EVALUATION OF ALGORITHM PERFORMANCE – 2007/08 GAS YEAR SCALING FACTOR AND WEATHER CORRECTION FACTOR

1.0 Background

The annual gas year algorithm performance evaluation considers three sources of information as follows:

- Daily values of scaling factor (SF) and weather correction factor (WCF)
- Reconciliation variance data for each EUC
- Daily consumption data collected from the NDM sample

The material presented here refers only to SF and WCF data. The other strands of this evaluation will be available for consideration at a subsequent DESC meeting.

The SF and WCF-EWCF graphs this year range over two whole gas years 2006/07 and 2007/08. These graphs are presented in their now standard form for each LDZ, in Figures 1 to 13 of this note. Tables of average values of the SF and WCF-EWCF, for gas years 2006/07 and 2007/08, along with the improvement or degradation in these averages between the two gas years, are presented in Tables 1 to 6. It should also be noted that SF and WCF values have been obtained for the period 1st to 10th October 2008 (the start of the new gas year 2008/09) and appended to the graphs of the previous two completed gas years.

Additionally, the root mean square deviation of SF from 1 has also been computed for each discrete month during the previous gas years 2006/07 and 2007/08, and the respective figures can be found in Tables 7 and 8. The differences in these RMS values between the two gas years are presented in Table 9. These figures provide a very useful additional measure of the variability of SFs about one (the ideal value).

2.0 Overall Results

These various graphs and tables indicate the following notable points:

- For the majority of LDZs, average values of SF for gas year 2007/08, generally (i.e. across weekdays and weekend days, for the winter period and for the summer period) appear to be closer to the ideal value of one than over equivalent periods of the previous gas year (2006/07). Exceptions to this were NE and WN LDZs on all days and in both the winter and the summer periods, NT LDZ for Saturdays, Sundays and the summer period and SW LDZ for the summer period.
- SF values during gas year 2007/08 have been in most instances close to one, taking on values that were on average a little greater than one in most instances (although some average SF values slightly below one also occurred in some LDZs). In gas year 2006/07 SF values were generally lower than one and also further away from one (WN LDZ excepted).
- Also, a specific feature of the SF patterns in gas year 2007/08 were the marked repeating day of the week patterns observed in the 5 LDZs SC, NO, NE, SE and SO for which for the first three months of the gas year (October-December) the values of aggregate NDM SND provided for use in the Gemini system (for calculating WCFs on the day) were not aligned to the correct day of the week. Because the ensuing WCF values were inappropriate for these LDZs over each day of this period, the SF had to compensate taking on the observed recurring weekly pattern of values. This issue did not apply to the rest of the gas year and from 1st January 2008 onwards the SF patterns in these LDZs do not show this marked day of the week pattern.
- The RMS deviation of SF from the ideal value of one provides a measure of the variability of SFs. In a majority (7 or more of 13) of LDZs in every month of gas year 2007/08 except September, the variability of SFs also appeared to be less marked, than during the previous gas year. LDZs SC, NE and WN apart, all other LDZs showed improvements over 8 months of the year or more. WN LDZ showed greater variability (worse RMS deviations of SF) in every month of the gas year while NE LDZ showed greater variability in every month apart from April and May. SC LDZ was worse from October to January and in September. NO, NW and SW LDZs showed greater variability during four of the months of the gas year, EM and NT LDZs were worse during three months, EA LDZ was worse in two months and WM, WS and SE LDZs were each worse in a single month. With respect to SC, NO and NE LDZs in the months October to December, this greater variability can at least in part be ascribed to the consequences of the incorrectly aligned daily aggregate NDM SND profile in these LDZs.
- Examination of the average weekday and weekend day values of WCF-EWCF in Tables 4, 5 and 6, indicates that WCF bias, as measured by the deviation of WCF from EWCF, appeared in general to be

somewhat worse, compared to that over the equivalent days of the previous gas year. Weekday (Monday to Thursday) WCF bias was worse in all LDZs. Weekend WCF bias over Friday, Saturday and Sunday days deteriorated in 37 of 39 instances: Friday and Sunday were worse for all LDZs and Saturday was worse in all LDZs except WM and WS. Over the winter period of 2007/08 as a whole (which includes the Christmas holiday period) all LDZs except WN and SO were worse than the winter period of gas year 2006/07 and even in these two cases the improvement was very slight. Over the summer period as a whole all LDZs except WS were worse than the summer period of gas year 2006/07.

During gas year 2006/07, WCF bias was generally negative for most LDZs over most days of the week. Exceptions were limited to WN LDZ over all days of the week and the summer period, SC LDZ on Fridays, Saturdays and the summer period, NT LDZ on Sundays and the summer period, and SO LDZ over the summer period. This preponderance of instances of negative WCF bias indicated that aggregate NDM seasonal normal demand (SND) specified for 2006/07 was too high.

During gas year 2007/08 WCF bias appears to have been strongly negative for nearly all LDZs and all days of the week and the winter and summer periods. The only instance of positive WCF bias was the winter period in SO LDZ and this was very close to zero. The levels of aggregate NDM seasonal normal demand (SND) specified for gas year 2007/08 are on the whole higher than those applied to 2006/07. It would therefore appear from these WCF bias values that these values of aggregate NDM seasonal normal demand (SND) were too high.

Tables 10 and 11 provide monthly values of weather corrected aggregate NDM demand as a percentage of aggregate NDM SND, for gas year 2006/07 and for gas year 2007/08 respectively. The predominance of percentage values lower than 100% in gas year 2007/08 (more so than for gas year 2006/07) further supports the view that aggregate NDM seasonal normal demands (SNDs) in gas year 2007/08 were too high and more so than in 2006/07.

- A consistently negative WCF bias would tend to drive the corresponding SF to a higher value than it would otherwise have. In the absence of negative WCF bias, SF values would be lower than their observed levels. Thus, in the absence of WCF bias, SF values in almost all LDZs would probably have been lower than the ideal value of one during gas year 2007/08.
- Over the first 10 days of October 2008, weather conditions nationally were around average for the period taken as a whole. SF values over these 10 days were very close to the ideal value of one in the majority of LDZs, but SF values in LDZs: NE, EM, WM and EA were not as well behaved as in the other LDZs. The broad improvement in SF values is in line with the expectation and intention of the change made to WCF by the implementation of UNC Modification 204.

  A very high WCF bias value was observed in WS LDZ on 4th October 2008. On this day LDZ demand was unusually high and aggregate DM demand was unusually low. This resulted in a strongly inflated aggregate NDM demand. One large unique site in the LDZ had a zero consumption on this day, which appears to have led to the much reduced aggregate DM demand.

3.0 Commentary

It is customary in this note on WCF and SF values to identify and provide a commentary on any unusual occurrences of SF and WCF-EWCF values, in the most recent gas year (2007/08). In part, these instances (up to May 2008) have previously been reported in Appendix 13 of the NDM report published on 27th June 2008. They are all included here for completeness:

- As already noted, a marked effect was that of the recurring weekly cycles in SF values during the period October to December in LDZs: SC, NO, NE, SE and SO. This was due to the values of aggregate NDM SNDs (which are used to calculate WCFs on the day) not being aligned to the correct day of the week. The ensuing WCF values were inappropriate for these LDZs over each day of this period and the SF had to compensate for this error, taking on a recurring weekly pattern. This issue did not apply to the rest of the gas year and from 1st January 2008 onwards the SF patterns in these LDZs did not show this marked day of the week pattern.
- Less extreme day of the week patterns in the SF were also observed in other LDZs (e.g. NW, WN, EA, NT and SW). These are not specific to the 2007/08 gas year and are due to imperfect weekend factors in the underlying EUC or NDM demand models (or both).
- The Christmas holiday period was evident in most LDZs (e.g. NW, EM, WM, WN, WS, EA, NT and SW) as a perturbation in the SF values from just prior to Christmas to just after the New Year. Similarly, the

early Easter (Easter Sunday was on 23rd March) holiday period was noticeable in some LDZs as a slight perturbation in SF values before during and after the holiday weekend. Again, these effects are not specific to the 2007/08 gas year and are due to imperfect holiday factors in the underlying EUC or NDM demand models (or both).

- April 2008 as a whole was colder than seasonal normal (on the current 17 year basis), in contrast to April 2007 which had been the warmest April month in gas industry weather records going back to 1928. In April 2008 no significant SF volatility was evident in most LDZs, except in the latter part of the month when a gradual warming led to a spell of warmer than average weather conditions. This caused a very small downward blip in SF values in some LDZs: most notably in NW, EM, WM, EA and SW. This muted effect (very small and of limited duration) was similar in nature to the much more marked impact on SF and WCF observed in April 2007 in some LDZs.

- The month of May 2008 was, despite a number of periods of heavy rain, the warmest ever month of May in gas industry weather records.

  For all LDZs the graphs of WCF bias (WCF-EWCF) show notable variability during May 2008. The first half of the month (apart from the first couple of days in some LDZs) was exceptionally warmer than seasonal normal. There were also shorter spells of colder than seasonal normal weather in the third week of the month and around the second bank holiday in the month. The extended period of strongly warm weather resulted in aggregate NDM demand falling away sharply and remaining low even when colder weather returned sometime around the third week of the month. This caused sustained strongly negative WCF bias of some 10-15 days duration from about the first week in the month onwards in almost all LDZs.

