EVALUATION OF ALGORITHM PERFORMANCE – 2013/14 GAS YEAR SCALING FACTOR AND WEATHER CORRECTION FACTOR

1.0 Background

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

- daily values of scaling factor (SF) and weather correction factor (WCF)
- reconciliation variance data for each end user category (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.

At the outset, it is worth setting out the characteristics of the key variables: the scaling factor (SF) and the weather correction factor (WCF).

The SF is a multiplier used to ensure that within each LDZ, aggregate NDM allocations equal total actual NDM demand. The ideal value of the SF is one, but variations may occur for a number of reasons including imperfections in the algorithms, but also errors in aggregate AQs and in measured LDZ and DM consumption (because aggregate NDM consumption is determined by difference: i.e. LDZ consumption-DM consumption), and deviations in aggregate NDM demand in the LDZ under average weather conditions away from the sum (for all end user categories (EUCs) in the LDZ) of Annual Load Profile (ALP) weighted daily average consumption based on EUC AQs. If other factors (most notably AQs) are not material, a scaling factor of less than one indicates a tendency of the NDM profiling algorithms to over allocate.

Up to the end of gas year 2007/08, the WCF represented the extent to which actual aggregate NDM demand in the LDZ differed from the forecast (before the year) seasonal normal demand (SND) for aggregate NDM in the LDZ. When actual aggregate NDM demand equalled seasonal normal demand, then WCF was zero. Typically, demand would have been above SND when it was colder than normal and below SND when it was warmer, and the WCF responded accordingly. However, if there had been an unforeseen growth in demand, then this would have been reflected in generally higher values of WCF than implied by the weather alone. Similarly, if demand had been unseasonably depressed (e.g. with early heating load switch-off or sustained demand loss due to high energy prices), then the WCF would have taken on a value lower than that expected solely due to the weather.

As a result of adoption of UNC Modification 204, the WCF applied from the start of gas year 2008/09 was redefined. WCF is now the extent to which actual aggregate NDM demand in the LDZ differs from the sum for all EUCs of ALP weighted daily average consumption based on EUC AQs in each LDZ. In the computation of WCF, the sum of ALP weighted daily average consumption for all EUCs in each LDZ (based on EUC AQs at the start of the gas year and potentially subject to revision periodically within the gas year) replaced year ahead forecast aggregate NDM SND in each LDZ. Broadly, WCF is still expected to take on positive values under conditions of cold weather and negative values under conditions of warm weather. Moreover, the effect on WCF of unforeseen growth in demand or unseasonably depressed demand would also broadly remain the same as before, with WCF respectively taking on higher or lower values than otherwise in these instances. However, the sum of ALP weighted daily average consumption for all EUCs in a LDZ is clearly not the same as a forecast value of aggregate NDM SND in the LDZ. Thus, the effect on WCF of unforeseen growth in demand or unseasonably depressed demand is now less clear. An excess in EUC AQs would tend to depress WCF and a deficit would tend to inflate WCF from the values it would otherwise have taken. So, UNC Modification 204 has replaced one potential source of error in the WCF calculation with another.

Up to the end of gas year 2007/08, any bias in WCF caused by seasonal normal demands for aggregate NDM in the LDZ being under or overstated would be observed by monitoring the quantity WCF-EWCF. The EWCF (estimated weather correction factor) is calculated directly from the demand model for aggregate NDM in the LDZ and captures the effects of weather alone on demand. The difference between WCF and EWCF thus isolates the non-weather component of the WCF. From 1st October 2008 onwards, WCF-EWCF merely reflects the difference between actual NDM demand relative to ALP weighted daily average demand (based on EUC AQs) and computed NDM demand relative to NDM SND. The EWCF (derived from a demand model for aggregate NDM as before) still captures the impact of weather alone on demand, but, for gas years 2008/09 onwards, the difference WCF-EWCF is no longer a measure of bias in the WCF due to SND for aggregate NDM in the LDZ being under or overstated. An equivalent measure to WCF-ECWF that captures the bias in the new definition of WCF due to EUC AQ error cannot be formulated, since there is no means of

separately and differently computing in a manner free of EUC AQ error, the sum for all EUCs of ALP weighted daily average consumption based on EUC AQs in each LDZ.

Figures 1 to 13 show graphs of the daily values of SF and WCF for each LDZ for two whole gas years 2012/13 and 2013/14. It should also be noted that SF and WCF values have also been obtained for the period 1st to 10th October 2014 (the start of the new gas year 2014/15) and appended to the graphs of the previous two completed gas years. Tables of average values of SF, WCF-EWCF and WCF, for gas years 2012/13 and 2013/14, along with the improvement or degradation in these averages between the two gas years, are presented in Tables 1 to 9. The root mean square (RMS) deviation of SF from 1 has also been computed for each discrete month during the previous gas years 2012/13 and 2013/14, and the respective figures can be found in Tables 10 and 11. The differences in these RMS values between the two gas years are presented in Table 12. These figures provide a very useful measure of the variability of SFs about one (the ideal value). In addition, Tables 13 and 14 provide monthly values of weather corrected NDM demand expressed as a percentage of aggregate NDM seasonal normal demand (SND) for each month of gas years 2012/13 and 2013/14 respectively.

2.0 Overall Results

These various graphs and tables indicate the following notable points:

- During gas year 2012/13 average SF values were less than or equal to one (over Mondays to Thursdays, Fridays, weekend days and summer) in 9 out of 13 LDZs. During gas year 2013/14 average SF values were less than or equal to one (over days of the week, weekend days, winter and summer) in all LDZs expect LDZ NT.
- For all 13 LDZs on Mondays to Thursdays, 12 out of 13 LDZs on Fridays and 9 out of 13 LDZs on Weekend days, average values of SF showed slight deterioration in 2013/14 (i.e. were further from the ideal value of 1) compared to the previous gas year (2012/13). There was no change in EM and NT LDZs during winter and WM LDZ on weekend days. However, LDZs NE, EM and WS displayed an improved SF value on Saturdays.
- Over the winter period of 2013/14 average values of SF showed marginal deterioration (i.e. were further from the ideal value of one) in 10 LDZs compared to the winter period of the previous gas year (2012/13).
- Average SF values for all of summer 2013/14 also showed slight deterioration over summer 2012/13 in 12 out of 13 LDZs, with the smallest deterioration being 0.003 (in LDZ WS) and largest being 0.024 (in LDZ WN).
- The RMS deviation of SF from the ideal value of one provides a measure of the variability of SFs. During winter 2013/14, October 2013 was slightly warmer than seasonal normal (the 7th warmest in the last 50 years) with the beginning and end of the month being much warmer than seasonal normal and the middle of the month being much colder than seasonal normal. November 2013 was colder than current seasonal normal overall with most days in the month having much colder than normal temperatures. December 2013 was warmer than seasonal normal (the 5th warmest in last 50 years) and January 2014 was also warmer overall (despite a few colder days at the end of the month) ranking as the 9th warmest January in the last 50 years. February 2014 was a mixed month (the first half of the month being slightly colder than current seasonal normal and the second half being substantially warmer) resulting in it being ranked 11th warmest in the last 50 years. March 2014 was also a generally mixed month with predominantly days of warmer than normal temperatures resulting in the month being ranked as 7th warmest in last 50 years. During the unusually warmer than normal winter months (i.e. those except November) of gas year 2013/14, the majority of individual LDZs and all LDZs considered overall showed slightly worse RMS deviations of SF (from the ideal value of one) compared to the corresponding periods of the previous gas year.
- RMS deviations of SF from the ideal value of one was worse overall across all LDZs during the summer period (April to September) of gas year 2013/14 compared to the same period of the previous gas year. For May and June, RMS deviations worsened compared to the previous gas year 2012/13 in all 13 LDZs. In a majority (at least 10 out of 13) of LDZs, the RMS deviation of SF from the ideal value of one was worse in April, July, August and September than in gas year 2012/13. Overall, the summer period of gas year 2013/14 was slightly warmer than the current seasonal normal basis. April 2014 was much warmer than normal (the 3rd warmest in the last 50 years). May 2014 was a mixed month (10th warmest in the last 50 years) with the beginning and end of the month being colder than normal and a notably warmer than normal 6 day period in the middle of the month. The months of June and July

2014 were both warmer than current seasonal normal overall (despite a few colder days) resulting in them both being ranked as 5th warmest in the last 50 years. August 2014 was colder than seasonal normal (9th coldest in last 50 years) whereas September 2014 was consistently warmer than normal and ranked as the 3rd warmest September in the last 50 years.

