MARKETS

SUSTAINABILITY

BUSINESS PLANNING

CHANGE MANAGEMENT

RESOURCE PLANNING

INNOVATION

PA Energy
Frederick Sanger Road
urrey Research Park
uildford, Surrey
U2 7YD, UK
ww.ppaenergy.co.uk
l: +44 (0)1483 544944
x: +44 (0)1483 544955

PPA energy

Planning Energy
for a Sustainable World

Technical Support for the Transmission Price Control Review 4 (TPCR4) Rollover

SO Capex – Electricity and Gas

Submitted to: Ofgem

Date: June 2011

Abbreviations

BM	Balancing Mechanism
Capex	Capital Expenditure
CCGT	Combined Cycle Gas Turbine
CNI	Critical National Infrastructure
EMR	Electricity Market Reform
EMS	Energy Management Systems
ESO	Electricity System Operator
FBPQ	Forecast Business Plan Questionnaire
FTE	Full Time Employees
GSO	Gas System Operator
GTO	Gas Transmission Operator
iEMS	Integrated Energy Management System
iGMS	Integrated Gas Management System
LNG	Liquefied Natural Gas
NG	National Grid
NetSip	Network Simulation Programme
NGET	National Grid Electricity Transmission
NGG	National Grid Gas
OLTA	Off-Line Transmission Analysis
Opex	Operational Expenditure
RAB	Regulatory Asset Base
RIIO	Revenue = Incentives + Innovations + Outputs

SO	System Operator
TO	Transmission Owner
TOGA	Transmission Outage Generation Availability
TPCR	Transmission Price Control Review
UKCS	United Kingdom Continental Shelf

Executive Summary

PPA Energy has been retained by Ofgem to provide support in assessing the capital expenditure programmes of the electricity and gas System Operators in 2012/13. This results from the decision to extend the current fourth Transmission Price Control Review for a further year.

The key activities of the project have been to review and question the SO Capex plans submitted by National Grid, to identify efficiency savings where possible, and to assess the reasonableness of the allowances being proposed.

This has been undertaken by:

- Reviewing business plans, presentations and other documents relating to SO Capex programmes;
- Undertaking a visit to National Grid offices for detailed discussion and questioning;
- Submitting further written questions to National Grid;
- Considering and analysing the available material; and
- Taking account of comments received from National Grid in June on the draft report issued by PPA Energy in April.

The expected outturn expenditure over the TPCR4 period has also been reviewed.

PPA Energy's overall conclusion is that there is scope for a significant reduction in the programmes put forward by National Grid, so that their scale is more realisable and there is less risk. The main reasons for coming to this view are as follows:

- National Grid's plans result in a significant peak of expenditure in 2012/13. PPA Energy doubts the deliverability of this, taking account of the proposed staff levels, and believes that it introduces considerable risk in the operation of real-time activities.
- Many requirements are, as yet, unclear and may change as, for example, the Electricity Market Reform process moves forwards. Many projects are linked to meeting the needs of decarbonisation and renewable development but the future plant mix and the methods of managing intermittency are far from clear. This means that work initiated now, even enabling activity, is likely to be subject to costly amendments. Business process definitions should come first.

[redacted]

[redacted]

- Very few of the proposed projects have reached the stage of formal sanction and although some have an initial mandate they are not sufficiently worked up to justify commitment to major expenditure at this stage.

For these reasons PPA Energy proposes that project commitments are reduced during the rollover year and more effort is focused on researching future requirements and options.

In the following sections National Grid's plans for SO Capex for both electricity and gas in the rollover year, 2012/13, are reviewed and revised programmes suggested. These consist of a base case allowance with minimum and maximum alternatives in order to provide a range. In PPA Energy's view the base cases provide central estimates of reasonable, required and deliverable sets of programmes for electricity and gas and therefore represent PPA Energy's recommendation. These are significantly lower than the plans put forward by National Grid as shown in Table 0-1: NG Base Case Proposed Allowances 2012/13 below.

Table 0-1: NG Base Case Proposed Allowances 2012/13

2012/13 NG SO Capex (£m)		
Electricity		
NGET 2012/13 Plan	Proposed allowance	
£42.0	£25.3	
Gas		
	NGG 2012/13 Plan	Proposed allowance
Exit reform (195AV)	£2.4	£2.4
xoserve capex	£11.7	£7.9
General allowance	£31.0	£18.0
TOTAL	£45.2	£28.3

Table 0-2: Range of Proposed Allowances 2012/13 below provides ranges of proposed allowances and indicates maximum and minimum figures for the proposed programme.

Table 0-2: Range of Proposed Allowances 2012/13

2012/13 NGET SO Capex (£m)			
NGET 2012/13 Plan	Proposed allowance range		
	Minimum	Base	Maximum
£42.0	£19.7	£25.3	£32.5

2012/13 NGG SO Capex (£m)				
	NGG 2012/13 plan	Proposed allowance range		
		Minimum	Base	Maximum
Exit reform (195AV)	£2.4	£2.4	£2.4	£2.4
xoserve capex	£11.7	£7.0	£7.9	£9.0
General allowance	£31.0	£12.6	£18.0	£21.4
TOTAL	£45.2	£22.0	£28.3	£32.8

Note: Exit reform expenditure is separately funded

Regarding electricity, PPA Energy's review of expected expenditure for the TPCR4 period concluded that the outturn would be excessive at £90.1 million against an original allowance of £47 million. This was, in part, due to delays and extra expenditure on approved projects, but also what is described as 'anticipatory' expenditure on projects and needs that are, as yet, not fully developed. There is also significant expenditure proposed on work that is described as necessary to maintain asset health, which was not part of the TPCR4 proposal. [redacted]. PPA Energy has questioned the efficiency of some of this expenditure and what should be included in the Regulatory Asset Base (RAB), which should be reviewed towards the end of the period.