  An illustrative example was SO LDZ where around mid-month (May) the weather was generally warmer than average but from 18th May onwards the weather became colder than average and colder still by 20th May, but NDM demand remained depressed (switched off due to the earlier warm weather). Thus, NDM demand on 20th May was much lower than would have been expected from weather conditions alone, leading to the observed sharply negative WCF bias. However, the corresponding SF value was hardly impacted. A very similar example with sharply negative WCF bias and little consequential impact on the corresponding SF also occurred in SW LDZ on 19th May.

  In these and other instances, since the negative WCF bias was caused by actual aggregate NDM demand falling away (and remaining switched off) the consequential impact on scaling factor (SF) was more muted. When aggregate NDM demand is too low WCF becomes too low which tends to force SF to be higher. However, the reduced aggregate NDM demand also directly acts to decrease SF. The two effects are in opposition and may in some instances (such as in SO LDZ on 20th May and SW LDZ on 19th May) broadly balance out. Thus, marked consequential perturbations of SFs in May 2008 were only observed sporadically.

  In most LDZs (SE excepted) positive spikes in WCF bias may be seen at or around the second bank holiday in the month. This bank holiday WCF bias was most marked in SC, NO, NE, WM, WS, EA, NT and SO LDZs. Aggregate NDM demand was higher than expected for the bank holiday and prevailing conditions (at or very slightly colder than seasonal normal). Once again, the consequential impact on scaling factor (SF) was muted due to two effects in opposition acting on the SF and broadly balancing out. Some consequential positive offsets in SF occurred in NW, NE, EM, WM, WN, EA and SW LDZs, while a SF offset in the opposite sense is apparent in WS LDZ.

- The month of June 2008 was colder than in recent years and was the coldest June month since 2002 (in gas industry weather records). A number of instances of sharply negative WCF bias caused by depressed NDM demand (i.e. NDM demand atypically low for the weather conditions that prevailed) were observed during June 2008. Specific examples were: 6th June in WS LDZ, 15th June in NO, EM and WM LDZs, 16th June in NW, NE, WN and SE LDZs, and 20th June in SC, NO, and EA LDZs. In all these instances there was little consequential impact on the prevailing value of SF. As previously noted, when aggregate NDM demand is too low WCF becomes too low which tends to force SF to be higher. However, the reduced aggregate NDM demand also directly acts to decrease SF. The two effects are in opposition and in some instances balance out.

- A similar effect (depressed NDM demand) but a somewhat different outcome was observed in many LDZs (SC, NO, NW, NE, EM, WM, SE and SO) during one or more days of the period 20th to 26th July 2008. NDM demand was depressed to levels lower than prevailing weather conditions would have suggested. However, on this occasion the direct deflationary effect of depressed NDM demand on SF outweighed the inflationary effect on SF of the negative WCF bias, resulting in a downward blip in the prevailing value of SF.

- In NO LDZ on 7th August 2008, a very low WCF value and a strongly negative WCF bias (WCF-EWCF) were observed. The cause appears to be an unusually low aggregate NDM demand in turn caused by a corresponding atypically high aggregate DM demand in this LDZ on the day in question. The high aggregate DM demand appears to have been caused by an erroneous measurement at a single unique site within NO LDZ. Consumption for this site was an order of magnitude (a factor greater than ten) higher that consumption on the days on either side (6th and 8th August) and consumption on each of the days 7 days before and after the day in question. Consequently, aggregate DM demand on the day was overstated by more than 10 GWh and this directly depressed aggregate NDM demand by more than 50% from its true value. At the corrected level of aggregate NDM demand WCF would have been -0.1790 rather than the observed value of -0.5233 and WCF bias would have been -0.1661 rather than the observed bias of -0.5104.

  Weather conditions in NO LDZ on 6th, 7th and 8th August were unexceptional - being close to seasonal normal. Yet WCF was very low and WCF bias (WCF-EWCF) was strongly negative due to the erroneous depressed aggregate NDM demand. This depressed WCF value would have impacted SF by causing it to increase. However, SF was itself impacted directly by the depressed value of aggregate NDM demand which would have tended to drive SF lower. The observed effect on SF was a balance of these two opposing influences. On this occasion the value of SF declined slightly - the direct deflationary impact of the incorrect depressed aggregate NDM demand being greater than the indirect inflationary impact of the depressed WCF.

- On 4th September 2008 in a number of LDZs (e.g. SC, NO, NW, NE, EM and WN) a sharply negative WCF bias occurred. This was due to actual NDM demand being unusually low on the day relative to the colder than seasonal normal weather conditions that prevailed, resulting in WCF taking on a much reduced value. The depressed WCF would tend to inflate the SF but the depressed NDM demand acting directly would tend to reduce the SF. On this occasion the two effects were broadly in balance in most of the affected LDZs resulting in no significant perturbation in the SF. A similar effect and similarly muted impact on SFs was also observed on 28th September 2008 in NE, EM and SW LDZs.

  On 5th and/or 6th September 2008 in a number of LDZs (e.g. NW, NE and WN) a positive spike in WCF bias occurred. This was due to actual NDM demand being somewhat atypically high on the day relative to the warmer than seasonal normal weather conditions that prevailed, resulting in WCF taking on an increased value. The inflated WCF would tend to decrease the SF but the increased NDM demand acting directly would tend to inflate the SF. Once again the two effects were broadly in balance in most of the affected LDZs resulting in no significant perturbation in the SF.

4.0 Assessment

In the demand attribution process as currently formulated, it is principally deviations of scaling factor from the perfect value of one that causes misallocations of aggregate NDM demand to individual EUCs.

Scaling factor deviations from one (offsets from one and also day to day volatility) are related to the closeness of correspondence (or otherwise) between aggregate NDM seasonal normal demand on the day and NDM EUC AQ weighted ALP on the day (in other words the (AQ*ALP/365) term in the NDM demand attribution formula summed across all EUCs in the LDZ). Since NDM SND is generally a forecast quantity while AQ is a backward looking quantity based on historical meter read data, this correspondence can never be perfect.

The impact of Modification 204 which changes the definition of WCF to be based on NDM EUC AQ weighted ALP (albeit periodic snapshots rather than computed on each day) should overcome this inherent constraint to achieving scaling factor values close to one. However, as a result of this change from gas year 2008/09 onwards, the term WCF-EWCF (hitherto a measure of WCF bias) will no longer reflect WCF bias due to Networks' forecast SND error. In future reporting to DESC of SF and WCF patterns, WCF-EWCF will merely reflect the difference between WCF based on NDM EUC AQ weighted ALP and estimated WCF based on aggregate NDM demand computed from a demand model. In effect, from gas year 2008/09 onwards, WCF-EWCF will be an indirect measure of the difference between a "pseudo-SND" (computed as the NDM EUC AQ weighted ALP) and forecast SND, in each LDZ.

At present, the ratio of aggregate NDM SND to NDM EUC AQ weighted ALP is broadly inversely related to the deviation of SF from the ideal value of one. Due to lower overall levels of demand, the effect is more pronounced in summer than in winter. Scaling factor volatility may be seen in a number of LDZs in the summer in both 2006/07 and 2007/08. The effect of the changes due to Modification 204 should be to reduce such volatility in summer 2008/09. However, the summer is also affected by warm weather cut-off and summer reduction effects in some EUC models.

Warm weather cut-offs in EUC demand models give rise to summer scaling factor volatility by a mechanism involving the DAF parameter. If weather on a day in summer is significantly different from normal for that time of year, the DAF value that is applied on that day to EUCs with cut-offs may not be appropriate for the prevailing weather. Thus overall the (1 + WCF*DAF) terms in the demand attribution formula may be either too low or too high and the scaling factor has to change abnormally to compensate.

There are also indications that EUC demand models with summer reductions also give rise to summer scaling factor volatility. Here, the mechanism involves the ALP parameter. If weather on a day in summer is significantly different from normal for that time of year, the ALP value that is applied on that day to EUCs with summer reductions may not be appropriate for the prevailing weather. Thus, overall the (AQ*ALP/365) terms in the demand attribution formula may be too low or too high and the scaling factor has to change abnormally to compensate.

An examination of the average monthly value of WCF-EWCF (the WCF bias) and weather corrected aggregate NDM demand as a percentage of aggregate NDM SND allows an approximate assessment to be made of the “equilibrium level” of SF in each LDZ (i.e. the likely level of SF if any WCF bias is discounted). This assessment is approximate and is based on identifying a period (of a month’s duration in this instance) over which WCF bias was small (at or near zero) and weather corrected aggregate NDM demand was close to (~100% of) aggregate NDM seasonal normal demand over the period, then identifying the average value of SF that applied to the period and adjusting this SF for any residual WCF bias that applied in the period.

If an “equilibrium level” of SF can be reliably identified in a LDZ, it may then provide an approximate indication of the prevailing level of aggregate NDM AQ in the LDZ - for example an “equilibrium level” of SF above one suggests that aggregate NDM AQ is less than it should be and an “equilibrium level” of SF below one indicates that aggregate NDM AQ is greater than it should be. However, the necessary coincidence of conditions does not always occur in a LDZ and in those circumstances it is not possible to reliably assess the “equilibrium level” of SF. Unfortunately, during gas year 2007/08, the ideal coincidence of conditions was absent in almost all the LDZs. A further complication was that weather corrected aggregate NDM demand as a percentage of aggregate NDM seasonal normal demand would have been biased lower (than the target 100%) if aggregate NDM SND was too high, which was the case during gas year 2007/08. Consequently, assessment of “equilibrium levels” of SF based on the SF patterns over winter 2007/08, was somewhat unreliable.