- Considered overall SFs during 2013/14 generally were slightly more variable than over the previous gas year.
- Examination of the average weekday and weekend day values of WCF-EWCF in Tables 4, 5 and 6 indicates that the deviation of WCF from EWCF, appeared to be less marked (i.e. closer to zero) for 3 LDZs (EA, NT and SE) and more marked (i.e. further from zero) for 4 LDZs (namely EM, WM, WS and SO), compared to that over the equivalent days of the previous gas year. For winter 2013/14 as a whole the deviation of WCF from EWCF was less marked than for winter 2012/13 in 11 LDZs. For summer 2013/14 as a whole the deviation of WCF from EWCF was more marked over that for summer 2012/13 in all but 4 LDZs (namely NO, EA, NT and SE). However, as previously explained WCF-EWCF is no longer a measure of bias in the WCF due to SND for aggregate NDM in the LDZ being under or overstated.
- WCF is the difference between actual aggregate NDM demand and ALP weighted daily average consumption in each LDZ (based on EUC AQs) divided by the ALP weighted daily average consumption in each LDZ. During gas year 2012/13 average WCF values were positive for all LDZs on Mondays to Thursdays, Fridays, Saturdays and Sundays. During the winter and summer periods the average WCF values were also positive for all LDZs (See Table 7). Positive values can be caused by factors such as EUC AQs being too low or by weather being colder than seasonal normal.
- During gas year 2013/14 average WCF values were negative for all LDZs on Mondays to Thursdays, Fridays, Saturdays and Sundays. During the winter and summer periods for gas year 2013/14 the average WCF values for all LDZs were also negative (See Table 8). Negative values can be caused by factors such as the EUC AQs being too high or by the weather being warmer than seasonal normal.
- WCF was closer to zero in 2013/14 than in 2012/13 on Mondays to Thursdays and Sundays in all LDZs and on Fridays and Saturdays in 12 out of 13 LDZs (see Table 9). In winter 2013/14 WCF was closer to zero in all LDZs and over summer 2013/14 WCF was closer to zero in 10 LDZs. The differences between the years are the result of differences in factors such as weather or EUC AQ inaccuracies.
- There was no notable step change in WCF values following implementation of revised pseudo SND values on 1st July 2014 (LDZs SC and WN). However, it is feasible that the warmer weather in July 2014 may have somewhat 'masked' any notable step change in WCF values as a result of the revised pseudo SND values.
- Comparison of weather corrected aggregate NDM demand as a percentage of aggregate NDM SND in 2012/13 (Table 13) and 2013/14 (Table 14) indicates that for the majority of the month/LDZ combinations the percentages for 2013/14 are higher than those for 2012/13. This suggests that relative to observed demand on a weather corrected basis, the SND values that applied (for computing DAFs for example) in 2013/14 were generally lower than in 2012/13.

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 (2013/14). This is not a comprehensive set of all observed perturbations, instead it is a set of the more marked instances along with examples of typical cases:

- The month of October 2013 was warmer than the current seasonal normal basis overall, ranking as the 7th warmest October in the last 50 years. The month began with a week of consistently warmer than normal weather and during this period aggregate NDM demand was depressed, resulting in negative WCF values and a much reduced SF value. Throughout the second week of the month, temperatures turned much colder than normal but during the period from 19th to 27th, the warmer weather had returned. On 28th October a vigorous autumn storm brought strong winds and heavy rain to southern parts of England and Wales causing widespread damage and disruption.
- Overall, the month of November 2013 was colder than the current seasonal normal basis ranking slightly colder than average over the last 50 years. The majority of the month saw colder than normal temperatures with particularly cold weather occurring during the period of the 19th to 26th where, according to the Met Office, the country experienced the first widespread frosts and some early-season snowfall in the north. During this particularly cold spell, increased aggregate NDM demand resulted in

consistently positive WCF values. While the increase in WCF would have tended to depress the SF, the direct effect on the SF of the increased NDM aggregate demand resulted in a corresponding increase in the SF in most LDZs.

In WS LDZ on 4th and 12th November 2013 there was a sharp positive spike in WCF (and an increased SF value). This was probably caused by an erroneous low consumption reading for a single very large DM supply point (or an incorrect overstated LDZ measurement value) in the LDZ. This resulted in a corresponding error in actual aggregate NDM consumption (total LDZ demand less LDZ shrinkage less sum of DM consumption) which was incorrectly too high giving a WCF value that was much too high.

- December 2013 was warmer than the current seasonal normal basis overall, ranking as the 5th warmest December over the last 50 years. The month began quite settled but a major winter storm on the 5th brought strong winds to Scotland and the east coast. More settled weather resumed until mid-month, with some notably high temperatures recorded in Scotland, after which the weather became increasingly unsettled and stormy. According to the Met Office, this was the windiest December in records from 1969 and one of the windiest calendar months since January 1993.

  In WS LDZ on 7th and 19th December 2013 there was a sharp negative spike in WCF (and a reduced SF value). This was probably caused by an erroneous high consumption reading for a single very large DM supply point in the LDZ. This resulted in a corresponding error in actual NDM consumption (total LDZ demand less shrinkage less sum of DM consumption) which was incorrectly too low giving in turn a WCF value that was much too low.

- January 2014 began with a 10 day spell of consistently warmer than normal weather where, according to the Met Office, a maximum temperature of 14.1°C was recorded in Cornwall on the 5th. The remainder of the month was mixed and overall, January 2014 ranked as the 9th warmest January in the last 50 years.

  In NE LDZ from 21st to 30th January 2014 there is a significant reduction in SF value. This was due to a largely overstated AQ for a single NDM site which became effective on 21st but was corrected on 31st.

- The month of February 2014 was one of some contrasts but overall ranked as the 11th warmest February in the last 50 years. The first half of the month was dominated by a succession of major winter storms bringing strong winds and temperatures mostly falling below current seasonal normal. The second half of the month was warmer than normal and during this period total NDM demand was depressed, resulting in negative WCF values on most days. While the reduction in WCF would have tended to increase the SF, the direct effect on the SF of the reduced total NDM demand resulted in small decreases in the SF during the period in most LDZs.

- Overall, March 2014 was warmer than the current seasonal normal basis, ranking as the 7th warmest March in the last 50 years. The month began with a short period (1st to 4th) of slightly colder than normal temperatures with the remainder of the month (apart from the period 22nd to 28th) saw temperatures rise well above seasonal normal, particularly on 9th, 16th and 31st. On these particularly warmer days, most LDZs displayed sharply negative WCF values (with a corresponding decrease in SF). While a reduced WCF would act on SF to increase its value, the direct affect of depressed aggregate NDM demand on SF is to decrease its value and this appears to be the predominant effect on these days.

- April 2014 was the 3rd warmest April in the last 50 years and, according to the Met Office, the equal 3rd was the warmest April in a series since 1910. Although the majority of the month was substantially warmer than the current seasonal normal basis, there was a short cold spell (18th to 20th) resulting in an increase in the total NDM demand and consequently WCF became positive in most LDZs on 20th.

- For the most part of May 2014 temperatures were slightly colder than seasonal normal, however, this was offset by a period (15th to 22nd) of much warmer than normal temperatures making May 2014 the 10th warmest in the last 50 years. The effect of this warmer than usual period resulted in a decrease in total NDM demand and consequently WCF became negative in all LDZs during most of these days.

- Overall, the month of June 2014 was warmer than the current seasonal normal basis and ranked as the 5th warmest June in the last 50 years. According to the Met Office, temperatures for June were above average across the UK with warm days and mild nights, although there were no spells of exceptional warmth. Although the majority of the month was warmer than normal, there were a few short unsettled spells around 4th to 5th and 27th to 30th resulting in notable positive spikes in WCF values across most LDZs.

  In WS LDZ on 15th June 2014 there was a sharp negative spike in WCF and a decrease in SF. This was probably caused by an erroneous input measurement in the LDZ resulting in a corresponding error

in actual aggregate NDM consumption (total LDZ demand less LDZ shrinkage less sum of DM consumption) which was incorrectly too low giving a WCF value that was much too low.

- Nationally, the month of July 2014 was warmer than the current seasonal normal basis overall (continuing the warm theme from previous months) and according to the Met Office, it was the 8th consecutive month with above average temperatures for the UK. The month ranked as the 5th warmest July in the last 50 years with the most notable warm period falling from 17th to 30th, such that the max CWV value was achieved on most days in each LDZ.

