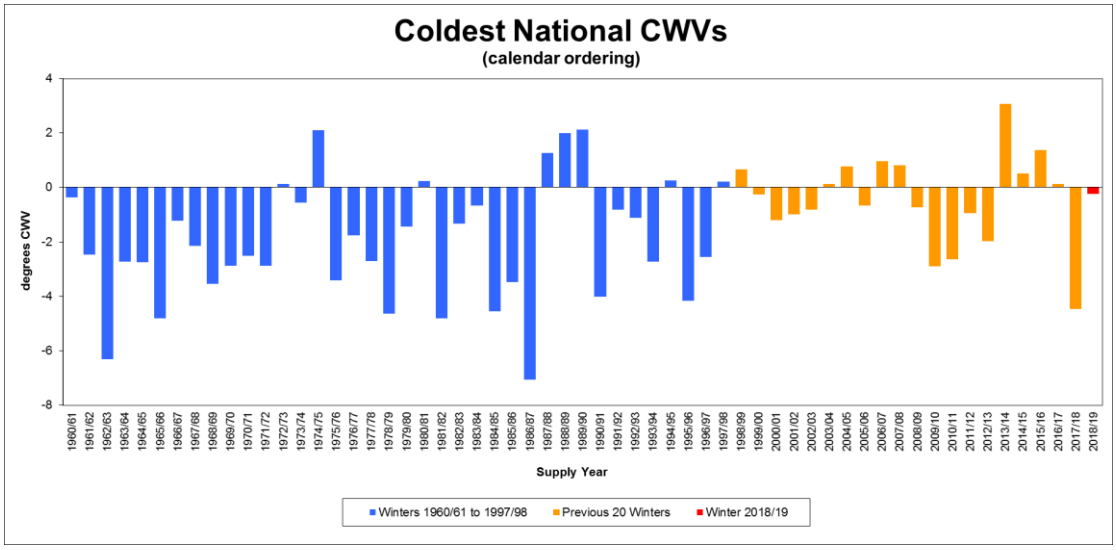
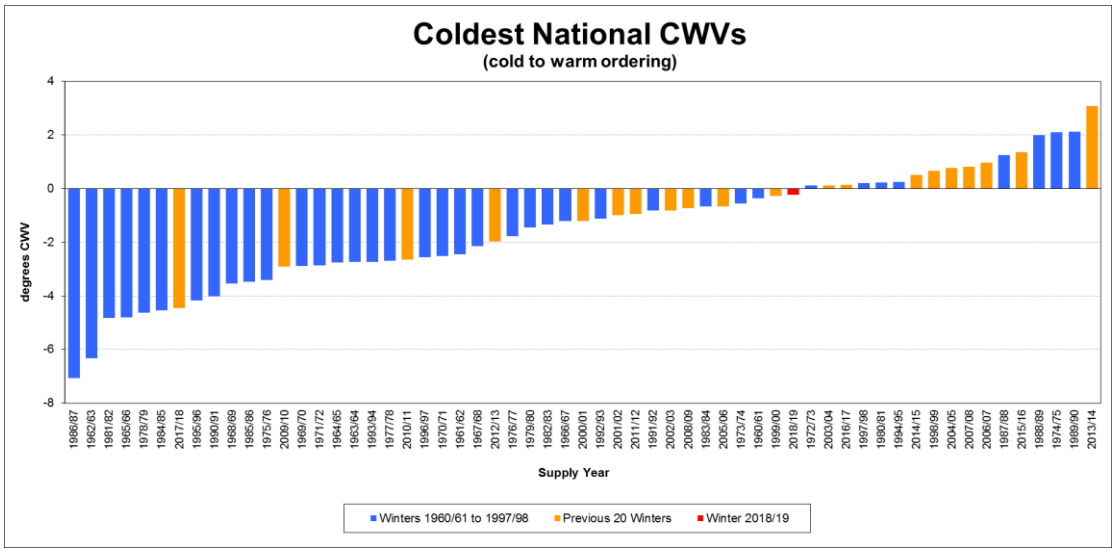


Figure 3 – Coldest day national composite weather in cold to warm order



Winter Severities

The 2018/19 winter severity, based on the winters from October 1960 to March 2019, was deemed to be **1 in 14 warm** for the full 6-month winter period and **1 in 11 warm** for the December to February winter period.