Nevertheless, “equilibrium levels” of SF for each LDZ are presented in Table 12 which also includes for comparison WCF bias (i.e. WCF-EWCF) and SF values for the winter period of gas year 2007/08 for all days and for Monday to Thursday weekdays. Winter period WCF bias and SF values can independently be used to assess excess or deficiency in aggregate NDM AQ in each LDZ. The inferences that may be drawn in each LDZ about the impact of WCF bias and thus the prevailing level of aggregate NDM AQs are also presented in Table 12 which was originally published as Table A13.13 of the NDM report dated 27th July 2008.

The “equilibrium” SF based assessment tends to suggest a lower excess (in some cases even a slight deficiency) in aggregate NDM AQ levels (in each LDZ) than the winter period WCF bias assessment. This is consistent with the impact of aggregate NDM SND (clearly too high in 2007/08) on the procedure for identifying the “equilibrium level” of SF (i.e. the estimated “equilibrium levels” of SF tend to be greater than they should be - implying a lesser aggregate NDM AQ excess or even a deficiency).

In WN LDZ, which is smaller in overall load size than adjacent LDZs, the prevailing level of NDM AQ appeared to be too low. The principal cause of the NDM AQ deficiency in this LDZ has been known for some time to be due to supply points incorrectly assigned to adjacent LDZs.

In one LDZ (SO), aggregate NDM AQ appeared to be broadly at the appropriate level, on the basis of the assessment of the effect of WCF bias on SF over the winter period.

For the other LDZs, aggregate NDM AQs appeared to be too high. On the basis of the assessment set out in Table 12, of the effect of WCF bias on SF over the winter period of gas year 2007/08, the aggregate NDM AQ excess is up to 2% for LDZs: SC, NW, NE and EM and in the range 3-6% for LDZs: NO, WM, WS, EA, NT, SE and SW. These assessments of AQ excess are generally lower than the corresponding assessments made for gas year 2006/07 and published in the spring 2007 NDM report (dated 27th June 2007).

Table 13 shows the percentage changes in aggregate NDM AQs at the start of gas year 2008/09 as observed on the Gemini system. It is clear that a significant reduction in aggregate NDM AQ has taken place for gas year 2008/09. The reduction is 3.4% overall across all LDZs and the reductions range from 2.4% in SO LDZ to 5.0% in WN and WS LDZs. The reductions observed at the start of gas year 2008/09 in LDZs: SC, NW, NE, EM, SO and WN are generally greater than any AQ excess indicated for these LDZs from the assessment of the impact of WCF bias on SF values. The AQ reductions in LDZs: NO, WM, WS, EA, NT, SE and SW are broadly in line with the AQ excess indicated for these LDZs from this same assessment.

Overall therefore, it may be that national aggregate NDM AQs are now too low. Following the adoption of Modification 204, WCF for gas year 2008/09 (and thereafter) is defined and computed differently. One consequence of this is that the approach to inferring AQ excess or deficiency from assessment of the impact of WCF bias on SF values, is no longer appropriate. Future analyses of WCF and SF patterns (for example with the NDM proposals to be published in June 2009) will not be able to shed light on NDM AQs in aggregate terms as has been possible hitherto, because an “equilibrium SF” analysis is longer feasible

