

# Holiday Code Review

14/12/2021

The logo for Xserve, featuring a stylized 'X' composed of blue and light blue geometric shapes, followed by the word 'serve' in a light blue sans-serif font.

Provided by:

The logo for Correla, consisting of two overlapping circles, one blue and one yellow, followed by the word 'correla' in a dark blue sans-serif font.

**correla**

# Modelling Approach 2022 – Holiday Code Rules: Intro.

- The current [Modelling Approach](#) includes a set of rules for determining holiday periods which are then used to calculate Holiday Factors for each of the EUC demand models
  - Appendix 5 of the Modelling Approach document provides the detail of the current Holiday Code Rules
- In summary there are rules for the following periods:
  - Christmas/New Year
  - Easter (example below)
    - [Easter Period:](#)  
Start: Wednesday before Good Friday; End: Friday after Good Friday
    - [Easter Codes:](#)  
Code 4 – Easter Saturday/Sunday, Code 5 – Good Friday/Easter Monday, Code 6 – All other days
  - First May Bank Holiday
  - Late May Bank Holiday
  - Summer Holiday
  - August Bank Holiday
- The current Holiday Code rules have been in place since 2011 and so are overdue a review
- In recent year's there have been questions raised in DESC's representations on the draft profiles about the suitability/appropriateness of the holiday periods within the ALPs/DAFs, e.g. length of period for Christmas/New Year and/or First May Bank Holiday

# Modelling Approach 2022 – Holiday Codes: Background

- EUC demand models are derived from sample data using regression analysis
- Regression coefficients (C1 and C2) are derived from sample demands for Mondays to Thursdays
- In some EUC demand models a reduction in demand is observed during holiday periods compared with the non-holiday Monday to Thursday demand
  - In these cases, it is necessary to carry out modelling of holiday effects by excluding holiday days from the regression
- A multiplicative factor for the days assigned in each holiday period is calculated
- Holiday factors are calculated from the NDM sample data and therefore cannot be specified in advance of the modelling analysis in the Spring, however rules for defining holiday periods can be reviewed

# Modelling Approach 2022 – Holiday Code Review: Scope

- The review of holiday codes will examine holidays and utilise existing model results
- There are currently 16 holiday codes in use which should be sufficient for all scenarios
- When determining the scope we need to be aware of time/resource constraints which means analysis needs to be focused on the main issues as DESC sees them
- It is not intended that the Summer Reduction period from late May to late September will change in this review, as this would unduly complicate the analysis
- The analysis will look to use data and models back from 2016/17 to 2019/20 – these years are the only ones for which models are available using the new CWVs and SN basis
- Two main proposed objectives of analysis:
  - Identify days within or neighbouring existing holiday periods which may need to be reclassified as holidays or non-holidays and reallocate the holiday codes for each period if necessary
  - Review whether it is still appropriate to exclude holiday days within regression analysis for the “domestic” EUC models (e.g. “01BND”)

# Modelling Approach 2022 – Holiday Code Review: Approach

- Review holiday periods performance (modelling error) using actual demand from sample for recent Gas Years (2017/18, 2018/19 and 2019/20). Review Domestic and I&C models across all LDZs
- Assess alternative periods using Demand Modelling inputs (2016/17 to 2019/20) via an appropriate methodology e.g. ANOVA (“Analysis of Variance”)
- Provide recommendations on Holiday Codes, including any changes amongst EUCs/LDZs

## Feedback from DESC:

- During discussions, it was suggested that both the May Bank Holiday and January New Year (inc. Scottish provision) requirements should be considered further
- Whole year requirements to also be assessed

# Investigation Outline

The objective of these slides is to provide a progress update on the Holiday Codes Review and seek DESC feedback

Data being used is Algorithm Performance data for

- 2016/17 (at EUC Band Level)
- 2017/18 (at EUC/LDZ Level)
- 2018/19 (at EUC/LDZ Level)
- 2019/20 (at EUC/LDZ Level)
- \*2020/21 (when it becomes available)

UIG Data for

- 2018 (at LDZ Level)
- 2019 (at LDZ Level)
- 2020 (at LDZ Level)
- Early 2021 (at LDZ Level)

Whilst all of the existing Holiday codes are being looked at , the areas of focus raised by DESC were

- The Holiday period extending into Early January
  - **Holiday code 5**
- The Early May bank holiday period
  - **Holiday codes 9 and 10**

# Christmas and Early January

## Reminder of current Holiday Code Rules

### Christmas/New Year (Holiday codes 1, 2, 3, 4, and 5)

Holiday period starts on the Monday before 25th December (but if 25th December falls on a Monday, Tuesday or Wednesday, starts on the Friday before 25th December) and ends on the first Friday on or after the second New Year bank holiday in Scotland.

