Flow Flexibility Zonal Capacity Attribution

Note for EOWG 12 12th July 2006

Background

National Grid NTS has declared that the 2010/11 "Physically Firm" Flow Flexibility release should be limited to 22 mcm nationally.

At EOWG 11 NTS proposed that this national availability should be apportioned to 17 Flexibility Zones so that the potential release quantities (as defined by the sum of the zonal maximum releases) should equal the national availability quantity.

It is envisaged that shorter term application processes, perhaps via enhanced OPN submission and acceptance processes, might be used to gain access to flow flexibility close to gas flow to complement the "physically firm" longer term release.

At EOWG 11 (28th June 2006) National Grid NTS presented a paper describing several potential methodologies for allocating the national capability to the zones. The paper included two sets of potential attributions. However given the anticipated low levels of "competition" within the zones EOWG members considered that the processes associated with attribution of available flexibility capacity based upon any single method would arbitrarily and artificially restrict the release of flexibility capacity. It was argued that an essentially arbitrary approach would be the primary determinant of where "physically firm flexibility capacity" might be held and who would hold it.

Additionally Ofgem have also expressed its disquiet with any arbitrary approach that predetermines the allocation of the National flexibility availability is unacceptable unless limitations of sale quantities within each zone are related to genuine physical limitations.

Action

Following discussion with Ofgem on 29th June 2005 National Grid NTS agreed that it would seek to establish the anticipated zonal attributions of the national flexibility capability based on a series of methodologies developed from those in the EOWG 11 paper.

High level descriptions of the various attribution approaches used to inform this paper and the resulting intermediate "zonal" attributions are included in Appendix 1.

At EOWG 11 National Grid NTS proposed that the community should consider the basis under which the 22 mcm might be released with a view that the sum of the zonal maxima should be no greater than national availability limit. Whilst National Grid NTS indicated a preference that the sum of the zonal maxima should equal the national availability Ofgem and EOWG participants requested an alternative approach. This would involve developing an approach that would allow potentially higher zonal maxima but with aggregate release constrained to the national availability.

In subsequent discussions with Ofgem the following formulation emerged:

$$ZR_i <= ZM_i \quad \text{for } i=1,2, \ldots\ldots n \text{ , and}$$

$$\sum_{I = 1, ..n} ZR_i <= NM$$

where

ZR_i represents **Z**onal **R**elease quantity in zone **i**
ZM_i represents Zonal **M**aximum quantity in zone **i**
i denotes the zone
NM represents the **N**ational **M**aximum aggregate release

National Grid NTS has advocated 17 zones (denoted zones 0, 1, ….. 16)
National Grid NTS has advocated a National Maximum "physically firm flexibility" of 22mcm

A series of scenarios have indicated potential attributions of the National Availability to the Zones subject to the restriction that $\sum_{I = 1, ..n}$ ZM_i <= NM (definitions of scenarios and resultant attributions of the National Availability are included in Appendix 1)

Applying the formulation to be explored arising from the Ofgem discussion would yield:

Zone	ZM_i
0	3.58
1	4.60
2	0.40
3	3.19
4	5.95
5	1.54
6	0.64
7	2.02
8	2.03

Zone	ZM_i
9	3.01
10	1.29
11	2.67
12	2.21
13	3.26
14	1.62
15	1.46
16	1.21

but with an aggregate National release subject to overall National Maximum of 22 mcm.

National Grid NTS response to the above proposal

The above formulation could allow "migration" of flexibility capacity to particular parts of the system that could not be accommodated. High utilisation of this capacity could generate offtake flow patterns that could not be accommodated by the NTS.

However based upon the recent network analysis work presented to EOWG National Grid established some area maximum flexibility utilisations, based upon a series of assumptions, that would be consistent with the envisaged network capability.

Provided that the sum of the zonal holdings within each area is within the physical maxima derived from that network analysis and the national aggregated release is limited to the derived national maximum of 22 mcm derived from other network analysis simulations then National Grid NTS considers that there is a high probability that simultaneous utilisation of all holdings could be accommodated.