  In EM LDZ on 28th July 2014 there was a sharp positive spike in the WCF (and an increased SF value). This was probably caused by an erroneous input measurement in the LDZ resulting in a corresponding error in the aggregate NDM consumption (total LDZ demand less LDZ shrinkage less sum of DM consumption) which was incorrectly too high giving a WCF value that was much too high.

- August 2014 was a rather unsettled month and overall ranked as the 9th coldest August in the last 50 years. According to the Met Office it was the coolest August for the UK since 1993, ending a sequence of eight warmer than average months. Despite an average start to the month (up to the 9th) the arrival of ex-Hurricane 'Bertha' passing over the UK on 10th to 11th was the beginning of a colder than normal period with a particularly cold spell occurring during the period of 19th to 27th. During this colder spell, inflated aggregate NDM demand resulted in positive WCF values (most noticeable on 25th).

- September 2014 was the 3rd warmest September in the last 50 years and according to the Met Office, temperatures were generally above average, though with no exceptional warmth on any particular days. Despite most days being warmer than usual, there was a small period of typically normal weather (19th to 24th). The last three days of the month were much warmer than normal and as a result, sharply negative WCF values may be observed during this period in all LDZs.

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 cause 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 the sum for all EUCs of ALP weighted daily average demand on the day (in other words the ALP*(AQ/365) term in the NDM demand attribution formula summed across all EUCs in the LDZ). Since NDM SND was previously a forecast quantity while AQ is a backward looking quantity based on historical meter read data, this correspondence could never be perfect. However, adoption of Modification 204 in October 2008 has resulted in this correspondence now essentially being met - except for perturbations due to small day to day changes in EUC AQs and unexpectedly high or low actual NDM demand levels (whether these are real or due to LDZ or DM measurement error). This is the main reason for the markedly improved SF behaviour since the start of gas year 2008/09.

Prior to 1st October 2008, the ratio of aggregate NDM SND to the sum across all EUCs of ALP weighted daily average demand [$\sum_{EUC} ALP*(AQ/365)$] was broadly inversely related to the deviation of SF from the ideal value of one. However, the effect was more pronounced in summer than in winter, and moreover, the summer was 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. This effect is not mitigated by the changes brought about by Modification 204. Thus, greater scaling factor volatility may still be seen in a number of LDZs in the summer in gas years 2012/13 and 2013/14.

In years prior to 2008/09, examination of the average monthly value of WCF-EWCF and weather corrected aggregate NDM demand as a percentage of aggregate NDM SND allowed an approximate assessment to be made of the "equilibrium level" of SF in each LDZ; that is to say the likely level of SF if any WCF deviation is discounted. This assessment was an approximate one and was based on identifying a period (of a month's duration preferably during the winter period) over which WCF deviation 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 deviation that applied in the period. When applicable to a LDZ, this assessment then provided an approximate indication of the prevailing level of aggregate NDM AQ in the LDZ.

As previously noted, with the implementation of UNC Modification 204 the difference WCF-EWCF is no longer a measure of bias in the WCF due to SND for aggregate NDM in the LDZ being under or overstated. From 1st October 2008 onwards, WCF-EWCF merely reflects the difference between actual NDM demand relative to ALP weighted daily average demand (based on EUC AQs) and computed NDM demand relative to NDM SND. In other words, the WCF itself now depends on NDM EUC AQs, and therefore assessing and removing the impact of a notional WCF "bias" on observed SF values to ascertain the impact of the prevailing level of aggregate NDM AQ on the residual SF is no longer feasible. One consequence of this is that the previously applied approach to inferring AQ excess or deficiency in each LDZ from an assessment of the impact of WCF bias on SF values is no longer valid.

Table 15 shows the percentage changes in aggregate NDM AQs at the start of gas year 2014/15 as observed on the Gemini system. From this it can be seen that a reduction in aggregate NDM AQs has taken place for gas year 2014/15 in all 13 LDZs. The reduction was 2.5% overall across all LDZs and the changes range from a 1.4% reduction in SW LDZ to a 3.3% reduction in NE and WN LDZs.