#### Holiday code 1: 25th December

**Holiday code 2:** 26th December, January 1st and any remaining bank holidays (except second Scotland New Year bank holiday) and any other Saturdays and Sundays in the period

**Holiday code 3:** Any remaining Mondays to Fridays between 24th December and day before second Scotland New Year bank holiday inclusive

**Holiday code 4:** Remaining days before 24th December

**Holiday code 5:** Remaining days (will always include second Scotland New Year bank holiday)

Christmas 2018		Christmas 2019		Christmas 2020		Christmas 2021	
Date	Hol Code						
Tue 18/12/2018		Wed 18/12/2019		Fri 18/12/2020		Sat 18/12/2021	
Wed 19/12/2018		Thu 19/12/2019		Sat 19/12/2020		Sun 19/12/2021	
Thu 20/12/2018		Fri 20/12/2019	4	Sun 20/12/2020		Mon 20/12/2021	4
Fri 21/12/2018	4	Sat 21/12/2019	2	Mon 21/12/2020	4	Tue 21/12/2021	4
Sat 22/12/2018	2	Sun 22/12/2019	2	Tue 22/12/2020	4	Wed 22/12/2021	4
Sun 23/12/2018	2	Mon 23/12/2019	4	Wed 23/12/2020	4	Thu 23/12/2021	4
Mon 24/12/2018	3	Tue 24/12/2019	3	Thu 24/12/2020	3	Fri 24/12/2021	3
Tue 25/12/2018	1	Wed 25/12/2019	1	Fri 25/12/2020	1	Sat 25/12/2021	1
Wed 26/12/2018	2	Thu 26/12/2019	2	Sat 26/12/2020	2	Sun 26/12/2021	2
Thu 27/12/2018	3	Fri 27/12/2019	3	Sun 27/12/2020	2	Mon 27/12/2021	2
Fri 28/12/2018	3	Sat 28/12/2019	2	Mon 28/12/2020	2	Tue 28/12/2021	2
Sat 29/12/2018	2	Sun 29/12/2019	2	Tue 29/12/2020	3	Wed 29/12/2021	3
Sun 30/12/2018	2	Mon 30/12/2019	3	Wed 30/12/2020	3	Thu 30/12/2021	3
Mon 31/12/2018	3	Tue 31/12/2019	3	Thu 31/12/2020	3	Fri 31/12/2021	3
Tue 01/01/2019	2	Wed 01/01/2020	2	Fri 01/01/2021	2	Sat 01/01/2022	2
Wed 02/01/2019	5	Thu 02/01/2020	5	Sat 02/01/2021	2	Sun 02/01/2022	2
Thu 03/01/2019	5	Fri 03/01/2020	5	Sun 03/01/2021	2	Mon 03/01/2022	2
Fri 04/01/2019	5	Sat 04/01/2020		Mon 04/01/2021	5	Tue 04/01/2022	5
Sat 05/01/2019		Sun 05/01/2020		Tue 05/01/2021	5	Wed 05/01/2022	5
Sun 06/01/2019		Mon 06/01/2020		Wed 06/01/2021	5	Thu 06/01/2022	5
Mon 07/01/2019		Tue 07/01/2020		Thu 07/01/2021	5	Fri 07/01/2022	5
Tue 08/01/2019		Wed 08/01/2020		Fri 08/01/2021	5	Sat 08/01/2022	
Wed 09/01/2019		Thu 09/01/2020		Sat 09/01/2021		Sun 09/01/2022	
Thu 10/01/2019		Fri 10/01/2020		Sun 10/01/2021		Mon 10/01/2022	

