NETA: GRID CODE - LARGE RAPID PHYSICAL NOTIFICATION STEP CHANGES

Further to a consultation undertaken by NGC in accordance with Licence Condition 8 of NGC's Transmission Licence, NGC drafted proposed amendments to the Grid Code to incorporate the changes necessary to implement the New Electricity Trading Arrangements (NETA). In accordance with Licence Condition 8, these proposed amendments were submitted to the Director General of Electricity Supply ("the Director") for approval.

During the consultation process, Edison Mission Energy (Edison) raised concerns in relation to one particular clause of the proposed drafting and asked the Director to take into account the effect that one of the proposed provisions of Section BC1A.1.1 of Balancing Code 1 (which forms part of the Grid Code) would have on the operation of Edison's plant at Dinorwig.

The particular provision proposed for BC1A.1.1 that was of concern to Edison stated the following:

"The input or output reflected in the Physical Notification for a single BM Unit (or the aggregate Physical Notifications of BM Units at a Grid Entry Point or Grid Supply Point or to be transferred across an External Interconnection, owned or controlled by a single BM Participant) must comply with the following limits regarding maximum rates of change, either for a single change or a series of related changes:

- *For a change of up to 200MW* — *no limit;*
- *For a change greater than 200MW and less than 1000MW* — *50MW per minute;*
- *For a change of 1000MW or more* — *40MW per minute,*

unless prior arrangements have been discussed and agreed with NGC. This limitation is not intended to limit the Run-Up or Run-Down Rates provided as Dynamic Parameters."

Edison's concern related to the restriction on the rate of change that was proposed to apply in the range from 200MW to 1000MW because this would impact directly on the normal loading and deloading of its pumps at Dinorwig, each unit ramping up to and down from 270MW at approximately 20MW/second. Edison suggested that if the range applied from 300MW rather than 200MW then the 50MW per minute restriction would not apply to the BM Units to be registered for Dinorwig. Edison has embarked on a study of the technical feasibility of constraining the ramping during pump loading and deloading of its Dinorwig plant but has said that it is not yet in a position to conclude.

Since the consultation exercise, in the light of Edison's comments, NGC has revised the wording of the proposed changes to the Grid Code so that BC1.A.1.1 now reads "40MW per minute, ***or such other limits of maximum rates of change as may be specified by the Director in a direction issued to NGC on or before 30 September 2000*** *unless prior arrangements have been discussed and agreed with NGC."*

These changes to the Grid Code have now been approved by the Director, and were also submitted to the Secretary of State for designation as part of the Implementation Scheme[1] using his NETA powers under the Utilities Act 2000.

The Director wishes to consult on the specific issue raised by Edison in order to inform any decision made on whether and, if so, what direction should be given to NGC on the maximum rates of change to apply in BC1. The attached paper sets out the arguments put forward by NGC to support the wording it originally proposed and also sets out Edison's position in detail.

Although NGC believes that only Edison, those trading across the Scottish and French interconnectors and Culham JET, are potentially affected by the 300MW – 1000MW limit, the Director wishes to consult more widely. This document has therefore been sent by E-Mail to members of the BSC Trading Consultation Group and placed on the Ofgem website for general comment.

Comments on the specific issue of whether the level above which NGC's agreement is required for rapid changes in ramp rate should be set at the 200MW proposed by NGC or the 300MW level proposed by Edison should be sent to Ofgem by 5 September. Comments are also invited about the use of the phrase "either for a single or a series of changes" in BC1A.1.1.

Comments should be sent to:

Dr Brian Wharmby
Technical Director
Office of Gas and Electricity Markets
Stockley House
130 Wilton Road
London SW1V 1LQ

Electronic responses may be sent to lorraine.ladbrook@ofgem.gov.uk

Respondents are free to mark their replies as confidential although we would prefer, as far as possible, to be able to publish responses to this document by placing them in the Ofgem library.

Anyone requiring clarification of any of the points raised in this paper should contact either David Hawkins on 0207 932 6169, Bridget Morgan on 0116 258 1406 or Dorcas Batstone on 0207 874 1622.

