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DESC: NDM Algorithm Performance
Strand 1: Weather Correction Factor (WCF) and Scaling Factor (SF)

13th November 2013

NDM Algorithm 2012/13 Performance Evaluation

- Each autumn / winter an assessment of the algorithm performance for the recently completed gas year is carried out, in this case 2012/13.
- Analysis performed by considering three sources of information:
  - Daily values of Scaling Factor (SF) & Weather Correction Factor (WCF)
  - Reconciliation Variance data for each EUC
  - Daily consumption data collected from the NDM sample
- This presentation covers the 1st of these strands - Strands 2&3 will be covered during February 2014.
- Accompanying document published on JO website sets out full commentary.

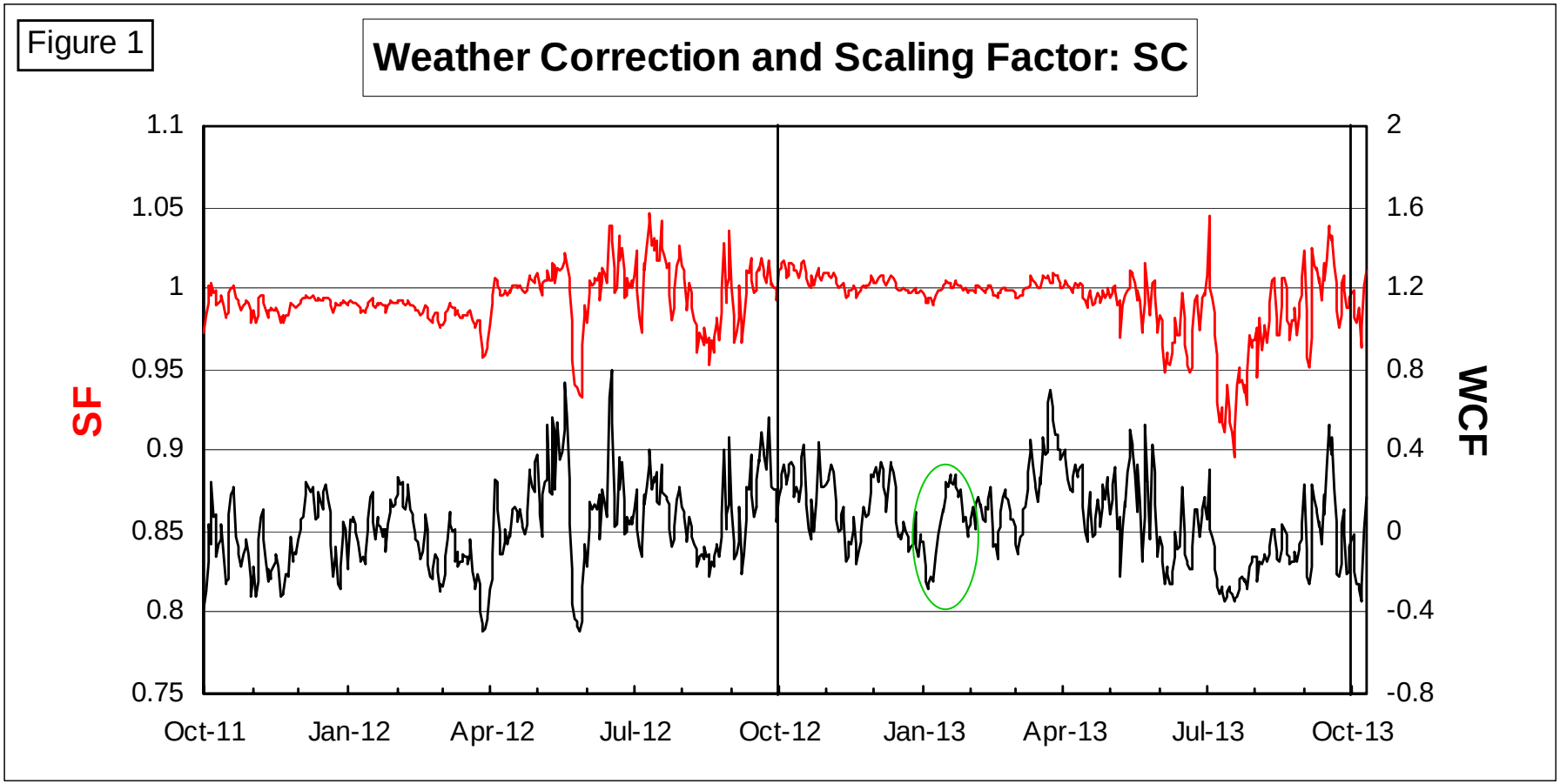
Analysis of Scaling Factor (SF) and Weather Correction Factor (WCF)