	1 in N	
LDZ	Oct to Mar	Dec to Feb
Scotland	9_warm	10_warm
Northern	28_warm	23_warm
North West	9_warm	8_warm
North East	21_warm	13_warm
East Midlands	20_warm	13_warm
West Midlands	13_warm	12_warm
Wales North	9_warm	8_warm
Wales South	11_warm	12_warm
Eastern	11_warm	7_warm
North Thames	10_warm	7_warm
South Eastern	10_warm	7_warm
Southern	9_warm	7_warm
South West	9_warm	8_warm
National	**14_warm**	**11_warm**

The following table shows historical winter severities based on the national CWV from October 1960 to March 2019 for the full 6 month winter period.

Winter	1 in N	Winter	1 in N	Winter	1 in N
1960/61	average	1980/81	3_cold	2000/01	average
1961/62	13_cold	1981/82	11_cold	2001/02	11_warm
1962/63	>59_cold	1982/83	average	2002/03	4_warm
1963/64	5_cold	1983/84	3_cold	2003/04	3_warm
1964/65	9_cold	1984/85	5_cold	2004/05	5_warm
1965/66	5_cold	1985/86	17_cold	2005/06	average
1966/67	3_cold	1986/87	4_cold	2006/07	35_warm
1967/68	6_cold	1987/88	average	2007/08	5_warm
1968/69	9_cold	1988/89	7_warm	2008/09	3_cold
1969/70	8_cold	1989/90	11_warm	2009/10	3_cold
1970/71	average	1990/91	average	2010/11	3_cold
1971/72	average	1991/92	3_warm	2011/12	21_warm
1972/73	average	1992/93	average	2012/13	6_cold
1973/74	average	1993/94	3_cold	2013/14	11_warm
1974/75	average	1994/95	6_warm	2014/15	4_warm
1975/76	3_cold	1995/96	4_cold	2015/16	27_warm
1976/77	4_cold	1996/97	average	2016/17	6_warm
1977/78	3_cold	1997/98	16_warm	2017/18	average
1978/79	17_cold	1998/99	4_warm	**2018/19**	**14_warm**
1979/80	average	1999/00	5_warm		

The following graphs show the average composite weather from October to March for all the winters since 1960/61 sorted by calendar (figure 4) and coldest to warmest (figure 5). The previous 20 years are shaded in orange with 2018/19 shaded in red. The winter of 2018/19 was the **5th** warmest year compared to the full weather history, with a National average CWV of **6.912**.