[1] A summary of the Implementation Scheme can be found on the NETA web site http:www.ofgem.gov.uk.

NETA: LARGE RAPID PHYSICAL NOTIFICATION STEP CHANGES

Background

Condition 8 of NGC's Transmission Licence requires it to consult on changes to the Grid Code. The Grid Code Review Panel, which reviews changes to the Code, set up a special sub-group, the NETA Panel Sub-Group, to consider those changes which were necessary to implement the New Electricity Trading Arrangements. Changes discussed by the group have been posted on NGC's web site and specific key changes have been considered within the Trading Group which met to consider the substance of the Balancing and Settlement Code and certain core documents including the Balancing Codes of the Grid Code. NGC also consulted all Authorised Electricity Operators with regard to Grid Code changes required for NETA.

Paragraph BC1.A.1.1 of Appendix 1 of the consultation version of Balancing Code 1 which appeared on the NGC web site on 1 June 2000 stated that:

"The input or output reflected in the Physical Notification for a single BM Unit (or the aggregate Physical Notifications of BM Units at a Grid Entry Point or Grid Supply Point or to be transferred across an External Interconnection, owned or controlled by a single BM Participant) must comply with the following limits regarding maximum rates of change, either for a single change or a series of related changes:

- *For a change of up to 200MW* — *no limit;*
- *For a change greater than 200MW and less than 1000MW* — *50MW per minute;*
- *For a change of 1000MW or more* — *40MW per minute,*

unless prior arrangements have been discussed and agreed with NGC. This limitation is not intended to limit the Run-Up or Run-Down Rates provided as Dynamic Parameters."

Edison Mission Energy ("Edison") objected to the above wording on a number of occasions throughout the consultations. It submitted written objections to NGC on 14 April and on 16 June and its representative in the BSC Trading Group objected to the wording during the relevant discussions. NGC wrote to Ofgem on 20 June, after the response date for views on the Grid Code had closed, to say that only one party had objected to the provisions of the Grid Code. On 28 June NGC, following discussion with NETA staff, again wrote to Ofgem, reaffirming its view that the Grid Code, rather than the licences was the correct place to limit large fast changes to Physical Notifications. Edison wrote to Ofgem on 5 July but no action was taken on their letter until a further letter was received from the company on 26 July. Ofgem spoke to both Edison and NGC on 1 August and asked them to set out their views comprehensively so that it could consider the matter urgently, given the time constraints for designation of the Grid Code by the Secretary of State and for approval by the Director General. Ofgem has come to the view that further consultation on this matter should be undertaken before a conclusion is reached and to this end NGC has submitted revised wording to BC1.A.1.1 to enable the Director to consider the matter further.

BC1.A.1.1 now reads

"The input or output reflected in the Physical Notification for a single BM Unit (or the aggregate Physical Notifications of BM Units at a Grid Entry Point or Grid Supply Point or to be transferred across an External Interconnection, owned or controlled by a single BM Participant) must comply with the following limits regarding maximum rates of change, either for a single change or a series of related changes:

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or such other limits of maximum rates of change as may be specified by the Director in a direction issued to NGC on or before 30 September 2000 *unless prior arrangements have been discussed and agreed with NGC." This limitation is not intended to limit the Run-Up or Run-Down Rates provided as Dynamic Parameters."*

Views of NGC and Edison

Both parties were asked to set out their cases fully. The text of both the NGC letter of 3rd August and the Edison letter of 2nd August is reproduced in Attachment 1 and Attachment 2 respectively. Edison Mission Energy are also referred to as "First Hydro" in this correspondence.

Additional points

In addition to the issues raised in their letter (Attachment 1) NGC has indicated in discussions with Ofgem that one of its main concerns is its ability to comply with the Electricity Supply Regulations should Edison switch on the pumps at Dinorwig in rapid succession at a time when such action might not be optimal in respect of system frequency. It said that "prior agreement" could mean an Ancillary Services Agreement and that NGC could accommodate physical notifications having faster rates of change if Edison agreed to submit offers and bids whereby NGC could modify Edison's intended operation.