For gas, in the TPCR4 period, National Grid's gas SO Capex expected outturn (£52.9 million) is broadly in line with allowances (£55.8 million). However, the programme is heavily skewed towards the end of the TPCR4 period, and the expenditure planned for 2010/11 has significantly under-spent. There is a risk that in attempting to mitigate this and to achieve the previously planned level of expenditure within the period that inefficiencies could emerge and the costs of projects could be higher than they need to

be. In these circumstances it is suggested that an assessment of the efficiency of the gas SO Capex spend (including xoserve) for the 2007/08 to 2011/12 period is delayed until closer to the end of the period so that full information is available and is undertaken as part of RIIO-T1.

1 Background

National Grid (NG) is the Transmission Owner (TO) for Electricity for England & Wales and for Gas for the United Kingdom. In addition to this, National Grid is also the System Operator (SO) for the United Kingdom for both gas and electricity. The current price review period for NG as TO and SO ends in 2012. Ofgem is undertaking an extension of the current fourth Transmission Price Control Review for one year ("TPCR4 Rollover").

The SO is concerned with balancing the system and managing its secure and efficient operation such that reasonable demands for electricity and gas can be met. Given this balancing function, NG has capital items (referred to as SO Internal Capex) which allow it to perform these tasks. The items include mainly information and telecommunication systems to manage system operation

In accordance with the rollover process, Ofgem has been reviewing the proposed SO Capex allowances and the requests made by NG in respect of such allowances for that year (i.e. 2012/13) and has sought to appoint technical consultants to support them in setting such allowances for the year.

PPA Energy was retained by Ofgem to provide this support. The contract started on the 9th February 2011.

The key deliverables consist of the following:

- To comprehensively review the Forecast Business Plan Questionnaire (FBPQ) SO Capex submitted by NG and raise appropriate questions for both Gas and Electricity;
- To assess the reasonableness of the allowances being proposed and where possible identify efficiency savings;
- To conduct a site visit, accompanied by Ofgem staff, to NG. This will include attending a presentation by NG with following Q&A session;
- To prepare follow up questions as needed;
- To challenge, where reasonable, the business case being put forward by NG. This may include at least 1 subsequent follow up meeting with NG; and
- To prepare a report which provides Ofgem with recommendations for allowances for SO Capex for 2012/13.

This report represents the final deliverable of the project.

2 Approach

At the start of this project PPA Energy was provided with a number of documents that covered the correct position in regard to SO Capex allowances for the rollover and adjacent years. This included the following:

- Completed FBPQs (Forecast Business Plan Questionnaire) provided by NG for both the electricity and gas TOs in respect of the rollover review (which included NG's plans for SO Capex in 2012/13 and adjacent years);
- The narratives provided by NG which supported the FBPQs;
- Slide presentations provided by NG on SO Capex plans; and
- NG's responses to questions that had been put to them by Ofgem regarding their plans in this area.

The initial task was to review this documentation.

A visit to NG was undertaken by a joint PPA Energy/Ofgem team. Following the visit a number of questions were prepared by PPA Energy and submitted to Ofgem in order to gain some additional understanding of the proposals. Answers were subsequently provided by NG, after which the sequence of events was as follows:

- On the 23rd February 2011 PPA Energy provided initials findings in regard to this work.
- On the 11th March 2011 PPA Energy provided its initial views on the range of allowances for SO Capex for electricity and gas for 2012/13.
- A report was subsequently produced in April, which was published by Ofgem in redacted form in early May.
- National Grid provided a response to the un-redacted report in early June.

This report, which is the final deliverable for this project, takes account of National Grid's comments. It is arranged as follows:

- Section 3 reviews a number of aspects of the strategic approach that NG has adopted;
- Section 4 examines the position for the electricity SO;
- Section 5 examines the position for the gas SO; and

- Section 6 contains a summary and conclusions.

3 Overview of National Grid's Strategic Approach

3.1 IT "Refresh" Policy

The National Grid Electricity Transmission (NGET) narrative, in support of its proposals for the 2012/13 rollover year, states in paragraph 358 regarding the management of its IT control infrastructure that:

> "We continue to plan to refresh IT systems every four to seven years as discussed in the TPCR4 review, however factors are driving these refreshes towards the shorter end of this scale and a policy of wholesale replacement".

NG responded to PPA Energy questioning on this topic indicating that the policy factored into their FPBQ plans was to "refresh our critical operations every five years and other systems every six years". It was also indicated that extended support was utilised where possible (although it was not clear that this had been fully taken account of in NG's plans), and that the impact of IT system changes on network system security was minimal as a result of the testing and implementation practices adopted.

NG apparent policies and their response to enquiries raise a number of questions.

Firstly, it seems to strongly contrast with the approach previously adopted, where systems that were installed during the 1980s and 1990s are still operational into the TPCR4 period.

Secondly, in PPA Energy's opinion, it has a number of serious disadvantages:

- It is costly and contributes to annual planned SO Capex expenditure two to three times greater than in earlier years;
- It introduces a high security risk during transition to new systems, particularly in a real-time environment and where multiple developments are being undertaken in parallel;
- It is difficult to anticipate the performance of new systems. For example, note the delay of 19 months incurred in upgrading the EMS;
- It will require a larger number of permanent, full-time staff to support the intensive programme of development; and
- It will be very difficult to manage the extensive interaction between systems, particularly when works are delayed.

It is, of course, recognised that externally supplied software systems undergo frequent upgrades driven by a wide user population. However, contracts with National Grid should include provision for strategic spares and ongoing support for reasonable, and

potentially extendable, periods. This proposed strategy does not appear to be efficient in meeting consumer needs in terms of costs and security.