Figure 4 – Average composite weather in calendar year order

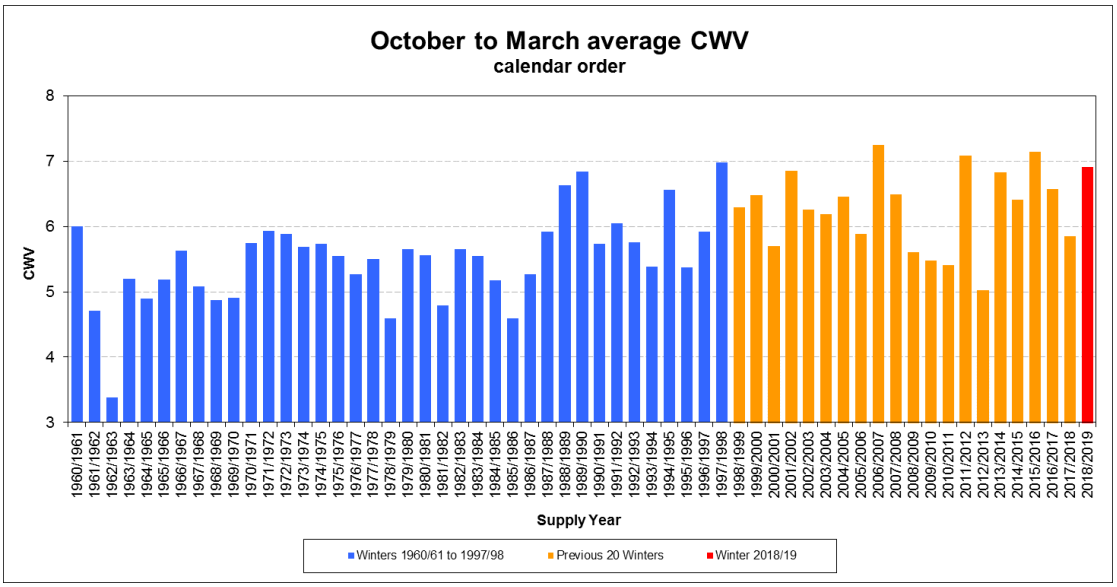
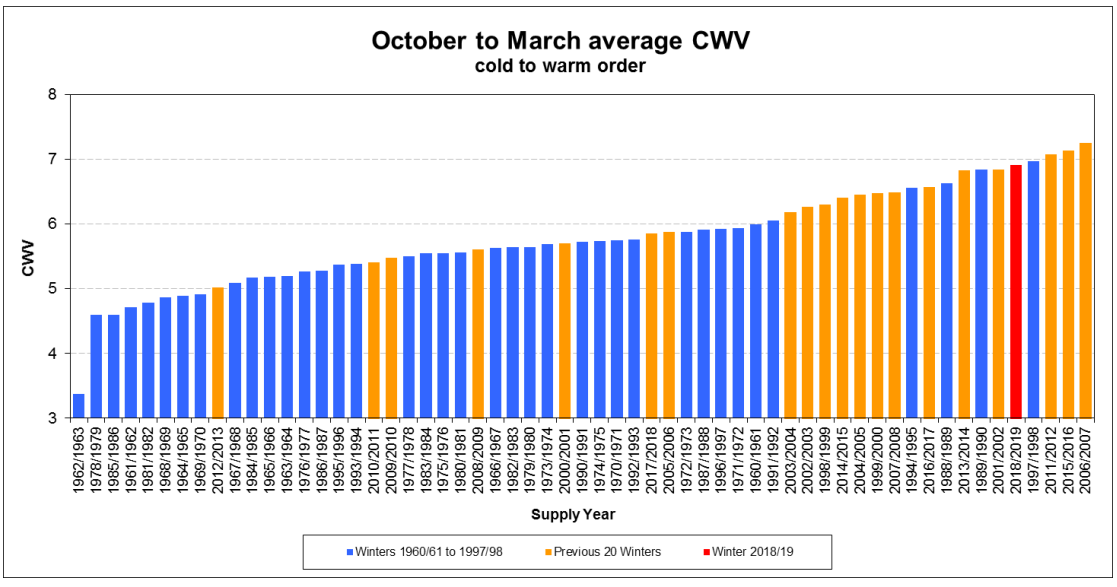


Figure 5 – Average composite weather sorted coldest to warmest winter



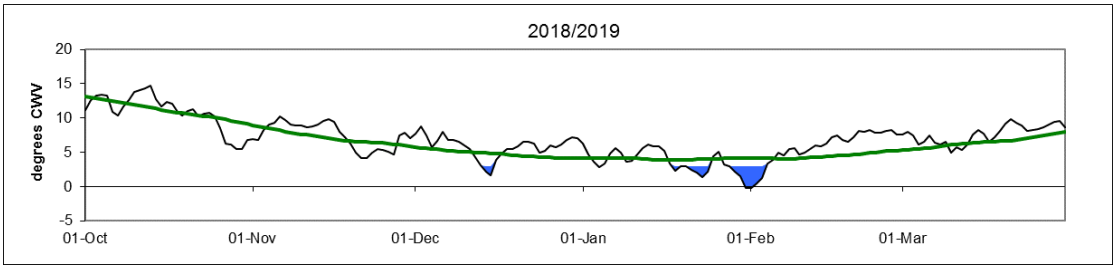
Cold Spells

The severity of cold spells can be calculated by comparing degree days below a threshold. The calculation is

Degree days = max (Threshold – CWV, 0)

For this cold spell analysis, a threshold of 3 degrees CWV has been used. There were **20** degree days in 2018/19 as shown by the blue shaded area in figure 6; the green line is climate change adjusted seasonal normal.