Figure 1

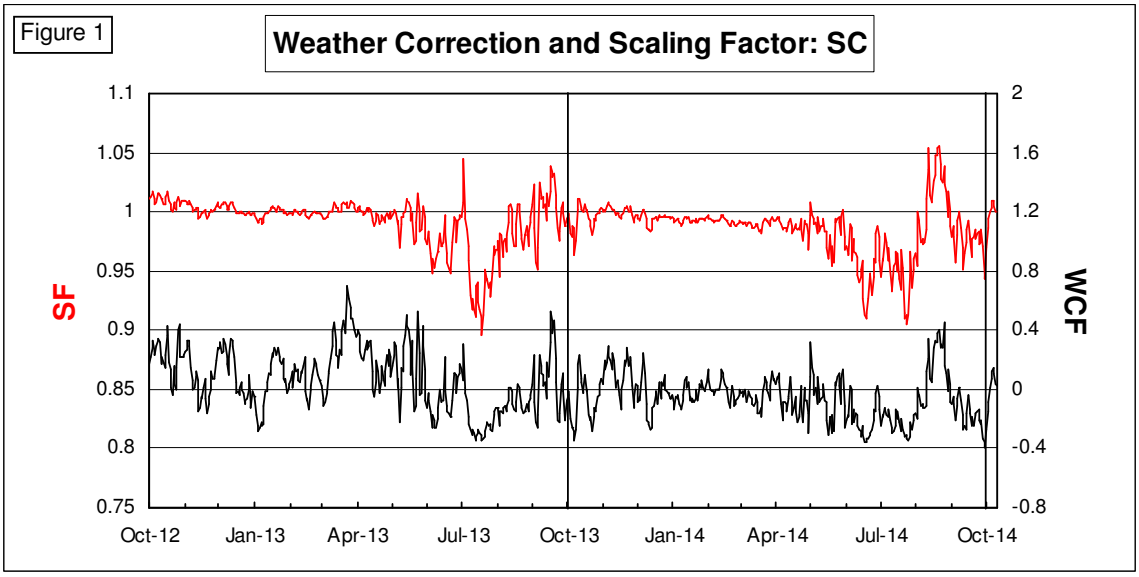

Figure 2

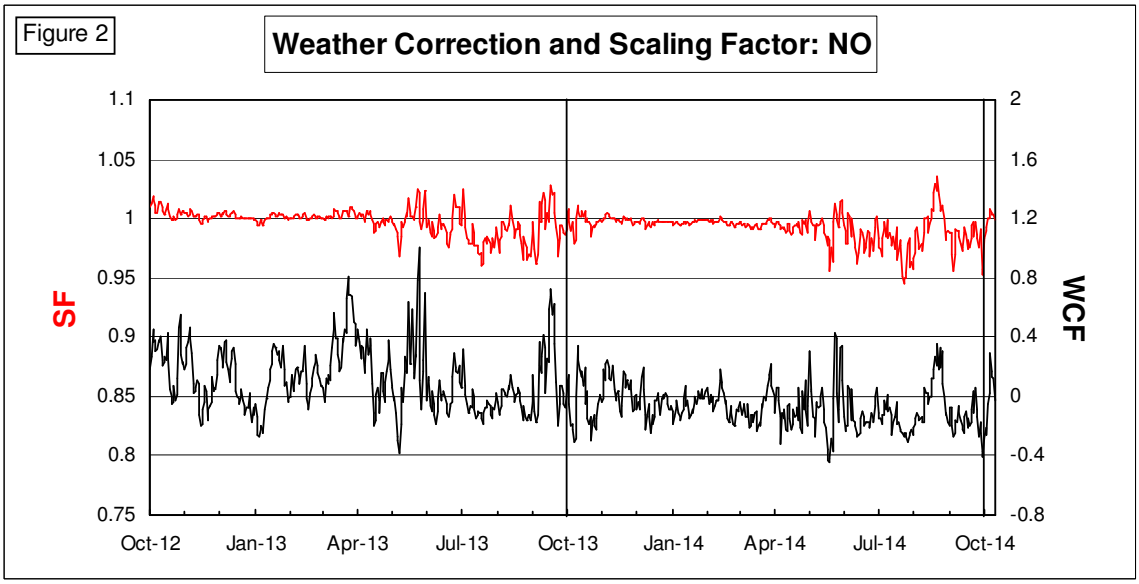

Figure 3

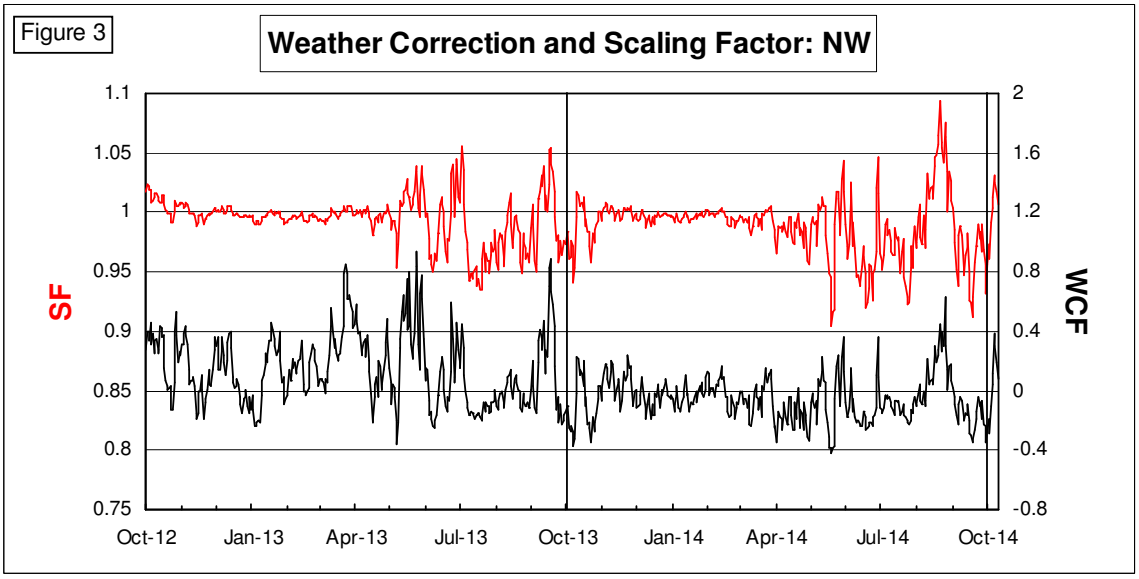

Figure 4

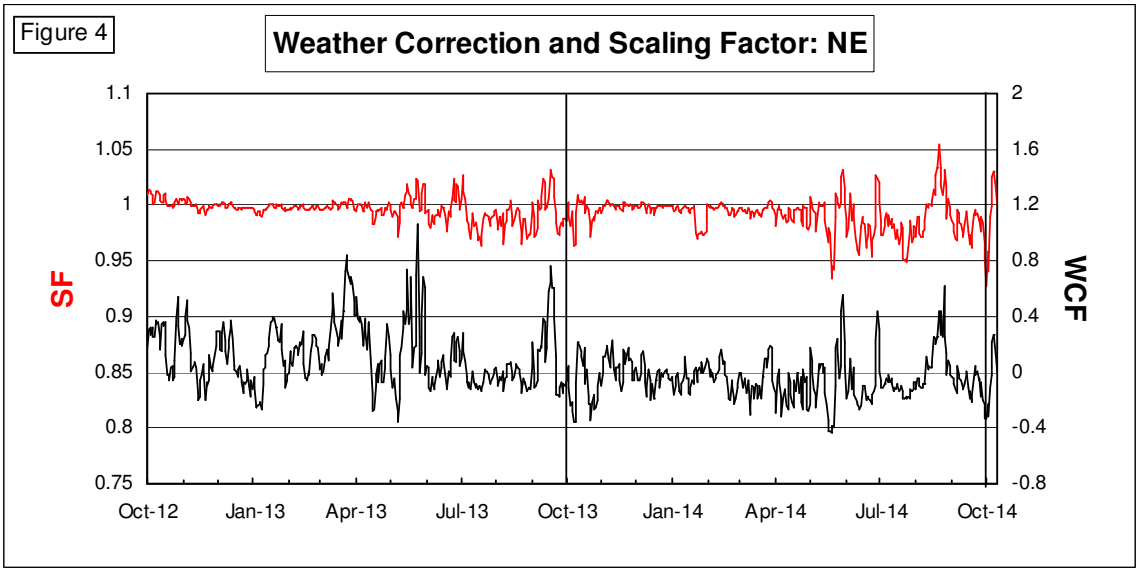

Figure 5

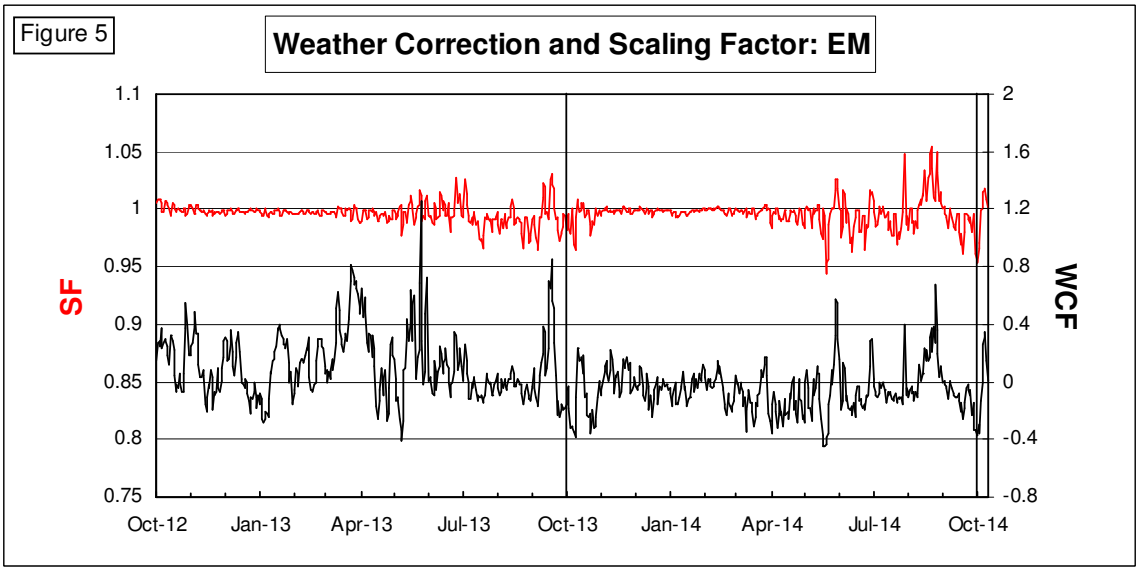

Figure 6

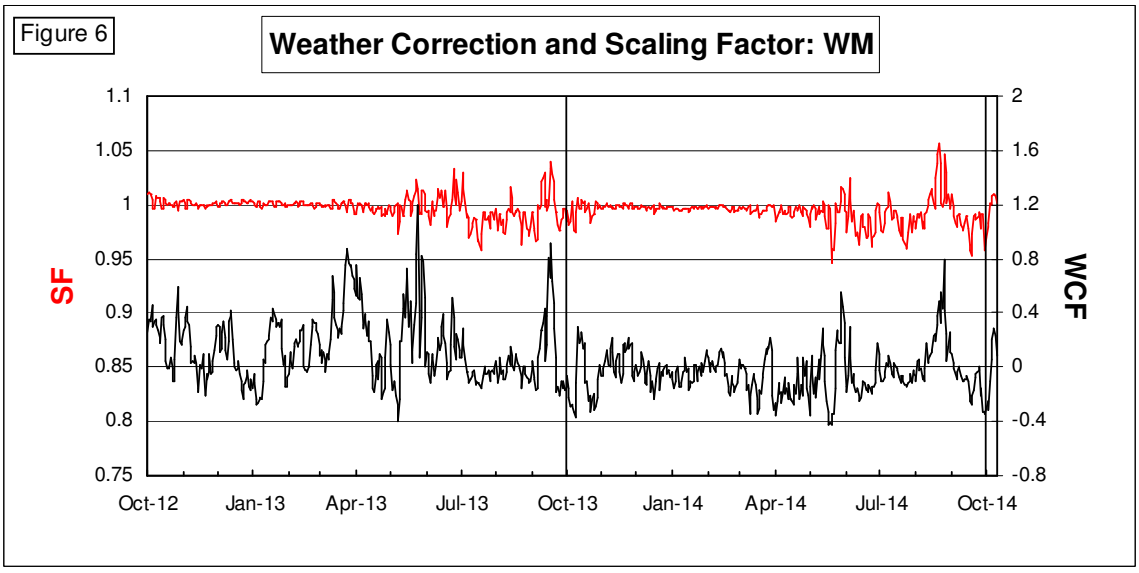

Figure 7

Weather Correction and Scaling Factor: WN

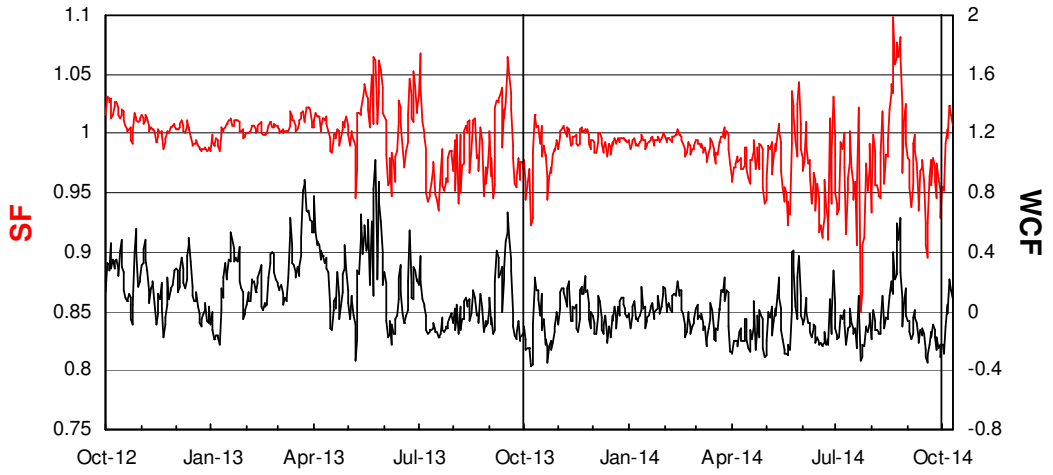

Figure 8

Weather Correction and Scaling Factor: WS

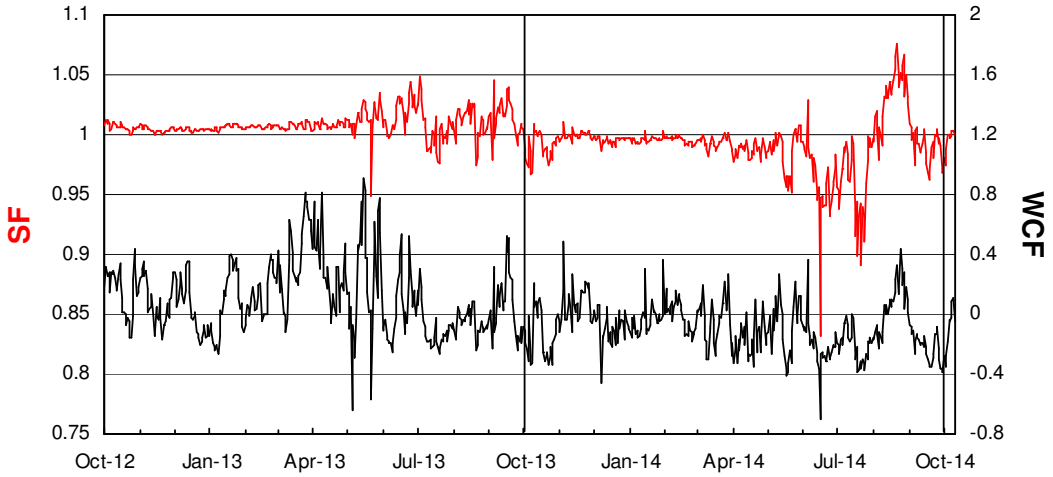

Figure 9

Weather Correction and Scaling Factor: EA

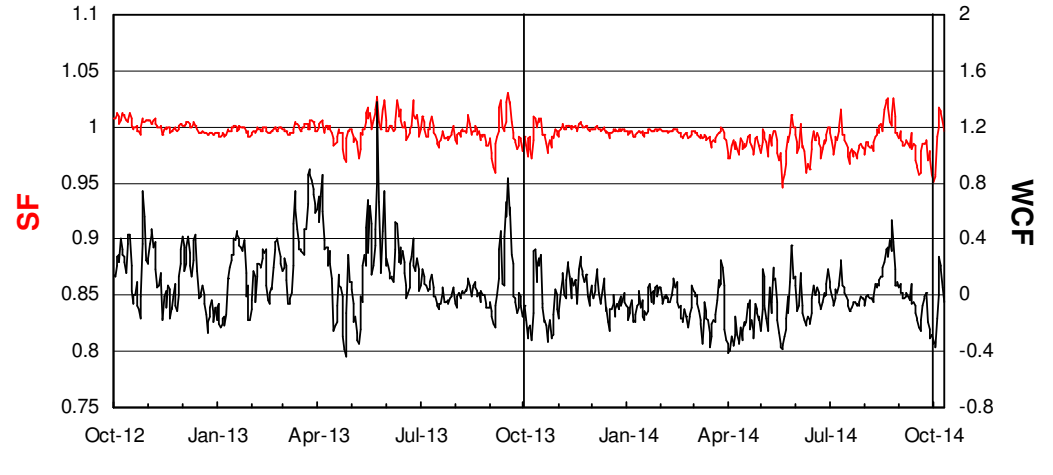

Figure 10

Weather Correction and Scaling Factor: NT

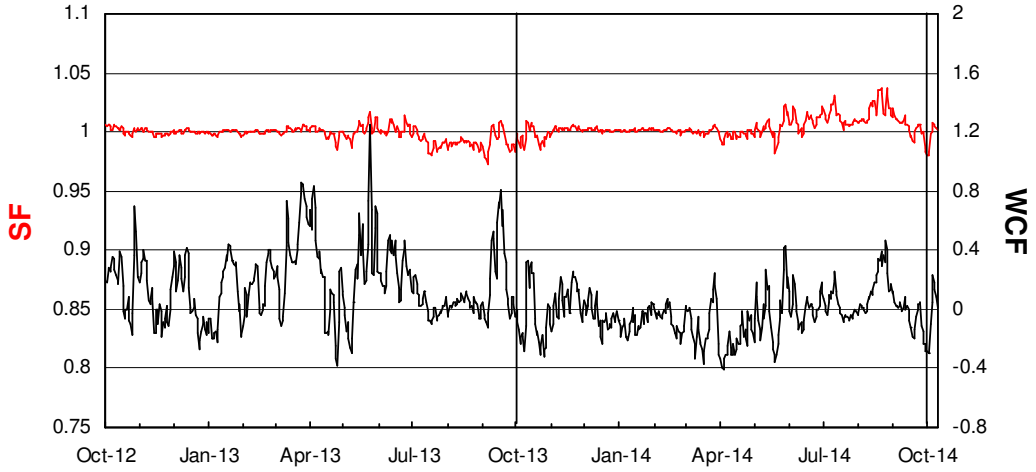

Figure 11

Weather Correction and Scaling Factor: SE

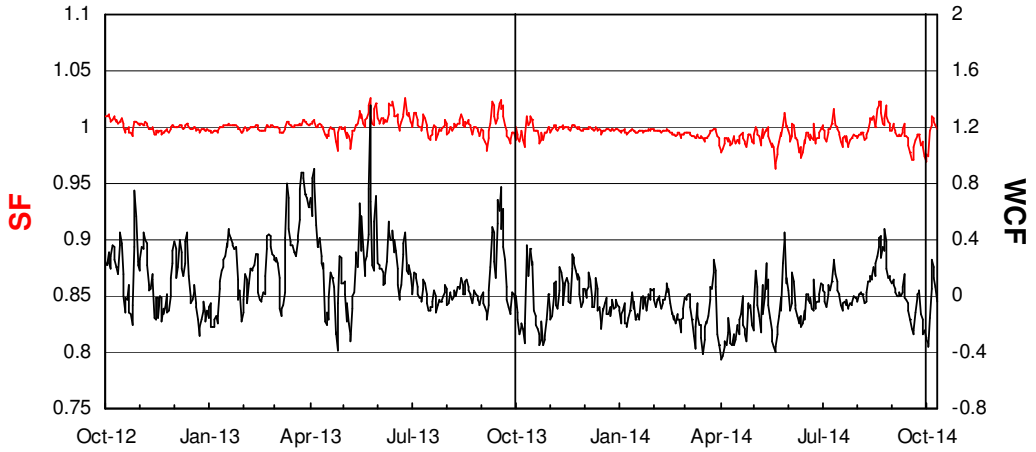

Figure 12

Weather Correction and Scaling Factor: SO

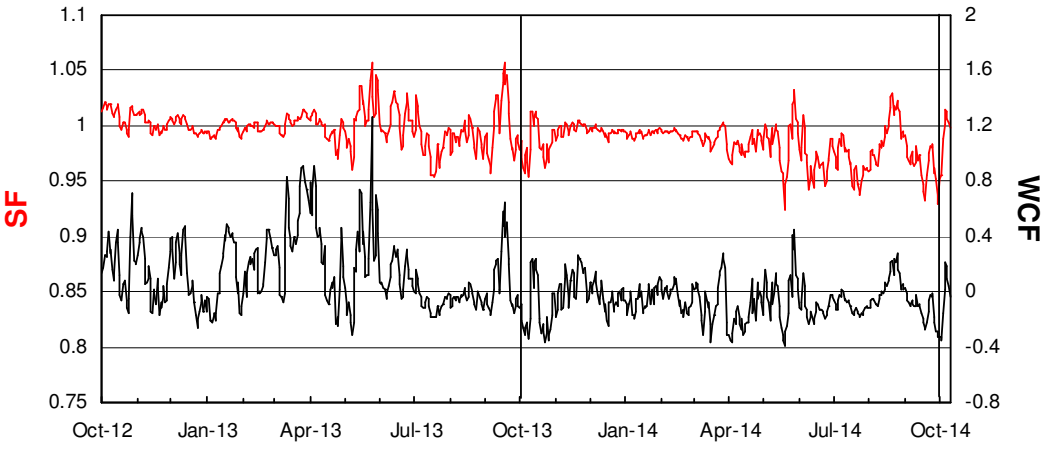

Figure 13

Weather Correction and Scaling Factor: SW

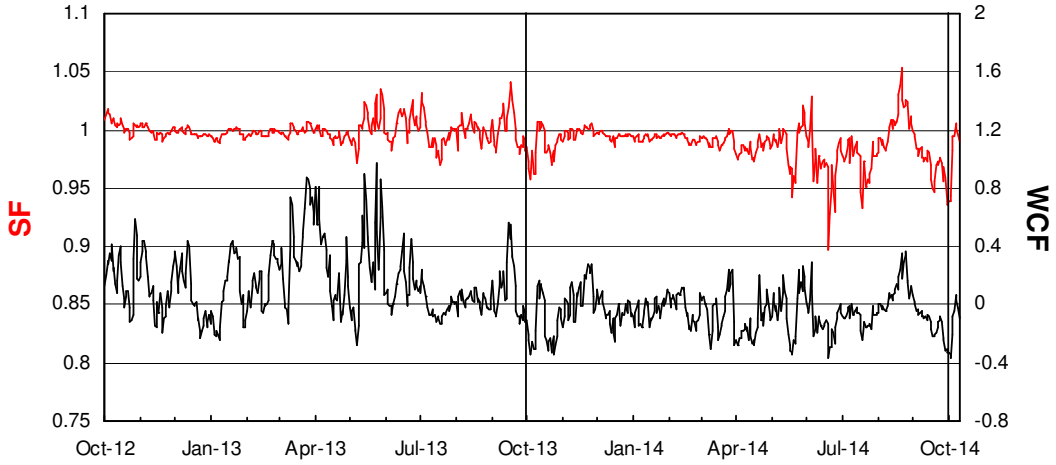

Table 1: Average Values of SF Gas Year 2012/13

LDZ	Mon-Thur	Friday	Saturday	Sunday	Winter	Summer
SC	0.993	0.991	0.993	0.994	1.002	0.983
NO	0.999	0.996	0.996	0.996	1.002	0.993
NW	0.994	0.994	0.994	0.996	1.000	0.990
NE	0.997	0.996	0.995	0.996	0.999	0.994
EM	0.998	0.995	0.994	0.995	0.998	0.994
WM	0.999	0.997	0.996	0.996	1.001	0.995
WN	1.000	1.001	1.002	1.003	1.005	0.997
WS	1.009	1.007	1.008	1.009	1.006	1.011
EA	0.999	0.998	0.997	0.996	0.999	0.997
NT	0.999	0.999	0.998	0.997	1.001	0.996
SE	1.002	1.001	1.001	1.001	1.000	1.002