It is also recognised that certain types of hardware, such as PCs, laptops, distributed servers and graphics displays, have relatively short lives and therefore can be expected to be replaced every three to five years. However application software, which is nowadays a very large component of IT spend, still has a long life - in the range eight to twelve years. During this period, it should be expected that the supplier would deliver an ongoing programme of upgrades and improvements of both performance and functionality. Whilst accepting the need for integration and testing, this is not a "refresh" or "replacement" programme and should be part of the ongoing maintenance charge. Software suppliers of, for example, NGET's (and National Grid Gas's (NGG)) mission critical systems who are suggesting that application packages will need to be replaced in significantly shorter periods should be challenged and their suitability questioned.

Further application software development (for example BM and iEMS applications) are driven more by business requirements and less by technology capability. Therefore application packages refresh programmes tend to be incremental and evolutionary with only a major refresh occurring if there is a step change in the business processes that the application package supports. This could be driven by the Electricity Market Reform (EMR) process. However this can only be effectively taken forward when the proposed changes become clear (See Section 3.2 below).

3.2 User Requirements

It is normal practice for business processes to be defined first as a prerequisite to establishing the IT systems required to support them. There is an ongoing debate about Electricity Market Reform that is generally expected to result in significant changes to how the system is managed. PPA Energy believes that the form of this change should be established prior to embarking on what is described as 'anticipatory' scheme development. Thus, some of this work should be delayed until the results of the EMR debate become clearer and future business processes can be robustly and comprehensively defined. Failure to do this will result in extensive, expensive and time-consuming re-work.

3.3 Drivers

The SO Capex section of the NGET narrative supporting the "rollover" FBPQ summarises some key messages (page 88). In particular it notes that de-carbonisation "of energy production and related changes to the generation market and transmission network will create a far more complex environment for system operation." It is also stated that such decarbonisation will result in "an increase in the scale and volatility of power flows on the system". Related assertions are made in relation to the gas transmission system by NGG. These comments are presumably based on expected wind generation volatility. Very high levels of wind capacity are already being effectively managed in countries like Germany and Ireland. A prerequisite to

identifying what control and monitoring facilities may be needed is to establish how the system will be balanced. Options for doing this include:

- Contracted peaking capacity located close to the wind entry point;
- Exploiting the balancing capability of other systems with hydro through interconnection;
- Utilising demand side management controlled through smart meter systems;
- Interacting with existing and new storage systems;
- Curtailing wind energy output at times of system stress; and
- Regulating marginal generation.

In practice a mixture of approaches is likely to be used and these will influence the control requirement. PPA Energy believes that more time should be allowed to clarify how the system will develop before anticipating needs. For example it may prove desirable to improve the forecasting of wind energy output and to install automatic generation control as is widely used across Europe.

3.4 Synergy between electricity and gas

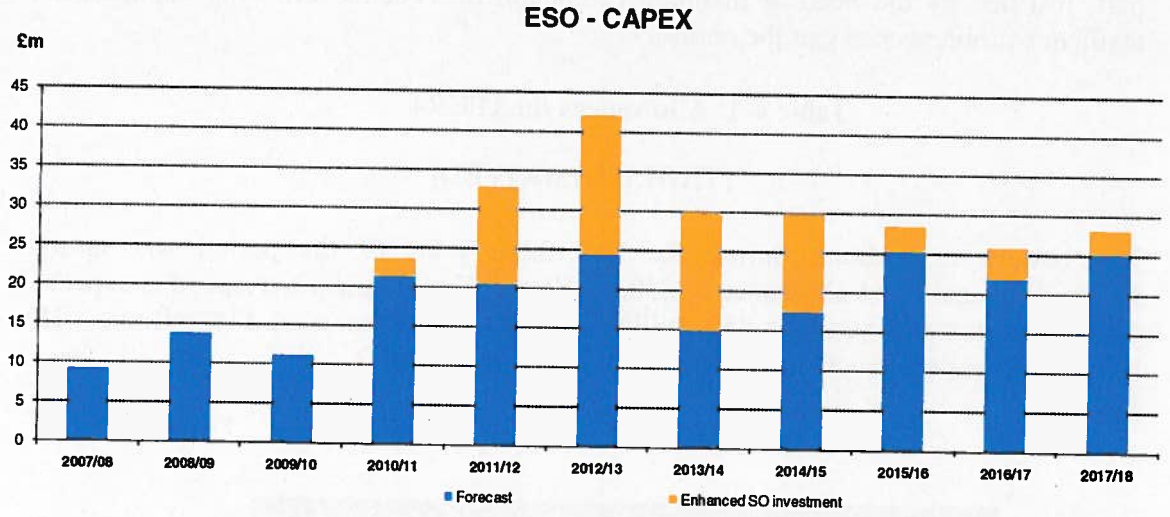
Now that NG manages the network for gas as well as electricity PPA Energy would have expected there to be more initiatives to save costs through the sharing of services and support arrangements. The narratives contained very little reference to how any such synergy between gas and electricity requirements would be exploited to realise savings.

4 Electricity: SO Capex

4.1 Introduction

NGET has proposed a significant increase in the SO Capex for the rollover year of 2012/13 and beyond. Historically expenditure has been around £10 million per year whereas for 2011/12 £32 million (in 2009/10 price – note all subsequent figures in this Section will be at this price level unless otherwise indicated) is proposed, rising to £42 million for 2012/13 as shown in Figure 4-1: Electricity SO Capex.

Figure 4-1: Electricity SO Capex



This is based on the need to maintain the health of IT systems critical to maintaining secure operation. It is also suggested that de-carbonisation will create a far more complex environment for system operation with an increase in the scale and volatility of power flows. The manner in which volatility will be managed is not yet defined but will have an impact on the design of supporting IT systems.