## Analysis

# Current Holiday Factors

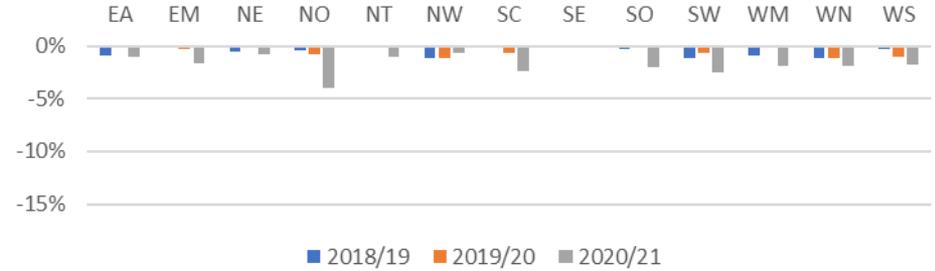
## Holiday Code 5

Examples of current holiday adjustment factors are shown on the right

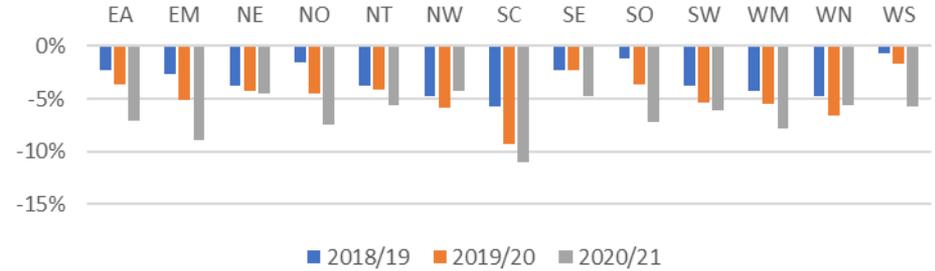
- Domestic adjustments are very small compared to I&C
- SC adjustments are the largest – likely to be due in part to the extra bank holiday
- Where adjustments are 0 they were deemed insignificant by the modelling process

For clarity, on the graph these are shown as a reduction rather than a multiplier (e.g. 0.97 is shown as -3%)

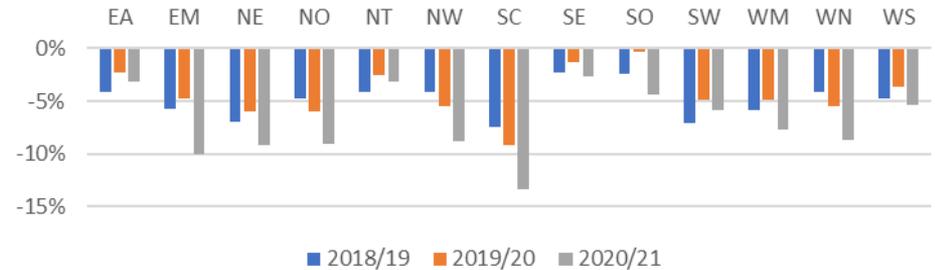
### Holiday Code 5 - 01BND



### Holiday Code 5 - 02BNI



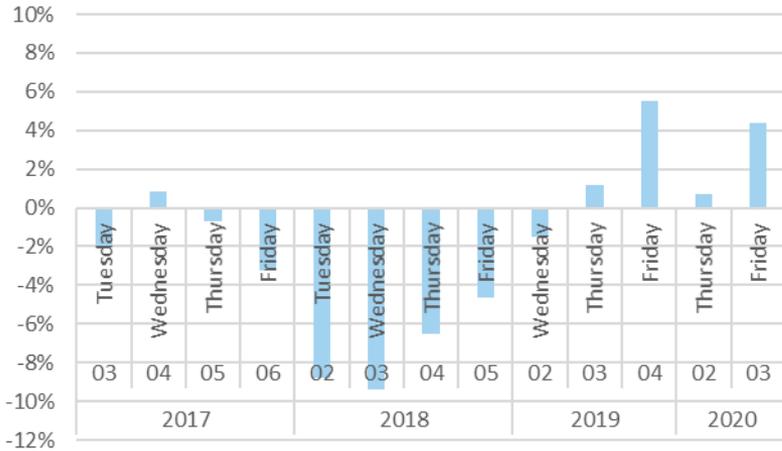
### Holiday Code 5 - 05B



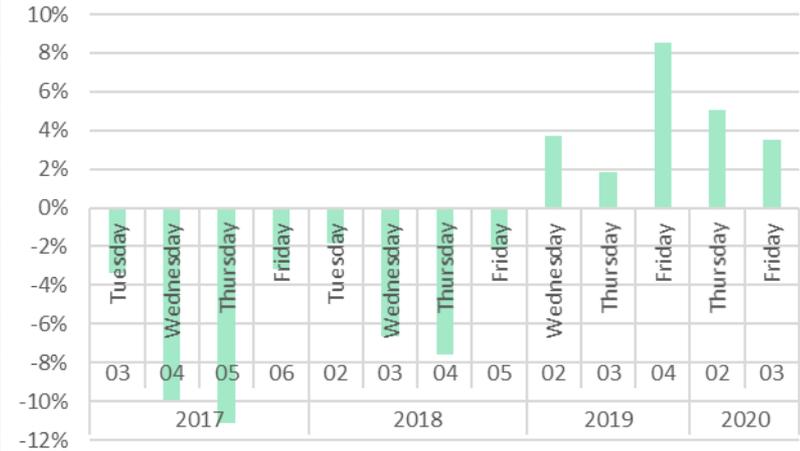
# Comparison of Residuals – Holiday Code 5