SO	1.000	0.999	1.001	1.000	1.002	0.998
SW	1.000	0.998	0.999	0.999	0.999	1.000
AVG	**0.999**	**0.998**	**0.998**	**0.998**	**1.001**	**0.996**

Table 2: Average Values of SF Gas Year 2013/14

LDZ	Mon-Thur	Friday	Saturday	Sunday	Winter	Summer
SC	0.984	0.985	0.989	0.989	0.994	0.978
NO	0.991	0.992	0.995	0.995	0.997	0.987
NW	0.985	0.988	0.993	0.993	0.995	0.981
NE	0.989	0.992	0.996	0.995	0.995	0.987
EM	0.995	0.996	1.000	0.999	0.998	0.995
WM	0.992	0.993	0.996	0.996	0.996	0.990
WN	0.977	0.982	0.991	0.991	0.991	0.973
WS	0.990	0.988	0.994	0.993	0.995	0.986
EA	0.990	0.989	0.992	0.991	0.995	0.986
NT	1.004	1.004	1.004	1.004	1.001	1.008
SE	0.995	0.994	0.995	0.995	0.996	0.993
SO	0.984	0.983	0.986	0.986	0.992	0.976
SW	0.987	0.986	0.990	0.991	0.993	0.983
AVG	**0.989**	**0.990**	**0.994**	**0.994**	**0.995**	**0.986**

Table 3: Difference Between Average Values of SF in Gas Year 2012/13 and 2013/14

LDZ	MON-THUR	FRIDAY	SATURDAY	SUNDAY	WINTER	SUMMER
SC	-0.009	-0.006	-0.004	-0.005	-0.004	-0.005
NO	-0.008	-0.004	-0.001	-0.001	-0.001	-0.006
NW	-0.009	-0.006	-0.001	-0.003	-0.005	-0.009
NE	-0.008	-0.004	0.001	-0.001	-0.004	-0.007
EM	-0.003	0.001	0.006	0.004	0.000	0.001
WM	-0.007	-0.004	0.000	0.000	-0.003	-0.005
WN	-0.023	-0.017	-0.007	-0.006	-0.004	-0.024
WS	-0.001	-0.005	0.002	0.002	0.001	-0.003
EA	-0.009	-0.009	-0.005	-0.005	-0.004	-0.011
NT	-0.003	-0.003	-0.002	-0.001	0.000	-0.004
SE	-0.003	-0.005	-0.004	-0.004	-0.004	-0.005
SO	-0.016	-0.016	-0.013	-0.014	-0.006	-0.022