- Analysis: Data graphs represent daily trends for SF and WCF
  - SF is a multiplier used to ensure total aggregate NDM demand = Allocated demand. Ideal value is one, however variations may occur for a number of reasons:
    - Errors in aggregate AQs, DM measurements, imperfections in algorithms such as modelling parameters (ALPs, DAFs, holiday factors)
  - WCF is a value which represents the extent to which actual aggregate NDM demand in the LDZ differs from the sum of the ALP weighted daily average consumption for all EUCs in the LDZ (based on snapshot taken for 1st October and potentially subject to revision within the gas year).
- 3 LDZ specific examples highlighted for period 2011/12 and 2012/13 and first 10 days of 2013/14
  - All LDZs and full explanatory detail contained in supporting document

Weather Correction & Scaling Factor: SC

Example 1

Figure 1



- January 2013 began with (1 week) period of consistently warmer than normal temperatures. By mid month, it had turned significantly colder (including snowfall between 18th to 25th) inflating aggregate NDM demand resulting in sharply positive WCF values.

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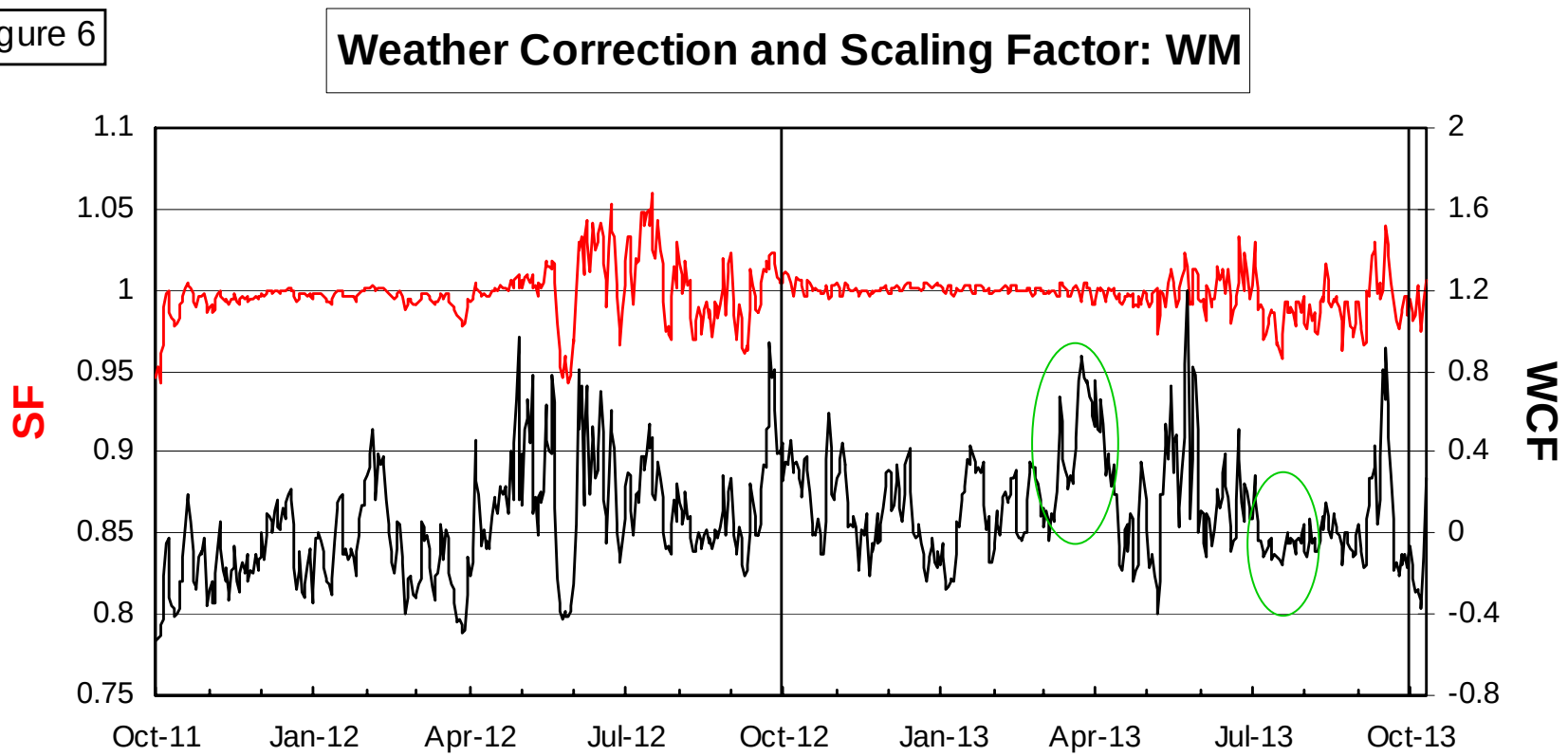
Weather Correction & Scaling Factor: WM