Much expenditure is proposed on new systems to meet fresh challenges under the heading of 'Anticipatory'. It is concerning that these anticipatory developments may not be in line with future requirements that will be influenced by the outcome of the EMR debate. Business processes should be defined before the supporting IT systems.

In addition, there are also concerns about the risks associated with carrying out such an ambitious programme of work in a real-time environment. These operational systems interact with each other making change difficult to manage. As reported in the NGET "rollover" narrative "the BM interfaces with over 30 other systems". It is to be noted

that systems are fully tested stand alone but difficulties can be perceived during commissioning associated with interaction with other live systems.

The business cases for a number of the proposed developments where significant expenditure in 2012/13 is planned do not appear to be fully established and very few projects have been sanctioned beyond the mandate stage. Understanding how benefits will result for consumers is a vital pre-requisite to endorsing allowances.

4.2 Expected SO Capex expenditure in the TPCR4 (2007/08-2011/12) period

The original allowances for the TPCR4 period are shown in Table 4-1 and amount to £47 million for the five years in outturn prices. The latest forecast expenditure for the period (which is a mixture of actual and revised estimates for the latter years) is now expected to be £89.6 million, which is almost double the original allowance. This is, in part, justified by the need to maintain the health of systems following unanticipated resilience problems early in the period.

Table 4-1: Allowances for TPCR4

[TABLE REMOVED]

The outturn expenditure during the first three years of the period was around £33 million against an allowance of £30.5 million. The principal overspend is expected during the last two years at £55 million against an allowance of £16 million. The breakdown of the expected expenditure is shown in Table 4-2.

Table 4-2: TPCR4 Expected expenditure

Category	Table 2.12 - Totals £m
In progress critical	38.7
In progress other	13.1
Enhancements anticipatory	14.5
Enhancements critical	8.4
Other asset health	9.0
Non scheme	8.8
savings-	-2.9
Total	**89.6**

The NGET narrative (Para 351) refers to an expenditure of £47.1 million on critical applications (£38.7 million plus £8.4 million) against an allowance of £21 million for the EMS and BM, i.e. an overspend of £26 million. The footnote (page 92) refers to the accepted total overspend of £42 million including the £26 million outlined previously, plus £13 million enhancements, plus £3 million other. A more detailed

breakdown is shown in Table 4-3: TPCR4 Overspend based on mapping the schemes to the NGET FBPQ Table 2.12 figures and is discussed below.

Table 4-3: TPCR4 Overspend

[TABLE REMOVED]

- BM - The BM replacement project has a total [redacted] 2012/13 for asset replacement with [redacted] with the remainder of the project cost representing mainly internal staff costs.

- iEMS – The previous system was installed in 1993 and replaced after 11 years in 2004. It is therefore surprising that so much additional expenditure was necessary during TPCR4 (2007/8) on upgrades and enhancements that led to total replacement. It was reported that problems were encountered with testing, leading to a 19 month delay (para 359) with commissioning during 2009. The system failed factory and site tests, the project was underestimated and extra costs were incurred. This may be typical of what might be expected from the pursuit of a strategy of continuous upgrades or refreshes.

- OLTA – A new facility to replace the existing in-house developed system analysis package, ELLA, to support more complex network analysis. As well as an overspend in TPCR4 of [redacted] the plan is to spend a further [redacted] on super OLTA in 2011/12.

- Enhanced capability – Further IT developments are proposed, in advance of need, to ensure the availability of systems. In PPA Energy's view these requirements may change due to the impact of EMR. There is a proposed expenditure of £14.5 million, mainly during 2010/11 and 11/12. Principal items include 'Improved situation awareness', 'Electricity Transmission Access Review' and data centres.

- There is a large spend on data centres based on an external report that criticised the power supply, air conditioning, and building structure of existing facilities. Within the TPCR4 period it is proposed to spend [redacted] Currently these schemes only have approval for a feasibility study and it is questionable that the proposed expenditure can be effected in these timescales.

4.3 Efficiency of Expected SO Capex in the TPCR4 period

The objective of this assessment is to judge whether all the proposed expenditure in the TPCR4 period should be included in the RAB against which returns are allowed. PPA Energy has considered NGET's Capex performance in the TPCR4 period in terms of:

- the overall spend compared with the original allowances;
- the business processes that surrounded the initiation and operation of Capex projects; and
- limited information on project cost benefit analysis that was provided by NGET .

Planned expenditure was about £47 million whereas the expected outturn is some £90 million. Of 27 projects with planned expenditure during the TPCR4 period only 5 have the same internal reference number to those provided at the start of TPCR4 (suggesting a very significant reworking of the programme and making comparisons difficult). PPA Energy has attempted to relate the new project list to the original allowances to establish the excess expenditure on original planned work and identify how the expected total overspend of £42 million occurs as follows:

- In regard to the originally planned work, PPA Energy judges that the expected spend of £51 million exceeds the allowance of £41 million by £10.5 million.
- There is also excess expenditure of £2.9 million on the global capital allowance of £5.9 million now referred to as Non Scheme based work costing £8.8 million.
- The new anticipatory expenditure on enhanced SO capability adds a further £14.5 million.
- New asset health work related to what is described as critical assets adds a further £8.5 million.
- Other asset health new work and statutory work adds a further £8.6 million.
- [redacted].

NGET appears to be choosing to replace assets (i.e. IT hardware and software) every few years rather than realise a reasonable life cycle. The status of this strategy has been questioned and PPA Energy has not been provided with any explanation as to how it has been documented and approved. In the event that the approach is implemented it may be appropriate to consider whether higher levels of depreciation should be applied to the RAB (in view of the shorter lifetime of systems) which may lead to a different pattern of growth in the RAB than may previously have been expected.