SW	-0.013	-0.012	-0.009	-0.008	-0.006	-0.017

Table 4: Average Values of WCF – EWCF Gas Year 2012/13

LDZ	Mon-Thur	Friday	Saturday	Sunday	Winter	Summer
SC	-0.008	-0.027	-0.028	-0.022	0.015	-0.045
NO	0.067	0.058	0.036	0.035	0.053	0.061
NW	0.018	0.033	0.024	0.038	0.042	0.005
NE	0.024	0.031	0.025	0.022	0.032	0.019
EM	0.003	0.013	-0.017	-0.009	0.008	-0.008
WM	-0.002	0.011	-0.003	0.010	0.011	-0.008
WN	0.029	0.056	0.066	0.074	0.077	0.012
WS	0.017	0.007	-0.035	0.021	0.017	0.000
EA	0.033	0.049	0.049	0.037	0.039	0.037
NT	0.047	0.061	0.071	0.053	0.026	0.080
SE	0.034	0.048	0.046	0.037	0.022	0.054
SO	0.010	0.022	0.026	0.021	0.053	-0.021
SW	0.023	0.016	0.028	0.043	0.027	0.024
AVG	**0.023**	**0.029**	**0.022**	**0.028**	**0.032**	**0.016**

Table 5: Average Values of WCF – EWCF Gas Year 2013/14

LDZ	Mon-Thur	Friday	Saturday	Sunday	Winter	Summer
SC	-0.024	-0.026	-0.030	-0.039	-0.007	-0.048
NO	-0.017	-0.021	-0.026	-0.040	0.011	-0.054
NW	-0.063	-0.043	-0.029	-0.038	-0.005	-0.099
NE	-0.035	-0.010	0.009	-0.012	0.003	-0.047
EM	-0.025	-0.026	-0.032	-0.031	-0.011	-0.043
WM	-0.036	-0.024	-0.019	-0.029	-0.019	-0.043
WN	-0.063	-0.040	-0.010	-0.019	0.004	-0.095
WS	-0.040	-0.062	-0.055	-0.042	-0.002	-0.090
EA	-0.016	-0.005	-0.016	-0.020	-0.006	-0.024
NT	-0.006	0.008	0.008	0.001	-0.014	0.012
SE	-0.015	-0.007	-0.018	-0.020	-0.017	-0.013
SO	-0.035	-0.026	-0.039	-0.039	-0.008	-0.062
SW	-0.035	-0.039	-0.029	-0.023	-0.010	-0.056
AVG	**-0.032**	**-0.025**	**-0.022**	**-0.027**	**-0.006**	**-0.051**

