

Gas demand turndown
Increasing system flexibility and security of supply for winter 2005/06
Proposal to DSWG

This paper argues that additional measures are available to stimulate demand response in the event of stress on the gas system this winter. It focuses on gas demand turndown, a new balancing service offered by National Grid (NG) in its role as SO, both as a short term response but also within a longer term development programme.

The core proposal for gas demand turndown is summarized in this summary outline. Additional background and discussion is set out in the Appendix.

Gas demand turndown/ management

Setting aside the detail, the core of the proposal hinges on two basic concepts. The first is that NG should take a proactive role in committing to demand reduction ahead of time (i.e. the immediate gas day). Second, to stimulate this, some form of capacity payment should be made to flexible load providers. Both are very necessary changes given the expected tightness of the system this winter (indeed we have already seen much to justify this perception over recent days of very high spot prices). And neither, if approached correctly, should necessarily undermine wider pricing signals.

In more detail this proposal comprises:

- NG would indicate the need for a specified quantity of firm load curtailment on a periodic basis, say monthly, perhaps a month in advance
- the arrangement could be initiated possibly from December on the basis that it is not practical to do anything sooner (i.e. it might tender early December for interruption that could be called in January)
- this quantity or the basis for deriving it should be based on some rationale parameter, possibly set by reference to the maintenance of the operating margin
- NG would tender for the defined quantity of firm load curtailment initially from suppliers with qualifying customers, perhaps customers with sites aggregated to 25,000 therms/day or perhaps limited to arrangements with qualifying customers over 1,000 therms/day. i.e. daily metered customers
- suppliers with a portfolio of sites under different ownership could choose to aggregate quantities to achieve the minimum thresholds
- ordinarily the firm commitment would be for reduction capability over a gas day, though there is no reason why volumes could not be “sliced and diced” within day

- NG would enter into bilateral contracts with suppliers (it says it cannot enter into contracts direct with customers¹) who were successful in the tender for quantities above a defined threshold
- consolidators or competing suppliers should be eligible to tender provided they could evidence firm purchase commitments with customers
- payment under the contracts would be two part, comprising availability (capacity) and utilization (energy) terms for gas turndown/ demand management
- the basis for valuing the capacity option might be assessed against the other mechanisms available to NG for supporting the operating margin (i.e. LNG or conventional storage)
- payment with respect to capacity could be deemed to create a system benefit and recovered from all system users, necessitating changes to the Transco revenue recovery mechanism
- utilization elements could be treated as a balancing cost and recovered through cashout or if they were considered to be a system good as system costs, and as with capacity element, recovered from all system users through Transco's revenue recovery mechanism²
- there could be requirements on suppliers to make the quantities available at a specified time (e.g. D+5) or in specified conditions (e.g. where the operating margin is expected to fall below specified levels)
- suppliers would then bid for the load reduction on a non-locational basis, and these quantities would be financially committing if called
- utilisation might be tailored to occur on a specified number of occasions over the month or perhaps have a stipulated minimum duration
- to minimise possible distortions with other market based processes, utilization bids could be submitted through the OCM
- where they were not, there would need to be due transparency.

The arrangement would be a pilot one, to enable the potential and take-up to be identified so that decisions on an enduring arrangement could be taken ahead of winter 2006/07.

¹ This is an issue that needs clarity/ resolution for next winter.

² given the potential acuteness of shortage in a severe winter and the multi-faceted nature of causal factors, there a strong arguments for treating this as a system good cost

To implement the gas turndown service the following changes would be required:

- introduction of a new gas turndown contract form and supporting tender arrangements
- mechanisms for making the tender process and its commitment visible to the wider market
- changes to the system management principles statement
- modification of Transco's revenue recovery mechanism
- changes to the cashout rules
- other supporting rules in the UNC.

Additional background is attached as an Appendix.

Gas turnaround
Increasing system flexibility and security of supply for winter 2005/06
Background

On Wednesday 9 November, the government provided an initial reaction to some of the current concerns and speculation about possible gas limitations this winter following a high-level meeting at 10 Downing Street chaired by Malcolm Wicks. The immediate background to that meeting was comment by National Grid that in the event of a 1-in-10 winter some 0.9bcm of response would be required to ensure continuity of supply after CCGT power stations had been pushed off the system. Given that such response is not available from non daily metered gas customers, it would need to be sourced in affect from industrial customers. The bottom line is that upwards of 30% of this demand would be exposed to interruption for up to 40 days in the 1 in 10 circumstances.

