National Grid Transmission: TPCR4 Rollover Response to PPA Energy's review of SO capex

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Introduction

1. On the 5th May Ofgem issued an extension to the April rollover consultation deadline to submit responses on information contained within the PPA Energy report. This document supplements our response to Ofgem's April consultation submitted on the 13th May 2011. We welcome the opportunity to comment on the information contained within the PPA report.

Approach to this response

2. In reviewing the PPA Energy report we note recurring critiques spanning both the NGG and NGET forecasts. Whilst our response to these wider points focus on SO capex, as most of the concerns that Ofgem hold equally apply to non-operational capex, this response should also be considered with respect to this area of expenditure.

3. In our opinion PPA appear to have fundamental misunderstandings that are guiding their rollover year cost assessment. We recognise this means we have not successfully explained and demonstrated the justification for our IT strategies and necessary investments but there also appears to be an underlying desire to delay expenditure into the RIIO-T1 period. We understand that Ofgem want the assessment of costs in the rollover year to be proportionate to a one year control. With a finite amount of IT system access and a sequential delivery programme that aligns with operational needs any deferment of investment will cause deliverability and security risks to these essential programmes of investment. We believe that reducing and delaying the consumer and customer benefits of these programmes is not an optimal position and that the recommended allowances for this area should be reconsidered.

4. This response focuses on the three main areas where our proposals were not understood or lacked the level of detail required by Ofgem and PPA to approve our expenditure plans. This response looks to give greater clarity within these areas and address the concerns that were raised within the PPA report.

5. Through this response we will show that the proposed investments in 2012/13 and the wider programme are reasonable, required and deliverable. Where appropriate, we have also attached supporting procedures and documentation to further help demonstrate the robustness of our submission. The three areas of focus are:

    a) IT strategy and asset health policy
    b) Justification for enhanced capability investments
    c) Deliverability – including availability of resources and governance procedures

IT strategy and asset health policy

6. Maintaining the health of our IT assets is at the heart of our SO activities because resilient and reliable systems are critical to our ability to operate the transmission systems. This was apparent during the TPCR4 period where system concerns arose and the regulatory funding proved insufficient to cover the risks being managed. We have invested above regulatory allowances to maintain system capability and our Rollover submission takes the lessons learnt from this into account.

7. Through our asset health stewardship we balance the maintenance requirements for ageing systems, and the risks any delays would bring, with the options to refresh or replace the assets and the related operational impacts this produces. Where possible

we extend the length of support that suppliers provide for our hardware and software but there is a limit to the extent this can be performed. For example we managed to negotiate an extension to our Hewlett Packard support agreement for superdome servers used in our iGMS system meaning asset refresh was not required before 2013 and correspondingly not costing as much as it otherwise would have done.

8. Our plans for the rollover year are centred on asset health work. They incorporate this mindset, the recent performance of the systems and the potential windows for investment to maintain a deliverable plan over the longer term. Any assessment of the need for investment in 2012/13 has to take into consideration all these elements and there are areas where it seems the PPA report does not do this.

9. PPA's initial comments suggested that the historical additional critical operations expenditure on asset health in the period were as a result of 'an over reaction to system problems early on in the period which were quickly overcome'. We are concerned that these misconceptions have guided some of the views in relation to the efficiency of our IT refresh policy. This may be based on a historical view of the risks involved with ageing systems, rather than taking into account experiences in the TPCR4 period which were discussed with Ofgem extensively during the annual RRP process[1].

10. In the April rollover Initial Thinking consultation, Ofgem expressed concern that 'there is a lack of clarity regarding the overall IT strategy, and policies seem to adopt an approach to hardware and software 'refreshes' that seem inconsistent with normal practice for complex applications'. Reading the PPA report this seems to be based on confusion between planned asset refreshes (i.e. changing hardware such as servers and moving from say version 1 of a software package to version 1.1) and system replacements (where all elements of the system are changed and application software is altered from say Oracle to SAP). This can be shown where there are references in the report to iEMS refreshes in the TPCR4 period and 2014 as replacements.

11. The following section along with appendix B looks to address PPA's concerns surrounding the applicability of our IT refresh policy and its application for the iEMS, OLTA and Telemetry schemes specifically. It outlines the rationale behind the policy and how we balance the management of security risk, from replacing real time applications with the risk of relying on ageing systems whilst simultaneously being flexible enough to cope with evolving business capability requirements.

IT Asset Health Policy

Hardware and software refresh and replacement

12. Our approach to refreshing hardware and software considers safety, risk, value and cost. For clarity we define a refresh as the replacement of hardware with comparable, supportable hardware and / or an upgrade to a current (supported) version of system software and application software. Upgrading to a current version of software ensures the availability of maintenance and security patches, it may also bring increased system capability, but that will simply be a by product of the upgrade and not its primary purpose.

13. For many systems, such as iEMS[2], we are several versions of software behind the suppliers' recommended version as we take a risk assessed view of the need to upgrade. Vendors will focus their efforts on the most recent versions of their product. As a result their capability to maintain older versions will decrease with time and they are

[1] Appendix A includes the question responses in this area for the RRP and information which show the high levels of Priority 1 (P1) and P2 incidents we were experiencing at the start of the TPCR4 period

[2] See appendix B for more detail

also likely to charge premiums to provide support for older versions. We will therefore always seek to balance the operational risks of remaining on an older version against the costs of upgrading the software.

14. A full replacement differs from a refresh, in that the usual trigger for a full replacement of an IT system with a new system will be to develop new or changed business capabilities. The business requirements will have changed to an extent that it is not considered possible or cost effective to accommodate the new and changed requirements through changes to the existing system and the procurement of an entirely new system is considered the best option in terms of the business benefits delivered versus the cost. The business requirements that drive such a replacement may be functional (e.g. a new process has to be supported) or non-functional (e.g. a substantial increase in user numbers or transaction throughput). For clarity the only major IT replacement project we are forecasting expenditure on in 2012/13 is the replacement of the Balancing Mechanism.

IT refresh policy

15. For investment planning purposes, we plan to refresh (rather than replace) hardware and software after approximately 5 or 6 years to sustain the system at its designed level of reliability and availability. Our policy is in line with industry good practice; this has been confirmed by IBM and HP[3] and has been applied since before the start of TPCR4. We develop a release programme each year; this combines changes for asset refresh with business driven changes and enables us to minimise the number of changes in a period and to schedule system changes to avoid critical operational periods.

