Appendix 1 – Capital expenditure

I Overview

1 As detailed in our main response we believe Ofgem are proposing revenue in respect of capital expenditure which would make it impossible to meet our interpretation of our licence obligations to develop and maintain an efficient transmission system while earning a return equal to Ofgem's estimate of our cost of capital. In fact, the level of unit costs assumed by Ofgem would also make it impossible to achieve such a return even in delivering the volume of replacement that Ofgem believe is necessary.

2 The scale of the gap between National Grid and Ofgem on capital expenditure is deeply disappointing as there seems to be little recognition of:

(a) our belief in our capital plans, demonstrated by our commitment to investment, particularly with regard to electricity asset replacement expenditure, where throughout the review period we have continued to sanction and deliver works in good faith, despite the regulatory uncertainty;

(b) the condition of the assets, which supports the need for replacement and underpins our confidence that our asset replacement plans represent the most appropriate level of asset replacement;

(c) the uncertainty in future gas supply scenarios which should drive a desire to ensure flexibility in the gas transmission system to avoid restricting the market and driving up capacity buyback costs, rather than a desire to minimise capital expenditure on the basis of a limited set of scenarios;

(d) the unreasonable proposals to penalise us by effectively disallowing 25% of expenditure in excess of the Price Control allowances, even if that investment is efficient.

3 Ofgem's proposals on capital expenditure represent the reduction of each of the individual factors - including unit costs, replacement volumes and supply scenarios - to a level which is well below what can reasonably be expected to be delivered. When combined, and considered in the context of an unreasonably low base rate of return and mechanisms which penalise any over-expenditure of the Price Control allowances, the result is a set of proposals which is simply unacceptable.

Electricity Transmission

4 For electricity transmission we believe the proposals are unacceptable for the following reasons:

(a) £670m of reduction in respect of electricity asset replacement

(i) Inadequate proposed volumes of replacement leading to, not least, a significant increase in risk of reduced network reliability because of:

- Assuming asset lives inconsistent with the best available information, ignoring:
  - the constraints on replacement in the last Price Control period; and
  - the condition of the assets established through condition assessments and forensic analysis.
- Modelling discrepancies leading to a significant underestimation of the volume of replacement required.

(ii) Substantially inadequate unit costs set

- below the actual, efficient, level of costs that we currently incur;
- without properly recognising the risk of above RPI cost pressures; and
- double-counting improvements in procurement efficiency through deducting a 5% real reduction in unit costs from 1 April 2007.

(b) In addition we also believe the baseline allowances for load-related investment are under-stated for electricity because:

(i) The allowances do not include significant expenditure at one site where the need case for works is now supported by a customer application;

(ii) Ofgem have removed 10% of our expenditure on exit connections for no good reason.

5 We recognise that GEMA are the guardians of customers' interests, and thus may opine that the costs of maintaining reliability are too great and thus we accept that they may choose to assume a lower volume of work than we propose. However it would be unreasonable (and indeed inconsistent with the Electricity Act) to expect us to spend to more than the capital expenditure allowances.

6 Indeed, Ofgem's proposed "incentives" on over/under expenditure of Price Control allowances would severely penalise any over expenditure, such that the Board of any rational company would find it extremely difficult to sanction any over-expenditure of the allowances. **In our view this would seem to imply that our obligation is to spend the allowance that Ofgem set, not to deliver any particular volume or level of reliability.**

7 As a result of this, Ofgem should note that the proposal to set unit costs below the current efficient level, combined with unachievable procurement efficiencies and inadequate protection for above inflation cost increases will result in the delivery of even lower volumes than even Ofgem believe is necessary. Given the specific licence obligations in relation to load related investment, any under-funding of load related expenditure would further exacerbate the reduction in replacement volumes, further jeopardising the reliability of the transmission system.

Gas Transmission

8 For gas transmission we believe the proposals are unacceptable for the following reasons:

(a) the proposed disallowance of £75m of historical investment to provide capacity at St. Fergus;

(b) £150m of reduction in respect of gas non-load based on:

(i) unreasonably limited supply scenarios;

(ii) extreme assumptions on potential "cost savings";

(iii) lack of recognition of auction signals;

(iv) lack of recognition of the legislative requirements with regard to emissions reduction;

(c) inadequate load related allowances for exit investment which has already been validated by a customer commitment;

(d) load related revenue drivers which do not reflect the current efficient cost of delivering the projects.

9 As for electricity transmission, we recognise that GEMA are the guardian of gas consumers' interests, and that they can choose to provide funding only for a very limited set of future scenarios, limiting the ability of the transmission system to cope with future supply patterns which differ from those used to determine the allowances. However it is important for GEMA to note that, in that event, it would be unreasonable (and indeed inconsistent with the Gas Act) to expect us to spend to more than the capital expenditure allowances.

10 Indeed, Ofgem's proposed "incentives" on over/under expenditure of Price Control allowances would severely penalise any over expenditure, such that the Board of any rational company would find it extremely difficult to sanction any over-expenditure against the allowances. **In our view this would seem to imply that our obligation is to spend the allowance that Ofgem set.** Even leaving aside our broad obligations to develop an efficient transmission system, it would be very difficult to limit spend to this level given the specific obligations in respect safety, the environment and responding to the demands of network users.

Summary

11 In summary, therefore, there remains a very significant gap between Ofgem's current position and our own. For **electricity transmission** we believe that the following adjustments need to be made to the proposed allowances:

(a) the reinstatement of a significant volume of replacement;

(b) the revision of overhead line and transformer unit costs in line with our unit costs as supported by historical costs;

(c) the reduction in scale and timing of the procurement efficiencies;

(d) the inclusion of a "risk premium" to buy out the risk of above inflation cost increases; and

(e) the inclusion of load related expenditure at Swansea and increase in allowance for exit related expenditure.

12 For **gas transmission** we believe that the following adjustments need to be made to the proposed allowances:

(a) full inclusion of historical expenditure to provide capacity at St. Fergus into the RAV;

(b) inclusion of allowance for expenditure to reduce emissions and replace protection and control systems at Warrington following the auction signals at Fleetwood;

(c) explicit acknowledgement that any over-expenditure of allowances in respect of additional investment to reduce emissions or to meet flow scenarios outside those assumed by Ofgem would be logged up to receive full remuneration of any foregone depreciation and return;

(d) inclusion of expenditure on load related projects which have already received user commitment in the baseline TO allowances, or full recognition of the current forecast of project costs in any revenue drivers.

13 The remainder of this appendix deals with the key issues underlying the gap that require resolution, and our response is in three further sections:

(a) In **Section II** we discuss Electricity Transmission capital expenditure as follows:

(i) historical expenditure;

(ii) RAV roll-forward

(iii) unit costs and procurement efficiencies;

(iv) non-load related volumes and allowance;

(v) load related expenditure.

(b) In **Section III** we discuss Gas Transmission capital expenditure as follows:

(i) historical expenditure;

(ii) non-load related expenditure;

(iii) load related expenditure;

(c) In **Section IV** we provide answers to specific capex related questions posed by Ofgem in their Updated Proposals.

II National Grid Electricity Transmission (NGET)

Historical expenditure

14 With regard to actual expenditure incurred in 2005/06, we welcome Ofgem's statement that they have found no evidence to suggest that the expenditure was inefficient.

15 However, we would strongly disagree with Ofgem's statement that the "additional expenditure reflects a different view on the timing of capital expenditure". This is because:

(a) For **load related expenditure** it reflects the reality of the need for investment to provide transmission capacity for system users, and to reinforce infrastructure to ensure compliance with the GB SQSS reinforcement. For this category of expenditure we are bound to invest to maintain compliance with our licence obligations, and **so there is no reason for Ofgem to disagree with the "timing" of this investment.**

(b) For **asset replacement**, our expenditure reflects the level of replacement required based on the evidence of the condition of the assets replaced, and so reflects a different view on the volume and urgency of investment required for asset replacement expenditure over the period to 2011/12. **It is our view, as the owner and manager of the transmission assets that the condition information showed a compelling need for replacement.**

16 As there should not be an issue on the timing of **load related** expenditure, we believe that Ofgem's reduction of the allowance for the years following 2005/06 as an "adjustment for 2005/06 actual" is completely unjustified – expenditure in this category is driven by changes in generation and demand, and so there is no sense in which an adjustment should be made in future years.

17 Given Ofgem's acceptance that costs incurred in 2005/06 were not inefficient, we find it astonishing that Ofgem have proposed to base their allowances from 2006/07 onwards on unit costs in respect of overhead lines, transformers and reactors which are significantly lower than that incurred in 2005/06 which

have been deemed to be not inefficient. This is discussed in further detail later in this response.

18 Finally on historical capex, we wish to respond to Ofgem's comments on the ongoing case of employee fraud. We are extremely disappointed at Ofgem's inclusion of this issue at this premature stage of the investigation and in the light of likely future judicial proceedings.

RAV roll-forward

19 Ofgem have now accepted our historical network expenditure from 2000/01 to 2005/06 as not being inefficient. However at this stage, and despite the content of appendix 11, we are unable to reconcile this statement with the additions to the RAV for the period 2000/01 to 2004/05. Our analysis indicates that **the net RAV additions appear to be understated by as much as £37.7m**. Thus far, we have not received any satisfactory explanation from Ofgem regarding this gap and we look forward to working with Ofgem to resolve this issue as soon as possible.

20 We also note, with great disappointment, that Ofgem have chosen not to engage with or address the issue of non-remuneration of a significant tranche of historical capital investment (£60.7m) that has been deemed by Ofgem to be "non-operational", despite clear evidence that no substantive allowance has ever been given for such a scale of investment.

21 Ofgem have not, so far, allowed this expenditure despite a report by the consultants Compass, commissioned by Ofgem (Review of National Grid's Work & Asset Management IT Capex, 23 August 2006), recommending an inefficiency range of £6m to £10.3m in this area. Clearly, even on the strength of this report, Ofgem should reinstate at least £50m of the expenditure incurred.

22 Furthermore, we think the inefficiencies Compass has proposed are poorly substantiated, largely based on assertion and hugely over-stated. A summary of some of our arguments against Compass' IT Capex report follows below:

(a) Compass' argument regarding excessive system integration (SI) costs is based on the flawed notion of a generic, homogeneous SI unit rate that it has compared us to. Implementing change programmes like OITH and WAM is not comparable to implementing a standard commodity system. Compass have overlooked the fact that National Grid engaged in competitive procurement exercises in the cases of both OITH and WAM.

(b) The OITH implementation timescale was driven by a larger business change programme which it supported. The overall business benefits would have been seriously eroded if we had delayed OITH, far outweighing any potential and arguable "overspend" on system integration. Timing the implementation of IS programmes in support of business change is not solely determined by when the technology introduction can be optimised - the business decisions are more complex than that. The optimum business value (and thus incentive to provide consumer benefit) may not fully coincide with the optimum IS value, i.e. it is the **total benefit** that matters more than the isolated

component parts. It is a frequent major criticism of IT programmes that they ignore the business environment and priorities within which they will be operating. OITH was a business programme which recognised these factors, to the greater benefit of the business. Having undertaken risk assessment within the business, the balanced view was taken that early system implementation was the best course of action.

(c) Compass' comments regarding our scheme sanctioning process demonstrate a misunderstanding. Papers are not brought to final sanctioning bodies in a vacuum, previously unseen by participants, but follow a well-defined hierarchical governance process of structured review and sanctioning bodies. At each level there is informed debate and challenge, and although papers may be modified or occasionally rejected at the final sanctioning point, most "scheme rejection" occurs before this point is reached. We believe that this is in line with best practice and would challenge Compass to provide evidence of companies with such a rigorous scheme sanctioning process as our own.