- A negative residual indicates the NDM algorithm has under-forecast
- A positive residual indicates the NDM algorithm has over-forecast

## Domestic Residuals



## I&C Residuals



- I&C residuals are generally larger than Domestic – both positive and negative
- I&C EUCs, appear to show under-forecasting in longer working weeks at the beginning of January
- 2018 was impacted by Storm Eleanor on the 2<sup>nd</sup> and 3<sup>rd</sup> January, with mild temperatures, high winds and rain

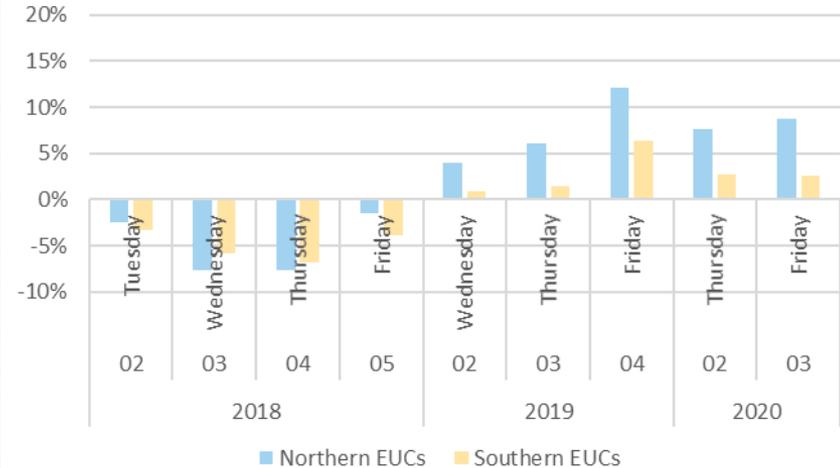
# Comparison of Residuals – Holiday Code 5

- A negative residual indicates the NDM algorithm has under-forecast
- A positive residual indicates the NDM algorithm has over-forecast

### SC vs Rest of GB



### North vs South (Exc. SC)



- Scotland residuals are significantly different to the rest of the EUCs particularly for the extra bank holiday (highlighted in darker blue)
- Northern EUCs are different to Southern EUCs but both show under-forecasting in 2018 when there were 4 working days in the first week of January
- 2016-17 data is not currently available at LDZ level

## Analysis

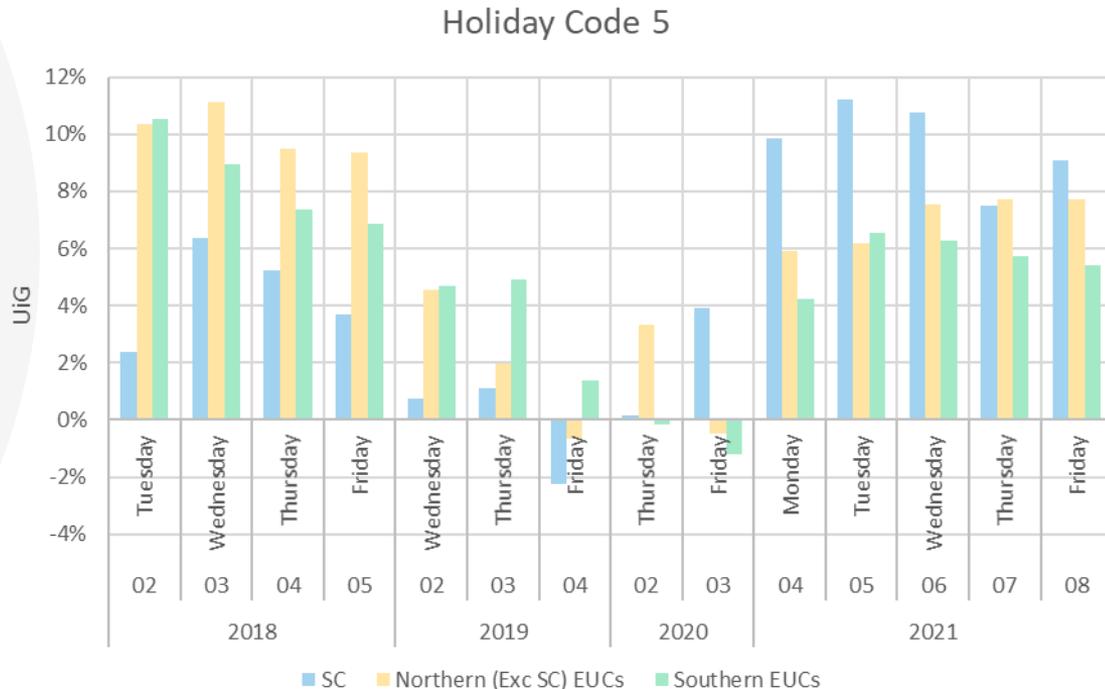
# UIG - Holiday Code 5

- Northern and Southern EUCs are largely quite similar in terms of UIG
- Scotland is noticeably different for individual years but still showing a similar pattern