Where NGET chooses to make anticipatory expenditure in advance of when facilities are fully needed then it could be argued that this does not provide immediate benefit to system users and thus should not be included in the RAB in advance of need.

It is noted that the EMS upgrade project incurred a 19 month delay (paragraph 359). It does not seem appropriate for the resulting additional costs incurred to be included in

the RAB. [redacted] and it is estimated that some 50% of this could be the result of delays. PPA Energy believes therefore that there is a case to:

- reduce the RAB carried forward into 2012/13 by £14.5 million on account of anticipatory work;
- reduce the RAB by [redacted]; and
- change the depreciation value on systems subject to frequent replacement.

With regard to the efficiency of the delivery process PPA Energy is satisfied that appropriate procedures were generally in place. However, it has been noted that some of the proposed works have very high costs. It was explained by NGET that these were based on competitive tenders for the main system but there is a significant provision for other input. For example the [redacted], based on a competitive tender, and additional information was sought on how the other services, [redacted]. It is now understood that the project cost outturn is expected to be [redacted]. This seems excessive for what is described as 'a standard package based product'. [redacted].

4.4 National Grid's SO Capex plan for 2012/13

The proposed expenditure for the rollover year of 2012/13 at £42 million is some four times historic annual expenditure and PPA Energy remains concerned that its delivery will add security risks. The following observations are made:

- IT systems should be designed to support the business processes but there is no evidence that these have been formulated for future years.
- A need is identified for 17 more full time equivalent staff to be recruited in order to release experienced people to support IT development capital works. This appears inadequate based on PPA Energy's previous analysis of the support required for capital programmes and it is also not clear where the staff will be accommodated.
- Given the number of projects occurring simultaneously and the proposed frequency of 'refreshes' there is a need for a technical overview to manage potential interactions between systems. PPA Energy has been advised that a process for this is in place for gas projects but not yet for electricity projects.

- The risks of using standard software integration platforms have not been fully evaluated with changes driven by a wider user base rather than the needs of NGET.

The main items making up the 2012/13 plan are shown in Table 4-4: NGET Proposed 2012/13 Capex.

Table 4-4: NGET Proposed 2012/13 Capex

[TABLE REMOVED]

The BM replacement project is already established with around half the expenditure committed during TPCR4. This project should be allowed to complete although a 5% reduction in the allowance is proposed to encourage more efficient delivery, given the lower project allocation included in TPCR4 (for project ISV9111).

The stability control system appears very speculative and there was no satisfactory explanation for the proposed works or its technical viability. The relationship to wind generation volatility is tenuous as this is likely to occur in dispatch timescales when automatic generation control may prove more valuable.

[redacted] A hardware replacement/refresh is scheduled to start in 2011/12 at an [redacted] Replacement appears premature given the previous system was only commissioned in 2009/10. In response to queries, NGET claim the hardware was chosen at project inception and is therefore dated. This appears to be a flawed approach with the supplier. [redacted]. There is a strong case for delaying these works until the outcome of the EMR becomes clear. In the light of comments from National Grid on the draft report it is recognised that the hardware is now dated as a result of previous problems. It is proposed that expenditure on the replacement hardware project is allowed, but scaled down by 5% representing an efficiency improvement. It is expected that the works during the rollover year will not pre-empt any changes in functionality that may be necessary as a result of EMR. Expenditure on the complete system replacement should be scaled down until the outcome of the EMR becomes clearer.

The expenditure on OLTA (ISCAP9123) during TPCR4 is [redacted] A second project (INVP 2476) estimates a total cost of [redacted]. The narrative (para 362 (d)) provides a breakdown of 'Other asset health' spend [redacted]. PPA Energy has queried with NGET what these projects cover and their relationship to each other. It is understood that the original OLTA project was to replace the in-house software ELLA with a standard package. Super OLTA enhances

the capability to do more studies (48) within the day to take account of wind variability [redacted] to cover hardware replacement. It is questionable what will be required to analyse the system until it is decided how wind variability will be managed. Also, it is doubtful whether control staff would be able to assimilate the results of so many studies in real-time. It is proposed to limit the super OLTA expenditure to further examination and research until the outcomes of EMR become clearer.

Expenditure on data centres continues through the rollover year. [redacted]. Options were considered but it is not clear that the proposal is the least cost and NG is reviewing their consultant's cost estimates. No time frame was imposed for rectification and the power-point outlining the consultant's cost assessment was dated June 2008, so apparently was not considered urgent. Currently only a feasibility study has been sanctioned. PPA Energy believes that other works could be given priority and proposes to scale down the expenditure on this project until the least cost option is established. In addition it should be noted that the study appeared to consider the situation at each site rather than considering the overall backup arrangements already in place.

4.5 Recommendations regarding National Grid's SO Capex plan for 2012/13

In evaluating the proposed project expenditure during 2012/13 a number of criteria have been applied in proposing allowances for the base case:

- Works sanctioned to the design phase are assumed to be progressed to completion with a 5% target cost reduction based on delivery efficiency improvements;
- Works with a mandate that have been in progress for several years are continued to completion;
- Works that have just started with less than 20% spend are delayed where they are not critical;
- Works due to start in 2012/13 are delayed pending clarification of need;
- Works not evidenced as being critical or not clearly defined are delayed;
- An allowance is made for ongoing evaluation and research where the need may be justified but influenced by EMR; and
- Non scheme based work allowance is reduced by 20% in the base case to align with previous expenditure.

These criteria have been broadly used to produce a central base case estimate of 2012/13 SO Capex together with potential maximum and minimum figures thus giving a range within which the allowance should be set.

The results of applying these criteria are summarised in Table 4-5: Proposed Allowance 2012/13 for the base case allowance together with the suggested range.