Table 6: Difference between average values of WCF – EWCF in Gas Year 2012/13 and 2013/14

LDZ	Mon-Thur	Friday	Saturday	Sunday	Winter	Summer
SC	-0.017	0.001	-0.002	-0.017	0.008	-0.003
NO	0.050	0.037	0.009	-0.006	0.042	0.006
NW	-0.046	-0.010	-0.005	0.000	0.038	-0.094
NE	-0.011	0.022	0.017	0.011	0.028	-0.028
EM	-0.022	-0.013	-0.015	-0.022	-0.003	-0.034
WM	-0.034	-0.013	-0.016	-0.019	-0.008	-0.034
WN	-0.034	0.016	0.055	0.054	0.073	-0.083
WS	-0.023	-0.055	-0.020	-0.021	0.016	-0.089
EA	0.018	0.044	0.033	0.017	0.033	0.014
NT	0.041	0.052	0.063	0.052	0.012	0.068
SE	0.019	0.041	0.028	0.018	0.005	0.041
SO	-0.025	-0.004	-0.013	-0.018	0.044	-0.041
SW	-0.012	-0.023	-0.001	0.020	0.016	-0.032

Table 7: Average Values of WCF Gas Year 2012/13

LDZ	Mon-Thur	Friday	Saturday	Sunday	Winter	Summer
SC	0.074	0.067	0.067	0.065	0.138	0.004
NO	0.126	0.125	0.101	0.097	0.161	0.075
NW	0.131	0.155	0.154	0.168	0.175	0.111
NE	0.117	0.130	0.130	0.119	0.159	0.083
EM	0.113	0.126	0.115	0.116	0.152	0.080
WM	0.134	0.140	0.148	0.150	0.167	0.111
WN	0.140	0.175	0.193	0.201	0.207	0.115
WS	0.106	0.096	0.083	0.146	0.141	0.074
EA	0.148	0.165	0.189	0.173	0.188	0.132
NT	0.158	0.174	0.205	0.184	0.171	0.170
SE	0.154	0.169	0.191	0.179	0.176	0.154
SO	0.133	0.141	0.164	0.163	0.190	0.096
SW	0.143	0.141	0.171	0.191	0.170	0.137
AVG	**0.129**	**0.139**	**0.147**	**0.150**	**0.169**	**0.103**

Table 8: Average Values of WCF Gas Year 2013/14

LDZ	Mon-Thur	Friday	Saturday	Sunday	Winter	Summer
SC	-0.062	-0.049	-0.055	-0.060	-0.016	-0.102
NO	-0.071	-0.062	-0.062	-0.081	-0.034	-0.106
NW	-0.071	-0.047	-0.030	-0.043	-0.032	-0.083
NE	-0.061	-0.032	-0.010	-0.047	-0.034	-0.061
EM	-0.056	-0.051	-0.055	-0.068	-0.050	-0.064
WM	-0.048	-0.042	-0.033	-0.044	-0.045	-0.044
WN	-0.071	-0.045	-0.013	-0.025	-0.023	-0.081
WS	-0.081	-0.112	-0.094	-0.083	-0.041	-0.134
EA	-0.040	-0.044	-0.057	-0.058	-0.044	-0.048
NT	-0.032	-0.030	-0.032	-0.038	-0.052	-0.013
SE	-0.041	-0.049	-0.062	-0.060	-0.057	-0.038
SO	-0.062	-0.062	-0.071	-0.074	-0.046	-0.083
SW	-0.055	-0.060	-0.048	-0.038	-0.040	-0.065
AVG	**-0.058**	**-0.053**	**-0.048**	**-0.055**	**-0.039**	**-0.071**

Table 9: Difference between absolute average values of WCF in Gas Year 2012/13 and 2013/14

LDZ	Mon-Thur	Friday	Saturday	Sunday	Winter	Summer
SC	0.012	0.018	0.012	0.006	0.122	-0.098
NO	0.055	0.063	0.039	0.016	0.127	-0.031
NW	0.060	0.108	0.124	0.125	0.143	0.028
NE	0.056	0.097	0.120	0.072	0.125	0.022
EM	0.057	0.076	0.060	0.048	0.102	0.016
WM	0.085	0.098	0.116	0.106	0.122	0.066
WN	0.069	0.131	0.181	0.176	0.184	0.034
WS	0.025	-0.016	-0.011	0.063	0.100	-0.061
EA	0.108	0.121	0.132	0.115	0.144	0.085
NT	0.126	0.144	0.173	0.147	0.119	0.157
SE	0.113	0.121	0.129	0.119	0.119	0.115
SO	0.072	0.079	0.092	0.089	0.144	0.012
SW	0.088	0.080	0.123	0.153	0.130	0.072

Table 10: Root Mean Square Deviation of SF from 1 Gas Year 2012/13

LDZ	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
SC	0.0106	0.0045	0.0040	0.0044	0.0024	0.0049	0.0052	0.0129	0.0312	0.0611	0.0220	0.0216
NO	0.0083	0.0033	0.0029	0.0032	0.0019	0.0048	0.0048	0.0124	0.0115	0.0216	0.0181	0.0187
NW	0.0115	0.0053	0.0031	0.0056	0.0050	0.0045	0.0065	0.0200	0.0281	0.0442	0.0282	0.0300
NE	0.0068	0.0038	0.0025	0.0048	0.0029	0.0034	0.0062	0.0117	0.0119	0.0179	0.0175	0.0178
EM	0.0045	0.0029	0.0024	0.0037	0.0032	0.0051	0.0063	0.0090	0.0099	0.0148	0.0152	0.0178
WM	0.0051	0.0022	0.0026	0.0022	0.0016	0.0040	0.0052	0.0106	0.0116	0.0198	0.0165	0.0196
WN	0.0174	0.0077	0.0097	0.0079	0.0055	0.0118	0.0099	0.0325	0.0275	0.0401	0.0257	0.0342
WS	0.0070	0.0046	0.0041	0.0063	0.0065	0.0076	0.0085	0.0196	0.0217	0.0171	0.0164	0.0204
EA	0.0071	0.0036	0.0044	0.0050	0.0034	0.0039	0.0107	0.0138	0.0092	0.0086	0.0084	0.0186
NT	0.0035	0.0019	0.0013	0.0021	0.0011	0.0029	0.0047	0.0070	0.0055	0.0104	0.0106	0.0127
SE	0.0061	0.0035	0.0021	0.0028	0.0016	0.0031	0.0063	0.0113	0.0119	0.0066	0.0043	0.0133
SO	0.0133	0.0071	0.0060	0.0068	0.0033	0.0074	0.0111	0.0247	0.0154	0.0248	0.0149	0.0274
SW	0.0075	0.0043	0.0038	0.0057	0.0032	0.0041	0.0060	0.0155	0.0115	0.0146	0.0074	0.0170
AVG	**0.0084**	**0.0042**	**0.0038**	**0.0046**	**0.0032**	**0.0052**	**0.0070**	**0.0155**	**0.0159**	**0.0232**	**0.0158**	**0.0207**

Table 11: Root Mean Square Deviation of SF from 1 Gas Year 2013/14

LDZ	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
SC	0.0117	0.0039	0.0075	0.0073	0.0082	0.0105	0.0138	0.0198	0.0507	0.0552	0.0299	0.0271
NO	0.0076	0.0024	0.0038	0.0035	0.0037	0.0056	0.0079	0.0146	0.0196	0.0300	0.0170	0.0220
NW	0.0228	0.0045	0.0051	0.0048	0.0056	0.0087	0.0208	0.0352	0.0462	0.0398	0.0399	0.0429
NE	0.0132	0.0024	0.0030	0.0152	0.0046	0.0061	0.0110	0.0231	0.0261	0.0275	0.0215	0.0224
EM	0.0121	0.0020	0.0021	0.0034	0.0024	0.0037	0.0081	0.0188	0.0173	0.0160	0.0222	0.0178
WM	0.0099	0.0023	0.0033	0.0040	0.0035	0.0053	0.0086	0.0170	0.0222	0.0198	0.0218	0.0220
WN	0.0315	0.0057	0.0096	0.0071	0.0088	0.0145	0.0289	0.0331	0.0517	0.0594	0.0457	0.0489
WS	0.0154	0.0035	0.0054	0.0049	0.0054	0.0079	0.0143	0.0207	0.0507	0.0496	0.0397	0.0164
EA	0.0127	0.0026	0.0035	0.0051	0.0057	0.0099	0.0179	0.0214	0.0204	0.0185	0.0144	0.0243
NT	0.0075	0.0032	0.0019	0.0019	0.0015	0.0026	0.0045	0.0094	0.0114	0.0141	0.0215	0.0089
SE	0.0079	0.0018	0.0025	0.0036	0.0051	0.0079	0.0129	0.0136	0.0122	0.0098	0.0101	0.0147
SO	0.0235	0.0052	0.0060	0.0077	0.0082	0.0128	0.0203	0.0274	0.0347	0.0379	0.0205	0.0397
SW	0.0201	0.0043	0.0058	0.0064	0.0076	0.0103	0.0167	0.0218	0.0379	0.0302	0.0185	0.0329
AVG	**0.0151**	**0.0034**	**0.0046**	**0.0058**	**0.0054**	**0.0081**	**0.0143**	**0.0212**	**0.0308**	**0.0314**	**0.0248**	**0.0261**