16. In planning the timing of our investments we also take into consideration windows of opportunity and interactions with other system developments. For the rollover year, planned investments for iEMS and iGMS are timed to avoid the London Olympics period and minimise knock on impacts that would occur from delays, such as future deliverability issues (due to resource availability) or delayed customer benefit.

System testing

17. For a number of our larger CNI systems (such as iEMS and iGMS) PPA suggest that the cost of system refreshes appears high. This is driven by the level of testing required to ensure there is no detrimental impact on system security from implementation of the refresh[4]. The level and complexity of testing required has increased by the need to rapidly develop solutions for market change in gas and electricity over the past decade (including NETA, BETTA, System Operator incentives, etc.) which has resulted in complex interfaces between systems. Implementing our future strategy should reduce the costs of such testing but will not remove the need due to the necessary nature of the work.

18. In their report, PPA refer to a 'high security risk during transition to new systems, particularly in a real-time environment'. We are very aware of this risk and consider that our approach to testing and implementation provides substantial mitigation. Evidence of our commitment to extensively test critical applications was outlined in the answer to question NG_F109. We encountered supplier delays as they failed to satisfy our requirements for the upgrade of the iEMS system[5]. Learning from this experience we continue to write clauses into supplier contracts to protect against delivery problems and continue to commit to a level of testing that mitigates delivery risk.

[3] Attached in appendix E is an email from HP confirming this.
[4] Business resources used for specifying systems and testing are costed to the project and excluded from opex.
[5] Note that the costs of these delays were borne by our supplier, not ourselves as PPA suggest in their efficiency review

Asset health review

19. As we approach the refresh of a system, we undertake an asset health review to ensure we do not spend inefficiently. We have recently completed such reviews for Gas Telemetry, Balancing Mechanism and iGMS. Each review has clearly identified the latest date by which the current system must be replaced. This date is typically driven by the availability of spare parts for hardware or the end of vendor support (an example of this is the support of HP superdome servers for iGMS). Using this approach that balances risk of using ageing software applications with the heightened security risk during transition to a new system in real time, we have identified required expenditure on some of our key systems in 2012/13.

20. Refreshing the iEMS hardware in 2012 has been identified as the optimal time utilising a suitable outage window to undertake this vital work and reduce the risk of failure of the current version of iEMS. With a moratorium on critical outages during the Olympics, the application will be refreshed after this event whilst also sequentially being installed to eradicate any interference with the Electricity Balancing System (EBS) replacement in 2013. By this time the hardware will be seven years old, well above the three to five year replacement cycle which is stated as being appropriate by PPA.

21. As set out in the rollover submission and subsequently in question response NG_F119, the infrastructure on which the iGMS system operates will be ten years old by 2012/13. As iGMS is a suite of integrated tools it is optimal to complete the replacement of the Management Information System (MIS) application in parallel with the re-engineering of the iGMS infrastructure thus reducing any inefficient, short term expenditure, due to developing temporary interfaces between iGMS components and the MIS.

22. Greater details of these schemes and the needs case for the timely delivery of these critical IT applications are contained within Appendix B.

IT Strategy

23. We have a clear IT strategy, but recognise that this may not have been articulated as well as it could have been during cost visits. This response provides the required clarification.

24. Over the last two years we have reviewed our strategy to reflect the opportunities that have developed in technology, the growth in IT services providers and expected future market developments. This strategy will enable us to deliver better IT services in the rollover year and beyond than would otherwise have been the case given the challenges ahead. Our IT Strategy is based on five key principles:

    a) Alignment
    b) Optimisation
    c) Adaptation of innovative technology
    d) Flexibility and agility
    e) Minimising risk and costs

25. Appendix C includes further details on these areas.

IT Transformation (Implementing the strategy)

26. As we stated in our TPCR4 Rollover narrative and in line with the above strategy, we are currently undertaking an IT Transformation programme to realise this strategy. This programme aims to deliver lower costs for our IT systems along with improved cost transparency. We have recognised that the capabilities of the IT market and opportunities have matured since our last major contractual commitment for service

delivery. We have worked with Ernst & Young to develop our new operating model, which they have confirmed is market leading for utilities. Our outsourcing model is to engage a spectrum of suppliers with optimal service capability in specific IT domains (e.g. application support) that are then managed by a further partner organisation (the Service Management Integrator (SMI)) to deliver an overall service model. The contracts will use 'utility pricing' so that we pay for services used rather than for capacity.

Critical National Infrastructure (CNI) strategy

27. We are not, however, outsourcing the support for our CNI systems. As discussed in the RRP process we did outsource this as part of the CSC contract but during the TPCR4 period it was proven that an outsource provider cannot provide the support that is required for these critical systems as they are not close enough to their operation. Due to the risk levels involved the support for these systems therefore remains within National Grid.

Enhanced Capability

Enhanced ESO capability requirements

28. Investment proposals for the enhancement of the Electricity System Operator (ESO) capability during the rollover period are set in the context of fulfilling our role in facilitating the drive to decarbonise the production of electricity and meet government obligations for the use of renewable energy by 2020. These legally binding targets stipulate the reduction of emissions of greenhouse gases, with 15% of the UK's energy to come from renewable sources by the end of the decade. Subsequently the dynamics of the generation portfolio is changing as the industry move towards less carbon intensive technologies.

29. This transition is not only changing the geographical flows of energy, as more renewable generation sources are connected at the periphery, but also changes the predictability of energy flows. This is rapidly increasing the number and complexity of the assessments made by planning and control staff to identify the most secure and efficient operating arrangements.

30. The penetration of renewable generation is expected to increase over the next decade. By 2015 we will see the commissioning of more innovative assets on the Transmission network such as Direct Current (DC) links, series compensation equipment and greater use of quadrature boosters. These assets will all require active control to optimise the network as power flows vary due to the intermittent nature of renewable generation. For example the number of optimisation studies required during a typical operational day will increase from 56 today to around 1500 in 2015.

31. This is a fundamental shift in our operating policy and processes and is not dissimilar in scale to the market changes we successfully facilitated in previous years where significant investment was required to enable new market arrangements and the safe operation of our networks as our responsibilities expanded. While similar in scale, the nature of these changes are very different, requiring new capabilities in our physical operations rather than just our balancing role.