The UIG data appears to show an over forecasting trend when there are 4/5 working days in the first week of new year

Aggregated values for Northern and Southern are calculated as an average across the 6 EUCs in each area

- UIG is less of a clear indicator of forecast accuracy than Algorithm Performance data, as there are a number of other data items included in the calculation, however,
  - A negative UIG indicates the NDM algorithm may have over-forecast
  - A positive UIG indicates the NDM algorithm may have under-forecast



# Early Conclusion:

Code 5 looks to be not needed for Domestic EUCs and for I&C EUCs appears to be causing the NDM algorithm to under-forecast where there are more than 3 working days in the first week of January

A likely suggested code change is to only have code 5 where there are 3 or fewer working days in the first week of January for England and Wales

Scotland needs more investigation regarding the second Bank Holiday

**Note:**

*Any review of the performance of demand models during holiday periods are naturally less conclusive due to the lack of available data points to review*



# Early May Bank Holiday

## Reminder of current Holiday Code Rules

### First Bank Holiday in May (Holiday codes 9 and 10)

From Saturday immediately preceding bank holiday, for 9 days in total. (Holiday runs from Saturday to Sunday).

**Holiday code 9:** First bank holiday in May; Saturdays and Sundays in period above.

**Holiday code 10:** All other days in period above.

Whilst all of the existing Holiday codes are being looked at, an area of focus raised by DESC was the Holiday period around the May Day Bank Holiday (Holiday codes 9 and 10)

- The holiday period starts between 29<sup>th</sup> April and 5<sup>th</sup> May depending on when May Day falls
- The bank holiday in 2020 was moved to the Friday to celebrate VE day
- Blue cells are bank holidays

2017 Dates	2018 Dates	2019 Dates	2020 Dates	2021 Dates	Weekday	Holiday Code
29-Apr	05-May	04-May	02-May	01-May	Saturday	9
30-Apr	06-May	05-May	03-May	02-May	Sunday	9
01-May	07-May	06-May	04-May	03-May	Monday	9 (10)
02-May	08-May	07-May	05-May	04-May	Tuesday	10
03-May	09-May	08-May	06-May	05-May	Wednesday	10
04-May	10-May	09-May	07-May	06-May	Thursday	10
05-May	11-May	10-May	08-May	07-May	Friday	10 (9)
06-May	12-May	11-May	09-May	08-May	Saturday	9
07-May	13-May	12-May	10-May	09-May	Sunday	9

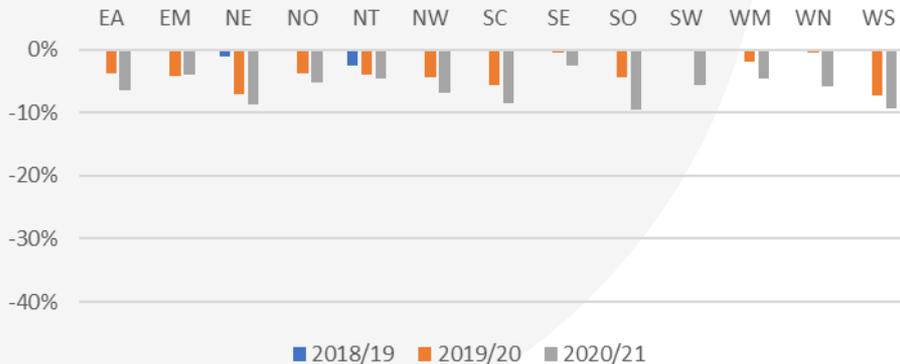
# Current Holiday Factors

Examples of current holiday adjustment factors for holiday code 9 are shown on the charts