23 In summary, we do not accept Ofgem's basis for disallowance of £60.7m of our historical "non-operational" capex. The latest Compass report provides extremely weak evidence in support of adjustments, and even then only to a fraction of the currently disallowed costs. We believe that we have incurred appropriate, necessary and efficient expenditure, in this area, that we should be remunerated in full. In our opinion, **the most equitable method for making this remuneration would be an appropriate increase to the RAV**.

Unit costs and procurement efficiency

24 This section of our response provides our comments on two inter-related issues:

(a) the efficient "base" unit costs on which the allowances for capital expenditure should be set; and

(b) the issue of above inflation cost pressures driving real increases in costs, and the application of a "procurement efficiency" to drive real reductions in costs.

25 In summary, we are extremely disappointed in the lack of progress that has been made on the "base" unit costs underlying Ofgem's proposed allowances, despite National Grid providing significant additional evidence supporting our unit costs. It is clear that this issue must be re-considered as at present Ofgem's unit cost assumptions are entirely unreflective of the actual current cost of carrying out replacement work.

26 On above inflation cost pressures, we welcome Ofgem's acknowledgement of this issue. However, we believe that the approach adopted by Ofgem to propose a fixed pot of money for this risk based on our latest projection of the most relevant cost indices, rather than to use indexation of the Price Control allowances, fails to adequately account for the significant risk to our business over the next five years. If Ofgem believe that a fixed allowance, based on a mean expectation of future cost increases, is an appropriate approach, then a

premium must be added to the ex-ante allowance in order to account for the significant risk that input costs increase by more than forecast, which we believe should involve at least doubling the ex-ante allowance for above inflation increases.

27 In addition, we continue to believe that the proposed level and timing of the application of a 5% procurement efficiency is unjustified and unwarranted. Whilst we agree that we should be incentivised to increase our procurement efficiency (which the RPI-X control already does), we believe that the setting of an allowance based on a step-change in efficiency in just five months time is totally unrealistic and completely unreflective of the market conditions in which we are operating.

28 The combined package of unrealistic base unit costs, ex-ante treatment of above inflation cost pressures and an immediate step change procurement efficiency, along with strong incentives to not overspend the Price Control allowances, combine to mean that even lower volumes of asset replacement would be delivered than even Ofgem believe are necessary.

"Base" Unit costs

29 We are extremely disappointed in the "base" levels of unit costs reflected in Ofgem's Updated Proposals in respect of overhead lines, transformers and reactors replacement schemes. We do not believe that Ofgem have any reasonable justification for their proposed unit costs, as they do not reflect the actual evidence of costs incurred, and are based on analysis which is, at best, extremely limited. We believe that the unit costs used in deriving our forecast are conservative, and already present a challenge to achieve, whilst Ofgem's base unit costs are completely unreflective of actual evidence.

30 This is an extremely serious issue –not least because, with Ofgem's proposed method of rolling forward investment into the RAV (i.e. only 75% of any spend in excess of the Price Control assumptions), if we were to deliver the volume of work proposed but at a higher unit cost, this would entail acceptance of a rate of return on investment which would be well below the allowed rate of return.

31 Our response on unit costs is structured as follows:

(a) evidence from historical unit costs – the base unit costs used by Ofgem to set allowances from 2006/07 onwards are inconsistent with Ofgem's view that actual expenditure up to 2005/06 was not inefficient;

(b) the limited nature of Ofgem's analysis – the analysis by Ofgem and their consultants was extremely limited, and appeared unbalanced towards seeking a "lowest possible" unit cost, rather than a reasonable "efficient average" unit cost across the full range of schemes;

(c) our own evidence on unit costs – we have made a number of submissions supporting our unit costs, based on real evidence, which Ofgem appear to have largely ignored;

(d) the "double counting" of efficiencies – Ofgem have used unrealistic base unit costs, and have then applied a further procurement efficiency, making it even more unrealistic for us to achieve the volumes of work for the capital expenditure allowance provided.

32 The main asset categories where Ofgem have used unrealistic base unit costs are overhead lines and transformers. Our comments in this section therefore focus on these asset categories.

Evidence from historical unit costs

33 In Ofgem's Initial Proposals, they stated that they had not found evidence of any inefficient expenditure in the period 2000/01 to 2004/05. In the Updated Proposals, Ofgem extended this view of historical expenditure to include 2005/06, again stating that they not found evidence of any inefficient expenditure, but commenting that, in their view, the fact that the expenditure was higher than they had forecast reflected "a different view on the timing of capital expenditure over the seven year period". In **neither consultation** did Ofgem make any statement about unit costs. **By extension, therefore, their acceptance that the expenditure was not inefficient means that they accept that the unit costs at which the investment was delivered were not inefficient.**

34 This being the case, we would not expect Ofgem to propose unit costs to apply to expenditure from 2006/07 onwards which start by differing significantly from those effectively deemed to not be inefficient in 2005/06 – however, this is indeed what Ofgem have done. The materiality of the differences between the costs actually achieved in 2005/06, and those which Ofgem are proposing as the unit costs from 2006/07 onwards, is discussed below.

35 This issue is most material for **overhead lines.** Following our response to Initial Proposals it became clear that Ofgem were using a base unit cost for overhead line full refurbishment of £235k/circuit km, based on analysis carried out by KEMA. Following a comprehensive submission from National Grid that detailed the inherent weaknesses in KEMA's analysis and set out further detail on the reasons for our own unit costs, Ofgem have increased the unit cost to £256k/circuit km.

36 Whilst we welcome Ofgem moderating their position, we do not accept that this revised position is at all reasonable. The £256k/circuit km was the unit cost proposed by PB Power. The analysis provided by PB Power for this position was very limited, and whilst it was slightly less extreme than that proposed by KEMA, their analysis was equally invalid, and their unit cost was no more reflective of a reasonable average cost of overhead line refurbishment schemes.

37 PB Power's unit cost was arrived at by simply considering a small number of schemes, and effectively determining that a 10% reduction was appropriate. Their approach is discussed in more detail below, but effectively dismisses some costs as atypically high, **and effectively bases their view on just two historical schemes**.

38 A more appropriate comparison is to consider the weighted average cost of schemes contracted during the last Price Control period, and particularly the most recent of those schemes. There are eight overhead line full refurbishment schemes with significant (over £1.5m) expenditure in 2005/06, and indeed these are the **only** schemes which were contracted for in the last Price Control period (i.e. from 2001 onwards), and so the cost of these schemes represents a more appropriate measure of recent actual costs. The weighted average unit contracted cost of these schemes (taking actual costs up to 2005/06 and our latest forecast from 2006/07 onwards), is just under £288k/circuit km.

39 Of these eight schemes, three schemes are in excess of 100km in length, and the average scheme length is over 80km. In the rest of the Price Control period the average length of scheme is just over 40km. Given economies of scale, it is to be expected therefore that the cost of schemes in the period from 2006/07 onwards would be higher that the average of the schemes involving expenditure in 2005/06.

40 Ofgem's proposed unit costs for overhead lines do not reflect the average current contracted cost of schemes in 2005/06, or the forecast cost of schemes from 2006/07 onwards. In summary, therefore, we believe that the evidence from actual costs from schemes in 2005/06 is supportive of our forecast average cost of overhead line full refurbishment over all schemes in the period 2005/06 to 2011/12 of around £300k/circuit km, and that Ofgem's figure of £256k/circuit km clearly inadequately reflects both actual and forecast costs.

41 This also demonstrates that Ofgem's proposed unit cost of £256k/circuit km is wholly inadequate, representing just 85% of the actual costs achieved. The materiality of this issue is very significant – if we were to deliver Ofgem's proposed volume of 1596km, the total value of the difference between Ofgem's unit cost and the average forecast unit cost of the schemes in the period to 2011/12 is just under **£75m**. **This would mean that we would either have to overspend our allowances by £75m to deliver the volume proposed by Ofgem, or deliver 250km less replacement than that proposed by Ofgem to stay within the allowances.**

42 For **fittings only** overhead line schemes, Ofgem have revised their unit cost since the Initial Proposals, increasing it by around 10% to £89k/circuit km. However, this is still lower than our average cost of fittings only schemes over the period 2005/06 to 2011/12 of around £104k/circuit km, with the total value of the difference being around **£28m**.

43 PB Power supported our unit costs for fittings only schemes, whilst Ofgem's position now appears to be effectively based on increasing KEMA's original cost in the same broad proportion as their increase in full refurbishment costs. Either this, or it is based on reducing the unit cost for fittings in the same broad proportion as the reduction to the full refurbishment cost. Either way, Ofgem have provided no evidence that it is based on any analysis of actual scheme costs.

44 An analysis of the fittings only schemes with significant expenditure in 2005/06 shows a weighted average of £95k/circuit km. However almost 40% of the volume of work is covered by one scheme which was one of the first

fittings-only schemes to be contracted, and for which the scope of works, and hence the contract cost, was grossly underestimated by the contractor – the contractor fundamentally misunderstood the extent of work required to ensure that the ground clearances of the overhead lines remained the same after the insulators had been replaced, particularly as the modern equivalent insulators were a different length to the insulators being removed. This resulted in a unit cost of this scheme at sanction of just £49k/circuit km, whilst we anticipate that the final unit cost for this scheme will amount to around £67k/cct km. This contractor has not undertaken a fittings only scheme since. This scheme is therefore not representative of the average cost – without the impact of this scheme skewing the result, the average cost of all other schemes was over £112k/circuit km, supporting the average cost in our forecast of £104k/circuit km.

45 For **transformers**, relatively few transformers were replaced in the historical period. However, where there are sufficient transformers in a particular category, the costs demonstrate clearly that there is absolutely no evidence from the historical schemes to suggest that the unit cost should be lower than that used in developing our forecast.

46 For 275kV GSP transformers, the average actual "unit cost" of replacement was £2.2m per transformer. Our FBPQ was based on an average unit cost of just under £2m per transformer, whilst the unit cost used by Ofgem in their Updated Proposals, unchanged from Initial Proposals, was just £1.7m per transformer, effectively less than 75% of the actual average cost achieved. This shows that, if anything, the unit costs used in deriving our FBPQ are conservative, and already present a challenge to achieve, whilst Ofgem's unit costs are completely unreflective of actual evidence.

47 Similarly, for 400kV GSP transformers the average actual "unit cost" of replacement is just under £2.9m. Again, this makes the unit cost used to derive our forecast of just under £2.4m per unit appear to be conservative, whilst Ofgem's unit cost of just under £2.15m per unit is unrealistically low, again representing just 75% of the actual costs achieved.

48 As for overhead lines, therefore, it is clear that analysis of the actual recent historical costs of transformers, deemed by default to have been reasonable by Ofgem in their acceptance of actual costs up to and including 2005/06 as not being inefficient, shows that our costs are, if anything conservative, and that Ofgem are totally unjustified in using a lower unit cost. The materiality of this issue is £17m based on the volumes proposed by Ofgem.

Ofgem's limited analysis

49 The second issue on which we want to respond is the analysis carried out by Ofgem and their consultants to arrive at their unit costs, which is, at best, highly selective.

50 In the Initial Proposals, Ofgem based all of their unit costs on analysis by PB Power, with the exception of overhead line unit costs, for which they used KEMA's costs. Even at this level, Ofgem adopted a selective approach – no reason was given as to why KEMA's costs for overhead lines were adopted over PB Power's, but it is notable that this is the one asset category where KEMA's unit cost was lower than PB Power's.

51 In addition, the analysis of the consultants themselves was extremely limited. In response to a question from National Grid, KEMA explained that their analysis for overhead line unit costs consisted of analysing four historical schemes, removing any elements of costs that they viewed as atypical, and then stating that resulting costs justified a base cost (not including steelwork, or any additional costs for environmental protection, terrain, road crossings etc) of £200k/circuit km – even though the average cost of the schemes, even after the so-called "atypical" elements had been removed, was £235k/circuit km! As a result of us demonstrating the inadequacy of this analysis in a submission made following our response to Initial Proposals, Ofgem have revised their unit cost for overhead lines – but only to the level originally proposed by PB Power.

