

TRANSCO REVIEW GROUP REPORT
"Review of NDM demand forecasting methodology"
Version 2.0

Review Group

**REVIEW GROUP 0567 - REVIEW OF NDM DEMAND FORECASTING
METHODOLOGY SUMMARY REPORT**

1. Summary

The Review Group was convened to consider the NDM demand forecasting process and in particular the application of NDM attribution, cash-out and reconciliation.

Initially the Review considered long term issues such as independent forecasting but after some consideration concluded that it was unlikely that shippers could achieve levels of accuracy approaching that currently facilitated by Transco without substantial investment.

Other longer term issues such as changing the basis on which demand attribution is determined were also considered and the report highlights the main findings. The group concluded that there may be some merit in addressing imbalance issues through reconciliation but the costs of doing so would outweigh any potential benefits.

Following rejection of Modification Proposal 0563 and removal of forecast deviation on 1 October 2002, the group focused effort on short term measures to alleviate imbalance exposure. The main effort being directed at additional daily attribution runs which gave rise to Modification 0590, which should it be accepted by Ofgem will provide for an additional attribution run at 21.30hrs within day. This should reduce further the differential between forecast and D+5 allocations, thereby potentially mitigating marginal cashout exposure to NDM imbalances.

Whilst there are no specific recommendations arising from the Review, the group has examined a number of issues, some of which may form the basis for future discussion in the appropriate forums. On that basis the group considers that it has completed its work as set out in the original terms of reference.

2. Treatment of NDM Load

2.1 Incentives to Forecast

The Review Group has examined the current forecasting process from Transco's demand models and LDZ forecasts through to NDM attribution in the forecast and D+5 allocation modes.

Having looked in some detail at Transco's demand forecast process and methodology, the group considers that it is unlikely that independent forecasting by shippers at LDZ level will achieve current levels of forecast accuracy at 16.00 within day (Gas year 2001/02 is 1.6% based on an average of all LDZ's) provided by Transco. Moreover

the costs for shippers to develop efficient forecasting tools would in all likelihood, in aggregate be higher than the marginal costs associated with daily attribution services provided by Transco. There is also no current system functionality to facilitate the provision of NDM forecast information from shippers.

The group considers that provision of relevant data by Transco in the interim will enable shippers to develop forecasting tools. The industry will need to consider more fully whether it wishes to pursue independent shipper forecasting and if so, what is required to enable it to work effectively. In doing so it will need to take into account the costs involved, commercial frameworks, system changes and long term benefits in comparison to the existing approach. In particular the operational use of such information and the impact this would have on system balancing by Transco. The industry may want to assess this in the context of whether the provision of additional attribution runs effectively minimises shipper risk to an extent that independent forecasting is not cost effective for shippers.

2.2 Incentives to achieve efficient daily balancing

The Review Group discussed the relevance of the current cashout regime following removal of forecast deviation and in particular the exposure of NDM shippers to marginal imbalance charges. Shippers are not balancing to a measured volume of gas but to a forecast of an estimate of demand at D+5. It is recognised by the group that by the very nature of the current D+5 Allocation process, NDM shippers will be unable to avoid marginal imbalance charges. As shippers are balancing on a daily basis to a figure that is not known until after the day, they will never (other than by chance) achieve a zero NDM imbalance. These charges will be recovered through neutrality and therefore there is a redistributive effect, some of this being from NDM to DM shippers. An estimate of the value of imbalance charges without forecast deviation based on the SMP – SAP differential for gas year 2001/02 was in the order of £3,000,000.

This group has considered changes to both the imbalance calculation point (outlined later in this paper) and amending cashout. The cashout discussion has centred on two main arguments over:

Cost Reflectivity – The view that shippers should be charged for the actual costs incurred by their actions. This is supported in principle by the Review Group whilst recognising the difficulty in determining how to target and apply those costs.

Incentive to balance – The view that charges should be set at a level that incentivises shippers to balance.

The extent to which the current regime reflects these two factors and the weighting they should be given cannot be resolved by this review group.

Given the complexity and impact on the balancing regime and gas market pricing, the group considers that this issue would be better debated in a more representative forum such as the NT&T workstream.