32. Operational experience gives us hard evidence to indicate the increasing impact that wind has on system operator costs. For example we are now beginning to see events occurring in 'operational' timescales in which very high Balancing Services Incentive Scheme (BSIS) costs are associated with constraining the output of wind turbines. Noticeably on the 5th and 6th April this year we were required to reduce up to 700MW of wind generation in Scotland with a total cost to secure the system of £900k.

33. We have responded by taking steps to improve our operational capability during the current price review. For example we have:

    a) Established and continue to improve our wind forecasting capability and the correlation with wind turbine output[6]
    b) Established a system to capture real time metering for embedded generation
    c) Made our reserve policy more flexible to adjust for varying amounts of wind generation output level and reduce costs
    d) Established contracts with wind generators to manage transmission constraints efficiently

34. To deal with this proactively we have developed a programme of capital expenditure that will enable us to continue to operate the network securely and efficiently over this period of change and the investment identified in the rollover year is a vital and enabling part of this programme. The consequences of interrupting this programme by delaying works in 2012/13 are twofold. Firstly it places greater risk on the timely and efficient delivery of the overall programme if an even greater volume of capex has to be delivered in the remaining period to the middle of the decade. Secondly, it may not be possible to deliver some of the enhancements in the optimum time so as to minimise long term costs to the consumer.

35. The practical consequence of not having appropriate levels of functionality, as the generation portfolio and transmission network develop, is that we would not be able to manage the associated greater level of risk and uncertainty without adopting a more conservative approach towards operating the network. This will require higher 'uncertainty margins' to be used with a direct impact on carbon emissions, constraint volumes and operational reserve levels. All of these impact directly on the cost and quality of service provided to customers. We estimate that savings in BSIS costs would be delivered by the programme, more than sufficient to justify the schemes that have been developed and justifying investing now rather than waiting until the next price control period.

36. In developing our proposals we are aware that there is considerable uncertainty over important aspects of future arrangements such as the timing of new renewable generation, Electricity Market Reform (EMR) and the extent to which various solutions to support system balancing, such as those highlighted in the PPA report, will become available in the required timescales to minimise balancing costs. We have therefore sought to adopt a 'least regret' approach wherever possible by delaying the commitment of capex as late as possible, consistent with the functionality being available when needed, and allowing sufficient time for relatively low cost analysis and development to ensure we apply the most efficient and effective long term solutions. In managing this uncertainty, though, we correspondingly have to factor in the long lead times for delivering IT projects.

37. Our investment proposals for the rollover period are focussed on the technical aspects of operating the electricity network in areas such as power flow and stability analysis, data and alarm management and iEMS hardware refresh. We would not expect these investments to be impacted by changes linked to EMR as they are related to the physical operation of the network and the management of risk and costs experienced by our customers and consumers.

[6] http://www.guardian.co.uk/environment/2011/may/25/wind-power-national-grid-forecasting : The Guardian article highlights the positive changes that we have already put in place.

38. There is also uncertainty over the nature of the solutions we require in some cases. A good example of this is the Stability Control System that was highlighted in the PPA report. We believe that it is highly likely that system conditions by 2015 will require the use of sophisticated stability control systems. Indeed we have already experienced stability issues under certain supply and demand configurations within Scotland. There is however uncertainty over the precise solution we would adopt. The loss of customer benefit if such a system is not available will be significant if we have to apply high contingency margins to boundary power flows in order to be confident of avoiding instability issues that would cause widespread disruption to the network. The investment of £4m in the rollover year is a logical and essential part of a long term programme to evaluate the need and analyse potential solutions of delivering such a system. This cost is required to keep our options open for as long as possible and only where the need is proven will it be built upon to deliver the main parts of the investment.

Enhanced GSO capability requirements

39. Investment proposals for the enhancement of the Gas System Operator (GSO) capability during the Rollover period are set in the context of being able to safely and efficiently manage the rapidly changing flow patterns affecting operation of the gas network. These investments represent a low proportion of the 2012/13 proposed investments as the focus here is on asset health but will become increasingly important through the RIIO-T1 period.

40. We are experiencing considerable variability in entry flows to the gas network with the move away from the North – South flows that have dominated system operation for many years, as a consequence of the replacement of declining UK Continental Shelf (UKCS) gas with interconnector imports from the EU, Norway and via LNG. This variability in flow is being compounded by the increasingly price responsive behaviour of some storage facilities.

41. We expect the UKCS to decline at a rate of between 5 and 10% per year over the next 10 years[7], with some annual variation as facilities are developed and decommissioned, driving ever increasing gas flow dynamics and capacity demands as the UK market matures into an attractive place for parties to seek supply and trading opportunities. Flow characteristics are also being impacted by the changing demand environment as Distribution Networks seek further flexibility from the NTS to meet their supply commitments, and we see an increase in Combined Cycle Gas Turbines (CCGT) and storage connections in direct response to the decarbonisation agenda of power generation. The operational challenge in the longer term will be impacted by CCGT loading, which will regulate to manage wind intermittency on the electricity system.

42. Given the excess of supply capability over peak demand as the new supplies discussed above are not driven by association with oil production, there are greater opportunities for shippers to react proactively to price fluctuations in the UK, and European and global supply issues. This creates an increasing challenge for the system operator in predicting how both supply and demand side market players (CCGT in particular) will choose to optimise their commercial and physical strategies and behaviour, leading to increased risk of being unable to meet capacity release and assured pressure commitments on the NTS, for example.

43. Without mitigations being put in place this will lead to more frequent System Operator intervention, such as capacity buy-back and locational energy actions at entry and exit, and more frequent application of the present UNC rules to limit user services, which in turn will generate costs for users and reduced trading opportunity in the market place. To

[7] http://www.nationalgrid.com/NR/rdonlyres/E60C7955-5495-4A8A-8E80-8BB4002F602F/44779/TenYearStatement2010.pdf : Further details are available in National Grid's Gas Transportation Ten year statement.

allow us to mitigate these increasing cost risks and minimise impact on users, we have identified a portfolio of SO tool capability developments which support enhanced processes that will allow us to better forecast the range of potential outcomes that may occur on a day, and carry out real time system analysis modelling based on these forecasts to identify and implement the most effective and efficient combination of operational and commercial actions.