52 All of the unit costs used for the Updated Proposals (with the exception of fittings only replacement) are therefore based on analysis by PB Power. PB Power's analysis of unit costs, as described in their report, can be summarised as follows:

(a) Identify a small number (i.e. 3 or 4) of schemes in an asset category.

(b) Reject any with a higher cost per unit than our unit cost as being "atypical", or remove costs from those schemes to remove the "atypical" element.

(c) Identify any with a lower cost per unit than our average unit cost as effectively setting the benchmark.

(d) On this basis propose a unit cost 10% lower than our unit cost.

53 In a question following Initial Proposals, we asked for further detail of PB Power's analysis – their response simply stated that the full detail was as described in their report.

54 By rejecting schemes with higher unit costs than the average, Ofgem are failing to reflect the reasonable range of costs across a number of schemes within an asset category. Given Ofgem's selective analysis, their unit costs clearly do not reflect a reasonable view of the average cost, as they reflect only the costs of the simplest of schemes, and not a reasonable view on the average cost of the range of schemes in the forecast.

55 As an example of their analysis, on **overhead lines** PB Power analysed four historical quad refurbishment schemes, and identified that two of them had a cost per km which was 15% less than our average unit cost, whilst the other two were effectively dismissed as being "atypical", requiring a significant amount of tower steelwork replacement, or having incurred "unforeseen delays and costs" due to environmental requirements. On this basis, PB Power used a unit cost which was reduced by 10% to "reflect actual costs". As discussed earlier in our response, a more comprehensive analysis of recent schemes would have shown that a fair weighted average cost, across a range of schemes with a range of terrain and conditions, serves to support our future average cost of around £300k/circuit km.

56 On **transformers**, PB Power's unit cost analysis is based on considering just three schemes, two of which had costs per unit which were below the average unit cost, whilst one had a cost per unit significantly above the average unit cost – PB Power acknowledged this, but then said "but this scheme includes additional expenditure for noise requirements and other civil works", effectively rejecting its contribution to average unit costs. Based on this analysis, PB Power reduced the transformer unit costs by 10% "to reflect actuals", which given the selectivity of their analysis, their unit cost clearly does not.

57 Transformer schemes can range in scope and cost, with schemes typically including some or all of the following costs in addition to the basic cost of purchasing and installing a transformer:

(a) replacement of basic foundations and structures;

(b) oil containment systems;

(c) fire protection measures;

(d) noise enclosures;

(e) fencing and buildings;

(f) access roads and skidways;

(g) cable ducts and troughs.

58 In addition, transportation costs can vary greatly, and in general have increased dramatically during the current period, with the Highways Agency enforcing a "water preferred policy". This means that, wherever it is possible to transport a transformer to site via a waterway, the Highways Agency will not grant permission for road transportation. As a consequence, the average transportation cost has increased significantly.

59 By choosing only low cost schemes as a "benchmark" for the unit cost, and dismissing additional costs as "atypical", PB Power have completely failed to take proper account of the range of costs which can be incurred on transformer schemes, such that their unit cost is totally unrepresentative of a reasonable "average" unit cost of transformer schemes.

60 It is evident under any reasonable interpretation that such analysis does not provide an appropriate basis on which to base the allowances for investment in the transmission system for the next 6 years to 2011/12 – particularly within a framework which additionally presumes further real reduction in costs and strongly incentivises companies to spend less than allowances. If Ofgem wish to carry out analysis of historical unit costs as a key to determining an efficient starting point for the level of future costs (which we do not dispute is a reasonable method), then the analysis must consider the full range of recent historical schemes, not just selectively consider those with a low cost. The appropriate unit cost for use in a forecast should reflect an "average" unit cost, with some schemes likely to have a lower cost per unit, and some likely to

have a higher cost per unit. This is indeed what our "average unit costs" do reflect.

Our evidence for unit costs

61 In addition to believing that Ofgem's analysis of unit costs is flawed not least because it does not reflect a reasonable efficient average cost of carrying out investment in the transmission system, we also have good reason to believe that the costs that we achieve in the business are efficient, and reflect the best available cost at any given time, taking into account the availability of suppliers and cost of raw materials and labour.

62 For **overhead lines** we have provided a submission to Ofgem which demonstrated our comprehensive approach to contracting for overhead lines, including:

(a) informing suppliers of the volume of working on the planning horizon to allow them to plan resource requirements;

(b) competitively tendering between suppliers on the rates tendered;

(c) sourcing materials from the worldwide market;

(d) advertising works in the European Journal and actively seeking to engage with potential new contractors on the Continent; and

(e) working with suppliers which have a worldwide portfolio of engineering projects.

63 As a result of the above approach to contracting for overhead lines, we firmly believe that the costs achieved are as efficient as reasonably possible, and therefore that the historical costs achieved across the range of schemes represent efficient costs – as discussed above, these historical costs serve to support our unit costs, and show Ofgem's unit costs to be unreflective of efficient average unit costs.

64 For **transformers** the position is consistent with overhead lines as we competitively tender for supply of all transformer components i.e. manufacture (transformers, coolers and marshalling kiosk), transport, installation and commissioning. Where suppliers offer the capability, we tender for the full provision of all civil engineering infrastructure (such as foundations, roadways etc.) required to install and operate a new transformer.

65 In addition, in order to secure attractive prices for the manufacture of new transformers, we have entered into bulk purchase agreements with suppliers, which have delivered more competitive prices in recent years, and have in fact delivered cost reductions on the purchase of transformers. On the basis of our tender process and approach to bulk purchase, we firmly believe that the costs achieved have been the best available.

66 However, the market for provision of transformers is currently extremely busy worldwide and most transformer factories have full order books, and lead times for equipment are increasing. Added to significant upward pressures on

the costs of raw materials used to manufacture transformers, there is likely to be a significant real increase in the cost of transformers over the next Price Control period. We believe, therefore, that our future unit costs, which are based on our recent historical tender and scheme costs, will probably turn out to be conservative and a challenge to maintain, with Ofgem's proposed unit cost being unachievable.

The double counting of unit cost efficiencies

67 Finally, by adopting such unrealistic unit costs which are materially below the level achieved in the historical period up to and including 2005/06, and then applying a further procurement efficiency, Ofgem are effectively "double-counting" efficiencies, compounding the risk on National Grid.

68 As discussed above, for overhead lines, transformers and reactors, Ofgem's base unit costs are 10% lower than our unit costs and around 15-25% lower than the costs achieved in the period up to 2005/06, having not found our expenditure to be inefficient in the period up to and including 2005/06. The procurement efficiency then proposes a further 5% reduction in 2007/08.

69 Therefore, from 2007/08 Ofgem are proposing that our allowances should be set on the basis that we should be achieving unit costs which are 15% lower than our unit costs, and even lower than the costs achieved up to 2005/06, which were not found to be inefficient. This cannot be a reasonable proposal, and Ofgem have not put forward any evidence to suggest that such a reduction in unit costs is either achievable or justifiable. We discuss the proposed procurement efficiency in more detail below.

Above inflation cost pressures and procurement efficiency

70 We welcome Ofgem's recognition of the validity of our claim that many of the costs associated with investment in the transmission system are increasing at a rate which is above general inflation. The above-inflation increases in costs such as manpower, civils and raw materials are well established within the industry and the capital investment world at large. It is entirely appropriate that Ofgem should take the changes in these costs into account in order to fulfil their obligation to ensure that the licensees are sufficiently funded to fulfil their obligations.

71 In our FBPQ and subsequent response to the Initial Proposals we set out our belief that the most balanced method for dealing with this risk would be to index our allowances to publicly observable indices. This would ensure that any movements in market prices – both downwards as well as upwards – would lead to an appropriate change in our allowance. We repeat our view here that this should be accommodated by use of cost indices within the revenue mechanism, rather than through the provision of an ex-ante allowance.

72 Ofgem's dislike of indexation is somewhat hard to rationalise. We believe that the approach adopted by Ofgem to propose a fixed pot of money for this risk, based on our latest projection of the most relevant cost indices, fails to adequately account for this significant risk to our business over the next five years. However, if the approach is to be a fixed allowance, a premium must be added to the base forecast of the anticipated above RPI trends.

73 At the last Price Review, above inflation increases in input costs were not considered, and no allowance was included in the Price Control allowances. However, over the period from 1999 to 2005, the costs of civils, manpower and aluminium increased by between **15% and 25%** in real terms, whilst the cost of steel increased by 50% in real terms and the costs of oil and copper increased in real terms by 100% or more. This illustrates the scale of increase that can occur in these input prices over the period of a Price Control. The forecast indices that we provided, based on analysis by independent cost consultants, forecast real increases of between approximately **5% and 15%** over the period from 2005 to 2011 in the input costs analysed (civils, manpower, oil, copper, aluminium and steel). The historical evidence clearly shows that, even with an ex-ante allowance for increases in input costs in line with our consultants' forecasts, we would still bear considerable risk that the actual increases are much higher than forecast.

74 Indeed, we asked our consultants[1] to update the original analysis carried out in December 2005, Ofgem's current allowance for above inflation cost increases being based on the December 2005 analysis. The latest analysis forecasts even greater real increases in input costs than was thought to be the case last December.

75 We believe that the minimum premium to properly account for the risk that is being retained by us is that the proposed allowance should be **doubled**. This would start to mitigate the risk in respect of price shifts that almost certainly will occur in certain markets that we will procure from over the next Price Control period.

76 On Ofgem's proposed procurement efficiency, as stated above, we would note that at present, Ofgem are effectively "double-counting" any efficiencies by applying a procurement efficiency on top of unachievable and unjustifiable starting unit costs, leading to some of Ofgem's unit costs being effectively 15-20% lower than the level deemed to not be inefficient in 2005/06. Such a reduction cannot possibly be justified.

77 In respect of the across the board 5% real reduction in unit costs presented in the name of a procurement efficiency, as we discussed in our response to Initial Proposals, Ofgem's case, seemingly based on a report from Deloitte, is extremely weak, and Ofgem have not offered any further justification for this since the publication of Initial Proposals. It should not be mis-understood that achieving a 5% real reduction in costs would be a remarkable proposition. Whilst some organisations identify procurement efficiencies that they have achieved which may appear to be of a larger magnitude to those proposed by Ofgem, these savings are not generally measured in real terms, but are instead measured against hypothetical baselines, budgets and forecasts, and are not in comparable industries.

78 However, we welcome Ofgem's recognition of the inappropriateness of applying a procurement efficiency from 2005/06, delaying the application until 2007/08, but we are deeply disappointed that Ofgem have not also recognised that time is required to achieve efficiency reductions and that these do not

[1] Gardiner Theobald and Fairway – original report December 2005, updated report September 2006

result in step-changes, but are achieved progressively over a period of time. **It is simply unrealistic, and completely unreflective of the market conditions in which we are operating, for Ofgem to assume that we can achieve a real reduction in capital costs of 5% from the start of 2007/08, which is just a few months away.** We continue to believe that, if a given level of real reduction in costs could be achieved over the Price Control period, this would be phased evenly across the period.

79 Our incentive to increase procurement efficiency is equally strong without this challenge and the effect of this reduction in allowance is simply to further exacerbate the inadequacy of the base unit costs. The effect of the combined package of measures on unit costs results in an effective further reduction in the volume of work that would be undertaken in the forthcoming Price Control period.

Unit costs – summary

80 In summary we totally reject Ofgem's basis for their unit costs and believe that:

(a) Ofgem have ignored the evidence from recent historical costs where Ofgem have not found any evidence of costs being inefficient, which serves to confirm the validity of our "base" unit costs;

(b) the proposed "base" unit costs are based on wholly inadequate and selective analysis, which has not resulted in a balanced view on the efficient "average" unit costs;

(c) Ofgem's proposal to deal with above inflation increases by means of an ex-ante allowance reflecting a forecast of real input cost increases fails to adequately account for the risk faced by our business of even higher increases;

(d) Ofgem have ignored the fact that our procurement follows efficient processes to deliver the best prices available from the market;

(e) Ofgem are double-counting efficiencies by applying procurement efficiencies on top of unrealistic and unachievable basic unit costs, which equate to a 15-20% reduction on some unit costs by 2007/08, when those costs were not found to be inefficient for 2005/06;

(f) the application of a 5% procurement efficiency from 2007/08 is still not justified.