Edison suggested to Ofgem and NGC that it felt that NGC's proposal was discriminatory and that it should not be obliged to place bids or offers. It said that the terms of its connection agreement required it to enter into an Ancillary Service agreement in relation to its pumping programme and it was willing to do this, but that seeking NGC's agreement each time it wished to submit a physical notification to switch one of its pumps on or off significantly disadvantaged it commercially. Furthermore, Edison drew attention to NGC's operation standards of frequency control which relate to 300MW changes and to BC2.5.4 (g) of Balancing Code 2 which requires participants not to exacerbate significant frequency deviations.

Next steps

Ofgem has informed the Secretary of State that NGC has inserted a revised form of words on maximum rates of change (as set out in Balancing Code 1 of the Grid Code) and that the Director will, if necessary, issue a direction to NGC on or before 30 September 2000 specifying other limits of maximum rates of change.

Comments on the specific issue of whether the level above which NGC's agreement is required for rapid changes in ramp rate should be set at the 200MW proposed by NGC or the 300MW level proposed by Edison should be sent to Ofgem by 5 September.

Comments should be sent to:

Dr Brian Wharmby
Technical Director
Office of Gas and Electricity Markets
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Attachment 1 – Letter from NGC of 3rd August

NETA: LARGE RAPID PHYSICAL NOTIFICATION STEP CHANGES

REASONS FOR 200 MW THRESHOLD LEVEL

I thought it would be useful to clarify why we have proposed a 200 MW threshold level for the ramp rate provisions in the Grid Code to manage large rapid changes in Physical Notifications.

Our thinking on this is driven by a desire appropriately to balance market participants' freedom against response holding costs and maintenance of frequency control performance standards at a level no lower than experienced hitherto. We understand that generators - particularly those with large, flexible units - wish to trade their output unfettered by Grid Code rules, and we are committed to enabling this as much as possible. However we also consider that wider consumers' interests are served by limiting large BMU's freedom in order to allow us to maintain power quality without a disproportionate increase in costs.

We feel that a 200MW limit on rapid changes to Physical Notifications (PNs) without NGC's agreement is reasonable and can be defended on technical grounds. Furthermore, self-despatching operation post-NETA is fundamentally different from the current central despatch approach, and it is not possible to extrapolate current practice to conclude that because large changes have been instructed in the past, they could always accommodated without consequence in future. Both these points are elaborated below.

The maximum level of *rapid* output change that we have proposed should be permitted without reference to NGC is 200MW. A sudden generation or demand change of this magnitude would typically cause a frequency excursion of around 0.15Hz. Therefore we have a ±0.05Hz margin either side of nominal 50Hz in which the frequency could lie before a change caused a breach of the long-established operational frequency control standard (±0.2Hz).

If the limit were relaxed to 300MW, then the frequency excursion we could see would be nearer 0.25Hz and a breach of the operational standards would almost always occur. Furthermore if the frequency were already low when this size change were imposed, then there is a real threat that statutory frequency control limits (as specified in the Electricity Supply Regulations) could be breached. We are obliged to report such breaches in our annual LC12 *Transmission System Performance Report* .

Minor breaches of operational and statutory frequency standards would perhaps not be a major concern to many consumers. However increasing the size of BMU output change that can be permitted without reference to NGC also increases the danger of a more serious incident. If the system were operating toward the lower end of the operational frequency range as a result of earlier generation losses or unexpectedly rapid demand increases, then the majority of the frequency response available from conventional generators would already be used up (at 49.8Hz some 80% of response is eroded). A 300MW rapid change would then almost certainly lead to a breach of statutory limits, and a severe frequency 'dip' leading to customer complaints is likely. This risk still exists with a 200MW limit on self-despatched changes, but the risk is lower.

You will have heard arguments that we currently instruct 300MW changes as a matter of routine. This is indeed the case, however there is a fundamental difference in that at the moment we would not give such an instruction if the frequency were below target. Rather we would wait until frequency were at or above 50Hz before instructing, for example, a 275MW pump to be synchronised, thereby avoiding the danger of eroded response, or of an excursion outside operational limits. It is worth noting that NGC currently has a "reject" or "accept" button to allow us to manage the timing of large (self-despatched) block loads from Cullam JET.