Figure 1

Weather Correction and Scaling Factor: SC

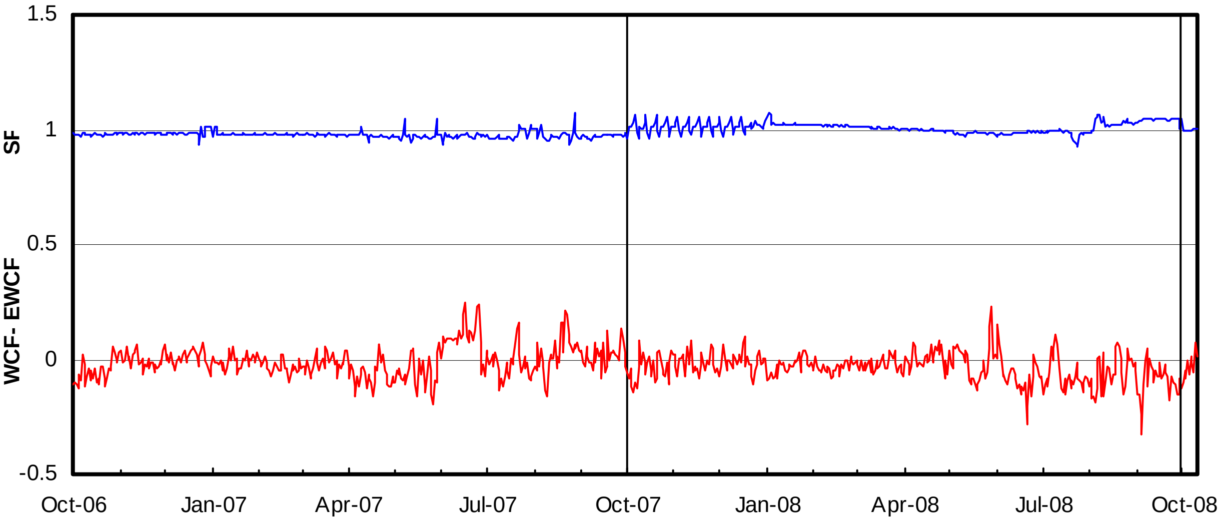

Figure 2

Weather Correction and Scaling Factor: NO

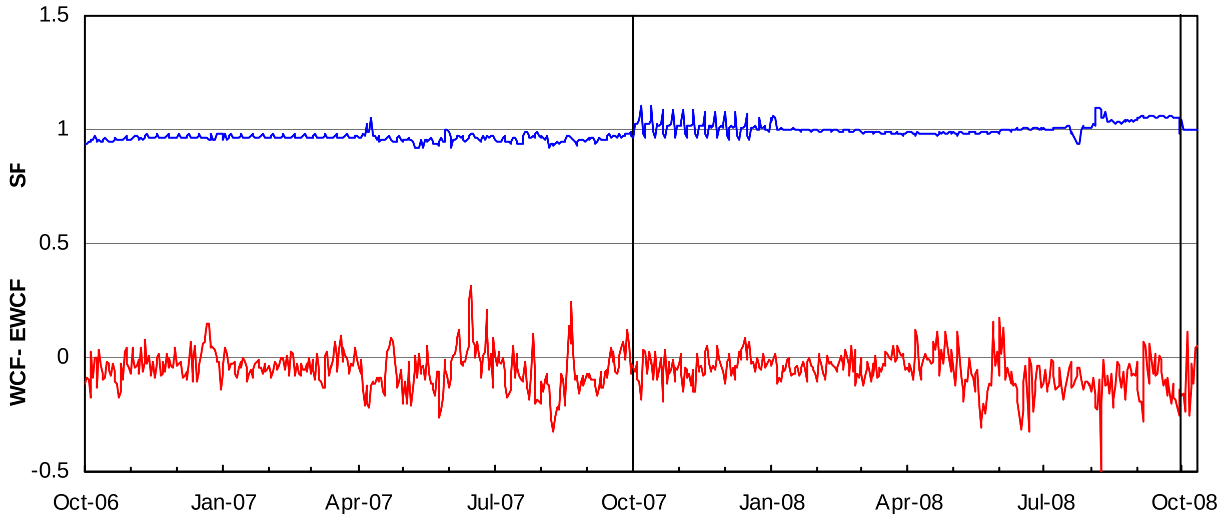

Figure 3

Weather Correction and Scaling Factor: NW

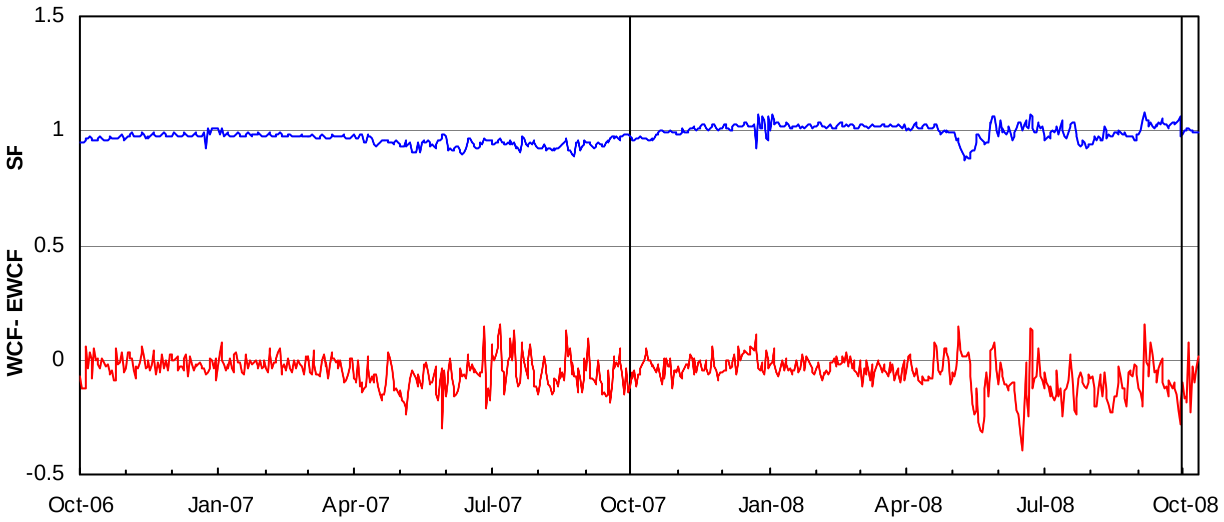

Figure 4

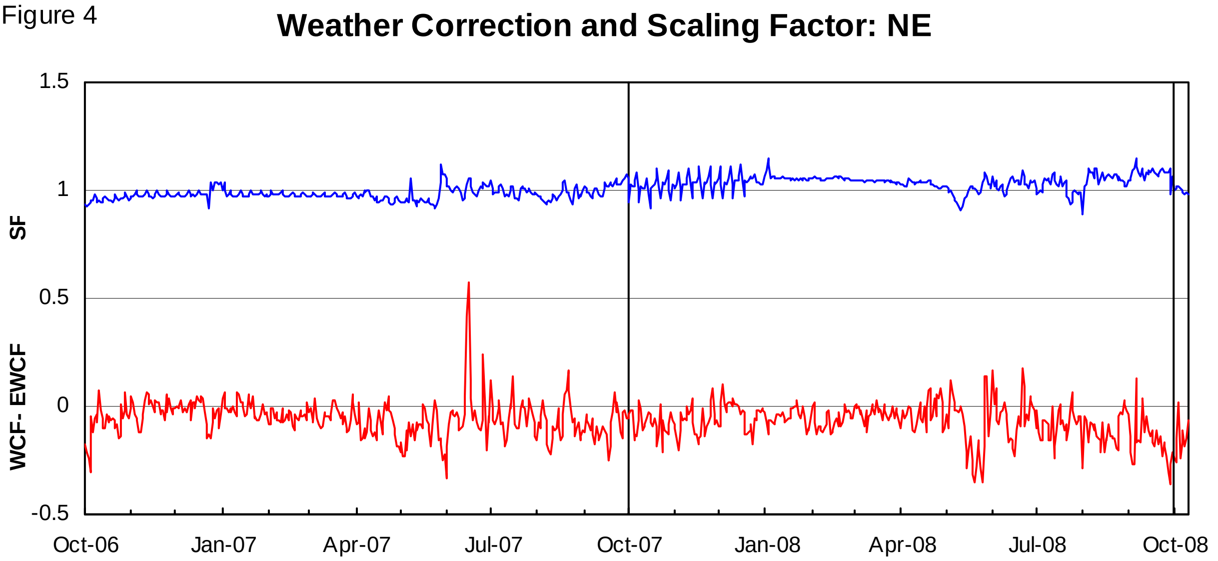

Figure 5

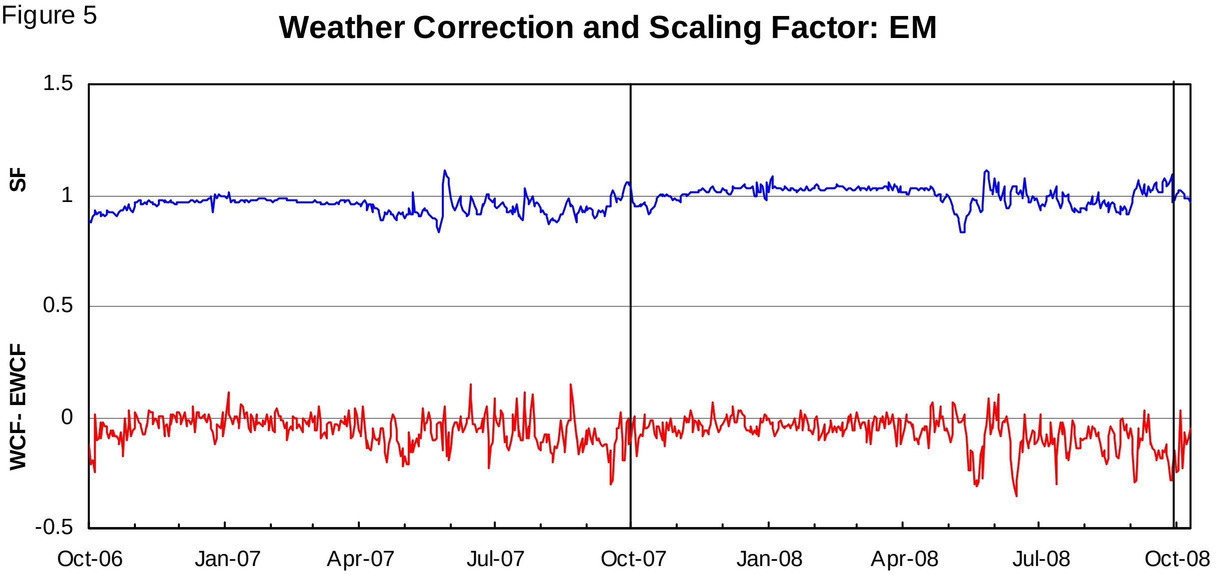

Figure 6

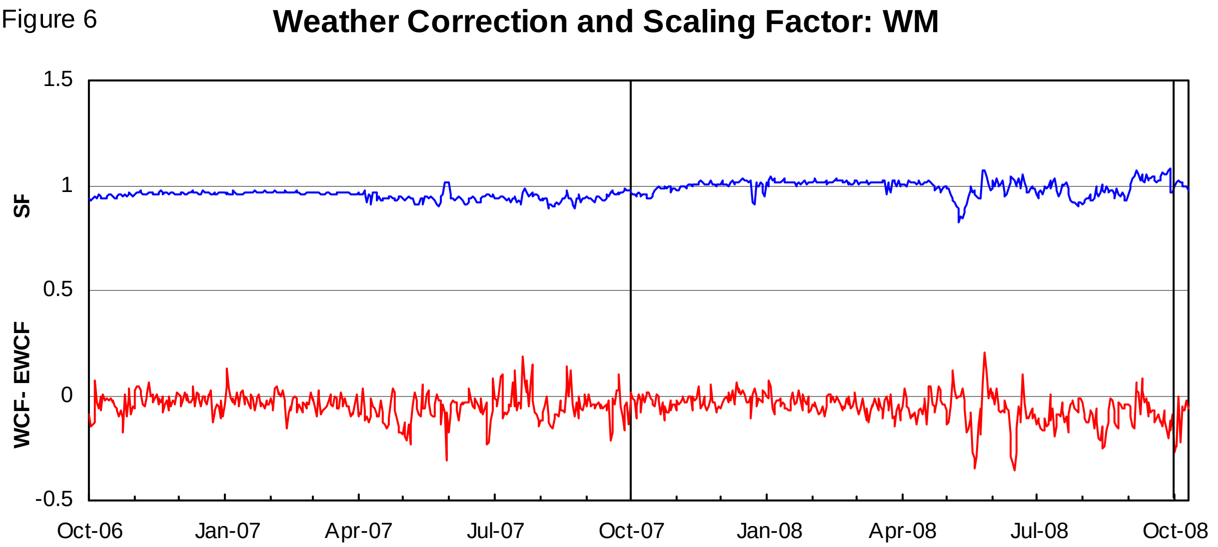

Figure 7

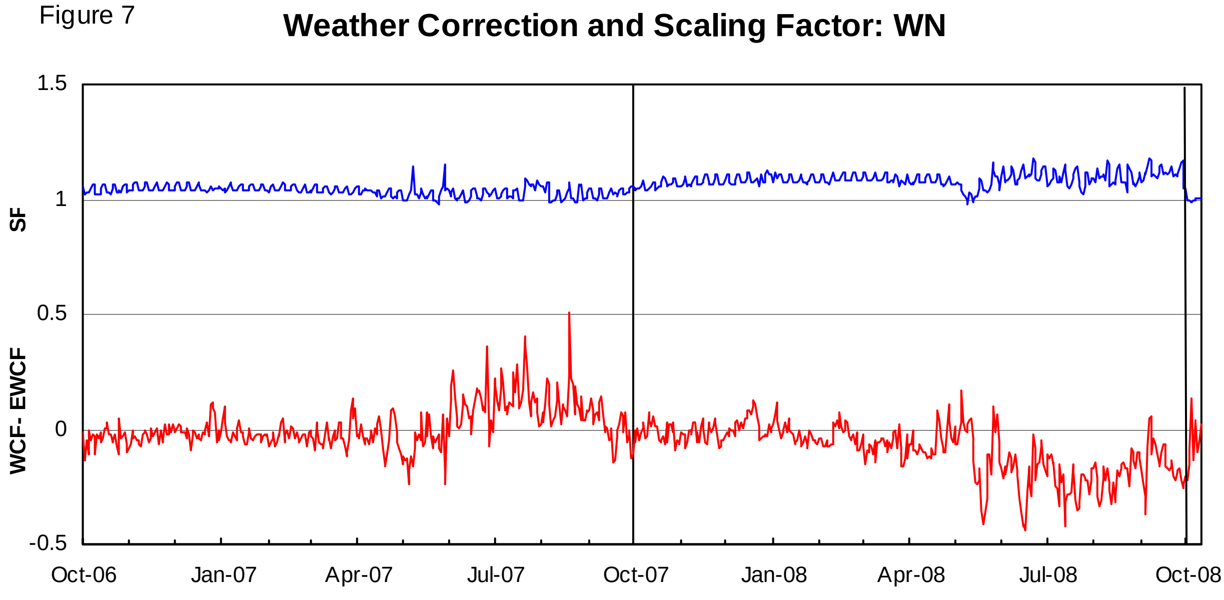

Figure 8

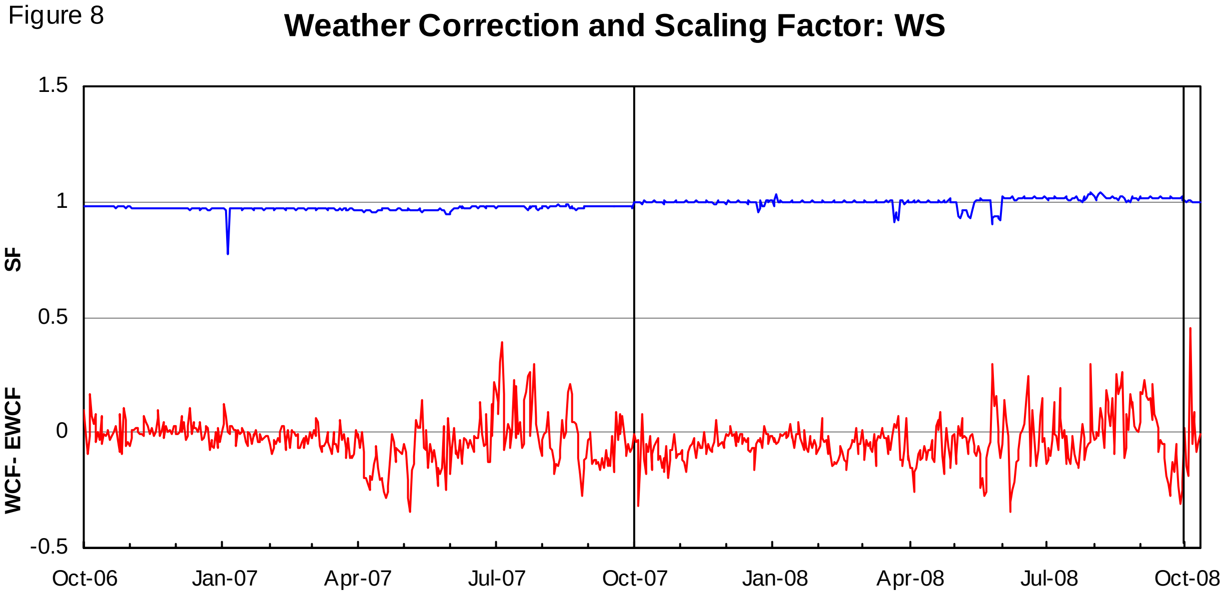

Figure 9

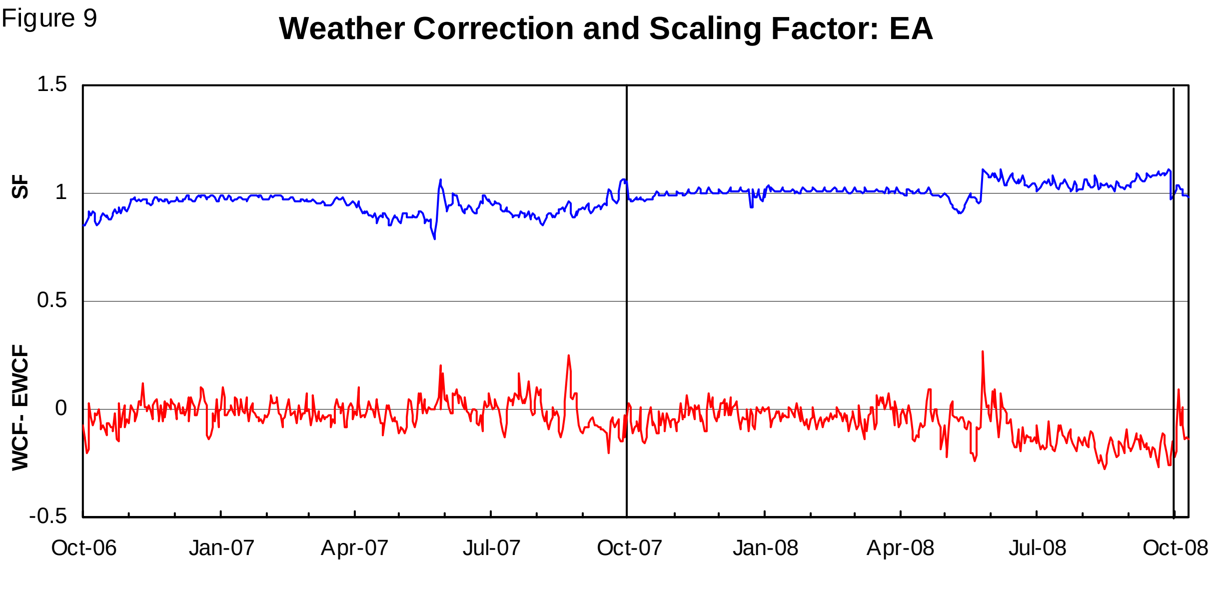

Figure 10

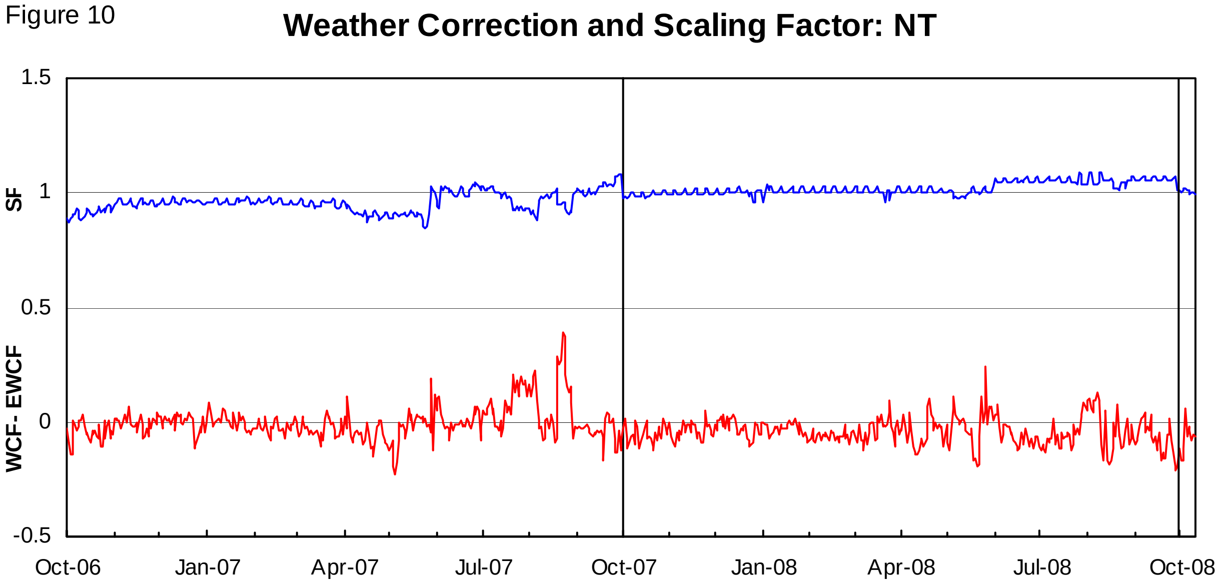

Figure 11

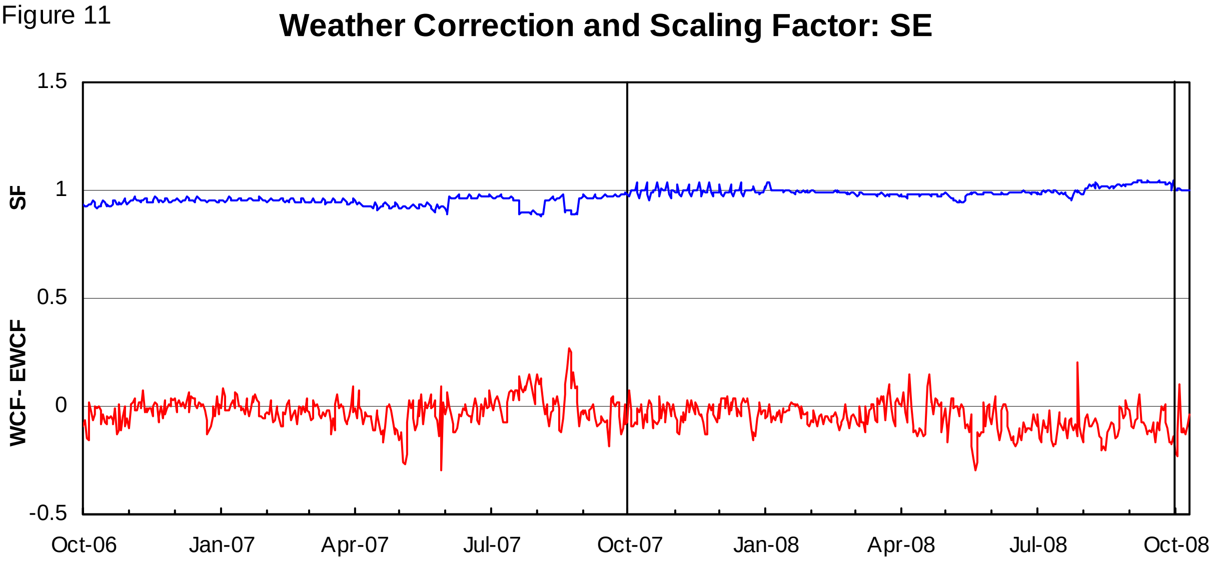

Figure 12

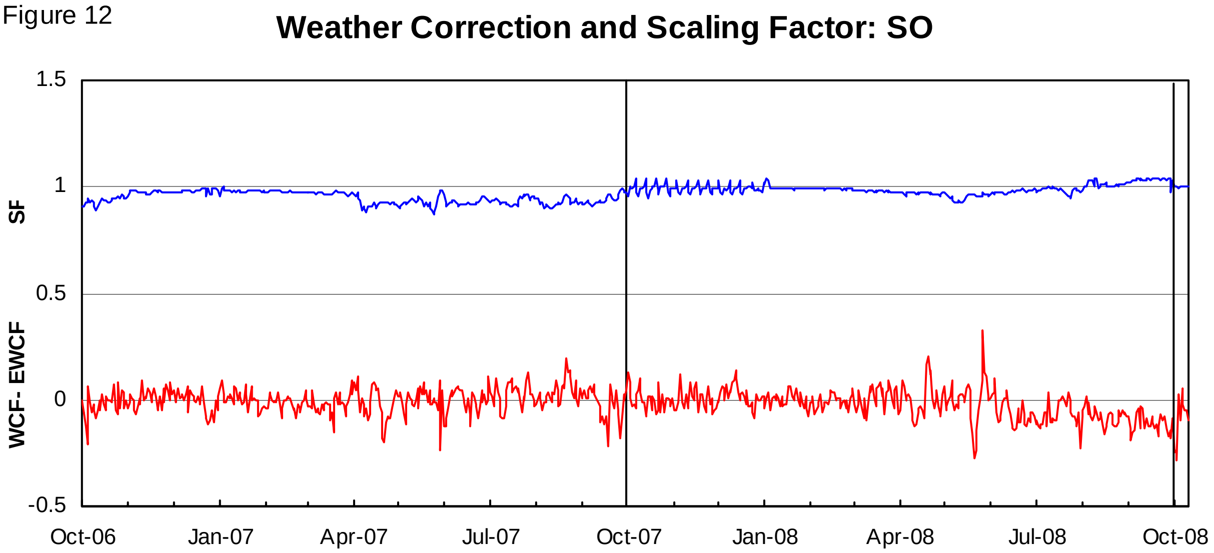

Figure 13

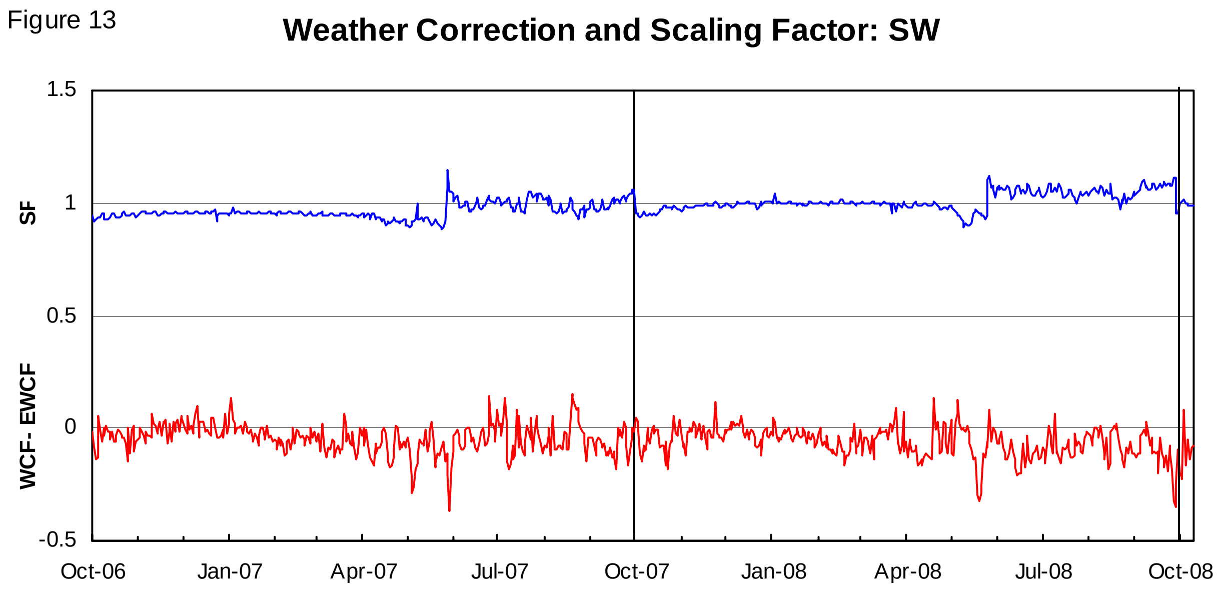
Weather Correction and Scaling Factor: SW
1.5
1
0.5
0
-0.5
SF
WCF- EWCF
Oct-06
Jan-07
Apr-07
Jul-07
Oct-07
Jan-08
Apr-08
Jul-08
Oct-08

Table 1: Average Values of SF Gas Year 2006/07

LDZ	Mon-Thur	Friday	Saturday	Sunday	Winter	Summer
SC	0.979	0.969	0.977	0.986	0.982	0.975
NO	0.960	0.966	0.973	0.963	0.966	0.960
NW	0.958	0.963	0.968	0.963	0.977	0.944
NE	0.977	0.985	0.998	0.988	0.978	0.988
EM	0.953	0.957	0.955	0.955	0.965	0.943