81 The net result of all of the above is that, **even if National Grid only delivered the volumes proposed by Ofgem**, it is certain that we would significantly overspend the Price Control Allowances and, whatever rate of return was set within the Transmission Licence, our **actual** rate of return would be significantly lower. For a transmission licensee to be placed in such a situation could not be consistent with Ofgem's statutory obligations to ensure that we are appropriately funded to fulfil our licence obligations.

82 Alternatively, and we believe more in line with the incentives proposed by Ofgem to discourage over-expenditure of the allowances, we would be forced to deliver less replacement volume than even Ofgem consider is required.

Non load related volumes and allowances

83 This section of our response provides our comments on:

(a) the replacement volumes underlying Ofgem's proposed asset replacement expenditure allowance;

(b) the proposed reductions in allowance for a number of other areas of non-load related expenditure.

84 In summary, we are extremely disappointed at the lack of progress that has been made in this area since Initial Proposals. We believe that Ofgem's modelling of replacement volumes is flawed and significantly underestimates the required volume of replacement.

85 Further, Ofgem's proposed volumes are even lower than their modelled volumes, as they have reduced their modelled volumes by "adjusting" the asset lives to "reflect our historical replacement". In doing so Ofgem are effectively stating that our actual replacement should be used to set the asset life, and are ignoring compelling condition information that clearly identifies a body of assets that are overdue for replacement due, not least, to the capital constraints under which we have been working under the last Price Control. **If our replacement is to be constrained by our present allowances, and our future allowances are to be constrained by the amount of replacement we actually do, Ofgem are at serious risk of starting a spiral of decline in the condition of the transmission system, and are placing the long term reliability, safety and environmental performance of the transmission system at risk. We do not believe that this is in the interests of consumers.**

86 We also believe that other proposed reductions in expenditure are poorly justified, and contribute to unacceptable proposed allowances for non-load related expenditure.

Replacement volumes

87 There clearly remains a huge difference between Ofgem's view on the required replacement volumes and our own. We are disappointed that, despite our best efforts to understand and discuss the differences between Ofgem's modelled volumes and our own, the issue has not moved on between Initial Proposals and Updated Proposals, and very little time now remains to satisfactorily resolve the differences. The volumes on which Ofgem's proposals are based remain unacceptable, and insufficiently justified.

88 Our response on volumes is structured as follows:

(a) a clarification of the differences;

(b) the evidence being ignored by Ofgem with regard to constraints on historical investment;

(c) the evidence being ignored by Ofgem with regard to the condition of assets forming the replacement "backlog";

(d) the serious implications of Ofgem's proposals.

89 The response demonstrates that we continue to believe that the volume of work proposed in our forecast is required, and that this is supported by our asset lives and modelling. We believe that Ofgem's approach:

(a) uses modelling which is flawed;

(b) further reduces volumes by increasing asset lives on a basis which completely ignores the technical evidence;

(c) represents a serious risk of entering a spiral of decline of network condition, jeopardising the long term reliability, safety and environmental performance of the transmission system.

90 Were the Final Proposals to be based on the current assumptions, excluding the information on the condition of the assets, Ofgem would have to accept responsibility for the potentially serious consequences for the ongoing reliability, safety and environmental performance.

Clarification of the differences

91 Our asset replacement plan is based on a bottom up capital planning process, identifying assets for replacement on the basis of condition information. We use asset replacement modelling to provide long term forecasts of required replacement volumes, and to provide a check against the volumes of replacement requirement identified through the bottom up planning process. We are confident that both the bottom up planning process, and our asset replacement modelling, reflect the most appropriate replacement volumes in order to maintain the ongoing reliability, environmental and safety performance of the transmission system. Through the review process we have presented to Ofgem and their consultants:

(a) the Asset Health Review and capital planning processes, designed to ensure that we identify assets as candidates for replacement based on regular condition assessment;

(b) various measures of asset and network performance which are consistent with a network which is ageing and deteriorating;

(c) numerous examples of condition assessments of individual assets and families of assets;

(d) the evidence underlying our asset lives.

92 Ofgem's proposed replacement volumes are based entirely on modelled volumes, using the outputs from PB Power's asset replacement modelling.

Following publication of the Initial Proposals, it was clear that there were very large differences between the outputs from PB Power's modelling and our modelling. As Ofgem's allowances are based on their modelling, it is essential that the sources of the significant differences in modelling outputs are understood.

93 In order to understand this issue, we have exchanged a significant amount of further analysis with Ofgem, and met with Ofgem to discuss the issue. From these discussions, the source of the differences has recently become clear:

(a) We define the year in which an asset is commissioned as the "first year" of an asset's life. Ofgem defined the year **after** commissioning as the first year of life. Ofgem's approach significantly under-ages the assets – for example if an asset is installed in 2004/05, Ofgem would not define it to have completed its "first year" of life until the end of 2005/06, when it may actually be up to two years old;

(b) Ofgem have applied our asset life data to the wrong asset age, effectively delaying replacement by a year. This is demonstrably wrong as, even using their definition of the age of an asset, this approach will not result in the replacement of 50% of a population until a year after the asset reach their Anticipated Asset Life (AAL), the AAL being defined as the point in time by which 50% of the population should have been replaced.

94 The combined effect of these two "shifts" in data result in a two year shift in replacement and Ofgem significantly underestimating the volume of replacement that is required.

95 However, Ofgem's proposals are based on an even lower volume of replacement than their own underestimated modelled volume. The replacement volumes proposed by Ofgem for switchgear, overhead lines and cables have been further reduced, as they have revised asset lives to reflect the actual volume replaced in the historical (up to 2003/04) period, and projected future replacement volumes on this basis. For overhead lines, switchgear and cables, Ofgem's proposed volumes are lower than even their own modelling by the following amounts:

(a) Overhead lines – 314 circuit km

(b) Switchgear – 71 circuit breakers

(c) Cables – 16km

96 In total, this deficit in volumes, even against their own modelling, has a materiality of some **£260m**.

97 In effect, Ofgem's proposed volumes effectively represent increases in asset lives of all asset types as follows:

(a) Overhead lines and switchgear by **three years;**

(b) Cables by **five years;**

(c) All other assets (including transformers and reactors) by **two years.**

98 In discussion with Ofgem, they have indicated that the justification for basing the future volumes on asset lives altered to reflect the historical replacement volume is that this is the "best information available" on which to base the future allowances. We do not believe that this is the case, and believe that Ofgem are ignoring vital information in setting the future allowances purely on the basis of historical replacement volumes.

99 In basing future allowances purely on the basis of modelling using asset lives which reflect our historical level of replacement, Ofgem are clearly indicating that they do not believe that there are any assets which have not been replaced which needed to be replaced i.e. there is no backlog of replacement in any asset category. We have made it absolutely clear throughout the review that there is a backlog of replacement – Ofgem seemingly reject this view on the basis that if we *really* believed that assets needed to be replaced, we would have replaced them, and use this argument to support their view that there are "implicit" longer asset lives which our replacement programme is really based on.

100 Ofgem's approach ignores or rejects two key pieces of evidence:

(a) the fact that our replacement programme does not exist in a vacuum, and that there have been real constraints in the historical period which have prevented replacement in line with policy;

(b) the compelling condition evidence that clearly indicates that there are a body of assets in the key asset categories for which replacement is overdue.

101 In summary, the basis for such an extension to asset lives is entirely flawed, ignores vital condition information, and places the future reliability safety and environmental performance of the transmission system in jeopardy. These two keys areas of evidence are discussed in turn below.

The constraints on historical expenditure

102 In dismissing the backlog of replacement, Ofgem are dismissing the evidence of constraints on investment which have existed in the historical period, which have prevented replacement in line with an ideal replacement profile.

103 Not least of these is the **financial constraint** of the Price Control allowances. Ofgem have expressed a number of contradictory views on the issue of whether we should have overspent the Price Control allowances. On one hand, Ofgem have stated their view that we could have reduced expenditure to stay within the Price Control allowances. On the other hand, Ofgem express concern that our financial targets at a group level have led to constraint of expenditure in the regulated business, and then use the fact that we have not delivered all of the asset replacement volume assumed at the last review as an indication of an "implicit" asset life on which to base future allowances.

104 Ofgem must accept the fact that the Price Control allowances do place financial constraints on a regulated business within the period for which the control is set, regardless of whether that business is part of a larger group. In managing the business responsibly, it is beholden on the management to ensure the financial resources of the company are managed efficiently, and that investment is prioritised. As part of this, if expenditure begins to exceed Price Control allowances, as was the case in the last period when load related expenditure, and the costs of equipment and labour, increased steeply, the management of the business should be expected to seek to reduce capital expenditure as far as possible until the financing of the business can be discussed with the regulator at the next Review.

105 This is exactly what National Grid has done in thoroughly investigating investment need cases, and prioritising expenditure to carry out the most urgent works, with some works being delayed until a new regulatory period, and new financing arrangements, are in place. **This was an entirely appropriate and responsible approach for the management of National Grid to take.** Notwithstanding this, we have overspent the Price Control allowances in the period 2001/02 to 2005/06 by more than £500m in light of the compelling need case for asset replacement work which we did not believe could be deferred until the next Review.

106 Given this, it is entirely unacceptable for Ofgem to seek to reduce future allowances on the basis that we have not delivered volumes of replacement in the historical period, driven in no small part by the fact that the historical allowances were themselves inadequate.

107 A second key constraint has been on **supplier resources**, particularly with regard to overhead lines. As the bulk of the transmission assets were built over a relatively short period during the 1960's, it is not surprising that the volume of required replacement should rise very steeply as many assets reach the point of needing replacement at the same time. For overhead lines in particular, this Price Review is occurring right at the point in time at which the volume of work is rising steeply. It is also not surprising that, given a relatively low volume of work over the last few years, suppliers were not in a position to instantly start delivering higher volumes of work. We have discussed at length with Ofgem our efforts to work with suppliers to make them aware of the volume of work that will be required over the next 10-15 years, and to allow them to ramp up their resources accordingly. Unfortunately, the ramp up of resources has not exactly matched the desired replacement profile, and what resources have been available have largely been used on more urgent fittings replacement schemes.

108 In basing future volumes on historical replacement performance, Ofgem are effectively ignoring the fact that there has been a need to work with suppliers to develop their resources, and are effectively penalising us for the fact that it has not been possible for us to exactly match available supplier resources with the desired replacement profile, resulting in some backlog of work.

109 A third key constraint has been on **efficient alignment of replacement** with distribution network owners. This is particularly the case with switchgear replacement, where the most efficient solution is to align works with the DNOs. We have worked with DNOs to try and achieve alignment, and where alignment has not been achieved, this has led to some switchgear

replacement being delayed. We have extremely good relations with DNOs, and strongly believe that it is in the long term interests of the transmission and distribution networks, and in consumers' interests, that we work with DNOs to achieve replacement solutions which use the resources of both DNOs and ourselves most efficiently.

110 Alignment of works can be difficult to achieve for a number of reasons. The first reason is that DNOs have different equipment to ourselves, and so have different priorities for replacement – for example, it is not necessarily the case that the sites where our highest replacement priorities are located coincide with the DNOs' highest priorities. There is naturally, therefore, a tension in seeking alignment, and it is important for both ourselves and DNOs to work together to agree efficient solutions. The second constraint is clearer – the DNOs are also subject to the financial constraints of a Price Control. The single biggest barrier to agreeing alignment of works is the fact that the DNO may not have been allowed expenditure for particular sites or assets where our highest replacement priorities lie.