Market participants have agreed to a Grid Code requirement to check that frequency is within ±0.3Hz of 50Hz (BC3.) before making a self-despatched change in output. This gives some backstop protection against self-despatched changes exacerbating a frequency excursion, but it is limited. It would not alleviate our concerns about a 300MW limit, as this provision would not impact on the extent of operation at or just outside operational limits.

I do not believe that we can manage this technical matter purely on the assumption that both parties will contract in perpetuity. Since this is a technical matter enabling us to meet our statutory obligations we remain of the view that the Grid Code restriction is appropriate. This is wholly analogous to similar restrictions on the gas network.

In summary, by adopting a 200 MW threshold value, we believe that we will be able to ensure that we have the necessary provisions under the Grid Code to manage frequency to the standards consumers have been used to. If the threshold level were to be raised to 300 MW, then we are concerned that the number of occasions when the system frequency would fall to or below operational limits may increase significantly. If such a fall in frequency control performance were unacceptable to consumers, OFGEM or other market participants, then we would need to increase response holding permanently at possibly considerable cost.

Turning to some of the specific comments in Edison Mission's letter to you dated 5 July: I would respond by saying that we do not see a 200 MW threshold provision as restricting their commercial position unduly. It is incorrect to assume that this is a change in practice from the current arrangements as under central despatch we have the flexibility to vary pump despatch times to match system conditions. We would exercise all reasonable efforts to agree to any FPN programme without modification (indeed as we have done so over the past ten years). We do not interpret this requirement as requiring Edison Mission to change the ramp rates of the Dinorwig plant to be less than any ramp rate threshold. In fact, we would be concerned if the ramp rates were reduced as we see the rapid output changes capable from this plant as being a very valuable feature to the system. We have already initiated discussions on agreeing an operational protocol with First Hydro to ensure that an efficient business process is in place to implement these provisions.

Our view remains that we should maintain the proposed 200 MW threshold in the Grid Code, where we would accommodate changes outside these levels by prior agreement.

Attachment 2 – Letter from Edison Mission Energy of 2nd August

Balancing Code BC1

Thank you for the opportunity to discuss our concerns with the proposal to limit BM Unit ramp rates submitted in Final Physical Notifications. We have been disappointed that our representations through NGC's review group and consultation process has not resolved these concerns. I am pleased to set out the full extent of the arguments we expressed today, and to offer our views on an acceptable solution. Before detailing the reasons why we cannot accept the proposals in BC1.A.1.1, I can briefly summarise our concerns as follows:

- As we load and de-load our pumps at Dinorwig we are not able to limit changes in load to less than 200 MW, nor are we able to limit the rate of change of load to less than the 50 MW per minute stipulated in NGC's proposal.

- Dinorwig and Ffestiniog have been operated with their current ramp rates throughout the 20 years of NGC's current security standards, and longer, causing no operational problems for system control.

- Under NETA, NGC will have at least three and a half hours notice of our pumping and generation intentions in the form of notifications on a minute by minute basis. Any system security concerns which NGC might have in respect of real-time operation are addressed by clause BC2.5.4(g) of Balancing Code 2. In real-time operation this clause will prevent action, including pump loading and de-loading, which would aggravate movements of system frequency outside the range of 49.7 to 50.3 Hz.

- An obligation on us to seek NGC's prior agreement to pump would be a constraint on our ability to match our energy contracts with a physical position. This would place us perpetually at risk of imbalance, and would be discriminatory. It is our understanding that First Hydro would be the only participant in the market who would be affected. In effect, such an obligation would effectively give NGC some commercial control over First Hydro plant. This would of course give them a conflict of interest with their ability to trade in energy markets and their commercial management of the Balancing Mechanism.

Expanding on these concerns in more detail:

Physical Characteristics of Dinorwig

The pumps at Dinorwig ramp at a rate of 20 to 30 MW per second. Typical transitions of a unit from and to pumping mode are depicted in the attached charts. The physical characteristics of the plant are such that the pumps load from either shutdown mode, or spinning in air, to full load. Unlike in generation mode, in pump mode we cannot regulate the load at intermediate levels. The sharp ramp in load occurs from a load of around 55 to 60 MW (when water is being churned by the pump-turbine runner) to a load of around 250 MW.