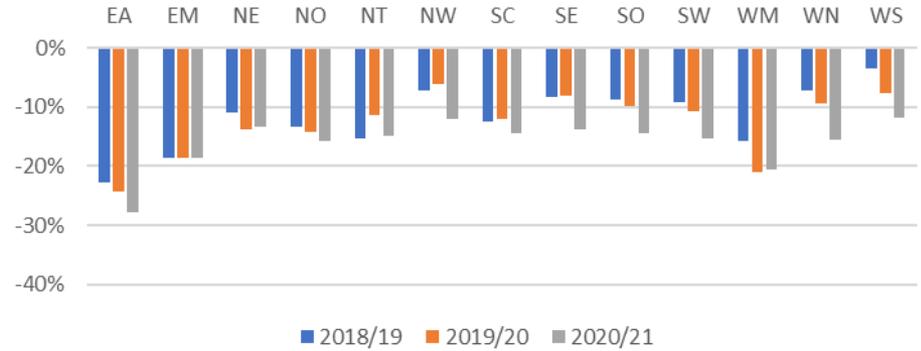
- Domestic adjustments are very small compared to I&C and are not consistent year on year
- The values for I&C are significant and consistent year on year

For clarity, on the graph these are shown as a reduction rather than a multiplier (e.g. 0.97 is shown as -0.03)

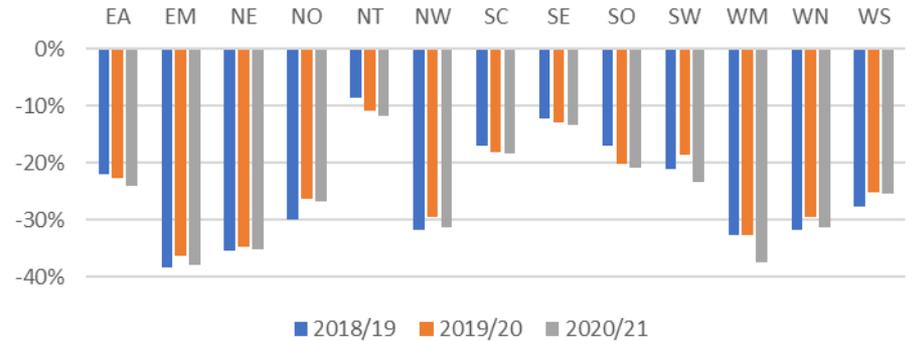
### Holiday Code 9 - 01BND



### Holiday Code 9 - 02BNI



### Holiday Code 9 - 05B



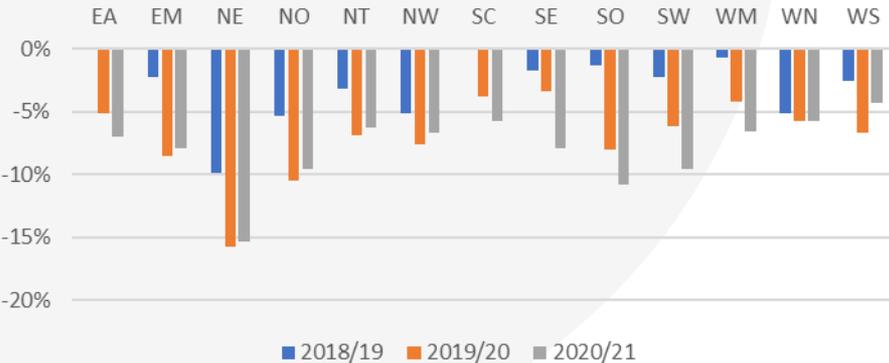
# Current Holiday Factors

Examples of current holiday adjustment factors for holiday code 10 are shown on the charts

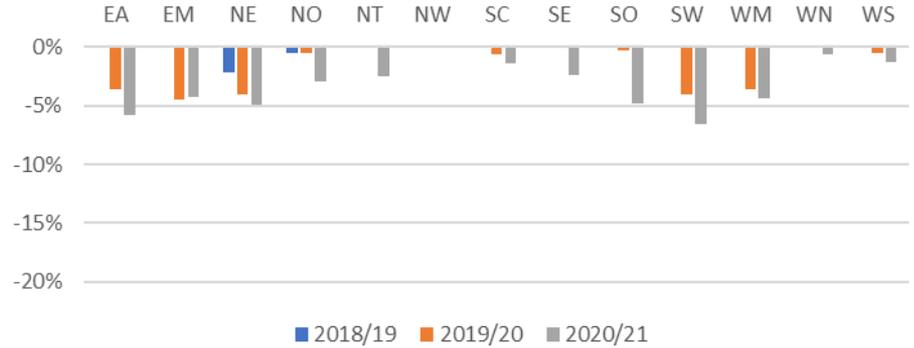
- Domestic adjustments are significantly bigger than I&C
- Year on year the values for I&C vary quite a bit and are very small

For clarity, on the graph these are shown as a reduction rather than a multiplier (e.g. 0.97 is shown as -3%)