111 Ultimately, National Grid has powers through the CUSC, introduced through the CAP012 modification, which allow us to simply notify a DNO and force through a replacement of our assets. However, not only would this damage relationships between ourselves and DNOs, which would not be in consumers' long term interests, but, as it only allows us to replace our assets rather than enforce an aligned solution, would still only result in an unaligned and inefficient replacement programme, ultimately increasing cost to consumers.

112 Ofgem have used the fact that we have not used our powers under the CUSC to enforce replacement as a sign that the replacement is not as urgent as we claim – however, in doing so, Ofgem appear to misunderstand what our powers under the CUSC actually allow us to do. Again, Ofgem are effectively penalising us for not having replaced assets, when the only way we could have replaced them would have been to have adopted a solution which was inefficient and resulted in higher costs for the consumer. Also the message from Ofgem is clear – if we believe we need to replace, we should use our powers to replace, **even if this is not the most efficient solution.** We do not understand how this can be in the interests of consumers.

The compelling condition information

113 In dismissing the backlog of replacement, Ofgem are also giving a clear message that they do not believe that the evidence for replacement of the assets forming the backlog was sufficiently compelling. We have provided extensive evidence, and continue to believe that there is a backlog, and that the case for replacement is compelling. This being the case, their approach of basing future volumes purely on the basis of "implicit" asset lives reflecting historical replacement is unjustified, and is of great concern for the future health of the transmission system.

114 For **overhead lines** condition evidence supports a backlog of replacement of around 250km. The routes that we believe that the condition evidence supported replacement prior to the end of 2005/06, but that we have not been able to replace due to the constraints discussed above, are listed below, along with a brief description of the condition:

(a) Aberthaw – Cowbridge (24 cct km) – significant corrosion of conductor, earthwire and suspension fittings heavily corroded and rusted, some elements near to mechanical failure, all elements are at or beyond latest onset of significant unreliability, 10 emergency repairs in 5 years;

(b) Cowbridge – Pyle (45 cct km) – as for Aberthaw – Cowbridge, loss of section of aluminium strands, fittings and insulators heavily rusted, failure of phase jumper caused loss of supply in 2004;

(c) Chesterfield – High Marnham (86 cct km) – exposed route suffering from subconductor oscillation inducing heavy wear on conductors, over 200 temporary repairs on the route, tower steelwork in poor condition, high number of unplanned outages impacting on system security;

(d) Iron Acton – Whitson (62 cct km) – commissioned in 1959, increased Foot Patrol frequency to monitor condition, over 50% of fittings, spacers and dampers, and almost 100% of insulators worn, rusty or missing, tests on insulation showed that 50% failed minimum design strength;

(e) Aberthaw – Tremorfa (18 cct km) – single circuit route, more than 60% of fittings, spacer and dampers worn and corroded, annual Foot Patrol to monitor condition on system critical circuit;

(f) Uskmouth – Whitson (12 cct km) – commissioned in 1959, operating resources expended to manage defects, fittings, insulators, dampers and steelwork all in poor condition, annual Foot Patrol to monitor condition on system critical circuits;

115 These brief “snapshots” of condition, which are all supported by detailed condition assessments, demonstrate that these routes are in poor condition and would ideally have been replaced prior to the end of 2005/06. The reasons why they have not been replaced are the financial and resource constraints discussed above, and the fact that five of the six routes are in South Wales meaning that outages need to be arranged sequentially, leading to delays from the ideal replacement time. In addition, as we have discussed at length with Ofgem during the review, it became apparent during the last Price Control period that the life of overhead line fittings was significantly shorter than the life of the fully-greased conductors, meaning that a number of urgent “fittings only” schemes were identified. This led to supplier, and financial, resources being diverted to what is essentially a new category of replacement.

116 However, there is no sense in which replacement has been delayed because the condition evidence does not justify replacement. In each case, replacement is urgently required, and would ideally have been carried out prior to the end of 2005/06. This, therefore, is the overhead line backlog that Ofgem’s approach to determining future volumes essentially denies the existence of.

117 For **switchgear,** the condition evidence supports a backlog of replacement of around 101 circuit breakers, the majority of the backlog being at 132kV. The

breakers that the condition evidence supported replacement prior to the end of 2005/06, but that we have not yet been able to replace due to the constraints discussed earlier, are listed below, along with a brief description of the condition issues:

(a) **Outdoor OB14 circuit breakers** – we have a reducing population of OB14 circuit breakers as a result of an on-going replacement programme. At the beginning of the last Price Control period, this design of circuit breaker was considered lower risk than other designs of conventional air-blast breaker and as such this family is generally being replaced towards the upper end of the conventional air-blast technical life range (i.e. at 50 years). However, the lower risk that would have been assigned to this family 5 years ago was unwarranted as evidenced by two in-service failures in the last 5 years. Forensic investigation of equipment removed from service which shows evidence of gasket and seal deterioration of equipment removed from service, which results in moisture ingress, corrosion jacking and, ultimately, failure of outdoor circuit breakers. As a result of the failures, it has been necessary to establish Risk Management Hazard Zones (RMHZ) around equipment to manage the individual risk to site staff. There is compelling evidence that replacement at sites such as Hams Hall, Elstree and Rayeigh are overdue and present an on-going reliability risk, particularly through the winter period.

(b) **Indoor OB14 circuit breakers** – OB14 breakers are also operated at indoor locations at Barking and Rugeley. Indoor failures have occurred, not due to moisture ingress, but rather due to wear of the sequence switch drive mechanism. Loss of flexibility of gasket material is common to both indoor and outdoor circuit breakers, resulting in increased stress on ceramic insulation as a result of 'hammering' on operation. The lower risk of disruptive failure associated with indoor assets is reflected in our prioritisation processes, such that we have fully utilised the flexibility within our replacement policy by allowing this small number of assets to be operated significantly beyond the anticipated technical life for the majority of the population, up to 58 years in current plans. Concerns around breaker condition are compounded by issues associated with the fabric of the substation buildings. We believe that the technical life of this equipment has already been fully exploited and the need for replacement is compelling.

(c) **Frame 'g'** – unlike the OB14, there was no doubt at the beginning of the last Price Control period regarding the performance and condition of the 132kV frame 'g' population, as this family has a long history of disruptive failure, again, principally due to moisture ingress. As such we are well through a replacement programme. Replacement work at Elland 132kV was disrupted by the explosive failure of a frame 'g' circuit breaker during 2003. Clearly it is far from ideal to leave planned replacement to such a time that unreliability of equipment being replaced presents unacceptable risks to scheme delivery, measured in safety or reliability terms.

(d) **GA6** – as with the frame 'g', we had a spate of failures at the beginning of the last Price Control period, which highlighted the need

to replace outdoor GA6 circuit breakers (and the 275kV GA10 design). A significant volume of background information has been presented as to the nature of the failure mode and our management strategy. National Grid has scheduled emergency risk management actions, in the form of design modification and enhanced maintenance to manage on-going risk. A number of DNOs have undertaken similar work. The condition information provided and our actions in respect of this family suggests that intervention to address condition concerns is overdue. Indoor breakers of this design have not been prioritised for replacement on safety grounds, however two recent failures (since 2005) have increased pressure to bring forward replacement.

(e) **Oil circuit breakers** – a large proportion of our 132kV bulk oil breakers are fitted with free breathing barrier bushings. Breathing mechanisms can become blocked, causing moisture to be drawn into the bushing with risk of disruptive failure. Evidence has been presented during the Price Review of a failure of this type at Minety in the last Price Control period. We have presented evidence of extensive sampling used to confirm bushing condition and prioritise enhanced maintenance or replacement. Risk management hazard zones associated with defective bushings sterilise significant areas of sites, making access to deliver maintenance, capital works or emergency repairs to adjacent equipment extremely difficult and increasing costs and system risk. Sites where oil-breaker replacement is overdue include Littlebrook, Penwortham and Harker, sites where the site-specific condition reports provide a compelling case that replacement is overdue, not only due to risk of breaker failure (evidenced by actual failures), but also due to the poor condition of site infrastructure, including severe subsidence, presenting unacceptable safety risk to operational staff.

118 As the manager of the transmission assets it is our opinion that the condition of the assets discussed above presents a compelling case that replacement of these circuit breakers is overdue, and that if Ofgem are asserting that the asset lives should be extended to match the historical volume of replacement, they are ignoring this condition evidence.

119 In addition to the above, whilst not forming part of the backlog up to 2005/06, other circuit breaker families are becoming a higher priority for replacement. For example OBYR14 circuit breakers are a later design of conventional air-blast circuit breakers introduced in the mid 1960s, and are currently the only conventional air-blast family not subject to safety risk management. However, evidence has been provided of internal stripdown of a 37 year old breaker removed from service at Laleham showing moisture ingress due to gasket deterioration, common to earlier conventional air-blast types, and a potential driver of circuit breaker failure. This clear evidence of deteriorating condition is likely to increase the urgency to replace this breaker type during the next Price Control period, as has happened with OB14 and indoor GA designs.

120 As can be seen, for these families of circuit breakers, the requirement for replacement is supported by evidence of catastrophic failures which present a significant safety risk, but also present a risk to reliability. As the failure modes identified relate to the degradation of internal components such as seals over time, or to the wear of components, it is entirely appropriate that a

family-based approach to identifying replacement candidates should be adopted.

121 This approach was questioned by Ofgem's consultants, in particular KEMA, who believed that our replacement plans should be disaggregated further. However, beyond this assertion they offered no evidence for how they thought the families should be broken down further. In addition they also misinterpreted asset life data as applying to a particular family of switchgear, when in fact it applies to all conventional air blast switchgear, and used the fact that a number of this family of switchgear has survived to beyond the latest onset of significant unreliability as "evidence" that the asset lives are pessimistic. We believe, therefore, that KEMA's views on 132kV switchgear replacement are a collection of misinterpretations and unsubstantiated claims.

122 In our view, as manager of the transmission assets, the need case for the replacement of these switchgear types which form the backlog is compelling, as these assets represent a risk to safety. In each case, replacement is urgently required and would ideally have been carried out prior to the end of 2005/06. This, therefore, is the switchgear backlog that Ofgem's approach to determining future volume essentially denies the existence of.

123 For **cables**, the backlog issue is somewhat different from that described above for overhead lines and switchgear. Essentially, the gap between the volume of assets decommissioned and the modelled volumes is due to two cables.

124 The Mill Hill – St. John's Wood 132kV cables (38km) were due to be decommissioned following the commissioning of the new Elstree – St. John's Wood cables. Works on the new cables were completed in the last Price Control period, but subsequent demand increases in London have precluded the decommissioning of these cables i.e. we would have decommissioned them as planned, but have needed to keep the cables on the system for load related reasons. The cables will now be decommissioned following completion of a new GSP at Hendon, but continue to present serious problems in terms of oil leakage, with almost 1400 litres of oil leaked in 2005/06, and reliability, with over 17 weeks of unplanned outages in the last 3 years.

125 The Beddington – Rowdown 275kV cables (20km) will be removed in 2007 as part of the scheme to replace them. They were originally planned for replacement by the end of the last Price Control period, but the scheme has been delayed from its original completion date in order to manage our expenditure given the fact that expenditure has exceeded regulatory allowances. The Beddington – Rowdown cables required over 7 weeks of unplanned outages over the last two years, and leaked over 2700 litres of oil in 2005/06.

126 For cables, therefore, the existence of a backlog is not due to evidence of "better" condition than our asset lives would imply – indeed the decommissioning of these cables remains a high priority, subject to the load related and capital constraints which we have experienced which have prevented us from completing their decommissioning. **Ofgem's approach to setting future allowances based on historical replacement is particularly unsound, therefore, for cables, as there is absolutely no sense in which**

our historical decommissioning can be used as a guide to the condition of the assets, and hence the asset lives.