Figure 6 – 2018/19 degree days



Figures 7 and 8 compare the cold weather degree days in 2018/19 with all winters from 1960/61 onwards. 2018/19 was the 14th warmest compared to all years.

Figure 7 – Cold weather degree days sorted by date

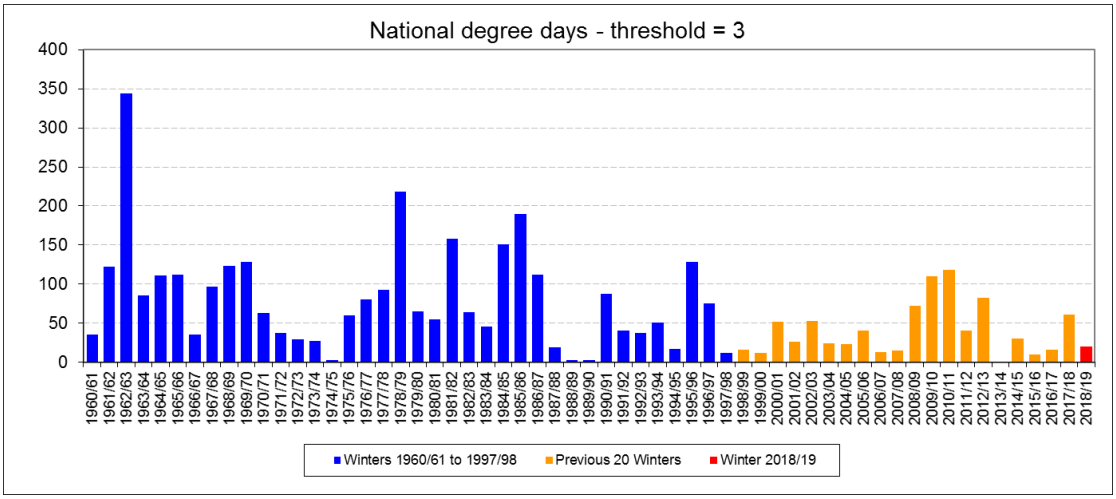
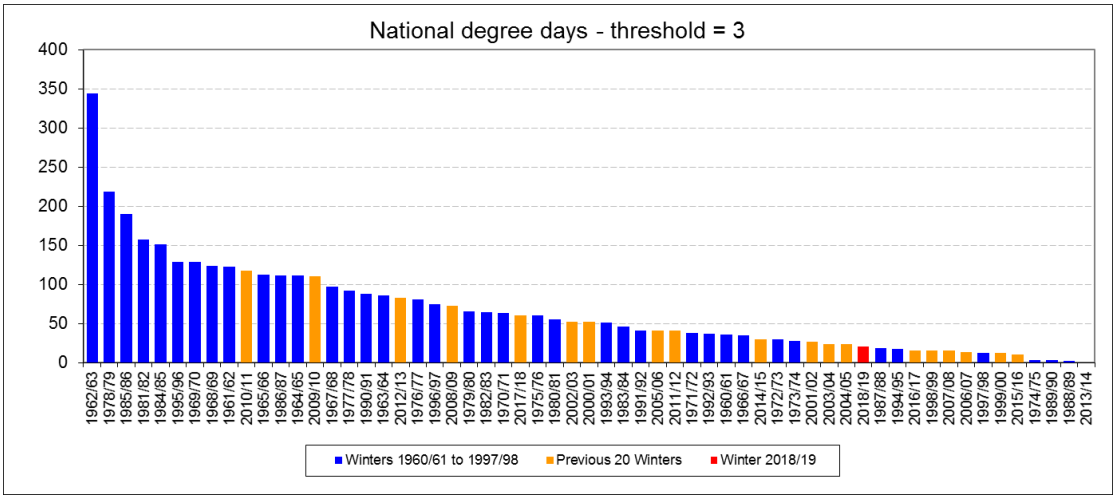