Example 2

Figure 6



- 2nd coldest March in last 50 years (particularly cold during later half of the month) – inflated aggregate NDM demand resulting in sharply positive WCF values.
- 3rd warmest July in last 50 years – depressed aggregate NDM demand resulted in negative WCF values.

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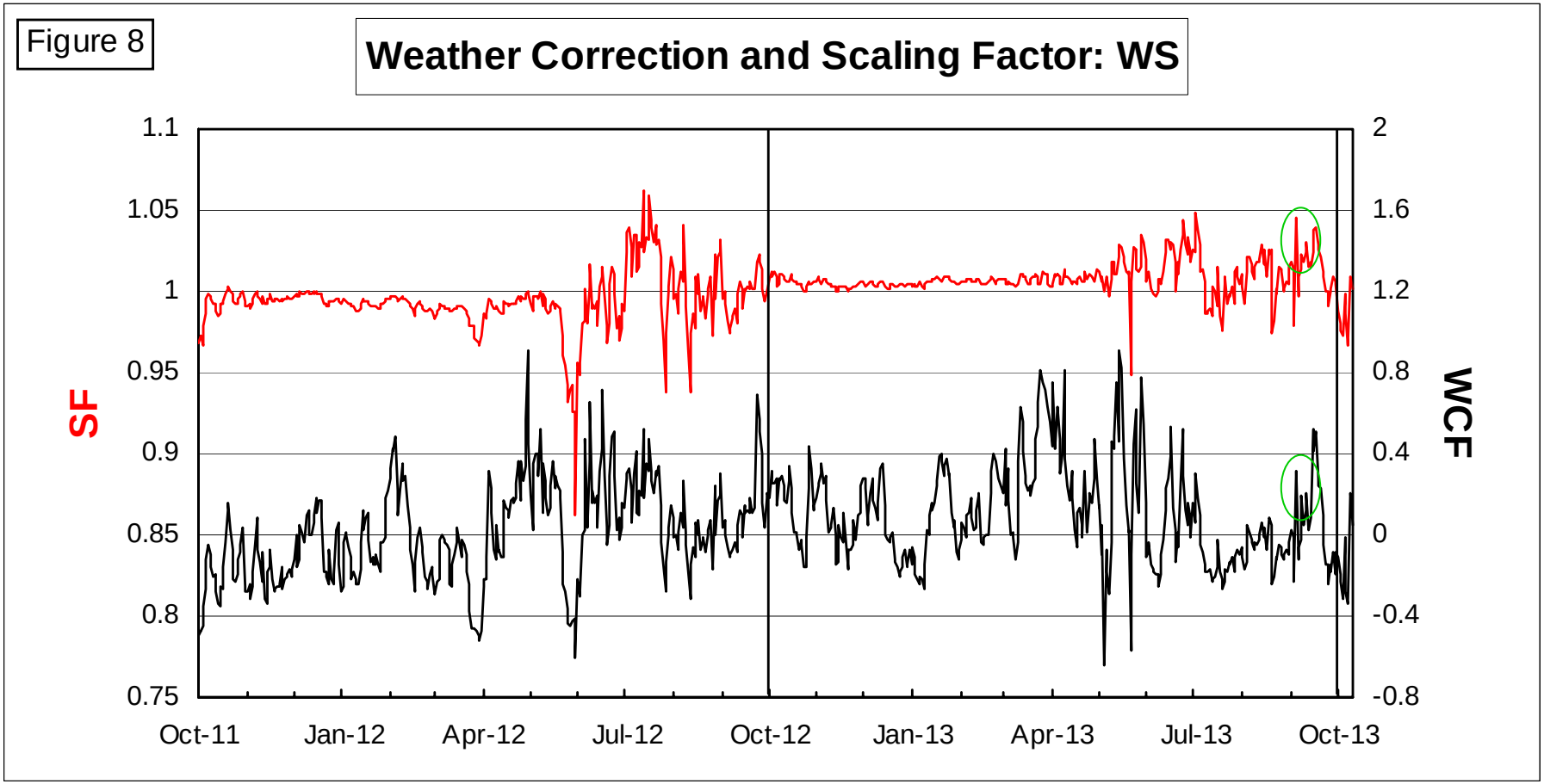
Weather Correction & Scaling Factor: WS