Table 4-5: Proposed Allowance 2012/13

2012/13 NGET SO Capex (£m)			
NGET 2012/13 Plan	Proposed allowance range		
	Minimum	Base	Maximum
£42.0	£19.7	£25.3	£32.5

It should be noted that the responses from NGET to questions show that four projects have no level of approval, eleven have reached the mandate or sanction at end of start-up stage, with only two relevant projects sanctioned up to the design stage (see table E6 of Appendix 1). Given the fact that many schemes are not fully worked up an aggressive approach has been taken in proposing allowances. There are three principal reasons for this:

- the proposed works should be based on updated business process definitions that take full account of the impact of EMR and these have not been developed;
- the volume of work proposed is several times that previously realised and PPA Energy has concerns that managing simultaneous changes in a number of interacting systems will introduce a security risk and may, in fact, not be delivered; and
- most of the projects are not fully sanctioned or established and the business cases are yet to be developed.

The base case allowance of £25.3 million for the year represents a 40% reduction on the NGET proposal of £42 million. The main reductions from the NGET plan proposed are shown in bold as follows:

- [redacted] – no clear case has been presented. A provision for further research has been allowed in the maximum case.
- [redacted] - scale back expenditure pending clarification of the impact of EMR.

- [redacted] – the need and benefit over and above that of OLTA has not been clearly established. An allowance for research has been retained.
- [redacted] from £1.0 million – this has not been approved and is not considered critical. An allowance for research has been retained.
- [redacted].
- [redacted] – this is not considered to be a critical requirement.
- Other asset health **£4.35 million reduction** from £5.35 million – [redacted] has been allowed but the other work is not considered a critical priority.
- [redacted].
- Non scheme based **£1.0 million reduction** from £4.6 million - during TPCR4 this allowance was set at around £1 million per year. The proposal for it to rise to £4.6 million per year should be justified by schemes and in the meantime it has been scaled back from £4.6 million to £3.6 million.

This is shown in detail in Table E3 of Appendix 1.

The principal additional reductions in the minimum allowance case are:

[redacted] More savings in BM replacement project through efficiencies [redacted]

[redacted] Further reduce iEMS replacement expenditure by [redacted]

[redacted] Reduced provision for property data centres pending scheme approval and cost review – further reduction of [redacted]

- No provision is made for other asset health – this is not considered a priority given the scale of other savings. [redacted].

- Further reduction in non-scheme provision of **£0.9 million** giving a total decrease of **£1.8 million**.

- Delay externally driven work saving **£0.8 million**.

These additional savings result in an allowance £5.6 million less than the base case at £19.7 million as shown in detail in table E4 of Appendix 1.

The proposed maximum case includes the following additional allowances:

- Allow all of BM replacement - [redacted].
- Allow all of EMS replacement – [redacted].
- Allow all of super OLTA - [redacted].
- Allow other critical operations - extra **£1.2 million**.
- Allow extra [redacted].
- Allow [redacted].
- [redacted].
- Allow extra [redacted] on other asset health.
- Allow most of non-scheme expenditure - extra **£0.7 million**.

These changes add some £7.3 million to the base case resulting in an allowance of £32.5 million as shown in detail in table E5 of Appendix 1.

The full range of the allowances is shown in table E7 of Appendix 1.

It is noted that savings are expected in development as a result of what is described as IS transformation. Where the allowances have been scaled down from NGET proposals PPA Energy has scaled down these savings on a pro-rata basis in each case.

The narrative suggests that savings will result from these developments. [redacted] Where this is the case then it is suggested that the costs and potential benefits should be included in a future incentive scheme.

5 Gas: SO Capex

5.1 Introduction

National Grid Gas (NGG) has proposed a significant increase in the SO Capex for the rollover year of 2012/13 and beyond. Historically, expenditure in this area has been much lower. In 2009/10 it was about £15 million (in 2009/10 prices – note all subsequent figures in this Section will be at this price level unless otherwise indicated) and in previous years was significantly lower than this, whereas for 2011/12, £34 million is proposed. This rises to £45 million (or £31.0 million excluding xoserve and exit reform) for 2012/13, as shown in Figure 5-1: Gas SO Capex. (Note that efficiency savings are shown as negatives)

[TABLE REMOVED]

Figure 5-1: Gas SO Capex

In the narrative that NGG has provided to support the figures shown in the rollover FBPQ it is argued that:

- changes in the sources of gas from the UKCS to increasingly LNG and other sources are leading to greater frequency of variation in the flow of gas, and greater system operation challenges;
- the use of CCGT power stations to balance the electricity system when there is a larger wind component will also lead to further and greater frequency of variation in the flow of gas and, again, greater system operation challenges; and
- the IT systems and other infrastructure supporting the gas SO are aging to the extent that they require imminent followed by regular refreshes or upgrades.

These arguments are used as a justification for the greatly increased gas SO Capex programme and the significant investment that is required over the next few years including the peak spend on the rollover year, 2012/13.

As with the electricity SO there are considerable concerns about the risks associated with carrying out such an ambitious programme of work in a real-time environment. Interactions between operational systems make change difficult to test and manage.

Again, as with electricity, the business cases for a number of the proposed developments where significant expenditure in 2012/13 is planned do not appear to be fully established and investment approval and sanction has rarely been fully achieved.

5.2 Expected SO Capex in the TPCR4 (2007/08-2011/12) period

Table 5-1 compares the expected outturn for the TPCR4 period (2007/08 to 2011/12) for the Gas SO Capex as provided by NGG in the rollover FBPQ (not including xoserve capex (to aid comparability) or expenditure on exit reform (which has a different funding mechanism)) with the original allowances.