Table 12: Difference between RMS Deviation of SF from 1 in Gas Year 2012/13 and 2013/14

LDZ	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
SC	-0.0011	0.0006	-0.0035	-0.0029	-0.0058	-0.0056	-0.0086	-0.0069	-0.0195	0.0059	-0.0079	-0.0055
NO	0.0007	0.0009	-0.0009	-0.0003	-0.0018	-0.0008	-0.0031	-0.0022	-0.0081	-0.0084	0.0011	-0.0033
NW	-0.0113	0.0008	-0.0020	0.0008	-0.0006	-0.0042	-0.0143	-0.0152	-0.0181	0.0044	-0.0117	-0.0129
NE	-0.0064	0.0014	-0.0005	-0.0104	-0.0017	-0.0027	-0.0048	-0.0114	-0.0142	-0.0096	-0.0040	-0.0046
EM	-0.0076	0.0009	0.0003	0.0003	0.0008	0.0014	-0.0018	-0.0098	-0.0074	-0.0012	-0.0070	0.0000
WM	-0.0048	-0.0001	-0.0007	-0.0018	-0.0019	-0.0013	-0.0034	-0.0064	-0.0106	0.0000	-0.0053	-0.0024
WN	-0.0141	0.0020	0.0001	0.0008	-0.0033	-0.0027	-0.0190	-0.0006	-0.0242	-0.0193	-0.0200	-0.0147
WS	-0.0084	0.0011	-0.0013	0.0014	0.0011	-0.0003	-0.0058	-0.0011	-0.0290	-0.0325	-0.0233	0.0040
EA	-0.0056	0.0010	0.0009	-0.0001	-0.0023	-0.0060	-0.0072	-0.0076	-0.0112	-0.0099	-0.0060	-0.0057
NT	-0.0040	-0.0013	-0.0006	0.0002	-0.0004	0.0003	0.0002	-0.0024	-0.0059	-0.0037	-0.0109	0.0038
SE	-0.0018	0.0017	-0.0004	-0.0008	-0.0035	-0.0048	-0.0066	-0.0023	-0.0003	-0.0032	-0.0058	-0.0014
SO	-0.0102	0.0019	0.0000	-0.0009	-0.0049	-0.0054	-0.0092	-0.0027	-0.0193	-0.0131	-0.0056	-0.0123
SW	-0.0126	0.0000	-0.0020	-0.0007	-0.0044	-0.0062	-0.0107	-0.0063	-0.0264	-0.0156	-0.0111	-0.0159
AVG	**-0.0067**	**0.0008**	**-0.0008**	**-0.0011**	**-0.0022**	**-0.0029**	**-0.0073**	**-0.0058**	**-0.0149**	**-0.0082**	**-0.0090**	**-0.0055**

Table 13: NDM Weather Corrected Demand as % of NDM Seasonal Normal Demand
Gas Year 2012/13

LDZ	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
SC	97.9%	98.4%	96.8%	96.1%	96.6%	100.0%	98.8%	102.7%	97.4%	99.2%	96.9%	99.2%
NO	96.5%	99.8%	97.3%	98.5%	100.2%	105.7%	103.8%	106.9%	102.0%	110.3%	105.6%	101.4%
NW	96.2%	94.7%	94.1%	95.0%	95.5%	96.7%	97.6%	97.2%	96.7%	109.2%	102.4%	96.5%
NE	97.3%	95.8%	94.4%	97.8%	97.1%	99.4%	97.6%	99.0%	97.0%	109.8%	101.8%	96.0%
EM	92.6%	95.4%	94.8%	94.5%	95.3%	96.1%	95.7%	93.2%	93.7%	102.0%	99.9%	91.6%
WM	94.4%	95.1%	94.6%	95.1%	96.4%	98.7%	97.6%	93.3%	97.3%	105.6%	95.7%	92.5%
WN	95.0%	96.4%	94.5%	97.0%	97.5%	98.2%	100.2%	99.0%	100.5%	113.3%	107.6%	92.9%
WS	93.0%	94.2%	93.9%	94.0%	95.7%	100.1%	103.1%	88.0%	94.3%	103.1%	98.7%	99.0%
EA	94.4%	95.0%	96.5%	96.2%	98.3%	102.4%	95.4%	94.3%	106.8%	106.2%	101.5%	95.5%
NT	93.2%	93.5%	96.1%	95.7%	97.6%	101.5%	99.2%	95.3%	111.0%	103.3%	100.7%	102.9%
SE	90.9%	92.6%	95.3%	94.7%	97.1%	99.9%	99.9%	94.1%	108.9%	105.2%	104.3%	98.7%
SO	98.1%	97.7%	97.8%	97.6%	99.5%	105.4%	97.9%	94.1%	104.7%	101.3%	105.0%	105.2%
SW	90.6%	93.8%	95.8%	94.7%	96.5%	102.1%	101.8%	92.8%	103.2%	103.8%	107.8%	102.4%

Table 14: NDM Weather Corrected Demand as % of NDM Seasonal Normal Demand
Gas Year 2013/14

LDZ	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
SC	99.7%	97.5%	98.8%	95.8%	96.6%	96.5%	101.1%	101.3%	101.0%	96.4%	105.3%	100.9%
NO	104.6%	99.0%	101.3%	98.6%	99.1%	97.5%	102.3%	104.8%	102.8%	98.3%	88.3%	94.1%
NW	100.4%	94.9%	97.5%	96.2%	97.9%	92.8%	93.6%	98.9%	103.7%	111.0%	101.0%	87.9%
NE	100.6%	98.2%	96.5%	96.0%	96.6%	96.0%	96.7%	99.5%	101.2%	104.5%	93.9%	100.3%
EM	100.1%	99.4%	98.3%	97.9%	99.1%	95.7%	95.6%	99.4%	105.4%	108.8%	96.8%	97.4%
WM	98.6%	96.0%	95.4%	95.4%	97.5%	94.0%	93.9%	97.8%	99.6%	105.5%	94.4%	95.7%
WN	100.4%	96.0%	98.8%	101.2%	102.4%	94.3%	95.1%	104.8%	109.3%	114.8%	101.5%	91.2%
WS	99.6%	100.6%	95.7%	100.8%	100.7%	95.2%	92.8%	95.8%	95.1%	98.8%	99.9%	95.4%
EA	101.2%	98.9%	98.4%	98.7%	98.9%	95.8%	91.9%	96.7%	105.1%	109.7%	101.4%	100.5%
NT	102.6%	98.4%	98.1%	96.8%	97.3%	94.9%	93.4%	100.1%	106.7%	107.9%	103.9%	102.5%
SE	100.8%	98.0%	98.6%	97.0%	97.3%	94.5%	91.4%	97.7%	103.5%	109.7%	102.5%	103.0%
SO	100.0%	95.8%	98.7%	99.2%	98.2%	96.3%	94.1%	97.7%	104.7%	102.3%	103.1%	102.2%
SW	99.5%	99.9%	99.8%	100.4%	101.1%	97.2%	97.2%	100.2%	104.1%	108.7%	104.5%	102.9%

Table 15: Aggregate NDM AQs at Start of Gas Year 2014/15

Based on data extracted from the Gemini system for gas days 29/09/14 and 08/10/2014

LDZ	% NDM AQ Change
SC	-3.2%
NO	-1.8%
NW	-3.0%
NE	-3.3%
EM	-2.4%
WM	-3.0%
WN	-3.3%
WS	-2.9%
EA	-2.1%
NT	-1.5%
SE	-2.0%
SO	-3.0%
SW	-1.4%
Overall	-2.5%