Commentary on National Grid NTS note "UNC0116: Enduring Offtake – Information request on the availability of NTS exit flexibility capacity"

TPA Solutions has been asked by Centrica Energy to review the analysis provided by National Grid (NG) on the availability of NTS flexibility. We understand that Centrica intends to circulate the output from our work to other members of the Gas Forum.

We have studied this material at a reasonable level of detail although we have not been able to make a thorough assessment of all aspects of the NG note in the time available.

Our impression is that it does not contain sufficient information to justify the implicit conclusion that there may be a scarcity of NTS flexibility. From our preliminary assessment, we believe that NG has significantly understated flexibility availability within the NTS and overstated GDN demands for NTS flexibility, and we give our reasons for this in the commentary below. There are elements of the analysis that appear to contain contradictory statements and circular arguments, and we therefore wish to raise some quite fundamental points at this stage.

We believe that the analysis is a starting point for debate with the industry rather than a conclusion, and the information provided by NG raises many more questions. We set out additional information that would assist in further assessment at the end of this note.

1. National Grid Methodology

The basic problem we have with the analysis presented by NG is that the selection of the 1 in 20 peak day as the starting point for assessing the flexibility availability may make the situation look much worse than a realistic scenario. The peak day figures clearly show that there is a lot less flexibility available than on day 1 and day 68 of the average weather load duration curve.

We appreciate that the basis for NTS design is to meet demands on the 1 in 20 peak day as set out in the licence, but there are other factors which we feel have not been acknowledged by NG in developing their conclusions.

We illustrate our concerns by exploring what would need to happen in order to achieve the worst case figures presented by NG. Firstly there would have to be a 1 in 20 peak day, which whilst a rare event in itself, is a theoretical design basis to start from. However on top of that there would have to be a combination of either high east coast flows or no IOG flow, and then back loading. This does seem a rather extreme scenario, admittedly possible but with a lower probability of occurring in combination than the occurrence of a 1 in 20 peak day on its own. To make matters seem even worse there is a statement that the availability would be severely reduced as a result of localised requests for flexibility. Application of this methodology gives flexibility availability figures for 2010/11 which are significantly below 20mcmd.

We offer two alternative approaches that can be used to demonstrate that a worst case figure of less than 25 mcmd for 2010/11 cannot be justified:

(1) This approach would use the NG minimum peak day figure for flexibility availability with balanced distribution (26 mcmd), on the basis that this is a clear design figure. Differences in supply and demand patterns or entry back

loading that might occur coincidently with the peak day are either accommodated within the design flow margin, or accounted for by the fact that there are no allowances in the NG methodology for diversity between GDNs.

(2) An alternative approach could be to take the NG figure of 30mcmd for availability at a demand level of 400 mcmd, a typical demand day in winter (this is obtained by taking the average of the 31 mcmd for day 68 and 29 mcmd for day 1 = 30 mcmd). Then, given that there is a much higher probability of this demand level occurring at the same time as a loss of IOG or high east coast flows, apply the reduction as a result of one of these events to give a pragmatic assumption of the availability of flexibility. This would give a value of 30 – 4 = 26 mcmd should there be no IOG flows. Should it still be felt necessary to accommodate the most onerous supply pattern (high east coast flows) then this reduces to 25 mcmd. Dealing with the issue of backloading at the same time would seem to be one coincident event too far, and the flow margin has a specific provision designed to deal with this aspect anyway.

We conclude from this that there appears to be no justification for a flexibility availability of below 25 mcmd for 2010/11.