WM	0.949	0.948	0.958	0.954	0.961	0.941
WN	1.025	1.040	1.057	1.058	1.046	1.027
WS	0.972	0.974	0.973	0.970	0.971	0.973
EA	0.940	0.939	0.945	0.944	0.959	0.923
NT	0.954	0.957	0.968	0.966	0.951	0.965
SE	0.944	0.944	0.956	0.951	0.950	0.943
SO	0.951	0.948	0.950	0.949	0.970	0.931
SW	0.958	0.960	0.974	0.979	0.952	0.976
AVG	**0.963**	**0.965**	**0.973**	**0.971**	**0.971**	**0.961**

Table 2: Average Values of SF Gas Year 2007/08

LDZ	Mon-Thur	Friday	Saturday	Sunday	Winter	Summer
SC	1.007	1.014	1.021	1.004	1.015	1.004
NO	1.008	1.008	1.022	0.998	1.005	1.011
NW	0.999	1.005	1.009	1.012	1.012	0.995
NE	1.032	1.039	1.056	1.040	1.042	1.033
EM	1.001	0.999	1.008	1.003	1.017	0.987
WM	0.992	0.994	1.001	0.992	1.003	0.985
WN	1.072	1.085	1.115	1.116	1.082	1.090
WS	1.002	0.999	0.996	1.004	0.996	1.006
EA	1.013	1.016	1.031	1.024	1.004	1.031
NT	1.014	1.018	1.035	1.037	1.004	1.037
SE	0.994	0.994	1.006	0.992	0.994	0.997
SO	0.988	0.989	1.001	0.986	0.991	0.988
SW	1.004	1.003	1.019	1.020	0.990	1.026
AVG	**1.010**	**1.013**	**1.024**	**1.018**	**1.012**	**1.015**

Table 3: Difference Between Average Values of SF in Gas Year 2006/07 and 2007/08

LDZ	Mon-Thur	Friday	Saturday	Sunday	Winter	Summer
SC	0.014	0.017	0.002	0.010	0.003	0.021