44. These tools, and associated process enhancements will allow us to maximise system capability over a wider range of system conditions, whilst maintaining safe control of operation and meeting our statutory and commercial obligations. This programme of works extends into the RIIO-T1 period as a series of enhancements timed to meet the forecast level of increasing challenge. The work specifically identified for 2012/13 (forecast and the final stage of developing and implementing Netsip modelling capability) is part of this overall plan and is needed by then to ensure we have the capability in place to efficiently manage evolving supply and demand dynamic behaviour on the NTS.

45. Our investment proposals for the rollover period are focussed on controlling the network, rather than market related. These investments will not be impacted by EMR as inferred by PPA. The only potential change that could impact on gas investment would be a change to the balancing period. This would impact on commercial systems only, not the systems contained in our proposed investment for 2012/13.

Deliverability

46. We note that PPA believes that there is scope for a significant reduction in the IT programmes put forward by us and that the scale of these investments increases system risk. Whilst recognising that there is a risk in refreshing the hardware and software real time system operator platforms, the risk in continuing to rely on ageing infrastructure for our critical operating systems is greater. This can be seen by the levels of P1 and P2 incidents that occurred due to ageing infrastructure early in the TPCR4 period (see Appendix A) which impacted on the operation of the system.

47. In order to deliver the required IT investment programme we have incorporated into our plan, greater business resources (to back fill key individuals that will support the delivery of the required applications). Through our IT transformation we have also signed contracts with Wipro and IBM for application development and have in place existing arrangements with other large providers (TCS and Zensar). These are all large companies possessing the scale to deliver our plans. Our IT Transformation programme has also strengthened our ability to define strategically aligned programmes that provide benefits in reducing risks, more efficient delivery and IT developed to provide the capabilities the transmission business will need. Furthermore we have robust governance structures in place to challenge and review the needs case and the progress in implementing our IT requirements. This section goes into greater detail about how we have the capability and processes to deliver.

Business Resources

Transmission UK resourcing strategy and workforce planning

48. As part of our business planning processes we undertake workforce planning exercises to identify the total resource requirement for our Transmission businesses. As part of this process the resource requirements stemming from business support for IT projects is calculated. Within this planning process a considerable amount of internal challenge has taken place with regards to our current and future IT business resource requirement. The level of resource has been determined after extensive collaboration and review by IT and business experts over a number of months. The process continues to take into account

learning from the delivery of historical projects and the associated business resource requirement whilst also taking into account future technological impacts and the transformed business models.

Transmission recruitment successes

49. The resource plans that underpin the rollover opex proposals for the ESO and GSO allow for the increase in resources to support delivery of the capital plan. This increase in resources creates a challenge in terms of recruitment, training, development and rotation of staff to ensure staff with the right level of experience and knowledge can be provided. We are confident that these recruitment challenges can and are being met, based on the success we have had in the latter part of the TPCR4 period in recruiting sufficient numbers of skilled staff. The 2010/11 recruitment target was met and we have already made in-roads in to the target for 2011/12 through continuing with our strategy that balances experienced external hires and the complementary 'grow our own' philosophy delivered through the expanded graduate and technical training programmes. By achieving this we create the capacity to free up business resource to support the delivery of our IT projects.

Provision of business resources to support the plan

50. For the first time in the TPCR4 period, the Network Operations directorate[8] achieved its 2010/11 recruitment targets and is well on track for delivering 2011/12 targets which consist primary of the resources necessary to backfill / release IT Business Resource (ITBR) onto key IT projects. This directorate is the primary user of the applications that we are investing in and will therefore be pivotal in supporting SO capex deliverability by providing the necessarily skilled and knowledgeable staff.

Resources (FTE)	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	Average
ESO Business resource (IT)	18	32	36	35	30	30	39	35	26	24	31
GSO Business resource (IT)	36	38	54	39	42	31	46	34	23	24	37
TO Business resource (IT)	32	38	37	41	38	34	32	32	32	32	35
Business resource (IT)	**87**	**108**	**127**	**115**	**111**	**95**	**117**	**101**	**81**	**80**	**102**
ESO IT resources	54	64	65	60	61	52	56	54	52	55	57
CNI	24	46	47	48	48	36	41	34	26	37	39
Non-CNI	30	18	18	12	13	16	15	20	26	18	19
GSO IT resources	32	24	29	25	22	19	23	30	35	27	27
CNI	6	7	8	7	6	5	7	10	12	9	8
Non-CNI	26	17	21	18	16	14	16	20	23	18	19
TO IT resources	23	26	29	28	25	25	21	19	19	23	24
IT resources	**109**	**114**	**123**	**113**	**108**	**96**	**100**	**103**	**106**	**105**	**108**
CNI Total	30	53	55	55	54	41	48	44	38	46	46
Non-CNI Total	56	35	39	30	29	30	31	40	49	36	38
Total resources	**196**	**222**	**250**	**228**	**219**	**191**	**217**	**204**	**187**	**185**	**210**

51. The table above summarises the level of resources (business and IT) required over the next few years and into the RIIO-T1 period. This highlights the need to continue increasing ITBR over the next 3-4 years from 87 this year to 108 in the rollover year and peaking at 127 at the commencement of RIIO-T1 in 2013/14. Our 2010/11 track record which required recruitment of more employees than ever before and our plans going forward gives us the confidence that we will be able to recruit the required number of business and IT resources thereby ensuring that future IT projects and business plans are capable of being delivered.

[8] Network Operations directorate accounts for the majority of ESO and GSO expenditure which in turn are people and systems intensive areas of our business.

IT Application Development

52. Under our IT Transformation programme, we have entered into five year contracts with IBM and Wipro for application development and maintenance services. These will come into effect in August 2011. Both organisations have confirmed they have the capability to flex their work forces to deliver the ramp up in our investment plan; IBM have almost 400,000 employees world-wide and Wipro have 120,000. We will continue to work with both organisations as our investment plans evolve so that they can plan to have the appropriate level of resources available to us. We will retain accountability for project delivery and ensuring that critical domain knowledge is maintained and enhanced, but for non-CNI systems responsibility for delivery will be with our partner organisations. For CNI systems we will continue to use our current proven processes to manage delivery risk whereby projects are internally led, and implemented by a mixture of internal, directly contracted and IBM / Wipro resources as appropriate.