Table 5-1: Gas SO Capex Allowances (excluding xoserve and exit reform) for TPCR4

2007/08 – 2011/12 GSO Capex allowances excluding xoserve at 2009/10 prices	£55.8 million
2007/08 – 2011/12 GSO Forecast actual capex excluding xoserve and exit reform at 2009/10 prices	£52.9 million

This indicates that the outturn is broadly in line with the allowances. However this outturn is dependent on relatively high levels of expenditure in 2010/11 and 2011/12, i.e. £15.1 million and £20.8 million respectively, and therefore is heavily back-loaded. These rates of expenditure are significantly higher than those achieved in earlier years and therefore there must be some risk that they will not be achieved.

In fact, as the end of 2010/11 was approaching, PPA Energy asked NGG to provide an update of the latest expected outturn for the year. This revealed that the spend is now expected to be some £5 million lower than previously forecast. NGG has not adjusted the latest 2010/11 expenditure for inflation as the year is not yet completed. This adjustment will slightly increase the under-spend.

NGG explained that some of the major reasons for the under-spend were as follows:

- Asset Health – Critical Operations (£1.3 million) – the planned spend has reduced due to:
  - the strategic review of the iGMS re-engineering project which has delayed spend; and
  - an ongoing review of options for CNI Data Centres.
- Other Asset Health (£0.7 million) – a re-phasing of the GTO Telemetry project workload has reduced current year spend.
- Business Capability (£0.6 million) – Total expenditure is £0.38 million, but this has been offset by reversal of over accruals of £0.4 million.

- Statutory / Market Driven (£0.6 million) – There have been no market driven changes to NGG systems in 2010/11.

- Non-Scheme Based (£0.5 million) – The under-spend in this area is largely due to continuing proof of concept issues for xoserve in the Gemini re-platforming project as outlined in paragraph 290 of the TPCR4 rollover narrative.

Whilst this is a useful description of what has occurred, it does not provide assurance that NGG will be able to successfully manage a programme of the scale put forward for 2012/13.

Table 5-2 compares the expected outturn for the TPCR4 period (2007/08 to 2011/12) for xoserve Capex as provided by NGG in the rollover FBPQ with the original allowances, as PPA Energy understands them. It suggests a significant under-spend as expenditure in the early years of the period seems to have been very low. The FBPQ indicates that larger expenditure in 2010/11 and 2011/12 - [redacted] – is expected and will, to some extent, redress the balance. However the latest forecast for the outturn for 2010/11 provided by NGG is £2.5 million (at 2010/11 prices) which continues the history of repeated under-spends.

Table 5-2: xoserve Capex Allowances for TPCR4

2007/08 – 2011/12 xoserve allowances at 2009/10 prices	£54.6 million
2007/08 – 2011/12 xoserve allowances (less operating costs) at 2009/10 prices	£28.6 million
2007/08 – 2011/12 xoserve Forecast actual capex at 2009/10 prices	£14.3 million

5.3 Efficiency of Expected SO Capex in the TPCR4 period

Table 5-3 compares PPA Energy's understanding of NGG's original plans for SO Capex for the period 2007/08 to 2011/12 as provided in business plans as part of the previous price control review (a total of £63.1 million at 2004/05 price levels), with the views of the TPA consultants who reviewed these plans at the time, (a total of £41.5 million at 2004/05 price levels) and the allowances as they were provided in the TPCR4 settlement (a total of £48.7 million at 2004/05 price levels of £55.8 million at 2009/10 price levels). Finally Table 5-3 shows the SO Capex for the period as included in the rollover FBPQ (note that for 2007/08 this only includes projects in flight in 2009/10).

Table 5-3: NGG SO Capex plans for TPCR4 and allowances

[TABLE REMOVED]

As previously mentioned this analysis indicates that the NGG expenditure on SO Capex (excluding xoserve and the separately funded exit reform work) is expected to be close to, but slightly less than, the original allowances.

PPA Energy did not undertake the TPCR4 analysis of this programme and so therefore carrying out a detailed project by project examination of the changes that have occurred is more difficult than with the electricity programme. In addition, in view of the expected scale of the programme in comparison with the allowances this examination is, arguably, not required. This suggests that the overall programme of work has been efficiently implemented and therefore the expenditure should be included in the RAB.

However it has also been previously noted that the programme is heavily skewed towards the end of the TPCR4 period, and the expenditure planned for 2010/11 as indicated in the rollover FBPQ has significantly under-spent. The discontinuities in the level of work could lead to inefficiencies in managing project delivery.

In these circumstances it is suggested that an assessment of the efficiency of the NGG SO Capex spend (including xoserve) for the 2007/08 to 2011/12 period is delayed until closer to the end of the period so that full information is available and that this is undertaken as part of RIIO-T1.

5.4 National Grid's SO Capex plan for 2012/13

As with electricity the proposed expenditure for the rollover year of 2012/13 is much higher than in earlier years. It amounts in total to some £45 million (including [redacted] million by xoserve and [redacted] on exit reform). This is a factor of several times historic annual expenditure and PPA Energy remains concerned with its deliverability and the risks and inefficiencies that attempting to deliver it will bring about. As with electricity, there are concerns regarding whether:

- the business processes that the systems developed with this expenditure are designed to support are fully understood;
- the staff resources required to undertake such a large programme can be identified and made available; and
- the risks of attempting to achieve the programme in a real-time 24 hours a day operation can be fully mitigated.

The main items making up the 2012/13 plan are shown in Table 5-4: NGG Proposed 2012/13 SO Capex.

Table 5-4: NGG Proposed 2012/13 SO Capex

[TABLE REMOVED]

5.5 Recommendations regarding National Grid's SO Capex plan for 2012/13

The same criteria as for electricity have been used to evaluate the proposed gas SO Capex project expenditure during 2012/13 in proposing allowances for the base case as follows:

- Works sanctioned to the design phase are assumed to be progressed to completion with a 5% target cost reduction;
- Works with a mandate that have been in progress for several years are continued to completion;
- Works that have just started with less than 20% spend are delayed where they are not critical;
- Works due to start in 2012/13 are delayed pending clarification of need;
- Works not evidenced as being critical or not clearly defined are delayed;
- An allowance is made for ongoing evaluation and research where the need may be justified but influenced by emerging but as yet undefined changes to the energy market; and
- Non scheme based work allowance is reduced by 20% in the base case to align with previous expenditure.