NO	0.032	0.026	0.005	0.035	0.029	0.029
NW	0.041	0.032	0.023	0.025	0.011	0.051
NE	-0.009	-0.024	-0.054	-0.028	-0.020	-0.021
EM	0.046	0.042	0.037	0.042	0.018	0.044
WM	0.043	0.046	0.041	0.038	0.036	0.044

WN	-0.047	-0.045	-0.058	-0.058	-0.036	-0.063
WS	0.026	0.025	0.023	0.026	0.025	0.021
EA	0.047	0.045	0.024	0.032	0.037	0.046
NT	0.032	0.025	-0.003	-0.003	0.045	-0.002
SE	0.050	0.050	0.038	0.041	0.044	0.054
SO	0.037	0.041	0.049	0.037	0.021	0.057
SW	0.038	0.037	0.007	0.001	0.038	-0.002

Table 4: Average Values of WCF – EWCF Gas Year 2006/07

LDZ	Mon-Thur	Friday	Saturday	Sunday	Winter	Summer
SC	-0.014	0.001	0.001	-0.006	-0.018	0.000
NO	-0.049	-0.045	-0.053	-0.040	-0.031	-0.064
NW	-0.049	-0.042	-0.042	-0.029	-0.020	-0.068
NE	-0.061	-0.036	-0.050	-0.044	-0.035	-0.071
EM	-0.060	-0.042	-0.059	-0.044	-0.032	-0.077
WM	-0.049	-0.032	-0.057	-0.034	-0.032	-0.059
WN	0.004	0.013	0.020	0.037	-0.023	0.048
WS	-0.033	-0.025	-0.036	-0.002	-0.008	-0.048
EA	-0.011	-0.013	-0.030	-0.016	-0.017	-0.012
NT	-0.001	-0.009	-0.015	0.001	-0.017	0.010
SE	-0.016	-0.020	-0.027	-0.017	-0.020	-0.017
SO	-0.004	-0.001	-0.008	-0.005	-0.010	0.001
SW	-0.047	-0.039	-0.050	-0.040	-0.028	-0.063
AVG	**-0.030**	**-0.022**	**-0.031**	**-0.018**	**-0.023**	**-0.032**