Use of more standardised (vendor) packages

53. The purchase of vendor packages has two benefits from a deliverability point of view; there is less need for detailed input from business staff at the requirements gathering stage and the majority of the resource for configuration will come from the supplier organisation. We are increasingly procuring vendor packages, which can be configured more economically, to meet our requirements rather than the historic bespoke application development necessary to meet our requirements. This option is becoming more viable as de-regulation in the utility market matures and technology evolves.

54. Although we are increasing the use of vendor packages, the amount of testing and integration required, when upgrading or refreshing, existing systems should not be underestimated. Our strong track record in successful implementation of critical systems has been because of the investment in our test programmes. Overall, our resource requirement is less compared to systems that are bespoke where this is appropriate to be undertaken (e.g. where vendor competition exists and can meet our needs). In addition, vendor packages will typically be more economic as the development costs will be spread across a number of customers and in most cases competition in the market will drive down costs. For example, when we sought to replace the Balancing Mechanism System we considered both vendor packages and a bespoke build. After a thorough analysis we dismissed the bespoke option as a less economic and efficient method of delivery and ended up awarding the contract to ABB[9].

Lifecycle services

55. As described above, we have selected IBM and Wipro to manage substantial elements of the Application Development and Application Management function, utilising a full lifecycle service model. This model ensures suppliers remain accountable for a business application from initial development through to enduring management and support for the duration of the contract. Using a lifecycle service model, as our plan is based on, offers advantages in gaining efficiencies in the development of new applications by utilising long term supplier commitment and enhanced knowledge of our IT services.

56. Implementing a full lifecycle service model will realise significant cost reduction opportunities and benefits to the customer. The financial benefits are achieved from lower overheads due to the flexibility of resourcing from suppliers, a mandatory year on year cost reduction which must be delivered by the supplier to meet their continuous improvement obligations, and access to lower cost resources.

[9] Note, the ABB contract to deliver the new BM platform represents a little over half the total BM replacement project cost. The response to question F102 provides further detail.

57. We will use external professional benchmarking organisations and an internal team of project specialists to continuously benchmark these contracts. The supplier is then required under the contract to adjust their costs in-line with the benchmark. Additionally we have the right to tender the project to other third parties.

IT Business Plan Sanctioning

58. The current SO capex and TO non-operational capex plans are the result of a comprehensive bottom-up business planning exercise that commenced during the Summer of 2009. The initial focus was on identifying the network themes, requirements e.g. network security and reliability, and capabilities required over the next decade. Attention then turned towards identifying the range of options, their deliverability and identifying the best and 'least regret' approaches in the face of increased uncertainty and concerns over affordability. During the last 6-7 months, additional time and effort has been spent on reconsidering and extending our rollover proposals out in advance of our RIIO-T1 submission in July. We have made good use of the time to: provide more evidence; more thoroughly investigate and generate more options and different approaches in key areas e.g. revised data centre and updated integrated Gas Management System strategies.

59. Throughout the last two years we have had ample opportunity to challenge, test and refine our IT strategy and consequential business plans. These plans were systematically reviewed and approved at each level e.g. IT and business directorates, Transmission Investment Committee (TIC), right up to Board level, having considered every key aspect of these proposals e.g. reasonableness (what capabilities are required and when), deliverability (credible ramp up) and affordability (provides value for money and least regret in the face of increased uncertainty).

60. In their report, PPA questioned our commitment to schemes that had not yet been sanctioned, and propose disallowing schemes that had not progressed through sanctioning bodies. The above shows that all the planned schemes have been tested thoroughly by sanctioning committees. The efficiency of project approval timing and this level of approval rate means that we would not have expected to have sanctioned all 2012/13 projects two years in advance, contrary to PPA's view that a greater number of projects should have been sanctioned. We continue to strictly monitor and govern the sanctioning of expenditure on IT projects in order to efficiently deliver the required systems.

61. In addition to our well established business planning and Prince2-based IT Solution Delivery and sanctioning processes noted by PPA during their visit, whole IT programmes are currently being reviewed and considered by governance groups. Instead of individual, but often related IT schemes progressing through governance, increasingly whole and well developed system strategies and application roadmaps are being presented to the appropriate governance groups to provide them with a broader context e.g. iGMS Evolution Programme, Transmission analysis roadmap (TARmap) and the migration of stand-alone work and asset management applications onto Ellipse.

62. Since the time of PPA's visit the number and value of the rollover year planned investment scheme proposals progressing through governance and being added to 'in flight project' continues to increase. To highlight the latest progress we have updated the response that we submitted in March for NG_F215. This is attached in appendix E.

IT Project Governance

63. The governance and delivery process for Transmission IT projects has continued to evolve and further improve during the TPCR4 period. A number of governance groups are proactively involved in shaping and determining our longer term IT strategies. This allows the governance groups to be better placed and more informed when approving and monitoring the delivery and performance of individual schemes. This combined approach means that key individuals within National Grid have the strategic visibility of the overall future SO capex plan as well as input into the governance of projects that are in progress.

64. The challenging yet collaborative nature of these governance groups helps to:

a) Ensure that all IT investment proposals are reasonable e.g. are required, offer best value for money, and are deliverable for the optimum time frame
b) Maximise the likelihood of the successful delivery of all IT schemes to agreed time, cost and scope e.g. delivery operational capabilities required, whilst optimising and ensuring delivery of both consumer and business benefits both now and into the future
c) Provide safeguards against unexpected developments e.g. the timely management intervention and corrective actions necessary to address exceptional or unforeseen events
d) Alignment to strategy and leveraging of best practices, new innovations and global IT capabilities e.g. IT transformation programmes, across gas and electricity

65. All the governance groups (see appendix D for further detail) work together to maximise the likelihood of the successful delivery (time, cost and scope) of all IT schemes. Membership of these governance groups is reviewed quarterly to ensure we continue to have the right business and technical experts within each group. This ensures the most appropriate individuals are always involved to add value to the decision making process for SO investments and IT strategy.

National Grid Solution Delivery Process

66. All investments follow our well proven IT Solution Delivery Process. The process follows a number of logical stage gates to maximise the likelihood of delivery and to provide the opportunity for timely management interventions where necessary. These stages include: mandate; start-up; requirements and design; development and implementation; and project closure[10].

Business sponsorship, ownership and engagement

67. Business sponsorship is essential to the successful delivery of IT scheme benefits and future capabilities. Investment scheme papers are therefore prepared on behalf of business sponsors by IT and business analysts who possess the relevant skills, technical knowledge and necessary operational experience. These key business sponsors also sanction the overall business plan, helping align the requirements of the plan and the ability to deliver this through IT investments.