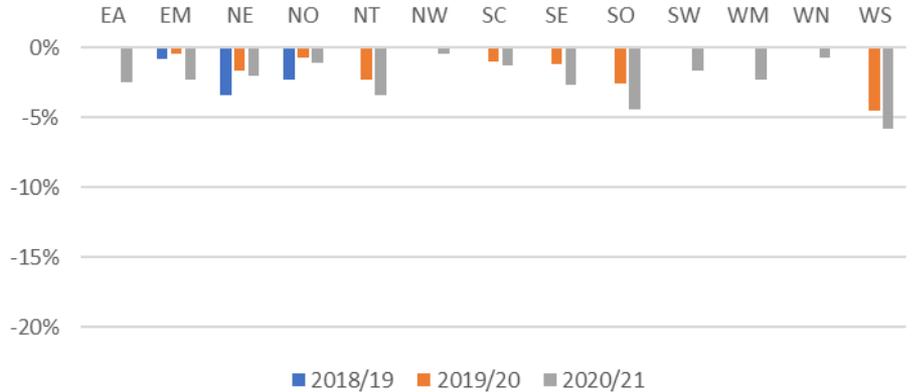
Holiday Code 10 - 01BND



Holiday Code 10 - 02BNI



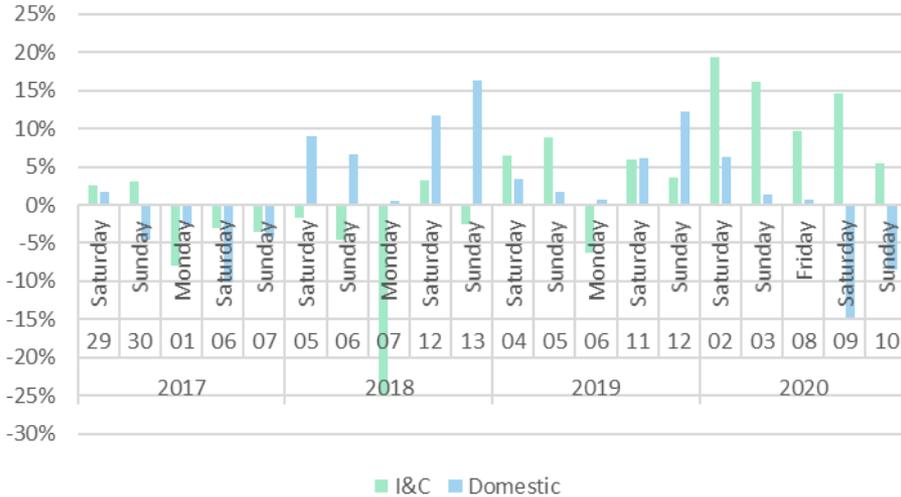
Holiday Code 10 - 05B



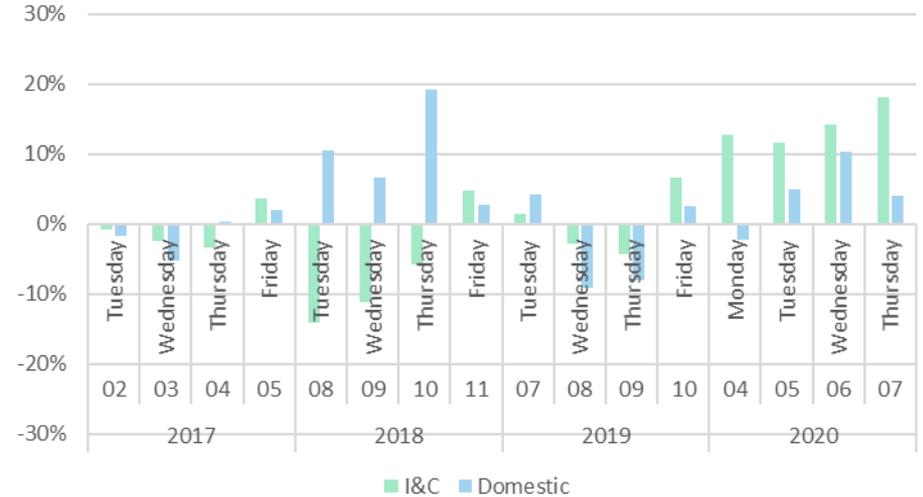
# Comparison of Residuals – Holiday Codes 9 and 10

- A negative residual indicates the NDM algorithm has under-forecast
- A positive residual indicates the NDM algorithm has over-forecast

Residual Comparison - Code 9



Residual Comparison - Code 10



- There is a clear impact of COVID-19 Lockdown to 2020 I&C figures
- For Code 9, Domestic residuals are generally positive and I&C are fairly evenly split
- For code 10, I&C residuals are generally negative whilst Domestic are generally positive