National Grid NTS' view is that, given inter-LDZ diversity and provided that DNs secure sufficient flexibility capacity to at least satisfy DN's NTS diurnal support requirements determined in accordance with current planning processes, and in the context of the continuation of Standard Special Condition A17 (see Appendix 3) then, subject to the additional limitations on the release of zonal holdings within each area defined by:

$ZR_0 + ZR_1 + ZR_2 + ZR_3 + ZR_4 <= AM_{North}$ (= 9)

$ZR_5 + ZR_6 + ZR_{11} + ZR_{12} + ZR_{15} <= AM_{Central}$ (= 8)

$ZR_7 + ZR_{14} <= AM_{West}$ (= 5)

$ZR_8 + ZR_9 + ZR_{10} + ZR_{13} + ZR_{16} <= AM_{East}$ (= 8)

National Grid would support such a release of flexibility capacity.

These would define the potential release of "physically firm flexibility capacity" for 2010/11. Further network analysis would be necessary to inform the inherent flexibility availability for subsequent years.

Conclusion

For 2010/11, National Grid NTS would envisage the release of "physically firm flexibility capacity" consistent with the above framework and parameters:

$$ZR_i <= ZM_i \quad \text{for } i=1,2, \ldots\ldots n \text{ , and}$$

$$\sum_{I = 1, ..n} ZR_i <= NM$$

$$ZR_0 + ZR_1 + ZR_2 + ZR_3 + ZR_4 <= AM_{North}$$
$$ZR_5 + ZR_6 + ZR_{11} + ZR_{12} + ZR_{15} <= AM_{Central}$$
$$ZR_7 + ZR_{14} <= AM_{West}$$
$$ZR_8 + ZR_9 + ZR_{10} + ZR_{13} + ZR_{16} <= AM_{East}$$

where

ZR_i represents **Z**onal **R**elease quantity in zone **i** (i=0, .. 16 with defined nodes in each zone)
ZM_i represents **Z**onal **M**aximum quantity in zone **i** (")
AM_{Area} represents each Area's Maximum for each of the 4 areas effectively defined above
NM represents the **N**ational **M**aximum aggregate release

and (with all quantities expressed in mcm)

i	0	1	2	3	4	5	6	7	8
ZM_i	3.58	4.60	0.40	3.19	5.95	1.54	0.64	2.02	2.03

i	9	10	11	12	13	14	15	16
ZM_i	3.01	1.29	2.67	2.21	3.26	1.62	1.46	1.21

Area	North	Central	West	East
AM_{Area}	9	8	5	8

NM
22

Subsequent years releases would be the subject of Network Analysis to determine the most appropriate assessment of system capability.

The above formulation maintains the aggregate national flexibility release at 22 mcm but addresses Ofgem and the communities concern that, consistent with physical capability of the system, flow flexibility might be sold locationally to where users value it most highly.

Appendix 1 – Scenario attributions and intermediate calculations

Zone	Option 1	Option 2	Option 3a	Option 3b	Option 3c	Option 4	Option 5	Option 6	Max value for each Zone
0	2.18	1.44	3.30	3.16	**3.58**	1.37	2.70	2.11	3.58
1	0.64	1.32	2.51	2.40	1.84	1.37	3.57	**4.60**	4.60
2	0.17	**0.40**	0.37	0.36	0.27	0.26	0.21	0.06	0.40
3	0.09	2.11	2.45	2.35	**3.19**	1.90	2.44	2.43	3.19
4	5.47	2.41	**5.95**	5.71	4.37	2.57	4.26	2.61	5.95
5	**1.54**	0.85	1.20	1.15	0.88	0.60	0.79	0.39	1.54
6	0.56	**0.64**	-0.46	0.00	0.24	0.44	-0.26	-0.07	0.64
7	1.58	0.87	**2.02**	1.94	1.82	1.49	1.56	1.12	2.02
8	1.59	0.82	-0.47	0.00	0.78	**2.03**	-0.27	-0.07	2.03
9	1.77	1.25	0.13	0.12	0.67	**3.01**	0.83	1.51	3.01
10	1.20	0.78	0.00	0.00	0.00	0.46	0.65	**1.29**	1.29
11	1.75	1.32	1.75	1.68	1.28	1.08	2.22	**2.67**	2.67
12	0.80	1.59	0.87	0.84	1.21	**2.21**	0.50	0.13	2.21
13	0.34	**3.26**	0.33	0.32	0.24	0.10	0.34	0.34	3.26
14	0.25	1.29	0.92	0.89	0.80	**1.62**	1.09	1.25	1.62
15	1.40	0.72	0.05	0.05	0.04	0.29	0.77	**1.46**	1.46
16	0.69	0.92	1.07	1.03	0.78	**1.21**	0.61	0.16	1.21
	22.00	22.00	22.00	22.00	22.00	22.00	22.00	22.00	40.71