2. Targeting flexibility demand geographically

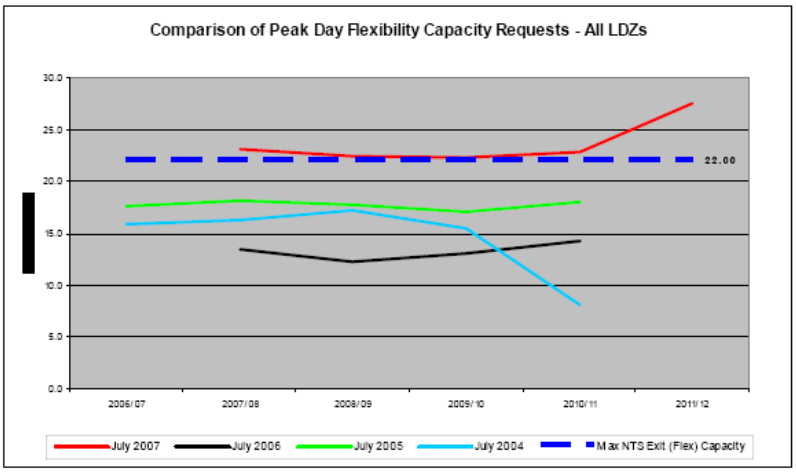
The methodology developed by NG firstly establishes flexibility availability when demand for the product is evenly spread geographically, and then shows a significantly reduced availability where demand is targeted on one of four geographical areas. For example, figures in the report show that an availability range of 24-32 mcmd is reduced to 18-21 mcmd when flexibility demand is targeted on the Midlands.

This appears to be a further example of NG using an extreme scenario to raise concerns over flexibility availability. The spread of flexibility demand is reasonably well understood and it is unrealistic to assume large shifts in the distribution of demand occurring at short notice. The ability to take flexibility at NTS offtakes is dependent on the infrastructure installed (both at the offtake and downstream), as well as the downstream diurnal demand, and large changes in demand distribution would be signalled well in advance through the downstream projects required to facilitate the change.

We focus on the need for an improved understanding of the GDN demands for flexibility below.

3. GDN's requirements and OCS process

The existing annual process for GDNs requesting NTS flexibility and its subsequent allocation has in many ways proved unsatisfactory. As the chart provided by NG (and reproduced below) shows there is significant year on year volatility in the flexibility levels requested by GDNs:



All other things being equal, we would expect a small steady increase in GDN requirements in line with modest demand growth. Instead, the requested levels show large year on year variations, both up and down, and the 2007 requests show an enormous increase in requirements compared to 2006.

The volatility in requested levels calls into question the reliability of GDN flexibility forecasting process – this has only been the responsibility of GDNs as independent entities since GDN sales, and is clearly still evolving.

In the table below we consider the significantly increased levels requested in the 2007 process compared to previous years' requests, by focussing on 2010/11 requirements:

Requested GDN requirements for 2010/11				
Date of request	2004	2005	2006	2007
NG NTS Peak GWh/d	4926	5066	4733	4664
Aggregate GDN Peak GWh/d	-	-	4993	4981
GDN Flexibility requirement mcm	8	17.5	14.5	22.5

Requests made in 2004, 2005 and 2006 bear some correlation to the peak day demand, but it is not apparent why the 2007 forecasts are so dramatically higher. It is also interesting to note the discrepancies between the peak day demands used by NG and the aggregate from the DN's, which could also serve to inflate DN flexibility requirements.

Following discussions between NG and the GDNs, the 2007 process culminated in requests that were revised downwards substantially, and NG has agreed to allocate the requested quantities apart from for 2011/12, where the request remains more than 10 mcmd above that for the previous year:

Flex (mcmd)	2007/8	2008/9	2009/10	2010/11	2011/12
Original GDN request	23.17	22.53	22.45	23.54	28.22
Revised GDN request	15.88	15.63	15.74	17.47	28.49
Allocation	15.88	15.63	15.74	17.47	17.47*

*Not finalised – reflects NG commitment for previous year

The unsatisfactory nature of this process is amply demonstrated – it is clear that GDN original requests can be nearly 50% in excess of the flexibility ultimately allocated. We therefore have no confidence that the process reveals the realistic requirements of GDNs.