127 Indeed, considering the cables that we plan to replace, there is absolutely no evidence to suggest that our asset lives are conservative. The twelve cables that we plan to replace, or commence works leading to their replacement, over the period to 2011/12 have each averaged almost two weeks of unplanned outages in each of the last four years, and have resulted in the leakage of almost 20,000 litres of oil over the last three years. On the cables with copper reinforcing tape (nine of the cables planned for replacement), condition information confirms that almost all sections are suffering from tape corrosion, and on six of these more than half of the sections are predicted to fail before 2011. In our view, this evidence only serves to support our asset lives and planned replacement, and certainly for this category we can see no justification in Ofgem's reduction of planned volumes.

The implications of Ofgem's Proposals

128 The implications from Ofgem's proposals are very serious, and what this means for transmission asset replacement needs to be considered very carefully. In summary, the volumes of asset replacement proposed by Ofgem are based on the following:

(a) Analysis of historical replacement (up to 2004/05), and assertion that this gives the best information on which to base the asset life i.e. the level of replacement carried out replaced all assets that needed to be replaced;

(b) Projection of future volumes based on imputed asset lives from historical replacement.

129 Essentially, Ofgem propose to set asset replacement volumes on the basis that historical replacement gives the best indication of asset lives, when the Price Control itself is one of the biggest constraints on replacement volumes. The implications of this can be seen as follows:

(a) The last Price Control under-funded load related expenditure significantly, forcing us to re-prioritise asset replacement expenditure leading to a reduced replacement volume. Ofgem have stated that they still believe that we could have stayed within our Price Control allowances, implying that they believe even less replacement could have been carried out.

(b) Ofgem then propose to set future volumes on the basis of the historical replacement, failing to recognise the constraints on replacement, thus providing lower volumes than we think are required. In addition to this Ofgem set unit costs at a level below the current level, and set incentives to harshly penalise any over-expenditure of the allowances. As such, we would deliver even less volume than Ofgem believe is required.

(c) At the next review, Ofgem again review our historical replacement, see that it is below the level assumed at the last review, and reduce

volumes further on the basis that the lower actual level of replacement implies a longer asset life.

130 It can be seen that such an approach, where the proposed future volumes are dependent on the outcome of the last review, represents a positive feedback loop, with little reference to the actual condition of the assets. **This will lead to a spiral of decline, where the condition of the assets deteriorates to a point from which we cannot recover.**

131 Whilst we recognise that it is Ofgem's prerogative to decide what is in the interests of consumers, we do not believe that Ofgem have properly considered the implications of their proposals.

Other changes in Updated Proposals

Removal of allowance for replacement of mesh substations with double bus

132 We are disappointed that Ofgem have chosen to remove an allowance of £34m for the installation of new double bus substations in place of mesh substations when the substations are in need of replacement, which had been allowed for in the Initial Proposals.

133 This additional allowance was suggested by KEMA, as the installation of a double bus substation requires the installation of more switchgear than is removed from the mesh substation which it replaces. As Ofgem's allowances are based on modelling of asset disposals, rather than the volume of asset additions, this was an entirely appropriate suggestion by KEMA, to ensure that our allowances reflect the volume of assets installed, rather than the volume of assets removed.

134 By removing this allowance, Ofgem are failing to properly reflect the costs incurred in replacing an old design of substation with a more flexible, extendible and secure modern substation design where required, an approach which Ofgem had previously, apparently, agreed with. **Ofgem have offered no justification for removing this expenditure, and no discussion on this issue has taken place since Initial Proposals** – if Ofgem believe that we should replace mesh substation like for like, then they should explicitly state that this is their view. Otherwise, they should ensure that our funding properly reflects their agreement with what we firmly believe is an entirely appropriate approach to substation design, which is fully in line with consumers interests.

Allowance for cables replacement

135 On cables, Ofgem have reduced their allowance by almost £40m over the seven years since the Initial Proposals, despite adding £31m to their allowance for cable refurbishments having been made aware that the Initial Proposals omitted expenditure from 2005/06 and 2006/07. Within the cables allowance, therefore there is a reduction of £70m. This appears to be due to changing the basis for their assessment of the cost of cable tunnels – they now appear, rather than dealing with tunnel costs as a non-modelled item, to have generated an effective "unit cost" for all cables, including those with tunnels, by taking our total forecast cost, less non-modelled items, and dividing it by our forecast non-load related disposals of 103km.

136 This means that the allowance for cables, including the cost of tunnels, is completely dependent on Ofgem's modelling. As discussed above, Ofgem's approach to identifying future volumes is completely invalid for cables given the reasons why the Mill Hill-St. John's Wood and Beddington-Rowdown cables were not de-commissioned in the last Price Control period. This approach completely fails to recognise the merits of the individual projects, and provides no allowance for projects which do not deliver any volume of decommissioning in the period, but still incur significant expenditure (e.g. St. Johns Wood – Tottenham, Wimbledon – New Cross).

137 Given Ofgem's new approach to allowing for the cost of cable tunnels, their approach to identifying cable volumes now also results in a reduction of the allowed expenditure for cable tunnels by £70m, effectively a 28% reduction in allowance for cable tunnels between Initial and Updated Proposals. In total the **Updated Proposals are some £90m below our forecast, a cut of 15% on total cables expenditure. This cut is completely unjustified and contrary to the actual condition of the cable network, as it is based on no analysis whatsoever, and is purely a function of Ofgem manipulating the basis for their allowance.**

138 The removal of this level of expenditure will effectively prevent us from continuing with a scheme to replace one of the cable routes planned in our FBPQ. It is our view as the asset manager that all of the schemes which we have identified for replacement have a compelling need case, both in terms of system criticality and environmental performance. It will not be possible for us to carry out all of these schemes with the level of funding proposed by Ofgem, which means that plans to replace at least one of the cable routes will have to be abandoned until after the end of the next Price Control period – if Ofgem believe that the level of funding is appropriate they should state which scheme they believe should not go ahead.

Critical National Infrastructure Security

139 During the Price Review we have been in discussion with Ofgem over the funding of works to improve the physical security of key gas and electricity sites, identified as being Critical National Infrastructure (CNI) sites. As the issue of expenditure at CNI sites has been considered as a whole, our comments here cover expenditure to enhance physical security at both gas and electricity sites.

140 As this discussion has largely taken place since the publication of Updated Proposals, we believe that it most appropriate to comment on the state of these discussions, rather than anything included in the Updated Proposals themselves, as these represent the latest position.

141 In summary, we welcome the positive discussions which have taken place so far between ourselves, DTi and Ofgem. We recognise that there is uncertainty over the precise scope and cost of the programme and therefore determining an ex-ante allowance is particularly difficult. Therefore, at present, Ofgem propose to give no upfront allowance for this expenditure, but propose to fund the programme ex-post following an annual review of the expenditure that will be undertaken jointly with the DTi.

142 This expenditure is driven by agreement between all parties, including ourselves, DTi, Security Services and Ofgem, on what is required to ensure that our substation sites are physically secure in light of the current and likely future security situation – subject to ensuring that we incur expenditure efficiently, there is no reason whatsoever why National Grid should suffer any financial risk or loss as a result of efficient investment, and without guarantees of appropriate funding, we cannot proceed with this investment.

143 In principle we have no fundamental objection to this approach subject to the receipt of sufficient guarantees that we would be fully reimbursed including foregone return, depreciation and financing costs accrued due to funding being allowed ex-post, rather than ex-ante. However, we do believe it would be appropriate to insert a minimum baseline level of funding within this price control to mitigate the scale of the adjustment that will inevitably need to be made at the time of the first review of actual costs.

Load related expenditure

144 In contrast to non-load related expenditure, we believe that significant progress has been made on load related expenditure. Following discussion, and clarification of information by both ourselves and Ofgem, we welcome the inclusion of additional expenditure relating to:

(a) the inclusion of Marchwood in the generation background, given the high degree of certainty on this project, resulting in an increase in generation related infrastructure expenditure of £27m;

(b) the correction of expenditure on reactive compensation to be consistent with the generation background, resulting in the inclusion of £105m in the period 2007/08 to 2011/12 (and it is assumed £10m in 2006/07 to be consistent with the information provided by ourselves, although this is not clear from the consultation document)

145 However, in addition to this, there are three further issues which need to be resolved prior to Final Proposals in order to achieve an acceptable set of Proposals, these being:

(a) **Swansea -** we have updated Ofgem on the costs of a scheme at Swansea, consistent with PB Power's generation background. In total, if included, this would result in additional expenditure of approximately £50m and has been extensively discussed with Ofgem and their consultants. We are unaware of any outstanding concerns from Ofgem on this matter. The need case for this expenditure is extremely robust, and it is not clear why Ofgem have not included this expenditure. We have received the application from WPD for a request to increase transformer capacity at Swansea North substation and a sanction paper for this scheme can be provided, if requested. There is now, therefore, a high degree of certainty about the need for this investment, and we will seek to discuss this issue with Ofgem in order to resolve it prior to Final Proposals.

(b) **Exit related expenditure –** Ofgem have removed almost £39m of expenditure from our allowance for exit related expenditure, purely on the basis of an inadequate piece of analysis by PB Power on a

scheme at Mannington, from which they suggested that 10% of exit scheme costs were related to asset replacement. In earlier responses, we have clearly explained that this scheme is required in accordance with the SQSS and there is no element of asset replacement associated with this scheme. We reiterate our view that this adjustment is very poorly justified.

(c) **"Adjustment for 2005/06 actual" -** It is not at all clear why £36m should have been removed as an "adjustment for 05/06 actual" for load related. Load related expenditure is driven by changes in generation and demand, and therefore there is no reason why expenditure in 2005/06 should be deemed to have offset any expenditure in 2007/08 and beyond. We seek clarification on the justification for this from Ofgem, as we do not believe that there is any logical reason why this adjustment should have been made.

146 In addition to the above, and in light of the fact that the definition and derivation of load related revenue drivers is still uncertain, the issue of unit costs for load related schemes is still of concern. Were Ofgem to revise unit costs in respect of load related expenditure to be more in line with the unit costs proposed for asset replacement, then the difference between us would actually increase.

III National Grid Gas NTS (NGG)

Historic expenditure

147 We are very disappointed that Ofgem propose to continue with their plan to disallow expenditure associated with St. Fergus. On this issue, we believe that Ofgem's justification for disallowing the expenditure is weak, and ignores a number of key facts regarding the information available, the potential risk of buyback costs and the gas entry capacity regime set up by Ofgem themselves at the last Price Review. Their approach to this expenditure presents a significant increase in regulatory risk, which is entirely inconsistent with the rates of return being offered.

148 In paragraph 6.7 of the Updated Proposals, Ofgem's supporting arguments for a full disallowance of the expenditure at St. Fergus can be summarised as follows:

(a) Based on the information available at the time of committing to the investments, the need case was weak.

(b) The "value of the added capacity" has been little so far, as **actual physical** flows have been below the capacity level even without the investment.

(c) We took an "over-pessimistic estimate" of the buyback costs when justifying the investment.

(d) There is no strong evidence to suggest that flows at St. Fergus could increase in the foreseeable future.

149 We believe that these comments display a fundamental lack of understanding of the gas entry capacity regime and our role in it, the risks of high buyback costs and the decisions that we are forced to make under the regime. Each of these comments is addressed below, although in a slightly different order.