Option 1 Highest Flex utilisation day (1 day) (Deepak Mistry analysis 22/06)

Option 2 Highest Zonal Flex utilisation (different days for different Zones) (Deepak Mistry Analysis 22/06)

Option 3 All attributions derived from DN's OCS statement Flex booking for09/10

Option 3a Based on nodal holdings aggregated to zonal level

Option 3b Aggregate zonal bookings set to zero where negative

Option 3c Nodal negatives set to zero before aggregation

Option 4 Based on DN's OCS Flat booking plus DC's 10/11 predicted demand from Transit UK day 1

Option 5 DN's Flex holding from OCS Flex plus DC 10/11 predicted demand pro-rated to 10mcm (22-12DN Flex hldng)

Option 6 DN's Flex holding from OCS Flex plus DC 10/11 predicted demand, then pro-rate the 22 based on this sum

NB: All quantities in mcm

Appendix 2 – Considering the "physical restrictions" envisaged by Network Analysis Area Analysis

Area	Zone	Max value for each Zone ZM_i	Max Area Value (from Network Analsysis) AM_{Area}	Sum of Zonal ΣZM_i	
North	0	3.58	9.00	17.73	Network Analysis indicates that Northern Area might not be able to accommodate simultaneous utilisation of all flexibility capacity holdings should in excess of 9 mcm "migrate" to the North under the allocation mechanism.
	1	4.60			
	2	0.40			
	3	3.19			
	4	5.95			
Central	5	1.54	8.00	8.53	Some limited potential for capacity holdings to exceed Area Maximum unless the area limitation is introduced
	6	0.64			
	11	2.67			
	12	2.21			
	15	1.46			
West	7	2.02	5.00	3.64	
	14	1.62			
East	8	2.03	8.00	10.81	As with North, East Area could not accommodate simultaneous utilisation of all flexibility capacity holdings should in excess of 8 mcm "migrate" to the East under the allocation mechanism
	9	3.01			
	10	1.29			
	13	3.26			
	16	1.21			

Appendix 3

Standard Special Condition A17. General obligations in respect of gas transporters' pipe-line systems.

1. The licensee shall act in a reasonable and prudent manner in the operation of the pipeline system to which this licence relates in so far as such operation may affect the operation of the pipe-line system of any other relevant gas transporter.

2. Without prejudice to the generality of paragraph 1, the licensee shall not knowingly or recklessly pursue any course of conduct (either alone or with some other person) which is likely to prejudice:

   (a) the safe and efficient operation, from day to day, of the pipe-line system of any other relevant gas transporter;

   (b) the safe, economic and efficient balancing of the pipe-line system of any other relevant gas transporter (so far as such other relevant gas transporter is required to balance its pipe-line system); or

   (c) the due functioning of the offtake arrangements provided for in the network code.

3. The licensee shall not knowingly or recklessly act in a manner likely to give a false impression to a relevant gas transporter as to the expectations that that other relevant gas transporter may have as to either:

   (a) the aggregate quantity of gas to be taken off that other relevant gas transporter's pipe-line system; or

   (b) the aggregate quantity of gas to be brought onto that other relevant gas transporter's pipe-line system, by the licensee through the operation of the pipe-line system to which this licence relates.