Example 3

Figure 8



- 4th September 2013 – sharp positive spike in WCF and much increased SF value
- Probably caused by an erroneous low consumption reading for a single DM supply point in the LDZ which resulted in corresponding error in actual aggregate NDM consumption

Analysis: Comparison Values 2011/12 to 2012/13

- Further analysis of algorithm performance considers:
- Change in average values of SF (11/12 to 12/13)
  - RMS deviation of SF from 1 (11/12 to 12/13): measures variability of SF
- Change in average values of WCF (11/12 to 12/13)
  - Difference of WCF-EWCF no longer a measure of bias in the WCF due to SND for agg.NDM being under or over stated.
  - However for completeness WCF-EWCF analysis has been carried out - results can be seen in supporting document.
- Change in aggregate NDM AQ from gas year 2012/13 to 2013/14

Average Values of SF
Difference between Gas Year 11/12 & Gas Year 12/13

Red: Greater SF deviation from 1 in 2012/13 – Green: Lower SF deviation from 1 in 2012/13

LDZ	Mon-Thur	Friday	Saturday	Sunday	Winter	Summer
SC	-0.001	-0.002	0.000	0.000	0.010	-0.016
NO	0.008	0.002	0.005	0.005	0.010	-0.001
NW	0.000	-0.006	-0.004	-0.004	0.010	-0.007
NE	0.003	-0.003	-0.001	0.000	0.008	-0.006
EM	0.002	-0.004	-0.002	-0.003	0.009	-0.002
WM	0.001	-0.002	-0.003	-0.004	0.005	-0.002
WN	0.010	0.000	-0.001	-0.001	0.013	0.003
WS	-0.002	-0.001	-0.001	-0.004	0.002	-0.006
EA	0.006	0.004	0.002	0.000	0.010	-0.001
NT	0.005	0.003	0.001	0.000	0.009	-0.004
SE	0.007	0.007	0.006	0.005	0.011	0.004
SO	0.009	0.006	0.005	0.006	0.013	-0.002
SW	0.005	0.003	0.002	0.002	0.011	0.002

- The difference between absolute average value of SFs from 1 has been calculated for gas years 2011/12 and 2012/13.
- Table compares the differences in results between gas year 2011/12 and 2012/13
- Green indicates on average the SF was closer to ideal value of one.