(a) **Actual physical flows have been below the capacity level even without the investment** – Ofgem appear to equate physical flows to an asset "adding value" and being "used and useful". However, the potential risk of buyback is a function of two things which must be considered:

(i) the probability of actual physical flows, driven by market fundamentals, needing to be curtailed due to a deficit between physical capacity, and the capacity rights held by shippers;

(ii) the chance that a shipper realises that there is a deficit of physical capacity and seeks to exploit that deficit by nominating flows which it knows we cannot be accommodate, **regardless of the market fundamentals.**

On the first issue above it is possible to carry out probabilistic analysis to estimate the potential buyback driven by market fundamentals. However, on the second issue, the risk is binary – if shippers do not notice the physical constraint then buybacks may not be required, but if they do notice then they will almost certainly, quite rationally, seek to exploit that constraint as much as possible. It is vital, therefore, that Ofgem understands the position we are in under the entry regime where the following combination of issues arise:

(i) where the physical capability that can be provided is lower than the baseline capacity;

(ii) where shippers purchase all capacity rights, in all timescales from long term to on the day, up to the baseline;

(iii) where those shippers have more than enough offshore capability to deliver against their capacity rights.

In these circumstances there is clearly a risk that shippers would wish to flow gas, based on market fundamentals up to their capacity right holdings. It is on this basis that calculations are carried out to estimate the "expected" value of buyback costs based on a view of the probability of particular supply scenarios materialising.

However, what this does not cover is the risk that shippers realise that there is a physical constraint and seek to exploit that constraint, regardless of whether the market fundamentals would drive them to flow gas or not. In this case, the constraint would clearly exist for a long time – at least three years until additional pipeline capacity could be installed. Therefore the exposure to buybacks could be extremely large – as discussed below the buyback costs could easily run into hundreds of millions of pounds.

Therefore if users have capacity rights and the ability to deliver gas up to those rights, and we could not deliver that capacity without investment, it is difficult to see any rational and efficient option other than to ensure that there is sufficient physical capacity by building pipelines or compressors.

The potential for a physical constraint to be noticed and exploited by shippers was demonstrated at St. Fergus in July this year, where physical capability was reduced due to a pipeline tie-in. Over the period of a few days we were required to buyback capacity at a cost which increased day by day. It is hard to believe that shippers flow nominations and prices driven by market fundamentals, rather than their knowledge that physical capacity was constrained and that there was an opportunity to exploit this constraint in order to profit from the buybacks that would result. Fortunately, that particular constraint only lasted for a matter of days as we managed to reduce the outage duration, but still cost up to **£10m per day** in buybacks - had we not invested at St. Fergus during the current Price Control period, physical capability would have been below the baseline capacity for most of the year, potentially resulting in huge buyback costs.

Ofgem appear to have underestimated the risk that market participants would seek to exploit a physical constraint, and the fact that the absence of presence of a constraint will change shipper behaviour significantly. In the absence of a constraint, the flows should be driven by market fundamentals, and flows may well be comfortably below physical capacity. However, given identical market conditions, if a physical constraint is present, shippers may well realise that there is an opportunity for profit which can be exploited, and nominate flows which they know cannot be accommodated, such that the system operator has no choice but to buyback capacity at whatever price it can.

In this context, therefore, an asset should be considered to be "used and useful" if it has provided sufficient physical capacity to avoid the need for significant buybacks, given consistent high levels of capacity holding and ability to deliver against those capacity rights. Against this definition, investment to ensure that the St. Fergus baseline capacity that we are obliged to offer can be physically delivered has indeed been **"used and useful".**

(b) **The information available at the time of committing to investments** – Ofgem still do not appear to have recognised the point that, under the regime set up by them at the last Price Review, we are obliged to offer shippers the opportunity to use capacity at each entry point up to a pre-defined baseline level, regardless of whether the network is physically capable of delivering such capacity. Given such a regime, we are in a position where, if shippers have capacity and the capability to deliver against that capacity, then we must consider the possibility of being forced into buying back capacity – if shippers nominated flows in excess of the physical capability of the network we would have to buyback **all capacity** from capacity holdings (which are at the baseline level on most days) back to the level which can be physically accepted.

At St. Fergus, the situation is that, having set a high baseline for all demand days, Ofgem effectively removed the need for shippers to purchase long term capacity, as they know that capacity will be available to purchase in shorter timescales, with much lower risk and if purchased on the day, very little cost. Shippers take full advantage of this, and secure capacity in all timescales up to the gas day, with capacity being sold up to baseline almost all of the time. If, therefore, there is a deficit of physical capacity compared to baseline, there is a risk of buyback.

Having said this, in the first long term capacity auctions run at St. Fergus in January 2003, despite the lack of long term signals, shippers provided a clear signal of their appetite for capacity even above the baseline level, with additional non-obligated capacity being sold in the winter quarters for 2004, 2005 and 2006. In addition at St. Fergus, it was also clear that shippers continued to book up to baseline capacity all year round in the shorter term auctions. Given the fact that there is more than enough gas and infrastructure offshore to deliver gas up to and over baseline capacity, it was clear that the risk of needing to buyback capacity during the majority of the year when the baseline capacity could not be delivered was very significant. On this basis the decision was taken to proceed with the investment to reduce the risk of significant buybacks.

The only alternative to investment would have been to seek to enter into Capacity Management Agreements with shippers. However, the volume of capacity that we would have needed to buy back on each day would have far exceeded even the greatest depth of the forwards market that we had seen. Given insufficient depth and liquidity in the market, at the time that the investment decision was made, we had no confidence that we would have even been able to secure sufficient depth of tender offers from shippers to manage the constraint risk, let alone achieve costs for buying back capacity which would have been any less expensive that buying back capacity on the day. In addition, by entering the market to buyback huge volumes of capacity for each day we would have clearly signalled to the market that we had a deficit of capability at St. Fergus, increasing the probability of incurring significant buyback costs into the future.

(c) **Overestimate of buyback costs** – Ofgem state their view that we were overly pessimistic in forecasting the potential buyback cost in justifying the investment. This statement is at odds with the facts as discussed above.

Ofgem suggest that they are not convinced that significant buyback costs were avoided by the investment. In terms of whether a large volume of buybacks would have been required, the facts are clear – shippers have held capacity equal to the baseline level, and therefore any physical constraint would have presented the opportunity for them to exploit the situation for profit. If Ofgem are suggesting that this would not have happened, we would suggest that this reflects a rather naïve view of the behaviour a rational profit seeking shipper, and represents speculative wishful thinking. Recent experience has demonstrated that shippers realise the potential for profit from

buyback due to a physical constraint very quickly, and take advantage of it.

In terms of the cost of buybacks, recent experience shows that the costs used to justify the investment were extremely conservative. The potential saving in **annual** buyback cost quoted in the sanction paper for the Aberdeen-Lochside project was £17m, at an average buyback costs of 0.20p/kWh. During the constraint in July 2006, the average buyback costs was 1.14p/kWh, almost **six times** the costs used in the Aberdeen-Lochside sanction paper, resulting in buybacks costs of up to £10m per day. We fail to see how Ofgem can possibly make a case that we were overly pessimistic in the sanction paper – if anything, real events have shown that the buyback cost would actually be far higher as the shippers realise the value of the constraint.

(d) No strong evidence to suggest that flows at St. Fergus could increase in the foreseeable future – this statement is irrelevant to the validity of the investment on two counts:

(i) The investment was not made to increase winter/baseline capacity, but to enable the physical provision of capacity up to the baseline in summer periods. The need to invest in order to do this was driven by Ofgem's decision at the last Price Review to set baselines which exceeded the physical capability of the assets, especially during the summer, exposing the NTS and consumers at large to the risk of high buyback costs.

150 Current information on likely entry cannot be relevant in considering the efficiency of a decision made four years ago. Ofgem should confine their judgement on the efficiency of investment decision at the time, rather than bringing in their current view of gas entry, which is biased towards a view of low St. Fergus flows as evidenced in their proposed future allowances.

151 To summarise this issue:

(a) In 2002, Ofgem set up a regime obliging us to offer a baseline level of capacity at St. Fergus which was in excess of the physical capability for all but the very peak demand time of the year, and allowed a significant amount of funding to allow us to build physical capacity to provide off-peak flexibility;

(b) We invested in physical capacity at St. Fergus in the light of ongoing purchases of capacity, with users having more than enough capability to deliver against those rights, leaving a significant risk of buyback;

(c) Actual evidence of buyback costs from July 2006 shows that our assessment of the potential buyback cost in justifying the investment was extremely conservative;

(d) Ofgem are employing "hindsight regulation" to judge, based on a poor understanding of the incentives and obligations which they have

placed on us, and the reaction of market participants to opportunities to profit from physical constraints.

152 Ofgem's approach in this matter is entirely unacceptable. Whilst licensees accept the potential for investment to be stranded if it is inefficient, their conduct in this matter shows that they are biased towards seeking to disallow investment, and are not inclined to take a reasonable view that a licensee, given the regulatory and market circumstances facing it, has acted in good faith in investing. This presents a new risk, which is not reflected in the rate o return of either National Grid, or indeed any other licences – the risk that investment made in good faith, based on the information available at the time, will be deemed to be inefficient on the basis of regulatory bias, or that Ofgem introduce incentives and obligations which they themselves do not understand sufficiently to make an informed, reasonable judgement.

153 What Ofgem also seem to fail to be able to understand is that the options that we have when faced with a decision to either invest or wait and see if a constraint will occur are mutually exclusive. By choosing to invest to remove the physical constraint, the buybacks costs never actually materialise – Ofgem seem to use this as evidence that the buyback risk was overestimated. However, surely they must recognise that it is not possible to say that the investment has not added value, as they cannot tell what the buyback would have been had we not invested.

154 We firmly believe that the purchases of capacity and the ability to deliver against them provide clear evidence of the potential risk of substantial buyback. Given Ofgem's stance on this, we are in little doubt that had we chosen not to invest, and shippers had noticed the physical constraint leading to substantial buybacks, possibly in the hundreds of millions of pounds, Ofgem would have then taken the view that we should have known that this was a risk, and therefore should have invested, and had not acted economically and efficiently in simply waiting to see if the buyback materialised!

155 Effectively, we believe that Ofgem have placed us in a "lose-lose" situation with respect to the gas entry regime – in considering investment in the future we will be faced with the conundrum that, if we choose to invest, Ofgem will say we should have waited and taken the buyback, and if we choose not to invest and significant buyback costs accrue, Ofgem will say we should have invested. Given Ofgem's desire to also introduce buyback incentives with high downside and no upside, the whole regime appears to have shifted to one where the risks are clearly not commensurate with even the high end of Ofgem's range of potential rates of return, unless Ofgem are going to play some part in the ex-ante investment decision themselves.

Procurement efficiency and above inflation cost increases

156 On above inflation cost increases, whilst Ofgem appear to have recognised the validity of our claim that many of the costs associated with investment in the transmission systems are increasing at a rate which is above general inflation, this has had little effect on the baseline allowances. This is because there is very little investment remaining in the baseline allowances which is not already either in progress, or at least sanctioned, such that cost forecasts

are firmer and the expenditure at the front end of the period, and less subject to the above inflation rises that have most impact by the end of the period.

157 However, it is clearly important that, having recognised the validity of the issue, an allowance for above inflation cost increases is included in the unit cost allowances for projects which will be remunerated through a revenue driver.

158 For non-load related expenditure Ofgem have not made any allowance for above inflation cost increases. Whilst we acknowledge that this is because we have not identified suitable indices to reflect the costs of non-load related works, this does not mean that they are not subject to the same above inflation cost drivers that effect electricity transmission works or gas transmission load related projects. Ofgem should, therefore, recognise that these pressures will apply to all investment, and should allow some estimate of above inflation cost rises for non-load related works.

159 In respect of the across the board 5% real reduction in unit costs presented in the name of a procurement efficiency, as we discussed in our response to Initial Proposals, Ofgem's case, seemingly based on a report from Deloitte, is extremely weak, and Ofgem have not offered any further justification for this since the publication of Initial Proposals. Further, as we discussed in our response to Initial Proposals, Deloitte's analysis only focussed on electricity transmission, and so there is no validity in Ofgem applying the proposed procurement efficiency to gas transmission.