# UIG – Holiday Codes 9 and 10

2020 and 2021 will both have been impacted by COVID-19 lockdowns and restrictions

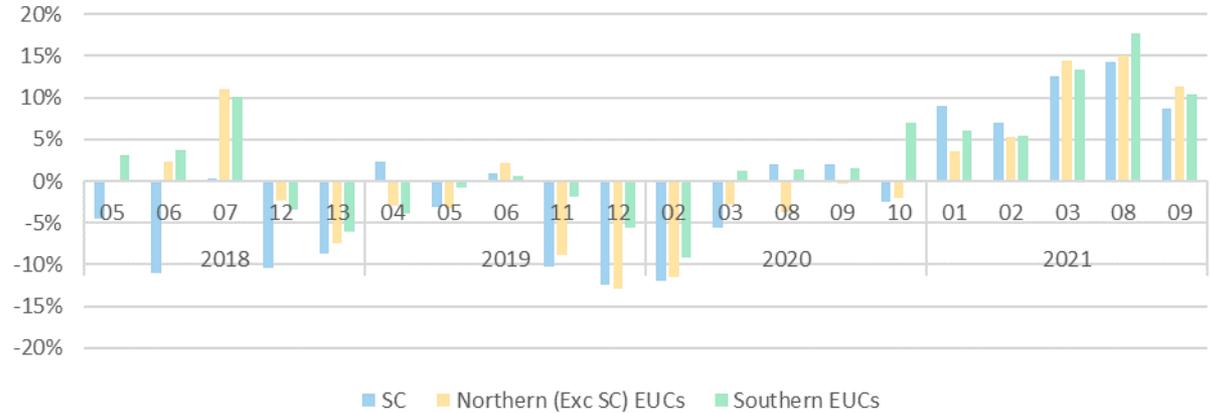
- 2018 and 2019 show UIG for Holiday code 9 is largely negative
- 2018 and 2019 show UIG for Holiday Code 10 is largely positive but not significantly, except for Northern EUCS which will be looked into further

Aggregated values for Northern and Southern are calculated as an average across the 6 EUCS in each area

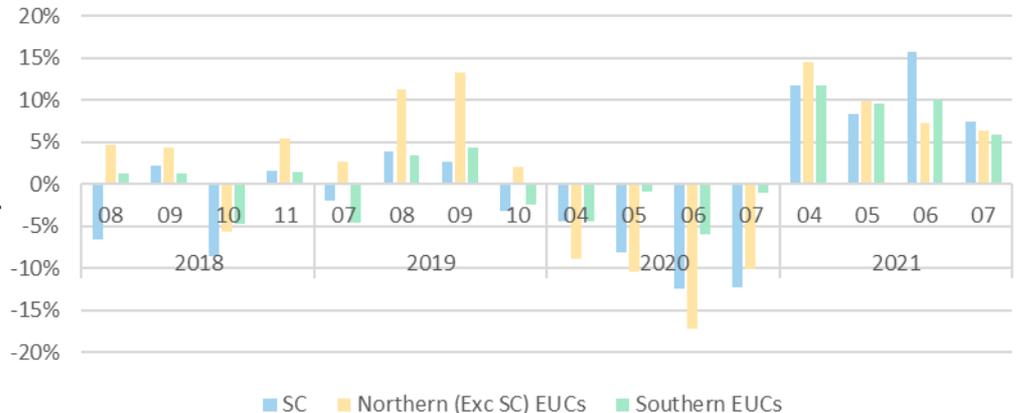
UIG is less of a clear indicator of forecast accuracy than Algorithm Performance data, as there are a number of other data items included in the calculation, however,

- A negative UIG indicates the NDM algorithm may have over-forecast
- A positive UIG indicates the NDM algorithm may have under-forecast

### Holiday Code 9



### Holiday Code 10



# Early Conclusion:

Code 9 appears to be causing the NDM algorithm to under-forecast for Domestic

Code 10 appears to be causing the NDM algorithm to under-forecast for I&C

A likely suggested code change is to only apply code 9 to I&C and only apply code 10 to Domestic

Note:

*Any review of the performance of demand models during holiday periods are naturally less conclusive due to the lack of available data points to review*



## Next Steps

Analysis will continue for the other Holiday Codes and will look at the non holiday Days to see if any need to be added.

We are looking to agree the Modelling Approach at the March DESC meeting, which includes any revisions to holiday codes.

We will correspond with DESC over email in the new year regarding any proposed changes if necessary.

Any thoughts or questions?

Thank you