Figure 8 – Cold weather degree days sorted coldest to warmest



Year on year gas demand changes

Actual gas demand was significantly lower in FY 2018/19 than in FY 2017/18, with the big falls coming from LDZ demand and exports to Europe. LDZ demand includes the weather sensitive domestic, and to a lesser extent commercial, load bands and with the weather changing from an average winter in 2017/18 to a 1 in 14 warm winter in 2018/19 - combined with summer 2018 being the joint hottest on record for the UK as a whole and the hottest ever for England - a lot of this decrease was driven by warmer weather reducing gas demand for heating. On a weather corrected basis the drop in LDZ demand was much smaller at <2%. The large fall in exports to Europe through IUK was primarily driven by the increase in LNG deliveries to continental Europe reducing the requirement for gas to flow from the UK to Europe to refill European gas storages ahead of the winter.

Figure 9 – 2018/19 actual compared to recent history

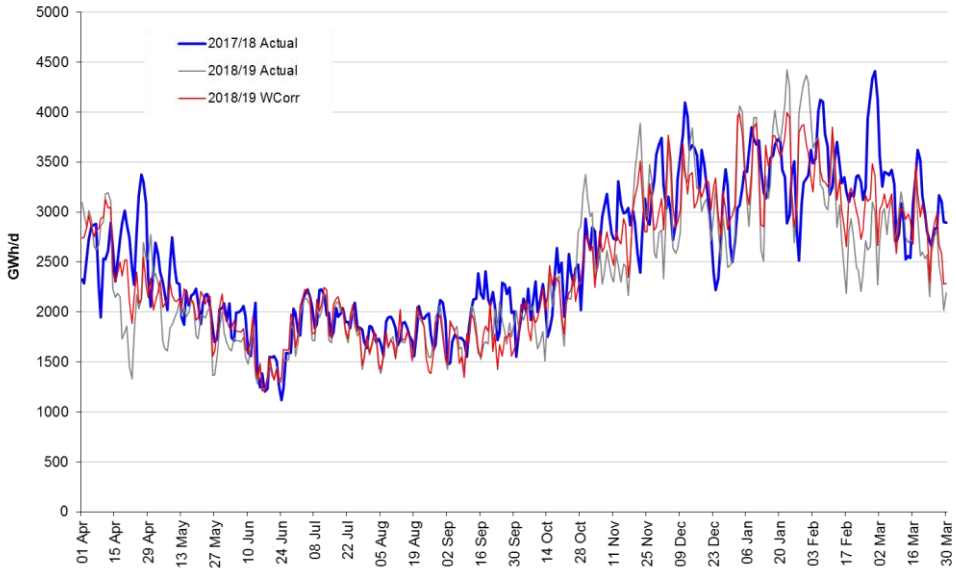


Figure 10 – Demand breakdown 2013/14 to 2018/19 (GWh)

Financial year demand	13/14	14/15	15/16	16/17	17/18	18/19
LDZ	543,895	527,690	521,324	544,283	571,799 1	524,561
NTS Power Gen	153,897	179,813	187,400	245,691	232,557	231,087
NTS Industrial	27,592	22,837	23,246	31,448	24,259	22,218
NTS Exports (Ireland: deemed flow)	61,578	62,702	59,725	39,631	38,953	41,764
NTS Exports (Europe: deemed flow)	40,928	64,509	86,274	67,178	85,228	49,788
NTS shrinkage	4,193	3,473	3,660	3,982	2,968	2,673
Total Demand (GWh)	832,083	861,024	881,629	932,211	955,764	872,090

Appendix

Appendix 1 - 1 in N probabilities

1 in N probabilities are calculated from statistical distributions of composite weather degree days. This is the formula as used for the cold spell analysis except with a different threshold which includes all days. The threshold used to calculate these degree days is 20 degrees CWV for all LDZs.

Degree Day = Maximum (20 - CWV, 0)

Appendix 2 - Composite Weather Variable

The Composite Weather Variable (CWV) is a weather variable created from 2-hourly temperatures and 4-hourly wind speeds transformed to produce a linear relationship with LDZ non-daily metered (NDM) demand. The national CWV is a weighted average of the LDZ CWVs.

From the 1st October 2015, a revised CWV relationship took effect alongside an updated weather history from 1960.