4. Revised GDN interruption arrangements

We believe that assumptions made by NG and GDNs regarding the degree to which existing interruptible load may become firm under the revised interruptible arrangements may significantly affect the flexibility availability analysis. In particular we are concerned that an overstated firm load assumption may lead to artificially low flexibility availability on two counts:

- Additional firm GDN load will presumably require additional flat NTS exit capacity, which in turn may restrict the available NTS flexibility

- GDNs may be assuming that they will need additional flexibility to support the additional firm load (NG appears to suggest that the marked increase in GDN flexibility requested in 2011/12 may be due to the revised GDN interruptible arrangements)

On the second point, we do not accept that the switching of existing GDN interruptible load to firm will necessarily lead to a substantially increased requirement for flexibility. Existing interruptible load that can be supported on a firm basis is, by definition, not subject to transportation constraints and can not therefore be interrupted by the GDN. Under today's regime the load will therefore remain on under high demand conditions and be provided with the necessary flexibility. No additional flexibility is required when the load formally switches to firm status under the revised arrangements. Further, existing interruptible load tends to be high load factor with limited flexibility requirements and there is no reason to believe this will alter on a change to firm status.

It is important that the assumptions being made in this area are understood and tested. If, for example, it has been assumed that GDNs will retain only their locational interruptible requirements through the tender process, then the significant assumed increase in firm load may be skewing the analysis towards a low available flexibility outcome.

A further aspect relates to the whether the revised GDN interruptible arrangements can be expected to operate satisfactorily if NTS exit capacity (both flat and flex) remains as a "free" product for GDNs. The GDNs would appear to have a financial incentive to minimise their interruptible requirements and to take firm NTS exit capacity instead, rather than trading off the costs of NTS exit capacity and interruption. This could unnecessarily depress available NTS flexibility.

These issues are not addressed in the NG report, and more detail is required to make a considered judgement of the impact of the revised interruptible arrangements on the availability of flexibility. As a starting point it would be helpful if NG and GDNs could provide details of GDN flat capacity requirements, GDN flexibility requirements and NTS flexibility availability in 2011/12 assuming:

- The existing GDN interruptible arrangements
- The revised GDN interruptible arrangements, based on:
  - GDN forecast of interruptible tender uptake
  - Interruptible tender uptake is for locational interruptible requirements only

5. GDN capex projects

NG is also concerned that GDN capex assumptions made by Ofgem during the recent price control review may lead to an increased demand for NTS flexibility. However, it should be noted that these projects (which may provide a combination of replacement flexibility for decommissioned holders and transmission capacity) have only been deferred, and for the majority of flexibility to be provided (in Southern DN), only by two years. There may be a resulting increase in demand for NTS flexibility but this will only be temporary, and followed by a decrease as the deferred projects are completed.

6. Concerns over GDN requirements

It is clear from the NG paper that GDN requirements form a crucial part of any analysis of NTS flexibility. However, from the evidence presented we have no confidence in the manner in which GDNs establish their requirements, and there appears to be an inbuilt incentive to over-forecast to gain access to a zero priced product.

Greater transparency in the request and allocation process (as was proposed under modification proposal 139A) might help, but for present purposes we believe that the GDNs should be asked to conduct a more fundamental assessment. This would cover historical and forecast flexibility requirements and capability for each GDN, with year on year changes explained and rationalised, as follows:

- The aggregate flexibility requirements to serve the customer base
- The capability within the GDN to provide flexibility to meet these demands
- The remaining requirement to be sourced from the NTS

In addition it would be helpful to understand details of the processes used to establish GDN requirements, including for example:

- The extent to which diversity of demand for flexibility (a) within GDNs and (b) across GDNs is taken into account in generating flexibility requirements and how this would impact on OCS bookings were GDNs able to book flexibility zonally
- The way in which negative flexibility requirements are dealt with

This would enable NG (and other interested parties) to conduct a far more robust NTS flexibility analysis than can be made using the currently available information.

7. Development the NTS

NG has clearly stated that all new pipeline developments have been incorporated into the analysis. However, in the absence of a thorough audit of the NTS network modelling techniques employed it is not possible to validate the extent to

which recent NTS expansion has impacted flexibility availability. It would be helpful if NG could provide more information on this.