68. The business sponsor is accountable for the successful delivery of the project. The sponsor works closely with IT and the project manager to define the project objectives and responsibilities for delivering these benefits and capabilities. The sponsor will also

[10] Appendix E contains our Solution Delivery Process Overview, which includes a flow chart of the governance procedures.

ensure the investment provides value for money, balancing the demands and interests of our business, wider industry and end consumers.

Summary

69. The SO capex investment proposals for the rollover year focus on maintaining the asset health of our IT assets taking into account windows for investment and balancing the risks of asset refresh with operational risks of change. The consequences of reducing the expenditure in this area is to place reliance on ageing systems for longer, increasing the risk that incidents such as those that occurred at the start of the TPCR4 period will be repeated.

70. The proposals for enhanced capability have been set in the context of the drive to decarbonise electricity production coupled with the changing shape of gas supply and the effects that this is correspondingly having on the operation of both the gas and electricity systems. The consequences of interrupting this programme manifest itself in two ways. First it places greater risk on the timely and efficient delivery of the overall programme if an even greater volume of capex has to be delivered in the remaining period to the middle of the decade and secondly, it may not be possible to deliver certain enhancements by the time they are required. The culmination of this is that consumer benefits will not be maximised.

71. To overcome the deliverability challenges of implementing our IT investment programme we continue to recruit business resources to back fill key individuals that will go on to support the delivery of the required applications. Furthermore we have robust governance structures in place to challenge and review the needs case and the progress in implementing our IT requirements making sure that a holistic view is achieved in efficiently maintaining existing systems and delivering the required future capabilities.

72. This response, in recognising our shortfalls in fully articulating our IT strategy within the cost visits, has sought to articulate our strategy. Our approach continues to be based around five key principles: alignment, optimisation, adaptation of innovative technology, flexibility and the minimisation of risk and costs. This robust approach will mean that we continue to deliver the required capabilities to our control staff and the wider energy market to minimise the costs to the end consumer in operating the gas and electricity systems.

Appendix A: RRP responses and TPCR4 system concerns

A1. We discussed the TPCR4 system concerns and our related approaches to invest in our critical operations systems with Ofgem during the RRP process. The answers sent below show some of this discussion but this mainly occurred during the RRP visits that took place for 2007/8 and 2008/9.


200708 QA No 50.doc


200708 QA No 67.doc


200809 QA Qu 083.doc

A2. Every reliability or loss of system incident is tracked within National Grid. This helps to inform the level of current reliability. The statistics on Priority 1 (P1) and P2 incidents for these systems, at the time and since, show the impact of our investment and in-housing of the CNI support. The incidents are rated in terms of criticality of the system and the length of outage. The most serious incidents are rated as:

(a) P1: Critical incident:

i. Complete loss of Critical Operational or Critical Business service

ii. Complete loss of more than one service

iii. IT incident leading to high risk of serious Health and Safety incident

iv. Confirmed uncontrolled security incident

v. Incident having immediate company-wide impact

vi. Any incident escalated to this level by National Grid

(b) P2: Major incident:

i. Complete loss of service

ii. Partial loss or loss of Critical Operational or Critical Business service causing significant operational issues

iii. Loss of resilience for a Critical Operational service

iv. Incident having an impact on a significant number of users at one or more sites

v. Any incident escalated to this level by National Grid

A3. There were over 100 incidents of this type in 2007/8 for our critical systems. This was unacceptable to us and highlighted the impact of our ageing systems on operational performance. With key, targeted investment we reduced these figures to under 60 in 2008/9, 45 in 2009/10 and to 37 in 2010/11.

Appendix B: Drivers behind the placement of key investment schemes in 2012/13

Integrated Electricity Management System (iEMS)

B1. The iEMS is the fundamental control system used on the electricity network. Failure of the iEMS will result in the Electricity National Control Centre (ENCC) losing visibility and control of the Electricity Transmission system, substantially increasing the risk of a total loss of all electricity supplies in England, Wales and Scotland. It is therefore paramount that appropriate investments are made in this fundamental control system, to maintain the reliability and resilience of the iEMS Systems and associated business processes. When considering such refreshes, issues to note include:

(a) The iEMS is based on a system provided and supported by GE. We are currently using version 10.1.14, whereas GE's latest released version is 15.1. In general GE, as with all similar vendors, will focus its efforts on the most recent versions of its product. As a result it's capability to maintain older version of its products will decrease with time. It is also likely to charge premiums to provide support for older versions of its products. We will therefore always seek to balance the operational risks of remaining on an older version against the costs of upgrading the software. National Grid needs to upgrade to a later version soon.

(b) Some of the hardware in iEMS is no longer manufactured. Whilst National Grid holds a store of strategic spares to mitigate some of the risk associated with this, some of the key elements of the hardware (incl. their strategic spares) will come to the end of their serviceable life in 2012/13. The majority of this hardware is no longer produced, and premier support (that commensurate with a high availability system) for other key elements expires during 2013-14. All hardware is anticipated to be out of support by the end of 2015 and in need of replacement to maintain reliability. Whilst it is possible that the vendors might offer support for additional periods beyond those already stated this is typically a highly expensive solution.

B2. A key factor in successfully delivering the refresh of iEMS is identifying a suitable outage window. Delivery in 2013 will interfere with the Electricity Balancing System (EBS) replacement. Outages are also not permitted during the Olympics. Therefore a slot just after the Olympics and before EBS deployment has been identified. Leaving the hardware replacement until later in 2013 after EBS deployment has been assessed as introducing unacceptable risk to the ongoing reliability of the system, although ongoing analysis will continue to review the most appropriate replacement window and maintain the optimal balance between operational risk and IT expenditure.

Offline Transmission Analysis (OLTA)

B3. OLTA is the main tool used to carry out transmission analysis for the electricity system from design and planning studies at 7 years ahead, through all network planning processes down to day ahead and also for re-optimising in short term timescales in the control room. In particular OLTA is used to help design and set-up the network as securely and economically as possible prior to real time. It was set up at a component level to enable monitoring of system dynamics to facilitate increased levels of renewable generation efficiently.