These criteria have been broadly used to produce a central base case estimate of 2012/13 SO Capex together with potential maximum and minimum figures thus giving a range within which the allowance should be set.

The results of applying these criteria are summarised in Table 5-5 for the base case allowance together with the suggested range.

Table 5-5: NGG Proposed Allowance 2012/13

2012/13 NGG SO Capex (£m)				
	NGG 2012/13 plan	Proposed allowance range		
		Minimum	Base	Maximum
Exit reform (195AV)	£2.4	£2.4	£2.4	£2.4
xoserve capex	£11.7	£7.0	£7.9	£9.0
General allowance	£31.0	£12.6	£18.0	£21.4
TOTAL	£45.2	£22.0	£28.3	£32.8

Note: Exit reform expenditure is separately funded

It should be noted that the responses from NGG to questions show that although some of the larger projects are fully or partially sanctioned, many others have no level of approval at all (see table G4 of Appendix 2). In one case the level of sanctioning has changed during the course of this project but this has not altered PPA Energy's recommendation regarding that project. Given the fact that so many schemes are not fully worked up an aggressive approach has been taken in proposing allowances. There are three principal reasons for this:

- the proposed works should be based on updated business process definitions that take full account of the impact of changes to the energy market and it is not clear that these have been developed;

- the volume of work proposed is several times that previously realised and PPA Energy has concerns that managing simultaneous changes in a number of interacting systems will introduce a security risk and may, in fact, not be delivered; and

- most of the projects are not fully sanctioned or established and the business cases are yet to be developed.

The base case allowance of £28 million for the year represents an approximate 40% reduction on the NGG proposal of £45 million. The main reductions from the NGG plan proposed are shown in bold as follows:

- iGMS Strategic Route Map [redacted] – no clear case has been presented. It is proposed that this project is delayed pending further progress with market developments, together with a clearer IT strategy. Some expenditure has been allowed for further research and planning.

[redacted]

- [redacted]

- xoserve: statutory/market driven **£3.0 reduction** from £3.4 million - expenditure on this topic is currently low. The requirements seem to be speculative and it is therefore proposed that the expenditure is scaled back.

This is shown in detail in Table G1 of Appendix 2.

The principal additional reductions in the minimum allowance case are:

- More savings mainly resulting from further efficiencies in the large, already approved programmes.

[redacted]

- [redacted]

- NetSip – [redacted]

[redacted] Gas Telemetry (IS Capex telemetry infrastructure refresh) – [redacted]

- xoserve – Further reduction in the expenditure where requirements and scope seem unclear. Additional reduction of **£0.6 million**.

These additional savings result in an allowance £6.3 million less than the base case at £22.0 million as shown in detail in table G2 of Appendix 2.

The proposed maximum case includes the following additional allowances:

[redacted]

- Allow more externally driven expenditure - **£0.6 million**.

- Allow extra preparatory expenditure on a range of projects - **£0.8 million**.

These changes add some £4.5 million to the base case resulting in an allowance of £32.8 million as shown in detail in table G3 of Appendix 2.

The full range of the allowances is shown in table G5 of Appendix 2.

It is noted that savings are expected in development as a result of what is described as IS transformation. Where the allowances have been scaled down from NGG proposals we have scaled down these savings on a pro-rata basis in each case.

6 Summary and Conclusions

In previous sections the NG plans for SO Capex for both electricity and gas in the rollover year, 2012/13, have been reviewed and revised programmes suggested. These consist of a base case allowance with minimum and maximum alternatives in order to provide a range. The base cases provide central estimates of reasonable, required and deliverable sets of programmes for electricity and gas and therefore represent PPA Energy's recommendation. These are significantly lower than the plans put forward by NG as shown below in Table 6-1: NG Base Case Proposed Allowances 2012/13.

Table 6-1: NG Base Case Proposed Allowances 2012/13

2012/13 NG SO Capex (£m)		
Electricity		
NGET 2012/13 Plan	**Proposed allowance**	
£42.0	**£25.3**	
Gas		
	NGG 2012/13 Plan	**Proposed allowance**
Exit reform (195AV)	**£2.4**	**£2.4**
xoserve capex	**£11.7**	**£7.9**
General allowance	**£31.0**	**£18.0**
TOTAL	**£45.2**	**£28.3**

The main reasons for the suggested reductions in the programmes are as follows:

- National Grid's plans result in a significant peak of expenditure in 2012/13. PPA Energy doubts the deliverability of this, taking account of the proposed staff levels, and believes that it introduces considerable risk in the operation of real-time activities.

- Many requirements are, as yet, unclear and may change as, for example, the Electricity Market Reform process moves forwards. Many projects are linked to meeting the needs of decarbonisation and renewable development but the future plant mix and the methods of managing intermittency are far from clear. This means that work initiated now, even enabling activity, is likely to be subject to costly amendments. Business process definitions should come first.

- National Grid's plans are based on an extreme IT strategy, and policies which involve hardware and software "refreshes" to their systems every few years. This is inconsistent with previous and normal industry practice for complex applications and will introduce added costs and risk in affecting transitions. PPA Energy would advocate a review of this strategy considering system life extension options.

- Very few of the proposed projects have reached the stage of formal sanction and although some have an initial mandate they are not sufficiently worked up to justify commitment to major expenditure at this stage.

Appendix 1 – Electricity

[REMOVED]

Appendix 2 – Gas

[REMOVED]