In his letter of 26 July, Nigel Hawkins explained that we were exploring ways in which we could reduce this ramp rate for pump loading and de-loading. Our initial conclusions are not favourable. Limiting ramp rates could be attempted by either reducing the rate of movement of the guide vanes (which control the flow of water past

the pump-turbine runner), or by converting the units to variable speed machines (by installing frequency conversion equipment). The former has not to our knowledge been achieved anywhere in the world, and it is our opinion that such an attempt may well cause problems of hydro-mechanical instability. The latter has been engineered elsewhere, and for us would involve major engineering re-construction at a cost of perhaps around £30m for two units, in addition to the loss of revenue for the duration of the work.

System Technical Considerations

On system technical grounds NGC's proposals are unjustifiable. The power system has been operated to NGC's existing standards of security, successfully for more than 20 years. Dinorwig and Ffestiniog have been operated with their current ramp rates throughout this time. NGC plan and operate the system to withstand the unplanned events set out in their licence standards, including losses in generation up to defined maxima (300 MW, 1000 MW and 1320 MW), and unplanned losses in elements of the transmission system.

Under NETA, NGC will have at least three and a half hours notice of our pumping and generation intentions in the form of notifications on a minute by minute basis. Indeed they will have an indication of these at least a day in advance. Any concerns NGC may then have, in terms of the ability of the system to tolerate the precise timing of the load changes in real-time operation, will be accommodated by BC2.5.4(g) of Balancing Code 2. This clause prevents action, including pump loading and de-loading, which would aggravate movements of system frequency outside the range of 49.7 to 50.3 Hz. We accept NGC's wish to have this particular clause for post-NETA operation. It will enable NGC to ensure that action which may have been planned at Gate Closure does not move the system away from an acceptable pre-contingency state.

Participation in the Energy Markets

From our business perspective, an obligation on us to seek NGC's prior agreement to pump would be unacceptable. Such a constraint on our ability to match our energy contracts with a physical position would place us perpetually at risk of imbalance, and would be discriminatory.

EME's concerns over Section A1.1.1 arise due to the flexibility of our pumped storage plant at Dinorwig and Ffestiniog; a feature which ought to be encouraged through the trading arrangements. With such performance First Hydro can offer response and reserve services for NGC, or contract energy profiles to precisely match the requirements of customers.

EME along with other market participants have welcomed the free-market intent of NETA; particularly the enhanced focus on bilateral agreements which will help Generators to more directly deliver what customers need. Flexibility, such as that offered by our pumped storage assets, is one way in which these needs are met. To do anything other than encourage plant flexibility would be counter to the principles which underpin NETA.

Proposals

Our initial preferred solution would be to remove clause BC1.A.1.1 and therefore the obligation to restrict limitations on ramp rates with Final Physical Notifications. We recognise that there would still be an obligation on us to manage our pumping load in real-time to the extent that we impose no change which would aggravate movements in system frequency outside NGC's operational range.

However, if the removal of BC1.A.1.1 were unacceptable then the clause needs to reflect some compromise which at least allows First Hydro the freedom to participate in the energy markets, and pump without the prior agreement of NGC. Increasing the limit of 200 MW in BC1.A.1.1 to 300 MW would help to achieve this. It is a figure which would match that of NGC's operational standards. Besides increasing the 200 MW limit, the ambiguity in the clause which we pointed out in our meeting with you, would need to be addressed. The words "either for a single or a series of changes" would need to be removed. If these words were to stand then the time period over which a "series of changes" were limited would be undefined and open to a variety of interpretations; besides being unacceptable.

Once again, thank you giving us the opportunity to explain our concerns. This is an issue which is of much importance to us, being of significance to our ability to compete in the energy marketplace. I look forward to an early and satisfactory resolution.

I am copying this letter to NGC, and would be happy for you to pass it to any other market participant if you felt that this would help in resolving the issue in a timely manner.