Table 5: Average Values of WCF – EWCF Gas Year 2007/08

LDZ	Mon-Thur	Friday	Saturday	Sunday	Winter	Summer
SC	-0.030	-0.045	-0.048	-0.040	-0.024	-0.049
NO	-0.062	-0.059	-0.063	-0.059	-0.037	-0.086
NW	-0.061	-0.051	-0.052	-0.074	-0.028	-0.092
NE	-0.074	-0.071	-0.070	-0.068	-0.055	-0.089
EM	-0.065	-0.064	-0.073	-0.072	-0.038	-0.097
WM	-0.058	-0.059	-0.055	-0.061	-0.035	-0.082
WN	-0.091	-0.077	-0.077	-0.101	-0.022	-0.155
WS	-0.038	-0.055	-0.031	-0.055	-0.055	-0.028
EA	-0.070	-0.086	-0.075	-0.077	-0.032	-0.117
NT	-0.040	-0.048	-0.039	-0.050	-0.040	-0.045
SE	-0.056	-0.069	-0.049	-0.048	-0.032	-0.079
SO	-0.022	-0.029	-0.028	-0.029	0.003	-0.053
SW	-0.062	-0.060	-0.051	-0.083	-0.040	-0.087
AVG	**-0.056**	**-0.060**	**-0.055**	**-0.063**	**-0.033**	**-0.081**

Table 6: Difference Between Average Values of WCF – EWCF in Gas Year 2006/07 and 2007/08

LDZ	Mon-Thur	Friday	Saturday	Sunday	Winter	Summer
SC	-0.016	-0.045	-0.047	-0.034	-0.006	-0.049
NO	-0.013	-0.014	-0.010	-0.019	-0.006	-0.022
NW	-0.012	-0.009	-0.010	-0.044	-0.007	-0.024
NE	-0.014	-0.035	-0.019	-0.024	-0.020	-0.018
EM	-0.006	-0.022	-0.014	-0.029	-0.006	-0.019
WM	-0.010	-0.027	0.002	-0.028	-0.003	-0.023
WN	-0.087	-0.064	-0.057	-0.064	0.001	-0.107
WS	-0.005	-0.030	0.005	-0.053	-0.048	0.019
EA	-0.059	-0.073	-0.046	-0.061	-0.014	-0.105
NT	-0.039	-0.039	-0.025	-0.049	-0.023	-0.035
SE	-0.039	-0.049	-0.022	-0.031	-0.012	-0.062
SO	-0.018	-0.029	-0.019	-0.025	0.006	-0.052
SW	-0.015	-0.021	0.000	-0.043	-0.011	-0.024

Table 7: Root Mean Square Deviation of SF from 1 Gas Year 2006/07

LDZ	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
SC	0.0202	0.0171	0.0216	0.0191	0.0201	0.0223	0.0275	0.0331	0.0304	0.0305	0.0333	0.0275
NO	0.0460	0.0342	0.0313	0.0319	0.0314	0.0320	0.0386	0.0536	0.0388	0.0441	0.0495	0.0354
NW	0.0370	0.0222	0.0223	0.0194	0.0213	0.0255	0.0438	0.0612	0.0675	0.0575	0.0736	0.0455
NE	0.0443	0.0237	0.0266	0.0197	0.0208	0.0253	0.0401	0.0585	0.0263	0.0214	0.0366	0.0334
EM	0.0786	0.0330	0.0261	0.0235	0.0251	0.0341	0.0754	0.0921	0.0538	0.0583	0.0859	0.0574
WM	0.0539	0.0379	0.0369	0.0348	0.0345	0.0379	0.0575	0.0672	0.0633	0.0585	0.0754	0.0512
WN	0.0453	0.0524	0.0508	0.0501	0.0493	0.0426	0.0325	0.0463	0.0282	0.0478	0.0379	0.0345
WS	0.0216	0.0265	0.0291	0.0504	0.0303	0.0321	0.0362	0.0374	0.0253	0.0225	0.0227	0.0192
EA	0.1042	0.0339	0.0255	0.0227	0.0264	0.0413	0.1039	0.1166	0.0600	0.0870	0.0981	0.0557
NT	0.0882	0.0460	0.0401	0.0393	0.0408	0.0492	0.0925	0.0954	0.0263	0.0457	0.0553	0.0394
SE	0.0634	0.0472	0.0460	0.0457	0.0475	0.0522	0.0714	0.0781	0.0415	0.0697	0.0781	0.0284
SO	0.0677	0.0239	0.0214	0.0201	0.0221	0.0291	0.0802	0.0765	0.0736	0.0667	0.0750	0.0616
SW	0.0595	0.0439	0.0460	0.0439	0.0467	0.0516	0.0735	0.0852	0.0203	0.0297	0.0351	0.0271
AVG	**0.0562**	**0.0340**	**0.0326**	**0.0324**	**0.0320**	**0.0366**	**0.0595**	**0.0693**	**0.0427**	**0.0492**	**0.0582**	**0.0397**

Table 8: Root Mean Square Deviation of SF from 1 Gas Year 2007/08

LDZ	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
SC	0.0294	0.0278	0.0254	0.0289	0.0186	0.0087	0.0040	0.0171	0.0149	0.0246	0.0333	0.0448
NO	0.0431	0.0370	0.0316	0.0166	0.0044	0.0139	0.0169	0.0143	0.0051	0.0231	0.0503	0.0542
NW	0.0254	0.0146	0.0359	0.0261	0.0244	0.0227	0.0162	0.0663	0.0295	0.0387	0.0272	0.0370
NE	0.0453	0.0516	0.0545	0.0645	0.0543	0.0427	0.0334	0.0433	0.0410	0.0434	0.0659	0.0855
EM	0.0385	0.0191	0.0320	0.0335	0.0337	0.0332	0.0239	0.0850	0.0349	0.0442	0.0541	0.0429
WM	0.0362	0.0118	0.0291	0.0178	0.0184	0.0184	0.0144	0.0777	0.0259	0.0505	0.0486	0.0456
WN	0.0647	0.0797	0.0905	0.0872	0.0931	0.0909	0.0830	0.0642	0.1128	0.0937	0.1032	0.1222
WS	0.0043	0.0049	0.0116	0.0079	0.0035	0.0253	0.0034	0.0464	0.0159	0.0180	0.0201	0.0176
EA	0.0225	0.0094	0.0227	0.0155	0.0144	0.0131	0.0112	0.0641	0.0631	0.0407	0.0403	0.0771
NT	0.0140	0.0100	0.0147	0.0163	0.0153	0.0171	0.0142	0.0153	0.0545	0.0548	0.0533	0.0590
SE	0.0204	0.0172	0.0158	0.0109	0.0092	0.0197	0.0217	0.0311	0.0133	0.0176	0.0214	0.0369
SO	0.0245	0.0201	0.0185	0.0114	0.0093	0.0203	0.0314	0.0498	0.0233	0.0207	0.0176	0.0350
SW	0.0397	0.0154	0.0096	0.0089	0.0057	0.0124	0.0152	0.0692	0.0575	0.0486	0.0429	0.0759
AVG	**0.0314**	**0.0245**	**0.0302**	**0.0266**	**0.0234**	**0.0260**	**0.0222**	**0.0495**	**0.0378**	**0.0399**	**0.0445**	**0.0564**

Table 9: Difference Between Gas Year 2006/07 and 2007/08

LDZ	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
SC	-0.0092	-0.0107	-0.0038	-0.0098	0.0015	0.0136	0.0235	0.0160	0.0155	0.0059	0.0000	-0.0173
NO	0.0029	-0.0028	-0.0003	0.0153	0.0270	0.0181	0.0217	0.0393	0.0337	0.0210	-0.0008	-0.0188
NW	0.0116	0.0076	-0.0136	-0.0067	-0.0031	0.0028	0.0276	-0.0051	0.0380	0.0188	0.0464	0.0085
NE	-0.0010	-0.0279	-0.0279	-0.0448	-0.0335	-0.0174	0.0067	0.0152	-0.0147	-0.0220	-0.0293	-0.0521
EM	0.0401	0.0139	-0.0059	-0.0100	-0.0086	0.0009	0.0515	0.0071	0.0189	0.0141	0.0318	0.0145
WM	0.0177	0.0261	0.0078	0.0170	0.0161	0.0195	0.0431	-0.0105	0.0374	0.0080	0.0268	0.0056
WN	-0.0194	-0.0273	-0.0397	-0.0371	-0.0438	-0.0483	-0.0505	-0.0179	-0.0846	-0.0459	-0.0653	-0.0877
WS	0.0173	0.0216	0.0175	0.0425	0.0268	0.0068	0.0328	-0.0090	0.0094	0.0045	0.0026	0.0016
EA	0.0817	0.0245	0.0028	0.0072	0.0120	0.0282	0.0927	0.0525	-0.0031	0.0463	0.0578	-0.0214
NT	0.0742	0.0360	0.0254	0.0230	0.0255	0.0321	0.0783	0.0801	-0.0282	-0.0091	0.0020	-0.0196
SE	0.0430	0.0300	0.0302	0.0348	0.0383	0.0325	0.0497	0.0470	0.0282	0.0521	0.0567	-0.0085
SO	0.0432	0.0038	0.0029	0.0087	0.0128	0.0088	0.0488	0.0267	0.0503	0.0460	0.0574	0.0266
SW	0.0198	0.0285	0.0364	0.0350	0.0410	0.0392	0.0583	0.0160	-0.0372	-0.0189	-0.0078	-0.0488
AVG	**0.0248**	**0.0095**	**0.0024**	**0.0058**	**0.0086**	**0.0105**	**0.0372**	**0.0198**	**0.0049**	**0.0093**	**0.0137**	**-0.0167**