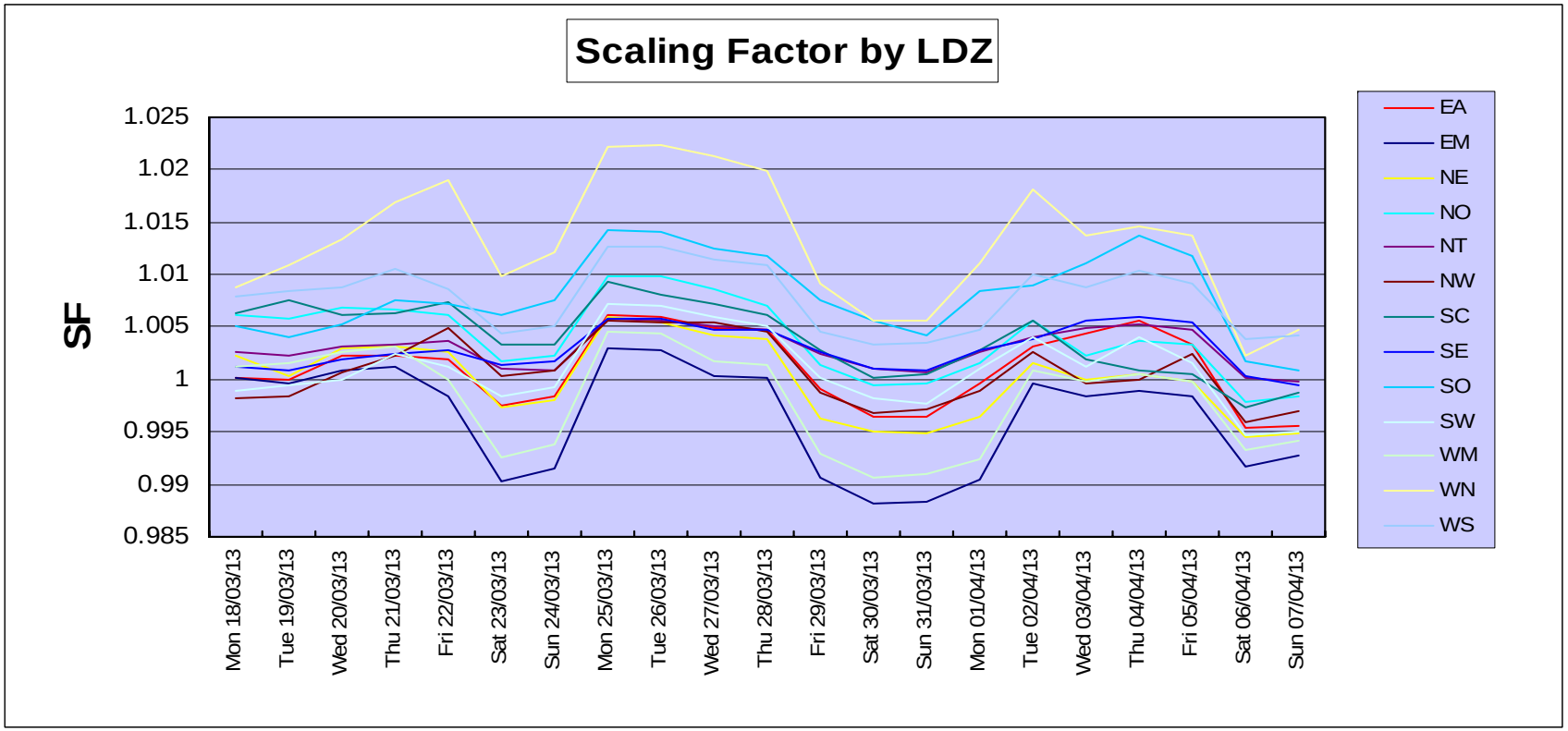
Average Values of Root Mean Square Deviation of SF from 1 Difference between Gas Year 11/12 and Gas Year 12/13

Red: Greater SF deviation from 1 in 2012/13 – Green: Lower SF deviation from 1 in 2012/13

LDZ	October	November	December	January	February	March	April	May	June	July	August	September
SC	0.0005	0.0096	0.0040	0.0061	0.0120	0.0175	-0.0011	0.0162	-0.0158	-0.0384	0.0031	-0.0067
NO	0.0201	0.0109	0.0036	0.0040	0.0101	0.0240	0.0044	0.0302	0.0113	0.0080	0.0139	0.0190
NW	0.0258	0.0085	0.0029	0.0000	0.0041	0.0218	0.0030	0.0298	0.0141	-0.0044	-0.0010	0.0052
NE	0.0219	0.0072	0.0023	0.0002	0.0058	0.0171	0.0012	0.0272	0.0175	0.0095	0.0092	0.0118
EM	0.0330	0.0100	0.0020	0.0020	0.0064	0.0148	0.0015	0.0355	0.0269	0.0234	0.0115	0.0128
WM	0.0162	0.0044	0.0000	0.0017	0.0031	0.0060	-0.0013	0.0159	0.0169	0.0110	-0.0001	-0.0003
WN	0.0318	0.0147	-0.0004	0.0038	0.0102	0.0194	0.0026	0.0210	0.0120	0.0068	0.0169	0.0024
WS	0.0053	0.0010	0.0003	0.0019	0.0024	0.0093	0.0003	0.0215	-0.0020	0.0157	0.0042	-0.0085
EA	0.0305	0.0109	0.0017	0.0016	0.0072	0.0126	-0.0025	0.0217	0.0199	0.0132	0.0153	0.0041
NT	0.0261	0.0121	0.0044	0.0043	0.0080	0.0137	0.0027	0.0220	0.0216	0.0136	0.0136	0.0082
SE	0.0286	0.0103	0.0040	0.0043	0.0077	0.0143	0.0020	0.0283	0.0125	0.0141	0.0206	0.0103
SO	0.0290	0.0131	0.0031	0.0037	0.0090	0.0175	-0.0005	0.0246	0.0167	0.0096	0.0064	-0.0035
SW	0.0139	0.0067	0.0034	0.0036	0.0073	0.0158	0.0008	0.0102	0.0110	0.0067	0.0058	-0.0043
AVG	0.0217	0.0092	0.0024	0.0029	0.0072	0.0157	0.0010	0.0234	0.0125	0.0068	0.0092	0.0039

- RMS Deviation provides a measure of the variability of SF. The deviation from 1 has been analysed for gas years 2011/12 and 2012/13
- Table compares the differences in results between gas year 2011/12 and 2012/13
- Overall SFs were less variable than the previous gas year.