Table 1 – Summary of Gas Demand-Side Response Analysis

| Winter severity | Estimated demand-side response required (bcm) | Potential contribution from CCGT sector (bcm) | Approximate residual requirement as percentage of non-power DM market sector ³ |
|-----------------|---|---|---|
| Average | 0.1 | 0.1 | None |
| 1 in 10 cold | 2.2 | 1.3 | 30% on average over 40 days |
| 1 in 50 cold | 3.7 | 1.8 | 50% on average over 50 days |

Source – National Grid

Ofgem primarily through the Demand-side Working Group (DSWG) has worked hard to get some focus on how the gas system would cope with a severe winter. Recent progress with development of a new National Grid website to better inform customers (which was launched on 15 November) and modifications UNC 61³ and 62⁴ has emerged directly out of work by the DSWG. Whilst such initiatives are obviously encouraging and generally supported by large consumer groups, ultimately these changes are limited in nature. Further, there is no guarantee, especially in the case of UNC 61, that it will successfully navigate the assessment process.

The record of the 9 November meeting notes that a number of other avenues are to be explored to provide further reassurance that the system can balance in a colder than average winter. These include:

- discussions between business representative organizations and the Environment Agency to limit consenting restrictions on fuel switching

³ The proposed extension of the ability of supplies to make reduction bids through the OCM but also the OTC markets following a GBA until UNC 62, with the option of keeping a standing bid in place with a duration of up to five days after a GBA has been called.

⁴ This proposes implementation of the new gas balancing alert (GBA), in loose terms a proxy for the NISM currently used in electricity to indicate system stress.

- with regard to the ability of switchers and load managers to do so in a timely and orderly manner, industry, employer and consumer agencies have been sent away to validate assumptions or quantify the extent to which they might be deficient
- the undertaking of further analysis of demand response capability in the large (but not energy intensive) user community
- analysis of contractual developments since last spring.

All these measures, while necessary and having merit, are untested and in some cases will not bear fruit or allow concerted follow up possibly until after any immediate need this winter. Further there are continuing indications that there are a number of distortions in the gas market that act as barriers to demand side participation. For instance, there is considerable uncertainty over:

- the extent to which gas business consumers can proactively manage load curtailment in response in short timescales even with high prices
- the impact of physical, operational and contractual limits on this theoretical response
- the extent to which current contracts with suppliers are addressing all areas of potential demand response.

At the same time, if media reports are to be believed, neighbouring markets are contemplating much more direct measures to limit gas exports, requisition gas in storage or in some other way by-pass established market processes in the event of tightening supplies. Against a background where it is already considered by some that assumptions in the winter outlook may already been generous⁵, it is very likely that if such measures were called, they could significantly aggravate the scale and frequency of load curtailment required of business customers in the UK.

There is considerable official anxiety about what will happen if it were to be an adverse winter. The government group formed to pull together thinking in this area is due to meet in early December to review progress against the various actions in play.

There is in affect a window of four weeks to get any further options to introduce flexibility into the gas system for this winter discussed and scoped.

Context of proposal

In developing the gas turndown proposal it is important to remember that:

⁵ The availability assumptions about the interconnector, including the upgrade, already look highly questionable. LNG availability is also highly sensitive to price developments in remote markets.

- gas and electricity are different commodities and their market structures have differing drivers and timescales
- take up of demand-based arrangements in electricity have been modest compared to some other electricity markets at least to date, but overall NG has a positive story to tell
- there are limits to other proposals in play and the extent to which they are likely to incentivise response by the demand side.

Gas is different

Measures adopted in the electricity sector in response to perceived risks of tight supply conditions over the past few years, including the concept of electricity turndown service, may suggest possible solutions that with adaptation can be applied in the gas market.

In gas, National Grid annually carries out an assessment of the operating margins requirements and publishes an operating margins statement. The ‘margin’ to the SO is provided by National Grid making gas storage bookings, primarily in liquefied natural gas storage and to a lesser extent, in mid range and long range storage.⁶

Operating margins are designed to stabilise system pressures in the short term until other market actions⁷ take effect. Although operating margins could be used at any point in the year, the main focus is the winter where an unplanned event is more likely to cause operational difficulties on the National Transmission System (NTS).

The gas network at the NTS level was originally designed for operation with uniform flows throughout the day. However, the inherent amount of storage (linepack) within the NTS does allow for a level of within day supply/ demand imbalance to be accommodated. For this reason any instantaneous unplanned event does not necessarily require the use of operating margins (particularly away from peak conditions).

So while timing considerations are different relative to the electricity market and the scope for balancing response by consumers within day is greater, there is still scope for the demand side to provide system support in helping NG achieve its defined operating margin, especially as an alternative to the call-off at storage.

It is misleading to suggest that NG’s residual gas balancing role is limited to on the day activity. Energy balancing on the day takes a number of forms, several of which are enabled by capacity (both energy and transport) reservation mechanisms entered into over a variety of timeframes to secure the operating margin.

⁶ Mid range and long range refers to the duration of the storage facilities.

⁷ For example, interruption, demand management, system reconfiguration, market sourcing of additional supplies or market storage.