3. Identify improvements in the demand attribution process

In addition to the existing process using D+5 Allocations, the Review Group considered two other possible approaches to determining the imbalance position.

3.1 Allocation before or within day

Transco's demand forecast would be used to determine a fixed attribution ahead of or within day. This would become the shippers balancing target and any subsequent changes to demand would be managed by Transco as residual balancing agent. The point at which demand were fixed would be critical. If it was set at day ahead this would provide greater certainty for shippers and allow them to manage their balancing risk more easily, although the demand target would be less accurate. Conversely, demand set later within day would be more accurate but would give shippers less time to manage their imbalance positions.

This model has the advantage of mitigating NDM shipper balancing risk by having a clear balancing target and perhaps greater certainty for Transco in terms of shipper behaviour. In turn this may lead to lower balancing costs for shippers and Transco. However the greater residual balancing role for Transco runs counter to the declared intent of the Regulator as expressed at the Review Group. The group therefore concluded that there was little value expending effort on such a proposal whilst acknowledging it was consistent with the current approach to cashout determination in the electricity regime.

3.2 Imbalance determination through reconciliation

Rather than a D+5 Allocation, shippers imbalances would be determined based on rolling reconciliation periods; for example M+1 to M+12. This is something similar to the reconciliation imbalance model used in the electricity industry. As it is unlikely that all NDMs will be reconciled at each monthly allocation, there may still be a substantial element of deemed consumption.

Rather than the current method that relies on attribution of measured aggregate quantities of gas within an LDZ at D+5, reconciliation uses the measured quantity at meter point level to determine the daily imbalance as expressed by the meter point profile. As the gas is a measured quantity rather than attributed, it more accurately reflects (to the extent of reconciliation for a shippers portfolio) the actual gas usage overall for that shipper. It does not reflect the actual gas demand conditions on the day and the final imbalance position would remain open to infinite adjustment unless a close out date was agreed by the industry at for instance 12 or 24 months.

If pursued, it is likely that it would need to be reviewed together with NDM meter read performance and suppression to minimise deemed quantities and the close out period.

For illustrative purposes, the aggregate reconciliation for January 2002 amounted to 235,121,052 kwh equating to 0.26% of LDZ demand for that month and the aggregate for July 2002 was 732,633,611 kwh or 2.4% of LDZ demand for that month. The impact on individual shippers if the reconciliation imbalance model were to be used

would depend on their customer portfolio. Nevertheless it is important to note that there is a substantial amount of gas being re-allocated after D+5.

In the electricity imbalance regime there is no concept of RbD, relying instead on meter point reconciliation and the impact of such a large proportion of unmeasured reconciliation would need to be more fully understood.

Whilst measured data through reconciliation of NDMs does provide actual consumption, it is arguable whether it represents a more accurate assessment of daily demand. The risk for shippers is not being able to assess their balancing positions close to real time and that of on-going exposure to cashout through rolling changes to imbalance positions. In this instance cashout pricing will be a key factor as SMP would represent an uncontrolled risk for shippers whereas use of SAP would encourage commercial imbalance behaviour.

The group considers that there may be some merit in considering this alternative further, but that the imbalance financial risk would need to be weighed against the costs and benefits of implementing this new approach.

3.3 Two stage cashout

Linked to 2.2 and 3.2 above is the issue of two stage cashout, whereby NDM shippers are cashed out on imbalances at System Marginal Price and reconciled at System Average Price.

The system average price for reconciliation is used because the industry considers such a price to reflect a fair market value for the purposes of cashout of differences between the deemed allocations and subsequent estimates of actual daily consumptions, derived taking account of meter reading information. Prior to 1 October 2002, this was also the means to cashout differences between the final NDM nomination arising from the daily attribution process and that derived after the day (effectively at D+5).

The group agrees that NDM shippers are now fully exposed to imbalance marginal prices and although imbalance and reconciliation are distinct processes there may be some merit in debating a realignment between reconciliation and imbalance cashout.

4. Improving Demand Attribution

4.1 Modification 0590

In order to mitigate short term risk arising from the removal of forecast deviation, Scottish and Southern Energy raised Modification Proposal 0590 in order to facilitate a 21.30hrs within day demand attribution run. The current 16.00 within day demand forecast error is currently less than 2% of the D+5 allocation and it is considered that an additional attribution run later within day will lead to a further reduction in forecast error as actual flows are seen on the system. This will enable shippers to further refine their imbalance positions if necessary and thereby reduce cashout exposure and may reduce Transco's residual balancing actions.