8. Operation of the NTS

We would also like to understand better the modelling assumptions relating to network optimisation and in particular use of compression, as we believe there is a linkage between compressor usage and the generation of flexibility within the system. For example, are the compressors assumed to operate to achieve minimum pressures across the whole day to minimise compressor fuel use, or are they operated to maximise linepack, irrespective of the impact on compressor fuel? Are there any other modelling constraints applied to the use of compressors and does this limit the ability to maximise flexibility? Again we request further information from NG regarding compressor operating assumptions for the modelling of the network.

9. Backloading

It is not clear why NG should attribute significant reductions in exit flexibility availability when entry backloading occurs. Firstly, as noted above, we believe that the design flow margin has an allowance to accommodate entry point flow variations. Secondly, we are unclear as to the linkage between entry and exit in this context. When backloading occurs, it is not the behaviour of demand that is a problem, as this is fairly predictable in diurnal terms, but the fact that a terminal is trying to deliver additional gas into the network which is already running at a high pressure. It is not clear why the measures needed to deal with entry constraints (for example, interruption or capacity buy back) would reduce the availability of exit flexibility in some other part of the system.

It would be helpful if NG could provide further information on the impact of both backloading and frontloading. If there really is a linkage between entry and exit flexibility as NG appears to be claiming, then this would suggest that flexibility is a “whole system” issue which would be inappropriately targeted if all remedies, and costs, were to be applied solely at exit points. It could be postulated that entry and exit points both contribute to and withdraw from available flexibility. This observation does not detract from the question as to whether there is any shortage of system flexibility. If such shortage were identified following objective analysis it would then be relevant to consider the relative causes of any constraints and to formulate a regime to address constraints of flexibility appropriately.

10. Further information

Below we summarise the further information that would assist a fuller assessment of the issues associated with NTS flexibility availability:

Supply impacts

1. It would be helpful to have a clearer definition of “high east coast flows”. Does this mean high Easington flows or some other scenario?

Revised interruptible arrangements

2. It would be helpful if NG and GDNs could provide details of assumptions relating to the revised interruptible arrangements (see section 4)
3. As a starting point we would like to see details of GDN flat capacity requirements, GDN flexibility requirements and NTS flexibility availability in 2011/12 assuming:
   - The existing GDN interruptible arrangements

- The revised GDN interruptible arrangements, based on:
  - GDN forecast of interruptible tender uptake
  - Interruptible tender uptake is for locational interruptible requirements only

GDN requirements

4. Full details of GDN historic and forecast flexibility requirements and capability, with supporting explanations for year on year changes, as described in section 6
5. As a starting point, it would be helpful if the information that is readily available could be provided (e.g. the IExCR statement updated to include GDN requirements as per previous versions; alternatively the most recent OCS statements)
6. Details of the processes used to establish GDN requirements as outlined in section 6, including for example:
   - The extent to which diversity of demand for flexibility (a) within GDNs and (b) across GDNs is taken into account in generating GDN requirements and how this would impact on OCS bookings were DNs able to book flexibility zonally
   - The way in which negative flexibility requirements are dealt with
7. See above for questions related to revised GDN interruption arrangements
8. What would be the flex requirements for GDNs if the peak forecasts used by NG were used instead of the GDN's numbers?

Development of the NTS and network modelling

9. Commentary on the impact of recent NTS projects on flexibility availability (see section 7), and more details of the network modelling techniques employed generally

Operation of the NTS

10. Details of the modelling assumptions with regard to compression as per section 8, addressing in particular the following:
    - What is the maximum credible linepack that can be generated from the NTS with the most favourable conditions assuming total flexibility to operate compression to support the generation of network flexibility?
    - Under the circumstances that have been identified for the 26, 22 and 21 mcmd available flexibility in the Executive Summary, has the utilisation of unconstrained compressor operation been used and if not how would these figures have changed?

Back- and frontloading

11. Further information on the impact of both backloading and frontloading (see section 9).