B4. As a result of the planned decarbonisation of the electricity network, the consequential increase in operational volatility and uncertainty will require a greater number of system security studies to be performed to ensure that security of supply is maintained at reasonable cost for the end consumer. In particular:

(a) We are expecting to increase the number of OLTA studies required offline at the day ahead stage from 1-2 per day to 24 before the end of 2012/13 vastly increasing the amount of data that has to be processed

(b) We will need to undertake increasing complex studies as a result of new grid technology and associated new analytical approaches which will require enhanced analytical processing capability

(c) We are seeking cost efficiencies by developing OLTA to support online analysis (e.g. Online Transient Stability Monitor)

B5. INVP1421 was established to take a proactive view on managing IT asset health and provide capacity to support other investments.

B6. The current OLTA architecture:

(a) Uses 32bit technology (which has resulted in the memory access constraint)

(b) Was installed in 2006 (and will attract increased support costs from 2012 onwards)

(c) Has now out of support CITRIX installed (further hinders performance)

B7. To deliver the performance required to facilitate the decarbonised business processes, there is a need to move to 64bit technology (which will alleviate the memory constraint, both improving performance and enabling the latest version of Powerfactory application to be installed which is essential to deliver the future analytical capabilities required. To validate this we are carrying out a detailed requirements phase under TARmap (which will be delivering the changes required to OLTA and other analysis tools).

B8. Thus if we do not upgrade the hardware, we will be unable to deliver changes to OLTA to support enhanced analysis required as a result of the decarbonisation of the network. This will require us to operate the electricity system much more conservatively leading to increased constraint and BSIS costs.

Integrated Gas Management System (iGMS)

B9. iGMS is a suite of integrated tools used to support the physical and consequently commercial operation of the high pressure gas network. Its primary components are; Network Manager (SCADA), Business Applications and Management Information System. The infrastructure on which the iGMS and Gemini11 systems operate will be 10 years old by 2012/13 and the investment required to refresh the system was explained as part of our submission. The £1.5m in 12/13 shown against iGMS Strategic Route Map is to complete replacement of the Management Information System (MIS) application which is part of the overall iGMS refresh programme.

B10. Investment is timed against windows of opportunity for refreshing the system outside of operationally critical periods. Any delay in this investment would impact on future deliverability. The rationale for its proposed timing and the options considered is described in our response to question 2010_NG_F119. Replacement of the MIS in parallel with re-

[11] Commercial system run by xoserve with integrated functionality with iGMS

engineering the iGMS infrastructure is considered the most economic and efficient approach in order to minimise the likelihood of incurring any inefficient, short term expenditure, due to developing temporary interfaces between iGMS components and the MIS. The MIS replacement project will run from 2011/12 through to 2013/14. Deferral or removal of planned expenditure in 2012/13 will extend the duration of this MIS element of the programme and correspondingly increase the cost of this project. Similarly delay in MIS replacement will delay delivery of the overall iGMS change programme and risk pushing elements of the overall solution beyond their vendor supported life.

Network Simulation Project (NetSiP)

B11. Planned expenditure in 2012/13 on NetSiP is the tail end of the NetSiP project. The projects primary driver is the replacement of the eight year old Consim Online simulation tool to address asset health issues. Deferral or removal of this planned expenditure will impact on our ability to complete this project. In addition to this primary driver, this project will leverage the industry standard SIMONE system and infrastructure introduced through this project to deliver a training simulator to support our workforce planning needs and create a platform for anticipated new capability to support control room training for operations in the changing environment. This is also required, as over the next 5-10 years, a sizeable proportion of our operational and control room staff will be reaching retirement age and to manage this churn we need a range of capabilities to reduce training timescales and burden. The SIMONE tool is intended to be our strategic simulation and analysis tool and a number of further investments through the RIIO period build upon this infrastructure to reflect the challenges of the changing supply and demand environment.

Gas Telemetry

B12. Following an asset health review for the Gas Telemetry Network, Cable & Wireless (who are contracted to provide support) have informed us that in their professional opinion, the network will be sustainable out to the end of 2015. To achieve this date, a number of mitigation activities need to be put in place, including extended contracted manufacturer support and active monitoring of the availability of spares (as many components are no longer available for purchase or supported by the equipment manufacturer).

B13. To achieve the 2015 estimate, we plan to commence installation of new communications equipment at remote sites in 2012/13. In all there are approximately 1000 sites where new equipment needs to be installed. Based on previous experience and information from Cable & Wireless, it is estimated that 10 sites can be upgraded per week; therefore installation would take 2 years if it could be carried out continuously. However during critical winter periods we adopt a moratorium on making changes that could have an adverse impact on system operations, although some level of site preparation or cut-over of less critical sites is envisaged. Allowing for these factors, means that installation must be carried out over 3 years. Failure to complete replacement by 2015 risks loss of this CNI service which is critical to the ongoing operation and safety of the gas supply network and an important component of National Grid’s safety case.

Appendix C: IT strategy

C1. This appendix gives more detail on our IT strategy

Alignment

C2. We will align the delivery of information services to the needs of the business, our customers and UK consumers through:

(a) A business aligned function that aligns IT strategy, delivery and service to business requirements and capability development

(b) A business led, technology enabled investment plan that aligns business requirements

(c) Making optimum use of IT compared with business processes to obtain the most economic and efficient solutions to business problems

(d) A Strategy and Architecture function that provides a global IT strategy and enterprise architecture that is aligned to the business strategy

Optimisation

C3. Optimise the provision and support of information services / technology by:

(a) Leveraging third party providers to deliver key services

(b) Adopting a flexible sourcing model that enables simple and efficient changes of provider

(c) Retaining ownership and accountability for processes and knowledge which are critical to National Grid's business (e.g. CNI support)

(d) Utilising a Service Management Integrator (SMI) to provide reliable end to end service delivery across multiple suppliers

(e) Adopting globally recognised standard Information Technology Infrastructure Library (ITIL) processes and tools to streamline and standardise service delivery across multiple providers

Adaptation of innovative technologies

C4. Use innovative technology where National Grid and its customers are likely to benefit from its introduction to improve the quality of the service that IT provides and/or to reduce the overall cost of this service, this includes:

(a) Cloud services, from virtualised infrastructure through to applications delivered as services

(b) Consolidated approach to business intelligence (BI) and analytics to better enable the business to make the most informed decisions