160 It should not be mis-understood that achieving a 5% real reduction in costs would be a remarkable proposition. Whilst some organisations identify procurement efficiencies that they have achieved which may appear to be of a larger magnitude to those proposed by Ofgem, these savings are not generally measured in real terms, but are instead measured against hypothetical baselines, budgets and forecasts, and are not in comparable industries.

161 However, we welcome Ofgem's recognition of the inappropriateness of applying a procurement efficiency from 2005/06, delaying the application until 2007/08, but we are deeply disappointed that Ofgem have not also recognised that time is required to achieve efficiency reductions and that these do not result in step-changes, but are achieved progressively over a period of time. **It is simply unrealistic, and completely unreflective of the market conditions in which we are operating, for Ofgem to assume that we can achieve a real reduction in capital costs of 5% from the start of 2007/08, which is just a few months away.** We continue to believe that, if a given level of real reduction in costs could be achieved over the Price Control period, this would be phased evenly across the period.

162 In addition, on the same basis that Ofgem have not included an allowance for above inflation cost indices for baseline load related projects (i.e. that the projects are well progressed) Ofgem should also recognise that it is not possible to achieve the procurement efficiencies on these projects – at present Ofgem propose a procurement efficiency of £13m on the pipeline projects deemed to be in the baseline allowance, which is unachievable.

163 As for electricity transmission, we welcome Ofgem's recognition of the invalidity of applying a procurement efficiency from 2005/06, delaying the application of the procurement efficiency until 2007/08. However, Ofgem appear to have applied this incorrectly, actually **increasing** the procurement efficiency on non-load related expenditure by £1m despite there being a net reduction in the allowance in this category.

Non-load related expenditure

164 This section of our response provides comments on non-load related expenditure, covering three main issues:

(a) gross overestimation of potential "cost savings" from compressor relocation;

(b) expenditure to replace compressors in order to meet emissions legislation;

(c) expenditure to replace and overhaul assets at gas compressors.

165 For asset replacement expenditure, emissions expenditure and the potential cost savings from relocation of assets, Ofgem's proposed allowances are entirely based on a limited set of planning scenarios that may not reflect the full range of flows and circumstances that the gas transmission system is required to accommodate. In many ways Ofgem's approach to this expenditure is similar to their approach on the St. Fergus investment – essentially Ofgem are stating a view that we should not invest for scenarios which differ from Ofgem's view. Both the proposed stranding of investment, and the reduction of allowances to maintain the capability of the existing compressor fleet represent a major disincentive for us to invest to ensure that the network is flexible to a range of scenarios, and that National Grid and consumers alike are not exposed to high buyback costs.

166 Fundamentally, Ofgem's view is based entirely on a limited number of planning scenarios which were developed to provide an "envelope" of potential flow patterns for the purposes of ensuring that capital investment planning was robust to a range of flows. As significant capacity is already in place to cater for flows from the northern terminals, it was not necessary to include such a scenario in the capital planning studies. These scenarios show low forecast running hours for a number of compressor sites, but this does not take into account the highly plausible scenario of continued high imports into St. Fergus and Teeside, nor do they take into account real operational circumstances such as compressor outages.

167 We believe that Ofgem have adopted an extreme view, which is not robust to flows which differ from those that Ofgem believe will occur. We believe that this is extremely imprudent in light of the significant uncertainty over future flow patterns. This approach has lead to Ofgem proposing reduced allowances in the three main areas identified at the start of this section.

168 Firstly, Ofgem have estimated **potential "cost savings"** as a result of relocation of compressor assets from sites which Ofgem believe would no longer be required under their flow scenarios, and so could be

decommissioned. At present Ofgem have removed some £30m of expenditure on the basis that these decommissioned assets can be used at other sites, reducing the need for purchase of new equipment. Not only does this allow absolutely no contingency in **our** allowances for **their** forecast to be wrong, but it grossly overestimates the potential savings.

169 We have estimated that, even if the flows turn out to be exactly in line with Ofgem's forecasts, which is itself very unlikely, such that we can decommission all of the sites which Ofgem believe are not required, a very generous estimate of the absolute maximum saving that could be achieved would be up to £10m, and almost certainly more like £5m. This does not take into account the higher operational costs that would be incurred relative to the installation of a new electric drive. These savings are therefore, totally unjustified, and again result in a systematic under-funding of the volume of work that Ofgem believe is required, such that even if we delivered that work we would be forced to overspend the Price Control allowances and earn a rate of return even lower than the stated allowed return.

170 Secondly, on the basis of the flow scenarios, Ofgem have reduced allowances for **emissions expenditure.** With regard to works at Warrington (installation of low emission compressor to meet emission legislation and replacement of protection and control system, total cost approximately £30m), we identified that the long term need for this compressor would be confirmed if sufficient bids for capacity were received at Fleetwood in the September actions. We acknowledge that Updated Proposals were finalised prior to the completion of these auctions, and hence Ofgem did not include this expenditure. However, the auctions have now closed, and a shipper has purchased a large amount of incremental capacity at Fleetwood, which secures the long term need for compression at Warrington. Given the confirmed long term need for compression at this site, we will have to invest in:

(a) low emission compression at Warrington in order to comply with emission legislation, and to receive a licence to operate the compressor from the Environment Agency (cost approximately £26m)

(b) replacement of the obsolete and unreliable protection and control system to ensure continued safe operation of the site (cost approximately £3.2m)

171 We trust that, given the confirmed long term need for the site, Ofgem will reflect this in Final Proposals.

172 However, we are disappointed that Ofgem have not discussed the treatment of expenditure at Moffat, or potentially a different site, if we are required to invest in order to meet emissions legislation. We continue to believe that there is a high likelihood that we will need to invest in at least one further site for emissions reduction during the next Price Control period, even if not at Moffat. We have proposed that the need for such expenditure potentially be treated as a revenue driver. Equally, expenditure could simply be "logged up", and included in the RAV at the next Price Review. However, as such expenditure would be driven by legislation, with potential enforcement action from the EA and their counterparts in Scotland, SEPA, we would expect that in this case, the expenditure would be treated as "pot 3" expenditure (i.e. with full recovery of foregone return and depreciation), as there is no justification

for why we should be financially penalised simply for meeting legislative requirements.

173 Thirdly, Ofgem have reduced allowances for **replacement of assets and overhaul of compressors** on the basis of their flow scenarios. As discussed above, we continue to believe that this is an extremely imprudent approach, and will result in reduced flexibility of the network to accommodate the range of possible, and indeed probable, flows. However, given Ofgem's apparent unwillingness to be persuaded on this issue, we believe that Ofgem should clearly state to the industry the basis for the allowances and their expectation of future flows i.e. that flows from the northern terminals (St. Fergus and Teeside) will continue to decline and that network capacity to accommodate these flows is no longer required, and that they are satisfied that the network does not need to be flexible to accommodate scenarios with high flows from these terminals.

174 Further to ensure that our allowances are fully aligned with our obligations to offer baseline capacities at the northern terminals, the baselines for these terminals **must** be based on a network which does not include the compressors that Ofgem believe are not required, which would lead to reduced baselines. If funding is not provided but baselines are maintained or even increased, Ofgem would be failing in their statutory duty to provide sufficient funding to enable us to meet our obligations, and both National Grid and consumers would be unduly exposed to high buyback costs.

175 If Ofgem fail to align our obligations with the allowances, and Ofgem's view turns out to be wrong, leading to us being forced to invest during the Price Control period to maintain compression facilities at these sites, we should not face any financial penalty for being forced into that investment. Any expenditure on our part on compressors excluded by Ofgem from our allowance should be in "pot 3" – i.e. we should get full foregone return and depreciation at the start of the next Price Review. Any other treatment for such expenditure would be an unnecessary and unwarranted penalty on National Grid, and another factor driving a need for a rate of return significantly higher than that currently on offer.

Load related expenditure

176 We welcome Ofgem's acknowledgement of higher forecast costs on the Milford Haven and Easington projects as being efficient. With the acknowledgement of these costs, we believe that all issues on new gas entry projects to provide baseline capacity have been satisfactorily resolved.

177 However, we continue to be extremely concerned with Ofgem's proposed treatment of exit projects which are currently being built or are under development, in particular Wormington-Sapperton and the projects related to Langage and Marchwood. Ofgem continue to be determined to remunerate all exit related expenditure through revenue drivers, even where clear signals from users have been received through the agreement of an ARCA, as is the case with the works for the Langage project. We can see no logical reason why, when a Price Control Review is in progress, these should not be included in the TO baseline allowance.

178 Of even more concern is the level of revenue driver that Ofgem propose to set for these projects, and the manner in which the revenue drivers would provide funding. All of these projects are either in the process of being contracted or are in delivery, and therefore actual latest project cost information is available. This information was shared with Ofgem's consultants TPA earlier in the year, who generally found the latest costs of these projects to be appropriate and efficient.

179 However, Ofgem have now engaged another consultant, Penspen, to assess project costs. Penspen have carried out a short desktop study, involving no consultation with National Grid (in contrast to TPA who carried out a 5 month review of our projects and expenditure, asking almost 200 questions, attending nine detailed capex workshops and carrying out a number of site visits). Penspen's analysis forecasts costs for these projects which are significantly lower than the current expected costs of the projects. Ofgem currently propose to base the revenue drivers on Penspen's lower forecasts.

180 We can see absolutely no justification for Ofgem choosing figures based on Penspen's limited desktop study over our own evidence from contract costs, and over the significantly more detailed analysis of TPA, seemingly purely on the basis that Penspen's figures are lower. This is a totally unacceptable approach, and would result in a systematic under-funding of projects. This is particularly unacceptable on those projects currently in delivery, where it is already known that the costs exceed Penspen's figures.

181 Further, whilst Ofgem have recognised our concerns that the revenue drivers are lower than expected costs, they propose to deal with the issue **at the next Price Control review.** We do not understand how Ofgem can possibly justify knowingly under-funding our investment for five years, and we believe that this would breach their obligation to ensure we are funded for meeting our licence obligations. Again, this is another reason why Ofgem's proposals would result in us earning an actual rate of return significantly lower than that stated.

IV Answer to specific capex related questions

Question 7.1

Do you agree with our proposed incentives fro efficient capital expenditure, including a 25 per cent incentive rate?

182 Our response to this question is given in Appendix 3.

What do you think about our proposals to address significant capex under spend? In particular:

i) What action should we take if this happens?

ii) At what level should we trigger this response?

iii) Should this response apply to load related and non load related capex?

183 Our response to this question is given in Appendix 3.

Question 11.2

Do you agree with our proposal not to apply the DPCR approach to transmission undergrounding?

184 We agree with the proposal not to apply the DPCR approach to transmission undergrounding.

185 We acknowledge that undergrounding can result in improvements to visual amenity for some people. It remains our policy to seek to retain existing overhead lines in position unless relocation or undergrounding will directly facilitate a major development identified as of national significance by central government.

186 Similarly when it is necessary to construct new transmission circuits our preferred option is to do this with overhead lines. We believe that our design guidelines and Schedule 9 commitments, combined with the consent process for new overhead lines provide suitable controls on the acceptability of system developments.

187 We seek to make the impact of its infrastructure on the environment as small as it reasonably can, and has investigated less visually intrusive designs for overhead lines. Such environmentally driven R&D activity is limited under our current R&D programme as projects to promote environmental studies beyond a regulatory requirement are inevitably prioritised below those delivering short term business benefit, despite having the potential for avoiding the need for installing some underground cable in the future.

Do you have views upon how we may best factor this in to our decisions?

188 Decisions on the detailed design of a proposed modification to the transmission system are always taken with regard to the impact of the equipment on the local areas. Investigations are always made into the particular circumstances and where it is necessary to replace (a section of) overhead line with underground cable, or to install underground cable rather than overhead line, we would expect such expenditure to be allowed by Ofgem.

189 Unless it is clear that underground cable must be used (for example in city centres, or to replace existing underground cable) we will continue to plan for overhead line connections.