The Review Group fully supports the objectives of this modification and subject to AT Link performance issues being sufficiently addressed, Transco supports its implementation.

4.2 NDM Allocation

NDM allocations in forecast and allocation mode are the product of total LDZ demand less DM demand and shrinkage. The key formulas that apply in this case are enclosed in Appendix A.

Underlying the allocation are a number of factors which influence how demand is calculated and attributed. The group considered the influence of AQ and SND in some detail, although on going responsibility for these issues will rest with current relevant industry forums.

AQ:

It was recognised that AQ error had an impact on NDM demand attribution in both allocation and forecast mode. A distortion can occur to demand attribution if there is a bias in AQ between more weather sensitive and less weather sensitive NDM load. Thus, any understated "domestic" sector AQ for example will lead to a proportionately greater allocation to less weather sensitive NDM load and hence bias.

NDM SND:

It was recognised that errors in NDM SND leads to WCF bias and hence affects NDM demand attribution in both forecast and allocation mode. The extent of the effect of NDM SND on demand attribution cannot be assessed in isolation since other factors (eg. metering error, nomination/forecast error, abnormal temporary effects of end user behaviour on actual demand) also have a bearing. Additionally, in the revised (post-Mod 496) approach to demand attribution, where WCFs and DAFs are in part based on aggregate NDM SND rather than aggregate LDZ SND, the controlling factor (ie. whether WCF or DAF) in the demand attribution formula determines the consequential SF bias. An approximate assessment of WCF bias (of which a part would be due to aggregate NDM SND error) may nevertheless be made based on assessments of WCF bias in allocation mode over gas years 1999/00, 2000/01 and 2001/02, using the results of the new approach to demand attribution applied retrospectively to those gas years. These analyses were undertaken in part in support of Mod-496 when it was under consideration and in part under the aegis of DESC. Gas year algorithm performance assessment including examination of WCF and SF bias is undertaken each autumn as a matter of course as part of the work of DESC. Indications from these studies over the three gas years were that normal weekday WCF bias was about -1.5%. WCF bias over the winter ranged between -1.5% and zero and for the year as a whole was -3% or smaller.

5. Impact of Daily Metered Nominations

The group examined the impact of DM nominations on NDM attribution in the forecast mode, as DM load is subtracted from LDZ demand forecasts together with shrinkage to determine the aggregate NDM forecast.

It was noted that DM nominations will have a distorting effect on NDM forecasts across all LDZ's.

There are two principal mechanisms that could be employed to reduce the impact on NDM shippers:

5.1 Daily Metered nomination incentives

DM shippers are currently incentivised to nominate accurately through scheduling charges and DM shippers are able to amend their nomination upto 04.00 hrs on the gas day. As the last NDM attribution run is at 16.00 hrs on the gas day, there is no incentive for DM shippers to input accurate nominations to coincide with the last NDM forecast or any prior attribution run.

5.2 Separate Daily Metered or Non Daily Metered forecasting

If Transco separately forecast Daily Metered supply point consumption rather than relying on shipper nominations or undertook an independent NDM forecast, there would be no distortion to NDM attribution due to shipper DM nomination behaviour. The impact on forecast deviation however is not so straightforward due to compensating behaviour between the NDM and DM sectors.

A number of simple models were discussed with the group, indicating that separate DM or NDM forecasting would need significant work to better the existing methodology. Compared with the current all LDZ average deviation of 1.6% for 2001/02, the simple illustrative models indicated much higher average deviations for separate NDM and DM forecasts. The group agreed that these models could be improved by more detailed work, but the level of effort required to out perform the current process could be significant and may be of marginal resultant benefit.

On the basis of the findings outlined above, the Review Group recognise the distortions caused by DM nominations but have not concluded the most appropriate way forward in terms of the benefits to shippers as they are not immediately obvious. It can however be noted that Modification Proposal 0590 may reduce some of the impact of DM nominations, as their accuracy generally improves within day. In addition, if Transco is in a position to provide aggregate DM information in each LDZ information, this may assist NDM shippers in compensating for variances.