Flexibility and agility

C5. Provide the agility to respond quickly and accurately to the changing needs of National Grid, the energy industry and consumers. This can allow us to implement both industry change and efficiency measures faster. We acknowledge that this has not always been as fast as

stakeholders would have liked, but anticipate that a number of features of our revised strategy and the resulting IT architecture will deliver the needed agility, these include:

(a) Virtualised infrastructure, allowing new capacity to be brought on line quickly when it is needed

(b) A stronger process and service based view of functionality that insulates the business from the underlying applications and makes business change easier to adopt

(c) A modular applications architecture based on off-the-shelf packages and standards based interfaces, making the implementation of new functions easier

(d) A corporate data model for National Grid and a single view of master data to speed interface development and ensuring there is “one version of the truth”

Minimise risk and costs

C6. To minimise risk in the delivery of reliable gas and electricity supplies in a number of ways including:

(a) A common approach to digital risk and data security which is applied across National Grid and is aligned with UK Government recommendations

(b) Dedicated infrastructure and service management for Critical National Infrastructure applications over which we retain control

(c) Improved business intelligence and analysis of the operations of the NTS and Electricity Grid to aid decision making across different timescales

C7. To minimise costs of delivery of IT by using:

(a) Virtualised infrastructure to maximise asset utilisation

(b) Cloud services wherever these are cost effective

(c) A minimum set of common applications, with the focus on the SAP footprint to reduce the cost of application development and maintenance

(d) Virtual desktops and web-based thin client delivery of application functions

(e) Improved process efficiency from leveraging best practice of our third part suppliers

Appendix D: Governance bodies

D1. This appendix gives more detail on the governance bodies used to sanction SO capex schemes.

IT Project Review Meeting (PRM)

D2. Each individual IT scheme paper is comprehensively reviewed at PRM by a wide range of IT subject matter experts whose purpose is to ensure amongst other things:

(a) That these investment proposals align with the overall IT strategy and application roadmaps

(b) The viability and suitability of the proposed technical and commercial solution and that there is sufficient resource availability to deliver

(c) That risks have been considered and the overall solution delivery approach represents best value for money

(d) That suitable service level agreements and key performance indicators are put in place to ensure alignment with IT strategy and business planning

D3. The PRM, if satisfied with a scheme proposal, will endorse it to progress to the Transmission business governance groups for approval[12].

Production Information Systems Management Board (PINS)

D4. Initial business co-ordination and governance around IT projects is primarily managed by three PINs that mirror our four forms of control: Gas System Operator (GPINS); Electricity System Operator (EPINS) and Gas and Electricity Transmission Asset Owners (APINS). Each PIN is chaired by the relevant business subject matter expert with attendance from IT specialists, solution delivery leads and IT/business finance. PIN members are closely involved in the management and delivery of IT projects as part of their day-to-day operational responsibilities and have the experience to effectively ensure all investments are appropriate and adhere to the governance guidelines[13].

Portfolio Steering Group (PSG) pilot programme

D5. The purpose the recently formed PSG is to consider the short and long term influences, obligations and dependencies on Transmission's operations and develop strategies and plans to meet the resulting requirements. These plans will ensure alignment between IT operational objectives in both 0-18 months (for Services and Solutions) and 18 month to 7 years+ timeframes for IT strategy and application roadmaps.

D6. More specifically one of the key activities that the PSG will undertake is in the area of resource co-ordination, effective project delivery and programme management. This will help to inform both short and longer term IT system strategy activity analysis including resource requirements and impact assessment. This will further improve our effectiveness in terms of: resource utilisation; management of key inter-dependencies and linkages between projects; informing future strategic recruitment activities; collaboration in delivery between the business and IT; and the more efficient flex of resources and skills across projects[14].

[12] Appendix E contains the Project Review Meeting Terms of Reference
[13] Appendix E contains a copy of the PINS Terms of Reference
[14] Appendix E contains a copy of the Gas portfolio steering group Terms of Reference

Critical National Infrastructure (CNI) System Steering Group

D7. For larger and more complex projects, a programme management board will be formed. For more critical applications, the (CNI) System Steering Group will determine physical CNI requirements and implications. This group takes a holistic view of factors affecting critical systems and their supporting infrastructure to ensure risk management and resilience is focused on. It is this group, chaired by the Network Operations director and attended by key IT and business representatives, that assesses the risks of refresh and replacement of CNI systems versus the risks of leaving the ageing, unsupported systems in place.

Transmission Information System Steering Group (TISSG)

D8. The role of TISSG, like other groups, is to thoroughly evaluate and further challenge each investment proposal such as the Electricity Balancing System Investment proposal (see Appendix E), to ensure delivery of, and the most efficient and effective use of information technology:

TISSG effectively:

(a) Links processes, resources and technical standards to business strategies and objectives.

(b) Aligns investments and business priorities so that costs are optimised and risks minimised.

(c) Review the opportunity cost of deferring or not proceeding with the project.

(d) Ensures the investment is economic and efficient based on qualitative and quantitative information.

D9. In addition to IT project governance, TISSG also focuses on strategic options, opex challenges, lessons learnt and numerous continuous improvement initiatives. This key governance group also leads in challenging and reviewing the overall IT plan and how it strategically aligns with our overall business plan, striking a balance between IT and other solutions. The TISSG Terms of Reference attached in appendix E give greater details. It is worth noting that TISSG approved or noted a total of 442 project / reports from January 2007 to April 2011.

Transmission Executive Committee

D10. Any IT scheme paper that exceeds £1m requires TISSG to recommend the proposal to the Transmission Investment Committee (TIC) (as per any other large investment scheme) for approval. Schemes exceeding £30m require approval from the Transmission Executive Committee (TEC). The terms of reference for TEC are attached in appendix E.

Appendix E: Supplementary Attachments

Name of Document	Attachment
Solution Delivery Process	Adobe Acrobat Document
Project Review Meeting Terms of Reference	Adobe Acrobat Document
Production Information Systems Management (PINS) Terms of Reference	Adobe Acrobat Document
Gas Portfolio Steering Group Terms of Reference	Adobe Acrobat Document
TISSG Terms of Reference	Adobe Acrobat Document
Transmission Executive Terms of Reference	Adobe Acrobat Document
Email from HP about industry best practice	FW: Asset Refresh Cycles
Updated sanction progress since submitting the answer to NG_F215	NG_F215_Sanction status - updated for 2