TABLE 10: NDM WEATHER CORRECTED DEMAND AS % OF NDM SEASONAL NORMAL DEMAND GAS YEAR 2006/07

LDZ	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
SC	94.63%	99.64%	100.51%	99.36%	96.65%	98.48%	93.04%	94.36%	109.64%	97.86%	103.51%	102.02%
NO	93.96%	97.93%	99.51%	96.08%	96.04%	97.47%	91.37%	90.76%	103.73%	92.20%	88.77%	96.24%
NW	96.98%	98.97%	97.73%	98.84%	98.41%	96.93%	91.06%	89.26%	93.28%	98.58%	94.13%	92.65%
NE	92.80%	98.84%	97.60%	99.16%	95.14%	95.62%	91.17%	88.03%	99.54%	94.65%	92.50%	91.41%
EM	91.74%	98.31%	97.91%	99.26%	97.48%	96.19%	90.73%	90.85%	96.68%	95.47%	91.26%	88.48%
WM	94.60%	98.52%	97.02%	98.30%	96.73%	95.51%	91.29%	91.32%	94.53%	98.67%	94.41%	94.43%
WN	95.91%	97.59%	99.56%	97.97%	97.26%	97.57%	96.85%	93.13%	109.92%	114.98%	111.65%	100.34%
WS	100.24%	101.53%	100.07%	99.71%	97.12%	96.25%	85.91%	90.46%	96.24%	108.58%	96.56%	92.94%
EA	93.15%	100.79%	99.14%	99.73%	99.73%	97.55%	98.19%	99.45%	101.04%	101.71%	100.15%	91.35%
NT	95.37%	99.59%	99.47%	100.23%	98.21%	96.92%	95.16%	96.99%	100.27%	107.50%	107.66%	95.40%
SE	94.16%	99.59%	99.31%	100.22%	97.48%	97.01%	94.30%	93.96%	97.08%	103.94%	103.66%	95.46%
SO	97.98%	100.99%	98.87%	100.65%	98.58%	97.54%	98.26%	99.34%	99.51%	102.03%	103.57%	97.60%
SW	95.66%	99.71%	100.31%	98.81%	94.77%	93.64%	91.76%	88.01%	96.59%	95.63%	97.23%	93.19%

TABLE 11: NDM WEATHER CORRECTED DEMAND AS % OF NDM SEASONAL NORMAL DEMAND GAS YEAR 2007/08

LDZ	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
SC	96.37%	98.52%	99.19%	97.17%	96.65%	97.94%	100.49%	98.96%	92.83%	93.07%	95.02%	90.76%
NO	95.13%	95.26%	98.44%	94.93%	96.77%	97.05%	100.14%	91.23%	90.07%	90.21%	87.95%	88.96%
NW	96.26%	96.81%	100.46%	97.04%	97.49%	95.24%	96.23%	93.20%	88.67%	88.23%	88.03%	90.24%
NE	91.82%	92.60%	96.70%	94.83%	93.73%	96.74%	96.96%	89.71%	95.89%	91.12%	89.04%	83.43%
EM	94.45%	96.49%	98.13%	96.34%	95.42%	96.23%	95.93%	90.64%	90.16%	89.94%	90.89%	84.80%
WM	95.99%	97.19%	99.13%	96.68%	96.07%	93.48%	95.17%	93.73%	89.93%	90.37%	89.29%	91.44%
WN	98.50%	98.13%	102.01%	97.95%	97.23%	92.55%	94.25%	91.06%	80.08%	77.02%	80.45%	84.17%
WS	90.67%	93.68%	96.75%	96.97%	92.91%	95.41%	91.17%	95.10%	95.81%	96.63%	106.25%	94.42%
EA	93.52%	98.08%	98.40%	96.95%	96.00%	97.87%	94.67%	93.92%	92.12%	85.45%	82.04%	81.82%
NT	94.87%	96.09%	97.46%	96.79%	94.07%	96.48%	95.60%	98.24%	94.47%	94.31%	97.69%	91.44%
SE	96.65%	96.01%	98.22%	96.84%	94.35%	98.17%	96.86%	92.25%	91.25%	90.09%	91.44%	91.00%
SO	99.64%	99.65%	102.22%	99.98%	99.41%	100.71%	99.79%	99.22%	94.23%	93.16%	92.38%	88.91%
SW	95.21%	97.35%	98.03%	96.97%	92.45%	95.94%	92.41%	93.03%	88.42%	91.99%	93.26%	87.63%

TABLE 12: EQUILIBRIUM SFS

LDZ	Equilibrium SF		WCF bias and SF				Comments
	Month	SF Value (adjusted for residual bias)	Winter Only Mon-Thu Values		Winter Only All Days Values		
			WCF bias	SF	WCF bias	SF	
SC	Dec	1.006	-0.020	1.010	-0.024	1.015	• WCF bias would tend to increase SF (by ~2 %pts.) from its observed value; therefore AQs appear to be too high (by ~1%). • Equilibrium SF slightly lower than observed winter SFs. • Equilibrium SF suggests AQs are slightly too low.
NO	Dec	0.994	-0.033	1.003	-0.037	1.005	• WCF bias would tend to increase SF (by ~3 %pts.) from its observed value; therefore AQs appear to be too high (by ~3%). • Equilibrium SF slightly lower than observed winter SFs. • Equilibrium SF suggests AQs are only very slightly too high.
NW	Dec, Feb	1.020(D) 0.998(F)	-0.028	1.009	-0.028	1.012	• WCF bias would tend to increase SF (by ~ 3 %pts.) from its observed value; therefore AQs appear to be too high (by ~2%). • One potential equilibrium SF higher than observed winter SFs. • Equilibrium SF suggests AQs could be okay or too low (by ~2%).
NE	Dec, Mar	1.011(D) 1.009(M)	-0.053	1.034	-0.055	1.042	• WCF bias would tend to increase SF (by ~5 %pts.) from its observed value; therefore AQs appear to be too high (by ~1-2%). • Equilibrium SF lower than observed winter SFs. • Equilibrium SF suggests AQs could be too low (by ~1%).
EM	Dec	1.008	-0.039	1.017	-0.038	1.017	• WCF bias would tend to increase SF (by ~ 4 %pts.) from its equilibrium value; therefore AQs appear to be too high (by ~2%). • Equilibrium SF lower than observed winter SFs. • Equilibrium SF suggests AQs could be too low (by ~1%).
WM	Dec	0.995	-0.036	1.003	-0.035	1.003	• WCF bias would tend to increase SF (by ~ 3 %pts.) from its equilibrium value; therefore AQs appear to be too high (by ~3%). • Equilibrium SF lower than observed winter SFs. • Equilibrium SF also suggests AQs are too high (by <1%).
WN	Oct	1.049	-0.023	1.071	-0.022	1.082	• WCF bias would tend to increase SF (by ~ 2 %pts.) from its equilibrium value; this suggests AQs are too low by 5-6%. • Equilibrium SF also indicates AQs are too low (but by ~5%). • AQs are too low due to portfolio error - supply points incorrectly assigned to other adjacent LDZs.
WS	Dec, Jan	0.962(D) 0.969(J)	-0.060	0.997	-0.055	0.996	• WCF bias would tend to increase SF (by ~ 6 %pts.) from its equilibrium value; therefore AQs could be too high (by ~6%). • Equilibrium SF lower than observed winter SFs. • Equilibrium SF also suggests AQs could be too high (by 3-4%).
EA	Nov, Dec	0.984(N) 0.986(D)	-0.027	1.001	-0.032	1.004	• WCF bias would tend to increase SF (by ~ 3 %pts.) from its equilibrium value; therefore AQs could be too high (by ~3%). • Equilibrium SF lower than observed winter SFs. • Equilibrium SF also suggests AQs are too high (by ~2%).
NT	Dec	0.978	-0.036	0.997	-0.040	1.004	• WCF bias would tend to increase SF (by ~ 4 %pts.) from its equilibrium value; therefore AQs could be too high (by ~4%). • Equilibrium SF lower than observed winter SFs. • Equilibrium SF also suggests AQs could be too high (by ~2%).
SE	Dec, Mar	0.981(D) 0.965(M)	-0.031	0.992	-0.032	0.994	• WCF bias would tend to increase SF (by ~ 3 %pts.) from its equilibrium value; therefore AQs could be too high (by ~4%). • Possible equilibrium SFs lower than observed winter SFs. • Equilibrium SFs also suggest AQs could be too high (by 2-4%).
SO	Jan	0.996	+0.012	0.989	+0.003	0.991	• WCF bias would tend to decrease SF (by up to 1 %pt.) from its equilibrium value; therefore AQs appear to be to be broadly okay or possibly very slightly too high. • Equilibrium SF very similar to observed winter SFs. • Equilibrium SF also suggests AQs are broadly okay.
SW	Dec	0.978	-0.038	0.988	-0.040	0.990	• WCF bias would tend to increase SF (by ~ 4 %pts.) from its equilibrium value; therefore AQs could be too high (by ~5%). • Equilibrium SF lower than observed winter SFs. • Equilibrium SF also suggests AQs could be too high (by ~2%).

Table 13: Aggregate NDM AQs at Start of Gas Year 2008/09

(Based on data extracted from the Gemini system for gas days 25/09/08 and 10/10/2008)

LDZ	% NDM AQ Change
SC	-2.5%
NO	-4.4%
NW	-3.6%
NE	-2.6%
EM	-4.1%
WM	-3.5%
WN	-5.0%
WS	-5.0%
EA	-3.3%
NT	-3.1%
SE	-3.4%
SO	-2.4%
SW	-4.0%
Overall	-3.4%