Observed Weekend SF Behaviour



- Xoserve received a query from E-ON regarding a notable weekend SF behaviour ‘trend’.
- Investigation identified:
  - The ‘weekend behaviour’ of SF is not present throughout the 2012/13 gas year but appears to be exacerbated by the much colder than normal weather.
  - No evidence that the revised NDM aggregate demands or DAF calculation has had any impact.

Scaling Factor Values 2012/13 : Conclusions

- In general, the average SFs tended to be a little lower than one.
- In 10 / 13 LDZs on weekdays (and 6 / 13 on Fridays and Saturdays), average values of SF were slightly improved compared to 2011/12.
- Average SF values for all of winter 2012/13 showed an improvement when compared to winter 2011/12 in all 13 LDZs.
- For summer 2012/13 average values of SF worsened slightly compared to summer 2011/12 in 10 / 13 LDZs.
- Monthly RMS values of SF (deviation from one) during 2012/13 were in a majority of LDZ / months combinations marginally better than in 2011/12.
- Considered overall SFs during 2012/13 generally were less variable than over the previous gas year.
- Due to the large number of factors that affect SF, it is difficult to draw conclusions from the analysis.

Average Values of WCF
Difference between Gas Year 2011/12 and Gas Year 2012/13

Red: WCF deviation further from 0 than 11/12 – Green: WCF deviation closer to 0 than 11/12

LDZ	Mon-Thur	Friday	Saturday	Sunday	Winter	Summer
SC	-0.051	-0.036	-0.049	-0.052	-0.076	0.102
NO	-0.111	-0.086	-0.076	-0.083	-0.075	0.051
NW	-0.129	-0.108	-0.108	-0.114	-0.082	0.022
NE	-0.104	-0.070	-0.069	-0.069	-0.076	0.063
EM	-0.102	-0.107	-0.094	-0.090	-0.036	0.043
WM	-0.120	-0.096	-0.087	-0.087	-0.055	0.064
WN	-0.123	-0.140	-0.151	-0.144	-0.103	0.009
WS	-0.105	-0.082	-0.078	-0.136	-0.033	0.041
EA	-0.139	-0.161	-0.172	-0.139	-0.093	-0.034
NT	-0.148	-0.172	-0.182	-0.150	-0.069	-0.063
SE	-0.129	-0.147	-0.187	-0.165	-0.062	-0.071
SO	-0.129	-0.138	-0.150	-0.144	-0.094	0.007
SW	-0.140	-0.135	-0.139	-0.165	-0.044	0.004

- The difference between absolute average value of WCFs from zero has been calculated for gas years 2011/12 and 2012/13.
- Table compares the differences in results between gas year 2011/12 and 2012/13
- Red indicates on average the WCF was further from zero than in 2011/12.

Weather Correction Factor Values 2012/13 : Conclusions

- The differences between the years are the result of differences in factors such as weather or EUC AQ excess.
- Average WCF was positive in all LDZs on Mondays to Thursdays, Fridays and weekend days.
- WCF was further away from zero in 2012/13 than in 2011/12 on Mondays to Thursdays, Fridays and weekend days in all LDZs.
- In winter 2012/13 WCF was further away from zero in all LDZs.
- In summer 2012/13 WCF was closer to zero in 10 out of 13 LDZs.

Aggregate NDM AQ Changes - start of gas year 2013/14

LDZ	% NDM AQ Change
SC	-1.9%
NO	0.1%
NW	-0.7%
NE	-1.3%
EM	-0.7%
WM	-1.1%
WN	0.1%
WS	-0.4%
EA	-0.5%
NT	-0.5%
SE	-0.8%
SO	0.03%
SW	-0.2%
Overall	-0.7%

NDM Algorithm 2012/13 Performance Evaluation

- Next Steps – Strands 2 and 3 to be presented at February 2014 DESC.
  - 1.Daily values of Scaling Factor (SF) & Weather Correction Factor (WCF)
  - 2.Reconciliation Variance data for each EUC
  - 3.Daily consumption data collected from the NDM sample