Lessons from electricity

To date NG has conducted two trials for a proposed demand turndown service, with only two suppliers participating providing access to modest quantities of curtailment.⁸ It is continuing to offer demand management (based on a lower threshold and greater pricing freedom) as a standalone service, but with no participation to date.

The experience with demand turndown/ management should not detract from greater success experienced from integrating demand response into other balancing service arrangements, as shown in Table 2.

| <u>Service</u> | <u>2000/2001</u> | <u>2001/2002</u> | <u>2002/2003</u> | <u>2003/2004</u> | <u>2004/2005</u> |
|--------------------|------------------|------------------|------------------|------------------|------------------|
| Fast reserve | 0% | 5% | 5% | 6% | 5% |
| Standing reserve | 23% | 29% | 29% | 29% | 32% |
| Frequency response | 29% | 29% | 28% | 32% | 32% |

Source – National Grid

The reasoning behind the mixed record of take up on electricity warrants further consideration by the DSWG, and can only be the subject of conjecture at this stage in the absence of hard analysis. Nonetheless a number of points can be made:

- demand represents an important element of NG’s balancing portfolio, over a variety of timeframes
- the figures have shown steady augmentation since go-live, especially with regard to standing reserve
- the introduction of fast reserve in 2002 shows that rollout of new products can be effective and swift.

Balancing service arrangements in electricity have shown steady and continuous development since go-live, with increasing emphasis on demand side provision. There remain bottlenecks to take up, but their existence should not detract from the real contribution and benefits already brought by customer response.

Limitations of other proposals

In identifying possible further measures, the following should be borne in mind:

- there are real limitations inherent in current proposals to encourage sell-bank of gas quantities by non-domestic customers, including timing asymmetry

⁸ The reasons behind the failure of demand turndown in electricity to find widespread take-up warrants discussion by the DSWG. Some suppliers believe the contrasting experience between this service and, say, standing reserve are different payment incentives.

- the realities of the business processes that inform operational decisions by consumers' businesses need to be factored in
- over the recent past voluntary load response in the sector (and restrictions that could well apply to it) have been largely untested.

Scope of UNC 61

In the event UNC61 is approved (assuming its current formulation), the potential penetration on the demand side is limited by:

- the requirement for prior existence of a GBA
- timing issues, such as a GBA which can only be called at D-1.

Despite the absence of any obvious other routes to market for the demand side, the combination of these factors is likely to significantly limit eligible volumes. Further the on the gas day focus of the nominations regime combined with a lack of forward information beyond the D-1 stage means that opportunities that may exist from flexible demand response are probably being over looked.

Customer circumstances

For many years, energy costs have been regarded as a diminishing factor affecting the competitiveness of many businesses. Many large users have dismantled switching capability against a background of falling prices and a switch to 'just in time' production methods which seek to minimize stocks of finished products.

Added to this many customers who might be able to flex operational processes can do so but only from a few days ahead, typically the working week ahead stage. For instance, many processes are confirmed at close of the prior week, so a site expecting a cold snap can factor this into its operations at that stage when it makes resource commitments but not later. Once production schedules are locked in, the scope for change is greatly diminished. Similarly delivery requirements specified under contracts with the energy purchaser's customers are sometimes firmed up at that stage, and once commitments have been made physical delivery is required unless specifically qualified.

These customer circumstances need to be taken into account when carrying out hypothetical assessments of demand elasticity and the scope for customer response, and do not seem to be understood well in discussions about demand side response.

Limited knowledge of customer behaviour

An extension of this theme is the limited knowledge about energy usage held by NG and suppliers, especially outside of the energy intensive and largest users.⁹ The tendency for

⁹ Reference to projects Krakatoa and Moscow suggest that the accuracy of even basic data is, while improving, limited.

suppliers to offer indexation supply deals has led to the assumption that customers exposed to shorter term price volatility might be expected to curtail use at times of high price. Empirical evidence from late last winter suggests that process limitations and other cost drivers can exercise a greater influence, and many customers continued to consume rather than cut back demand.

In effect limited knowledge of customer behaviour and its drivers is confirmed by the recent decision of DTI to update its view of commercial arrangements involving large consuming customers and how this might have changed in the contract rounds since March.

All the evidence suggests that a number of factors, including the limited routes to market even with UNC61, operational and contractual restrictions and modest knowledge of customer behaviour outside the energy intensive users, will restrict the scope for active demand management in the event of a severe winter.

Against this background, greater participation by customers in demand side schemes requires:

- recognition of the security benefits of predictable and controllable demand response and their potential impact on the operating margin
- transfer of these benefits into availability incentives
- widening of the SOs ability to contract for demand response beyond UNC61 timescales
- fine tuning of the SOs role as residual balancer to enable it to enter into gas demand turndown contracts, possibly from the one month ahead stage in response to system need.

These ingredients have been combined in the gas demand turndown proposal.