5.3 LDZ and DM Metering Errors

The impact of both LDZ metering and DM metering errors has been considered by the group.

It has been noted that over the past two years LDZ metering errors have accounted for substantial volumes of gas, but the overall effect has been small, approximately 0.04% of overall LDZ demand. It was also recognised that by the very nature of mechanical equipment errors will continue to occur. The impact on imbalance exposure will be small as LDZ metering errors will be incorporated into the demand models used by Transco. There is a risk that a high LDZ meter error may coincide

with a day of high cashout prices, but in part, based on the historic information provided to the group the risk of such an occurrence is small. The group recognised there is no mechanism to address imbalance cashout exposure should an occurrence take place.

DM meter errors typically arise through datalogger drift and are corrected either where an error is identified or at the annual check read. They do impact NDM attribution but the extent of DM reconciliation as a proportion of DM AQ for 2001/02 is 0.54%. Overall DM reconciliation credits would tend to indicate that DMs are typically over reading and therefore depressing total NDM demand. As with LDZ meters, most of the errors will occur over a protracted period (upto 12 months). In most cases there will therefore be an alignment between overstated nominations and overstated allocations, minimising the impact on imbalance.

5.4 LDZ Shrinkage

Shrinkage was considered briefly by the group but its effect on demand attribution is small and given the existing industry governance, it was not considered further.

6. Information exchange

As debate within the group has moved from longer term issues such as shipper forecasting to short term risk mitigation with an additional demand attribution run, the requirement for shippers to provide additional information has reduced. Nevertheless the review group has requested information provision that would enable shippers to develop forecasting tools. Transco is currently examining information provision and will respond in due course.

Appendix A

NDM Profiling Formula & NDM Demand Attribution

The NDM profiling formula is :

$$\text{NDM demand} = (\text{AQ}/365) * \text{ALP} * [1 + (\text{DAF} * \text{WCF})] * \text{SF}$$

The formula is applied to each day and to each particular end user category within a local distribution zone (LDZ). For each end user category there is a separate value of ALP and DAF for each day.

AQ is the annual seasonal normal demand for a supply point or aggregation of supply points assigned to a particular end user category. AQ is defined to relate to a standard 365-day year.

ALP is the daily seasonal normal demand for the end user category for the day, relative to the average daily seasonal normal demand for the end user category.

DAF is the daily adjustment factor which on the day is the ratio of: the weather sensitivity of demand in the end user category per unit seasonal normal demand of the end user category *to* the weather sensitivity of *aggregate NDM demand in the LDZ* per unit seasonal normal *aggregate NDM demand in the LDZ*.

WCF is the weather correction factor, which is defined as follows :

$$\text{WCF} = \frac{\text{forecast or actual aggregate NDM demand in the LDZ} - \text{seasonal normal aggregate NDM demand in the LDZ}}{\text{seasonal normal aggregate NDM demand in the LDZ}}$$

SF is the scaling factor defined as follows :

$$\text{SF} = \frac{\text{aggregate forecast or actual NDM demand in the LDZ}}{\text{aggregate NDM demand (from formula with SF=1)}}$$

For the purposes of daily balancing, the NDM profiling formula is applied to each individual LDZ. Thus, values of SF and WCF are required for each LDZ. After the day, both WCF and SF are based on actual measured overall demand as well as actual measured aggregate DM demand in the LDZ. Ahead of and during the day, both WCF and SF are based on forecast overall LDZ demand and the aggregated sum of nominated DM demand in the LDZ.

ie.

aggregate actual NDM demand = actual LDZ demand - LDZ shrinkage - aggregate actual DM demand in the LDZ

and

aggregate forecast NDM demand = forecast LDZ demand - LDZ shrinkage - aggregate sum of DM nominations in the LDZ

In the application of the formula, the value of $[1 + (\text{DAF} * \text{WCF})]$ is constrained to be not less than 0.3, in order to ensure that deemed consumptions always remain within a reasonable bandwidth, even when unusual values of ALP, DAF and WCF coincide.

Note: This Appendix has been extracted from Appendix 8 of the annual NDM Report (entitled: “NDM Profiling and Capacity Estimation Algorithms”) published by Transco at the end of June each year.